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SURVEY OF LAND-GRANT COLLEGES AND UNIVERSITIES

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PART VII.—EXTENSION SERVICES

Chapter I.—Introduction

A fundamental fault of educational institutions has been their failure to recognize substantially in practice that education is a lifetime process. Educational agencies have until recently pretty generally confined their efforts to the earlier years of life. They have been little concerned with assisting the individual in his problems of learning after he has left school. Adequate facilities have not been provided to serve the limited and specific postschool desires of those who recognize the need for further educational direction. This is true even in the case of those whose postschool period began early in life. The provision for further educational opportunity for college graduates and for the professionally trained has been notably deficient. It is true that the level of general education is being raised and that the period of education, especially in the professions, tends to be prolonged, but only recently have the developments in modern scientific and social progress tended to break down the old conception of education as a process of acquisition and storage during early life.

Educational agencies are beginning to regard it as their function to provide people with lifetime opportunities to secure aid upon their problems of learning. That this is the case is evidenced by the development of the movement known as adult education. Although this term is inadequate to cover the conception of education as a lifetime process, it does emphasize the need for educational opportunity for the period of life that our present organized system of education most generally neglects. This is essentially the field of extension services.

If this ideal of educational provision for all periods of life is to be attained, all the organized agencies of education will be involved. For any State a state-wide system of cooperating and coordinating agencies will be required. Full responsibility can not rest upon any one institution or agency. Its field of educational endeavor, its resources in personnel and money, and the resources available from other agencies of the State will determine the part of the land-grant college in the development of any state-wide program of extension education.

It is not the function of this survey to present an educational program for any specific State that will insure lifetime educational opportunity to all its people. Nor is it the survey's function to define the part that any individual institution should play in such a program. It is the function of this survey to show what the land-grant colleges are now doing that may contribute to educational development of this kind and to point out the deficiencies in and the obstacles to such utilization of the existing resources of the land-grant institutions. The survey may also properly suggest in general terms to the land-grant colleges certain extension objectives and functions that may be assumed by them.

Presentation of these matters will not be controlled strictly by abstract logic. For the sake of clarity and in order to relate the treatment to existing forms of institutional organization, discussion of extension services will be grouped about two major centers of activity; first, cooperative extension in agriculture and home economics established under the Federal Smith-Lever law and supplementary legislation and, second, other forms of extension activity sometimes grouped by the institutions in a university extension division.

Throughout this discussion the basic objectives of all types of extension activity are defined in liberal terms. It is the viewpoint of this survey that Smith-Lever extension, which includes only extension work in agriculture and home economics, can not properly be considered as exclusively vocational. To consider it so is to miss entirely the humanistic and social purpose which should constitute the basic foundation of all education. This survey will emphasize appreciation of this point of view of Smith-Lever extension as well as evident lack of it. Indeed this is no less important than is the appraisal of its failures and successes in the strictly vocational phases of its work. General extension, which includes the arts and sciences, engineering, and business and, in short, all extension service other than that included under Smith-Lever, will be viewed in the same light. Its objectives also are vocational, humanistic, and social.

Chapter II.—Position and Objectives of Smith-Lever Cooperative Extension

College and university extension activities have been regarded quite commonly as by-products of resident instruction and research. The main business of the institutions has been intramural work. Educational service to persons not classified as "regular" students has pretty largely been regarded as a stepchild in the family of institutional activities. Therefore, in spite of recognition of a certain relationship to institutional responsibility, extension work has not usually been assigned by the colleges and universities to an educational and administrative position coordinate with that of resident instruction. The most notable exception to this general statement of the situation is the development of Smith-Lever extension. Smith-Lever extension work has been set up in the land-grant colleges with definite objectives quite distinct from those of resident instruction and research. An administrative and operating organization has been developed for the specific purpose of attaining these objectives. Methods that depart widely from those prevailing in resident instruction have been accepted as appropriate to the purposes that characterize Smith-Lever work.

It is the purpose of this portion of the land-grant college survey of extension services to examine and to comment upon: (1) The reasons for the unusual position occupied by this specific form of extension activity in institutional administrative and educational organization; (2) to present the objectives of Smith-Lever extension; (3) to describe the administrative and financial organization for the attainment of these objectives; (4) to discuss the character and duties of personnel charged with the operation of the administrative and educational work of Smith-Lever extension; (5) to consider the relationships of the Smith-Lever organization and personnel to national, State, and local organizations; (6) to describe methods of program building and operation of the service depended upon to attain theoretical and practical objectives; (7) to present some of the statistical results of Smith-Lever extension; and, finally, (8) to summarize findings and to make suggestions for the future.

Reasons for the Unusual Position of Smith-Lever Extension

The Smith-Lever extension service occupies an important and dignified position in the land-grant colleges and universities. This is true despite the fact that the instruction given carries no college credit, and despite the fact that admission requirements, class attendance, prerequisites and sequences, and all the mechanism of resident college work are practically unknown to this type of extension service. The reasons for the prominence and strength of the Smith-Lever extension organization in the face of the violence thus done to the cherished academic traditions of higher education are not difficult to discover. No adequate estimate of this work can be formed, however, unless these reasons are clearly understood.

Obviously a fundamental cause for the success of Smith-Lever extension work is the fact that it provides educational assistance that meets a real need for such service. Yet this does not account for its institutional position in the land-grant colleges. Other forms of extension work that offer educational service equally as valuable and as much needed have not attained comparable influence and organization. The distinctive reasons why Smith-Lever extension occupies the position that it does as compared to other types of extension service must be sought upon other grounds. Five points deserve emphasis in this connection.

First, when the land-grant colleges found themselves unable through resident college work to accomplish one of their most important purposes—that is, direct service to farmers in connection with their immediately practical problems—Smith-Lever extension provided the way. The ideal of direct practical service to the industrial classes, but especially to rural people, was from the beginning prominent in the minds of the leaders of the land-grant college movement and dominant in the consciousness of the people and legislators who supported these institutions. Such service through resident college instruction was never very successful. It became increasingly difficult as emphasis upon science became necessary to solution of the basic problems of agricultural production and as general national standards of college education were developed to which the land-grant colleges were compelled to conform if they were to attain and hold a respectable position among the higher educational institutions of the Nation. Smith-Lever extension for the first time in the history of the land-grant colleges provided an effective means of accomplishing the purpose of direct service that had been cherished but poorly realized throughout the period of development of agricultural education upon the college level. Smith-Lever extension, therefore, owes its important position in land-grant-college organization, in part at least, to its value as a means of keeping faith with the public and the rural population to whom promises of direct aid had long been made as an inducement to give financial and moral support to these institutions. How well Smith-Lever extension has served this purpose is part of the story of some of the succeeding pages of this report.

Second, Smith-Lever extension became intrenched in land-grant-college organization by reason of Federal support. It is difficult to believe that the institutions would have so uniformly and so heartily accepted instruction work of the kind Smith-Lever extension carries on as a part of their permanent organization if Federal financial support had not been given to the work in the colleges and if Federal organization in the Department of Agriculture had not provided leadership and guidance in the development of the work. Whatever the theoretical or practical objections to encouragement of specific educational activities by means of Federal money and administrative direction, the benefits of Federal support of this kind in the case of Smith-Lever extension are clearly evident.

A third influence that has given to Smith-Lever extension activity a strong place in the organization of land-grant colleges is the pressure upon legislatures, governing boards, and administrators exerted by business and economic organizations that recognize the possibility of financial profit to themselves through the increased agricultural production that may be expected to result from the use of better methods brought to farmers by the extension service. The underlying motive is not at variance with public welfare. Nor has such support been confined to those directly engaged in handling agricultural products. Business interests whose agricultural contacts are so remote as to appear quite intangible have aggressively championed extension activities.

Fourth, Smith-Lever extension would not occupy the position it does if its advocates and leaders had not exercised a very high degree of public activity and good sense. Public activity is here used not in the sense of party politics but in the sense of utilization of the means and influences through which legislative action is secured in a democracy. There has been, on the part of Smith-Lever interests, little of the academic contempt for the practical agencies and methods through which public action is secured in the United States. In other words, the integration and harmonious participation of Smith-Lever extension with what in noneducational connections we are accustomed to call the political genius of the Nation has to a large degree accounted for its success as compared with other forms of extension services.

Fifth, traditional academic thought and attitudes have been noticeably lacking in Smith-Lever procedure and objectives. Cooperative arrangements with local, State, and national groups and publicity of a character that can be understood by the people distinguish Smith-Lever extension. Freedom from restrictions, both of academic regularity and of academic aloofness, have made Smith-Lever extension the best understood and the most heartily supported element of the land-grant colleges by those who directly and indirectly control legislative support.

It is fully recognized that none of these reasons for the strong position of Smith-Lever extension in institutional organization and public appreciation would be operative or legitimate were it not for the fact that it renders an actual and far-reaching service that deserves recognition and support for its own sake. The point is that this recognition and support have been given more heartily and more completely because of the five contributing factors just described—a historical ideal, Federal support, private economic advantage, political consciousness, and cooperation supplemented by effective publicity.

Objectives of Smith-Lever Extension

The Smith-Lever Act in establishing cooperative agricultural extension work emphasized the vocational training of farm people by stating that its purpose was "to aid in diffusing among the people of the United States *useful* and *practical* information on subjects relating to agriculture and home economics and to encourage the application of the same." Obviously the basis of argument used by those who urged the passage of this Federal act was largely that of the great need of increasing the earning capacity of farmers through more efficient production and distribution of their products. This was the economic motive.

Accompanying this appeal, and usually used to strengthen it, was the underlying reason for desiring greater economic returns, namely, the need of changing the "standards of rural living" by providing those essentials of physical and mental satisfactions that make for a richer life.

In other words, the ultimate objective was not more and better food, clothing, and housing. These were merely means and conditions prerequisite to improvement of human relationships, of intellectual and spiritual outlook. Apparent preoccupation with economic interests must be interpreted in terms of the purposes that material welfare is intended to serve.

Of the 46 statements made by the land-grant institutions for the purposes of this survey, 29 placed the economic or income objective first, 8 considered it a secondary purpose, and 2 gave it third mention. Only 7 failed to emphasize this practical aim of agricultural extension education. The second objective given most common consideration was "changing standards of living." Nine replies gave this first rank, 17 listed it second to the economic motive, while 10 gave it third ranking.

The "improvement of community social life" was prominent in the statements of objectives. It was not mentioned first by any institution, but 18 considered it an important aim of the service. In 10 of the replies, emphasis was laid upon the development of leadership as a specific objective, and the same number indicated "the development of people" as a major purpose, although only four gave it first rank. The principal objectives stated by the institutions may be summarized as follows: To increase farm earnings (economic), 39; to improve "standards of living," 36; to improve social life, 18; to develop leadership, 10; to develop people, 10; to give opportunities to rural boys and girls, 4; to provide vocational training, 3; to teach cooperation, 2; to improve health of rural people, 2; and to maintain soil fertility, 1.

It is worthy of note that statements concerning the objectives of Smith-Lever extension indicate a tendency to name practical, immediate means toward desired ends rather than the fundamental purposes underlying this form of adult education. For example, one reply stated that the prime objective of extension work was to assure the maintenance of the soil fertility of the State. Obviously this is not an aim but a method or an application of a farm practice out of which may develop some training of the individuals who utilize this particular project. Likewise statements relating to improving the health of rural people, or increasing the understanding of the relations of rural folk with townspeople, or emphasizing the teaching of hand skills in doing farm work, all have degrees of importance but are merely phases or methods in the attainment of basic objectives. In some cases, however, even though immediate and perhaps expedient aims were given first mention, following statements interpreted the purposes in more fundamental terms. In statements made concerning home economics extension, for instance, objectives are defined quite generally in terms of cultural and social interest in the home and community. Improved practices in housekeeping mentioned by 27 of 44 States as an objective was in all but one instance further explained as a medium through which cultural or intellectual interest might be developed or as a means whereby time might be freed for these aspects of life.

Broad viewpoints concerning Smith-Lever extension need special emphasis because of the practical nature of the educational "services " rendered, the historical development and growth of the system, and the character of educational training and experience of many of the staff who have manned the various State extension organizations. The close relation of extension projects to the many agencies shaping the life and habits of rural people and the pressures resulting from some of these relationships make necessary adherence to sound and definite ideals, to long-time objectives, and to procedures determined by such ideals and objectives. The fundamental function of Smith-Lever extension education is *the development of rural people themselves.* This is accomplished by fostering attitudes of mind and capacities which will enable them better to meet the individual and civic problems with which they are confronted. Unless economic attainment and independence are regarded chiefly as means for advancing the social and cultural life of those living in the open country, the most important purpose of extension education will not be achieved.

Chapter III.—Administrative Organization of Smith-Lever Extension

Any statement of the objectives of a movement or activity is little more than the expression of hope unless machinery and personnel are provided appropriate to the procedure and activities necessary to practical attainment. The Smith-Lever organization for the accomplishment of its primary and secondary objectives will therefore be considered in considerable detail. For convenience of presentation this discussion will be grouped under three topics: (1) The form or mechanics of organization; (2) the financial organization; and (3) the personnel organization.

Certain elementary distinctions familiar to all extension people are not so well known to other members of the institutional staffs or to the general public. No understanding of the organization is possible without a clear picture of these basic matters. Therefore it is essential that as a preliminary to detailed discussion of Smith-Lever organization a bird's-eye view of the main features of the organization and of its relationships be presented.

There are three more or less distinct divisions in the national system of Smith-Lever extension organization—the Federal Office of Extension in the Department of Agriculture, the central extension office in each of the land-grant colleges, and the local county organizations. Each of these aspects of the organization has certain characteristic functions, but in the actual conduct of the work all are intimately related to and dependent upon one another.

The State central organization is responsible for the Smith-Lever extension work of the State carried on directly and through local county organizations. It has certain financial responsibility to the Federal Office of Extension and in addition maintains close advisory and cooperative relationships with the Federal office. Further, the central State extension office as a part of the land-grant college, has direct contact and important interrelations with the resident teaching and experiment station staffs, as well as with the institutional administrative authorities.

The local county organizations constitute the main operating agency and are responsible both to the State central organization in the land-grant college and to such local authorities as participate in support of local activity.

Functionally these three organizations are all concerned with agricultural extension, home economics extension, and boys' and girls' club work.

Further discussion of the Federal Office of Extension does not seem necessary at this point. The remainder of this section of the report on the form of Smith-Lever organization will therefore deal first, with the general descriptions of the central State office and of the local county organization; second, with the problems and relationships of the State office and with the duties of State office personnel; third, with the problems of the county organization.

Form of Organization

The form of organization is important only in so far as it indicates division of labor and administrative responsibility of staff personnel. In many of the States the population is so small and so scattered that special problems of organization are presented. In other States it is apparent from the reports that wide variations exist in the supervisory responsibilities and relationships of those in charge of various types of activities.

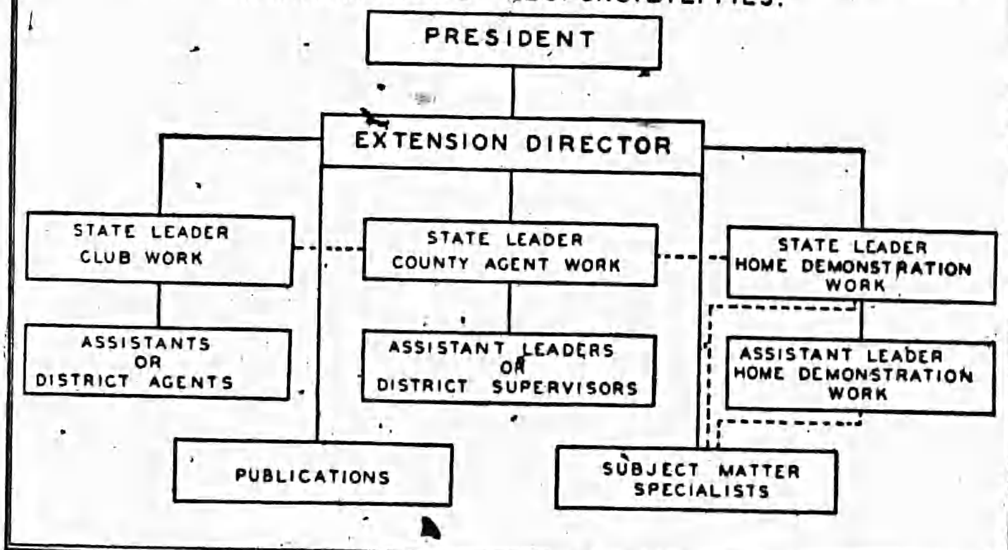
At the head of the Smith-Lever extension work in all of the land-grant colleges is a director of extension. This is true, although in eight States the offices of dean of the agricultural college, director of the experiment station, and director of extension are under the direction of one person. In two of these instances vice directors of extension are in immediate charge.

Because of the size of the staff engaged upon various phases of Smith-Lever extension work it is necessary that the director of extension depend upon assistants for supervision of certain groups of the staff busied with specific lines of activity. Thus the members of the extension staff whose function it is to provide specialized technical information in regard to specific subjects such as poultry, dairying, food preservation, and so on through the whole range of matters with which agriculture and home economics are concerned may be supervised by one assistant who is known as the State leader of subject-matter specialists. Such leaders are found in seven States. In the same way State leaders or supervisors may be placed in charge of county agricultural work, home demonstration, and club work. Two or more of these activities may be combined under a single leader or supervisor. In all but four States, however, there are separate leaders for agricultural, home demonstration, and club work. In some organizations the duties of the State agricultural, home demonstration, and club leaders are performed through or with the assistance of district leaders responsible to the State leader of one or more of these types of activity for the extension work in certain counties.

Infrequently the State leaders for agricultural, home demonstration, and club agents are dispensed with and district leaders report immediately to the director of extension who thus performs the functions of State leader. In some organizations, however, the assistants to State leaders are not assigned upon a geographical basis, but functional duties are assigned to various assistants who are charged with state-wide responsibility for the activity concerned.

The personnel assigned to these functions, supervision of subject-matter specialists and leadership of county agents, home demonstration agents and club agents, together with the director of extension, constitute the central administrative staff of leaders or supervisors.

TYPICAL ORGANIZATION OF SMITH-LEVER EXTENSION SHOWING ADMINISTRATIVE RESPONSIBILITIES.



Included in the central State organization also are subject-matter specialists who constitute the scientific and technical staff that through the local extension organization provides advice and material concerning the application of scientific knowledge to the problems of farmers and of home makers.

In 25 States the extension service maintains a special service and publicity section for purposes of publication of information of value to the extension work, and in seven States organizations are found separate subdivisions for conducting short courses and institutes.

Figure 1 indicates the administrative relationships of the typical State central extension organization, and Table 1 shows the variations of administrative responsibility as reported by 47 institutions.

TABLE 1.—*Variations of administrative responsibility as reported by 47 institutions*

Administrative officer	Responsible to—						
	President	Dean and director of institution	Director of extension	State leader: Agriculture	State leader: Home-demonstration work	Home-economics department	Other subject-matter departments
1	2	3	4	5	6	7	8
Director of extension	24	19					
Assistant director			2				
State leader—Agriculture		1	37				
Assistant State leaders—Agriculture			10	18			
Home-demonstration leader		1	40	2	2	1	
Assistant home-demonstration leader			6	3	20	1	
State club leader		1	34	2	3	1	1
Agriculture specialists		1	31	8	1	1	2
Home economics specialists			16	1	20	2	2

Before proceeding to discussion of the duties assigned to the personnel of the central State extension organization and of administrative relationships arising between the various elements of the organization it seems advisable to describe briefly the main features of the local county organization.

The primary cause for the success of Smith-Lever extension service is the wide extent and thoroughness with which local communities have been organized for cooperation in the work. Central in this organization is the office of the county agent. This office ~~in~~ the typical, completely organized county consists of an agricultural agent, a home demonstration agent, and a club agent although club agent work may very properly be, and frequently is, assigned to the agricultural and home demonstration agents and has no separate personnel. The relationships of these three agents within the county vary but the typical plan in 20 of 33 States in which the ~~three~~ work through the same community organization, is to place the agricultural agent in charge of the county program of work. In 10 States each of the different types of county agents carry on their work independently of each other although this would seem to afford opportunities for conflicts and misunderstanding.

In this connection may be mentioned the discussion that has centered about the titles that have been given county workers in extension. The common titles, by lines of work, are county agricultural agent, county home demonstration agent, and county club agent or leader. However, in at least two of the States the agricultural agents are officially known as "farm advisors." Five of the institutions report using the title "assistant agent" for home economics workers, ~~while 10 use this~~ title for boys' and girls' club workers. It has been claimed that unity of work, centralization of local administration, combined financial resources, and simplified State and Federal relations are distinct advantages of this plan but in most States apparently the administrators have believed that "identity" of the work and voluntary cooperation of all agents under distinct titles, have proved sufficiently valuable to offset the other disadvantages.

The agents work with and through local cooperating groups. (Table 2.) The cooperating organizations are constituted in a variety of ways and membership is determined upon different bases under different State and local conditions. In 26 organizations the executive committee of the county unit of an agricultural organization known as the farm bureau, is the designated official board through which the agricultural work is developed. The same local group cooperates in the development of the home economics extension work in 17 States. In 10 others the local group is composed of a special extension committee formed of representatives of different county organizations, mostly private in nature, but supplemented usually by one or more county officials. This type of local committee is also active as the cooperating agency in home economics extension work in six States. The other prevailing type of organization for assisting in the development of home projects is known as "The county home demonstration council" and is active in 16 States.

TABLE 2.—*Form of county organization for developing extension work*

Form of local committees	Agricultural agents[1]		Home demonstration agents[2]		4-H Club agents[3]	
	County committees	Community or township committees	County committees	Community or township committees	County committees	Community or township committees
1	2	3	4	5	6	7
Farm or home bureau	[4] 12	[4] 10	13	5	7	4
Special extension	[4] 16	[4] 14	19	11	9	8
Made up of:						
Men only	9	8	0	0	1	0
Women only	0	0	15	7	1	0
Men and women	21	13	15	8	13	10
Average number of persons on committee	8	15	15	10	9	9
Urban interests represented	11	10	10	8	6	3

[1] 42 institutions represented.
[2] 41 institutions represented.
[3] 20 institutions represented.
[4] Several have both.

Still another type of local committee has been found effective in developing programs of work. This is a special extension committee, formed by project leaders, independent of any organization as such and organized largely through the efforts of the extension agents to assist in carrying on work along definite project lines.

In more than half the States the local county organization consists of persons selected by the people to represent townships or designated communities of the chief farm organization. In about one-fourth the "commodity" or "project" basis is employed, with local people selecting the leaders that make up the cooperating committee.

In the remaining fourth of the States different county organizations select their representatives, often as required by the State extension law. The county extension agents are usually active in assisting to perfect the local organization through which the work is to be developed.

Twenty institutions report that the work in the counties is further developed through definite township or community organizations, such as a township farm bureau unit, a farmers' club or community club, meeting regularly as a part of the extension program. Twenty-six report a similar plan in home demonstration work. In 10 of these the groups are known as "women's home demonstration clubs," and in 2 the home bureau units serve this purpose. In 8 of the 20 States reporting definite "locals" the farm bureau township unit predominates, while in 10 others the community clubs and community farm bureau units are the cooperating groups.

In those States in which more than one extension agent is employed in the counties, 33 report all agents working through the same local organization, while in 10 the home and club agents have separate "locals" through which these lines of work are carried on.

In general, the county extension agent's office and the cooperative local organization constitute the essential elements of administrative organization in the county. In actual conduct of the work various committees of local people and selected leaders from the community are enlisted.

We may now return to discussion of the administrative relationships and the duties of the personnel of the State extension services.

It is necessary that the director of extension keep in touch with the work of the central State extension staff and through them with the problems of the work that demand administrative attention. Three methods are most commonly used—staff conferences, written reports, and grouping of the staff physically in the central office.

In 29 institutions conferences of all leaders and supervisors are held occasionally; in 8, such conferences meet monthly; and in 13, weekly. In 14 instances regular monthly conferences are held with all the administrative heads.

Reports of visits to the field made by members of the central staff are required by 29 directors while 25 depend upon monthly statistical and narrative reports to keep in touch with administration problems. Nine reported that weekly reports served this purpose to good advantage.

The important point in this connection is not the specific manner in which the administrator learns of problems requiring his attention, but rather the opportunities created which enable the director to develop attitudes of mind on the part of the staff and to share with them responsibility in adopting solutions that best serve the basic purpose of the extension work as a whole. The large number of relationships between the extension service and the many agencies with which it forms contacts, requires definite, positive types of administration based upon sound educational principles and the long-time point of view. If this phase of rural adult education fails to reach its maximum effectiveness and to hold its true place in the general educational program, it will be largely because of weak administration based upon expediency of action or because of limited vision of the broad objectives and ideals which should determine its directive policies. It is quite apparent from the reports that one of the weaknesses of Smith-Lever extension in some institutions is failure to exercise the degree and type of administrative control necessary to inspire the entire staff with the long-time view of its work. Administrative supervision and relationships must be such as to strengthen consciousness of the educational principles involved if the land-grant colleges are to perform their real function in this large field of rural education.

Undoubtedly physical grouping of the central supervisory extension staff provides opportunities for contacts, exchange of views, and information and for a degree of administrative supervision that are more difficult to obtain when personal association requires special effort. That the weight of opinion supports this view with reference to the central administrative staff is evident by the fact that 40 of the 46 institutions that replied to the inquiry concerning their preference favored the "grouped" plan for this portion of the central State staff. Of the 40 preferring this arrangement, 32 reported it as the plan now in operation. Since this is strictly a problem of overhead organization the consensus of opinion in regard to the matter would seem to be in harmony with sound principles of organization. It is an elementary principle that when it becomes necessary to break up general directive and supervisory responsibility among several individuals the closest possible association and contact must be maintained if unity of organization policy is to be established and friction of operation reduced to the minimum.

Whether or not subject-matter specialists should be "housed" with the extension administrators in one organized group or "scattered" in their respective departments is not so definitely established as a settled plan. Twenty-one institutions reported operating satisfactorily with a partially centralized staff of specialists with others stationed in their respective departments; 16 indicated that all specialists were "scattered" among the subject-matter divisions; and 13 institutions maintained a complete centralized staff. In reply to the query as to an ideally constructed form of specialist arrangement, 22 favored the "grouped" plan and 25 expressed preference for the "scattered" type of organization.

Those institutions favoring the "grouped" plan for all workers pointed out the following advantages:

(a) Makes possible more intimate contacts between specialists and administrators; (b) permits development of unified plans and promotes general adoption of more effective teaching methods; and (*b*) promotes loyalty to and enthusiasm for the entire extension program.

With equal positiveness the proponents of the "scattered" plan point to definite advantages: (*a*) Makes possible more complete and more satisfactory the necessary contacts with subject-matter departments; (*b*) promotes professional quality and standing of specialists; and (*c*) tends to secure a larger degree of cooperation from all institutional workers than is possible under the "grouped" plan.

Much can be said for both plans and for the combined arrangement followed by two-fifths of the institutions. The problem is largely one that must be determined by specific institutional situations such as those of the character and disposition of the personnel involved and those created by the physical plant in which the extension and the agricultural departments are housed. The matter is significant only if a weak director or one who is obsessed by theories of regularity of organization allows the quality of the service to be affected through lack of control or by excessive insistence upon the mechanics of organization.

Several matters of central extension administrative organization and policy that are significant for the effectiveness of the extension work itself and for sound relationships with the resident teaching and experiment-station staffs require discussion.

Methods of handling farm correspondence that is received by the extension service are sometimes a source of friction and misunderstanding unless the administrative procedures and relationships involved are well defined. Because of diversity of practice and the somewhat intangible nature of the expense arising from preparation of answers to inquiries from the field, institutional accountants find it difficult to determine the costs of such activity. Question in regard to the methods of handling extension correspondence of this character is, therefore, most frequently raised by the institutional authorities interested in cost accounting, but the question is also important from the standpoint of the relationship of the Smith-Lever extension organizations to the resident departments of instruction and research. Obviously the portion of farm correspondence that relates directly to extension projects or that refers to extension activities, relationships, and administration should be handled by the extension service and paid for from its funds. In 14 of the institutions all technical farm correspondence is considered the function of the extension service only, and when taken care of by subject-matter departments the extension budget is charged with its cost. In 27 institutions, however, it is considered a departmental function, and each department handles its own or referred correspondence. In five of the States the handling of all technical correspondence is considered the function of subject-matter departments and the extension service has no responsibility in the matter.

Similar problems are involved in the methods of handling laboratory examinations and analyses of soils, weeds, water, feeds, and diseased animals. Thirty-one institutions report that work of this kind is a function of the resident department concerned and that the expense is borne by departmental budgets. In 12 of the institutions the extension services pay a portion of this expense. In one organization work of this kind is a function of the extension service and is financed from the extension budget.

In the great majority of institutions the subject-matter extension specialists have a number of definite responsibilities to both the extension organization and the subject-matter departments they represent. In 28 of the institutions their employment is a matter of cooperative joint action of the director of extension and the heads of the subject-matter departments. In 15 of the States, while the selection lies wholly with the extension directors, certain responsibilities are involved in the relations of the specialists to the departments concerned.

The most common practice is for the extension service to retain full responsibility in arrangement of field schedules, financing field expenses, drawing up plans of work, requiring reports of service, and unifying and improving methods of teaching. The most important responsibility of the departments is that for subject-matter content, although to a minor extent some responsibility is assumed in improving teaching methods, particularly in the development of more effective visual methods of presentation of subject matter.

It is interesting and important to note in this connection that institutional reports show that in five institutions the subject-matter departments assume no responsibility whatsoever for the work of extension specialists. This is an extremely serious fault in organization relationship. The basic position of Smith-Lever extension in land-grant college organization is, in the long run, dependent upon close articulation with the resident work and personnel of the institutions. On the other hand, public support of resident work is in large part determined by public attitudes that may be created by Smith-Lever extension activities. Failure of the resident departments to participate in and support extension is likely to be harmful to the land-grant college as a whole. Wherever articulation has not been developed between Smith-Lever extension and the agricultural and home economics departments, or wherever there is in the existing organization no provision for real cooperation between these two phases of institutional activity, the matter should receive the attention of administrators and, if necessary, of governing boards in the interest of the welfare of the institution as a whole.

The function of preparing subject-matter material for extension teaching in home economics in more than half the institutions (24) is assigned to extension specialists. In 17 others county home demonstration agents assist in preparing material used by local leaders. In two institutions the State home demonstration leaders prepare all home economics subject matter used in extension. Consultation with resident departments in such preparation is not as common as it should be, only six replies indicating complete and satisfactory cooperation in this important phase of the extension service. In only two institutions is there any evidence that home economics subject matter is being prepared for girls' clubs by persons who are not technically trained in this field. Unless the content of extension teaching is prepared by persons highly trained in the technical subjects that constitute the program of work, high quality of teaching can not be maintained and progress in these fields will be decidedly retarded.

One aspect of the relationship of extension specialists to their subject-matter departments deserves special mention. It might be assumed that extension specialists would quite commonly bring back from the field to their subject-matter departments valuable ideas for resident teaching and problems requiring research attention. Their field contact with the graduates of the college of agriculture and with the problems of the State constituency of the entire institution makes this appear reasonable. Indeed in some phases of land-grant college work, notably in that of teacher training, qualified persons are sometimes employed for the purpose of studying the human product of the institution after graduation, in order that content of courses and procedures of instruction may be modified in accordance with deficiencies and needs thus discovered. Yet only two of the land-grant institutions in their report to the United States Office of Education emphasize the value of the service of this kind that the extension specialists may perform for their resident departments. One-third of the institutions rated this function as second in a scale of three points and two-thirds rated it as least important of the functions of the subject-matter specialists. Practically all of the institutions indicated that specialists perform this service to some extent, but it is clear that few administrators have clearly defined this function and provided adequately for its accomplishment. The opportunities for observation and inquiry during their field work would seem to indicate that this should be one of the most common relationships of all extension specialists with their departments. To overlook this opportunity is a distinct loss to both extension and resident groups.

Resident instruction and extension instruction in home economics do not function independently in the majority of land-grant colleges.

Among 45 reporting, but 5 show no correlation. Cooperation is manifested by frequent conferences of the two groups. Of marked significance is the fact that in 13 institutions specific pieces of research upon problems defined by members of the extension staff are under way. Further coordination is brought about by the teaching of extension courses for prospective workers and by field work in extension by members of the resident teaching or research staffs.

Certain details of practice in the administrative relationships of directors to the supervisory and specialists staffs and to the resident departments deserve brief consideration.

It is common practice for specialists and supervisors to make their own individual field schedules in 34 institutions, in 2 of which there is no approval required by the director. It is likewise significant that in 6 of the institutions resident teachers and research workers are in no way responsible to the extension director while on extension trips, and in 10 instances the field schedules are made independently of the extension service. These practices are surely open to question. Directors of extension are unanimous in their opinion that all such workers should have a definite responsibility to the extension administration. Much of the inconsistency now arises from the fact that responsibility is determined upon the basis of the source of expense allowance for the services performed rather than upon the basis of problem correlation between the institutional units concerned. This matter deserves the attention of the administrative officers of the institutions.

The duties and responsibilities of State leaders or supervisors of local agents include the administration of certain activities and supervision of personnel engaged upon these activities. The emphasis upon specific duties varies with the nature of the service rendered. In agricultural extension the principal duties of supervisors of local agents have been fairly well defined and the methods of supervision reasonably well established. In home demonstration work there is little responsibility placed upon local or State agents in the maintenance of county finances, while in the county agricultural agent program of supervision this is a most important duty. Likewise, the administration of 4-H Club agents and their activities entail distinct differences in emphasis and in methods—so much so as to warrant the employment of separate supervisors for the different lines of activities. This is but another example of specialization in supervision of related fields of work.

In order to determine the scope and relative emphasis on specific duties performed by this supervisory staff, State supervisors were requested to rank the duties listed in the following table as most important, (A); next important, (B); and of least importance, (C).

The summary in the table ranks the duties in the order of the emphasis reported for supervision by agricultural leaders. The relative ranking for the home demonstration and club leaders is given in Table 3.

TABLE 3.—*Relative ranking of duties of home-demonstration and club leaders*

Ranking of duties by agricultural leaders	Per cents of A, B, C[1]								
	Agricultural leaders			Home leaders			Club leaders		
1	2	3	4	5	6	7	8	9	10
1. Maintain county personnel	86	9	5	81	17	2	71	14	15
2. Assist in formulating county programs	84	16	0	86	14	0	78	18	4
3. Check on progress of county programs	76	22	2	65	33	2	68	21	11
4. Interpret administrative policies to the counties	65	19	16	45	27	28	26	26	48
5. Assist in maintaining county finances	59	12	29	42	11	47	21	11	68
6. Make contacts between agents and central office	43	27	30	29	45	26	16	52	32
7. Present extension problems to local committees	32	48	20	36	48	16	16	52	32
8. Adjust county troubles and difficulties	36	38	26	37	46	17	18	32	50
9. Make contacts with organization leaders	30	38	32	34	39	27	26	44	30
10. Arrange district conference programs	46	26	28	34	32	34	25	35	40
11. Present salary needs of agents to local committees	35	23	42	24	31	45	21	11	68
12. Assist specialists in formulating programs of work	23	42	35	51	21	28	24	28	48
13. Assist in carrying out county programs	26	38	40	40	31	29	58	34	8
14. Assist specialists to make contacts with county workers	22	38	40	32	26	42	24	20	56
15. Assist in training local leaders	23	24	53	49	28	23	61	35	4
16. Bring back problems for research	5	33	62	13	28	59	5	19	76

[1] A, most important; B, next important; C, of least importance.

It is significant that the first three duties were considered the most important for all three groups of leaders. Reference to the summary shows that much greater emphasis is placed on some duties by one group of leaders than by others. For example, the training of local leaders is fourth for club workers, sixth for home supervisors, but fifteenth for agricultural leaders. Conversely the maintenance of county finances is fifth for agricultural leaders, twelfth for home workers, and fourteenth as a duty for club leaders. The full significance of the assignment of duties to supervisors of local agents becomes evident only in the light of consideration of the problems and methods of county organization and operation. The next paragraphs will therefore discuss county extension organization in some detail.

The county extension organization exists for but one purpose—to carry on direct educational work. It occupies much the same position in the Smith-Lever extension service that the local school system occupies in the public educational system of the State. State administrative, supervisory, technical, and statistical officers are important, but the greater part of the actual instruction is done through the local organization. The central office and staff exist for the benefit of and in order to facilitate the work of the county.

The well-organized and most productive extension organizations are those in which not only the central supervisory force serves effectively, but those in which local people are securely welded into groups with definite responsibilities and active parts to play in the development of the community program.

A prerequisite to this accomplishment is effective organization of the county extension office itself, of the time of the paid extension agents in charge of the office, and of the relations of the agents to the local cooperating organizations.

Without systemized organization of time, projects, personnel, and resources, the program of work in a county tends to result in a series of miscellaneous tasks, each perhaps of some importance in itself, but wholly unrelated to any recognized program. At the end of a given period of such work there are no definite mileposts of progress, no tangible evidences of achievement, nor any satisfaction on the part of the agent in having done anything worth while. Therefore, concentration upon definite projects, goals, and methods is essential as the major emphasis of a calendar of work. This is not an easy task in organization. It should be one of the important supervisory functions of the State staff to train the agents to develop the necessary abilty to become effective organizers of their work.

Every county extension office adopts either a systematic form of procedure for handling correspondence, meeting personal and telephone calls for service, dealing with administrative matters and general office routine, or the procedure is allowed to run itself into a chaotic condition of inefficiency and waste. This is particularly apparent in counties which maintain more than one agent. When activities are so highly developed as to require more than one agent, projects, contacts, and relationships are multiplied, and a directing head for the county office responsible to the central office for administrative procedure becomes a necessity. Twenty-four of the forty-three institutions indicated that in those counties in which there is more than one agent the agricultural agent is in charge of the office, while in nineteen others joint responsibility is the general plan of operation.

In line with the more common plan of administrative responsibility as reported, it should be noted that 38 institutions rank agricultural agents as first in order of placement in counties; 30 rank home-demonstration agents second; 3 place them first in order of employment; and 5 give preference to assistant agricultural agents over 4-H Club agents that are ranked third in order by the larger number of the institutions.

In connection with the county organization for the development of the 4-H Club program the question was raised in this survey as to the soundness of the tendency to depend upon relatively untrained assistance in the technical instruction of club members.

The direction this expansion is taking in States where separate club agents are employed has a significant bearing on the success of a program of work for farm boys and girls and on the strength of the county extension program. In the counties where agricultural, home economics, and club agents are employed, the club agent is in many cases, a man agriculturally trained. He organizes clubs, selects leaders, directs their work, receives reports—in fact, carries on all the club work in the county, both in agriculture and home economics. The wise club agent will confer with the agricultural and home demonstration agents to the end that the junior program may not be separate from that of other extension work.

But there are sure to be serious weaknesses in project work carried on by a person wholly untrained in a subject-matter field. County club agents sometimes have the assistance of State home economics specialists, but this is not adequate. The local leader of a girls' club must rely largely upon printed directions and her own experience. She needs the counsel and leadership of a trained home-economics person, if the quality of product is to correspond to a recognized home-economics standard. For example, exhibits at fairs often show lack of home-economics supervision, and subject matter presented to groups of girls may be quite inaccurate because of this lack of training; the home economics extension program is one thing—the home project club another. The two should be united, coordinated, integrated. The same is true of the agricultural work for adults and juniors.

A study of the club staff training indicates that many paid county club agents do not possess the required amount of technical training needed to attain desirable standards of teaching. When this condition exists it is desirable and practicable for the organization and supervisory phases of the club program to be performed by club leaders, but the subject-matter instruction and all technical phases of the program should be handled by the trained agricultural agent or the home-demonstration agent.

As has been noted in a preceding section of this report, Smith-Lever extension is carried on in the counties of the several States through organized groups of rural people. In many States definite county-wide organizations have been set up for the specific purpose of developing and carrying out the extension program. In other States groups already organized have been used to further the program. In most of the States these organizations are purely voluntary; in others cooperation with specific organizations is required by law. The relationships with these organizations will be discussed in the section of this report following the discussions of financing and staff personnel.

Financial Organization and Support

Financial support of Smith-Lever extension is derived from Federal, State, and county sources. Public funds from each of these political units are used in practically all the States. In addition, in 22 of the States (in 1928) contributions from farm organizations and other private agencies were used to supplement the public funds, thus providing altogether four main sources of financial support.

Previous to 1915, the first year in which the Federal Smith-Lever funds became available, private agencies such as chambers of commerce, banks, business firms, and interested individuals had contributed funds toward employment of county agents and had thus assisted in stimulating the development of the State extension organizations. The passage of the Smith-Lever Act in 1914 with its continuing appropriation feature and its requirement that the States appropriate funds at least to the amount of Federal money received, brought about a definitely organized system of combining funds from various sources for the support of the work.

Table 4 shows the sources of funds and the changes in amounts and proportions for the years 1915, 1920, 1925, and 1927.

TABLE 4.—*Total funds for cooperative agricultural extension work in all States for year ending June 30* [1]

Fund	1915		1920			1925			1927		
	Total fund	Per cent of total	Total fund	Per cent of total	Per cent of increase	Total fund	Per cent of total	Per cent of increase	Total fund	Per cent of total	Per cent of increase
1	2	3	4	5	6	7	8	9	10	11	12
Federal Smith-Lever	$474,935	13.2	$4,464,344	30.5	840.0	$5,879,084	30.4	31.7	$5,878,437	29.3	
State Smith-Lever			3,984,344	27.2		5,399,084	27.9	35.5	5,398,437	26.9	
State and college (other than Smith-Lever)	1,044,270	29.0	1,244,466	8.5	19.2	1,978,747	10.2	59.0	2,093,654	10.5	5.8
County	780,332	21.7	2,865,740	19.5	267.2	3,893,814	20.2	35.9	4,531,714	22.6	16.4
U. S. Department of Agriculture	1,010,950	28.1	1,427,112	9.7	41.2	1,191,247	6.2	[2] 16.5	986,894	4.9	[2] 17.1
Clarke-McNary:											
Federal									43,252	.2	
State									43,252	.2	
Other	286,749	8.0	672,073	4.6	134.4	990,396	5.1	47.4	1,088,598	5.4	9.9
Total	3,597,236		14,658,079		307.5	19,332,372		31.9	20,064,238		3.8

[1] In order to include all States the table was made up from data furnished by the Extension Service of the U. S. Department of Agriculture. Reports submitted by various States in this survey check closely with these figures.

[2] Decrease.

In 1915 there were expended approximately three and one-half millions of dollars for cooperative extension, of which the Federal Government, through the Smith-Lever and Department of Agriculture funds, contributed 41 per cent; the States, 29 per cent; counties within the States, 22 per cent; and private agencies, 8 per cent. Five years later, by 1920, the total expenditures had increased 300 per cent and had grown to more than fourteen and one-half millions of dollars. Of this amount the Federal support was about in the same proportion as in 1915—40.1 per cent; the States had increased their appropriations to 35.7 per cent, the counties contributed 19.5 per cent, and private agencies 4.6 per cent.

The development in 1925 showed a further increase in total funds with Federal contributions increased in amount, but decreased in proportion, to 36.5 per cent, while State funds had increased to 38 per cent, county funds to slightly more than 20 per cent, and private contributions had increased almost 50 per cent in amount and shared in the total to the extent of 5.1 per cent.

In 1927 the total expenditures increased but 4 per cent over those of 1925 and the Federal and State Smith-Lever amounts remained practically unchanged. The Clarke-McNary funds for forestry extension work became available in that year, but in a relatively small sum, while county funds increased to 22 per cent, and the funds from private sources increased slightly to 5.4 per cent of the total.

Table 5 indicates the important changes in the basis of financing from 1915 to 1928.

TABLE 5.—*Basis of financing for agricultural extension education, 1915–1928*

Year	Amount	Year	Amount
1915	$3,597,236	1922	$17,181,751
1916	4,864,181	1923	18,484,845
1917	6,149,620	1924	19,082,025
1918	[1] 11,302,765	1925	19,332,372
1919	14,661,560	1926	19,485,493
1920	14,658,079	1927	20,064,238
1921	16,792,248	1928	20,677,424

[1] The height of the war-time expansion of extension work.

Table 5 shows a fivefold increase in funds in the 8-year period, 1915–1922, inclusive, and illustrates the large step-up because of the war-time food-production program with the slower but rather steady growth up to the time the Smith-Lever funds derived from the Federal Government reached their maximum in 1923.

The 5-year period, 1923 to 1927, shows a more gradual increase, amounting to approximately one and one-half millions for the five years. The important feature was not the rate of financial growth, but rather the manner in which the funds were expended for the various activities making up the services rendered by the State extension organizations.

Distribution of expenditures by major activities.—Table 6 shows the average distribution of the total budget by years for all States. The grouping of activities follows that of the published data in the annual reports of cooperative extension work by the United States Department of Agriculture. Anyone interested in the distribution of the funds of any State will find the same type of information, except the computed percentages, in these reports.

Table 7 shows total expenditures of all States distributed by the major items of expenditure and activity.

A striking feature of the distribution of expenditures is the consistent allocation of funds among the various groups of activities throughout the period. This indicates well-settled policies of organization and program. A study of the distribution State by State shows few outstanding exceptions that can not be readily explained by the size of the State or by peculiar determining conditions not comparable with those existing in other States.

The expenditures for the administration of an organization or service is of special significance to those charged with the responsibility of administration. In recent years there has been a tendency to scrutinize carefully this group of expenses and to attempt to place under this heading only those expenditures that properly pertain to this function. Ways and means of reducing administrative costs have been diligently sought by many administrators.

TABLE 6.—*Distribution of agricultural extension expenditures by major lines of work,[1] all States, 1923-1927*

Year	Average total budget	Administration		Publications		County agricultural agent work		Home demonstration work		Club work		Agricultural specialists		Home economics specialist	
		Average amount	Per cent of total	Average amount	Per cent of total	Average amount	Per cent of total	Average amount	Per cent of total	Average amount	Per cent of total	Average amount	Per cent of total	Average amount	Per cent of total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1923	$385, 100	$25, 559	6. 6	$6, 932	1. 8	$200, 530	52. 1	$57, 765	15. 1	$20, 795	5. 4	$63, 132	16. 3	$10, 398	2. 7
1924	397, 540	25, 037	6. 3	8, 283	2. 1	208, 318	52. 4	54, 814	14. 8	20, 672	5. 2	64, 401	16. 2	11, 926	3. 0
1925	402, 750	23, 600	5. 9	8, 560	2. 0	207, 010	51. 4	62, 479	15. 5	22, 151	5. 5	66, 454	16. 5	12, 888	3. 2
1926	405, 948	22, 590	5. 6	9, 280	2. 2	211, 100	52. 0	65, 471	16. 1	22, 327	5. 5	64, 140	15. 8	11, 366	2. 8
1927	419, 735	22, 180	5. 3	7, 988	1. 8	217, 030	51. 7	67, 309	16. 1	22, 666	5. 4	70, 515	16. 8	12, 172	2. 9

[1] In order to include all States in these calculations the data were taken from published annual reports of the Extension Service, U. S. Department of Agriculture.

TABLE 7.—*Distribution of expenditures by projects, all States, years ending June 30*

Projects	1915		1920			1923			1925			1927			1928			Per cent of change, 1923 to 1928
	Total expenditures	Per cent of total	Total expenditures	Per cent of total	Per cent of change	Total expenditures	Per cent of total	Per cent of change	Total expenditures	Per cent of total	Per cent of change	Total expenditures	Per cent of total	Per cent of change	Total expenditures	Per cent of total	Per cent of change	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Administration	$295,308	8.44	$995,052	6.79	236.95	$1,226,809	6.64	23.2	$1,132,491	5.86	[1] 7.7	$1,064,772	5.28	[1] 6.0	$1,104,829	5.34	3.8	[1] 9.9
Printing and bulletin distribution	71,598	2.05	308,629	2.11	331.06	332,987	1.80	7.9	393,723	2.04	18.2	367,432	1.82	[1] 6.6	281,366	1.36	[1] 23.4	[1] 15.5
County agent work	1,902,231	54.38	7,665,177	52.29	302.96	9,625,817	52.07	25.5	9,936,517	51.40	3.2	10,417,473	51.71	4.8	10,428,075	50.43	.1	8.3
Home demonstration work	319,822	9.14	2,177,025	14.85	580.69	2,790,419	15.10	28.1	2,998,862	15.51	7.5	3,230,811	16.04	7.7	3,473,386	16.80	7.5	24.5
Boys' and girls' club work	182,930	5.23	883,616	6.03	383.03	991,180	5.36	21.7	1,059,714	5.48	.7	1,095,659	5.44	3.4	1,213,207	5.87	10.7	12.2
Extension school—short course and instruction	297,282	8.50	220,640	1.51	[1] 25.78	219,066	1.19	[1] .8	261,868	1.35	19.5	244,949	1.22	[1] 6.4	229,514	1.11	[1] 6.3	4.8
Exhibits and fairs	14,019	.40	23,245	.16	65.81	18,521	.10	[1] 20.3	22,300	.12	22.2	37,106	.18	66.4	22,999	.11	[1] 38.0	24.2
Publicity									45,968	.24		154,676	.77	236.5	233,881	1.13	51.2	
Correspondence courses	8,443	.24	24,998	.17	196.08	35,322	.19	46.6										
Home economics specialist			332,415	2.27		502,968	2.72	51.3	610,119	3.16	21.3	590,798	2.93	[1] 3.2	596,915	2.89	1.0	18.7
Animal husbandry	31,970	.91	231,142	1.58	623.00	338,875	1.83	46.6	368,775	1.91	8.8	417,323	2.08	13.2	409,316	1.98	[1] 1.9	20.8
Poultry	9,470	.27	151,162	1.03	1,496.22	270,060	1.46	79.0	281,095	1.45	3.9	325,017	1.61	15.6	348,699	1.69	7.3	29.1
Dairying	106,098	3.03	276,918	1.89	161.00	369,725	2.00	33.5	383,406	1.98	3.7	337,173	1.67	[1] 12.0	356,781	1.73	5.8	[1] 3.5
Animal diseases	4,564	.13	63,201	.43	1,284.77	54,798	.30	[1] 13.2	35,843	.19	[1] 34.5	30,800	.15	[1] 14.0	36,689	.18	19.1	[1] 33.0
Agronomy	20,913	.60	218,019	1.49	942.50	388,280	2.10	78.0	413,403	2.14	6.5	403,985	2.01	[1] 2.2	437,966	2.12	8.4	12.8
Horticulture	29,928	.86	190,601	1.30	536.87	316,237	1.71	65.9	317,171	1.64	.3	357,277	1.77	12.6	351,738	1.70	[1] 1.5	11.2
Botany and plant pathology	4,923	.14	196,723	1.34	3,896.00	84,167	.46	[1] 72.1	101,697	.53	20.8	93,007	.46	[1] 8.5	98,896	.48	6.3	17.5
Entomology	3,940	.11	88,680	.60	2,150.76	111,120	.60	25.3	104,266	.54	[1] 6.2	121,702	.60	16.7	127,881	.62	5.1	15.1
Rodent pests			129,141	.88		176,223	.95	36.5	144,785	.75	[1] 17.8	7,407	.04	[1] 411.6	7,239	.04	[1] 2.3	[1] 310.8
Forestry	3,965	.11	10,695	.07	169.74	14,188	.08	32.6	30,919	.16	117.9	115,837	.58	274.6	127,658	.62	10.2	799.8
Agricultural engineering	13,042	.37	125,161	.85	859.68	177,601	.96	41.9	155,621	.80	[1] 12.4	158,365	.79	1.8	171,076	.82	8.0	[1] 3.7
Farm management	51,531	1.47	116,381	.79	125.85	163,831	.89	40.8	169,454	.88	3.4	178,546	.89	5.4	177,215	.85	[1] .3	8.1
Rural organization	5,060	.14	30,026	.20	493.40	37,050	.20	23.3	64,422	.33	73.9	69,182	.34	7.4	64,264	.31	[1] 7.1	73.4
Marketing	2,299	.07	179,621	1.23	7,713.01	171,272	.93	[1] 4.6	169,132	.87	[1] 1.2	172,233	.85	1.8	216,307	1.04	25.6	26.3
Miscellaneous	119,478	3.41	19,819	.14	[1] 834.12	68,328	.36	244.8	130,819	.67	91.5	155,790	.77	19.0	161,526	.78	3.7	23.6
Total	3,498,814	100.00	14,658,081	100.00	318.94	18,484,844	100.00	26.1	19,332,370	100.00	4.6	20,147,320	100.00	4.2	20,677,423	100.00	2.6	11.9

[1] Decrease.

This tendency toward reduction in overhead expense in extension work may be noted both in the table showing average annual budgets and in the table showing total expenditures of all States for each major grouping of expense. With steadily increasing total budgets the amount expended for administration has tended to decline in average amount expended by the States (Table 6) and also in the percentage of the total expenditure devoted to administration (Table 7). Only 10 of the 47 States reporting on this question indicated any increase in this item of expense and the largest single step-up was explained by a rapid growth of the service and a change in the method of bookkeeping.

A detailed study of the reports indicates, however, the need for a better understood definition of what items of expense should be charged to "administration." Uniformity of accounting practice based on a well-understood definition would permit comparisons that would be helpful to administrators in their study of this problem. Pending such definition, figures that show large reduction of administrative expense must be regarded with considerable suspicion.

Expenditures for "publications."—The expenditures for "publications and their distribution" show wider variations between the States than does any other group of expenses. While the average amounts given in Table 6 indicate an increase in the years following 1923, it is apparent that many States have not developed this phase of the work in proportion to other activities.

The reports show that four institutions spent less than $600 annually for printing and publications during this period, three others spent less than $1,000 each, and 23 States, or approximately one-half, expended less than $5,000 each for this important part of the service. However, 12 of the institutions report an average expenditure of more than $10,000 annually and one spends more than $122,000 annually for providing reading matter for its constituency.

Recent studies in efficiency of methods employed in extension work have suggested that bulletins, circulars, news service, and other types of publicity rank higher in effectiveness at a much lower cost per unit of result than any other method. Although these results are not conclusive, there is need that this subject be given serious consideration by the administrators of extension organizations.

County agricultural agent work.—The cost of "county agricultural agent work" constitutes the major share of the total budget in practically all States. The average distribution was more than half of the total expenses for this item and the range within States did not fall below 21 per cent in any State and ran as high as 65 per cent of the total in several States. With the increase in total funds from 1923 to 1926 the allotments for field workers steadily increased. While the average percentage distribution through the 5-year period for the total of all States was very uniform the variations among States were in proportion of the size of the State budgets and the extent to which the county agent system had become established.

The allotments as reported for 1927 were grouped as follows: More than $400,000, 4 States; $300,000 to $399,000, 4; $200,000 to $299,000, 12; $100,000 to $199,000, 11; $50,000 to $99,000, 6; $25,000 to $49,000, 5; and less than $25,000, 4. The maximum expenditure in any State was $634,100, and the minimum expenditure in any State was $6,240.

Home demonstration work.—The budgets provided for "Home demonstration agents," while not as large as for agricultural agents, show a more rapid rate of increase than for any other activity and illustrate the interest that is being developed in this phase of the extension program. Because of the well-developed plans for the training of local leaders in this field and the efficient organization and presentation of subject matter, it has been demonstrated that more people have been reached and more home practices affected per worker and per dollar expended than for any other type of extension work. It is likely that the expenditures for this activity will continue to expand at a more rapid rate than other items because of the tremendously large field to be developed and the relatively small field force now employed. The trend toward this development was quite marked in 1928 and 1929 by reason of the administrative policies adopted for the expenditure of the Federal Capper-Ketcham fund, first made available in 1928–29.

Boys' and girls' club work.—The amount reported as being expended directly for boys' and girls' club work does not represent the proper share of the total budget that should be classified as expenditure for the work done in this phase of the extension service. The amounts and proportions shown in Table 6 include only the expenditures for the actual State club staff and the relatively few county club agents. As a matter of fact, the largest share of the club program of work in most States is done by the county agricultural and home demonstration agents. The United States Department of Agriculture, from a recent study of this point estimates that from one-fourth to two-fifths of the time of county agricultural and home demonstration agents is spent on boys' and girls' club work. This means that a goodly share of the 52 per cent of the total budget now reported under "County agricultural agent work" and a portion of that charged to "Home demonstration work" should properly be allocated to "Club work." Such allocation would more accurately represent the amount that is actually being expended for this activity.

Subject-matter specialists.—About one-sixth of the average total budget was spent for agricultural specialists during the period 1923 to 1927. Considerable variation was noted, however, in the reports from the various States in the amounts expended even though the percentages of the total budgets were quite similar in most States

These variations were as follows: More than $100,000, 5 States; $75,000 to $100,000, 6; $50,000 to $74,000, 14; $25,000 to $49,000, 10; $10,000 to $24,000, 9; and less than $10,000, 2. The maximum expenditure in any State was $213,352, and the minimum expenditure in any State was $6,796.

The allotment of funds for the employment of specialists shows a progressive increase over the 5-year period in approximately the same proportion as the increase in the total budgets, indicating that as resources became available this part of the service received a reasonable amount for necessary expansion.

The expenditures for home-economics specialists indicate the maintenance of a much smaller staff of field workers, the proportion being about $1 for this work to $5 expended for agricultural specialists. The increase from 1923 to 1927, however, was 17 per cent, which was considerably greater than the rate of development in other groups.

Among the 39 States that furnished information much the same relative variations were reported as in the agricultural work, although much smaller amounts were involved. These groupings were as follows: More than $25,000, 3 States; $10,000 to $25,000, 20; $5,000 to $9,000, 12; and less than $5,000, 4. The maximum expenditure in any State was $50,660, and the minimum expenditure reported by any State was $3,760.

In connection with expenditures for subject-matter specialists and in view of the fact that legislative authorities are sometimes inclined to believe that expenditures for extension personnel outside that assigned to the counties should be kept at a minimum, it is interesting to note that almost three-fourths of the total amount for Smith-Lever extension was expended directly in the counties. The total amount used for the employment of subject-matter specialists has been less than 18 per cent of the average budget in any year since the establishment of the work.

It is interesting and important also to examine the facts in regard to emphasis upon subject-matter fields as shown by the financial data contained in Table 6. The period from 1923 to 1928 is selected for consideration because 1923 marks the date upon which the maximum Smith-Lever appropriation became available and may be regarded as the beginning of the period of a definitely organized and firmly established system of project lines of work. During this period expenditures for home-economics projects increased 19 per cent; animal husbandry extension, 21 per cent; poultry work, 29 per cent; plant-disease projects, 18 per cent; rural organization and community activities, 73 per cent; and marketing extension, 26 per cent.

On the other hand, there were decreases in relative proportions of total expenses in such lines as animal disease, rodent pest extermination, and in the project of dairying.

Collection and handling of funds.—How are Smith-Lever extension funds collected, administered, assigned to specific purposes, and what are the questions and problems that arise in connection with the cooperation of Federal, State, and county governments, and private sources in providing and expending these funds?

In accordance with the Smith-Lever Act of 1914, Congress annually appropriates $4,580,000 for distribution in equal semiannual payments to the treasurer or other authorized office of each of the States upon warrant of the Secretary of Agriculture. Allotment to the States of this money and of supplementary funds provided by later legislation is calculated on the proportion which the rural population of each State bears to the total rural population of the United States. The State allotments under this provision are shown in Table 8.

TABLE 8.—*Maximum amounts of Federal funds available to each State under the terms of the cooperative extension act* [1]

State	Regular 1925–26	Supplementary 1925–26	State	Regular 1925–26	Supplementary 1925–26
Alabama	$156,690.28	$46,511.55	Nevada	$14,958.05	$1,572.06
Arizona	27,281.67	5,479.56	New Hampshire	23,028.65	4,131.04
Arkansas	126,604.08	36,972.02	New Jersey	63,735.67	17,038.14
California	97,361.48	27,699.98	New Mexico	33,561.01	7,471.52
Colorado	48,798.96	12,302.11	New York	153,222.19	45,411.92
Connecticut	45,442.29	11,237.80	North Carolina	175,029.60	52,326.46
Delaware	18,155.63	2,585.93	North Dakota	54,563.97	14,130.04
Florida	58,872.25	15,496.08	Ohio	176,106.99	52,668.07
Georgia	182,944.65	54,836.11	Oklahoma	128,765.52	37,657.36
Idaho	34,955.14	7,912.60	Oregon	41,300.38	9,924.51
Illinois	175,895.10	52,600.88	Pennsylvania	258,268.20	78,719.18
Indiana	125,473.54	36,613.55	Rhode Island	11,213.92	384.90
Iowa	131,934.33	38,662.10	South Carolina	120,862.85	35,151.64
Kansas	101,841.56	29,120.50	South Dakota	52,652.38	13,523.92
Kentucky	152,241.30	45,100.93	Tennessee	147,739.98	43,673.65
Louisiana	103,361.43	29,602.40	Texas	261,326.40	79,688.86
Maine	47,369.04	11,848.72	Utah	28,651.72	5,913.96
Maryland	56,287.11	14,676.40	Vermont	29,341.01	6,132.52
Massachusetts	26,122.68	5,112.07	Virginia	140,444.28	41,360.38
Michigan	123,823.55	36,090.40	Washington	58,492.59	15,375.70
Minnesota	116,538.75	33,780.58	West Virginia	97,326.55	27,688.90
Mississippi	133,687.00	39,217.83	Wisconsin	120,684.26	35,095.01
Missouri	154,958.78	45,962.54	Wyoming	20,933.14	3,466.60
Montana	40,064.49	9,532.64			
Nebraska	81,082.60	22,538.38	Total	4,580,000.00	1,300,000.00

[1] Department Circular 251, U. S. Department of Agriculture.

In addition to money support thus provided, all correspondence, bulletins, and reports for the purposes of the Smith-Lever extension work are entitled to transmission through the mails without payment of postage. The money value of this privilege is difficult to determine. It is also impossible to estimate accurately the value of the services of extension specialists in the Department of Agriculture who are lent to the extension services of the States that desire such help.

The act further provides that payment may not be made until a sum equal to the State's allotment from Federal Smith-Lever funds, less $10,000 per State, shall have been provided by the State, county, college, local authority, or by individual contributions from within the State. The money thus provided as an offset to Federal Smith-Lever money is subject to the same restrictions as to use and accounting as govern the Federal Smith-Lever funds under the specific provisions of the act or by reasons of regulations prescribed by the Secretary of Agriculture. None of the combined State-Federal Smith-Lever money may be used for purchase of land or buildings, for college course teaching, circulating libraries, correspondence courses, or to influence Congress in any manner, and the amount that may be expended for printing and distribution of publications is limited to 5 per cent of the annual amount of Smith-Lever funds. Various other less important conditions are prescribed by the rulings of the Department of Agriculture in regard to types of expenditure. In addition supplementary funds, amounting to $1,300,000 provided in the agricultural appropriation act of 1926 are restricted in such manner as to prescribe that not less than 77 per cent of these supplementary funds shall be expended for the salaries of county extension agents.

An accounting system is prescribed by the Secretary of Agriculture which provides that accounts and vouchers for all funds used in extension work under the Smith-Lever Act shall be kept at the college in each State receiving the benefits of the act. The rules provide for separate accounting to the Secretary of Agriculture for Smith-Lever Federal funds and funds from within the State used to offset that fund. Although all the provisions are not observed apparently, the regulations require that vouchers for expenditures from funds contributed by counties, local organizations, or individuals shall be approved by the State director of extension work as well as by the county officer or other representative of the contributing parties and be paid by the county or other local treasurer, who should file a certificate of payment with the director of extension work. Further, a separate account must be kept for each project under each fund from which paid. The vouchers must be classified according to the projects actually approved by the United States Department of Agriculture. Annual reports from the college extension service and from county extension workers are required in accordance with schedules prepared by the department.

Financial accounting for Smith-Lever funds in accordance with the provisions of the regulations prescribed by the Department of Agriculture is subject to criticism of institutional finance officers and of their associations, not on the basis of objection to specific requirements, but on the ground of diversity of practice. The different accounts required by various Federal departments that are responsible for funds received by the institutions tend to complicate institutional bookkeeping. Since this matter is not peculiar to Smith-Lever extension relations, but involves other Federal aids to the land-grant colleges, it will be discussed in connection with institutional treatment of these problems in the section dealing with business management and finance.[1]

In few instances did a director of extension regard the provision that Federal money must be matched with money from within the State in any other light than that of a distinct advantage. Relationships with the Federal Department of Agriculture are such that, in spite of occasional friction, the benefits of the cooperation, especially with reference to funds, are such as to outweigh any other consideration that might be of force in the minds of extension directors. But three States indicated objections. One of these pointed to the probability of developing antagonism to Smith-Lever work if the procedure is continued with future appropriations. An interesting problem is involved here. The question might be raised concerning the point to which Federal support of an educational movement should be carried and to what extent the "offset" provision should be applied as a blanket requirement for all States. Initiation of and continued stimulation of such an educational system may well be a foremost function of the National Government, but the decisions as to limitations and the reaching of maximum support are difficult to make.

Satisfaction with the "offset" plan is not so generally the situation with reference to general administrative officers of the institutions. A single criticism, not based on abstract theory alone, frequently has been discussed by presidents and some educational officers, the contention that in order to match Federal money the resident departments are sometimes starved and the State program of education distorted. Since, however, this is a general objection to all Federal subsidies that carry the "offset" provision and is not peculiar to Smith-Lever funds, detailed discussion of this matter will be found in the chapter dealing with the business management and finance of the institutions as a whole.

State financing.—In the great majority of States the directors of extension make the decisions as to allotments of funds for the various projects that make up the county programs of work. Leaders of projects submit statements of budgetary requirements, including salary adjustments, and by conferences and discussions administrative decisions are made upon the basis of available funds and the relative importance of projects.

[1] See Vol. I, Part III.

Administrative decisions are not easily made as to adoption of new projects, either as additions or as substitutes for work under way. State funds used for Federal offset are rather closely limited as to use, while appropriations above offset requirements are restricted to specific purposes in most States.

The requests for increased State extension appropriations are considered, in most States, to be an institutional responsibility. These requests are usually included in the total budget and submitted to the State legislature either as a distinct item of the total askings or as a separate appropriation. In other States the appropriation requests for extension work are kept entirely separate from other institutional askings and the responsibility for submitting the measures and for obtaining favorable support for their passage is left entirely with the extension administration.

It would seem logical and just that legislative requests in all States should be included in the larger institutional budget—to be promoted along with other requests by institutional administrators, not as a separate and distinct type of educational activity, but as an essential part of an institution's function.

County financing.—While cooperative financing of Smith-Lever extension work has many advantages, dependence upon voluntary assistance for extension support is largely responsible for the fact that nearly half of the institutions list insufficient and uncertain funds as the outstanding weakness of the system. In most cases it is the uncertainty of county financial support which seems to be of greatest concern.

The plans that have been developed for financing county workers vary widely and utilize a number of combinations of funds from contributory sources. Three-fifths of the States report the payment of county agents' salaries on the basis of approximately one-third from Federal funds, one-fourth from State funds, and two-fifths from county appropriations. In only four States are all salaries of county workers paid from State and Federal funds with expenses derived from county funds. In one State, the county farm bureaus contribute one-half the salary of the county agents and in two others these private farm organizations pay one-third of the salaries. Twenty-two per cent of the entire budget for extension work is supplied by local county governments. County appropriating officials are elected by the people and have political affiliations. Their actions, therefore, are colored by political expediency. This means that county appropriations for extension work are subject to attack at any time. A very small number of individuals who for various reasons may be opposed to the work, can make a great deal of noise to which county officers frequently lend willing ears if there is a chance of decreasing appropriations.

There is another difficulty involved here. In many States county funds go toward the salaries of agents. These salaries are frequently higher than those of most county officials and this creates an embarrassing situation for appropriating bodies. Then, too, a salary of say $2.500 for a county agent seems quite large to many farmers who are unfamiliar with all of the factors that determine the salaries of this group of workers. It therefore becomes difficult, if not impossible, to hold good men in the service when salary increases must come from county funds. The uncertainty of funds, especially county funds, which arises from the method of financing extension work in State and counties calls for serious consideration in connection with the problem of staff turnover. In 1927, nine States had a turnover of 20 per cent.

A few States now pay the entire salary of county workers. In such instances local expense such as travel in the county and office assistance and supplies are paid from county funds. Several other States have taken definite steps to secure sufficient increases in State funds to put such a plan into effect. In reply to the question of the desirability of paying all salaries of county workers from State and Federal funds and all expenses from public county sources, 36 States favored the proposal, while 10 did not favor the plan.

This method of financing county work possesses several advantages over the present method. First, the determination of salaries rests with administrative officials at the college of agriculture. They know what salaries are necessary to hold good men. Second, counties are much more free to appropriate for local expenses than for salaries. Third, under the present system, if a county appropriation is cut off the agent is left without a job. The college has no budget to support him unless and until a vacancy occurs. If his salary were paid from State and Federal funds he could be temporarily transferred to another position until a vacancy occurred. This would relieve the agent of the constant fear of having his local support cut off and would leave him free to develop a program more completely removed from any chance of political influence than is now possible. Fourth, it would make it possible to place and keep good men in counties having low tax duplicates and hence relatively small possibility of making large appropriations.

Operating expenses.—The sources of operating expenses of county workers also vary widely, but a common method of financing this cost is a rather definite dependence upon county funds. Thirty-eight institutions indicated a decided preference for the plan of paying operating expenses from local funds while five expressed disapproval of the proposal. It is significant, however, that no State reported in favor of the use of private funds in planning the budgets and in direct support of the project work. In one-fourth of the States the county pays the entire expense, in four others the county farm bureau meets this charge, while in more than half of the reports State and county funds combined in the ratio of 1 to 2 took care of operating the service. Fifteen States report using county farm bureau funds and four others indicate other private sources of finance. While the total contribution of private funds is 5 per cent of the total extension budget, three-fourths of this is expended in two States, leaving a relatively small amount to be distributed over the other States. It is quite apparent from the replies on this point that a portion of the county farm bureau contributions are not regularly reported in a number of the States, and, therefore, the amount actually being used in extension work is somewhat larger than indicated.

The method of disbursing and accounting for county and private funds is important. In seven of the States the county funds are sent directly to the institutions to be disbursed in the same way that State and Federal funds are handled. In 22 of the States, local county authorities disburse these funds by order of the director of extension or of the dean of the institution concerned. In 16 instances, however, the payments are made directly to the agents by county authorities. In these cases the State extension administration may or may not approve and may or may not audit such payments.

Some variation exists in the handling of farm bureau and other private contributions. In nine of the States these funds are paid directly to the county workers by the organization. In four others they are paid by order of the directors of extension, and in six States by order of local-county public authorities. The payment of such funds directly to public educational agents by private agencies tends to develop opportunities for embarrassing administrative relations. Such practice is not good procedure.

The methods of providing transportation expenses within counties vary somewhat in the different organizations. In 21 States the extension agents own and operate their own cars on a mileage-rate basis. The most common rate quoted was 10 cents per mile with a range from 7 to 15 cents. Thirteen States report that the automobile rate on a flat monthly-allowance basis ranges from $30 to $50 per month. In 14 States the most common method is county ownership of the cars used by the agents with operating expenses paid by county funds. In some States all three methods are used.

In reply to the question as to what are the most important next steps looking to the improvement of extension work, one-fourth indicated that in their opinion the most important improvement that can be accomplished is the establishment of a better financial system. The great majority stated specifically that the change they believed to be desirable is the payment of all salaries from State and Federal funds, with operating expenses from county funds, or, more desirable than that, the maintenance of the entire system by State and Federal funds. This desire for adequate, sound financing involves more than the obtaining of increased funds for growth and further development of the extension system. A very important principle is involved.

The county agent is a publicly supported teacher and leader of thought and action in rural communities for the purpose of assisting in the development of people through the teaching of methods and principles that result in improved farm and home practices. Therefore, the place and work of a county agent is that of a public leader—a teaching and demonstrating leader. In his leadership he is working with all members of the public and he should be working on a well-planned, long-time program, arising from definite local needs and built with the aid of local community representatives. It follows that he should assume the rôle of director and teacher by stimulating constructive thought and action by those with whom he is working. The present method of financing county agent work in some States entails using Federal, State, and county funds from public sources, together with funds privately subscribed by members of farm organizations.

Reports from the institutions indicate the following objections to this situation or to conditions that are likely to arise from it:

(1) The agricultural extension work is of such a public nature and has such a public function as to demand that all members of the public receive equal service; that is, nonmembers of a farm organization are entitled to the same service as those who are members of the organization and who pay their dues and thus support the extension work directly.

(2) The haphazard manner in which local money is obtained in many counties makes it difficult to establish a permanent type of extension program with an agent located more or less permanently in the county and thus able to project a long-time piece of work of an extension nature. This means that the county agent often must play politics and place himself under obligation to certain groups or individuals. Under such conditions he is not always an independent educational agent.

(3) The county farm organizations in the main are not strong financial organizations. They have a difficult time maintaining their memberships and the contributions they make to the extension service leave them without sufficient funds to carry on certain types of organization work and to maintain and institute commercial activities in which the members are interested. Thus, extension work tends to rob the organization of funds necessary for its own activities.

(4) Local organizations develop plans for commercial activities of various kinds, both in buying and selling, in which the county agent becomes involved because of his dependence upon the organization for a part of the funds required to maintain the work. In

many instances the clerk of the county agent's office may be requested to serve as an employee of a commercial enterprise of the farm organization which is in competition with other business interests. This, therefore, tends to develop factions and ill feeling, and may lead to complaints against such activities.

(5) Too large a part of the time of supervisors in the State offices is spent in maintaining "fences" and insuring continued private support and county appropriations. While the work of these supervisors should be on extension methods, programs, and projects from the standpoint of getting more and better work done, their time is spent in circulating petitions, meeting local committees for financing purposes, and developing ways and means of bringing about the kind of sentiment that will permit the continuation of private funds as well as public county funds.

On the other hand, it is apparent from the replies that continued interest of local people is often enhanced by the payment of fees or contributions to the extension fund. It is believed by many that this tends to increase local responsibility and that people tend to value the service more highly because of such contributions. This is a strong argument for local financial cooperation.

Another phase in the further development of extension work emphasized by a fourth of the institutions was the need for the employment of more home demonstration agents in order to develop the home project work on a more equitable basis with the agricultural projects. This need has a direct relation to financing, for the present plan of obtaining county funds in many of the States has developed very difficult problems for those who are interested in increasing the number of county home demonstration agents. Too often the county budget is prepared on the "agricultural" basis first, then home needs are considered, and if sufficient organization work has been done and sufficiently strong influences are brought to bear upon appropriating "boards" an additional sum may be added for this phase of the program of work. If the total budget for the two agents is barely enough on which to exist and emergency situations arise which threaten to affect the prosecution of the program, the county agricultural agent usually in charge of the county program quite naturally protects his own interests first. This tends to create administrative and financial problems which affect the permanency and effectiveness of the entire program of work.

With 60 per cent of the agricultural counties of the United States without county home agents, and with an ever-growing demand for a strong educational program with farm women, and with the present interest in the development of the farm home, coordinate with and superior to the agricultural program in its effect on "a desirable rural life," it is to be expected that the need of sufficient money for developing this phase of the extension system will receive more adequate recognition in the near future.

One-fourth of the institutions indicated as one of the advisable next steps the expansion and improvement of the quality of the junior club program. While only five gave this as the first important need, it has the same important relation to a change in the method of financing as has the development of the home program, and therefore, directly or indirectly, it was listed by the majority of replies as one of the important phases of extension services in need of further development.

From the county club leader standpoint there is vast room for expansion. Fully 90 per cent of the agricultural counties are without paid club leaders. Only 1 out of 20 rural boys and girls of club age (10 to 20 years) is being reached with this organized program of work designed to teach the skills of agriculture and home making and the ideals of leadership and citizenship.

Future financing requirements.—In the year ending June 30, 1928, the expenditures for agricultural extension work in the United States totaled almost $21,000,000. The administrators of the State organizations were requested to estimate the amount of money that would be required to employ sufficient personnel to complete the organization set-up in each State within a 10-year period. Due to the widely varying differences in the extent to which the organizations have been developed, the estimates vary widely. One State reported needing but $7,260 to complete its organization. At the other extreme was $760,000. The average of 35 estimates was $207,500, which on the basis of a similar average for 48 States would amount to approximately $10,000,000. This would bring the annual total extension budget to about $32,000,000 if present plans and methods are continued and completed without essential modification.

Chapter IV.—Smith-Lever Personnel

The type and character of personnel are basic in the development of the program of work in any organization. The particular form of organization may be relatively unimportant, methods of administration and of operation may vary widely, but the outstanding qualities possessed by the personnel tend to give an organization the standing that it has in the particular field of endeavor in which it is engaged. That this applies to the Smith-Lever extension organizations is clear from even cursory examination of the character of staff personnel maintained by extension services in the States that have the highest standing and records of achievement as compared with those that are of little reputation beyond local circles. The facts concerning Smith-Lever extension personnel as reported by 43 institutions are summarized in an attempt to illustrate the general status and principal variations of the factors that determine staff character. For convenience of presentation this discussion will be grouped under the two classifications of personnel information and staff management.

Personnel Information

An outstanding feature of Smith-Lever extension workers is their youth. Table 9, which gives the facts about the age and experience of the various groups of extension workers, indicates that 77 per cent of the entire personnel are less than 40 years of age. This is, of course, to be expected in an organized system that is less than 15 years old. Further, work in the county organizations makes severe physical demands upon the workers and requires the active vigor of early life. Perhaps, also, the relatively low salary scale for this work in many States results in its being largely a "beginner's" job, in which losses must be constantly replaced by fresh recruits.

Quite naturally the administrative workers are older and are found concentrated in the range from 40 to 50 years of age, while the specialists, many of whom are recruited from county workers and teachers of agriculture and home economics, tend to fall into the younger age range between 31 and 40 years. With but 7 per cent of the workers above the 50-year mark, it should be expected that this part of the institutional organization for agricultural education would be characterized by a virile, active personnel fired with the spirit of service and imbued with the idea of making real progress in its field of work.

TABLE 9.—*Staff information regarding extension workers—Age and farm experience, 43 institutions reporting*

Position	Number employed	Age range					Number reared on farm	Number owning farms	Number managing farms	Without farm experience	Managed home	Number having no research experience	Number having 1 years' teaching experience or more	
		Under 30	31 to 40	41 to 50	51 to 60	Over 60							High school	College
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Director	43	0	3	25	10	2	33	14	5	0	1	26	10	15
State leaders:														
Agricultural	54	0	20	22	8	2	44	10	8	0	0	15	15	10
Home	42	1	14	20	4	3	20	5	2	5	8	3	22	14
Club	34	0	14	13	3	0	27	11	3	10	1	1	9	8
Assistant State leaders:														
Agricultural	91	4	41	31	9	3	75	24	6	2	0	6	18	6
Home	62	6	35	15	4	1	35	4	0	12	4	6	31	9
Club—														
Men	37	4	25	3	2	0	24	2	4	1	0	1	16	3
Women	29	7	16	4	1	0	14	0	2	4	0	0	15	0
Specialists:														
Agricultural	447	82	202	96	21	8	296	69	28	6	4	60	63	106
Home economics	127	35	56	22	4	1	55	11	0	40	13	6	63	30
County agricultural agents	1,992	339	1,014	341	94	24	1,640	327	104	32	4	90	513	99
County home agents	855	339	302	126	39	6	531	35	7	119	9	11	333	43
Club agents:														
Men	78	39	27	6	2	0	45	11	7	2	0	0	23	1
Women	28	22	5	1	0	0	11	0	0	0	1	0	16	0
Assistant agricultural agents	95	49	20	9	4	1	83	11	4	1	1	4	12	5
Assistant home agents	31	13	4	8	0	0	23	1	1	7	1	0	12	1
Assistant club agents [1]	16	10	2	1	0	0	1	0	0	0	1	0	4	0
Editors	42	5	19	6	1	1	20	3	0	0	3	6	4	9
Total		955	1,819	749	206	52	2,977	538	181	241	51	235	1,179	359

[1] Women.

However, age is but one factor. Several others are important in determining the character of personnel employed in Smith-Lever work. The practical nature of the demands for development of technical skills in farming and home making has tended to stress the need of practical experience in these fields, perhaps to some neglect of demands for institutional training in the science and technique of these professions.

It is to be expected that scientific workers in agricultural extension would be recruited from the occupations with whose interests they are called upon to deal. Administrative authorities thus expect to secure in these workers a background of interest and of experience with the practices and problems of the agricultural and home economic vocations. While farm-mindedness may be a very indefinite term, it has a well-known meaning and sometimes an exaggerated importance among agricultural educators. A sincere interest in and a sympathetic understanding of rural people and of their problems is intended to be covered by this term. Agricultural college administrators seem to agree quite generally that this interest and understanding are best developed by a background of farm experience.

The reports relating to the factor of experience show that three-fourths of all extension workers were reared on farms, and that of those engaged in agricultural projects, 98 per cent have had practical farm experience. Of the same groups the replies indicated that 23 per cent owned or managed farms as a method of capital investment or personal activity in addition to their regular employment.

Further study of the reports in regard to other types of experience showed that 28 per cent of the total staff had taught high-school classes and about 8 per cent had had college teaching experience. Within the groups it was to be noted that one-third of those engaged in supervisory and specialists' lines of work reported having had college teaching experience, while a smaller proportion indicated research experience in experiment-station work.

Table 10 presents further facts concerning the training of workers. It will be noted that the county-agent group contains the largest number with no college training. This is explained by the employment of practically trained men in the early years of county-agent service at a time when the demands for personnel exceeded the supply of college graduates who were otherwise fitted for this special line of work. A bachelor's degree in agriculture or home economics is now a definite requirement for the position of county agent in two-thirds of the institutions, while the others strongly emphasize college training as a requirement. It is also significant to note the relatively large number of agricultural and home-demonstration agents who during the past five years have been given leaves of absence for study and have received advanced degrees.

TABLE 10.—*Institutional training of agricultural extension workers*

Position	Number with no college training	Number with less than bachelor of science degree	Number with— Bachelor of science degree	Master's degree	Doctor's degree	Professional courses in education	Number of leaves of absence in last 5 years for study	Number receiving advanced degrees in last 5 years	Number of published bulletins
1	2	3	4	5	6	7	8	9	10
Directors	0	0	27	12	6	4	13	8	34
State leaders:									
Agricultural	0	7	37	9	0	7	22	3	25
Home	0	8	22	8	0	18	11	1	28
Club	2	14	17	10	1	10	13	3	33
Assistant State leaders:									
Agricultural	1	23	55	5	0	12	12	4	5
Home	0	20	35	3	1	21	11	1	15
Club—									
Men	0	2	26	5	0	7	5	2	12
Women	0	3	20	1	0	10	3	1	7
Specialists:									
Agricultural	8	24	276	100	17	42	45	45	226
Home economics	0	11	64	32	2	30	11	19	79
County agricultural agents	171	329	1,453	79	1	235	137	22	25
County home demonstration agents	23	333	401	33	0	287	120	10	5
County club agents:									
Men	1	11	56	1	0	12	9	2	3
Women	0	4	21	0	0	1	0	0	1
Assistant county agents:									
Agricultural	8	7	77	8	0	6	2	7	4
Home demonstration	3	1	20	2	0	11	0	1	2
Club (women)	0	2	9	0	0	4	0	0	0
Editors	1	5	30	2	0	10	4	1	6
Total	218	794	2,646	310	28				

Table 11 presents the distribution of extension workers as to college training and various types of experience. The percentage distribution is significant. It is apparent that supervising leaders in agricultural extension were selected in the early days of extension work without rigid requirements as to college training, teaching, or research experience.

Specialists in both agriculture and home economics quite generally possess college degrees. Eighty-nine per cent of the agricultural specialists have a bachelor's degree and 33 per cent a master's degree, while 85 per cent of the home-economic specialists have their first degree and 43 per cent their master's. One-fourth of the agricultural specialists have college-teaching experience and about one-seventh have taught in high schools previous to their extension employment. The previous teaching record of home-economics specialists is impressive and partially accounts for their success in local leader training. One-half have taught in high schools and one-fourth in college.

TABLE 11.—*Per cent of workers with experience qualifications*

AGRICULTURE

Position	Number	No college training	Less than bachelor of science	With bachelor of science	Master's degree	Reared on farm	No actual farm experience	With teaching experience: High school	With teaching experience: College	With research experience	Actual home management experience
1	2	3	4	5	6	7	8	9	10	11	12
Directors	43	0	0	100	44	77	0	23	35	60	------
State leaders	44	0	18	82	24	82	0	28	18	28	------
Assistant leaders	79	1	29	70	9	82	2	19	7	7	------
Specialists	308	3	8	89	33	66	1	14	24	13	------
County agents	1,953	8	17	75	4	82	1	26	5	4	------
Club agents	68	2	16	82	-----	58	2	29	1	0	------

HOME ECONOMICS

Position	Number	No college training	Less than bachelor of science	With bachelor of science	Master's degree	Reared on farm	No actual farm experience	With teaching experience: High school	With teaching experience: College	With research experience	Actual home management experience
State leaders	30	0	27	73	36	48	12	52	33	7	19
Assistant leaders	55	0	36	64	5	56	20	50	14	18	6
Specialists	75	0	15	85	43	43	20	50	24	5	10
Home demonstration agents	308	3	44	53	4	62	14	39	5	1	1

The training record of county workers, at first glance, presents an indication of an inadequately trained staff, but this is partially accounted for by the former emphasis upon practically trained people which carried a very strong appeal to local county boards in the earlier days of the service. It should also be pointed out that many of the agents may have had normal-school training.

Sixteen per cent of the agricultural agents and 44 per cent of the home agents had not received their first college degree, while but 4 per cent of each group had taken their master's work. It is significant, however, that 26 per cent of the farm agents had taught in high school, and 5 per cent in college, while 39 per cent of the home agents had high-school teaching experience, and 5 per cent had taught in college.

These records point to the very grave need of making it possible for the staff to find ways and means of continuing their training while on the job, preferably by leaves of absence for resident instruction.

In connection with the training of extension workers, it is important to note that Smith-Lever extension has progressed to the point of having its technique of organization and operation developed into courses of study as a part of the curricula of agricultural colleges. One-third of these institutions offer courses for credit in agricultural extension, while two-fifths of them include such courses in home economics.

The agricultural extension courses are elective in all the institutions, while in home economics two institutions have included them in the required work.

In six of the colleges the course work is accepted for postgraduate credit. In both agriculture and home economics the courses are given by both resident instructors and by members of the extension staff in 11 of the colleges, while in 6 the instruction is given wholly by representatives of the extension service.

As a part of such courses in methods of work, opportunity is given for practice work with county agents and specialists in eight of the institutions. In most instances the students serve as assistants in the counties without pay, but with field expenses provided. This sort of extension teacher training should be excellent experience for prospective extension workers.

No adequate course can be given without a practice requirement. Further, courses of study without field training have proved unattractive to students in a number of the institutions because extension positions have not been offered upon graduation unless supervised practical field experience has been obtained. For this reason some of the colleges report such training courses as being offered, but with few, if any, students enrolled.

As is to be anticipated, agricultural specialists are engaged most in productive work, with 226 publications to their credit. Home-economic specialists rank second, with 79 publications. Bulletins by the county staff are relatively meager in number, a condition that is explained by the practical nature of their major activity and by the fact that their training is less advanced academically than is the case of State leaders and specialists.

Staff Management

The training, experience, and productive activities of present members of the Smith-Lever extension staff give a very incomplete picture of staff problems and situations. Institutional management of the staff in large measure determines the character of the staff and the efficiency with which it operates. Certain phases of such management will be discussed in the following paragraphs under the topics (1) selection of staff, (2) distribution of time of staff, (3) provision for training in service, (4) leaves for advanced study, (5) academic ranking, (6) salaries, (7) tenure, (8) measures of efficiency, and (9) completion of staff.

Selection of staff.—That administrators are mindful of the importance of institutional training and experience as qualifications for selection to important positions is indicated by Table 12. This summary of the replies from 42 institutions shows the number that have definite employment requirements and those that place pronounced emphasis upon them.

TABLE 12.—*Requirements for selection of staff*

Nature of requirement	Staff subdivisions											
	Director		State leaders		Specialists		Agricultural agents		Home agents		Club agents	
	Required	Emphasized	Required	Emphasized	Required	Emphasized	Required	Emphasized	Required	Emphasized	Required	Emphasized
1	2	3	4	5	6	7	8	9	10	11	12	13
Bachelor's degree	15	2	14	2	14	1	----	----	9	4	6	3
Bachelor's degree in agriculture or home economics	24	3	30	10	32	6	39	15	24	16	15	9
Advanced degree	6	15	2	9	3	15	----	4	----	2	----	2
Farm experience (1 to 5 years)	14	9	18	15	16	19	22	19	3	10	10	11
Home or other experience	----	----	5	8	4	9	----	4	16	16	2	6
Teaching experience:												
High school	2	2	1	4	3	4	1	2	3	9	----	2
Smith-Hughes	----	----	----	----	1	2	2	5	2	5	----	2
College	2	3	1	2	2	3	----	----	----	----	----	----
Administrative experience	14	10	7	10	1	3	----	3	----	3	----	2
Professional educational training	1	7	2	4	2	7	2	6	3	7	----	6

The attainment of ideals in the selection of an extension staff often yields to practical conditions and even to expedient action at times. Nevertheless, it is apparent from a brief study of Table 9 that a number of institutions have not set the standard of qualification for employment high enough to insure a staff of sufficiently high caliber.

It would seem reasonable that all institutions should require that supervisors of extension teaching in agriculture and home economics should in the future be graduates of courses of study in these fields. It is highly essential that all subject-matter specialists be as well trained for this work as are resident teachers or research workers for their respective fields. The record indicates that such is not the case, either as to requirement or emphasis. This fact is partially responsible for the impression in many institutions of a relatively low standard of educational work in extension. The only adequate answer to this criticism is a highly trained staff with rigid requirements for selection and with opportunity for further training in service.

Attention is called to the requirements for county workers, particularly for home and club agents. Only one-half of the institutions require a degree in home economics for county work and only one-third demand such training for county club agents. Unless higher standards are maintained for these positions the record of performance will not favorably compare with those in other fields of extension service.

Methods of employing the State staff of specialists were described in the section dealing with responsibilities of specialists to subject-matter departments and to the extension organization.[3]

The methods of employment of county workers vary with the form of cooperation developed between the State institution and the county organizations. In 18 institutions county agents are selected from assistant agents in training. This training period varies from three to nine months. In other institutions the newly employed agents are brought to the central office for detailed instruction in administrative policies, methods of county work, scheduling of specialists, office organization, report forms, and for conferences with the subject-matter staff of the college. In both plans close supervision is usually given to the county work for the first few weeks of employment.

The process of selection of an agent is usually a cooperative matter between the supervisory representative of the extension administration and the local county board or committee. The ordinary practice consists of the selection of suitably qualified prospects by the college representatives, with definite recommendations as to necessary salaries and perquisites. The final selection is then made by the local representatives, usually with complete cooperation of the two agencies.

The removal of a county agent is not as easily accomplished as his employment. The record of performance is often much clearer to the administrator of his work than to local people. Weaknesses in ability to organize, in developing local leadership, in handling local problems, and in coordinating the various forces with which the agent is constantly cooperating may become apparent to his supervisor long before it is discovered by the local board. In these situations it becomes necessary to convince the governing boards of the existing conditions and to arrange a change of personnel.

On the other hand, the local people often discover the development of traits of character in the agent or methods of handling local problems that indicate the need for making a change in agents. The important point lies in maintaining close relations between the State supervisory force and the county groups charged with the responsibility of cooperatively administering a high standard of educational service.

Distribution of time of staff.—Administrative officers must know and be responsible for the way members of the staff employ their time if an effective and coordinated organization is to be maintained and if an articulated program of extension is to be carried on in actual operation. This basic principle of organization is not inconsistent with a large degree of freedom and of responsibility on the part of individual persons to whom duties are assigned. The prob-

[3] See p. 452.

lem is primarily one of administration and no rigid rule can be laid down that will be universally applicable.

The number of days in the field for State specialists or supervisors, for instance, is not at all a measurement or even an indication of efficiency in service. It does serve as a rough index of field demand and of relative volume of extension teaching or supervision away from the college. Obviously extension teaching in agriculture and home economics is organized on the plan of carrying subject matter to groups of people in their respective communities. This naturally requires field work and an indication of the acceptance of such teaching is the demand generated among local groups for the development of specific projects as a part of the adopted program of work. Hence, the continued record of a small number of days in the field raises questions about the reception of teaching and of supervision on the part of the State staff and concerning the ability and methods pursued by county extension agents.

On the other hand, there can be too many field days with insufficient time spent in the office preparing teaching material, and studying improved methods of presentation and of supervision. Well-organized subject matter is as essential as well-organized groups for the reception of the material. Successful teaching methods are as essential in the field as in the classroom—perhaps, in many instances, more attention needs to be given to presentation because of the conditions under which the teaching is done.

Table 13 presents the average number of days in the field and in the office spent by the State leaders and specialists, on the basis of a 3-year average, by staff divisions and projects, together with the average range of division of time as reported by 37 institutions. The average number of counties visited is included but the variation was very great in this item because of the wide variation in the size of the States.

TABLE 13.—*Distribution of time of agricultural extension staff*

Position	Number of days in field, average professor 3 years [1]	Number of days in office, average per person 3 years [1]	Range in days in field, 3-year average [1]	Range in days in office, 3-year average [1]	Number counties visited, 3-year average [1]
1	2	3	4	5	6
Director	96	171	21-165	85-250	27
State leaders:					
Agriculture	136	148	92-218	96-234	29
Home demonstration	130	142	51-183	80-204	34
Club	142	146	101-199	106-198	41
Specialists:					
Animal husbandry	154	119	104-231	87-165	42
Poultry	157	109	104-212	70-175	44
Dairying	164	118	90-213	71-176	41
Animal diseases	119	163	63-[illegible]	100-242	34
Agronomy	143	127	79-218	65-167	44
Horticulture	144	122	95-206	87-161	43
Botany (plant pathology)	132	131	49-186	88-192	43
Entomology	111	136	83-194	81-176	50
Rodent pests	113	164	124-161	141-165	26
Forestry—agricultural	127	134	77-218	71-185	31
Engineering	130	117	48-211	35-179	41
Farm management	121	148	43-190	88-189	30
Rural organization	159	109	105-250	50-169	49
Marketing	138	117	46-213	70-149	44
Clothing	139	119	100-219	67-196	34
Foods and nutrition	145	130	82-203	82-194	35
Home management	124	128	73-208	94-207	28

[1] Average for years 1925, 1926, and 1927.

In many States the general division of time, in the well-organized and more popular projects, runs about 60 per cent field work and 40 per cent office work—counting out annual leave, Sundays, and holidays. In those instances of minimum days in either field or office work, as illustrated in Table 13, questions might well be raised as to the causes for such extremes. More than 200 days of field work leaves very little time for constructive preparation of material and for association with institutional people. More than [illegible]0 days in the office for many staff members, for full-time workers, may indicate unsuccessful teaching, lack of proper local organization, unwise selection of projects, or weak administration of the service. Three weeks' official field work for a director would appear to be wholly inadequate for properly keeping in touch with conditions pertinent to the best development of the extension program in its relation to other agencies concerned in the educational progress of the State. Likewise, the spending of more than 200 days in the office by supervisors as a 3-year average would appear to leave a very small portion of the available time for active field contact and supervision.

Very similar problems exist with reference to the time of county extension agents. Of necessity the county personnel must be largely responsible for the budgeting of their own time, but directors of extension and State leaders may very advantageously encourage and guide in the process and should find in records of such time the basis for estimating the progress and effectiveness of the county program.

Study of this matter in connection with the land-grant college survey shows that the agricultural agents of 36 institutions have so arranged their work as to have regular office periods, while those in 9 States do not. The number of office days per week was 1 in 25 institutions and 2 days per week in 9 others. Similar proportions were indicated for home and club agents, but with a smaller total number of institutions reporting.

It is encouraging to note that in 33 States both the agricultural and the home agents budget the time by means of a calendar of work and 15 report the same for club work.

In these States the average amount of time allowed for "emergency" or "call" work was 21 days for agricultural agents and 16 for home agents. In club work more time was allowed for this part of the calendar, an average of 24 days. The maximum reported was 40 days for agricultural work, 35 for home agents, and 50 for club agents. Whether or not these maximums are too high depends upon a number of factors, the chief of which is the effectiveness with which the balance of the time is expended upon the regular program of work.

The number of days extension agents spend in the office is not in itself an indication of either the quality or the quantity of accomplishment. There must be large variation in this, as in many other elements of the organization and operation of the agents' activities. However, too much time in the office reduces the opportunity for the maximum accomplishment in the lines of work that constitute the basic educational program.

The average number of days in the office per agent, as reported by 42 institutions, was 100 for agricultural agents and 96 for home demonstration agents. For 19 institutions the average for club agents was 95 days. The range was as follows: Agricultural agents, 40 to 162 days; home demonstration agents, 40 to 152 days; and club agents, 44 to 170 days.

The vacation allowances (not necessarily taken) and amount of time spent outside the counties on official work by the three types of agents as reported by the institutions was as follows:

Vacation	Agriculture agents[1]		Home agents		Club agents	
	Average	Range	Average	Range	Average	Range
Vacation (weeks per year)	3	2-4	3	2-4	3	2-4
Outside of county on official work (days per year)	16	8-26	17	8-25	19	8-28

[1] 44 institutions reported agricultural agents; 44, home agents; and 21, club agents.

Training in service.—The facts about the training of the Smith-Lever extension staff have been given in a preceding section of this report. In spite of certain extenuating factors the academic qualifications of this portion of the land-grant college personnel are cause for some concern. In spite of the fact that this situation is well known and some provision for it has been made, training in service has not received the attention it deserves by either the extension workers themselves or by the institutional authorities. Self-improvement for this type of service is even more important than for the resident staffs in teaching and research.

The folowing number of institutions reported the use of various methods of staff training while in service:

Methods of staff training in service	Number of institutions
Registration in regular university courses while on the job:	
(1) Resident members of staff	28
(2) County extension agents	18
Correspondence courses for credit	14
Correspondence courses not for credit	10
Class extension courses for credit	3
Class extension courses not for credit	7
Study courses in district conferences for county workers	15
"Methods" schools for specialists and State leaders	23
Study courses for specialists and State leaders	4
Apprenticeship as assistant county agent, men and women	34
Staff discussions of important problems and methods	45
Required or suggested reading	20
Special lectures at annual conferences	46

It will be noted from the above summary that in only slightly more than half the institutions do State supervisors or specialists pursue regular university courses while on the job. The replies concerning leave of absences for study described elsewhere in this report do not indicate wide use of this means for self-improvement by extension workers. The conclusion may fairly be drawn that administrators need to develop ways and means of stimulating the further training of staff members in order that the quality of extension service may steadily improve.

Correspondence courses for credit may serve as a valuable aid to a limited number of State workers, but this method will never suffice to place the extension force on a par with teaching and research workers. To emphasize reading courses without credit, either for State or county workers, should be a supplementary aid only, for it will never secure recognition of professional training and standing.

The many distracting influences caused by the different tasks imposed upon county extension workers tend to limit the development of credit courses by correspondence study. Opportunities and ways and means must be developed for agents to leave their local tasks to reenter the spirit and atmosphere of resident instruction. This is a process essential to advancement in efficiency in their daily work and for the personal attainment and satisfaction that such training gives.

Leaves of absence for study.—Each year sees the number taking advanced work increasing, but very much more emphasis needs to be placed upon this important phase of personnel improvement by extension administrators. The very nature of the practical tests imposed on county and State staff members tends to scatter their energies among a wide range of activities rather than to concentrate their attention upon methods and problems. The result is that the inclination is toward routine habits and lines of least resistance. People engaged in such work need to pursue concentrated studies away from their fields of activities if they are to keep abreast of the times in science and serve as leaders in new methods and new projects and to experience a very essential renewal of interest in their daily work.

Thirty-eight institutions reported various policies relative to the granting of leave for self-improvement of staff members. Five of those reporting do not grant leave to extension workers. The others make no distinction between the State extension staff and other institutional workers, but 16 of the States make an exception of county workers.

It is of interest to note the influence of the popular emphasis on economic subjects in the recommended subjects for those taking advanced training or for those preparing for extension work. In order of their preference the subjects were as follows: Rural economics, 44 institutions; sociology, 43; journalism, 41; psychology, 38; and education, 33.

Academic rank.—The granting of academic rank to extension workers has been a common topic of discussion in many institutions. From the reports in this study, 37 institutions grant academic rank to directors, 22 extend it to other administrators, and 20 grant rank to subject-matter specialists, but in only 7 institutions are county workers awarded such ranking. Table 14 presents the cases of ranking in terms of numbers. This is a matter of serious concern to those attempting to make more permanent and secure the employment of highly trained extension teachers who may enjoy advantages of this nature comparable with other university staff members. The progress in this direction has a most important relation to the development of properly trained, highly qualified, and a more permanent force of men and women in the field of agricultural extension. Probably higher educational requirements of training and experience for the various ranks of the college and university staffs will not soon be modified. If extension workers desire to be given standing in the higher educational world comparable to that of other major activities of the institutions they will be compelled to meet in large part the general training standards for such rank.

TABLE 14.—*Academic ranking of extension workers*

Position	Professor	Assistant professor	Associate professor	Instructor
1	2	3	4	5
Directors	16	0	1	1
State leaders:				
Agriculture	9	2	4	0
Home demonstration	7	3	5	0
Club	7	3	5	1
Assistant State leaders:				
Agriculture	1	4	10	0
Home demonstration	0	4	4	0
Club—				
Men	0	9	2	1
Women	0	3	1	4
Specialists:				
Agriculture	39	74	33	20
Home demonstration	4	27	2	9
County agricultural agents	10	68	25	51
County home demonstration agents	1	10	11	0
County club agents:				
Men	0	7	1	7
Women	0	0	0	6
Assistant county agricultural agents	1	2	0	5
Assistant county home demonstration agents	0	0	0	0
Assistant county club agents (women)	0	0	0	0
Editors	2	2	2	2

Salaries of the agricultural extension staff.—While salary scales may not always measure the standing and relative efficiency of staff members of an organization, they are indicative of types of individuals and of relative values of services that are identified with educational institutions. Salary incomes of all educational personnel have always been notoriously low. Nevertheless, the salary scales paid by colleges and universities to the various academic ranks correspond closely to the amount and kinds of education and experience of the persons holding these ranks.[3] Table 15 shows the number of Smith-Lever extension staff members of various positions classified by annual salaries in the 42 institutions replying to this question. The table must be interpreted with reference to the training and experience of this staff as compared with those of other divisions of the land-grant institutions.

The percentage distribution of the salaries of the various groups of workers presents another way of emphasizing the status of extension personnel with reference to salaries. This is shown in Table 15.

[3] See Vol. I, Part VII, for general salary data.

TABLE 15.—*Distribution by per cent of salaries of extension workers (other than directors)*

Position	Number reporting	Per cent in various groups—42 States				
		$1,000 to $1,999	$2,000 to $2,999	$3,000 to $3,999	$4,000 to $4,999	$5,000 to $5,999
1	2	3	4	5	6	7
AGRICULTURE						
State leaders	67			48	44	8
Assistant leaders	69		11	59	26	3
District agents	62	2	6	85	6	
Specialists	588	6	30	55	8	1
County agricultural agents	2,195	4	49	40.5	6	0.5
Club agents	105	20	60	17	1	1
HOME ECONOMICS						
State leaders	42		12	67	21	
Assistant leaders	58	10	54	36		
District agents	48	9	60	31		
Specialists	193	4	74	22		
Home demonstration agents	931	21	72	7		

It should be noted that 49 per cent of the county agricultural agents receive from $2,000 to $2,999. Of 1,272 male graduates of land-grant colleges studied in connection with this survey, who are now engaged in college teaching, only 31.9 per cent have salaries within this range. In the next salary range in the table, $3,000 to $3,999, are found 40.5 per cent of the county agricultural agents, while 35.9 per cent of male college teachers trained in the land-grant colleges fall within this salary range. It is significant, however, that only 6.5 per cent of the county agricultural agents receive more than $4,000, while 17.1 per cent of the college teachers receive more than this amount. These facts would seem to indicate that the agricultural agent's job offers fewer opportunities for the higher academic salaries. Of the agricultural agents 53 per cent have salaries of less than $3,000, while of the college teachers 53 per cent have salaries above this mark. On the other hand only 4 per cent of the agricultural agents have salaries of less than $2,000, while 14.9 per cent of the college teachers receive less than this amount. In other words, on the average the agricultural agent's salary is likely to start higher, but the maximum for the greater number is lower than in the case of college teachers.

Home-demonstration agents' salaries as compared with those of 250 women college instructors who are graduates of the land-grant colleges show 72 per cent of the former receiving from $2,000 to $2,999, while only 40 per cent of the latter are placed in this salary group. Further, only 21 per cent of the home-demonstration agents receive less than $2,000, while 46.4 per cent of the women college teachers receive less than this amount. On the other hand, as in the case of agricultural agents, a smaller per cent of home-demonstration agents (7 per cent) receive more than $3,000, while the salaries of 13.6 per cent of the college teachers are above this figure. The only conclusions that can be drawn from the salary studies made by this survey are: (1) That when training and experience are taken into consideration, the agricultural and home-demonstration agents are well paid as compared with college teachers produced by the same institutions that, for the most part, produce the county agents; (2) that the college teacher has on the whole a better chance of securing a higher salary than has the county agent, if he remains in county-agent work.

Although 26 institutions state that low salaries of county agricultural agents are the cause for the rapid turnover of this group, the salary factor, in view of the figures given above, should operate no more severely in the case of county agents than in the case of college teachers in general, except as the maximum may be expected at a lower level and is reached more quickly. In those States, however, in which salaries of county workers rank well up as compared with the institution's resident instructors, the personnel enjoy the reputation of being outstanding in their field and their relationships to their institutions and to the public in general are on a higher plane than in the majority of the States where low salaries prevail.

The salary limitations are so well known by many agents that side lines of commercial activities have been developed to provide supplements to their regular salaries. When such earnings are derived from investments in enterprises that compete with other local agencies or when the business is of such a nature as to entail practices contrary to sound extension teaching a very grave administrative problem is presented.

To limit the right of an employee to invest his savings in private business is not always desirable; neither is it wise to prescribe the types of commercial activities in which his investment should be barred. It is clear, however, that in the instances where the standing and the progress of the extension program is at stake there can be but one course of action. The public service, for which the agent is employed, must be protected at all costs of private interest and investment. Private investments can not be permitted to conflict with the time required for performance of extension duties or to cause prejudice and sentiment to be developed against the extension service.

While it is clear that administrators of the extension work have a responsibility and an obligation in maintaining high standards in all phases of this service, the county workers have a particularly important responsibility in so fitting themselves for their work and so conducting their part of the extension program as to merit and very properly command higher pay for more efficient services. In far too many instances the agents themselves have either been incompetent, satisfied with mediocre salaries, or failed to keep abreast of the times by the amount of self-improvement necessary for growth and progress.

Tenure of office.—One of the measures of the stability and permanence of a movement as young as Smith-Lever extension is not the specific figure that may be used at any given time to indicate the tenure of office of any group of workers, but rather the progress made in the gradual lengthening of the period of service of the important groups.

That progress is being made in many of the classes of extension employment is indicated by Table 16. The differences in the averages of columns 1 and 2 point to a marked lengthening of the average period of service of State leaders of home economics extension, district leaders of agriculture, men and women specialists, and county agricultural agents. This points to more stability in financing, to a better trained staff, and to improved types of local cooperating organizations.

The process of lengthening the tenure period demands the very thoughtful attention of administrators of State extension services. With continuous service in these as in other positions that are closely limited as to promotion in rank or in salary, the tendency is for workers to fall into ruts and to be content if the routine tasks necessary to hold the job are performed.

In all public and institutional service such ruts are quickly developed, and they as quickly become the traveled roads to mechanical performance of monotonous duties. This is true in extension work—so true as to offer startling proof of its existence in both State and county positions. It seems almost inevitable that long tenure of service should be associated with loss of enthusiasm and initiative. This tendency can be counteracted only by measures taken to develop those human qualities and interests that broaden the intellectual horizon and by provision for advancement of economic opportunity commensurate with growth in the field of employment.

There can be no shirking from the responsibility of developing county extension work into a living, growing, permanent opportunity for initiative and personal inceptive, with adequate recompense for outstanding performance and growing satisfactions for those engaged in this phase of institutional service.

TABLE 16.—*Average tenure of office, length of service, and distribution of staff*

Staff	Average tenure, all members		Number of members of staff who have been in extension service (to year ended Nov. 30, 1927), by years of service											
	Resigned 1924–1927, inclusive	On staff year ended Nov. 30, 1927	1 or less	2	3	4	5	6	7	8	9	10	11 to 15	More than 15
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Director	8.2	8.0	2	2	1	3	7	1	3	3	1	5	11	10
State leaders:														
Men	7.3	7.7	5	4	2	0	7	6	11	3	9	11	33	26
Women	3.9	5.8	11	8	4	5	4	9	3	6	6	3	13	12
District leaders:														
Men	5.7	6.9	42	3	3	4	7	1	16	16	10	13	19	11
Women	4.8	4.8	5	2	3	6	8	12	9	4	5	9	7	1
Specialists:														
Men	3.7	5.8	105	73	58	51	43	42	42	53	34	33	52	11
Women	2.9	3.9	46	21	20	12	14	11	7	12	6	4	11	3
County agriculural agents	4.1	4.9	347	223	228	247	209	152	170	145	134	104	123	21
Assistant county agricultural agents	2.9	2.1	72	20	14	12	13	3	16	4	1	1	0	0
County home agents	2.9	2.1	234	149	113	117	67	55	37	32	23	32	23	1
Assistant county home agents	1.9	2.8	13	3	4	4	4	2	1	0	0	0	0	0
County club agents	2.8	2.9	48	23	15	11	12	8	8	9	0	1	0	0
Assistant county club agents	1.0	2.0	6	4	1	2	1	2	1	1	2	2	0	0

The quality of county-agent service in general is affected by the rapid turnover of agents. That the element of continuous service in the same county is an important factor in maintaining the confidence of local people and in the best development of the program of work is apparent. The existing condition in the States replying to the question as to length of service is illustrated in Table 17.

TABLE 17.—*Number and per cent of county extension agents who have served continuously in the same county*

Term of service	Number of agricultural agents	Per cent	Number of home agents	Per cent	Number of club agents	Per cent
1	2	3	4	5	6	7
1 year or less	483	24.4	422	38.3	56	40.0
2 to 4 years	797	40.3	[illegible]	37.4	46	32.9
5 to 7 years	422	21.3	157	14.2	28	20.0
8 to 10 years	161	8.1	81	7.5	10	7.1
More than 10 years	113	5.9	29	2.6	0	....

This means that one-fourth of the agricultural agents and almost two-fifths of the home demonstration and club agents had been employed not more than one year in the same county when this survey was made, and that two-thirds of the agents had been in the same county not more than four years. It is true that there are situations in counties that demand transfers of agents to other locations, and often improved service results from changes of location for agents who have possibly been "too long" in one county. These are exceptions, however, and there are many more examples of arrested development and curtailment of projects well under way by the too rapid turnover of the county agent staff.

The average percentage rate of annual turnover was reported upon for the three years 1925, 1926, and 1927 for the three main groups of workers as follows:

Group	Per cent in agriculture	Per cent in home economics
State leaders	27.5	42.1
Specialists	13.0	37.0
County agents	14.2	24.1

Six institutions reported an average of less than 10 per cent turnover for all workers, but in certain other institutions the maximum rate for agricultural specialists ran as high as 40 per cent and the range for county agricultural extension agents from 5 to 30 per cent.

The principal reasons ascribed by the directors for the relatively high rate of turnover in extension staffs is summarized in Table 18.

TABLE 18.—*Reasons for turnover in extension staff*

Reason	Number of institutions reporting— State staff	Number of institutions reporting— County staff	Reason	Number of institutions reporting— State staff	Number of institutions reporting— County staff
Matrimony (home workers)	32	32	Incompetence of workers	7	9
Low salaries	29	26	Institutional promotion	7	6
Commercial competition	11	10	Self-improvement	9	5
Excessive travel (away from home)	12	6	Insecure county appropriations		13

How can the period of service be increased?—Thirty-two institutions indicated a number of methods that would contribute to the lowering of the rate of staff turnover. The extent to which any of them may be put into effect depends on conditions peculiar to each institution. The principal suggestions were: Better salaries, 23 institutions; stabilized county financing, 10; all salaries from State and Federal funds, 4; more opportunities for self-improvement, 4; older home-demonstration agents (as a corrective for loss from matrimony), 3; better trained workers, 3; and more careful selection of workers, 2.

These suggestions are of value as indicating the attitude of mind in which administrators approach the staff problems of turnover. It was to be expected that the first remedy to be proposed would be "higher salaries" in view of the fact that large salaries add to the attractiveness of any position and aid in securing sufficient candidates to enable the administrator to select staff members carefully. But it is doubtful whether low salaries are the important fundamental cause and the remedy merely an increase in pay. Other questions may be raised concerning the underlying factors in this problem of personnel turnover. Has the Smith-Lever extension movement developed under well-planned, definitely organized methods of sound educational procedure? Has the personnel, in the main, been selected on the basis of as much training in teaching and in "leading" as in "doing"? Has "expediency" been the basis of decision of many relationship problems rather than sound, permanent principles? Have day-to-day calls for service and "emergency" problems tended to displace well-planned programs with definite results that might have made tenure of office more permanent and satisfying?

Perhaps all these are being constructively answered in the progress institutions are making along these lines. It is encouraging to note a lowering of the rate of turnover during the past few years. This may be accounted for by better selection of agents by administrators, a gradual increase in salaries, and improved methods of carrying on the county work. As the system of agricultural extension grows older and the staffs become better organized and more satisfying possibilities appear for those engaged in this particular phase of adult education, the tenure of position will tend to increase and the rate of turnover will be perceptibly reduced.

Selection of the staff, distribution of duties among its members, provision for its further training both while in service and during periods of leave provided for study, the academic ranking of the staff, salary adjustment and scales, and maintenance of continuity by keeping turnover within reasonable limits are all administrative responsibilities. All of these matters are directly dependent upon institutional policies and can not be determined with reference to the Smith-Lever extension service alone. Nevertheless, the director of extension is the advisor of the institutional authorities with reference to the application and measure of the effectiveness of these policies in so far as Smith-Lever extension is concerned. He is the official spokesman for this phase of institutional activity. In order to exercise his responsibilities in the immediate administration of the personnel of the service and in order to provide information needed by institutional administrative officers, the director must be able to estimate the efficiency of the personnel under his direction. The means and methods used by extension administrators to accomplish this purpose with reference both to the State and county workers was, therefore, studied in some detail.

Sixteen means of measuring efficiency were listed and rated A, B, and C in descending order of importance by 40 directors of extension. Table 19 presents the summary of these statements. The percentages of A's, B's, and C's for each factor are given for each of the three groups of workers. The means used are listed in order of ranking for county workers. The relative ranking for specialists and for State supervisors may readily be ascertained by noting the factors with higher percentages.

TABLE 19.—*Summary of means used to measure efficiency of staff members*

["A," those most important; "B," those next in importance; and "C," those least important]

Rank and type of efficiency measurements [1]	Staff members and per cent of A, B, C								
	County workers			Specialists			State leaders		
	A	B	C	A	B	C	A	B	C
1	2	3	4	5	6	7	8	9	10
1. Record of number of farm and home practices changed	81	12	7	71	13	16	41	16	43
2. Number of persons reached	64	28	8	36	49	15	37	10	53
3. Monthly and annual reports	63	30	7	54	29	17	58	27	15
4. Record of number of field contacts	57	25	18	37	33	30	30	35	35
5. Official reports from county	53	16	31	44	19	37	36	15	49
6. Attendance at and interest in conferences	46	42	12	42	44	14	45	41	14
7. Reports of specialists	44	31	25	46	40	14	24	36	40
8. General reports from counties	36	50	14	44	39	17	43	31	26
9. Reports of county extension agents	33	25	42	59	31	10	54	31	15
10. Attitude toward advanced study	31	43	26	46	15	39	33	45	22
11. Problems brought back from field	31	43	26	40	45	15	44	37	19
12. Comparisons of days in field	26	33	41	12	55	33	10	40	50
13. Number of county or district meetings attended	16	41	43	9	40	51	12	36	52
14. Attendance at professional meetings	15	36	49	21	44	35	19	41	40
15. Reports from members of State organizations	13	34	53	16	53	31	19	38	43
16. Membership in professional societies	6	47	47	12	58	30	2	31	67

[1] 40 institutions reported county workers; 39, specialists; and 39, State leaders.

In recent years increased emphasies has been laid upon definite tangible results from extension effort in the form of recorded numbers of farm and home practices changed. Other quantitative measurements have been the number of persons reached by the extension service and the number of service contacts made in developing project lines of work. That these indicators of "volume of business" or quantitative measures were foremost in the minds of extension administrators is shown by the relative ranking of these three means of rating efficiency. For county workers they ranked first, second, and fourth; for specialists they were given first, third, and eleventh places, and first for State leaders. Just how efficiency of State supervisors may be directly rated by the number of changed practices is not clear. It would seem that other factors would more correctly and more definitely indicate the success with which State leaders are meeting their responsibilities.

From a long-time viewpoint there must be some measures of quality of service as well as of quantity. The degree to which farm people were taught to depend upon their own efforts may be one measurement. Another may be the rate and degree of growth of cooperative enterprises in a community or the number of young people of the county induced to continue their education by attendance at institutions of higher learning.

The attitude toward advanced study, which ranked tenth in county staff, sixth with specialists, and ninth with State leaders, contains the element of quality in self-improvement that should warrant its consideration being given more prominence. Length of service in a county or as a State leader or specialist, combined with the initiation of new ideas and evidences of growth, may be very decided indications of efficiency. Every administrator needs to study ways and means of analyzing reports of project achievement and of supervisory activities that he may know, first, that progress is being made more definitely, and, second, something about the rate of progress.

Requirements for completing the State extension staffs.—In the section of this report dealing with the financing of Smith-Lever extension education, estimates by the directors were presented as to the amount of money that will be required to provide the personnel expenses necessary to meet the probable additional organization requirements during the next 10-year period. Estimates in terms of personnel were returned by 46 institutions, hence the totals represent approximate requirement in staff for future building of the entire Smith-Lever extension system. The reports indicate that the present staff of State supervisors or leaders constitutes 80 per cent of the number required if the work is to be fully developed. The number of specialists employed in 1928 was about 60 per cent of the total estimates. The 1928 staff of agricultural county agents appeared to be 75 per cent completed, while home demonstration agents then employed constituted but 48 per cent of the required number. The number of county club agents was only 33 per cent completed. The estimates of the 46 institutions grouped by staff divisions are presented in Table 20.

TABLE 20.—*Estimated increases in staff required during next 10 years—46 States*

Staff divisions	Employed 1928	Additional required	Total	Per cent complete
1	2	3	4	5
State leaders	341	96	437	78
Specialists	759	567	1,326	57
County agricultural agents	2,279	751	3,030	75
Assistant county agricultural agents	151	386	537	28
County home demonstration agents	1,034	1,121	2,155	48
Assistant county home demonstration agents	33	239	272	12
Boys and girls' 4-H Club agents	236	483	719	33
Editors	49	31	80	61
State stenographers	630	220	850	74
County stenographers	630	1,112	1,742	36
Grand total	6,142	5,006	11,148	56

These estimates reveal that in the minds of those responsible for the development of this phase of adult education the size of the present extension staff should be almost doubled during the next 10 years. This is significant as an indication of the aspirations of the service; its significance as a practical program of development will depend upon the points at which it is proposed to apply additional personnel, upon effective utilization of the staff now available, and above all upon the needs that must be served in an ever-changing social and economic rural life. In this connection it is significant that the directors estimate that 59 per cent of the additional personnel required during the next 10 years will be county workers, of which 38 per cent are county agricultural workers, 46 per cent home-demonstration workers, and 16 per cent club workers. In 1928, subsequent to submission of these estimates by directors, new Federal legislation provided for annual division among the States of $1,480,000 in addition to Federal Smith-Lever money already granted on condition that of this new grant 80 per cent must be utilized for the payment of extension agents in the counties.

Chapter V.—Smith-Lever Relationships

The very essence of extension service requires that a variety of relationships be established and maintained with both official and private organizations. Attempting, as it does, to aid and influence rural people in their everyday economic and social relationships, Smith-Lever extension must function with, rather than upon, its clientele. Naturally these relationships give rise to problems and difficulties just as do all associations that involve adjustment of different interests and preoccupations.

Federal Relations

In addition to financial relations discussed briefly in the section dealing with "financial support of Smith-Lever extension" there are many service relationships with the United States Department of Agriculture of very great importance in the administration and operation of this cooperative extension work. The responsibility for the administration of Federal funds by representatives of the Federal service entails approval of plans of work, acceptance or rejection of specific projects, submission and acceptable records of performance and achievements, and even extends as far as direction concerning specific activities of State field workers.

It is important to note that the Secretary of Agriculture on August 25, 1922, prohibited certain types of activity on the part of county extension agents:

> As they are public teachers it is not a part of the official duties of extension agents to perform for individual farmers or for organizations the actual operation of production, marketing, or the various activities necessary to the proper conduct of business or social organizations. They may not properly act as organizers for farmers' associations; conduct membership campaigns; solicit membership; edit organization publications; manage cooperative business enterprises; engage in commercial activities; act as financial or business agents; or take part in any of the work of farmers' organizations, or of an individual farmer, which is outside of their duties as defined by the law and by the approved projects governing their work.

The various Federal laws provide that cooperative extension work shall be conducted in such manner as shall be mutually agreed upon by the Secretary of Agriculture and the State agricultural colleges. By an agreement between these agencies an extension director located in each State is the representative of both the college and the department. He submits projects for extension work to the secretary for approval.

The relationships that arise from State laws passed as a result of the acceptance of the offset feature of the Federal Smith-Lever law are not universally regarded with entire satisfaction. Twenty-nine States report that the content of their laws is in accord with sound principles of procedure and organization, but 15 desire fundamental changes. Seven of these feel the need for raising the legal maximum of county appropriations. In six of the States, objection is raised to the naming of any one farm organization as the sole agency through which extension work may be carried on or requiring the formation of a county unit of a farm organization as a prerequisite for the establishment of the service. In three of the States the law provides for voting on the "county agent" work—both for its establishment and for its maintenance—which throws the service into local politics, jeopardizes its standing and permanency, and has proved prejudicial to sound administration of this educational movement.

In order to determine whether any elements of existing Federal relations are unsatisfactory to the States, inquiries were directed to the institutions which gave free opportunity for criticism and suggestions on the part of institutions and of the extension service. Nine States made comments relative to the use of Federal specialists in subject matter. Six frankly question their value to the development of the State program of work. Two requests were made for the use of more specialists, particularly in home economics, while one State objected but made no suggestion as to the basis of the objection.

Another relationship open to some question by four States was that of the requirements under which annual reports are made by county workers. These objections emphasized the large number of questions involved, the impossibility of making reliable answers to many of them, the extreme statistical nature of the report, and the amount of time required for its proper consideration by State administrators.

This matter of reporting has always been more or less a bone of contention over which many conferences have been held and as a result of which, many changes have been made in the form and content of the reports. It might have been helpful had these States submitted specific ways and means of improving the annual report requirements.

Relations with State Departments of Agriculture

To the question as to the status of the relations with the State departments of agriculture, 39 of the 45 States expressed complete satisfaction with the cooperation. This is conclusive evidence of the harmony with which the administrators of these two organizations have worked out their local problems and cooperated in the many phases of the work touching the development of a State's agriculture.

The following list of significant services illustrates the types of activities in which satisfactory cooperation has been reported:

Types of activity:	Number of States reporting
Preparing exhibits for State fair	36
Boys' and girls' club work at State fair	40
Judging contests of club work	38
Livestock disease control	28
Cooperating with State department of public health	26
Market information, grading, and inspection	21
Assistance in selecting crop reporters	19
Gathering statistics for State department	13
Insect control and inspection	12
Assisting departments of forestry and conservation	12
Seed testing and certification	10
Plant disease control	9

Likewise the relations with the State fairs, with the State department of health, with immigration, forestry, and conservation departments or commissions, have been harmonious and of mutual value. However, in most States such departments are charged with both regulatory responsibilities and also with duties that have a very close relationship to educational projects. The line of demarcation is not always clearly defined, and instances are rather numerous in which each organization has assumed some of the functions of the other. This is illustrated by the report that in two States representatives of the extension service were deputized for regulatory duty by State departments of agriculture. Such relationships are clearly outside the intent and proper function of the extension service.

Some of the most important relationships with official State activities arise, however, in connection with the public-school system. Of these one of the most troublesome has been the adjustment between Smith-Lever extension and Smith-Hughes vocational work in agriculture and home economics in the high schools.

Smith-Hughes relations.—Three years after the passage of the Smith-Lever Act the Congress passed the Smith-Hughes law providing for vocational education in agriculture, home economics, trades, and industries in cooperation with the public-school systems of the several States. The work in agriculture and home economics, with which this inquiry is concerned, enjoyed a rapid development. Teachers of agriculture and of home economics were located in many schools throughout the country. Their duties extended beyond the limits of the classroom. They were expected and required to discharge the customary duties of public-school teachers and, in addition, supervise home projects which pupils in their classes were required to work out. Further, the work of these teachers extended to offering part-time and evening courses for adults in the communities served by their schools.

Thus there are two groups of workers in the same field, extension workers supervised jointly by the Federal Department of Agriculture and the State agricultural colleges and Smith-Hughes workers by the Federal and State Boards for Vocational Education, working through the public schools. Both groups may carry on certain activities with the same individuals in a community. This situation offers considerable opportunity for differences to develop among Federal, State, and local representatives of these two lines of work. During recent years there have been discussions of duplication and conflict. Hence this phase of the survey of Smith-Lever extension work in the land-grant colleges attempted to discover the extent and causes of these difficulties.

If the replies of 33 States may be trusted, it would appear that the discord between these two activities has been considerably exaggerated by the acute character of disagreements that have developed in a relatively small number of States. Thirty-three State Smith-Lever extension directors reported that their relations with Smith-Hughes administrators in the field of agriculture are satisfactory; only 10 reported that unsatisfactory relations exist. Further, 43 States indicate that relations between extension workers and Smith-Hughes teachers are satisfactory; while only two feel that the situation in this respect is lacking in harmony. In the field of home economics but two States expressed dissatisfaction with prevailing relations with either administrators or teachers. On the other hand, 31 States indicate that in their opinion the lines of work carried on in agriculture by these two groups of workers are sufficiently similar in some respects to give both groups concern over possible overlapping that may result in difficulty. Eighteen States express the same judgment in regard to home economics.

The following activities listed in the order of the frequency mentioned, together with the number of institutions suggesting each, are those in which Smith-Hughes workers actually overlap functions of Smith-Lever workers: Projects with adults, 23 States; community or individual service, not a part of all-day, part-time, or evening class work, 20; 4-H Club projects, 18; community projects, 16; short courses, 13; general community meetings, 10; institutes, 7. In home economics the following activities in order were mentioned: Projects with adults, 10 States; 4-H Club projects, 8; community projects, 5. All of these projects will be recognized as lying within the field of extension work. Smith-Lever work, on the other hand, is mentioned as overlapping the function of Smith-Hughes teachers in the following projects: Home projects, for persons 14 years of age or over regularly enrolled for systematic instruction, 11 States; junior home projects for pupils 13 years of age or under, 8 States; short, or part-time courses, 6 States; evening classes, 3 States. In home economics the only projects mentioned as offering possibilities of overlapping are home projects, junior home projects, and short, or part-time curses. The statements recorded above indicate how similar are the lines of work carried on and how largely the same groups of people are reached by Smith-Lever extension and Smith-Hughes vocational teachers.

It is quite to be expected that Smith-Lever workers would place chief blame for existing or possible unsatisfactory relations upon Smith-Hughes workers.

The following, with the number of States mentioning each item, lists the chief causes for difficulty as they are reported from this somewhat prejudiced standpoint: Federal Smith-Hughes laws, 22 States; Federal Smith-Hughes supervision, 16; State Smith-Hughes supervision, 12; attitude of Smith-Hughes teachers, 11; Federal Smith-Hughes regulations, 10; attitude of county agents, 6; State Smith-Hughes regulations, 5; local authority, 5. As related to home economics work only three causes were mentioned any considerable number of times, namely, Smith-Hughes Federal laws, 11 States; Smith-Hughes Federal supervision, 7; Smith-Hughes State supervision, 7. In only a few instances is any responsibility for unsatisfactory relations placed upon Smith-Lever laws or regulations either Federal or State.

However, it is both interesting and encouraging to note that from 30 to 40 States report mutual aid rendered by the two services.

Extension workers in agriculture are rendering service to Smith-Hughes teachers in such activities and projects as: Supplying specialists help, 40 States; stock judging activities, 39; assisting in local shows and exhibits, 36; subject-matter information, 36; cooperation in evening class work, 33; getting boys and girls to enroll in Smith-Hughes courses, 32; short or part-time courses, 31. Home economics extension workers are assisting Smith-Hughes teachers in such activities as: Subject-matter information, 23 States; assisting in local shows and exhibits, 18; getting boys and girls to enroll in Smith-Hughes courses, 17; securing specialists help, 13; short, or part-time courses, 7; cooperation in evening-class work, 6. Likewise Smith-Hughes teachers are assisting extension workers in the following projects: Leadership for 4-H clubs, 38 States; getting enrollment for 4-H clubs, 37; training demonstration teams, 30; community organization, 25; 4-H camps, exhibits at fairs or tours, 24 States each; institutes, 18. In home economics assistance is rendered by from 8 to 24 States in all of the home-economics projects mentioned above.

In the field of 4-H Club activities 14 States indicate that special difficulties have arisen. A number of reasons are given for this situation. A few States reported that Smith-Hughes teachers are not permitted to engage in 4-H Club activities. Others, that pupils enrolled in Smith-Hughes classes are not permitted to become members of 4-H Clubs. Still others point out that difficulties arise in State and local contests where both Smith-Hughes pupils and 4-H Club members compete. Difficulties here are accentuated when certain contestants have had extended training in both lines of work, which places them at a distinct advantage over those who have had training in but one line of work.

Remedies suggested by the States in which conflict occurs vary widely. At least one says that difficulties can not be removed under existing laws. Others maintain that most of the troubles can be eliminated if there is proper understanding and cooperation between local teachers and extension agents. Again, better understanding between Federal and State administrators as to functions of the two groups of workers is felt to be essential. At least one State provides that pupils enrolled in Smith-Hughes classes may not compete in 4-H Club exhibits or contests.

Of a much more serious nature are statements from 10 States that the employment of Smith-Hughes teachers has made difficult the establishment or maintenance of extension agents. Three of these States report that county agricultural agents have been discontinued as a result of activities of Smith-Hughes teachers, and one that home-agent work was discontinued in a county for like reasons. These cases are so few in number that too much importance should not be attached to them, yet they indicate that there are real possibilities of serious interference between the two lines of work.

On the whole it is apparent that extension services as directed by the Federal Department of Agriculture and land-grant colleges and Smith-Hughes work as directed by the Federal and State Boards for Vocational Education have been developed intensively in each of the 48 States with a large degree of cooperation and with relatively little serious difficulty. There are, however, sufficient cases of gross overlapping and duplications of function and unnecessary conflict to merit the serious attention of Federal and State administrators. Numerous conferences have been held between Federal agencies responsible for the work of each group. Official representatives of State agencies have likewise been in conference among themselves and with Federal offices. In the fall of 1928 an extended conference of this nature was held. A memorandum enlarging upon and superseding previous agreements was drawn up and is now under consideration by the States.

A few fundamental principles must be followed in dealing with this situation. First of all, Smith-Hughes work was authorized by Congress three years after the Smith-Lever law was passed and with full knowledge of the work already initiated by land-grant colleges in the extension field. Those who made possible the development of this type of vocational work, therefore, never intended that there should be duplication of functions.

Both phases of work are meant to function in the interest of rural improvement. Both groups work with rural people—men, women, boys and girls. Both are supported from Federal, State, and local funds. There can, therefore, be no justification for or toleration of unreasonable duplication of effort. All agreements must be based upon the needs of and service to local people rather than upon prerogatives of institutions or agencies. The staffs of the two groups combined is even now wholly inadequate to the task ahead. For each there is a large field that may be satisfactorily defined. It is the job of administrators to define these fields. Smith-Hughes activities are built around the public school. There is no disagreement as to function in the task of dealing with regularly organized classes made up of pupils in the school. Neither is there any question raised by extension workers in regard to regularly organized part-time or evening classes or with home projects for either youths or adults when they are an integral part of real organizad class work. Difficulties arise when infrequent and general meetings with adults are held under the name of regular class work. Likewise when home projects and demonstrations are carried out on the farms of adults who may attend infrequent meetings. This is not systematic class work. It is extension work and must be recognized as coming under the jurisdiction of extension agents. If Smith-Hughes teachers participate in such work it should be with the consent and under the direction of extension agents.

Similar statements can and should be made in regard to general community activities. No extension worker should deny the right of a Smith-Hughes teacher to become a part of the community in which he lives or to promote its welfare in every legitimate way. But all such activities that are concerned with the interests of all the farms and farm homes in the community which get beyond community boundaries and reach out over the county as a whole, must be coordinated with the county program of work and under the direction of the extension agent or agents.

When boys and girls are regularly enrolled in Smith-Hughes classes and hence are carrying on home projects and are likewise participating in 4-H Club activities, great care should be exercised to make sure that the pupil's best welfare is given first consideration. It is quite possible that he can not properly carry the two lines of work. Certainly he should not carry on one project and get credit through both agencies. In case a choice is necessary the advantage of carrying a Smith-Hughes course under the careful guidance of a teacher resident in the community should not be overlooked.

Relations with other State educational agencies.—The State department of education, aside from Smith-Hughes relations, represents a public agency with school projects and programs that touch the extension work in certain phases of home economics and with boys' and girls' club projects. In 12 of the States cooperation was indicated in health projects in agriculture and in 23 States in home economics. In approximately half the States the health work is incorporated with many of the junior-club projects, and special features of this important phase of club demonstrations are emphasized at many of the county and State fairs.

In many of the rural schools the "hot lunch" is stressed in home economics, and 32 States report cooperation in this project, while 27 States indicate cooperation in other "nutrition" school projects in home economics.

The support of club work by school teachers, county superintendents, and State school officers has been outstanding and was reported as especially noteworthy by 45 extension directors in connection with farm projects and by 34 in home economics. Credit for 4-H Club work was given by public schools in but eight States, indicating that this is not a common practice. It is assumed that this reflects the judgment of school authorities and extension administrators based upon the fact that club programs in extension have not been conceived nor conducted with the idea of obtaining scholastic credit.

Relations with State farm and home organizations.—The methods of reaching and teaching groups of people that have been developed by placing county agents in rural communities in Smith-Lever extension work have brought the State extension workers into close contact with many organizations representing various types of interests of urban and farm people. The relations with such organizations as the Farm Bureau, the Grange, the Farmer's Union, Federated Women's Clubs, commodity cooperatives, crop and livestock breeders' associations closely affiliates the extension service with organized groups that have a decided interest in the educational progress of the people composing their membership. On the whole, these organizations are not only favorable to the extension work as a matter of expedient policy, but many of them work closely with and depend upon the cooperation of extension workers for the successful development of their own educational programs. Likewise the program of the extension service has been developed with far more effectiveness than would have been possible without the cooperation and assistance of these organizations.

Only one discordant note was sounded in the reports as to the attitude of these privately supported organizations toward the State extension work. Six States indicated an unfavorable attitude on the part of one of the national farm organizations—"The Farmers' Educational Union of America." This opposition centers in the north Middle West and is largely accounted for by the close relations of the extension services to the farm bureau—a rival farm organization. The logical point of attack for such opposition in the counties in which this antagonism has been expressed, has been the county agent and in some instances it has been alleged that the work has been discontinued because of the active opposition of some of the leaders of this organization. In view of the fact that these reports come only from 6 States out of 22 in which this particular organization is recognized, it appears to be more properly a matter for local adjustment than a matter of national importance.

Table 21 presents the summary of replies to the questions covering the types of relationships with the private farm and home organizations.

Attention is called to the wide extent to which extension workers serve on special committees and assist in preparing programs for the various groups. The contributions of these groups in assisting extension representatives in presenting legislative needs and their direct financial assistance in promoting 4-H Club work have been noteworthy in many of the States.

TABLE 21.—*Number of States reporting relations with State farm and home organizations*

Type of relations	Number of States reporting on—								
	Farm bureau federation	Home bureau federation	Grange	Farmers' Union	Federation of farm women's clubs	Federated women's clubs	Commodity cooperatives	Breed and crop associations	Horticulture and vegetable growers
1	2	3	4	5	6	7	8	9	10
Organizations existing in your State	34	2	30	22	9	43	11	11	11
Carry on educational activities other than in cooperation with extension service	12	1	24	16	4	35	10	11	11
Carry on commercial or legislative activities	28	2	24	17	4	24	11	11	9
Extension service represented on executive committee:									
Officially	2	0	0	0	3	3	...	...	...
Ex-officio	26	2	2	0	2	4	9	7	...
Have memorandum of agreement with	6	0	1	0	3	1	...	...	...
Helpful in presenting needs of extension service to legislature	31	2	13	4	3	26	7	8	...
General attitude toward extension service:									
Favorable	31	2	26	12	11	39	11	11	11
Unfavorable	0	0	0	6	0	0	...	...	...
Members of extension staff serve on special committees	29	2	18	5	9	28	9	7	...
Members of extension staff assist in preparation of special programs	28	2	18	4	10	29	8	9	6
Contribute funds for:									
4-H Club prizes	7	0	7	1	4	13	6	5	...
4-H Club trips	7	0	4	0	5	6	6	4	2
Other extension	7	1	1	0	0	0	...	...	...

Relation to business, civic, and social groups.—In addition to the close working relationships of extension workers with farm groups, a rather striking feature of community building centers around the activities and relations of county extension workers with urban business, civic, and social groups. The contacts thus made and the mutual appreciation of the services rendered by each to the other have done much to popularize the extension system of education and to place it in a favorable light before all the people.

That the attitude of these groups is favorable to the State extension organizations, in so far as the testimony of extension directors is evidence, is attested by the fact that in but one instance, out of 271 State groups, was an unfavorable experience recorded. It is true that some States indicated indifference or insufficient contact on the part of some groups, but this seems to have no special significance since no uniformity of such unfavorable experience with a single group is shown.

In the opinion of the extension administrators the cooperation with business agencies has been positively beneficial rather than of doubtful value or detrimental to the welfare of the extension service. Likewise, the services rendered these organizations by the representatives of the extension organizations have been helpful in building community spirit, in breaking down the barriers of prejudice and suspicion, and in constructive development of a better understanding of problems in which both groups have been concerned. Appreciation of these services was indicated in the replies from the States in which it was shown that cooperation with the extension service as a community building agency was sought by these commercial groups.

Table 22 shows the types of activities and forms of cooperation that have been developed in the great majority of States with commercial and social groups.

TABLE 22.—*Number of States reporting relations with State, urban, business, civic, and social groups*

Nature of cooperation	Groups cooperating and number of States reporting							
	Chamber of commerce	Bankers' association	Luncheon clubs	Federation of women's clubs	Railway companies	Red Cross	Parent-teachers associations	Manufacturers' associations
1	2	3	4	5	6	7	8	9
Organizations existing in your State	39	45	43	44	43	38	15	4
Promote agricultural tours	16	30	15	2	24	0	-------	-------
Promote short courses in cooperation with extension service	6	18	9	3	10	1	-------	-------
Provide scholarship for 4-H Club members	3	14	6	5	18	0	1	-------
Finance trips for 4-H Club members:								
Out of State	9	15	5	2	25	0	-------	-------
In State	12	16	14	3	20	0	6	-------
Offer prizes for 4-H Club work	10	21	12	7	15	0	7	-------
Loan money for purchase of calves, pigs, etc.—4-H Clubs	3	21	8	1	1	0	-------	-------
Provide entertainment for 4-H Clubs	13	11	18	3	6	0	-------	3
Cooperate on demonstration projects such as special agricultural trains	10	9	7	2	32	0	-------	-------
Cooperation has proven:								
Helpful	29	40	34	29	41	17	15	4
Of doubtful value	0	0	0	0	0	0	-------	-------
Detrimental	0	0	0	0	0	0	-------	-------
Cooperation sought by:								
Extension service	20	36	24	22	28	7	-------	1
Business group	23	33	24	21	35	10	-------	3
Attitude toward extension service:								
Favorable	34	42	42	40	40	28	15	4
Unfavorable	1	0	0	0	0	0	-------	-------

While the replies to the question of commercial relationships to extension work indicated a high degree of satisfactory cooperation, certain tendencies were pointed out that will require safeguarding of extension projects by wise administration of such cooperation.

Reference to Table 21 shows the principal commercial activities centering upon 4-H Club projects. This cooperation consists largely of providing trips, scholarships, and special prizes for winners of local club demonstration contests.

As long as commercial cooperation furthers the development of the boy and girl, without exploitation of any kind, there can be no questioning of the motive. The form of participation is a matter that must always be decided by the administration of the extension service involved. The motive, however, is not always clear cut and free from suspicion. Evidence indicates the need for careful scrutiny of certain types of offers of assistance to the 4-H Club program. In a number of instances on record awards have been made, and others offered, that are entirely out of proportion to the efforts required to qualify for them. This practice will lead inevitably to exploitation of the club work and embarrassment to administrators of the service. If it is continued, it will defeat the very worthy purposes that underlie the junior work in extension education. Where direct advertising of commercal products is attempted or where "follow-up" methods are used to reach farm people, with the club work as an avenue of approach and of appeal, the line should be sharply drawn and such attempts at exploitation promptly defeated. Any other policy will lead the 4-H Club program to be discredited as a sound, wholesome educational youth movement.

Nor is the 4-H Club work the only phase of Smith-Lever extension in which attempts at exploitation threaten to become a factor in the program of work. It is claimed that certain types of commercial enterprises whose products are used by farm people, in the farm home as well as in the farm business, are developing avenues of advertising through land-grant college channels. If it be true that these public educational agencies are being used for such purposes by commercial interests, it is essential frankly to recognize the situation and to take necessary steps to develop a type of relationship that will at all times serve to protect the educational functions of the institutions.

There are many types of relations between commercial organizations and educational agencies that can be made mutually beneficial and satisfactory. In spite of the reports of a few embarrassing situations the important fact remains that there are many forms of cooperation that are proving advantageous to both groups. As indicated in the early part of this report, one of the reasons for the present popular position of Smith-Lever extension is its close relationship to, and its consequent support by, the many commercial agencies with which mutually profitable relations have been developed.

Relations with county organizations.—Twenty-nine States definitely specify the farm bureau as one of the cooperating agencies in the counties and, where it exists, it is usually the chief agency. In 13 States cooperation with the farm bureau is required by law. In 19 of the States it is reported that the public does not differentiate between the terms "farm bureau work" and "extension work."

Without question the farm bureau has played a larger part in the development of the agricultural extension program in the United States than all other organizations combined. At the time of the passage of the Smith-Lever law there was no farmers' organization of a nation-wide character, specifically interested in extension activities. The Grange was perhaps the nearest approach to this. It existed in many States and was strong and flourishing. It was, however, a secret organization with a ritualistic ceremony as a strong feature in initiation to membership.

Those who were charged with the development of the extension program felt that a new organization should be formed. The farm bureau was the result. Organized, as a rule, with a nominal membership fee of $1 per year a sufficient body of farmers was brought together in the counties to provide at least a nucleus for the development of a program. The number of members varied from 100 to several hundreds. A county executive committee was formed which provided the official body through which extension agents worked. In many counties local units representing townships or communities were organized to provide definite local contacts.

In many States and in many counties of these States, farmers began to see the need and possibilities of such an organization for service in other lines. Commercial activities in the field of buying and selling were, therefore, undertaken on a small scale. The membership soon came to realize that if much was to be done in these activities close cooperation among counties was necessary. Accordingly, in 1918 and 1919, a movement was begun to form State federations of county farm bureaus. This idea spread with great rapidity over the North and West. In 1920 a National Federation of State Farm Bureaus was formed. Coincident with these developments many States advocated increased membership drives in counties. In many States a uniform fee was adopted by all counties, in some States $5 per member, in others $10 and in one at least $15. This increase in membership dues together with a large increase in members during the years 1918 to 1921 gave county, State, and national organizations large financial resources.

These resources the country over were used liberally in the support of extension work. They were also used in many States to promote commercial activities on a large scale. So far as this was done through and in the name of the farm bureau, complications of greater or lesser degree have been created for extension work. Difficulties are due to the fact that extension service is largely supported by public funds, and is, therefore, open to all who care to use it. When such a public agent works in close cooperation with a private organization carrying on large commercial activities, many of which are in competition with private enterprises of a similar nature, the legitimacy of the relation is sure to be questioned. In many cases the criticism is so serious as to endanger or to bring about the withdrawal of local public funds.

Most States both from the standpoint of the colleges and farm organizations are meeting the situation successfully. One fact, however, seems to stand out with striking prominence: If cooperation of extension service with the farm bureau is to continue successfully, all commercial activities developed by the latter must be carried on through separate organizations created for the purpose. If this can not be done, the alternative for extension is to seek other channels through which to develop its educational program.

The 16 States reporting which do not work chiefly or in part through the farm bureau cooperate with different kinds of local county groups, such as "county extension associations," "county boards of agriculture," "county boards of commissioners," "community clubs," and "county advisory councils." The most of these are apparent groups created solely for the purpose of developing an extension program. In four States cooperation is specified by law.

In 17 of the States having farm bureaus a "member" is understood to be the family; that is, one fee makes man and wife members. In these States home-demonstration work and agricultural work are carried on through the same organization. Five States have a home bureau and one has a home department of the farm bureau. In most of the other States home-demonstration work is carried on through separate organized groups, such as "county councils of home-demonstration clubs," women's clubs," "home-makers' associations," and "home economics advisory councils."

In the matter of fees required of members in these several types of organization through which extension work is carried on, practice varies widely. In 17 States no fees are required. There may be voluntary contributions in some cases. Twenty-nine States work with organizations charging a membership fee. Seventeen of these, as stated above, have a family membership fee varying from 50 cents to $10 per year. Eleven States have a uniform fee for all counties. Twelve States have a fee for men, one as high as $15 per year, and eight have a separate fee for women which varies from 50 cents to $5 per year.

In line with statements made above regarding difficulties encountered by extension workers when cooperating organizations engage in commercial activities, 25 States report that groups with which they work engage in no commercial work. Those States in which cooperating organizations do engage in other lines of work report such activities as "cooperative buying," 13 States; "cooperative selling." 10; "legislation," 10; "automobile insurance," 5; "freight rate adjustment," 4; "taxation," 3.

In none of the States do extension workers take chief responsibility for membership campaigns. In 26 States for agriculture and 24 for home economics, extension agents assist local committees in campaigns. Extension workers do not, except in one case for home economics, solicit memberships.

In only two cases for home economics do county extension agents confine their services even largely to members of cooperating organizations. They are thus quite aware of their obligation to serve all the people regardless of organization affiliations. Such a stand must be vigorously defended, if necessary, when overenthusiastic organization members urge limiting extension work to members only in the hope that new members will thus be induced to join.

A study of Table 23 indicates the number of States in which very definite cooperation has been developed with a number of county organizations.

TABLE 23.—*Number of States reporting cooperative relations with county organizations*

Type of relationship	Grange	Farmers' union	Women's clubs	Breed associations	Fair associations	Chamber of commerce	Luncheon clubs	Bankers' associations	Board of education or county superintendent of schools	Red Cross	Health board	Farm bureau
1	2	3	4	5	6	7	8	9	10	11	12	13
Major county organizations	21	14	35	27	38	33	37	31	34	24	21	20
Represented on county extension committee	9	3	12	12	12	11	8	12	13	7	8	21
General attitude toward extension serivce:												
Favorable	25	12	39	34	43	37	39	36	37	31	27	21
Unfavorable	0	8	1	0	0	0	0	0	0	1	1	0
Actively carrying on projects in cooperation with extension service	13	4	22	29	33	23	23	27	23	10	16	21
Helpful in presenting needs of extension for county appropriations	13	4	26	22	18	27	25	25	18	3	6	18
Extension agents frequently consulted by governing boards	16	4	23	32	37	29	31	29	23	15	15	20
Extension agents represented on governing boards:												
Officially	1	0	3	8	5	7	10	1	1	1	0	5
Ex officio	5	1	9	10	19	8	8	6	3	5	4	8
Extension agents generally members:												
Agricultural agent	20	6	0	10	19	23	35	0	1	14	1	6
Home agent	14	2	25	1	11	2	4	0	0	11	0	2
Club agent	12	0	2	2	6	5	5	0	0	5	0	2
In general, the program is:												
Educational	19	6	34	30	39	24	29	27	34	22	24	21
Social	22	3	32	2	7	3	32	1	1	5	0	6
Commercial	3	15	1	19	16	26	4	21	1	1	1	7
Legislative	10	8	8	3	2	6	1	9	2	1	3	8
Contribute funds for:												
Salary extension agents	0	0	0	0	0	1	0	0	7	0	0	8
Experimental extension agents	0	0	1	0	2	5	0	1	4	0	0	9
4-H Club prizes	8	1	13	25	34	29	28	30	5	0	1	16
Other extension work	3	0	3	1	6	6	5	4	4	2	1	7
Cooperative in joint rural-urban activities, such as picnics, fairs, banquets, etc	19	10	27	24	27	34	36	27	12	5	7	18
Extension agents assist in membership campaigns	2	0	3	10	2	0	0	0	0	4	1	13
Antagonistic to extension because of assistance rendered cooperative organizations	3	2	0	0	0	1	1	0	0	0	0	0
Extension agents serve as officers	8	0	3	8	8	4	12	0	1	3	2	1
Extension agents set up exhibits	7	0	7	11	31	7	3	3	3	2	3	11

In addition to cooperative relations with rural and urban organizations and groups, institutions were asked to comment on their relations with public-school officials.

Thirty-six reported that there was definite cooperation between county extension agents and county superintendents of schools (a few States have no such officials) in the field of agriculture and 34 in home economics. Only 8 reported no cooperation in agriculture, and 7 none in home economics. Twenty-five States report definite cooperation in 4-H Club work. According to their statements, county superintendents encouraged or specifically requested teachers to give some attention to club work, to permit extension workers to come before school groups to explain club work or to secure enrollments. In certain cases teachers served as leaders of clubs at the superintendent's direction. County superintendents in some States are members of county committees on club work; speak at meetings arranged by extension agents; assist in arranging for extension exhibits, fairs, etc.; permit the use of the schools for the purpose of making surveys, and carrying information concerning specific projects home to parents. There is abundant evidence of wholesome cooperation between these officials and extension workers. This is as it should be.

Superintendents of high schools likewise are reported as cooperating in the extension program and along lines similar to those mentioned above.

An effort was made to discover if there was any conscious effort definitely to articulate the 4-H Club program with the work of the schools. Eighteen States report progress in this direction. Three States say that school credit may be given for satisfactory work done in 4-H Clubs. Two States indicated that the rating of teachers is raised if they participate in club work. Four States say that certain school periods are set aside for 4-H Club meetings, for a discussion of club work by the teacher, by members of clubs, or by the extension agents. One State says that 4-H Club exhibits are made a part of regular school exhibits.

Thirteen States report that public-school officials feel that there should be greater correlation between the school and the 4-H Club activities of the child. But few suggestions are offered as to how this may be accomplished. In the opinion of many, this is an important problem. Many agencies are working with and hence bidding for the time of the child in his out-of-school hours. With this situation school people have a right to be concerned, particularly if these outside activities are coincident with the school year. It would seem that the primary concern of all who are interested in the proper development of the child should be to see to it that all of the child's educational experiences, whether in or out of school, are reasonably well correlated both as to content and extent, to the end that all such experiences may contribute to a continuous and complete educational development.

Chapter VI.—Teaching

Previous chapters of this report on Smith-Lever extension work have described types and problems of organization, methods of administration, financing, and personnel, and State and county relationships. In what subjects and fields of instruction are these resources used? How are these fields and activities combined to make a program for the county, the basic instructing unit in the Smith-Lever extension service, and for the State? The facts about these matters and discussion of their significance will constitute the subject matter of the section next to be presented.

The basic Smith-Lever law and all supplementary legislation define in general terms the subject-matter fields with which Smith-Lever shall deal as those of agriculture and home economics. To determine what this means in terms of interpretation of the general requirement by the Smith-Lever service requires classification of the various projects carried on in the counties. Such a classification for agricultural subjects has been made in Table 7 in connection with distribution of expenditures. It will be recalled that the major subject-matter fields were animal husbandry, poultry, dairying, animal diseases, agronomy, horticulture, botany and plant pathology, entomology, rodent pests, forestry, agricultural engineering, farm management, rural organization, and marketing. In home economics the subjects that are usually emphasized are clothing and textiles, housing, home management, home crafts, nutrition, food preparation and preservation, and child welfare.

Of special interest in connection with the offerings of material for program building is the dissemination of economic material. During the period of economic distress for the rural districts from 1920–1927 there has been a remarkable development of the demand for information of this character.

This type of information embraces not only current prices of farm commodities, prices of industrial products, and relative purchasing power of specific commodities, but the history of prices and their trends as well. Market practice may be incorporated under this heading, but ordinarily this is a separate division of information, dealing with principles and methods rather than economic facts as to production and consumption. It does include cost-of-production data, wages of hired labor, equipment costs, transportation expenses, and choices of enterprises based on the factors that determine their relative chances for profitable returns. The emphasis on this last-named type of information is more popularly known as "outlook" or "forecast" material.

Thirty-seven institutions of the 43 replying indicated that use was made of "outlook" information in connection with the development of county and district programs of work. The principal sources of data from which the State outlook reports were developed are: Bureau of Agricultural Economics, United States Department of Agriculture; State crop and livestock estimates; census reports; the current market quotations.

It was the consensus of opinion of 38 out of 40 directors that the outlook material, as prepared and published by the United States Department of Agriculture and various State institutions, needs to be made more accurate and more adaptable to wider utilization by commodity specialists. It should be pointed out in this connection that the State specialists and county agents who use this type of prepared material have a very important responsibility in developing a background of economic training so that they may be better able to interpret and apply the information to the best advantage.

That dissemination of economic facts and principles is of growing importance and popularity is illustrated by the increasing number of "outlook" meetings, of economic conferences, and the basing of county and community programs upon local basic facts, supplemented by those economic forces applicable to local conditions. Forty-four of the forty-five replies indicated a belief that this type of information could well be more widely used in building local programs of work.

One of the national slogans of the postwar period was, "Adjust farm production to market demands," implying thereby that this would serve as a remedy for the agricultural depression and that this "idea" was new and had never been applied to agricultural production. As a matter of fact, these adjustments are constantly taking place. Changes in production plans, to be effective and profitable, must be made slowly. The very nature of farming as a business makes this imperative. Sudden changes result in highly speculative adjustments, with many complicating factors that endanger the outcome more than they insure profitable results. The question has long been in the minds of trained farm economists as to how safely fundamental changes of widespread application may be advocated and promoted as a part of a farm management program. Sixteen of the forty-three directors expressed a very positive opinion on this point. They emphasized the function of extension service in presenting the economic facts and in teaching principles involved in making essential adjustments. This is entirely a different matter from setting up a formal program, promoting a definite goal, and urging widespread sudden adjustments of farm enterprises.

Extension offerings in marketing projects have been emphasized in recent years as an important part of extending economic information as to price trends; analysis of price fluctuations; internal organization and operation of marketing units; methods of organizing cooperatives; principles of cooperation; and methods of improving practices in assembling, grading, and packing agricultural products.

Twenty-two institutions reported marketing projects under way with State specialists as leaders in developing the marketing program of work. The reports indicated 73 per cent of the time of these specialists was spent upon cooperative marketing with the range varying from 10 per cent in one State to 100 per cent in seven States.

The principal services rendered to cooperatives by the specialists were reported as follows: Advice as to methods of organizing cooperatives, 18 institutions; discussion of cooperative principles with farm groups, 15; improving accounting and business practices, 14; conducting grading and packing schools, 13; preparation of literature in cooperative marketing, 5; establishment of a market price news service, 4; obtaining and signing members to contracts, 2; and assisting in locating new markets, 2.

In many of the States without marketing specialists the county agricultural agents have developed such phases of the work as, grading demonstrations, formation of local cooperative units, discussion of principles of group marketing, and improvement of business practices of existing cooperatives.

A closely related field of work being offered in nine States through specialists is known as extension work in rural organization. Projects in this field embrace such activities as recreation, development of the drama in rural communities, providing monthly programs for local extension units, and formation of community organization units as active participating groups in the county programs of work. Of the nine institutions reporting the employment of such specialists, one uses two full-time workers and another one part-time and two full-time specialists.

The large place that child care and parental training has in the minds of those directing home economics extension was indicated by reports from 17 institutions stating that the next expansion of subject-matter teaching will be in this field. Ten indicated new development in the managerial phases of home making, including the handling of family finance. Others mentioned plans for expanding the projects in home literature and in family relations.

A much-needed development is the preparation and use of more bulletins and other aids to extension publicity in both the adult and junior work in home economics. In the junior program the development desired by 15 out of 29 institutions reporting lies clearly in the direction of raising the standard of the offerings.

Thus practically all the fields of direct value in the occupation of farming and home making are included in the Smith-Lever program. But these are classifications of a much larger number of activities; they do not imply systematic instruction covering each of the areas of knowledge included. The actual work carried on in a given community will vary from time to time in accordance with specific needs and interests of the local situation and will represent at a given time only a very restricted aspect of any one of these subject-matter fields. Thus the specific subject matter of instruction at any time is in large part determined by analysis of specific situations in the local community or county. In a community interested in the dairy industry, for instance, analysis may reveal a prevalence of low-producing cows. Representatives of the local community participate in the analysis and readily recognize the need for corrective measures. The subject matter is thus determined both by the specific problem and by recognition of the problem by the community. Classification of the interests and problems thus embodied in Smith-Lever extension teaching has little meaning beyond that of displaying the combined scope of specific activities carried on throughout the country. The important matters are (1) the method whereby these specific activities are selected for instruction purposes, and (2) the means used to coordinate and develop specific projects into a balanced program of work for the community, county, and the State.

Developing County Program

The procedure ordinarily followed in developing county programs of work in any county organized for cooperative extension service, centers about the county agents in their relation to the various groups comprising the local cooperating organizations.

Two common methods of formulating county programs have been developed. One may be designated as the county committee plan in which selected representatives are brought together for the consideration of important county problems and needs. Committees are usually formed, projects selected, and a program of work formulated with the county agents serving as advisers and as guides of procedure.

The second plan is known as the community committee plan in which the county is districted into community units, each with a local committee serving with the agents in selecting projects and developing the desired program of work. A combination of the two methods in various forms is noted from the reports.

The important conclusion is that definite plans of procedure have been developed to bring local interests into prominence and to foster the formation of the county program from within, rather than bringing to the county a standardized ready-made plan, often unsuited to local conditions and usually initiated under difficult conditions of local interest and reception.

This is illustrated by the ways in which the agents work with the local organizations. In 38 of the States the agents meet regularly with their cooperating committees and in 33 of these they are responsible for planning the programs and reports for the meetings. It is customary for the agents to report regularly to this committee both in agriculture and in home economics, but ordinarily they do not serve as officers of such local groups. In eight of the States the agents were reported as serving as secretaries, and in two of the States as chairmen.

Relations of agents to local committees.—The most common procedure followed by extension agents in most of the States in agriculture, home and club projects is given in Table 24.

TABLE 24.—*Number of institutions reporting responsibilities of agents with local committees in program building*

Agents' procedure	Number of institutions reporting		
	Agricultural agent	Home agent	Club agent
Review projects under way	42	40	21
Present facts as a basis of program	41	38	19
Develop active discussion of projects	40	37	20
Guide discussion and action	39	36	20
See that goals are set for projects	20	21	7
Assist in selecting demonstration centers	10	9	4
See that committee selects leaders	35	37	18
Cause committees to make decisions	28	29	9
Act only in advisory capacity	28	26	15

The large number of institutions that indicate the agent's part in guiding program construction shows that this dependence upon agent leadership is the general rule. In view of the importance necessarily given to local participation in all phases of the county extension program, it is difficult to see what other method might be used to secure decision concerning adoption of specific projects. Yet more than one-fourth of the institutions emphasized inadequate and poorly planned programs as one of the important weaknesses of Smith-Lever extension and one-third regarded the improvement of county programs as one of the essential next steps in perfecting the Smith-Lever system of education.

Too many county programs are thrown together by mere statements of problems or needs, entirely unsupported by statistical evidence, by analysis to the factors involved, or by a study of their relative importance and their susceptibility to attack and solution.

Often the programs are all inclusive and so general and indefinite in statement as to methods of procedure as to result in merely a routine listing of every problem or need mentioned by some one as requiring attention. Progress would be made if the projects could be limited in number, the elements of each carefully considered, means of attack analyzed, and strong, definite efforts centered on a few projects.

Correlation of home and agricultural programs.—Thirty-one institutions stressed the need of more closely correlating the agricultural and home economic projects that make up the county programs. Without doubt the economic, or income-making projects, are uppermost in the minds of the agricultural agents and the groups with whom these projects are developed. On the other hand, the humanistic and social values of the home projects are constantly in mind and receive due emphasis in the process of developing these projects. That common understanding of viewpoints and cooperation of local agencies in promoting a well-balanced program is essential to attaining the best results is at once apparent.

Suggestions for developing such correlation in program building include joint planning of the program by the agricultural and the home agents, adoption of projects in which each may contribute assistance, such as farmstead beautification and community recreation, frequent conferences between county and State workers in both fields, and opportunities for each group to obtain the viewpoints of the other.

The development of superior programs depends upon intensive study of the problems of rural development, thorough analysis, both economic and social, and of a limited number of immediate and long-time needs of communities, counties, and State. This must be supported by a more complete determination on the part of State administrative officials and county agents to adhere to definite long-time objectives in spite of numerous calls for emergency help. This will require strong central administrative supervision of programs, well-trained specialists, and county extension agents more adequately trained in general social and economic principles. Only thus will "organized" effort replace discursive work, the long-time viewpoint be substituted for "expedient" program making, and a factual basis underlie the adoption of the projects.

Extension Teaching

The teaching carried on in Smith-Lever extension is quite different in method and means used from that of resident instruction.

This is evident from the way offerings are determined and organized in Smith-Lever extension as compared with the courses and curricula of the college. Wide departure from resident teaching practices result from the organization and procedure imposed upon Smith-Lever work by the informal character of the relationship between those taught and those who teach. The emphasis is upon the initiative of the learner, and the task of the Smith-Lever service is largely one of making easier or facilitating the processes of self-instruction. The aids to self-directed activity, therefore, occupy a much larger place in the picture than is the case of regular school work. It is the purpose of this section of the Smith-Lever extension report to describe some of the methods and means used in Smith-Lever work, to record certain facts in regard to their prevalence and to comment upon their utility. Seven such aids to learning will be discussed: (1) Lecture method, (2) demonstration, (3) the personal advisory method, (4) correspondence instruction, (5) publication, (6) visual aids, and (7) the radio.

Lecture method.—For many years the holding of farmers' institutes or itinerant subject-matter presentation by the lecture method constituted the principal form of extension teaching. Since the passage of the Smith-Lever law in 1914, with consequent organization of county agent work and demonstration methods of teaching, the number of farmers' institutes has declined, as represented in Table 25.

TABLE 25.—*Farmers' institutes conducted by Smith-Lever extension, year ending June 30, 1927*

State	Number held [1]			Assisted by—			Total attendance	Attendance per institute	Season of year
				Extension staff		Other institute staff			
	1 day	2 days	More than 2 days	Number	Institute				
1	2	3	4	5	6	7	8	9	10
Connecticut	16			23			715	45	December to March.
Georgia	36			30			20,650	573	February to March.
Indiana	385	77		2	39	2	178,601	387	November to February.
Kansas	5	10	1	2			2,365	148	November to March.
Massachusetts	4			10		4	900	225	Do.
Minnesota	66	1		1	2		9,735	145	January to March.
New York	124			11			6,031	49	December to March.
Ohio	130	645		10	94		665,250	858	Do.
Utah		8		10		7	9,164	1,145	December to February.
Virginia		20	1	27		6	4,212	201	
Wisconsin	135	127	23	14	10		97,293	341	November to March.
Total [2]	901	888	25	140	145	19	994,916	548	

[1] Institutes may have 1 or 2 sessions per day and may extend 1, 2, or 3 days.
[2] 11 States reporting.

General meetings, extension schools, special commodity meetings, outlook and economic discussions, and similar "talking" sessions in extension are illustrations of the use of the lecture method in which the agent or specialist, or both, present the information in lecture form. Even though discussion is more or less freely developed as a result of the imparted information, such meetings should be considered as conducted by the use of the lecture method.

The widespread use of this method of extension teaching has been condemned more or less because of the danger of overdoing the talking program without obtaining positive and permanent results in terms of definite actions. Nevertheless this method has an important place if kept in proper balance with other methods based on "doing" rather than on "hearing." The danger lies in the tendency to follow the line of least resistance in many projects by adopting the lecture as the principal, if not the sole method in developing the program of work.

Demonstration method.—In reply to the question of what is the outstanding strength of the extension system of education, 27 of the 44 States that expressed an opinion believe that the fact that teaching is carried on by means of the demonstration is the strongest feature of Smith-Lever extension. While this method is used to some extent in classroom teaching, it has reached its highest development in the field of agricultural extension.

Under this method, the learner is not asked to accept mere statements of fact. The fact, whether it relates to the quantity and kind of fertilizer recommended, a dairy ration suggested, or the alteration of a pattern, is given practical application. Fertilizer in required amounts is applied to the soil, cows are fed the ration suggested, the pattern is laid out. Doubt as to the validity of the facts is thus removed. Better still, the person taugh becomes the demonstrator, thus adding to the advantage of hearing about and seeing the result, a third factor, that of "doing," which helps greatly to clinch the lesson. This method is particularly well adapted to teaching adults—men and women with mature minds and more or less fixed habits of thought and action.

Teaching situations arise from needs that are felt by the learner and frequently are created by demands from the learner. What public-school teacher would not glory in the thought that his classes were demanding that they be taught his subject! Extension teaching under these conditions and by this method enjoys advantages that compensate for many of the difficulties incident to the plan.

The personal advisory method.—Although the old individual service idea under which extension work was first initiated has fallen into some disrepute and has been largely replaced by organized community groups, by method and result demonstrations, and by the "self-help" plan of procedure, the personal advisory method of rendering assistance still persists and doubtless should continue as an element in Smith-Lever extension service. Although no county agent should to-day spray an orchard, cull a poultry flock, treat a load of seed potatoes, select a dress or a piece of household equipment, or do any one of a number of project operations, as a service for an individual, the opportunity to render an expert consulting service, either personally or by correspondence, still remains one of the important methods of instruction in extension. The attitude of the advisor and his skill in meeting requests for specific information give occasion for further instruction that may produce results far more important than the solution of the immediate problem presented.

Correspondence courses in agriculture and home economics.—In 10 institutions correspondence courses in agricultural subjects and in home economics are offered and administered by the agricultural extension services.

This activity is in direct charge of the extension director in two States, in another the agricultural editor supervises this project, in three institutions specialists in "farm and home study" serve in this capacity, while in others extension supervisors and subject-matter specialists are in immediate charge. In five of the reports of this activity, representing 50 per cent of the number of institutions maintaining this type of service, it was indicated that general extension divisions were maintained with no apparent cooperative relation with the correspondence-course work. In those institutions possessing a general extension organization it would appear that the responsibility for conducting all institutional correspondence courses, whether science, literature and the arts, or in agriculture and home economics, should be assumed by this organization.

The preparation of the course material is handled entirely by the members of the agricultural extension staff in two institutions, by members of the resident teaching staff in four others, and by both the extension and resident staff in four institutions.

The advertising of the study courses receives special attention by the publicity agencies of the extension and college organizations. Not only do bulletins, catalogues, circulars, and the news service carry this information, but county extension agents, specialists, supervisors, and students comprise a force that adds personal advertising of such opportunities as are offered through the correspondence study courses.

In the administration of this project the extension groups report very satisfactory cooperation with subject-matter departments in the grading of papers, preparation of courses, and the revision of course material. In order to avoid difficulties of obtaining satisfactory service of such nature the institutions recommend that extra pay be allowed for this work unless it is organized as a part of the regular duties of the staff. If extension specialists are given the responsibility of this type of teaching it would seem desirable to reduce the amount of regular field work ordinarily required for full-time service.

The proportion of correspondence students living in towns and cities as reported by the 10 institutions is of interest as an indication of the relative importance of types of predominant industries. In three agricultural States more than 90 per cent of these students were classified as rural, in two others 50 per cent of the students lived in town, in two others, predominantly industrial, 75 per cent registered as living in cities and villages.

Table 26 presents the principal facts developed by the study on this phase of the program of teaching rural people with an extension activity.

TABLE 26.—*Correspondence courses in agriculture and home economics*

Classification of courses	Number of institutions reporting	Average number of courses per institution	Average number of lessons per course	Range in lessons per course		Number of institutions either giving or not giving credit for course work	
				From	To	Yes	No
General agriculture	1	2.0	20			1	
Agronomy and soils	8	3.0	13	3	24	2	6
Animal husbandry	10	4.0	13.5	3	24	2	8
Horticulture	10	5.5	15	3	28	2	8
Farm management	7	1.5	12	3	20	0	7
Marketing	3	1.6	11	10	15	0	3
Forestry	5	1.0	8	3	12	1	4
Home economics	5	3.0	10	3	23	2	3
Miscellaneous	9	3.8	10	3	13	2	7

Classification of courses	Number of institutions which offer or do not offer certificates for course work		Average fee charged [1]	Range in fees		Average enrollment for institution	
	Yes	No		From	To	1925	1927
General agriculture	1		$12.50			50	55
Agronomy and soils	6	2	5.50	0	$14.00	23	20
Animal husbandry	6	4	6.00	0	14.00	210	208
Horticulture	6	4	4.00	0	12.50	122	131
Farm management	4	3	1.66	0	2.00	50	64
Marketing	2	1	2.00	0	2.00		50
Forestry	4	1	3.50	0	7.00	2	6
Home economics	4	1	10.00	0	12.50	15	151
Miscellaneous	5	4	5.50	0	14.00	108	190

[1] Five institutions made no fee charges for correspondence courses.

Publications.—Publications of information for the purpose of rendering aid to Smith-Lever clientele may range from news items published in newspapers to carefully prepared, practical presentations of recent research in the form of extension bulletins. They may, as in the case of much of the publicity material used, be only remotely related to instruction, yet carry information or furnish the initial impulse to further learning. Few realize perhaps how largely our knowledge of the practical application of scientific discovery is based on advertising matter. On the part of many, knowledge of modern progress in refrigeration, transportation, and communication, even of medicine, is based on the attractively illustrated and succinctly written advertisements that take up so much space in newspapers and magazines. Smith-Lever extension has not neglected this means of conveying information as well as of promoting interest in the service that it can render.

One of the commonly accepted factors of successful newspaper publicity service is systematic continuous news, properly prepared, and so distributed as to reach the local editors at the time and in the form best adapted to their use. This is particularly true in extension news publicity, which is run without charge, much of which really contains elements of advertising value that would ordinarily be accepted only under rate charges.

In connection with this type of service the reports indicated that 39 institutions out of 46 furnished a regular news service to newspapers outside their respective States. Of this number all but two maintained a service to daily papers as well as to country weeklies. In 12 the material was all printed, but in most of them the news service consisted of mimeographed or multigraphed copy. On the average it was noted that 61 dailies and 248 weeklies were served per institution.

The use of bulletins, circulars, pamphlets, dodgers, posters, and similar mediums has been an important phase of extension work since the establishment of the service in land-grant institutions. Marked progress has been made in the development of improved types of bulletins intended for popular consumption and depended upon to supplement the personal field staff in carrying on the organized project work in agriculture and home economics.

In the preparation of subject-matter extension bulletins, the members of the research, teaching, and extension staffs assume approximately equal responsibilities in all but five of the institutions. In these five exceptions only the members of the extension staffs prepare the extension bulletins. The requests for preparation of bulletins on specific subjects originate in various ways; specialists, subject-matter departments, county agents, directors, cooperating farmers, and others may first express the needs for specific publications.

The size of the bulletins has tended to change in recent years; at one time 16 and 24 page bulletins intended for more or less popular reading were common. This has been changed so that the more popular size ranges from 4 to 12 pages, with 8 the most commonly mentioned size.

Likewise the method of distribution has changed, for specilization of subject matter has tended to the development of special mailing lists, while increased costs of printing and distribution have made necessary more careful announcement and advertising of "available-on-request" publications. This has the advantage of stimulating definite requests for specific bulletins, thereby indicating an interest and desire on the part of the reader and avoiding the huge losses associated with large general mailing lists.

Seven institutions report the use of the general mailing list, with issues of extension bulletins varying from 2,500 to 22,000 copies. Thirty-six, however, depend upon special lists with advertising in county papers and the sending of announcement cards to bring requests for the special subjects under discussion. Twenty-three of the institutions send announcement cards only, and depend entirely upon requests for bulletin distribution.

Of very different character, but undoubtedly important in maintaining the instruction given through Smith-Lever means, are the so-called house organs or regular news bulletins to staff members and cooperators with the extension service. While the nature of the matter contained in these publications varies considerably from institution to institution, an appreciable proportion of it is valuable material for the instructing personnel of the organization. Twenty-three institutions maintain publications of this kind; 24 report that they do not.

A summary of the important phases of this news service indicated that the average age of this activity was 7 years, that 17 institutions run a monthly of 12 issues per year, and that 5 maintain a weekly of 52 issues. The size of issue ranged from 300 to 50,000 copies. The average size per number was 8.7 pages and the distribution ranged from strict adherence to extension staff members only to a circulation comprising the extension staff, local leaders in counties, county officials, all newspapers, all 4-H Club members, all teachers, bankers, libraries, and to farm men and women upon request.

Publicity of Results of the Program of Work

Any public activity directly dependent upon the support of the people for its successful continuation and development must be well and favorably known for its progress and for the results in attaining the objectives for which it was originated. This is particularly true of county extension programs of work. It is essential that properly prepared reports of work started and completed be widely distributed among those for whom the service is presumed to be established. Many extension agents owe their success as much to "letting the world know" as to proper selection of projects and successful organization of groups of cooperators.

The methods indicated by Table 27 of reaching local people with the results of project work at the end of the year or given period of time were reported by the number of institutions indicated for each method. A number indicated the use of several or all methods.

TABLE 27.—*Methods of giving publicity to results of project work*

Method	Agricultural agent	Home agent	Club agent
Publication in local papers	33	31	16
Presentation at an annual meeting	29	30	18
Printing and distribution	16	14	12
Presentation at unit and district meetings	11	9	4
Presentation to extension committee only	7	6	2
Total number of institutions reporting	42	41	18

In the development of news service and other types of effective publicity in the county the most common and most valuable mediums for the use of the extension agents are the local county papers. Some use is made of special county extension news bulletins and the use of the news organ of the farm bureau is a very effective method of reaching local people in some States with the stories of extension achievements and for important announcements. In all States extension "copy" is furnished to county weeklies and in 36 special mention was made of the cooperation with daily papers and agricultural journals of the State or district.

The next most important medium of publicity open to county agents was reported as "mimeographed letters," with a number of comments as to the value of using illustrations therewith, and learning to prepare attractive news copy.

Visual aids.—One type of appeal to the mind through the eye—the extension exhibit—has long been prominent in extension work. Various forms of exhibits have been developed, ranging from agricultural trains carrying extensive detailed exhibits to the rural districts to the showing of panels, charts, photographs, and poster displays at county and community fairs. In recent years highly developed commercial advertising displays have had a tendency to stimulate improved methods of illustrating principles and practices in agriculture through exhibits. While improvement in technique of building attractive displays has been noteworthy, there is a growing belief that teaching by means of these types of illustrations is not particularly effective. This conclusion has been one of the outstanding features of the method studies of doing extension work as developed by the Federal extension service.

Twenty-two of the institutions report furnishing an exhibit service to county extension workers, while 16 provide exhibit material to various State organizations. State and county fairs serve as mediums for institutional displays of various types. In many States banks, creameries, elevators, stores, and schools cooperate in providing space for exhibits of equipment, bulletins, models, charts, and posters. Breed and crop associations, farm bureau unit meetings, home-achievement days, boys and girls club displays, field-day demonstrations, women's clubs, and many others provide desirable settings and opportunities for exhibits of slides, films, charts, livestock, crops, and other types of illustrative material.

Table 28 shows the summary of the number of exhibits for which the extension services of 35 States were responsible for the year 1927. This indicates the expenditure of a large amount of time, energy, and money in the attempt to illustrate some of the methods and results of extension work. The emphasis upon county and community exhibits as contrasted to State and outside displays is significant.

TABLE 28.—*Number of exhibits in agriculture and home economics, arranged by extension service in 35 States, for the year ended November 30, 1927*

Type of extension service	Agriculture				Home economics			
	Men	Women	Boys	Girls	Men	Women	Boys	Girls
1	2	3	4	5	6	7	8	9
Community	17,470	2,586	18,307	2,442	2,762	6,832	815	12,100
County	36,507	6,073	25,665	5,145	176	9,012	1,313	23,352
State	1,044	352	5,332	1,149	2	437	66	5,012
Out of State	15	10	625	18	0	2	5	60

Visual aids to field instruction in many extension projects have been developed by 31 of the 41 institutions replying to this question.

The use of charts and strip films has been especially emphasized in recent years, while the use of motion-picture films has diminished. The "show" atmosphere so often developed by the running of films is not conducive to effective teaching, particularly where "features" are used to attract attendance. The extensive substitution of strip films and charts for motion films is quite general and the opportunities so much more varied and effective as to indicate a rather rapid development of this type of visual instruction.

Table 29 illustrates the extent to which these aids have been developed as reported by 31 institutions.

TABLE 29.—*Extent of use of films, slides, and charts (31 institutions) year ending November 30, 1927*

Type of service	Owned	Rented	Borrowed from— United States Department of Agriculture	Borrowed from— Others	Made by your extension service
Films (strip and motion)	1,608	79	2,466	450	46
Sets of slides	16,533	0	275	6,132	1,037
Sets of charts	1,278	0	31	18	530

Radio as an extension agency.—Thirty-one institutions reported using the radio for broadcasting programs in agriculture and home economics. Fourteen replied that this agency was not used for any purpose. Of those indicating use of the radio 17 owned their own stations, 14 used commercial stations, and 2 used both. Of the institutional stations only 1 was of 5,000-watt power, 3 of 1,000 watts, and the remainder of 500 watts or less. In only two instances did the reports indicate that the States were covered by these stations.

On the other hand, the 14 institutions using commercial stations reported that the States, with two exceptions, were quite adequately covered and reception generally satisfactory. None of these radio stations was less than 1,000 watts in power and five were 5,000 watts or more. This comparison points to one of the limiting factors in institutional broadcasting and illustrates the advantage held by the commercial stations as a general rule.

The programs in agriculture and home economics center about subject-matter information and announcements of important events. Eight of the institutionally owned stations and all but one of those using commercial stations confine their broadcasting to these general types of programs. Only three of the institutions provide a weather-reporting service while eight of those owning their stations give daily market reports as an important phase of their programs.

Only two institutions provide what may be termed completed programs, featuring agricultural and home economics information in regular series of connected lectures and a considerable amount of entertainment, news service, and general information. Of those using commercial stations, all but one confine their broadcasting to subject-matter discussions in agriculture and home economics.

The time of broadcasting is important, for rural reception is limited by conditions peculiar to the industry of farming. Very little broadcasting was done on Saturday by these institutions, while Monday, Wednesday, and Friday were reported as the heavy broadcasting days. The time of day is even more important than the day of the week. Of those owning stations, two institutions reported a rather complete daily schedule beginning at 9.30 a. m. and running to 9.30 at night. Two gave their programs at noon only, 6 others in the evening—from 7 to 8 p. m., 4 used both noon and evening hours, and 2 were on the air in the morning only.

Of those using commercial stations, four days per week were most common and noon and evening (30 minutes to one hour) the daily time of broadcasting for all but one institution.

A noticeable difference between the two groups lies in the more restricted time allowance and the more unfavorable evening hours of those using commercial stations. This may be accounted for by the fact that none of the institutions pay for this time, and commercial stations quite naturally sell the more desirable hours.

The time per talk has become fairly well standardized with 10 and 15 minutes the two common periods, and in no instance were lectures of more than 20 minutes reported. Approximately half of all programs of subject-matter information were arranged in series form ranging from 3 to 12 talks in a series. But one institution maintains a registration system for enrollment in radio "classes."

The most important question in the broadcasting of extension material is whether or not the radio offers an opportunity for doing comprehensive, systematic extension teaching. Eighteen out of thirty reports were in the affirmative, but in few instances were adequate reasons given in support of the affirmations. On the other side, the 12 negative replies were followed by positive statements—most of them to the effect that the radio was extremely valuable as a means of widely extending certain types of objective information and for advertising important events, but as a systematic teaching medium it lacks many of the essential elements.

This agency in education is so new and its problems and possibilities so little known as to prohibit the settling of such a question with the meager available information at hand. Further studies may reveal methods of utilizing this agency in ways and to an extent entirely beyond the present conception of those whose experience leads them to question the radio as an important aid in extension teaching.

The "local-leader" method of extension teaching.—The question was asked by this study, "Is the local-leader method established as a successful method of extension teaching in agriculture and in home economics?" The replies to this question and to others concerning detailed operation of the method were extremely interesting.

Eighteen of the forty-six institutions replying indicated affirmative answers for agricultural projects and exactly double this number, or 36, affirmed the success of the method for home projects. A study of the returns, however, clearly shows that some of those testifying to its success in agriculture interpreted the term "local leader" to mean a project committeeman or representative *without* the specific duty and obligation of receiving the subject-matter material in lesson form from the State specialists and in turn serving as teachers of their own local groups of farmers, previously organized for this purpose. This is the commonly accepted interpretation of the local-leader plan in home-economics extension, and discussions of this plan during the past few years have centered upon the difficulties of its successful adoption for many agricultural projects.

The range of percentages of all agricultural projects being developed by the 18 institutions indicating successful application of this method was from 5 to 85 per cent, with 7 reporting less than 25 per cent of the farm projects under this method and 11 indicating from 30 to 85 per cent. It can not be said that the returns as made tend to settle the question or to contribute greatly to the conclusion as to the success or failure of this method of extension teaching in farming subjects. The situation in home-economics projects is entirely different. The institutions using this method reported approximately two-thirds of the projects operating under the local-leader method, with 25 institutions indicating more than 75 per cent and 6 with all home projects under this plan of operation. Apparently it has become much more firmly established as a successful method in home projects than in agricultural projects.

In 4-H Club work the leader plan is also widely used in the sense that both adult and older junior leaders carry club lessons on both farm and home subjects to their organized groups. The average number of club projects so developed by the 46 institutions constituted 80 per cent of the total club program. The distinct difference in club and home projects under this plan is the absence of definite reports of club members directly through their leaders and the tendency to break up the subject-matter material into sporadic lessons that lack the continuity and completeness of the home projects.

One of the commonly expressed objections to the use of local leaders pointed out that such work was so exacting in its detail and required so much of a volunteer leader's time that the supply would soon be exhausted and those who had served in such capacity would soon tire of the responsibilities and heavy duties unless financial recompense was forthcoming. Five years' experience in home-project work has failed to substantiate this objection to any great extent. It is rather significant that 30 out of 41 replies for agricultural work, 37 of 46 answers for home subjects, and 36 of 42 statements regarding 4-H Club projects indicate positive opinions that as the extension work develops it is less and less difficult to secure desirable types of local leaders. It should be kept in mind, in this connection, that this plan operates on the volunteer and not on the compensation basis. Only two institutions reported payment of services and two the payment of expenses for leader work in agriculture or home economics.

Table 30 summarizes the number of institutions that emphasize various functions of local leaders.

TABLE 30.—*Number of institutions emphasizing activities of local leaders*

Activities	Projects in—		
	Agriculture	Home economics	Club work
Assist at meetings	39	42	45
Serve as demonstrators	32	36	31
Organize local groups	31	35	43
Report results	29	41	42
Assist with exhibits	28	39	41
Keep records of progress	23	42	40
Pass on subject matter	15	28	26
Other	9	10	6

Limitations of the use of the local leader method of teaching.—The local leader method of teaching home economics has had a mushroom growth. Its use is therefore attended by an unusual number of problems which were not foreseen. In extreme cases it may constitute a mechanism which threatens to prevent the attainment of the very purpose it was set up to accomplish. A discussion of some of the problems involved in the use of lay persons in teaching subject-matter courses may serve to stimulate further thoughtfulness in the employment of the local leader method.

First, it requires a very unusual specialist or county home demonstration agent to teach in a few hours, methods of teaching and subject matter to lay persons, so that a certain degree of success will be insured when the lesson is repeated.

Second, the physical factors of transportation, time, and money, make adequate observation and supervision of local leaders' teaching in their own communities very difficult.

Third, unless this method is carefully introduced and developed, some women hesitate to accept the information given by one of their own number and this results in the development of a hostile attitude toward the work. On the other hand, experience has shown that information received from a local person who lives in the same situation as her neighbors and which has proved valuable to her, may often be more acceptable and usable than that received directly from the specialist.

Fourth, the extreme use of the local-leader method tends to develop situations in which the county agent is merely an "instigator of events" and local people may grow to view the services of the agent as negligible in comparison with those of the specialist.

However, the values that have proved effective in developing strong programs of work by the local leader method, and its practically universal adoption as a distinctive aid in extension teaching leaves no doubt of its continued use in home-economics extension.

Chapter VII.—Results of Smith-Lever Work

A brief study of the results of project work in agricultural subjects serves to emphasize the extent and relative emphasis that characterize the various projects in the entire group of States. Attention is called to the large number of recorded demonstrations, local leaders, and adopted improved practices. It is apparent that those projects that concern production practices in both crops and livestock have received more attention and have been much more widely developed than have those economic and social projects of more recent emphasis, namely, outlook, material, prices, marketing, forestry, and rural community organization.

Inasmuch as county programs largely reflect local demands and the more apparent immediate needs of the various communities, it may be concluded that the people themselves are either more concerned with the production of commodities than with their distribution and are more interested in the earning of incomes than with the spending of them for such social and personal advantages as are afforded by recreation, education, civic improvements, and home beautification. On the other hand, the emphasis upon the immediately practical may be due to reliance of the Smith-Lever organization upon traditional viewpoints that emphasized production or it may be due to failure to exercise leadership in directing the attention of rural people to economic and social relationships.

The past 9-year period of economic stress in agriculture has rapidly brought to the front the desire for more knowledge of price movements, causes of price fluctuations, cooperative marketing, cost of production factors, and for general dissemination of economic material relating to farm production and distribution and also to the purchasing power of agriculture as related to other industries.

Quite naturally the extension emphasis has been largely upon economical production of farm products. The producer is an individual with an investment of capital and labor in enterprises the choice and management of which lie largely within his control. Until recently, as measured in terms of fundamental changes of an industry, there was little cooperation among producers centered upon the ownership and management control of their selling agencies. Furthermore, market prices, supply and demand, surplus control, relative purchasing power, and similar elements in his individual business were very difficult, if not impossible, to apply in any such practical manner as were production practices and changes that are within his experience and his control. As a matter of fact, many people still insist that improvement in the producer's financial and social progress and development must come largely from economy of production rather than through economy in selling.

However that may be, a desire and an insistent demand are being manifested increasingly on the part of producers for more emphasis upon economics, sociology, and those subjects that concern the group selling of their products and their relationships with other people.

The record of activity achievement in junior work is impressive. Large numbers of result demonstrations and a great variety of projects have been participated in by many farm boys and girls. Here again the emphasis has been placed upon improved methods of production of commodities and so often upon the basis of award as to raise the question of a lack of balance in the program.

In the projects in which awards have been granted wholly on the basis of yield or quantity without regard to cost of production or quality of product or its marketability, emphasis needs to be redirected to these factors. Likewise the tendency has been to center so much attention upon the award for special achievement as to lose sight of the teaching of the " why " or the science underlying the production process and to overstress the mechanics or " how " of the process.

Many administrators of club programs are studying methods of affecting changes in emphasis in the program so as to develop in the minds of rural boys and girls the more fundamental economic and social meanings of their project work. This should mean less objective and narrowly confined requirements for earning honors for achievement.

There is room for improvement in increasing the proportion of enrollments in club work that finish the year's work. In some projects only 50 per cent complete the year's work, in others 75 per cent is a very high return. In many lines of work close to 100 per cent is possible and within the practical range of accomplishment in most States.

The quality of junior teaching might be greatly improved by placing more emphasis upon values of mind and character training. These matters are not usually stressed by extension workers. Four-H club work should be used to supplement other educational activities of the members and to whet the desire for continuing some form of resident education. From this great group of rural boys and girls should be recruited outstanding prospects for education in agricultural colleges and other institutions of higher learning.

The mass effect of a year's work in extension can not be adequately measured in terms of numbers of people concerned or practices changed or counties reached, but some idea of the volume of work under way and of the extent to which local volunteer leadership has contributed to extension achievement may be indicated by a summary of statistics (Table 31) for all lines of work, as reported by the United States Department of Agriculture for 1927.

TABLE 31.—*Summary of some phases of all lines of extension work, 1927*

Activity	Total number reporting	Number of county reports
Volunteer leaders:		
Adults	183,065	3,014
Juniors	60,182	2,905
Project clubs:		
Adults	32,557	2,415
Juniors	44,188	3,031
Membership in clubs:		
Adults	803,904	1,560
Juniors	619,712	2,515
4-H Club members	399,107	2,378
Per cent of 4-H Club members	64.4	----
Communities organized	58,576	3,262
Farms visited	755,015	2,599
Office calls at agents' offices	3,600,448	3,443
Telephone calls at agents' offices	2,476,572	3,443
Extension short courses and institutes	8,790	1,269
Attendance at short courses and institutes	505,571	1,269
Official bulletins distributed	5,120,768	3,135
Junior camps	2,456	1,320
Attendance at junior camps	125,661	1,320
Farm women's camps	689	463
Attendance at farm women's camps	25,405	463

Table 32 presents some of the important measures of results by agricultural projects in the work with adults and with boys and girls. Attention is called to the large number of "action" results in terms of improved practices adopted on farms in those activities dealing directly with production problems. It is also significant that a relatively large amount of emphasis is being given to marketing problems, attested by more than 400,000 instances of recorded practice.

TABLE 32.—*Results of projects in agricultural extension, all States,*[1] *year ending November 30, 1927*

Number of—	Projects: Soils	Cereals	Potatoes, cotton, etc.	Legumes and forage	Horticulture and landscaping	Forestry	Animal husbandry	Dairying	Poultry	Rural engineering	Farm management	Marketing	Rural organization	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
ADULTS														
Counties reached	1,902	1,787	1,456	1,510	1,640	744	1,926	2,564	2,582	1,815	1,448	550	296	----
Communities reached	19,742	----	29,505	----	24,643	5,036	20,393	21,257	30,316	13,528	15,689	----	11,006	----
Local leaders cooperating	19,063	----	33,545	----	20,269	3,535	20,692	20,473	26,938	8,944	16,350	----	21,711	----
Method demonstrations	37,736	29,883	31,156	42,869	69,001	2,849	37,104	20,764	57,803	22,685	7,996	10,761	3,543	374,150
Result demonstrations	48,754	41,712	35,132	72,539	120,220	3,358	19,793	22,571	50,102	21,749	----	----	1,340	437,270
Farms adopting improved practices	279,774	311,692	166,909	241,956	378,244	15,807	198,516	429,105	259,222	151,478	70,522	421,973	18,320	----
JUNIORS														
Clubs	0	2,123	1,846	621	325	176	4,091	2,484	4,359	0	394	0	0	----
Enrollment:														
Boys	----	41,214	38,699	8,676	4,340	2,867	63,481	23,361	44,512	----	7,704	----	----	----
Girls	----	1,884	2,224	548	1,034	296	6,793	10,093	54,270	----	1,929	----	----	----
Completed:														
Boys	----	24,627	23,736	4,888	2,711	1,980	39,744	16,877	24,933	----	4,168	----	----	----
Girls	----	1,162	1,492	355	666	212	4,597	6,199	31,823	----	757	----	----	----
Counties reached	----	1,787	1,456	1,510	1,640	744	1,926	2,561	2,582	----	1,448	----	----	----
Communities reached	----	----	29,505	----	24,643	5,036	20,393	21,757	30,316	----	15,689	----	----	----
Result demonstrations	----	25,789	25,228	5,253	88,922	2,192	44,341	23,076	56,756	----	4,925	----	----	276,482

[1] Data provided by the Extension Service, U. S. Department of Agriculture.

Statistical summaries of extension results are valuable for comparative purposes from year to year and may be used for any given period as indications of volume of activities and character of projects on which special emphasis has been placed.

It is true that national totals of numbers of people reached by State extension services fail to indicate existing wide differences between States, just as individual State totals can not picture the variation in records of achievements between counties. Such totals, however, are impressive in denoting growing, virile organizations engaged in a large worth-while service to large numbers of rural people. Just as a bank statement expresses size, soundness of principles, and permanency of service, so may achievement records be interpreted for Smith-Lever extension.

That Smith-Lever extension has placed large emphasis upon the demonstration method of teaching is clear in view of the total of 800,000 demonstrations for the year 1927. Straight production projects lend themselves to widespread adoption of this method and the results as illustrated in Table 32 testify to the prevailing popularity of emphasizing both method and result demonstrations as a means of securing adoption of improved practices.

In the work with boys and girls the previous statement pointing out the opportunity for increasing the number of completions is strongly supported by the percentages quoted for the various projects. The average for all projects considered was slightly more than 60 per cent. This record is entirely too low and points to one of two fundamental faults in this phase of the extension service. Either enrollments are obtained in wholesale fashion without proper organization and careful selection or the program of work is carelessly supervised with subject-matter teaching inadequately provided. Some States have a record close to 80 per cent, and even this can be increased by improved methods of operation.

Table 33 presents the record of achievement of home-economics projects for the year ending November 30, 1927. Similarly to the report of agricultural projects in Table 32 the figures are impressive in their illustration of the interest and participation of rural women in the extension service.

The total number of demonstrations (649,127) is quite remarkable considering the number of workers comprising the home-extension staff.

Likewise the number of persons adopting improved practices is remarkable. Reports show almost 400,000 to have adopted improved methods of food preparation and preservation, 168,000 in nutrition, almost 107,000 in home management, 126,500 in home furnishing, and 83,000 in home health. In addition, 109,000 persons adopted better methods in home gardening in 1927, 60,000 in poultry management, 17,000 in home dairying, and 84,862 in community activities.

These accomplishments were made possible in large measure by the unselfish, voluntary service of local people, 19,000 of whom assisted as teachers in foods programs, 16,000 in nutrition, 32,500 in clothing, 11,400 in home management, 12,000 in house furnishing, and more than 9,000 in home health.

Among juniors the reports of results of home economics project work indicate corresponding accomplishments. More than 140,000 girls and 1,000 boys completed projects in food preparation and preservation in 1927, almost 50,000 girls and 7,000 boys in nutrition, 146,000 completed clothing projects, 13,800 home management, 30,000 home furnishing, and 56,000, a tenth of whom were boys, completed courses in home health.

In the junior projects the record of completions made by the girls was not as high as that of the boys, even in their own projects. The same criticism holds true in these activities as was made in connection with the boys' and girls' work in agricultural projects, namely, the relatively small number completing the year's work.

TABLE 33.—*Results of projects on home economics extension, all States,*[1] *year ending November 30, 1927*

Number of—	Projects: Food preparation and preservation	Nutrition	Clothing	Home management	House furnishing	Home health	Home gardening	Home poultry	Home dairy	Community activities	Total
1	2	3	4	5	6	7	8	9	10	11	12
ADULTS											
Clubs	9,310	7,706	12,693	5,297	6,958	2,947	2,398	1,565	930	6,261	
Counties reached	1,308	1,020	1,501	891	921	754	583	569	336	480	
Communities reached	16,182	12,013	21,592	8,466	9,834	9,229					
Local leaders cooperating	19,217	16,089	32,590	11,421	12,617	9,389					
Method demonstrations	82,064	35,753	98,936	21,702	35,012	14,483					287,950
Result demonstrations	98,719	43,931	81,126	30,950	33,093	23,421	28,853			21,084	361,177
Individuals adopting improved practices	397,517	168,293	297,245	106,667	126,417	83,259	109,061	60,183	17,155	84,862	
Total enrollment[2]	281,176	156,166	238,760	115,012	127,813	85,237	79,154	67,991	29,422	127,594	
Total completed	179,816	78,907	143,513	60,413	60,411	47,533	51,700	41,493	16,918	64,455	
JUNIORS											
Clubs	10,404	3,059	12,141	1,148	2,291	3,111				3,976	
Enrolled:											
Girls	242,237	88,879	224,796	31,399	55,713	88,818				87,384	
Boys	2,296	8,911	427	150	272	9,158				5,306	
Completing:											
Girls	140,991	47,765	145,913	13,765	29,893	50,955				42,512	
Boys	1,311	6,686	268	57	131	5,397				3,596	
Result demonstrations	101,273	55,219	93,592	10,471	23,226	38,303	30,264	16,774	2,287	17,479	388,888

[1] Data from Extension service United States Department of Agriculture.
[2] Number of adult projects carried on by home agents, specialists, and local leaders.

The effect upon family relationships, family finance, and community well-being through the adoption of practices and changing attitudes of rural people by the home economics projects can not be statistically measured but it represents one of the permanent values of this educational service.

The statistics quoted in Tables 31 and 32 present the objective results of extension work in terms of the participation of local groups in the adoption of practices designed to improve the business of farming. But these are not the most significant measures of extension achievements.

Far more valuable and permanent are the less tangible results of the development of attitudes of mind that express an eagerness to participate further in the process of continuing education. This outstanding record can not be readily measured and tabulated for any given period. Its significance is noticeable and appreciated, however, by a visit to any rural community where the service has been in operation any length of time. Every day witnesses more people, not only becoming familiar with the fact of its existence, but finds them seeking ways of profiting by using various phases of its educational offerings.

So long as educational ideals guide the operation and administration of the extension service and so long as those responsible for fulfilling its functions bear clearly in mind the true objective being sought, namely, the development of people, there will be no serious question raised as to its place in the educational system or as to the significance of its achievements.

Chapter VIII.—Findings and Recommendations, Smith-Lever Extension

(1) Smith-Lever extension owes its present position to five contributing factors, namely: An historical ideal of direct service, substantial Federal support, private economic advantage, political consciousness, and cooperation supplemented by effective publicity.

(2) The statements of objectives and programs of work do not adequately recognize that Smith-Lever extension includes not only vocational training but also important social and humanistic purposes.

(3) The fundamental objective of Smith-Lever extension education, namely, development of rural people themselves, was stated as of first importance by but four institutions. It was pointed out that this objective is accomplished by fostering attitudes of mind and capacities which will enable rural people better to meet the individual and civic problems with which they are confronted.

(4) The lack of close articulation of extension with resident instruction and research work is a decided weakness in the organization of many institutions.

(5) Unless extension specialists bring back to their institutions pressing problems requiring research attention, they are only partially filling the job. This function has not been sufficiently emphasized.

(6) The lack of systemized organization of time, projects, personnel, and finances in some counties is hindering the attainment of maximum results.

(7) The most effective extension organizations are those in which the central supervisory force serves effectively and in which local people are securely welded into responsible active groups.

(8) The functions of the club agents in organization and supervision should be more fully supplemented by and coordinated with competent technical knowledge ordinarily available through trained agricultural and home demonstration agents.

(9) Smith-Lever extension is financed cooperatively, the Federal Government contributing 35 per cent; State funds, 37.5 per cent; county funds, 22.1 per cent; and private agencies, 5.4 per cent (1927 budget).

(10) In spite of the fact that the adoption of the local-leader method has made it possible for home-economics extension to reach more people and to secure adoption of more practices per worker and per dollar of cost than any other type of extension service, its ultimate success will depend upon the solution of the following problems: (*a*) Teaching subject matter and methods of presentation to local leaders in a relatively short time; (*b*) a method of adequate supervision of the teaching done by local leaders; (*c*) the present dependence upon acceptance and use of material presented by local people rather than by trained State specialists; and (*d*) the tendency for the county agent to become merely an instigator of events rather than a teacher of subject matter.

(11) If 4-H club work was charged its complete cost of operation it would include from one-fourth to two-fifths of the charge now being placed against county-agent work.

(12) The responsibility for obtaining State legislative appropriations for extension activities is now assumed by the directors in several States. Such requests should be included in the larger institutional budgets and promoted by institutional administrators.

(13) Present methods of financing county workers is a serious weakness in extension organization in the great majority of States. The most important needed change is the payment of salaries of all county workers from State and Federal funds and expenses from county funds.

(14) Sixty per cent of the agricultural counties are without home-demonstration agents. Increasing demands for this service deserve immediate attention.

(15) Normal development of the extension system has been arrested because of lack of money. To complete the organization on the basis of the plan now contemplated will require an accumulating increase of $1,000,000 a year for 10 years.

(16) Administrative measures being developed to raise the level of training and caliber of extension workers are not adequate and satisfactory, as evidenced by the facts that (*a*) 30 per cent of State leaders, 8 per cent of agricultural specialists, 15 per cent of home-economics specialists, 17 per cent of agricultural agents, and 44 per cent of home agents are not college graduates; (*b*) one-half of the institutions that grant leave of absence for self-improvement of staff members do not grant this privilege to county extension workers; (*c*) one-third of the institutions fail to require even a bachelor's degree as a qualification for specialists and only five require that these extension teachers shall have had teaching experience; and (*d*) one-half do not require practical farm experience as a qualification for county-agent work.

(17) The conclusions concerning salaries are: (*a*) When training and experience are considered county extension agents as a whole are well paid compared to college teachers; and (*b*) the college teacher has a better chance of ultimately securing a higher salary than the agent, if both remain in their respective fields of work.

(18) One feature of great strength in the extension system is its close relationship to commercial organizations. Nevertheless, these relationships have resulted in failure to maintain in some instances the strictly educational functions of the extension service. The solution lies in strict adherence by responsible administrative officers to definite educational policies that have been laid down.

(19) If cooperation with the Farm Bureau is to continue successfully, all commercial activities developed by it must be carried on entirely separate from the county extension office or extension must seek other channels through which to develop its educational program.

(20) Commercial agencies have very properly cooperated with and strongly supported Smith-Lever extension activities. Reports of attempts at exploitation of these relations in the interest of business enterprises make very clear the need of promptly dealing with these situations. There can be no compromising with educational principles and responsibilities.

(21) All agreements between Smith-Lever and Smith-Hughes forces must be based upon the needs of, and service to local people rather than upon prerogatives of institutions and agencies.

(22) The "outlook" economic material needs to be made more accurate and more adaptable to wider utilization by State specialists.

(23) Contrary to common belief and public expression, much extension service is being rendered in the field of agricultural marketing. Twenty-two institutions report extension marketing projects under way with 73 per cent of the time of the specialists expended on cooperative marketing. It is important that Smith-Lever forces adhere closely to their educational functions in this as in other fields of work and do not become involved in commercial activities.

(24) Programs of work consists often of a large number of projects hastily chosen and "thrown together" into a paper outline of activities. Projects should be fewer in number and the elements of each thoroughly analyzed.

(25) There is a very pressing need of more closely correlating the agricultural and home economics projects.

(26) The demonstration method has reached its highest development in Smith-Lever extension but needs study and analysis prerequisite to further development in more projects.

(27) It is probably too soon to draw definite conclusions as to the value of the radio in extension work. Forty per cent of the institutions using the radio consider it valuable for dissemination of objective information, but at present seriously question it as a teaching medium.

(28) There is a decided tendency to base judgments as to efficiency and progress upon quantitative measures and to ignore the importance of quality in achievements.

(29) The per cent of completions of 4-H club projects is entirely too low. Whereas the average does not exceed 60 it should be at least 85 or 90.

(30) Unless 4-H club work supplements other educational activities and whets the desire for continuing education it is not meeting its opportunity. Sufficient emphasis has not been placed upon this objective by 4-H club administrators.

(31) If Smith-Lever education fails to reach its maximum effectiveness and to hold its true place in the general educational program it will be largely because of weak administration based upon expediency of action.

Chapter IX.—Position and Objectives of General Extension

The land-grant colleges have succeeded to a considerable degree in providing life opportunity for people to secure aid in their problems of learning in agriculture and home economics through the Smith-Lever extension service. Generally speaking, they have only begun to provide such opportunity in other fields of extension education. Although half these institutions offer extension work in the arts and sciences, in engineering and industry, in teacher training, and in commerce and business, their extension programs, with the exception of a few institutions, are narrowly restricted in these fields. Within the limits of institutional functions present points of weakness should be strengthened. This can be done without lessening the support now given to lines of work that are already well established. Harmonious relations between Smith-Lever extension and other phases of this work will be developed if the whole problem of extension is regarded as one phase of the general problem of education in its broadest aspects. In order to complete a well-rounded program, general extension service must be given increasing attention.

Discussion in this report of the general extension service of the land-grant colleges deals with the following chief divisions: Present status, aims and objectives, organization, financing, personnel, relationships, methods of making services known, offerings and activities, and a summarized statement of findings and recommendations.

Position of General Extension in Land-Grant Colleges

The relatively subordinate position of general extension in the land-grant colleges and universities is due to a number of causes. Sparsity of population in some of the States makes extension work difficult. The lack of adequate financial support has forced a number of the institutions to confine their attention to resident activities. Further reason for failure to develop general extension may be found in the conditions accounting for the origin of the land-grant colleges. The original Federal enactment which resulted in the founding of many of the institutions and which has influenced the development of all gave an impetus to the promotion of practical agricultural and home economics extension education. Emphasis upon these obviously and immediately practical phases of extension has resulted in considerable neglect of other just as practical types of extension service and in almost complete neglect of the social and humanistic fields.

The most significant prerequisite, however, for understanding the status of extension work is to be found in the division of these institutions into two classes—the universities and the land-grant colleges.

The universities which include the land-grant colleges have a direct responsibility for the promotion of a full extension program, including both Smith-Lever and general extension. The separate land-grant colleges have less direct responsibility for general extension, but as they are interested in the whole educational program they share responsibility either directly or indirectly for the promotion and advancement of many types of adult education that are legitimately offered through general extension activities.

A view of the scope of extension service in land-grant institutions can be gathered from the statement of their offerings. The universities, as is naturally to be expected, lead in the variety of fields covered, but it is evident from questionnaire replies that not all the schools in either group were able to give definite information with respect to the extent of work in certain subject-matter fields. In Table 34 are listed the replies of the institutions giving the scope of their general extension work.

TABLE 34.—*Scope of general extension service*

Subject matter field	Land-grant universities: Number of institutions reporting	Land-grant universities: Number stating reason for not offering course: Not institution's function	Land-grant universities: Number stating reason for not offering course: Adults not interested	Separate land-grant colleges: Number of institutions reporting	Separate land-grant colleges: Number stating reasons for not offering course: Not institution's function	Separate land-grant colleges: Number stating reasons for not offering course: Adults not interested	Separate land-grant colleges: Number stating reasons for not offering course: Cooperation with other institutions only
1	2	3	4	5	6	7	8
Engineering	14	....	1	11	....	....	....
Teacher training	17	....	....	14	1	1	2
Arts and science	18	1	....	7	7	....	1
Commerce and business	16	1	....	5	4	....	1
Veterinary medicine	3	2	1	3	2	....	....
Mining	5	1	....	10	5	....	....

To say that general-extension work is not the institution's function is not an entirely satisfactory answer to the question of why the land-grant institution does not offer it. Available resources of these schools in trained faculty men and women who could contribute valuable services in fields other than agriculture and home economics indicate their ability and consequent responsibility in general extension either through direct service or through cooperation with other institutions. Neither is there substantial basis for thinking that adults are not interested in extension education in fields other than agriculture and home economics. The enrollment of hundreds of thousands of adults in general-extension courses offered by State educational institutions and the enrollment of many times that number in commercial correspondence schools are indications that people everywhere are interested in the study of problems related to many phases of life. The fact that such a large number of men and women are paying relatively high prices for work offered by these commercial institutions is a challenge to State schools that have failed to realize their responsibility to their own constituencies for providing certain types of continuing education for adults.

Changing social and economic conditions are affecting a change in the conception of the objectives of land-grant college education. There is an increasing realization that the functions and offerings of these institutions must be adapted to current social and educational developments. The aims and objectives of Smith-Lever extension and of general extension in their broadest and most fundamental aspects are the same. These services are concerned with the educational advancement of the same people, both rural and urban. Both realize that the interests and welfare of the people depend upon an educational program that takes into consideration not only training in modes of making a living, but also in ways of participating most fully in the various complex activities of society. General extension can contribute substantially to an educational program designed to accomplish these objectives.

Appraisal by the land-grant colleges of the value of their general-extension service certainly should give encouragement to increasing its scope and amount. Of the 27 institutions reporting, there is practically unanimous agreement that their general extension ranks high on the basis of quality of work done, standing of the staff compared with resident staff, and the effect of the service on the position of the institution in the State. This is true of its appraisal by the people of the State, by public-school teachers, and by the administrators and the faculties of the land-grant colleges themselves. The one institution that reports that its general-extension work is unsatisfactory explains that this is due to the fact that so little is offered.

Objectives of General Extension

Failure to understand the objectives of general-extension education is one reason for its slow development in the land-grant colleges. Fundamentally the objectives of general extension are the same as those for education in general. General extension attempts to bring to adults the advantages of vocational, humanistic, and social education which are not open to them through the usual educational agencies nor through agricultural and home-economics extension. There are good reasons why men and women of various walks of life should engage in purposeful study in engineering and industry, in commerce and business, and in the arts and sciences under the direction of universities and colleges, even though they are not enrolled for work in residence. General extension is concerned with the promotion of study in a wider range of subject-matter fields than is Smith-Lever extension. Its constituency is more widely distributed among the various professions and occupations. It is the function of the land-grant colleges within the widest limits of their institutional resources to provide democratic education for the common people. Manifestly this can be done only by taking the colleges to the people who can not go to college.

It is the chief function of general extension, therefore, to contribute guidance and assistance in the problems of both vocational and liberal learning for relatively mature people who are for the most part engaged in the daily tasks of earning a living and who wish to utilize their spare time in study. Study may be directed along the line of training for immediate improvement in vocational proficiency, thus contributing to promotion in service, or in fields of purely cultural interest. In either case, both objectives are attained if the work is successfully accomplished.

There is no doubt that the present trend of economic development indicates a greater demand for general extension. Increase in the use of machinery and other devices is constantly increasing the need for study on the part of workers. It is also lessening the pressure of manual labor, thus affording to people more opportunity for study. The general rise in the level of educational achievement is creating a demand for better means of employing leisure hours. The natural result will be a more satisfactory utilization of all the resources now available for guidance in purposeful reading and also a demand for more resources.

Chapter X.—Organization of General Extension

General extension service requires an organization that will assure freedom for its development according to special extension needs and at the same time accomplish the most thorough integration with the institution. The failure of general extension to develop its special techniques and methods, on the one hand, and its failure to enlist the sympathetic cooperation of the university faculty on the other, can usually be traced directly to faulty organization, either in form or in personnel—sometimes, unfortunately, in both.

The most satisfactory administration manifestly is one that provides for direct centralization of authority and responsibility. General extension should, therefore, be placed under the administration of one head, who is directly responsible to the president for all such work offered. The cooperation of an advisory committee has its merits, providing it is only advisory, for such cooperation assists in the correlation of extension services within the institution.

Administrative Form

The organization of general extension requires that it provide for satisfactory correlation of various phases of extension work and also for its proper integration with the institution. In 21 of the 29 institutions reporting, the general extension work is included under one head, usually a director; in 20 the director is responsible directly to the president, while in 4 he is responsible to a committee. To accord directors a rank coordinate with the deans is the general practice. Of 23 land-grant colleges reporting, 19 employ general extension directors, whose primary function is the administration of the general extension service and whose time is devoted to this work.

Only four directors are hampered by other duties, such as institutional administration, committee work, or resident teaching, to such an extent that the administration of general extension is regarded as of secondary importance. That the directors have opportunity to travel for the purpose of lecturing and establishing desirable relationships is indicated by the replies of 18 of 23 schools. Lack of administrative assistance or clerical force or funds is given by five schools as reasons for their failure to provide such opportunity. That the directors have not taken due advantage of their opportunities to travel for the purposes suggested is shown by the report of only 241 lecture engagements for all deans and directors during 1927–28.

While the form of organization indicates centralization of general extension under the direction of one head, reports from the institutions show that there is considerable departure from the plan in actual practice. From Table 35 the extent to which general extension service is actually offered under different administrative controls may be determined. Much division of authority and responsibility is evident.

TABLE 35.—*Number of institutions in which general extension service is offered under different administrative controls*

Separate unit	Administrative direction by—		
	General extension	Departmental activity	Individuals
Agriculture (not including Smith-Lever)	11	9	[illegible]
Engineering and industry	14	11	[illegible]
Home economics (not including Smith-Lever)	15	6	[illegible]
Teacher training	13	11	[illegible]
Arts and sciences	18	6	[illegible]
Commerce and business	16	5	[illegible]
Veterinary medicine	3	3	[illegible]
Mining	4	4	[illegible]

The relationship of extension service and resident work is one of the most important problems confronting the administrator of general extension. How to maintain satisfactory cooperation with the resident staff and at the same time realize the possibilities of the service for the people of the State is a difficult problem. There is danger, on the one hand, of isolating the extension service from the resident institution instead of integrating it satisfactorily, and danger, on the other hand, of failure to adapt the work to the needs of the constituency to be served.

One of the most common causes for apprehension on the part of university administrative officers has been the belief that general extension tends to set up a separate university that may fail to maintain the scholastic ideals of the institution. Results of the survey show that this belief is not well founded. The selection and assignment of extension instructors is a matter in which department heads have considerable responsibility. The most-favored procedure is for the director of extension and the department head concerned to act jointly, a plan most admirably suited to assuring harmony with general university interests. The practices followed are indicated in Table 36.

TABLE 36.—*Number of institutions reporting responsibility for the selection and assignment of extension instructors in general-extension service*

Classification of instructor and type of instruction	Number of institutions reporting responsibility on—		
	Extension director	Department head	Joint action
Members of extension staff only:			
Extension short courses	9	2	8
Extension classes	7	2	9
Correspondence work	10	2	9
Members of resident staff:			
Extension short courses	5	6	9
Extension classes	5	5	14
Correspondence work	4	5	12

Even greater is the share of the resident department heads in directing the character of instruction. This is done by keeping in touch with extension teaching through conferences, use of common outlines and syllabi, and through exchange of instructors in resident and extension teaching. (Table 37.)

TABLE 37.—*Number of institutions reporting extension instructors' responsibility for methods of teaching and subject-matter content*

Classification of instructor and type of instruction	Number of institutions reporting responsibility on—		
	Extension director	Department head	Joint action
Members of extension staff only:			
Extension class—			
Methods	9	3	11
Content	4	6	11
Correspondence study—			
Methods	7	2	10
Content	2	6	10
Members of resident staff:			
Extension class—			
Methods	5	4	13
Content	3	6	12
Correspondence study—			
Methods	7	5	11
Content	1	8	10

Certainly the plan of organization and the procedure followed offer good opportunities for harmonizing general extension work with resident practice if resident department heads are disposed to take any reasonable and sympathetic interest in extension service. It is clear from questionnaire returns that directors of general extension defer to the departments to a considerable degree with respect to methods of teaching and subject-matter content.

An effective organization of general extension provides for satisfactory contacts with local groups. Contact is established and maintained with communities either through local committees as is the case in 8 institutions, or through individual representatives as in 13.

Local committees are sometimes appointed by local groups of interested persons and sometimes by extension administrators for the execution of their projected programs. Individual representatives also are chosen by groups or appointed by extension administrators in the same manner. Selection by groups of people interested in extension work is reported by 13 institutions and selection by the extension administrators by 12. Appointment by school superintendents is reported by five schools and an equal number report cooperation by individuals who, on their own responsibility, represent the local extension interests of the institution. Naturally such a representative may or may not be a satisfactory person with whom to deal.

The most usual method by which contact is established and maintained with local representatives is through correspondence, although 17 land-grant colleges report conferences held in local communities and 10 report conferences on the home campus. Nominal compensation is paid local representatives by six institutions and four allow remission of service charges for assistance given. Most local representatives serve temporarily.

Practically all of the land-grant colleges offering general extension service utilize to a great extent the resources of local communities, most of which provide space for classrooms, conferences, and lectures, together with heat and light without charge. Undoubtedly this cooperation coming from the people contributes greatly to the success of extension programs. It is helpful, not only for the actual money values thus contributed, but also for the interests and enthusiasms that develop from the participation of local people in college and university projects.

It is good policy for universities to require that local communities provide housing and incidental service as a condition for the offering of university work. However, there may be some exceptions to this rule. This is particularly true in large cities where general extension programs have developed to an extent that assumes the proportion of a branch institution. This is occurring in many urban centers and is particularly true in the case of universities that offer a rather complete educational program. These branch developments are in effect junior colleges in some States. They are even more than that in some instances where extension courses are offered quite generally on even the graduate level of instruction.

Financial Organization

Democratic education in the United States owes its great progress to the fact that it is supported largely by taxation and is open to all at a minimum cost. The original conception of the land-grant college was based on this principle. In accordance with this conception agricultural and home economics extension, supported by liberal Federal and State appropriations, has made notable progress. But the principle of relatively free education has not been applied to general extension to the degree that is the practice in public higher education and in Smith-Lever extension. That this is true is evident from the fact that the total excess of expenditures over fees collected from users of service for general extension in all the land-grant colleges reporting is less than $300,000. The most striking fact relating to the financing of general extension work in the land-grant colleges is the discovery that the expenditures are so small.

General extension budgets are handled in the same general way as are the budgets of the schools and colleges of the institution. The president, or the president acting jointly with the director, has final decision with respect to allotment and appropriation of general extension funds in 25 of the 30 institutions reporting on this question. Only 3 schools report an extension-budget committee although 16 state that the needs of the different service units, including salaries, are set up by the respective heads of these divisions. In 26 institutions general-extension funds are disbursed through the regular university office while only 2 make such disbursements through the general extension office. General extension divisions of half the institutions are permitted on their own responsibility to order books, magazines, office equipment, films, slides, and current supplies, while half make such orders through the office of the general purchasing department.

The fact that so much dependence has been placed upon the fee system in order to finance general extension has led to the development of some phases of the work to the neglect of other phases. Many useful services are not sufficiently promoted because they lack the popular and, in some instances, the somewhat cheap appeal necessary to secure money in the form of fees. Certain extension services are expanded to considerable proportions because the clientele which they reach is more easily organized into groups for the purpose of extension study. This is particularly true of class extension work among public-school teachers. At the same time, there may be difficulty in extending other phases of extension work which may be of equal or of even greater value to the people, and especially to the people who are not in a position to profit so much from the work offered by the usual educational agencies. Lack of money, in other words, has had too much influence on the trend of general extension.

Plant, Housing, Equipment

All 29 land-grant colleges reporting state that their general-extension divisions have office space on the home campus which with one exception is provided without charge against the extension budget. This office space is adequate in 16 of the institutions and inadequate in 13. In local centers housing facilities including space, light, heat, and service for administration, short courses, and extension classes are provided both by public and private agencies. The very general practice is for local communities to provide such facilities without charge. General extension divisions are usually supplied with mimeograph and multigraph machines, but less than a third have printing equipment. Films and slides are owned by more than half the institutions but fewer than half of them have cameras.

Chapter XI.—General Extension Personnel

Of greater importance than the form of organization is personnel and its management. While it is not within the province of a survey to attempt to evaluate the worth of any member of a staff, it is possible to inquire concerning factors commonly regarded as important in determining staff efficiency. Extension staffs are usually made up of two different groups. These are the extension staff proper composed of those who devote full time, or practically full time to the work of extension; and the supplementary group of instructors who are employed to assist in extension teaching.

It is taken for granted that a general extension staff should compare favorably with the resident staff in training and experience. But it is not always necessary that the scholastic training should be the same. Work carried on without reference to credit may in many instances be done most effectively by persons not hampered by academic tradition. Qualifications necessary for success in certain phases of general extension administration differ from those rated important for success in residence. In some respects, especially in personality requirements and in ability to deal with more mature people, qualifications necessary for success in extension work are more exacting than in resident teaching. Nevertheless, general extension work will gain acceptance among academic bodies to the degree in which extension staffs measure up to resident staffs with respect to scholarship, experience, and ability.

Whether or not the scholastic attainments of instructors as shown by their academic degrees is a satisfactory measure of the quality of teaching, especially of teaching a group of extension students at any rate the compilation of data in Table 38 giving the facts is interesting.

TABLE 38.—*Data in regard to educational qualifications of instructors of credit-extension classes, 1927–28*

Degree held	Instructors		Classes		Enrollment	
	Total	Per cent of total	Number of classes taught	Per cent of total	In classes taught	Per cent of total
1	2	3	4	5	6	7
Ph. D	205	26	299	10	8, 222	17
M. A	277	36	1, 527	50	18, 157	38
B. A	181	23	706	23	12, 854	26
M. D., LL. B., J. D., etc	35	4	105	4	2, 839	6
Other special degrees: C. P. A., etc	13	2	53	2	1, 166	2
No degree	73	9	339	11	5, 110	11
Total	784	100	3, 029	100	48, 348	100

Management of Staff

The general extension administrative staff is selected in much the same way as the members of the resident faculty. The usual procedure is for the head of the extension division to recommend appointments to the president. However, in the case of staff members who are to teach credit courses it is the general practice for heads of extension divisions and department heads to make joint recommendations. If district representatives teach, their selection and appointment are governed by this rule. However, they are usually considered only as community assistants and are not formally appointed.

One persistently difficult problem of general extension-staff personnel is that of securing instructors for extension classes. The demand for classes can not be satisfactorily provided for far in advance as requests for various courses may come at any time and from any section of the State. The general practice is to employ a permanent extension staff of a relatively small number of instructors for the lines of work in greatest demand and to draw on the resident staff of the institution for additional instructors as requests indicate need. In addition it is a common practice to employ capable instructors from other State institutions, non-State colleges, other educational agencies, and from the fields of business and professional pursuits in response to demands that the institution can not meet from its own faculty resources. This plan has merit in the possibility of serving parts of the State remote from the resident campus and also of providing types of instruction for which the institution may not be strongly equipped in teaching personnel. It has the apparent disadvantage of the probable lack of opportunity for harmonizing the subject-matter content and the method of teaching with those of resident instruction.

The ways by which the land-grant colleges have met the problem of providing a supply of extension instructors are shown by Table 39.

TABLE 39.—*Sources of supply for instructional staff of the general extension division, 1927–28*

Source, according to institutions represented	Instructors		Classes	
	Total	Per cent of total	Total	Per cent of total
Own institution	608	55	1,284	47
Other State-controlled educational institutions in State	31	3	108	4
Non-State-controlled colleges in State	45	4	112	4
Out-of-State colleges	34	3	41	1
State departments	5		15	1
Public-school administrators and supervisors	44	4	70	3
Public-school teachers	52	5	257	9
Business and professional people	294	26	846	31
Total	1,113	100	2,733	100

Limitations on extension instructors.—That resident instructors assume extension teaching for extra pay as an obligation in addition to their regular resident institutional work is a valid criticism of general extension. This practice is followed by 23 land-grant colleges while only 6 state that extension teaching is regarded as a part of the regular teaching schedule with a corresponding reduction in resident work. These institutions, with but two exceptions, practice both methods. Extension teaching for extra compensation, if engaged in to a very limited degree, may not be particularly bad. Perhaps it is no worse than is the general practice of college professors of supplementing their salaries by doing other "outside work." It is, however, subject to grave abuse. The land-grant colleges have recognized this danger as is shown by the fact that the amount of extension teaching which full-time resident instructors may do is limited in 10 schools by the extension administration, and in 18 by the institutional administration.

The problem of limiting the amount of extra work that may be undertaken by extension instructors is, of course, closely related to the difficult general problem of securing extension instructors. That so little progress has been made in its solution may be accounted for by the fact that general extension has developed largely as expediency dictated. The land-grant colleges with a few exceptions have failed to recognize it as a movement of major importance justifying both personnel and financial support, commensurate with other major divisions of the institutions.

There is a well-defined belief that the measure of a university's appreciation of individuals or of staff units of its faculty is found in a study of its salary roll. Whether there is any basis for this belief or not, data giving the median salary, and salary ranges for members of extension staffs are of interest. See Table 40.

TABLE 40.—*Salaries of the general extension staff, not including part-time employees or part-time instructors*

Item	Staff											
	Directors	Administrative assistants		Extension class instructors		Correspondence-study instructors		Clerks		Stenographers		
		Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	
1	2	3	4	5	6	7	8	9	10	11	12	
Median salary	$4,500	$2,500	$1,500	$3,250	$2,500	$2,750	$1,750	$1,250	$750	$750	$750	
Salary range	2,000 to 8,000	500 to 5,000	500 to 4,000	1,500 to 6,500	1,250 to 3,500	1,500 to 3,750	1,000 to 3,000	500 to 3,000	500 to 1,000	500 to 1,000	500 to 1,750	

Reference to Part VII, Staff, of this survey will afford a basis of comparison of extension salaries with those of other divisions of the institutions.

Regularly employed members of general extension staffs, with the exception of administrative assistants in local centers, have been generally granted academic rank. Directors are all so recognized. No institution reports that requests of extension divisions for such rank have been denied its staff members.

Recognition has not been generally accorded general extension division staffs with respect to membership with power to vote in institutional bodies. While it is evident that extension divisions, which are concerned largely with administrative problems, are not primarily interested in resident departmental problems as such, they could perform a useful function as participants in the deliberations and decisions of institutional councils and of the general faculty as well. Certainly such association may very reasonably be supposed to promote better understanding and articulation between the resident and extension personnel. Inasmuch as practice in this respect is more frequently in favor of such membership than common report would indicate, Table 41 is inserted for the information of administrators who have the question to consider.

TABLE 41.—*Eligibility of general extension staff to membership with power to vote in the following bodies*

Body	Number of institutions reporting—	
	Yes	No
Ruling body of the institution, senate, council	10	8
Graduate council	6	9
General faculty	17	5
College or school faculty	11	5
Departmental resident staffs	7	7

The problem of improvement of the general extension staff has not been given the special attention it deserves if the replies to the questionnaire are a reliable criterion. The methods suggested for further training with the number of institutions indicating their use are as follows: Staff discussions of important problems, 16; regular university courses, 12; required or suggested readings, 9; correspondence courses, 7; and class extension courses, 5.

The fields of study most favored for members of extension staffs with the number of approvals are: Psychology, 6; economics, 6; sociology, 6; education, 5; journalism, 5; and vocational teacher training, 1.

Since leaves of absence are frequently granted and more frequently used for the purposes of study the practice of the institutions in regard to leaves for members of extension staffs is of interest in this connection.

Of the 20 land-grant colleges reporting, 15 state that leaves of absence for study are granted to general extension staff members. Of these, 11 say that leaves are granted on the same basis as to members of the resident staff.

Chapter XII.—Relationships of General Extension

One of the most important considerations in the life of an educational institution is the strength of its relationships with the public which it serves. This is very true of the land-grant institutions as they have from the beginning been agents of the people and as such have been responsible to the people. Nevertheless, the faculties of these institutions have not always recognized the full extent of their obligation to and dependence upon the public that never sets foot on the campus. They quite frequently when not associated with the Smith-Lever extension service confine their interest to those who enroll for resident study. This lack of appreciation of the importance of the relationships of the land-grant colleges to the people of the State in general and to many extra campus agencies and occupations has resulted in ignorance of the full value of the extension services offered. Extension work has been considered as something separate and apart from the institution through which it functions.

Although as has been pointed out by preceding pages the relations of Smith-Lever extension to Federal agencies are varied and close, those of general extension are very limited. This is especially true of relations involving finances. Only in the limited field of teacher training under the administration of general extension is there any Federal support of this character. General extension does, however, make considerable use of certain types of Federal aid particularly of various bureau publications which are used as contributions to the package library services. Motion-picture films are also available from Federal bureaus for State distribution. There are many untapped sources of potential Federal aid that extension directors could investigate to the advantage of their services. Many bureaus and offices of the Federal Government might also profit to a much greater extent than is at present the case by the helpful cooperation that extension divisions could extend. A lack of knowledge and understanding of these mutually helpful resources accounts in large part for failure to utilize them.

State relations of general extension are wide in scope and important in their influence. As a rule these relationships are not due to laws and regulations. There are few cases of relationships established by law. Of 18 States reporting such regulations, 2 say the laws are unsatisfactory. Control by State departments of education is a factor in 8, chiefly in the field of public-school relations. It is clear that general extension is chiefly concerned with more or less informal cooperation with the activities of numerous institutions, State departments, and voluntary organizations in the State. These relationships have been established most frequently with public schools, libraries, women's clubs, chambers of commerce, State departments of education, public utilities, and parent-teacher associations. Relations with labor groups, employer's associations, and municipal agencies have received less attention.

A neglected factor which is important from the standpoint of economy of operation of general extension service is the relationship between the higher educational institutions of the State, especially those that are publicly supported. It is naturally a matter of public concern to know whether funds raised from taxation are economically spent. An efficient State extension service requires that the educational institutions engaged in it shall work according to a program which recognizes the particular resources in trained men and women, in publications and other usable materials, available from each and which fully utilizes these resources. Such a plan eliminates harmful institutional rivalries and wasteful duplication of effort as well.

The land-grant institutions are beginning such cooperation with institutions of higher learning in their respective States. Nearly a half of them, 18, report cooperative activities, such as making known their services to other institutions, participation of faculty in extension service of another institution, and division of subject-matter fields according to institutional emphasis. Only two schools report geographical zoning of the State for economy in administration. Reluctance to enter into an agreement for zoning of territory is natural and justifiable as the land-grant colleges and universities must serve the entire State. It would be unfortunate if they should be considered sectional institutions. Cooperation with other institutions through participation of faculty with others in general extension service will, however, effect economy in administration without loss of institutional recognition anywhere. The methods of cooperation with other institutions and the number of land-grant colleges employing each are given in Table 42.

TABLE 42.—*Character of general extension cooperation between institutions of the States*

Subject-matter field	Type of cooperation				
	Geographical zoning of the State for economy in administration	Division of subject-matter fields according to institutional emphasis	Participation of faculty in such service with another institution	Referring requests for service to proper institution	Making known to the people the services offered by other institutions
1	2	3	4	5	6
Agriculture	0	1	5	7	6
Engineering and industry	0	1	2	3	2
Home economics	1	3	5	4	5
Teacher training	1	6	7	3	5
Arts and sciences	0	0	0	3	3
Commerce and business	0	0	1	3	2
Veterinary medicine	0	1	1	3	2
General extension	0	1	3	5	3
Total	2	13	24	31	28

Almost all of the land-grant colleges report cooperation from public libraries, especially in extension teaching. Data on this problem show, however, that possibilities of library cooperation are not fully realized. There is good cooperation in supplying reference books for extension students, although 2 institutions report no use of this service and but 3 institutions make no use of library cooperation in distributing extension announcements. Only 6 report that extension workers are asked to speak on library programs, while 10 report that they are not. Relations between general extension and public libraries could be strengthened by mutual cooperation.

Institutional libraries of the land-grant colleges and universities assist in general extension work by lending books both for class extension and correspondence study. That 10 institutions do not do so for class extension and that 8 do not for correspondence study indicates that they are not adequately prepared to undertake this service or that plans for such cooperation have not been worked out.

Land-grant colleges have not fully recognized the need of cooperation with public schools, libraries, State departments and commissions, and with municipal agencies, especially with respect to avoiding unnecessary duplication of work as is shown in Table 43.

TABLE 43.—*Methods of avoiding unnecessary duplication of work offered by other State agencies*

Agencies	Methods employed—			
	By offering college grade work only	By requiring college entrance requirements	By offering work in centers not served by others	By cooperation definitely agreed upon
1	2	3	4	5
Public schools	10	4	12	9
Libraries and library commissions	1		5	6
State departments:				
Highway	1		2	3
Sanitation	1	1	2	3
Conservation	1		2	3
Municipal agencies: Public works	1		1	7

Publicity

General extension has failed to make the most of its opportunities to develop a satisfactory publicity program. The most frequently employed methods for making known the services of the extension division are official bulletins or news letters, correspondence, and newspaper publicity used by all the institutions, and lectures, district representatives, advertising, and radio, all of which are utilized by half the colleges reporting. Extension divisions lack some of the means of effective publicity that are inherent in residence, among which are campus appeal, athletic teams, alumni, and the traditions of the institution. Furthermore, general extension has not developed community contacts through cooperative activities to the extent practiced by Smith-Lever extension with such favorable informative effect.

Chapter XIII.—Offerings of General Extension

The democratic character of university extension service is indicated by the general appeal which it makes to all people regardless of age or of educational level of achievement. Informal services of general extension, such as visual instruction aids and package libraries of information are utilized by the public schools where millions are served, by women's clubs, and by other community groups, as well as by individuals from practically all the walks of life.

In its teaching service also university extension reaches students irrespective of age and within broad limits of educational advancement. Mature men and women who for some reason have not completed their secondary school training enroll in home study courses of high-school grade as a means for removing this handicap. Boys and girls with approval of high-school principals take such courses in case of local need of cooperation. Work which is offered both in short courses and in class and correspondence study without regard to university credit of any kind appeal to a wide range of citizens. The greatest field of the more formal phases of university extension teaching, courses for credit, is the large class of undergraduate college students and of teachers in service. These groups enroll in extension work for the chief purpose of applying credits toward their regular collegiate degrees.

Graduate courses, too, are becoming increasingly popular. Graduate work is offered in the form of specialized training for people in business and in the professions. Many enroll in such courses because their previous collegiate training was general or was in another field or because economic, social, and scientific changes have rendered their training obsolete. Others take such courses chiefly for their general cultural value. Still others engage in graduate study through university extension for the purpose of obtaining advanced degrees. It is significant that 15 land-grant colleges [4] accept extension-class credit to apply on the master's degree and 5 [5] accept

[4] Alabama Polytechnic Institute, University of Arizona, University of Arkansas, Purdue University, Iowa State College, Louisiana State University, University of Maine, University of Missouri, University of Nebraska, North Carolina State College, Ohio State University, Pennsylvania State College, State College of Washington, University of Wisconsin, and the University of Wyoming.

[5] University of Arkansas, University of Idaho, University of Missouri, North Carolina State College, and State College of Washington.

correspondence study. One institution (University of Nebraska) accepts extension-class work as a part of the requirement for the doctor's degree. As mature students are the most capable in pursuing studies under a minimum of direction, graduate extension work will develop more generally within the fields of study where the necessary research materials are available.

That general extension work of the land-grant colleges is available for people of all ages and of varying degrees of previous training is evident from Table 44, which indicates the number of institutions offering work through different types of instruction on a variety of levels.

TABLE 44.—*Educational levels and medium of instruction of general extension offerings*

Educational levels	Medium of instruction				
	Short course	Class extension	Correspondence	Lectures	Other
1	2	3	4	5	6
Subcollegiate:					
General adult education without regard for formal credit of any kind	14	[1] 14	[1] 16	11	1
Organized high-school courses for adults who desire college entrance credits	-------	4	[1] 14	1	2
Undergraduate:					
Courses of freshmen grade for young students who expect to go to college, teacher-training courses, etc	1	14	18	4	1
Higher courses for teachers in service and others with partial college training	[1] 2	19	18	3	1
Cultural education for the general public	1	[1] 14	[1] 19	10	1
Graduate:					
Specialized work for trained people in business and professional work	3	10	7	3	-------
Cultural courses for college graduates	-------	12	11	4	-------
Credit courses for application toward—					
Master's degree	[2] 1	14	5	-------	1
Doctor's degree	-------	1	-------	-------	-------

[1] Pennsylvania State College—Engineering only.
[2] Pennsylvania State College—Teacher training only.

The extent to which the different schools and colleges of the land-grant institutions offer general extension work through noncredit short courses, through extension classes and correspondence, both credit and noncredit, and through a number of informal extension services is shown by the Table 45, listing the offerings of institutions reporting such service.

TABLE 45.—*Number of institutions reporting offerings and activities relating to schools and departments*

School or department	Offering and activities: Short courses	Class extension: Credit	Class extension: Noncredit	Correspondence work: Credit	Correspondence work: Noncredit	Lectures	Public information	Library, including package library	Home reading courses	Public discussion (oratory, debating)	Public-school relations (contests, etc.)	Community drama (play, recreation)	Surveys	Municipal reference	Club service, women's clubs, Parent-Teacher Associations, etc.	Labor education	Visual instruction	Radio
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Agriculture	9	5	4	14	9	12	7	4	5	1	4	3	6	2	6	----	7	10
Engineering and industry	16	10	12	10	10	14	11	5	3	1	2	1	3	4	----	4	6	10
Home economics	2	7	3	10	5	11	7	4	5	1	4	2	2	----	8	----	6	9
Education (teacher training)	2	18	8	19	5	13	7	3	5	3	5	3	4	----	8	----	5	7
Arts and sciences	3	19	8	19	10	16	7	8	6	8	6	8	1	----	9	3	8	7
Commerce and business	3	15	8	17	10	14	8	4	4	2	1	2	2	4	4	2	6	6
Medicine	2	1	3	----	1	4	2	1	----	----	----	----	----	----	----	----	1	1
Dentistry	1	1	----	----	----	1	----	----	----	----	----	----	----	----	----	----	1	1
Veterinary medicine	1	----	----	----	----	1	1	----	----	----	----	----	----	----	----	----	----	3
Pharmacy	----	----	----	----	1	----	----	----	----	----	----	----	----	----	----	----	----	2
Mines and geology	2	2	3	6	2	2	2	1	----	----	----	----	----	----	----	----	2	2
Military training	----	----	----	----	----	----	1	----	----	----	----	----	----	----	----	----	----	----
Forestry	1	2	----	2	----	2	1	1	----	----	----	----	----	----	----	----	1	4
Law	----	----	1	2	1	----	----	----	----	----	----	----	----	2	----	----	----	1
Music	1	5	5	8	4	6	4	2	2	1	4	1	----	----	2	----	1	7

Table 46 shows a wide range of offerings by different schools and colleges within the institutions, but the number of institutions offering general extension work in a large number of the different educational fields is not large. Not one of the schools and colleges is represented by general extension in all of the institutions. Those most generally appearing are arts and sciences in 19, teacher training in 19, engineering and industry in 16, and commerce and business in 15.

Offerings by courses.—Another and more detailed view of the scope of the general extension work of the land-grant colleges may be obtained by a study of the list of individual courses offered through short courses and through extension class work and correspondence study, both credit and noncredit. Table 46 gives this list with the number of schools that offer such courses.

TABLE 46.—*Number of schools offering credit and noncredit courses in general extension, 1927–28*

Subject	Short courses	Class extension		Correspondence	
		Credit	Noncredit	Credit	Noncredit
1	2	3	4	5	6
Agriculture:					
Agriculture legislation				1	
Agronomy	3			7	5
Animal husbandry	3		1	10	6
Dairy husbandry	4		2	5	5
Entomology	1			4	3
Farm economics	3			7	1
Farm crops	3	1		4	4
Farm management	3			5	1
Farm machinery	2				1
Farm structures					1
Floriculture				1	1
Fruit growing	2	1		5	5
Poultry	3		1	8	7
Marketing	3			4	1
Arts and sciences:					
Art		5	3	7	
Astronomy		2	1	6	3
Bacteriology	1	1		1	
Biology		4		3	1
Botany	1	6		8	4
Chemistry		3	3	9	2
Civics		1		6	2
Drawing		6	5	9	6
English—					
Composition		13	6	19	9
Business English	1	4	7	11	6
Public speaking, debating, etc	1	10	7	4	
Literature		13	4	18	7
Entomology				2	4
Ethics		4		7	
Eugenics		1		3	
Evolution		1		3	
French		14	1	17	4
Fine art		4		3	
Genetics		4		3	1
Geography		4		8	2
Geology		4	1	9	2
German		5		15	2
Government	1	8	1	13	3
Greek		1		4	
Health education		8	2	8	3
History		12	1	19	7
History of art		1		3	
Italian		4		6	
Latin				15	3
Mathematics			2	5	8
Arithmetic		7	3	16	8
Algebra		2	4	13	10
Geometry, plane		3	1	13	7
Geometry, solid		5	2	16	5
Trigonometry		4	1	19	3
Analytics		4	1	16	3
Calculus		1		3	
Meteorology		1		3	
Mineralogy		1			1
Nature study		4	1	1	1
Norwegian		1		1	
Philology		1		1	
Philosophy		8	2	10	
Physical education		2	2	3	1
Physics		1	1	11	7
Physiology		4	2	6	2
Political science		8	1	15	2
Psychology	1	15	5	19	5
Public school art		3		2	1
Radio	1	1	4	1	6
General science		1	1	2	2
Sociology		12	3	16	2
Spanish		11	2	17	2
Swedish		1		2	
Zoology		8	1	7	1

TABLE 46.—*Number of schools offering credit and noncredit courses in general extension, 1927–28*—Continued

Subject	Short courses	Class extension		Correspondence	
		Credit	Noncredit	Credit	Noncredit
1	2	3	4	5	6
Commerce and business:					
Accounting		9	3	13	5
Advertising		3	5	3	6
Banking		6	3	8	2
Bookkeeping		2	4	6	5
Business administration		3	2	2	1
Business English		3	5	7	6
Business law		6	5	12	3
Commerce		1	2		1
Cooperative finance		1	1	2	
Credits and collections		1	2		
Economics		11	4	18	5
Finance		6	3	3	
Geography (applied)		2	1	5	
Industrial management	1	1	3	3	3
Insurance	1	3	2		
Investments		3	2	1	
Journalism		4	1	10	3
Labor problems		2		1	1
Marketing		3	2	2	
Money		4		6	
Office management					2
Personnel management		3	2	1	2
Public utilities		1	2		1
Real estate	1	2	4		
Retail-store management	1	3	3		2
Salesmanship		3	5	4	5
Statistics		4		1	1
Taxation		1	1		
Traffic management		1		1	
Transportation			1	3	
Dentistry	1				
Education:					
Elementary		13	2	13	4
Secondary		12	3	18	5
History and philosophy		11	1	15	3
Administration and supervision		16	2	16	3
Educational psychology		15	2	19	3
Methods of teaching		14	1	18	4
Measurements and research		12		12	
Rural		4	1	9	1
Engineering and industry:					
Civil	5	3	4	6	5
Structural		1	2	2	2
Electrical	5	5	7	8	6
Mechanical	1	5	6	9	6
Mining	1	2	2		
Architectural		2	1	3	2
Chemical		1	1	1	1
Textile		1	1	1	
Automotive		1	2		2
Home economics:					
Child care and development	1	3		6	3
Costume design	3	2	1	2	
Economics of the household	2			2	1
Food and nutrition	3	4	1	3	2
Home management	2			5	1
House planning	2			1	
Interior decoration	3	2	1	2	1
Parental education	2	1	2	2	
Special methods in home economics	2		1		
Textiles and clothing	4	3	1	5	1
Law		3	3	3	1
Library	2	1	1		2
Medicine	1				
Mining	1		2		1
Music		7	2	7	4
Pharmacy				1	1

Offerings through short courses.—It is evident that short courses are regarded as very effective devices for the promotion of general extension activities in the land-grant colleges. This is particularly true of engineering and industry, commerce and business, and education. It is also true of medicine, considering the small number of institutions that include the study of medicine in their curricula. Table 47 indicates the totals for all the institutions reporting.

TABLE 47.—*Number and sponsor of short courses conducted by general extension service, 1927–28*

Sponsored by school of—	Number of short courses held—		Attendance
	On campus	Off campus	
Agriculture	14	1	2,177
Engineering and industry	59	2	5,527
Home economics	2	5	465
Education (teacher training)	2	23	403
Arts and sciences	1	17	504
Commerce and business	15	8	1,275
Medicine	3	7	462
Dentistry	5	1	176
Veterinary medicine	1		
Mines and geology	1		28
Music		2	177

Offerings through class and correspondence teaching.—The general extension work that is best known and of greatest general appeal is its teaching through extension class work and correspondence study. That this is true serves to emphasize the difference in technique and method in the development of Smith-Lever extension and general extension. Smith-Lever has had a development largely independent of the controls and limitations of resident academic departments. On the other hand, general extension, through both class teaching and correspondence study, has, to a marked degree, transferred to the extension field the subject-matter content and methods of instruction prevailing in residence.

This development of general extension along lines closely paralleling regular resident college work constitutes both its greatest strength and its greatest weakness. It has succeeded to a considerable degree in maintaining university standards, particularly in the scholarship of instructors and in the quality of its student personnel. It has gained general acceptance, although in many instances grudgingly granted, among colleges and universities of reputable standing. In order to gain this recognition among educational institutions, however, general extension's two foremost activities have had to sacrifice much of the democracy of education that should give university extension its greatest appeal. As a result the number of people served through these media of instruction, while large in the aggregate, compares very unfavorably with the millions reached through Smith-Lever activities. Rules and regulations imposed by deans and department heads have served admirably to maintain university standards. They have served just as effectively to cause millions to enroll in commercial correspondence institutions from which work is available on an entirely different basis.

A study of student personnel and of courses emphasizes the fact that general extension through class and correspondence teaching serves chiefly a limited stratum of society. The occupations reached in greatest number, as shown by institutional reports, are in descending order: Through class extension, teachers, students, housewives, and business men; and through correspondence study, teachers, students, and business men. The subjects taken most frequently through extension class instruction are English, history, education, psychology, sociology, trade, and industry; and through correspondence study, English, education, psychology, mathematics, history, and economics.

Quality of Extension Teaching

It is obviously difficult to compare accurately the quality of work done through extension teaching with that done in residence, as there are so many factors that enter into the problem. To measure the actual mastery of content of certain courses by extension students in comparison with such achievement by resident students, is, however, quite feasible either through standardized tests or examinations identical with those in residence. Only 4 of 28 institutions have attempted a comparison by the former and only 8 by the latter method.

A study of the quality of work done by extension students who have enrolled in residence as compared with that of other resident students, although not necessarily a measure of the quality of extension teaching, has value as a means of determining the quality of students transferring from extension study to resident work. Only three land-grant colleges have made such a study.

Class extension.—Class extension has always been considered one of the most important general extension services. On account of its parallel relationship to resident instruction it has been developed according to recognized standards of university procedure to a greater extent than is true of any other general extension work. The tendency to adapt the formal standardized procedure of resident instruction to an educational program, which should, as one of its important functions, make a distinctive contribution to education through developing its own appropriate technique, has limited the field of service of class extension. This limitation has operated in two important ways, the extent of area served and the proportion of the population to which the work appeals.

All of the institutions reporting on the comparison of extension students and resident students express complete satisfaction with those who have done extension work. Some say that extension students rate slightly higher but the general impression is that there is no appreciable difference in the achievement of the two groups.

Practice	Number of schools
1. Calling for judgment factors on assignment	22
2. Calling for comparisons of texts and references	16
3. Calling for opinion of student with respect to developments	16
4. Relating problems of course to situations familiar to students	17
5. Oral tests through interview with students	4
6. Occasional supervised tests	7
7 Final examination under supervision	24

The opinions of those reporting on the advantages and disadvantages of correspondence study are interesting as shown by the following table:

ADVANTAGES

	Yes	No
1. Clear thinking, because thoughts must be written	24	2
2 Self-reliance in solving problems unaided	23	2
3. Improved self-expression through writing	21	2

Additional advantages not called for in the questionnaire were suggested by one or more institutions as follows: "Correlation of subject matter," "more individual and personal criticism than can be given in classes," "thorough knowledge, because every part of the work is covered," "adapts itself to student's spare time and ability," and "develops perseverance, accuracy, and initiative."

DISADVANTAGES

	Yes	No
1. No "face to face" contact with instructor and other students	16	5
2. Copying from assigned readings	12	6
3. Lack of sequence in thought resulting from slow progress	6	13

Additional disadvantages were mentioned as follows: "Loss of 'face to face' contact compensated for through kind of lesson." These are not of the conventional formalized type. "Occasional unavoidable delay in returning papers." "Lack of inspiration." "Present social and economic life makes too much demand on time of student and seems to prevent his giving time to his course."

The foregoing comments indicate a keen appreciation of the problems involved in the direction of home study by mail. They also indicate the importance of the need of a special technique for such teaching under the supervision of special correspondence instructors.

Under prevailing conditions the problem of class extension can be most satisfactorily solved on a state-wide basis in small communities in which the population is somewhat compact. Among such States are Rhode Island, Delaware, Connecticut, Massachusetts, and New Hampshire. Considerable areas in many other States are included in this category, especially if the educational institutions of the States develop a plan of cooperation in this work. It is clear, on the other hand, that, even under the most favorable institutional conditions, there are certain States, such as Nevada, Wyoming, New Mexico, Arizona, and Montana, each with large areas with a relatively sparse population and few cities, in which the organization of classes can not generally be successfully accomplished.

No considerable proportion of the population has been effectively reached through the medium of class extension. Although many vocations are listed among those served, the number enrolling from most of them is not large.

Correspondence study.—Correspondence study is a method of teaching procedure accepted by 26 of the land-grant colleges. A total of 26,054 students with class enrollments of 34,615 are reported. The future development of this important extension service will undoubtedly depend upon the success of administrators in developing further the best special techniques for its continued improvement and in bringing about a better public appreciation of its important values as an agency of continuing education for adults.

At present there is general agreement with respect to the most important techniques employed. Practically all of these institutions require textual assignments, collateral readings, regular written exercises, and final examinations. Fifteen report that the students' prompt attention to the work is urged by a system of regular reminders of delay, while 14 resort to this procedure occasionally. Twenty-two schools have tried the radio as a supplementary device, but only 4 have indicated that they are sure of its value. It is significant, however, that none has expressed disapproval of its use. Only 6 land-grant colleges report that they have tried extension courses through a combination of group discussion and individual study, while 19 say that this interesting and perhaps valuable method has not been utilized.

The general public is looking to higher institutions of learning for reliable information of a nontechnical character on problems of human interest. The land-grant colleges have the resources in their trained faculties for providing this information through the administration of their extension divisions. Such service can be made available only through the proper integration of the general extension staff with the resident faculty. Cooperation should also be extended to include the different land-grant colleges themselves in the dissemination of public information of common interest throughout the country. An interchange of bulletins among these institutions would make possible better library facilities for the constituencies of each. Such cooperation would obviously make possible certain economies in publishing. Distribution of such information through the administration of extension divisions ought also to make such information available through a loan for those who desire it, obviously an improvement over the present unsatisfactory method of distributing land-grant college publications. In this connection it is important to note the need of closer cooperation of general extension divisions with various departments of the Federal Government, including the Office of Education. The great resources of these Federal departments, particularly in their stores of publications, could, through such a plan, be made available for the general use of the public if they were put at the disposal of the land-grant colleges for State distribution. By such procedure the Federal Government and the State institutions could profit mutually.

Informal extension services.—The wide range of the general extension work, in addition to correspondence and class teaching, is shown by the data on informal extension services.

Number of institutions giving different types of informal extension service

Service	Service through definitely organized bureau	Incidental service	No service
1	2	3	4
Lectures	11	17	0
Public information	10	15	2
Library (including package)	10	7	6
Home reading	6	7	7
Public discussion	8	6	6
School relations	7	12	4
Community drama	6	8	6
Surveys	5	8	4
Municipal reference	5	6	8
Club service	8	11	1
Labor education	3	5	8
Visual instruction	10	7	5
Radio	10	6	6
Alumni	7	6	7
Community music	3	8	8
Forum	2	6	9

There is an increasing demand for informal public service on the part of the land-grant colleges. It is evident that intelligent people in general and college people in particular are desirous of continuing their education through lecture courses, radio lectures, community drama development, directed home reading, and correspondence courses of less meticulously academic character. What these people want is not the discipline of former classroom study but rather a new discipline of refreshing inspiration and pleasurable study.

Teacher training.—General extension courses in teacher-training work appeal to students of greatly varying degrees of training. Classes are open to teacher-training students without previous college training in 16 institutions and to those with no teaching experience in 13. Teachers in service who are of undergraduate college rank are enrolled in extension classes of 23 land-grant colleges. Graduate work is also offered, for application on the master's degree requirements in 15 institutions, and on the doctor's degree requirement in 1. The number of enrollments in an extension teacher-training class is limited in 7 institutions while 15 impose no limit.

Chapter XIV.—Findings and Conclusions, General Extension

(1) One important problem of general extension education in the land-grant institutions is due to the division of these institutions into two classes—joint universities and separate land-grant colleges. It is evident that the joint universities with their greater resources in staff personnel and with their broader educational functions can successfully promote greater programs of extension service. In spite of this fact, some of the universities have not availed themselves of the opportunity to offer general extension work. The separate land-grant colleges have not sufficient appreciation of the importance of their resources and peculiar functions in the development of State programs of general extension through cooperation with other institutions. It is important that all of the land-grant colleges assume responsibility within the broadest limits of their institutional functions for the execution of a cooperative program planned for the achievement of the common objectives of all types of extension service.

(2) The land-grant institutions report quite generally that their general extension service is under the direction of one head, but there seems to be confusion as to the actual administration of the services offered. There are too many administrative controls in a number of institutions. Division with respect to authority and responsibility leads to confusion in the institution and to embarrassment in its relations to the public.

(3) The position of general extension in the institution is another matter of supreme importance in the organization of this service. It is necessary to recognize that extension and resident work are mutually interdependent. This interdependence has two distinct phases—the proper recognition of general extension in university organization, and recognition by the extension staff of the need of resident cooperation. Resident organizations have not accepted the extension organizations into full fellowship in university circles; neither have extension organizations utilized to a satisfactory degree the resources that ought to be available from resident faculties. The general result of these failures to appreciate mutual interdependence has been to accentuate the isolation of general extension.

(4) One of the most difficult problems related to the administration of university extension is the selection of a satisfactory staff. Extension work demands, in addition to a high quality of scholarship, important factors relating to personality. Successful extension instructors must deal with people of many different organizations and professions as well as of different ages and educational levels of attainment. They must, therefore, be able to adapt their work to the varying conditions under which it must be done. As extension work continues to develop it will become increasingly necessary to employ larger permanent staffs in order to develop techniques of procedure both in administration and in teaching that will meet the peculiar needs of this service.

(5) The land-grant colleges have not yet recognized that general extension is a major interest which the institutions should foster on the same basis that they recognize in the case of other schools and colleges. Reliance for support on fees has resulted in the stimulation or undue emphasis on certain phases with neglect of others. Proper recognition of university extension in the allocation of land-grant college budgets will improve this situation.

(6) Institutions of higher learning, in spite of their many services to the public, occupy to a considerable extent a position of isolation in the State. This isolation has elements of strength and also of weakness. It has, however, left the institutions too far removed from the life of the people and especially those people who have no contact with the usual activities of academic character. General extension can effect this contact with the various agencies and with the different professions and occupations just as has Smith-Lever extension in the rather more limited fields of its service.

(7) Although general extension has recognized to a certain degree the importance of publicity, in making known its services to the State, it is surprising to learn how little these devices have been effectively employed. This failure to utilize to the fullest degree the many legitimate publicity methods by which university extension may be promoted is in no small measure responsible for the present position of this important service in the land-grant colleges.

(8) The most important consideration after all, with respect to general university extension is the extent and quality of the service which it has rendered. The survey indicates clearly that the land-grant colleges offer general extension services over a great range of subject matter and through many types of approach to the people. Although the range of offerings is great, the actual amount of service is not very considerable except in a limited number of institutions.

Chapter XV.—Problems Common to Smith-Lever Extension and General Extension

Smith-Lever extension and general extension, in their broader mental objectives of both are vocational, humanistic, and social education. They are concerned with the education of people most neglected by other educational agencies. Facts already given in discussion of Smith-Lever extension and general extension show that they have relationships with each other and with the general problem of education. To a considerable extent they work through the same organizations. This means that from different points of view they touch different interests of the same people and even that their educational interests overlap. It is, therefore, a problem of concern to both forms of extension and to institutional administrations as well, whether they make approaches to these organizations and people independently and as separate agencies and whether their educational programs are also planned and executed without reference the one to the other. These problems of extension organization and program become especially significant to institutional administrations and also to State legislative bodies when they are called upon to provide support for a double overhead and an overlapping of educational programs. The question is very properly raised as to whether support is balanced and most effectively used. Further, the solution of the problem of relationships of a single institution's extension activities does not solve the entire problem of effective expenditure of public funds. State authority may very properly inquire into the coordination of the institution's extension work with work of a similar type carried on by other publicly supported agencies. Legitimate interest of public authority is not confined to institutional aggrandizement and growth, but is concerned with the educational welfare of the entire State and may well insist that this welfare be served through the harmonious correlation of all the means created and supported to do this work.

The major problems common to Smith-Lever extension and general extension in the land-grant colleges are discussed in this report under the following heads—social and economic relationships, correlation of extension services within the institutions, financial support, and cooperation with other educational agencies.

Social and Economic Relationships

One measure of whether the land-grant college services of Smith-Lever extension and general extension are adequately covering the common field of their educational objectives is their own estimate of strength and weakness in certain relationships. Their appraisal of their position with respect to the State's industries and occupations shows conclusively that these institutions have not developed their programs adequately to serve the general population of the State. Naturally, strength is evident with agriculture and home economics, and in less degree with education. The institutions are still less secure with engineering, with commerce and business, and with the professions. That relations with labor have hardly been attempted is shown by the fact that only one land-grant college considers its position strong with this group. A summary of these self estimates by the institutions is given in Table 48.

TABLE 48.—*Relative rating ascribed by the institutions to their leadership with respect to extension services*

Service	Rating			Could the position of the institution be improved by—			
	Strong	Fair	Weak	Increasing the extension service of the institution?		Cooperating with other institutions in extension service?	
				Yes	No	Yes	No
1	2	3	4	5	6	7	8
Agriculture, farming	40	2	-------	32	1	6	5
Professional or business connected with:							
Agriculture	20	14	2	28	-------	6	2
Teaching	17	11	4	21	-------	7	-------
Engineering	9	7	8	20	-------	3	1
Home economics:							
Professional and business connected with home economics	28	3	9	32	-------	6	1
Teaching	16	7	3	16	-------	4	-------
Home making	27	5	1	24	-------	4	-------
Forestry	10	11	6	23	-------	5	-------
Commerce and business:							
Manufacturing	3	5	8	13	-------	1	1
Mining	1	3	8	8	-------	0	1
Transportation	4	2	6	10	-------	2	1
Banking	4	6	5	12	-------	2	1
Insurance	-------	5	8	11	-------	2	1
Public service	6	7	3	13	-------	2	1
Merchandising	3	6	6	13	-------	0	1
Education:							
Teaching	18	6	2	16	-------	6	-------
Administration	10	8	3	13	-------	3	-------
Professions:							
Medicine	2	2	3	5	-------	1	1
Dentistry	1	1	1	3	-------	1	-------
Veterinary medicine	2	4	3	9	-------	2	-------
Law	-------	2	3	4	-------	-------	1
Ministry	-------	4	3	4	-------	1	1
Labor:							
Skilled	1	5	4	6	-------	2	-------
Unskilled	-------	5	5	8	-------	1	-------

A very similar picture is presented in the appraisals by the land-grant colleges of their relation to the various agencies. Here again is indicated strength with education through public schools and State departments and with departments of agriculture. Corresponding strength with other State educational institutions, however, is lacking. Only limited contact is apparent with private colleges and with libraries. The land-grant colleges, with three exceptions, have failed to make contacts with State charitable and correctional institutions. In establishing contacts with voluntary associations, especially with women's clubs, civic clubs, and farm bureaus, they have been more successful. From Table 49, it is evident that the institutions realize that their relations with many groups can be improved both through the development of their own extension services and through cooperation with other educational agencies.

TABLE 49.—*General relation of entire extension program to the various agencies in the State*

Agencies	Type of contact			Could the institution improve its relations through—			
	Considerable	Limited	None	Developing its own extension service?		Cooperating with other institutions?	
				Yes	No	Yes	No
1	2	3	4	5	6	7	8
Education—Public schools	37	6	0	18	1	7	1
State colleges	10	20	1	10	0	7	1
Non-State colleges	4	19	16	8	1	9	1
Libraries	9	20	6	14	1	9	1
State departments:							
Agriculture	31	8	1	11	1	4	1
Education	31	9	1	14	1	4	3
Health	22	18	0	16	1	6	2
Geology	6	10	16	7	0	3	0
Service commission	4	9	12	5	0	4	0
Conservation	13	10	6	9	1	2	1
Taxation	4	15	14	8	0	6	1
Legislative reference	6	14	10	10	0	6	0
State charitable and correctional institutions:							
State school for boys, etc	3	15	10	6	0	4	0
Orphans' home	3	16	17	5	1	8	1
Prisons	3	18	17	6	1	8	1
Voluntary associations:							
Women's clubs	31	9	0	12	1	6	2
Church organizations	12	25	4	12	1	6	2
Civic clubs	27	12	0	14	0	5	2
Merchants	15	21	3	14	0	8	2
Manufacturers	13	19	7	15	0	7	2
Farm bureaus	28	6	5	10	1	4	2
State bar	4	6	26	5	1	5	2

Other tabulated data point to the same situation. Elements of greatest strength in extension services of the land-grant colleges with reference to the possibilities suggested are thought to be—support of boards of trustees, interest of faculty in extension; extent of State served, thoroughness of work attempted, and cooperative relationships. Elements of weakness are varieties of industries and occupations helped and scope of subject-matter offerings. These two elements of weakness in extension program should be a matter of concern to the land-grant colleges. Table 50 summarizes the opinions of the institutions on these points:

TABLE 50.—*Number of institutions reporting elements of greatest strength and greatest weaknesses in adult education State program*

Element	Condition	
	Strong	Weak
Cooperative relationships	29	8
Scope of subject-matter offerings	20	16
Extent of geographical area covered	31	6
Varieties of industries and occupations helped	9	25
Thoroughness of work which is attempted	29	6
Interest of faculty in extension	24	9
Support of board of trustees	32	4

Coordination of Institutional Extension Services

The improvement of the position of the land-grant colleges with the people depends in part upon the administration of the different extension services as a unified program. Thirty-three institutions report that not all extension education, including Smith-Lever, is under the administration of one head. As the nine reporting that it is under the direction of one head offer practically no extension work except Smith-Lever, no problem of coordinating the services is at present involved in these institutions. The plan of having separate directors of Smith-Lever extension and of general extension has been quite generally accepted by the universities offering the most satisfactory extension programs covering the different fields of education.

Division of responsibility for extension service is indicated by the different administrative controls under which it is offered. Departmental activity in many institutions indicates that general extension has not been recognized by the land-grant colleges as a major unit of activity. (See Table 51.)

TABLE 51.—*Number of institutions reporting administrative control under which extension services are offered*

Service	Administrative direction by—				
	Smith-Lever	Smith-Hughes	Engineering	General extension	Departmental activity
1	2	3	4	5	6
Agriculture	42	14	1	14	8
Engineering and industry	2	3	11	13	5
Home economics	41	12	0	14	7
Teacher training	2	26	2	15	12
Arts and sciences	1	1	0	21	6
Commerce and business	0	0	0	17	6
School veterinary medicine	7	0	0	2	6
General extension	4	0	0	20	8

Of equal importance with the question of administrative organization of extension services is that of attitude of mind on the part of different members of extension-service staffs with respect to institutional coordination. Of 40 institutions reporting, only 29 say that it is the function of the different extension workers to understand the services of the different units of the institution. Even fewer than that, 23, state that it is their function to interpret these services to the people of the State. These facts indicate a degree of excessive departmentalization in a field of service that is of immediate concern to the noncollegiate citizenry of the States. They may very properly insist upon closer relationships when they realize that organizational independence affects directly and indirectly the service that they have a right to expect from the public institutions that they support.

Even granting a reasonable general interest in the possibilities of coordination, it is evident that there is lack of appreciation of the importance of ways and means suggested for bringing it about. Only in the differentiation of subject matter is there agreement that cooperative effort is generally practiced. There is reasonable teamwork claimed by the institutions in mutually understanding services, in planning State programs, and in reporting conditions and reactions in the field of service. There seems, however, to be no appreciation of the need of correlation in utilizing the services of district representatives, in standardizing report requirements, setting up cooperative budgets, or in economizing travel expenses. Only 2 institutions report that all extension education is coordinated under a committee; 36 report that it is not so coordinated.

An obviously narrow point of view is reflected in the majority of answers to questions relating to plans for coordinating extension services. This attitude on the part of many is no doubt due chiefly to the fact that administrators of the extension services and of the institutions have been so engrossed with other difficult problems that they have given little thought to the general aspect of extension service relationships. It is easier to follow the usual independent, departmental procedure than to correlate between institutional units.

Extension Finances

A picture highly indicative of the financial situation is revealed by a study of the questionnaire returns stating the amount and sources of the expenditures for the different types of the extension services of the land-grant colleges. Liberal grants of money from the Federal Government for agriculture and home economics extension and for teacher training in trades and industries have greatly stimulated all the States to develop and expand these types of service. These grants matched with equally liberal State appropriations for the same work have resulted in a highly organized and effectively administered extension service in these Federally subsidized fields of education. No corresponding stimulus from the Federal Government has operated to promote extension education in engineering and industry, in commerce and business, in the arts and sciences, or in any of the other phases of general education. Neither have the States, with a few exceptions, adequately met their responsibility by offering educational advantages through a general extension service adapted to the needs of their entire adult citizenry. The general program of State extension services has thus been distorted with reference to the economic and social needs of the States.

The different extension services are not offered to the people of the State on equal financial terms. Agriculture and home economics extension through Smith-Lever is relatively free; other extension work must be supported largely or wholly by fees paid by those desiring it. Replies to the questionnaires were practically unanimous in attributing this difference in charge to Federal grants and State appropriations. As State appropriations are influenced by Federal grants it is evident that the States have been quite generally unwilling to give full financial support to types of extension work not assisted by subsidies. Consequently there has been an uneven development of extension services. Failure to promote all forms of extension education that contribute to achievement of the same vocational, humanistic, and social objectives, indicates a lack of appreciation of the possibilities inherent in a well-balanced extension program.

Cooperation of Educational Institutions

Closely related to the problem of finance is the question of cooperative extension service relationships on a state-wide basis. It is natural that a State should wish to know whether an institution is making the most of all the resources available for a service before providing more. The extension work of a State can best be done by regarding it as a problem common to all the educational agencies that have resources available for that type of service. The land-grant colleges have not fully recognized the possibilities for cooperation in extension work with other institutions. As appreciation of the importance of such cooperation is shown in questionnaire replies by only the University of Arkansas, Colorado Agricultural College, Connecticut Agricultural College, University of Delaware, University of Florida, Purdue University, Iowa State College, Michigan State College, University of Minnesota, Mississippi Agricultural and Mechanical College, Rutgers University, Cornell University, Rhode Island State College, Clemson Agricultural College, South Dakota Agricultural College, West Virginia University, University of Wisconsin, and University of Wyoming.

Cooperation is effected by the land-grant colleges in 10 States by agreement of directors of extension, in 3 by a committee of cooperative schools, and in 2 by State department control. Cooperative procedures followed most effectively are—making known to the people the services offered by other institutions and referring requests to the proper sources of information. Participation of faculties in service with other institutions is also practiced successfully. Less frequently employed cooperations are the division of subject-matter fields according to institutional emphasis and geographical zoning of the State for economy in administration.

Conclusion

In the consideration of the future development of extension services of the land-grant colleges it is evident that the problem should be viewed broadly with reference to changing economic and social conditions. The population of the State in relation to its area, the State's industries, its probable future industrial and social progress, the educational functions of the institutions and their place in the State's scheme of education, the strength of the institutions in faculty personnel and in organized units of service, and the financial resources of the State are all factors of supreme importance. These conditions require that Smith-Lever extension and general extension be viewed by public authority and by administrators of land-grant colleges as a common problem. A satisfactory development of these services, from the standpoint of the State as a whole, will assure a proper balance in achieving the common objectives of vocational, humanistic, and social education for the people.

PART VIII.—RESEARCH

Chapter I.—Introduction

Agriculture in the United States to-day is probably unexcelled for the efficiency with which human effort is used in the production of food and raw materials. At the present time about one-fourth of the population is producing food and farm products for all our own people and a surplus for export. Call said that in colonial times more than 95 per cent of all producers were farmers and yet there was produced scarcely more than enough to feed and clothe the people.[1] In 1850 the average farm worker cultivated 1 acre where now he cultivates almost 3 with greater efficiency. Agricultural production was more than 14 per cent greater in the period 1922–1926 than in the period 1917–1921, despite the fact that the acreage of crop land was not increased.

The frontier of agriculture in the United States is a thing of the past. It is now largely a matter of historic interest. An illuminating paper by Farrell[2] describes this situation.

> As late as 1858, an article in the North American Review[3] spoke of the Missouri River as the eastern boundary of a "vast desert nearly 1,000 miles in breadth, which it was proposed to traverse, if at all, with caravans of camels. * * * A geography written by Woodbridge and Willard[3] and published in 1824, had this to say of the region: "From longitude 96°, or a meridian of Council Bluffs, to the Chippewa Mountains is a desert region of more than 100 miles in length and breadth. * * * Agreeable to the best intelligence we have, the country, both northward and southward of that described, commencing near the source of the Sabine and Colorado, and extending to the northern boundary of the United States, is throughout of a similar character. * * * There is little possibility that it can ever become the residence of an agricultural nation."

The States of Kansas and Nebraska are midway between the north and south boundaries of this "desert." They are approximately representative of the region. Together they contain more than 3,000,000 people. In 1925 they harvested crops from more than 40,000,000 acres of land. The crops were worth more than

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[1] Call, L. E. The Increased Efficiency of American Agriculture. Science, Vol. LXIX, Jan. 18, 1929.

[2] Farrell, F. D. A Desert Becomes a Garden. Sigma XI Quarterly, March, 1926.

[3] Barrows, William. The United States of Yesterday and of To-morrow, 1883, pp. 102 and 133.

$800,000,000 and in addition they had about $500,000,000 worth of livestock. In the same year the two States were using nearly a million motor cars, supported 1,100 newspapers, and ranked high in number of students sent to college per 1,000 of population.

These comparisons serve to present in a measure the results of the remarkable changes that have occurred in agricultural geography; in the improvement of old crops and the introduction and creation of valuable new ones; in improved methods of soil management; in the development of more productive herds and flocks; in the methods of control for plant and animal pests and diseases; in new methods and practices for processing, storing, transportation, and distribution of agricultural products; in new uses for agricultural products; and in the advent of the "mechanical age" in agriculture.

Responsibility for this metamorphosis may be traced largely to the agricultural experiment stations established in every State in the Union and to the Federal Department of Agriculture. For the application of science to the problems of agriculture in its many phases they form a national system that changed a desert into a garden. Farrell further describes this great change as due to the—

> Application by an indomitable people of the results of research in agriculture and mechanical science. Patient research in field and laboratory and exploration of every country in search of useful plants have produced new facts, new plants, new machines. These have been early taken up by the people having the spirit of the pioneer and their use has been fruitful.

Early Historic Sketch of Agriculture

The versatile Benjamin Franklin interested himself actively in the development of agriculture. The American Philosophical Society, founded in 1744 under his leadership, published many articles on agriculture and in his proposals for an academy in Philadelphia in 1749 he "suggested that a little gardening, planting, grafting, and inoculating be taught and practiced, and now and then excursions made to neighboring plantations of the best farmers." [4] Five years later, in 1754, the curriculum of the academy included a course in the chemistry of agriculture.

It was not until March, 1785, however, that the first agricultural organization was actually formed on the American Continent. Known as the Philadelphia Society for Promoting Agriculture, its object was a "greater increase of the products of the land within the American States." To accomplish this purpose the society offered to print memoirs, offered prizes for experiments, improvements, and

[4] True, Alfred Charles. A History of Agricultural Education in the United States.

essays. George Washington was also vitally interested in agriculture and "early determined to study and experiment with a view of improving agricultural conditions for himself and farmers generally."[5]

During the first half of the nineteenth century many agricultural societies were formed, local fairs were held by farmers, agricultural exhibits and shows were conducted, and frequent articles designed to promote knowledge in agriculture appeared in the leading periodicals.

In 1852 it was estimated that there were about 300 active organizations in 31 States and 5 Territories, and in 1860 there were 941 agricultural organizations recorded in the books of the United States Agricultural Society. * * * These organizations brought a considerable and growing body of the most intelligent and progressive farmers into active relations with a nation-wide movement for the advancement of agriculture. Through meetings, fairs, correspondence, publications, and articles in the agriculture and other papers, they sought to make the public feel that the interests of agriculture and farming populations were entitled to more consideration by Congress and the State legislature. They were increasingly active and influential in the efforts to establish State boards of agriculture, a national department of agriculture, the teaching of agriculture in schools and colleges, the carrying on of experiments and scientific investigations for the improvement of agriculture, and the building up of agricultural journals and books.[5]

Origin of Agricultural Experiment Stations

As a result of this public pressure, the United States Department of Agriculture was established by an act of Congress on May 15, 1862, and the National Government was enlisted in the great movement to promote agricultural education and research. The Morrill Act was also passed in the same year establishing land-grant colleges in every State to provide instruction in agriculture. From the very beginning agricultural experimentation on a small scale was conducted in the colleges. The work consisted mainly of field tests in crop varieties, soil analyses, and studies of soils and later treatment of animals and to some extent the feeding and care of animals. The meagerness of the supply of scientifically tested knowledge on agriculture was fully realized and also the tremendous possibilities for future development through the establishment of experiment stations. Hilgard, according to True—

Dates the beginning of the experiment station movement in this country from the time of the meeting of the land-grant colleges at Chicago in 1871, but before this Professor Johnson and his associates at the Yale Scientific School in Connecticut had inaugurated work looking toward the establishment of such stations. The experiments of Lawes and Gilbert at Rothsamsted, England, the investigations of Boussingault in France, and the organized work of the experiment stations in Germany, had already attracted attention in this country.[6]

[5] Ibid.
[6] Ibid.

The first agricultural experiment station in the United States was actually established in 1875 at Wesleyan University, Middleton, Conn., by Prof. W. O. Atwater. It was later moved to New Haven and its work was merged with the Scheffield Scientific School. In the same year the—

> University of California decided to organize an experiment station and this was done by Professor Hilgard almost as soon as he went to the university in 1875. That year he equipped a laboratory for research in agricultural chemistry and began field experiments on deep and shallow plowing for cereals. * * * In 1877 the North Carolina Experiment Station was established by the State legislature and located at the State University, which was then a land-grant college. In New York, the Cornell University Experiment Station was organized in 1879 by the voluntary action of the faculty of agriculture of the university, and the following year the New Jersey State Experiment Station was created in connection with the Scientific School of Rutgers University.[7]

Within the next few years stations were established in the States of Alabama, Indiana, Kentucky, Louisiana, Maine, Massachusetts, Minnesota, Nebraska, New Hampshire, Ohio, Tennessee, Vermont, and Wisconsin.

The results of the experiment work of the stations, colleges, and the Department of Agriculture were widely disseminated and were received with favor. But on account of the meager and insufficient funds available, the accomplishments were limited both in extent and importance. A campaign was then inaugurated for a national system of agricultural research including the Department of Agriculture and experiment stations in every State in the Union aided by financial support from the Federal Government. A convention of delegates of the land-grant colleges which met in Washington discussed and endorsed this project and through their united action and the active support of the United States Department of Agriculture, the Grange and other supporters of agricultural advancement, the Hatch Act was passed by Congress in 1887. The terms of this act are discussed in detail in Part I of this report, which deals with the historic background of land-grant college education in the United States. In the accompanying table are presented the years in which State agricultural experiment stations were organized prior to the enactment of the Hatch Act and also the dates of organization of the stations under the terms of the act.

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[7] Ibid.

TABLE 1.—*Organization of State agricultural experiment stations* [1]

Station	Date of original organization	Date of organization under Hatch Act
Alabama (College)	February, 1883	Feb. 24, 1888.
Alabama (Canebrake)	Jan. 1, 1886	Apr. 1, 1888.
Arizona		1889.
Arkansas		1887
California	1875	March, 1888.
Colorado	1879	Feb. 29, 1888.
Connecticut (State)	Oct. 1, 1875	May 18, 1887.
Connecticut (Storrs)		Do.
Delaware		Feb. 21, 1888.
Florida		1888.
Georgia	Feb. 18, 1888	July 1, 1889.
Idaho		Feb. 26, 1892.
Illinois		Mar. 21, 1888.
Indiana	1885	January, 1888.
Iowa		Feb. 17, 1888.
Kansas		Feb. 8, 1888.
Kentucky	September, 1885	April, 1888.
Louisiana (Sugar)	do	
Louisiana (State)	April, 1886	
Louisiana (North)	May, 1887	
Maine	March, 1885	Oct. 1, 1887.
Maryland	1888	April, 1888.
Massachusetts	May, 1882 [2]	Mar. 2, 1888.
Michigan		Feb. 26, 1888.
Minnesota	Mar. 7, 1885	1888.
Mississippi		Jan. 27, 1888.
Missouri		January, 1888
Montana		July 1, 1893.
Nebraska	Dec. 16, 1884	June 13, 1887.
Nevada		December, 1887.
New Hampshire	1886	Aug. 4, 1887.
New Jersey (State)	Mar. 10, 1880	
New Jersey (College)		Apr. 26, 1888.
New Mexico		Dec. 14, 1889.
New York (State)	March, 1882	
New York (Cornell)	1879	April, 1888.
North Carolina	Mar. 12, 1877	Mar. 7, 1887.
North Dakota		March, 1890.
Ohio	Apr. 25, 1882	Apr. 2, 1888.
Oklahoma		Dec. 25, 1890.
Oregon		July, 1888.
Pennsylvania		June 30, 1887.
Rhode Island		July 30, 1888.
South Carolina		January, 1888.
South Dakota		Mar. 13, 1887.
Tennessee	June 8, 1882	Aug. 4, 1887
Texas		Apr. 3, 1889.
Utah		1890.
Vermont	Nov. 24, 1886	Feb. 28, 1888.
Virginia	1888	1891.
Washington		1891.
West Virginia		June 11, 1888.
Wisconsin	1883	1887.
Wyoming		Mar. 1, 1891.

[1] Data from Report on the Work and Expenditures of Agricultural Experiment Stations, Office of Experiment Stations, 1901.
[2] In 1882 the State organized a station here and maintained it until June 18, 1895, when it became a part of the Hatch station at the same place.

Scope of Study of Agricultural Research

The ensuing survey has for its purpose a comprehensive study of the nation-wide system of agricultural research built up during the last half century in the United States, a system that is unsurpassed by any other country in the world. The various phases of the work will be treated under the following general headings: (1) The control and relationships of research activities; (2) financing; (3) the results of research in agriculture; (4) station organization and management; and (5) standards and special problems in agricultural research.

Throughout the study it is proposed to present the facts with a view of showing the agricultural experiment stations as an agency of service to the agricultural industry, to the many other related industries and agencies, and to the American people as a whole.

Chapter II.—Control Over Research Activities by Agencies Outside of the Station Organizations

Originating as they did through the interest of the people as a whole, and made a part of a State and national system, the agricultural experiment stations from the first have been subject to supervisory control by Federal as well as by State governments. At creation, also, they were in most States made a part of the respective land-grant agricultural colleges, and as a result have been subject to the control of the institutional authorities.

The individual agencies that may directly or indirectly exercise overhead control have grown in number, as governments and colleges have grown, and become divisionalized and departmentalized. Table 2, although lacking somewhat in completeness, indicates, in a rough way, for 1928, such control agencies and the main activities over which control may be exercised.

TABLE 2.—*Agencies which may exercise overhead control of agricultural experiment stations and the main station activities in which such control may be exercised*

Agency	Number of institutions reporting activities in which control may be exercised—											
	Policy	Program of work	Staff appointments	Staff salaries	Cooperation and coordination	Maintenance	Travel: In State	Travel: Out of State	Publication	Sales	Purchases	Appropriations
1	2	3	4	5	6	7	8	9	10	11	12	13
Chancellor	3	2	3	3	3	3	3	3	2	2	2	
President	38	36	40	40	33	34	32	34	30	26	29	
Board of regents	34	22	35	38	20	31	18	20	17	16	18	1
Board of education	2	2	2	2	2	2	2	2	2	2	2	1
Academic institutional council	9	6	2	2	3	1	1	1	2	1	2	1
U. S. Department of Agriculture	18	26	1	2	15	10	4	4	8	1	4	
State board of agriculture	3	3	3	3	2	3	3	3	2	2	3	
State board of business control			1	3		5	2	4	3	5	6	
State governor	5	2	4	5	1	12	1	4			1	1
State budget director	1	1	1	3	1	12			1			2
State legislature	12	7	3	6	5	25	7	6	4	4	4	2
Board of higher curricula	2	3	1									2
State printer commission						1			8			
State executive council								1				
Institutional business manager				1		7	1	1	2	6	12	
Director of experiment station	3	2	2	2	2	2	2	2	2	2	2	
State board of managers	1	1	1	1	1	1						
State board of visitors	1	1			1	1						
State auditor								1				
State civil service			1	1								
Station council		1										

State administrative control, for the most part, stops with the president of the institution and the regents or corresponding agency which constitutes the governing body of the institution. Federal administrative control is limited to the supervisory work of the Department of Agriculture in connection with Federal subsidies provided through the Hatch, Adams, and Purnell funds.

In some instances delay resulting from the necessity of securing authority and approval from several agencies may retard progress and interfere with the prompt action that agricultural emergencies sometimes demand. Obviously it becomes difficult to maintain high morale among research staff members if the channels of overhead authority are so intricate as to prevent prompt purchase of minor supplies and equipment or to interfere with travel for timely observation in connection with a research project that may mean thousands or millions of dollars to the agricultural industry.

Difficulties are sometimes due no doubt to lack of complete understanding between control agencies and research workers concerning the influence that business formalities may have upon the object and output of research for which funds have been made available. Governing boards and presidents may well keep constantly in mind the following statement of James Rowland Angell as regards the individual in research:

> Individual initiative, resourcefulness, ingenuity, imagination, vision must be kept at a high pitch all along the line. * * * Here we are not concerned with quantity production of a stereotyped product, of which the hundred thousandth specimen shall exactly resemble the first. On the contrary, the product is in some sense constantly varied and, unless it proves to be varied, the process has failed of its purpose, has degenerated into mere hack work, or has been based on essentially mistaken principles.[8]

Although it is true that the modern tendency and need is for organized research as distinguished from research by the individual genius working alone and in seclusion, the element of individual initiative and responsibility must be large. Research must be organized in such fashion as to promote joint effort and purposeful cooperation of individual research workers. Organization for control must carefully avoid suppression of individuality and diversion of attention from the research problems themselves to control procedure. Businesslike accounting for public funds is essential, but procedure should be as simple as possible and so arranged as not to become a competitor with discovery for the best efforts of the research staff. Otherwise control action will result ultimately to the disadvantage of the State and its agriculture.

[8] Angell, James Rowland. The Organization of Research, Association of American Universities, Proceedings, 1919, pp. 27–41.

The survey returns and field study by the survey specialists show that the research staff is not jealous of such control as an infringement of prerogatives. Such discontent as exists arises for the most part from the disturbance by reason of multiplied and inapt regulatory control of concentration upon complex and difficult research problems. Once a research is assigned the objective of control should be none other than the providing of adequate facilities and promotion of a morale capable of super effort. To the extent that this objective is distorted by control agencies they should accept responsibility for delays and reduced output from research.

Relationships with the United States Department of Agriculture

The responsibilities of the Department of Agriculture under the Hatch Act were delegated to the Office of Experiment Stations, established October 1, 1888. For the first few years supervision was mainly through reports submitted by the colleges and stations. Since 1894, however, the work and expenditures of each station under the Federal acts have been reviewed with some thoroughness annually by a representative of the Office of Experiment Stations. The procedure for such review has developed with increases in Federal funds. At present it is essentially as follows: (1) A representative of the Office of Experiment Stations visits each State experiment station annually, inspects all vouchers drawn on the Federal funds and discusses each research under way with staff members and administrative officers. The review of research on Federal funds is supplemented to some extent by review of all research carried on by the station. (2) All research paid for from Adams and Purnell funds must be outlined in writing and submitted to the Office of Experiment Stations for approval before expenditures are made. Any changes from the approved plan must be with the consent of the Office of Experiment Stations. (3) A program of proposed investigations on Adams and Purnell funds is submitted to the Office of Experiment Stations annually before July 1 each year showing by projects the proposed expenditures of these Federal funds during the succeeding year. (4) Annually the station submits a financial report of expenditures classified on forms provided by the Office of Experiment Stations. (5) The station director each year submits a report on station work and progress to the Office of Experiment Stations and in recent years a complete list of station research projects is solicited but not required.

By questionnaires and discussion with administrators and research workers an attempt has been made by the survey to discover how this Federal supervision is viewed by the State institutions and the Federal administrators; what are its advantages; its disadvantages; and what changes, if any, appear advisable.

Forty stations reporting are unanimous in approval of the present method of inspection and approval of accounts on the Federal funds. The present procedure in formulating and approving research projects on Hatch and Adams funds is given unanimous approval. Procedure under Purnell funds is approved by 38 States. Two States maintain that the use of Purnell funds could be made more effective if fewer restrictions were imposed.

The requirement of Federal scrutiny and approval of research projects on Adams and Purnell funds is reported as advantageous by most of the States. Thirty-eight of forty reports agree that this requirement and procedure are advantageous in coordinating the station work with similar research elsewhere. Two States do not recognize such advantages. Forty States reporting are unanimous that this requirement is advantageous in improving and maintaining standards of research. Thirty, of thirty-eight States reporting, maintain that the relationship to the Federal office promotes long-time investigations which might otherwise be discontinued prematurely because of State demand for research upon more immediate but frequently less important problems.

Disadvantages of such Federal control as is exercised are reported by but few States. They are covered by the following points: (1) Purnell funds could be used more effectively if there were fewer restrictions on lines of work which may be undertaken. (2) Distance from the Federal office sometimes results in delay to the disadvantage of research. However, this comment was accompanied by the statement that "in general, projects under Adams and Purnell funds are better handled than those on State funds." (3) One State indicates that there are no disadvantages as long as State funds are sufficient to cover the numerous kinds of overhead expense which can not be escaped but which are difficult to assign to Adams and Purnell projects under the restrictions imposed. (4) Another reports that the arrangements are as a whole advantageous, but that occasionally Federal disapproval of a project that has been carefully planned by the State stations causes some inconvenience and wasted effort. (5) It is frequently recognized that the advantages of Federal supervision as now administered by the personnel of the Federal office might be destroyed if different personnel attempted, as would be easily possible, to dictate research plans and methods inappropriate to the needs and capacities of State stations.

These statements require only brief comment. The occasional disapproval of a project may be warranted, when the national as well as State viewpoint is considered. The terms of the appropriation act and the violations of good research standards that are sometimes found in station projects make such disapproval obligatory. Delays due to distance from Washington can be minimized by air-mail service and telegraph. Where State appropriations are small there may be real difficulty in adhering strictly to Federal restrictions in the use of Adams and Purnell funds but the State, as well as the Federal Government, has a responsibility and the availability of Federal Hatch funds should make possible adjustments to meet administration of the Adams and Purnell funds.

Obviously much depends upon the policy and personnel of Federal administration. However, there is a growing tendency toward a general policy of national and State participation and cooperation in agricultural research. This is perhaps sufficient warrant that the "policy of participation rather than of control" will continue in Federal supervision of the Hatch, Adams, and Purnell funds.

The policy of the Office of Experiment Stations from the first has been publicly announced "as one of participation rather than of control." The vote of approval from the institutions secured by the survey is ample evidence that participation has meant valuable contributions in guiding and helping to shape standards of research, in the maintenance of national as well as State and local viewpoints; in continuity of research where local need and local pressure might otherwise have resulted in too great emphasis on expedient investigation.

State Station Relationships to Research by the Department of Agriculture Within the Respective States

The Federal Department of Agriculture maintains its own program of research. Obviously in this work, as in the research under Federal subsidies to the States, there is need and opportunity for joint Federal and State participation, cooperation, and coordination. The survey attempted to discover the ways in which such cooperation and coordination are brought about, and the extent of such joint effort. What follows is not a complete quantitative picture but represents fairly well, policy, method, and performance.

Policy.—Examination of documents shows that this area of State and Federal cooperation in agricultural research has periodically been the subject of discussion by State and Federal workers since 1870. Throughout, there is recognition of the principle of cooperation and joint participation in research.

The following are the main types of cooperation:

Joint State-Federal operation of field stations.—"To assist in solving problems of special agricultural enterprises or problems of localities there were in 1928 a total of 114 substations of a permanent nature connected with the State stations."[9]

The survey returns show that the investigations of at least 40 of these substations, distributed over 21 States, are in cooperation with offices of the Department of Agriculture. Dry-land agriculture, irrigation agriculture, cereal investigations, forage investigations, tobacco investigations, potato investigations, plant nutrition, soil fertility, plant diseases, plant insect control, animal husbandry and other subjects are under joint investigation. Several offices of the United States Department of Agriculture are cooperating at a number of individual stations.

In 16 of the 21 States the State controls land and buildings. In 5 the Federal Government has contributed land or has made contributions for buildings.

Federal contributions toward operation and maintenance vary from 2 to 95 per cent of the total. At 26 stations the Federal contribution is reported as 50 per cent or more and at 7, between 25 and 50 per cent.

Of the men in charge of such substations some are Federal appointees and some are State appointees.

The investigations are agreed upon and planned jointly. The carrying out of plans is under immediate direction of the superintendent. Federal and State agencies use the results—the State for local and State application, the Federal for regional or national application in conjunction with results from similar stations or from research elsewhere. Of the 21 States reporting such cooperative stations, all reported favorably upon cooperation in all its phases as at present administered. Not a single suggestion for modification of procedure was received in response to the survey question on this point.

Federal Field Stations Maintained Independently of State Stations

Of 40 States reporting, 24 list a total of 51 Federal stations maintained independently of State stations. Ten States have 1 such station each; 6 have 2 each; 4 have 3 each; 3 have 4 each; and 1 has 5.

In answer to the question, "Is research at such stations coordinated with research of your institution?" 7 States reported "yes"; 5 States reported coordination in part; and 12 States reported "no."

Seven States report formal agreement and 9 report informal agreement as to problems under investigation; only 3 report agreement as to location of station. Fourteen, however, report that State station staff members are advised of progress and results periodically through reports or conference.

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[9] U. S. Department of Agriculture, Office of Experiment Stations, Report on the Agricultural Experiment Stations, 1928.

In answer to the survey question, "Are the methods of procedure satisfactory?" 10 States answer "yes"; 11 States answer "no." The returns do not indicate a lack of harmony or good feeling among workers but rather a belief that more purposeful coordination and cooperation would be advantageous.

The suggestions offered may be summarized as follows: (1) All projects should be in cooperation with the State station if practicable. Where this is not, practicable plans should be agreed upon by joint consideration as to location of such stations and concerning investigations to be undertaken. (2) A definite understanding and agreement should be perfected so as to promote good relationships and understanding which will be continuous even though personnel changes.

These suggestions have real merit and should be considered in connection with each such independent Federal station. This statement is based not upon apparent duplication of work or lack of harmony but upon the following points: (1) Joint consideration of all such work will result in plans based upon the best technical information and skill combined with the best local as well as national information as to problems to be investigated. (2) Plans jointly considered will result not only in combination of ability, experience, and viewpoint but will be followed by joint use of facilities and continued concern that duplication be avoided. (3) The example of some 40 stations jointly operated in 21 States indicates that coordination is feasible.

Cooperative Investigations not Involving Maintenance of Field Stations

Each State institution was asked to indicate for the year 1927–28, cooperation with the Department of Agriculture in agricultural research other than that involving maintenance of cooperative field stations or independent Federal stations as discussed under the two preceding headings. Forty States reporting show a total of 321 such cooperative projects. One State lists 35; one 31; one 22; two 18; only four States have but 1 such project each.

An approximate classification of the projects indicates State-Federal joint investigation in at least 36 subject-matter fields. Some 26 States list Federal-State cooperation in a total of 40 projects in the field of farm management and costs of production; 14 States show a total of 18 projects in marketing; 17 States, a total of 48 projects on cereal investigations; 12 States, 28 projects on soil survey. In like manner forage-crop investigations, irrigation and drainage, plant diseases, plant insect pests, animal breeding, and grades and standards for agricultural products are subjects of wide cooperation, each with a variety of specific problems under jointly organized investigation. As further examples, 8 States show cooperative investigation on the problems of "soft pork"; 5 on quality of meats; 4 on study of animal fiber; 2 on oil sprays; 3 on drug plants; 9 on soil fertility; 3 on tobacco; 5 on finance; 4 on farm machinery.

The department is sharing the expense of such joint investigations in varying amount from 1 to 100 per cent of the total expenditures. Ninety-seven projects show Federal support to the extent of 50 per cent or more; 49 projects show 25 per cent of Federal support; 5 projects show as much as 90 per cent of the total support from Federal sources. The amount of Federal support was reported for only 212 of the 321 projects.

The survey inquiry as to whether cooperation in such work is satisfactory: (1) In formulating plans for the research; (2) in carrying out the plans; (3) in the use of results; (4) in coordination of results with similar results elsewhere for national and State use; and (5) in procedure to insure due recognition of all agencies and individuals; brought forth replies as follows: 29 institutions reported without qualification; with reference to all questions that cooperation was satisfactory; 10 institutions made a similar report with qualifications and suggestions for improvement; 4 institutions reported unsatisfactory procedure for insuring recognition of all agencies and individuals participating.

The qualifications and suggestions for improvement in procedure relative to such cooperation are fairly summarized in the following points: (1) There is need for more prompt publication by the Department of Agriculture and there should be less curtailment of manuscript by department offices not participating in the cooperation. "Better do less and report it than bury it until it loses all but historical value" is the comment of one report. (2) There should be a more nearly uniform or standard form of cooperative agreement, and adherence to the policy of addressing communications regarding projects, reports, and proposed publication to the director or administrative head of the State station. (3) Closer contact of cooperators. (4) Two reports, only, suggest that there is a tendency to dictate on the part of the department workers.

It is not surprising that some dissatisfaction should arise in cooperative handling of a total of 321 separate investigations. That 29 institutions report approval without qualifications, and an additional 10 approval with some qualification, indicates that these instances of lack of harmony are not general. More prompt publication is probably contingent upon more liberal financial support for publication of results. The objects of the research are discovery followed by practical application. Delay may be expensive to the agricultural industry and to the public.

Uniformity and simplicity of cooperative agreements should promote cordial cooperation. However, the subjects under investigation, the terms of cooperation, the individuals cooperating and legal restriction upon the use of funds frequently make for considerable complexity of agreement if confusion is to be avoided. Complete understanding should be the objective of cooperative agreements even though simplicity of statement may have to be sacrificed somewhat in some instances.

Good administration calls for reasonable adherence to a policy of administrative action through the responsible head. On the other hand, morale and effective work under cooperation are dependent upon the freedom of the individual worker. To harmonize the two principles is the task of the administrator, and deserves careful attention of station directors and of the heads of administrative units in the United States Department of Agriculture.

Research by the Department of Agriculture not in cooperation with the respective State stations.—In the past, at least, representatives of the department have entered States and carried on research without the knowledge of the State institution or of the station staff engaged in similar work for the State. This practice has sometimes led to embarrassment of the State workers and was at one time the cause of considerable criticism and complaint. There seems to have been little friction of this kind during recent years.

Thirty-four institutions report that within the past five years no representative of the department has undertaken research within the State without the knowledge of the State college and station. Only five report that department representatives have done so. One report states that a department representative came to work within 10 miles of the college without knowledge of the local institution.

The examples cited by the five institutions show that instances of this kind are confined to a few cases and to a few Federal offices. In some instances it would appear that individuals and not departmental or bureau policy have been responsible.

Leadership and Advisory Assistance by Department of Agriculture

Because of opportunities for national and international observation and contact the Department of Agriculture and its personnel should be in position to render valuable leadership, assistance, and advice to State workers. The survey inquiry concerning this feature of the relationships between the Department of Agriculture and the States shows that 22 institutions acknowledge valuable leadership and 31 valuable assistance from the department in developing fundamental principles generally applicable. Ten institutions doubt the leadership and three question the assistance.

Twenty-seven institutions acknowledge valuable leadership and thirty valuable assistance in cooperating on researches of national scope; seven report doubt the leadership and two question the valuable assistance.

Twenty-eight institutions acknowledge valuable assistance in planning State projects along lines in which the department has established leadership; eight report no such assistance.

Twenty-two institutions report valuable leadership and thirty report valuable assistance from the department in cooperating on researches pertaining primarily to the respective States; 11 report no Federal leadership and 2 no valuable assistance in this respect.

Nineteen States report valuable leadership and twenty-three assistance from the department in diagnosing emergency problems of the respective States; 12 report no such leadership; and 9 report no such assistance.

Many problems arise that are new both to the department workers and to workers in the State. Problems that have mainly a local or regional aspect may be best diagnosed and studied by the State or regional research workers. Federal leadership and assistance, therefore, is not to be expected in all cases. As a whole the acknowledgment of Federal help on the part of State institutions indicates a cordial relationship. No doubt the personnel of the department would acknowledge assistance in similar degree from the personnel of the State stations.

Lack of assistance from the Department of Agriculture has no doubt been due in some instances to failure of State stations to take advantage of assistance that was available. Because of the general acceptance of the principle of Federal noninterference with State matters the State staff, through its proper administrative officers, should take the initiative in seeking aid and cooperation.

Training of Research Workers

Fifteen States acknowledge leadership or assistance by the department in training research workers and nineteen report no such assistance. This probably represents the situation accurately. The department draws many of its workers from the personnel of State stations, and the State stations in turn secure personnel from the department. This interchange of staff is a part of the functioning of the national system and is highly desirable. A staff made up of qualified workers who have had experience in the department and in State stations is an advantage to both agencies and to the public service.

The passage of the Purnell Act in 1925 greatly stimulated joint attack on research of national scope. Six major problems or lines of research were agreed upon at once for cooperation between the Department of Agriculture and the State stations. A special committee was designated for each subject and formulated plans for research projects under each of the six national problems agreed upon. These plans, or outlines, were carefully considered by the National Joint Committee of the department and the station directors on "Projects and correlation of research." The reports made to the survey on two essential questions concerning such national effort are of interest and importance: (1) The institutions were asked whether in their judgment the Department of Agriculture should assume leadership to a greater degree in planning researches of national scope and in working out the relationships thus arising as among States.

In reply to this question 31 States answered "yes" and 7 "no."

The affirmative reports gave as examples of problems that require such leadership and joint effort: (a) Insect problems, such as the corn borer; (b) animal diseases, as infectious abortion; (c) plant and animal disease surveys; (d) plant and animal nutrition; (e) principles of livestock breeding; (f) quality of products, such as the cooperative study on "soft pork" and the study of "grade and staple studies of cotton in relation to mill consumption"; (g) consumer-demand studies; (h) distribution problems; (i) soil problems, such as erosion.

(2) The survey asked a second question. Is it advisable and practicable for the Department of Agriculture to center upon research to develop or expand fundamental principles, leaving research on local and regional problems to the State stations?

On this point 33 out of 36 institutions reporting, maintained that researches in many States are essential to progress in discovering, expanding, or developing fundamental principles. The point is supported by the following arguments: (1) The State station is called upon to meet many local and sectional problems requiring research quite as fundamental in character as any program the department might undertake. To wait upon the department would be impracticable and ineffective. (2) The department can not fulfill its functions and confine itself to research on fundamental principles. Application as well as discovery is the objective of research. Application of principles to regional problems and conditions is important and requires the best joint effort. (3) Research does not lend itself to "piece work" in the sense of manufacturing standard articles. Through a policy of cooperation and participation, man power, funds, and facilities can be pooled to secure most effective attack without unwise duplication.

In the course of the survey the suggestion was made that relationships and understanding between the State stations and the Department of Agriculture might be furthered by a memorandum of understanding as to cooperation and participation in research within the respective States. Only 6 institutions favored such a proposal and 25 opposed it. Formal agreements might tend to standardize procedure and further minimize or eliminate occasional, perhaps unwarranted, research by the department in the field of the State stations. Also they might serve to prevent diverse judgments and publications concerning the practical value of investigations and thus insure that the public receive consistent advice from the State and Federal stations.

On the other hand, formality tends to slow up work and curtail initiative. Prompt action is sometimes necessary to effective results.

Further, real cooperation is between individuals and should be worked out with a minimum of restrictive and formal regulation. Administrative agencies have served their proper function when they have brought workers together in mutual understanding and provided facilities and freedom for their individual cooperative task. Cooperative research work actually undertaken should be the subject of written plans and understanding but these agreements should not encroach unduly upon the individual's initiative and freedom to carry on in accordance with the exigencies of the investigation undertaken.

State Station Relationships with Federal Departments Other Than the Department of Agriculture

The survey returns show three State stations cooperating with the Chemical Warfare Service of the War Department on investigations of poisons to control boll weevil. A number of States are cooperating with the Geological Survey of the Interior Department on ground water investigations. A number are cooperating with the Interior Department on problems of reclamation. Cooperation with the Bureau of Mines of the Department of Commerce on potash research is reported.

Emphasis by the stations upon manufacture, preparation, use, distribution, and marketing of agricultural products would seem to make necessary and to provide opportunity for more effective cooperation with the Federal Department of Commerce. The State station data on production, preparation, quality, and use of agricultural products that become articles of commerce have a bearing upon ultimate sale and consumption.

It is suggested that State stations and Federal agencies make some further study of the aspects of their problems that are related in order that the interests of agriculture and the public may be served more effectively through cooperative effort. Research bearing upon manufacture, preparation, transportation, distribution, and marketing of agricultural products is rapidly expanding. The need for reliable facts will call for further expansion. Facts pertaining to agricultural products should be coordinated with facts concerning the processing of the same commodities and both these aspects of production interpreted in relation to distribution and marketing.

Relationships and Cooperation Among States

The idea that State stations and their research personnel are not cooperating effectively on problems which concern adjoining States is not uncommon among the public. That they should cooperate is obvious but the problem is not simple and the point at which cooperation becomes uneconomical is not easily determined. Much depends upon the character and object of investigation. An attempt was made, therefore, to determine the extent and nature of such cooperation. Thirty-four institutions reported. Of these, 30 list projects in cooperation with other State stations. Four have no such cooperation. A total of 94 projects covering such cooperation are listed by 30 States. Forty-three of the ninety-four investigations involve more than 2 States; 1 State lists 21 projects; 7 States each have 4 or more; 8 list but 1 each. As many as 28 States are cooperating in research on factors influencing the quality and palatability of meat; 18 States are cooperating upon research concerning vitamine content of foods; 24 on marketing live stock and live-stock products; 22 in testing winter wheats for hardiness.

The Office of Experiment Stations report for 1928, states that "during the year 1927–28 about 900 projects, or approximately 13.5 per cent of the total number of station projects, were carried on cooperatively between several stations or with the Department of Agriculture, this indicating an apparent gain of 50 per cent over the preceding year." The number was increased to about 1,100 in 1929.

Other Ways of Coordinating Research of the Different States

Joint attack on outstanding common problems, as reported in the preceding paragraph, is important. At best, however, such formal cooperation can include only part of the research of a station that may be of value in other States with respect to method or results. How best to make the work of an individual station available to other stations and States without unreasonable expenditure of money and time, has been a matter of thought and discussion since the beginning of the stations.

Thirty-five States rated in order of importance, the following 13 means for a station staff to keep informed concerning research at other stations. The points are listed according to descending frequency as indicated by combined State ratings: (1) Staff members inspecting work of their respective subject-matter fields elsewhere; (2) conferences between directors; (3) regional subject-matter conferences; (4) correspondence between subject-matter specialists; (5) exchange of project plans, reports, and publications; (6) regional subject-matter committees; (7) national scientific meetings and their reports; (8) through work and plans of national project committees; (9) through work and plans of national research subject-matter committees; (10) regional scientific meetings and their reports; (11) listing of projects of all stations by Office of

Experiment Stations; (12) informal personal report of activities at other stations by inspectors from Federal Office of Experiment Stations during annual inspections of station work; and (13) Experiment Station Record.

Efforts to cooperate and coordinate can not replace actual research in laboratory and field. Judgment and care are necessary to prevent overemphasis of either individual effort or cooperative relations. The main suggestions from the survey for guidance in this regard may be summarized as follows: (1) The subject-matter problem rather than the whole field of agricultural research should rapidly become the basis of regional cooperative research; (2) subject-matter conferences for joint consideration of a single problem or of a very few problems common to two or more States are most effective in outlining investigations and methods of coordinating effort. The station about to undertake an investigation on a problem common to two or more States should take the initiative and solicit joint consideration; and (3) the practicability of specialization in research by the several stations of a region is worthy of further thought. Such specialization might easily be carried too far; each State must meet its responsibility for State problems. Nevertheless, allocation of major research to selected stations may possibly be developed to a point beyond present practice.

Relationships of the Experiment Station to Other Official State Agencies

Other Official State agencies doing research within the field of the experiment station.—Twenty-two institutions report research within the field of agriculture by official State agencies other than the experiment station, and 19 report that there is no such research now under way. For the most part such research has to do with plant and livestock diseases and pests, marketing, and conservation, undertaken by State departments of agriculture, boards, and commissions.

Six States report that coordination of research by such agencies with the work of the agricultural experiment station is provided for by law; 12 report coordination by conference and agreement on individual projects; 6 report coordination by written agreement of understanding. In many States apparently there is no established procedure to insure coordination. The best results depend upon understanding and cooperation between individuals and groups. This is difficult to secure by legislation or by coercion.

The basic responsibility for agricultural research, it would seem, has been placed upon the agricultural experiment station by Federal and State legislation. The establishment of authorized coordinate, duplicate, or competing research agencies appears unwise from the standpoints of economy and effectiveness.

If the agricultural experiment station is not functioning properly the deficiencies should be corrected and the station strengthened. The establishment of new agencies to fill gaps in the activities of the station will lead ultimately to wasteful effort and neglects the obvious advantages of national relationships and long experience of the experiment station system. On the other hand, in the public interest, the line between what is research and what is not research and experimentation can not be drawn too precisely if the legitimate interests of the State are to be served through the stations.

Cooperation in Research Between the Stations and Other State Agencies

The survey reports indicate that coordination and cooperation with other State agencies are effective in a number of States; 10 institutions report a total of 42 projects in cooperation with 12 different State agencies. Twenty projects are in cooperation with State departments of agriculture or corresponding offices; 5 with the State plant board; 3 with departments of institutions and business management; 2 with food and drug commissions; 2 with commissions on conservation and development; 2 with livestock sanitary boards; 2 with the State bureau of markets; 1 with the fish and game commission.

The subjects under cooperative study include plant and animal pests, sanitation, quality and grading of products, tests of flour, milling and baking, crop varieties, seeds, feeds, dairy products, storage of potatoes, drainage, irrigation, oyster propagation, timber growth, fertilizers, fumigation, water pollution and sewage disposal, and removal of spray residue from fruits. This list is not complete but indicates cooperation under way which appears to be extremely profitable. The examples are commended for consideration.

Station Research Undertaken to Meet Needs of Regulatory Agencies

If the experiment station functions as the State agency responsible for all, or even the greater part, of research in agriculture a part of its research and experimentation may be undertaken to meet needs of State regulatory agencies. This varies among institutions, and for the individual station in different periods. Of 31 stations reporting on this point, 16 estimate such research as constituting 1 per cent or less of the station program; 4 estimate it as less than 5 per cent; 11 indicate that the amount of such research is negligible. That such research is usually meritorious is the opinion of the 26 stations reporting. The returns show that most of the States assist regulatory agencies in field examinations and other service where a research specialist is needed. With few exceptions it is the opinion of experiment station directors that this service is advantageous in keeping the research staff advised concerning the agricultural problems of the State.

Research by Other State-Supported Educational Institutions

The survey reports are almost unanimous in the statement that no other State-supported educational institution is carrying on research in agriculture as of 1928. Five institutions report some slight amount of such research and lack of information is indicated by others. There seems little tendency to modify the present policy of the States in maintaining and supporting the agricultural experiment stations as the recognized State-national agency for research in the field of agriculture.

Continuance of this policy is advisable.

Relationships of Station Research to Commercial Agencies

Research and its results are having an ever-increasing influence upon agricultural methods, organization, and products, and upon materials and equipment used in agriculture. As a natural consequence agricultural research and the practice and restrictions which may result from such research are of vital concern to commercial enterprises and agencies. What relationships have developed? As publicly supported institutions, what should be the policy of the stations in regard to these relationships? These are questions of importance to the general public as well as to the business and educational interests immediately concerned.

Of 41 institutions reporting on this question, 15 had no agricultural research in cooperation with commercial agencies in 1928. Twenty-six institutions, however, list for that year a total of 120 cooperative research projects, involving a total of 113 cooperating commercial agencies.

One institution lists as many as 16 projects; one has 15; one 14; one 6; four have 5 projects each; seven have 4 each; four have 3 each; two have 2; and only five have but 1 each.

The subjects under investigation include: Transmission of ultra-violet light; strength of wheat flour; chemistry of milling and baking; the practicability of raising chicks in storage brooders and fattening batteries in feeding stations; thermal death point of micro-organisms in fruit and vegetable products; study of disinfectants to control possible dissemination of bacillary white diarrhea in forced draft incubators; vitamin content of American cod-liver oil; economic development of New York milk shed; effect of chilling on banana fruit; attraction of insects by light; animal nutrition; plant nutrition; diseases of canning crops and other plant diseases, cooking of pork products; soil fertility, and many studies of fertilizers for different crops; studies of insecticides and fungicides; electricity in relation to agriculture in its many phases.

The main agencies cooperating include: Railroads, canners and packers, glass manufacturers, manufacturers of chemicals, fertilizers, farm equipment, and food products; agricultural commodity associations, such as walnut growers; and utilities.

The form and amount of support from commercial agencies cooperating are listed for most projects but not for all. The total reported for the 26 States listing such cooperative research amounted in 1928 to $160,880 in cash, $52,870 in research fellowships; $3,950 in scholarships; and $26,505 in equipment and materials. This is not a complete record of these relationships in 1928 for they are changing rapidly from day to day. The facts presented, however, are sufficient to indicate the extent of the problem, the possibilities for good, and perhaps for embarrassment.

The survey has found keen interest in the formulation of policies for the guidance of the institutions in establishing and maintaining relationships of this kind. The problem is becoming more pressing as demands for such research become more numerous and more important. Business increasingly displays a willingness to finance worth-while investigations for which public funds are not available.

Administrators and research workers see clearly that the effects of this development are of interest to producers and to consumers of agricultural products, as well as to the commercial agencies and enterprises involved. As a public educational institution the agricultural experiment station must protect as well as serve the entire public.

The Committee on Experiment Station Organization and Policy of the Association of Land Grant Colleges and Universities in 1928 and again in 1929 proposed a statement of policy which was accepted and approved by the association in 1929, essentially as follows:

The establishment of the agricultural experiment station as a publicly supported research institution was based upon the premise that the results accruing from research in the field of agriculture benefited all society. That this premise was correct has been amply demonstrated by the broad application that has been made of the results of such research. Since research in this field benefits all society, it should be supported not by a single class or by a few groups of especially interested classes, but by society as a whole. Commercial agencies, therefore, that have a particular interest in such work because of its close relation to their own activities can usually best serve their own interests, those of the station, and of the general public by using their influence to secure for the station adequate financial support from public funds.

When public funds are not available for the conduct of research of a special character for which there is urgent and immediate need, private grants from commercial agencies may make possible the securing of prompt results and thus serve both these interests and those of the public.

However, it is self-evident that the acceptance of such grants may lead to embarrassing situations. The usefulness of the agricultural stations is based upon the maintenance of an unbiased and unassailable position and the committee believes that strict adherence to the principles as stated is necessary to safeguard the position of the stations and the interest of the general public. These four principles follow: (1) The research supported in this way should be of general public importance and in the field of the agricultural experiment station. (2) All such researches should be institutional and not cooperative with individual departments or staff members, and salaries and other expenditures should be handled through regular institutional channels. (3) Carefully worded project agreements should be drawn, setting forth the nature and purpose of the project, and the conditions under which the grant is accepted and is to be used. In this the interest of the station and of the public should be safeguarded in the same way as research under other station funds, and the right to patent any discovery be reserved to the institution. (4) Results should first be made public through the regular station channels, whether favorable or unfavorable to the cooperating agency.

Gratuities.—For the present purpose a gratuity is defined as a gift made either to an individual on the station staff or to the station itself in order to gain good will. The acceptance of a gratuity, which in the case of individuals may vary from pigskin memorandum books to expenses for extensive travel, is contrary to the best interests of the station because prejudicial to its standing as a disinterested and public institution. On the other hand gifts to the station of livestock, machinery, or materials may be properly received when their acceptance obviously will further worthy experimentation and demonstration. Each case, however, should be carefully considered on its merits.

Relationships by Reason of the Regulatory Functions of Experiment Stations

Many national, State, and local regulatory measures have resulted from the discoveries of research. Such measures have to do with agricultural production and the products of agriculture on the one hand, and on the other with commercial products used by agriculture. The regulatory action may affect farmers, the consumer of farm products, the manufacturer, or the retail merchant. Not infrequently the service or object of the regulation can best be accomplished through supervision or assistance by research workers who have all the technical facts at their command. In other instances regulations have not been developed to the point that warrants a separate agency for regulatory work. For these reasons many of the experiment stations are functioning in one or more ways as regulatory or inspection agencies for the States.

Twenty-two States report such regulatory function; 22 report none. Fourteen stations are charged with the inspection of fertilizers; 16 with inspection of feeds or seeds, or both; 8 with inspection of insecticides and fungicides; 5 with inspection of nursery stock; 3 with inspection of creameries; 3 with inspection of apiaries; 3 with stallion registration; 2 with control of crop pests and diseases; 2 with certification of Babcock glassware. Livestock sanitary work; dairy bull registration, grain inspection, protein testing of wheat, dairy inspection, mosquito elimination, inspection of serum and virus, are each handled by at least one station.

Regulation means restriction in some form. As a consequence, there may be occasionally a tendency on the part of agencies affected to influence the research program and procedure, when it appears that the results of research are unfavorable or likely to be unfavorable to their immediate interests. Eleven institutions report such attempts to influence the research program, but it appears that in no instance reported was the attempt of any serious importance or successful. In instances where intimidation methods have been used, or threats made, the station has stood firmly on well-grounded facts and has been able to maintain its position. Necessarily the facts must be reliable and the action legal and tempered by good judgment.

In some ways, no doubt, research would profit by freedom from regulatory functions. If, however, the objects and functions as set forth in Federal and State acts creating the stations are fully considered, certain regulatory activities or assistance along the lines specified will render valuable public service and react with some advantage to the research program. The objective is both "discovery and its application." Helping to work out effective application assists in determining the evaluating problems. It would seem advisable, however, to establish a policy which would confine station responsibility for regulation to those aspects of this function which require first-hand technical information and skill and to leave the exercise of police powers to the executive departments of the State.

Relationships With Noncommercial Agencies, Other Than State and Federal Which Carry on Researches in Agriculture

Agriculture includes so many fields and separate phases that research by noncommercial agencies without Federal or State support may be along lines or on subjects within the scope of the agricultural experiment station. The prominence of agriculture as a national industry and the widespread interest in agricultural welfare have led to establishment of a few such agencies primarily for agricultural research. What is the extent of such research? To what extent is there coordination and cooperation with the work of agricultural stations in the respective States? To these questions 38 institutions submitted answers. Twenty-four reported no such noncommercial research agencies; 14 listed a total of 20 such agencies. Of this total, 10 are educational institutions; 5 are endowed institutions, foundations, and gardens; 2 are endowed agencies for farm studies; 1 a food laboratory; 1 for research on fertilizers; and 1 for research in taxation. At 4 of these agencies at least part of the investigations apply directly to agriculture. These include poultry breeding, potato breeding, dairy management, diseases of livestock, land economics and farm organization and management, and fertilizers.

The reports indicate cooperation with the agricultural stations in two cases, coordination of research in three others, and no coordination in the remaining cases. With few exceptions there appears to be no conflict or marked duplication between the work of these agencies and the work of the stations. On the other hand, contributions of real value to agriculture may result, especially from research of agencies not primarily agricultural but doing research in one or more fields of science from which contributions applicable to agriculture may result.

Effect of Foregoing Relationships upon the Research Program of the Experiment Stations

Of 43 reports on the question of the effect of these relationships upon the programs of the stations, 41 indicate that there is no material disturbance of the station program of research by demands of the organizations and agencies mentioned in the foregoing pages. Four of the forty-one, however, attached qualifications. Among the disadvantages mentioned is the fact that the uncertainties of outside assistance hamper formulation of a continuing policy, the disturbance arising from outside demands causes irritation and occasional demands result in a shift of concentrated effort. These qualifications are supplemented by the two reports which admit disturbance of research by continual calls for demonstrations and assistance in the nature of individual service rather than research or service to agriculture as a whole.

This almost unanimous report is perhaps hardly warranted where disturbance may come from so many sources or in so many ways. Yet harmony in relationships, as a whole, appears in marked degree. Funds are not always available to legislatures for appropriation. Likewise, funds available to the stations are rarely, if ever, adequate to meet the many demands for investigations. The experience of years has led to an understanding of these facts with the general results that: (1) The stations budget available funds for a reasonable amount of emergency work, and as far as possible expand by overtime work of staff members rather than by discontinuing investigations underway; (2) the constituency realize limitations and do not press demands beyond reason.

Chapter III.—Finance

Income

Total income and main sources of income.—The total income of the agricultural experiment stations in continental United States, the main sources from which the total is derived, and comparison of income by 10-year periods beginning with the fiscal year 1899–1900 are shown in Table 3. The figures are taken from annual reports on "Work and expenditures of the agricultural experiment stations" prepared by the Office of Experiment Stations of the Federal Department of Agriculture.

TABLE 3.—*Sources and comparison of income of agricultural experiment stations*[1]

Source	1899–1900	1909–10	1919–20	1927–28
1	2	3	4	5
Federal funds	[2] $719, 999. 07	[3] $1, 344, 000. 00	[4] $1, 440, 000. 00	[5] $3, 360, 000. 00
State funds	247, 281. 46	1, 320, 370. 06	3, 594, 441. 80	8, 054, 679. 51
Individuals and communities	2, 420. 51	16, 468. 61	----------	----------
Fees	70, 927. 31	175, 137. 96	415, 610. 48	569, 348. 92
Sales of farm products	90, 088. 84	277, 502. 82	1, 223, 529. 20	1, 810, 764. 78
Miscellaneous	40, 140. 59	404, 220. 80	125, 916. 36	414, 961. 83
Total	1, 170, 857. 78	3, 537, 700. 25	[6] 6, 799, 497. 84	[6] 14, 209, 755. 04

[1] Figures taken from the annual reports of the Office of Experiment Stations of the Department of Agriculture for the years 1900, 1910, 1920 and 1928.
[2] Hatch fund only at this time.
[3] Hatch fund $15,000 and Adams fund $13,000 at this time.
[4] Hatch fund $15,000 and Adams fund $15,000 at this time.
[5] Hatch fund $15,000, Adams fund $15,000, and Purnell fund $40,000 at this time.
[6] Balances from previous year not included.

Combined Income of State Stations and Federal Department of Agriculture for Research

The total income for agricultural research includes amounts available to the Federal Department of Agriculture. The combined State and Federal income was about as follows for 1927–28: State stations, $14,209,755.04; Department of Agriculture, $11,300,000;[10] total, $25,509,755.04.

Considered alone, these sums for agricultural research may seem large. Their significance may be viewed in better perspective by means of certain comparisons.

[10] Data furnished by director of research, U. S. Department of Agriculture.

The total estimated capital invested in agricultural production in 1919–20 was about $79,500,000,000 [11] and in 1927–28 was about $58,500,000,000. Comparable estimates are not available for the two other fiscal years included in Table 3. On this basis the investment in research by the State stations and the Department of Agriculture combined was about 43.5 cents for research to each $1,000 of investment in agricultural production in 1927–28, a year when values of capital investments were low and funds for agricultural research at the highest point. To be complete, of course, this comparison should include amounts expended for agricultural research by agencies other than State stations and the Department of Agriculture. Compared with the whole, however, these additions would be small and would not seriously affect the result. On the other hand, much agricultural research has to do with processing, transporting, and marketing, in which the capital investment is large. This investment is not included in the capital investment of $58,500,000,000 upon which the relationship of research funds to capital investment has been estimated.

Total income for research compared with gross income from farm production.—The gross income from farm products is estimated [11] at about $15,750,000,00 in 1919–20 and about $12,250,000,000 in 1927–28. On this basis the investment for research by the State stations and the Department of Agriculture represents about $2.09 for research to each $1,000 of gross income. Stated in another way, there was made available by State and Federal Governments for agricultural research in 1927–28 an amount approximating one-fifth of 1 per cent of gross income from agricultural products. The gross income for that year was near the average for the years 1919–20 to 1927–28. The funds for research were at their peak.

Comparison of expenditure for research in agriculture with expenditure for research in other industries.—A pamphlet issued by the Division of Engineering and Industrial Research of the National Research Council [12] gives an indication of the volume of expenditures by industry for research purposes.

These facts are presented in the following table in terms of the relationships of expenditures for research to capital investment and to gross sales:

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[11] U. S. Department of Agriculture, Crops and Markets, July, 1928.

[12] Research, a Paying Investment. Division of Engineering and Industrial Research, National Research Council. Published in Factory and Industrial Management, October, 1928. (An analysis of 800 replies received to a questionnaire sent out by the Division of Engineering and Industrial Research of the National Research Council to millionaire manufacturing companies of the United States.)

TABLE 4.—*Ratio of expenditures for research to capital invested*

Industrial group:	Average expense in per cent of capital invested
All industry	1.3
Automobile	1.7
Chemicals and allied products	2.4
Food and kindred products	1.3
Rolling mills and steel plants	.4
Leather and its products	1.4
Lumber and its products	1.9
Metal-working plants	2.1
Paper and pulp	1.0
Rubber and its products	.9
Textiles	.7

These data indicate that industries expend about $13 for research to each $1,000 capital invested, whereas the expenditures of State and Federal agencies for agricultural research amount to about 43.5 cents for each $1,000 of capital invested in agricultural production. Agricultural research is limited largely to that which is publicly financed.

Relationship of expenditures for research to total sales.—The report of the National Research Council makes the following statement in regard to the relationship of industrial expenditures for research to total sales:

The executives were requested by the National Research Council Engineering Division to give not only the actual amount spent yearly for scientific investigations, but to report the ratio between this expenditure and the capital invested. Several were of the opinion that a much better ratio would have been that of expenditures to sales. There were, in fact, instances in which the research expense was being rigidly held to a certain per cent of the total sales—1 per cent being the most general figure. A few executives explained that this method includes the advantage of extending to the research department the increased sales increment accruing from an improvement of the product, reduction of production costs, developing new products, and efficient sales studies.

As previously shown, the combined State and Federal expenditures for agricultural research in 1927–28 was about one-fifth of 1 per cent of gross sales from agricultural products.

Sources of revenue of agricultural experiment stations income from States compared with Federal appropriation.—As indicated in a preceding chapter, experimentation and research were undertaken and financed by a number of States prior to the Federal Hatch Act. The stations as an established public system, or agency, however, began with the Hatch Act of 1887, providing a Federal subsidy of $15,000 annually for each such station.

The Federal funds are granted without specific requirement that such funds be duplicated by the States, either in whole or in part. However, in commenting upon administration of the funds under the Purnell fund, the Secretary of Agriculture made clear that these funds were for further endowment and should not be considered as relieving States of their responsibility.

By the fiscal year 1899–1900, six States had granted State appropriations to their respective stations in amounts exceeding the Federal funds; 13 other States had granted appropriations less in amount than the Federal funds; the stations in 31 States were at that time without State support other than fees, receipts from farm products, and such facilities as were provided by the institutions of which the stations were a part. By 1909–10 the number of stations having State appropriations had increased to 36. The State funds from all sources exceeded the Federal subsidies in 24 States. In 1927–28, notwithstanding the additional $40,000 of Federal funds for each station under the Purnell Act of 1925, the State funds from all sources exceeded the Federal funds in all but 13 States. Only one State was without State appropriations for station work. Except in 15 States the State appropriations alone exceeded the Federal appropriations. The State appropriations were less than $30,000 in but 5 States—Maine, Delaware, Nevada, New Mexico, and New Hampshire.

The income for the stations from all sources exceeded $500,000 in 8 States—Ohio, California, Illinois, Indiana, Minnesota, New York, North Dakota, and Texas. Four stations had incomes between $400,000 and $500,000—Michigan, New Jersey, Wisconsin, and Florida. For 5 States the income was between $300,000 and $400,000—Iowa, Connecticut, Kentucky, Nebraska, and Oregon. Eleven stations had total incomes between $200,000 and $300,000—Colorado, Kansas, Louisiana, Massachusetts, Mississippi, Missouri, Montana, North Carolina, South Carolina, Washington, and Wyoming. Six had incomes $140,000 to $200,000, or more than double the Federal funds—Alabama, Arizona, Arkansas, Maryland, Pennsylvania, Utah, and Virginia.

Relation of State appropriations for experiment stations to total taxes in the respective States.—How is the tax bill of the individual taxpayer affected by these State appropriations for experiment station work? Table 5 summarizes the facts in regard to this relationship for 17 States from which data were sufficiently reliable to justify recording.

TABLE 5.—*Amounts received by the respective State experiment stations out of $100 taxes collected for all purposes in 1928*

Institution	Amount for support of experiment stations out of each $100 total taxes by cents	Institution	Amount for support of experiment stations out of each $100 total taxes by cents
University of Arkansas	0.50	Montana State College	32.0
Connecticut Agricultural College	24.0	University of Nebraska	21.6
Connecticut Experiment Station	5.0	Rutgers University	16.0
University of Delaware	24.11	North Carolina State College	.04
University of Florida	56.0	Oregon Agricultural College	26.63
Georgia State College of Agriculture	18.1	Agricultural and Mechanical College of Texas	50.23
Coastal Plains Experiment Station (Ga.), Georgia Experiment Station	11.0	Agricultural College of Utah	34.0
Iowa State College	24.0	Virginia Agricultural and Mechanical College	28.0
Kansas State Agricultural College	17.34	State College of Washington	15.1
Massachusetts Agricultural College	3.5		

If an individual's taxes for all purposes amounted to $100 in 1928, it is apparent that not more than about 50 cents was for support of agricultural experiment station research. The amount may have been as small as 3.5 cents. The chances are about two to one that the amount for station support did not exceed 30 cents out of each $100 of taxes.

Questions Relating to State Appropriations

Basic reasons for public financing of research.—Question is sometimes raised as to the reasons for public financing of agricultural research. The history of the establishment of the United States Department of Agriculture and of the State stations indicates that the welfare of agriculture was looked upon as basic to the welfare of the Nation and all its people. There was nation-wide concern about agriculture following the Civil War. Agricultural research, through the State stations and the Department of Agriculture, were a part of the national State system established to render assistance in the interest of national and State welfare as well as welfare of the farm population. The 37 institutions reporting agree that the welfare of agriculture still is of sufficient importance to the welfare of all classes of people to constitute a major basic reason for public financing of agricultural research. This reason is given first place by 29 of the 37.

The interest of the public in promoting unrestricted use of the findings of research which may reduce cost of production and distribution, improve quality, and insure supply of agricultural products is ranked equal in importance to agricultural welfare by 6 of 32 States reporting. At a time of agricultural surpluses this reason for public support assumes less importance in the minds of many than it should. It is an essential element of the constant problem of placing agriculture on a parity with other industries, and yet maintain food supply, in quantity and quality, at a price consistent with the purchasing power of consumers.

The difficulty of organizing agriculture for self-supporting research is a third important reason for public financing of agricultural research. Agriculture is made up of many enterprises and activities engaged in by large numbers of individuals operating under a wide diversity of conditions. The problem of self-financing for agricultural research is made more difficult by the fact that findings from agricultural research are so difficult to control through patent or otherwise. A new crop, a new cultural method, new herd management, can not be monopolized and any agency other than the public would have difficulty in securing financial returns on the discovery sufficient to encourage further research. The public gets its return through decreased cost of living and from the increased purchasing power of agriculture.

These reasons for public financing of research in agriculture are of considerable weight in justification of the wisdom of present national and State policies. Economic, social, and educational returns from such public investment are discussed in some detail by subsequent pages of this report.

Basic reasons for specific appropriations requested.—Agricultural research as carried on at the stations for the most part is generally recognized as intensely practical. Criticism of this tendency is not lacking. However, the survey returns show that a majority of the institutions consider the need of research to solve immediate problems as first among reasons for requesting State appropriation. This is due, in part, perhaps, to less difficulty in securing support for such research than for research of less immediate practical use. In part, however, this arises from the obligation of the institutions to serve immediate practical needs.

On the other hand, the tendency among the stations is to emphasize increasingly types of research which seek to discover or develop new principles fundamental to the solution of agricultural problems. While the work in the past has not been devoid of such research, it is becoming a matter of greater concern to research men as the problems of agriculture become more complex. This concern is evidenced by the fact that 13 institutions list the need of support to discover or develop new principles as the argument of greatest importance in making requests for appropriations. New principles developed through research on plants, animals, soils, and methods may do more for agriculture than endless refinement of methods based on principles now known. The present work is of such immediate concern that it must go on. Time is an important element in more fundamental research and the work in this direction should be strengthened.

Twenty-six institutions reporting emphasize the possibility of increasing the value of their research to agriculture, the State, and the Nation if, to a greater extent than is the case at present, research could be undertaken to work out solutions of problems in advance of emergency conditions which result in great economic losses. The State stations and the Federal Department of Agriculture could to-day foretell serious economic losses by reason of conditions which are not yet under study, and for which no provision is made in research appropriations. This situation is worthy of more serious consideration by those engaged in agriculture and by the public. To provide for more investigations of this kind would require larger appropriations for research and greater assurance, than at present, that funds will be continuing. Perhaps the millions of dollars of loss from the corn borer, hog cholera, infectious abortion, and grain smut might have been reduced and some of the millions of dollars spent to meet these destructive agents after they had gained a foothold might have been saved if earlier research had anticipated the need. Comparatively small amounts for adequate research well in advance of the real emergency in many such cases should greatly reduce both economic losses and costs of control.

The survey returns indicate that facts concerning services rendered to constituents as the result of research have most weight with legislators in securing research funds. Facts as to the previous accomplishment of research share with appeals by groups of constituents second place in importance. Statements as to need for research to develop new principles for the solution of existing or prospective problems do not have the appeal that past accomplishments do.

Factors Which Make Difficult the Securing of Appropriations

Competition from other institutional and State agencies for funds and lack of understanding of the results of research in relation to success in other activities appear to be of about equal importance as factors limiting appropriations for research. Inability of constituents to secure personal or group services that are not properly research functions in some cases also react to the disadvantage of research.

When student enrollment is taxing facilities and teaching force to capacity the importance of research may be less urgently apparent than need for classrooms, equipment, and teachers. The popularity of agricultural extension may have a greater appeal than need for long-time research which will produce principles and facts to make extension work effective and permanent. Likewise, the need for large sums to control or eradicate a pest may be more popular than lesser sums for research to anticipate and to prevent the need for other large sums for later control of other pests.

Research, especially of the more fundamental type involving long and arduous labor and much skill, has natural disadvantages in this competition. The survey reports indicate as a whole that administrative officers realize the importance of research of this type and have maintained it fairly well in competition with the rapid growth and needs in other, perhaps more popular, lines.

Receipts from fees.—The total receipts of the stations from fees of various kinds in 1927–28 amounted to $569,348.92, as compared with $70,927.31 in 1899–1900. This item of research income may easily be misinterpreted. In some cases it is an item secured in exchange for a similar or larger sum expended for staff time, equipment, materials, and interruption of productive research. Where the fee income from an activity is large enough and constant enough to provide for the service rendered without interference with major research the activity may contribute a small net to research.

The main sources of such fee income are: Inspection of fertilizers; inspection of insecticides and fungicides; inspection of feeds; inspection of seeds; tests for diagnosis of diseases such as infectious abortion in cattle and bacillary white diarrhea in poultry; nursery stock inspection; creamery inspection; Babcock glassware standardization; tests of seeds, water, milk, analyses of soils.

In some cases the work is assigned to the station and the fee fixed by law. Ordinarily the object of the fee is to make the service rendered self-supporting. In others the work has grown as a service which the station is best qualified to render. The fee is set by the institution and is usually based on the cost of the service rendered. Attention is again directed to the fact that the income from fees is not net income for research. Fees should not be regarded as a substitute for research appropriations.

Receipts from sales.—The receipts from sales of products reached a total of $1,810,764.78 in 1927–28 as compared with $277,502.82 in 1909–10. This income from sales as in the case of income from fees may be misleading. It is made up mainly from sale of farm products. Obviously there can be little net return to the stations from this source, when production must be under experimental conditions. For proper experimental work the products must be produced and studied. When all observations are complete the residue of products is sold. The income is in the nature of salvage and may readily be less than the cost.

In financing research, therefore, sales from products should be considered in terms of permanent resources and should be handled as revolving funds. It is merely the nature of the activity from which these funds are derived that makes it necessary to convert products into money. Receipts should be considered as a revolving fund and not confused with new income. To confuse the two or attempt to finance research through sales of products which must be replaced in kind and quantity can lead but to one end—disappointment in research output.

Miscellaneous receipts.—This item is intended to include funds from various sources other than State and Federal appropriations, fees and receipts from sale of products. As indicated in a previous chapter, 26 institutions reported a total of 120 research projects involving cooperation with 173 commercial agencies during 1928. The commercial agencies contributed a total of $217,700 to further these cooperative ventures. It is contributions of this nature which make up the greater part of the $414,961.83 miscellaneous receipts shown in Table 3, for 1927–28.

The total of more than $414,961 in 1928 as compared with $2,420.51 in 1899–1900 indicates that station work and results are recognized as of value to the activities of the contributing agencies, either directly or through betterment of agriculture.

Expenditures for physical plant.—The institutions where the stations are located have provided largely for physical plant, including offices, laboratories, greenhouses, lands, and farm buildings. This has been a natural outgrowth of the policy established by the Hatch and other Federal Acts which provide that erection, enlargement, and repair of buildings necessary for carrying on the station work must be provided for the most part from funds other than Federal subsidies.

Chapter IV.—Results of Research in Agriculture

Economic, social, and educational returns from the money expended.—What is the practical value of the research laboratory to the manufacturer? Does it help increase profits and reduce costs, or is it merely a pleasant fad—a temporary experiment—helpful in some ways, of course, but of no particular aid in solving the day-to-day problems of the plant and the sales office?

"These questions and related ones," says Robert M. Davis[13] author of a pamphlet, Research—Its Cash Value "were answered by 800 manufacturers in a survey completed by the Division of Engineering and Industrial Research of the National Research Council * * *." "In their answers," continues Davis, "only 3 of these 800 executives are of the opinion that scientific research does not pay, and this 'minority trio' is made up of executives of comparatively small concerns."

"Seven hundred and ninety-seven, then, out of a total of 800 manufacturers, 68 per cent of whom maintain laboratories, appear to be convinced of the dollars and cents value of research."

Does research in agriculture bear a similar relation to that of industry? Does its cash value justify the cost? Do its contributions better social conditions?

Returns from investment in the agricultural experiment stations reach the public in many ways, economic, social, and educational in character. An exact measure as to value of the contributions and services rendered is difficult to secure. The survey however seemed to afford opportunity for accumulation of more definite and more complete estimates than have hitherto been available. Accordingly, specific estimates supported by concrete examples of generally recognized accomplishments were sought from each institution. Although scientists as a group are hesitant to estimate their contributions in money values, enough returns were received to warrant the discussion and conclusions following.

For better understanding of the contributions presented let us consider briefly a generally recognized contribution not included later, the Babcock test, established through research by Dr. Stephan Moulton Babcock, of the Wisconsin experiment station.[14]

The introduction of the centrifugal cream separator in 1885, rendering possible the efficient removal of cream from the whole milk,

[13] Davis, Robert M. Research—Its Cash Value, quoted from pamphlet, Research—A Paying Investment. Division of Engineering and Industrial Research, National Research Council.

[14] Russell, H. L. The Coming of Age of the Babcock Test. Circular of Information No. 32, Wisconsin Agricultural Experiment Station, March, 1912. Used as source of facts.

stimulated development of the cooperative creamery movement. The pooling of milk and its purchase on the basis of weight or volume regardless of butterfat content had been a serious handicap, and the difficulties involved had threatened to wreck the system of associated butter making. In an address before the Wisconsin Dairyman's Association in 1889, Charles R. Beach pictured the needs of the situation in the following words:

> Why should I try to produce milk of a high standard to pool with that of poor quality, or to produce cream that has two or three times the money value of my neighbor's, and then sell it at the same price by the gage. The first step toward improvement among milk producers must be the reorganization of the whole factory system, placing the same upon such basis that the patrons shall receive pay for their milk and cream in exact proportion to its true value * * *. This done, it would revolutionize the whole method of keeping cows.

Investigations were undertaken by several agencies, including the Agricultural Experiment Station of Wisconsin. From his research at this station, Babcock gave to the world the Babcock test, July, 1890, "A new method for the estimation of fat in milk, especially adapted to creameries and cheese factories." This method replaced inefficient, time-consuming tests by one which could be made in five minutes, and efficient to such a degree that no change has since been made in essential features. It has been adopted as the standard test in the United States and Canada and is used widely throughout the world.

As a contribution to general welfare through agriculture and the dairy industry, the Babcock test has been of influence in many ways. Together with the cream separator, this test has determined the course of the dairy industry. The development of cooperative dairy manufacturing is associated with it; so, too, are increased milk production through study of individual cow performance, improvement of dairy breeds for milk production, reduction by one-half of the unseparated cream in the skim milk, and, less directly, the maintenance of soil fertility through dairying. The economic return obviously can not be expressed in terms of dollars and cents.

Major Types of Contributions from Research and Their Economic Importance

Thirty-five institutions reported contributions of one or more types of research and gave examples for use in this survey. Thirteen institutions did not report or made no comments; four reported the task impracticable or requiring more time than was available. A total of 402 specific examples were given. Of these 252 were such that estimate of economic value was considered possible.

The method used in making these estimates may be illustrated in the case of a new crop developed by an experiment station. The new crop is developed and tested in comparison with existing commercial crops to determine comparative merit before it is distributed for general agricultural use. The merits established through experimental comparisons are checked with performance of the crop when grown by farmers. The acreage of the new crop is fairly well known, the increase in yield or other advantage is known, and consequently the economic value of the contribution can be estimated. In the same way contributions of other types can be estimated. Especially is this true where agriculture has developed largely since the stations have been established, and facts as to practices and returns are known for many years back.

In presenting the contributions, the institutions and the survey recognize to the full the participation of the Department of Agriculture in the work leading to contributions reported. Determination and division of credit upon an exact basis is impracticable. Likewise a contribution originating in one State may reach its maximum value in another State after adaptation by the local research workers to State conditions and problems.

Acknowledgment of the part played by agricultural extension, resident teaching, outside agencies, and individuals, all of which have aided in applying the discoveries and findings of research, does not affect the basic fact of experiment station responsibility for production.

The purpose is to represent research and its output in relation to economic, social, and educational welfare and to express the result in terms which will be understood.

The examples submitted show an estimated contribution for 1928 of $842,470,995 in economic value to the agricultural industry, distributed roughly as follows, by major types of contributions:

From the application of improved methods of soil improvement and maintenance developed by agricultural research	$87,990,000
From the use of new crop varieties introduced or produced and new methods of growing them	207,405,495
From the application of new methods developed by agricultural research for controlling plant diseases	45,567,500
From the application of new methods developed by agricultural research for control of plant-insect pests	99,739,000
From the application of new methods developed for dairy-herd management	59,575,000
From the application of new methods developed for beef-cattle management	36,590,000
From the application of new methods developed for sheep management	9,615,000
From the application of new methods developed for the management of hogs	74,550,000
From the application of new methods developed for the management of poultry	70,050,000

From the application of new principles and practices developed for animal breeding	$42,238,000
From the application of new methods developed for controlling animal diseases	52,825,000
From the application of new methods developed for utilizing animal products	2,300,000
From the application of new methods developed for marketing animals	11,800,000
From the application of new methods developed for marketing animal products	13,955,000
From the application of new methods developed for improvement in organization of farm business	15,635,000
From the application of new methods for the development of farm accounting	2,100,000
From contributions of other types [15]	10,446,000
Total	842,470,995

Soil improvement and maintenance.—The foregoing estimate for this type of contribution is based on 33 cases submitted by 28 States. Missouri, for example, reports that:

The yields of most Missouri crops have shown either an increase during the past two or three decades, or they have about held their own. This is in contrast to a gradual decrease in the years preceding. A considerable share of this can be accounted for through improved systems of soil tillage, the use of better cropping systems, including the soil-building legumes, a marked increase in the use of lime, and inoculating material for legume crops, and increase in the use of commercial fertilizing materials and through a better saving of farm manure. The adoption of these better practices according to the best estimates has made a difference of at least 1 bushel of corn per acre on the 6,500,000 acres grown, 1½ bushels of oats on an acreage of 1,500,000, 1 bushel of wheat on 2,500,000 acres, and 1 ton of tame hay on the 3,000,000 acres of the State. In addition, there is little doubt that out of the 175,000 acres of alfalfa, improved methods of soil management have resulted in one-half a ton annual increase per acre, while the improvement in the yield from inoculating soybeans and the increased yields from miscellaneous crops such as truck crops and minor field crops, has been very appreciable. Figuring these increased yields at standard prices brings a total of a little more than $15,000,000 annually.

This statement could be duplicated in kind, perhaps not in full magnitude, by most State stations and would be based upon accomplishments and facts generally recognized in the State and region.

Individual problems of soil fertility, management, and maintenance by the hundreds have been met wholly or in part. The value of sulphur applications to land in alfalfa in Oregon, already applied to some 40,000 acres and applicable to 100,000 acres, means about $6 an acre net increase in return to the farmer. Lime, manure, and inoculation cultures for the same State mean the difference between

[15] Such as: Control of bee diseases, control of injurious mammals, methods of snow survey to predict water supply for irrigation, disposal of sewage, storage, and refrigeration of farm products, processing of farm products, and others.

successful growing of legumes and not growing legumes for the dairy industry of the coast section. Such individual items could be listed at length from New Jersey, Pennsylvania, or New York, or from Maine to California and from Florida to Washington.

The results have been increases in yield varying from 1 to 100 per cent; reduction in losses from various soil conditions estimated from 5 to 30 per cent; reduction in cost of production varying from 2 to 50 per cent; and improvement in quality of product from 1 to 35 per cent. These vary with the crop, the problem, the locality, and the extent to which the specific problems are met and corrections applied.

New crop varieties and methods of growing them.—That the great American desert of the old geographies has become a national grain bin is due in no small part to contributions of new crop varieties and methods of growing them from State stations and the Department of Agriculture. The introduction of hard red winter wheats and their improvement has exercised an influence in this change that can not be measured. But to select one example, the value of Kanred wheat may be estimated. The Kansas station report shows that this wheat was produced not because of any stress of circumstances which made a new variety especially desirable. Kanred wheat was the result of effort to find or create better varieties; an effort which has constituted an important phase of the work of the Kansas station since its organization in 1888. In one sense, Kanred wheat was an accidental discovery; in another and more significant sense, it was a direct result of scientifically directed effort.

The early work of the Kansas station demonstrated the value of the hard red winter wheat varieties for most of the State as contrasted with the soft red winter wheats which were being extensively grown. Accordingly, in 1906, about 600 heads were selected and grown in separate head rows. The best of these were propagated from year to year and one of them was named Kanred and released for distribution to the farmers of the State. It spread rapidly, not only over all the State of Kansas, but found its way into every State in the United States and into foreign countries. In many of these, it was found to be unadapted, but in some, as for example, in Argentina, it is said to have made a remarkable record in comparison with local varieties.

In 1924, when a survey of wheat varieties was made by the United States Department of Agriculture, Kanred comprised about 21 per cent of the acreage of hard red winter wheat, and ranked second only to Turkey in that class. At that time, more than 4,000,000 acres were grown. In experimental tests in Kansas, extending over a period of 17 years, Kanred has averaged about 2 bushels per acre more than Turkey, the variety it has replaced. It adds approximately 8,000,000 bushels to the annual wheat crop of the United States with practically no increase in the cost of production.

But even for wheat, contributions are not confined to the onetime American desert. For the Northwest, Hybrid 128, Hybrid 123, Hybrid 143, Ridit and Triplet and Albit were created, tested, and developed by the Washington State station. More than one-fourth of the wheat produced in the State is of these varieties. In tests on experimental fields they outyield those which they have replaced by from 1 to 7 bushels per acre. Conservatively estimated at an average of 3 to 4 bushels increase per acre the total annual increase in yield because of their use is more than 2,000,000 bushels. Ridit and Albit, the varieties most recently produced and spreading rapidly, are resistant to smut and where grown prevent major losses from this disease.

Federation wheat in Oregon is another example. When fall-sown wheat was winter killed in 1924–25, farmers followed the advice of the station and replanted about 400,000 acres to Federation, a spring wheat. The estimate made by farmers of the increase in yield over commonly grown varieties was from 2 to 10 bushels. State loans for purchase of seed were paid off, and the station and its Federation wheat were given a large share of credit for about $2,000,000 worth of increase in yield.

Similar examples could be given to include most of the wheats grown in the United States to-day.

Legumenous forage crops, so important in the maintenance of soil fertility and the animal industries, may also be cited. Red clover introduced from western Europe proved satisfactory in East Central and Atlantic Coast States, but failed completely in all but the more humid sections of the Great Plains. The need was largely met by introduction of alfalfa and sweet clover and in learning how to grow and utilize them.

Contributions of outstanding value to the production of leguminous crops could undoubtedly be given from any State. A report [16] from New York shows that alfalfa was grown in small areas of that State in 1896 but that attempts to grow it in new areas were largely failures. Widespread experiments demonstrated that sometimes by inoculation, sometimes by liming, and sometimes where both inoculation and liming were necessary, alfalfa could be successfully grown where otherwise it was a failure. By 1919 the State production was 258,000 tons from about 120,000 acres. Besides becoming a valuable crop it was a decided contribution to maintenance of soil fertility.

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[16] Jordan, W. H. The Future of Agricultural Experiment Stations, Proceedings of Land-Grant Colleges, 1922.

In methods and practices of growing crops contributions are likewise outstanding.

In the spring of 1907 it was observed that wheat in many fields in eastern Kansas was quite yellow in color while the wheat in adjoining fields was of a dark-green color. Inquiry revealed the fact that the difference resulted largely from the time when the land was plowed. Experiments were started that year to determine the influence of different times and methods of preparing the land for wheat on the yield of the following crop and if certain methods resulted in a better yield, to ascertain why this was the case.

At the time the experiment was started most of the wheat land was plowed relatively late and no special effort was made to get the work done early in the season. The experiment showed that the yield of wheat was reduced, on the average, about 1 bushel per acre for each week the seed bed preparation was delayed after the middle of July.

Wheat farmers adopted the improved method very rapidly and to-day at least 8,000,000 acres of wheat land are prepared an average of four weeks earlier than it was prepared before the experiment was started. With an average increase of 1 bushel per acre for each week this means an annual increased production of 32,000,000 bushels of wheat having a market value of about $32,000,000. The information obtained from these experiments also made possible the profitable western expansion of the Wheat Belt into a region where wheat could not be grown successfully by the old methods of [illegible] management.

It was found that this difference in yield was due in eastern Kansas to a higher nitrate content of the early plowed land at seeding time while in central and western Kansas the higher yields from the early tillage were found to be due to a higher moisture content of the soil.

In 1909 wheat growing in a large area of eastern Oregon was subject to uncertainties and hazards. Good years intervened with low yields and crop failures. A cooperative State-Federal station was established to meet the situation. Years of careful experiments proved that early plowing for summer fallow increases wheat yields 5 to 6 bushels an acre. At least 80 per cent of farmers in the region are now plowing from 5 to 6 weeks earlier than they did before the station results were made known. They testify that this change in practice means an average increase of at least 3 bushels an acre annually over about 500,000 acres—a net value of $1,000,000 or more. Of even more importance wheat production is established upon a relatively dependable basis.

The foregoing are merely examples of relatively limited application. Similar contributions apply over large areas. In Texas, for example, practically all crops grown are introductions, creations, or improvement made by the Texas station, the Department of Agriculture, and other State stations:

Prior to 1906, Giant milo and Standard kafirs comprised the varieties of grain sorghum making up the acreage of this crop grown in Texas. Now they comprise less than 5 per cent of the acreage of grain sorghums. They have been almost completely supplanted by early-maturing improved strains developed and distributed by the Texas station and the United States Department of Agriculture. The improved strains furnish a reliable grain feed crop to a region not adapted to corn and have resulted in an agricultural development in the semihumid region of Texas the value of which it is impossible to estimate. Calculated on a basis of estimated increased acre-yield of improved varieties alone, as compared with that of unimproved varieties, the increased value of the grain sorghum crop is more than $7,500,000 annually.

The acreage devoted to cotton in Texas has increased from 10,510,000 acres in 1915 to 17,968,000 acres in 1929. A large part of this increase has occurred in west and northwest Texas as a result of 10 years' research work with this crop by the Texas station. Strains, varieties, and cultural practices adapted to this section were developed. One million bales of cotton worth almost $100,000,000 are now produced annually in this region. Just how much of this value may be accredited to the station is difficult to tell, but it may be conservatively estimated that research with this crop has added $10,000,000 annually by reason of the development and introduction of new and improved varieties.

Denton wheat, a new variety developed for the north Texas wheat region, has yielded approximately 20 per cent more than ordinary varieties. This region grows 1,000,000 acres of wheat annually and an added value of $2,500,000 per annum is estimated to result from the use of this improved variety. Nortex oats, a new variety developed from the Texas Red Rustproof, is estimated to produce $3,000,000 increase to the wealth of the State per annum.

A report from Cornell as of June 30, 1927, shows that in the past 45 years 4,500,000 acres have gone out of cultivation, but in 30 years, crop yields increased 25 per cent and New York farmers were producing more food than was ever before produced in the State. Two new wheat varieties from the station, largely grown, yield about 10 per cent and more than those previously grown; new barley varieties for 85 per cent of the acreage give increased yields of about 20 per cent. A new resistant bean saved the bean industry; new cabbage varieties have been created.

A report from New Jersey is as follows:

While no exact measures are available, it is reasonable to believe that efficiency since 1900 in agricultural production in New Jersey has increased 20 to 30 per cent by reason of application of results from research, and that the total value of New Jersey's agricultural production would be 20 to 30 per cent less than it is if our yields per unit were back on the basis of what they were 20 years ago.

The foregoing statement is prefaced in the New Jersey report by census figures establishing increased efficiency and is supplemented by ample illustrations of research results in application.

The total estimate for contributions in the form of new crop varieties and methods of growing them is based upon reports and 137 type examples submitted by 30 institutions. The value of the contributions comes mainly from increase in yield, reduction in losses, reduction in production costs, or improvement in quality estimated at from 1 to 50 per cent, depending upon the example.

Controlling Plant Diseases

One who has not seen fields of potatoes ravaged by disease; apple orchards after a few years of uncontrolled canker infestation; pear orchards full of blight; grain fields well infested with rust, smut, or "foot rot"; berries heavily infested with diseases; "curly top" disease in fields of sugar beets or truck crops; or similar demonstrations of the effect of plant diseases may be doubtful concerning estimates of value from station contributions which control or cure these diseases.

Potatoes were grown on, perhaps, 3,500,000 acres of the United States in 1928. What disease and research to control disease means to this industry is illustrated by the few examples following. Dr. W. H. Jordan, in an address in 1922, gave the following statement concerning the potato industry in New York State:

> In 1909 and 1919 the potato crop in New York was 48,000,000 bushels and 32,000,000 bushels, respectively. In 1919, 20,000,000 bushels were sold, the returns from which were probably not less than $10,000,000.
>
> Nearly 25 years ago the devastations of blight so seriously menaced the potato crop that it became incumbent upon the experiment stations to study the problem of prevention. * * * In 1902 a 10-year series of spraying experiments was begun, at the end of which period it was found that thorough spraying had increased the average yield 97.5 bushels per acre. Business experiments for 9 years and volunteer experiments for 7 years, carried on during the 10-year period, showed an acre increase of 36 and 54 bushels, respectively. As from 300,000 to 400,000 acres of potatoes are planted in New York annually, the value of this demonstration needs no comment.

That the Maine station has contributed much to the practical control of troublesome potato-disease problems is recognized in that State and elsewhere. The work of this station on potato diseases was worth "more than a million dollars a year to farmers of Aroostook County in the control of previously uncontrollable late blight of potatoes" is the statement of a railroad president as early as 1901. Control for blackleg of potato, potato scab, and potato rot has likewise been worked out by this and other stations. The examples could be expanded to include many other States.

The list of diseases which, uncontrolled, would wreck the fruit industry is a long one. A printed report of 1926 from Oregon has this to say concerning control of apple scab:

As early as 1903 apple scab threatened the apple industry of Oregon. It thrives in the cool, moist climate of western Oregon and Hood River. The experiment station begun research and control experiments. In 1907 A. B. Cordley, then station entomologist, discovered that lime sulphur would control scab better than any fungicide previously known. This discovery has revolutionized orchard spraying in all parts of the world. The chemist, the entomologist, the pathologist, and the horticulturist of the station have since been at work to standardize and perfect the lime sulphur sprays. Orchardists can now hold losses from scab to small amounts. Net gains from following the station recommendations amount to at least $500,000 annually in Oregon alone.

Smut of grains, especially wheat and oats, one time a major problem and still troublesome, has been controlled within economic limits. And in late years a number of smut-immune, or highly smut-resistant varieties and strains have been distributed to farmers in some sections.

Equally striking facts concerning control of diseases of tobacco could be cited from Virginia and other States. Likewise outstanding examples could be given for truck crops, small fruits, sweet-potatoes, corn, cotton, and alfalfa. A complete list would be a long one. In some cases control measures are reasonably satisfactory; others are, at best, control in part; many diseases, new and not so new, are as yet troublesome unsolved problems. The total estimate given by the table is based upon some 45 examples submitted by 23 institutions as outstanding contributions resulting in increase in yield, reduction in losses, reduced cost of control measures, or improvement in quality. Under present marketing conditions as much as 50 per cent or more of an apple crop may be unmarketable unless diseases are controlled. And for a crop such as potatoes the yield would be negligible with diseases uncontrolled.

Control of Plant Insect Pests

Experience with the boll weevil, the gypsy moth, the European corn borer, and the more recent experience of the citrus industry with the fruit fly should bring forcibly before the public the seriousness of the constant fight against insect pests and the importance of advance information from research so that control measures can be applied promptly and effectively.

Up to the spring of 1929 the United States was free of the Mediterranean fruit fly. What happened then is rather well pictured in an article Conquering the Fruit Fly, in Nature Magazine for December, 1929:

For a few intensive weeks in the spring and early summer a grim little war was carried on in the sunshiny peninsula, on the outcome of which the prosperity of hundreds of thousands of Americans depended. * * * It is one more of those modern dramas at which the scientists looks on from a privileged seat, watching the contending forces with an absorbing interest possible only to the well-informed. In the present case none but the trained entomologist could fully appreciate the play of dramatic elements involved. * * * Once allowed to spread it would, in the conservative words of the experts, bring chaos to many agricultural regions of the South and West, destroying the livelihood of wide sections of our population and forcing the expenditure of untold sums for eradication or control. * * * Florida at once released a $50,000 emergency fund and $40,000 more was transferred from other work by the Federal Government for immediate use. * * * On the recommendation of Secretary Hyde Congress pushed through a special appropriation of $4,250,000 for eradication and control. All available personnel was set at once to work. * * * Promptly undertaken, swiftly executed, well-planned and handled, this latest little war of scientists against insect furnishes just about the most striking example we have had of the value of modern quarantine service. If you still have any doubt about that value, ask the lumberman standing sadly amid the ruins of our once noble stand of chestnut timber, or the New England selectman fighting endlessly to hold the gypsy moth in check, or the cotton farmer watching the weevil eat up great bales of dollars season after season. What would it not have been worth to each of them to have had at the proper moment just such an effective defense as that which has blocked this first incursion of Ceratitis capitata.[17]

From the not distant past come memories of similar struggles with grasshoppers, Hessian fly, chinch bug, codling moth, and others. The western half of Kansas was the scene of devastation by grasshoppers periodically from the early seventies until after 1900. The following from a special report of the Kansas station indicates what happened after 1911:

In 1911 the agricultural experiment station, realizing that not only were the grasshoppers increasing in alarming numbers but also that they would do enormous damage to crops, stationed one of the regular staff men in the field to study the situation and develop effective methods for the control of the hoppers. Several recommended formulæ for the preparation of poisoned baits were tested, but since none of them were effective or practical the station worked out and perfected its own poisoned bran bait, together with the method of application. * * * During the summer of 1913 an extensive control campaign was conducted in western Kansas. Twelve counties, representing an area of 11,963 square miles, were organized for concerted action. About 874 tons of bran mash were distributed. A much more extensive campaign followed in 1919, at which time the total number of counties organized was 39, representing an area of 33,985 square miles, or about two-fifths the entire area of Kansas. A total of 4,565 tons of bran mash was distributed. This required 83 tons of white arsenic, 83,000 gallons of molasses, and 498,000 lemons and oranges. The results were excellent throughout the infested areas and crops valued at more than $25,000,000 were saved or protected.

Since the campaign of 1913 poisoned bran mash has been used extensively in America, Africa, and Europe for the control of grasshoppers. It is also

[17] Wilson, Otto. Conquering the Fruit Fly, Nature Magazine, December, 1920.

used extensively in America for the control of army worms, fall army worms, and cutworms, all of which are insects of major importance feeding on farm or field crops.

A summary of some of the most important grasshopper campaigns in the United States and Canada from 1913 to 1923 shows the enormous amounts of materials used by the farmers in protecting their crops to be 103,430 tons of bran and 3,775 tons of white arsenic, and the estimated savings or crops protected to be $141,692,975. The materials listed in making the above summary were purchased out of funds appropriated to the county, State, or Province. The cost of the campaigns and tremendous amounts of materials used was not estimated, but was based on the actual figures. The estimated savings, or the crops protected, are, of course, based on estimates.

Consider also Hessian fly control. The Nebraska report estimates saving of $6,000,000 in 1928 from control of this pest by measures developed or improved by the station for Nebraska conditions. The State Board of Agriculture for Kansas reports that this insect reduced the 1924 wheat crop by 20,000,000 bushels in that State. Since then methods of control worked out and proved effective by the experiment station have been put into application to an extent which has reduced losses from this pest to about 800,000 bushels average annually since 1926. The remedy in this case is not poison, but, early deep plowing, proper seed bed preparation, destruction of volunteer wheat, proper time of planting—the joint contribution of entomologists and agronomists.

Who has not heard of the "chinch bug" and its destruction of grain fields from the early seventies down? Like the grasshopper the chinch bug is still a menace but can be controlled by wise prevention and protective measures worked out largely through agricultural research by the State stations and the Department of Agriculture.

The Bureau of Agricultural Economics estimated the production of apples in 1928 as 185,743,000 bushels. What apple grower has not had experience with codling moth? Uncontrolled this pest would wreck the industry. Effective control varies with the locality and with the season. In every State where apples are grown commercially the stations have contributed and are still contributing much of economic value in the battle with this pest.

The following from the report of the South Carolina station concerning cotton-boll weevil illustrates another line of attack on insect problems:

The South Carolina Experiment Station has played an important part in overcoming the boll-weevil pest by working out cultural practices and fertilizer methods which enable the Southeast to increase production materially under boll-weevil conditions. Intensive studies of the factors influencing fruit-bud formation and rapid growth resulted in working out practices which have literally resulted in making two stalks of cotton grow where only one grew before. It was found that by crowding the stalks in the row and placing the rows closer together the individual plants, when properly cultivated and fertilized, formed buds and squares just as rapidly as when the stalks were given greater distance. In other words, by increasing the number of stalks per acre from about 7,000, as was the former practice, to 20,000, both the earliness of the crop and the total yield were materially increased. Field experiments show an increase of 73 per cent in earliness and an increase in total yield of 66 per cent by use of these methods.

During 1927 and 1928 a total of 679 farmers in the 5-acre cotton contest conducted by the South Carolina Agricultural Extension Service by using these methods produced an average of 566 pounds of lint cotton per acre at an estimated cost of less than 10 cents per pound.

The use of these improved methods have also resulted in an increase in the average yield for the State as is shown by the fact that the 1929 crop averaged 172 pounds per acre against 147 pounds for 1928, and 160 pounds for the 5-year average.

The picture might be expanded almost without end and still be supported by concrete examples. The estimated value of contributions as given is based upon 35 examples submitted as outstanding by 21 institutions. The values come naturally through reduction in losses, improvement in quality, and increases in yield due to control or preventive measures.

Dairy Herd Management

The value of dairy products of the United States in 1925 was estimated at about $2,750,000,000 by the Bureau of Agricultural Economics.[18] The estimated value of contributions from the stations is based upon reports received from 22 institutions. The fundamental importance of the Babcock test worked out by the Wisconsin station has been set forth. The combined contributions on feeds, feeding, and management of dairy herds are somewhat different in type, yet such contributions, too, are imperative to the present scope and character of the commercial dairy industry.

The dairy cow, from an economic viewpoint, has been properly termed, "simply a manufacturing plant through which is run so much raw material in the form of nutrients to turn out the finished products, milk and cream." Obviously the problems are many and concerned with the raw products, feeds, and their combination, in their relation to the welfare of the cow as well as to economy of

[18] Crops and Markets, July, 1927.

production, and the whole in relation to systems of agriculture and to markets.

In part, the contributions of the experiment stations and their economic value are illustrated by the following statement covering the situation in Minnesota:

In 1920 there were 1,359,000 cows kept for their milk in Minnesota. The average production of butterfat was estimated at 160 pounds annually per cow. The number of cows in the State has since increased to 1,500,000 and the annual yield of butterfat to 190 pounds per cow.[19]

The increase in yield of butterfat per cow is due in part to the wide adoption of feeding standards for dairy cows worked out and advocated by the experiment station, and in part to the better culling practices of farmers through the activities of the cow-testing association, centered also in the State agricultural experiment station.

The significance to farm income of this increase per cow is indicated when it is applied to the total number of cows now in milk. An increase of 30 pounds per cow for the 1,500,000 cows in milk gives an additional 45,000,000 pounds of butterfat annually. Sold at 40 cents a pound, which is somewhat less than the prevailing market price for the period, it will increase the income of the dairy farmers of the State by approximately $18,000,000 annually.

North and South, East and West the experiment stations have contributed in a similar way to promote the efficiency of the dairy industry as a major agricultural enterprise. Quality of products has been improved from 1 to 100 per cent; production costs reduced from 1 to 40 per cent; and increase in yield per animal has been material.

Beef Cattle Management

Certain major contributions of many stations are illustrated by the following from Missouri and Iowa:

In Missouri, 25 years ago, timothy hay, corn, and corn fodder were the feeds most available and most commonly used for cattle feeding in Missouri. Feeding experiments were conducted at the Missouri Experiment Station which showed that cattle fed corn and timothy hay required 5 bushels of corn more to produce 100 pounds of gain than cattle fed legume hay instead of timothy. These experiments showed also that the corn requirement might be lessened by the use of nitrogenous supplement in case the legume hay was not available. For each one of the 600,000 cattle marketed per year from the State, there is saved the corn which may be saved in the production of 100 pounds of gain. This at 80 cents per bushel amounts to $2,400,000.

With the postwar deflation came a general move to sell cows from Missouri farms. The Missouri Experiment Station experiments showed two methods of managing breeding herds and their calves which would increase the returns approximately $15 per calf. One of these is the grain feeding of early calves while nursing and the sale of these calves in late fall. The other system calls for liberal wintering of the calves and full feeding of the yearlings on grass during the summer. The 50 counties in Missouri where cows are main-

[19] Based on figures from the Minnesota Crop Reporter and reports of the State dairy and food commissioner.

tained in the greatest numbers produce annually about 200,000 calves and the use of these systems in the management of these calves would increase the receipts approximately $3,000,000. The use of corn silage in cattle management has greatly increased the producing capacity per acre. An increase of $5,400,000 annually in the cattle receipts through the work of the experiment station is, therefore, quite possible.

The following statement from Iowa illustrates an important far-reaching contribution of a different character:

Many of the rations fed to fattening cattle are low in such minerals as sodium, chlorine, calcium, phosphorus, iron, iodine, and perhaps other elements.

Common salt which supplies the sodium and chlorine has been fed to cattle for years, however, very little work had been done with more complex mineral mixtures for fattening cattle previous to the work started here in 1923. In the six different comparisons since that time the feeding of one ounce of a simple mineral mixture per steer daily has increased the average margin, over and above feed costs, some $5 per steer.

The steers receiving the simple mineral mixture, made up of high calcium limestone, bone meal, iron oxide, and potassium iodide, in all cases made greater gains, required, with one exception, slightly less feed per hundred pounds of gain and sold for more money per hundredweight.

The $5 additional margin attributed to the mineral feeding would mean a $100 greater margin over feed cost per car of cattle, hence many more dollars in the pockets of our feeders.

The feeds, pastures, and management that are best adapted to local conditions for growing and fattening to meet market demand have been subjects of investigation by most stations. The facts developed are the basis of modern beef cattle production.

Sheep Management

The sheep industry requires many different types of management to meet the conditions found among the great flocks of the mountains and deserts, the feeding enterprises of the corn belts, and the farm flock enterprises.

Contributions of a character typical of those from many State stations are illustrated by the following from Nebraska:

Approximately 1,000,000 western lambs are fattened for market in Nebraska each year. The results of 30 years' work at the Nebraska station show that a saving of 12½ cents in the cost of feeding each lamb can be made by using home-grown feeds plus a protein supplement under certain price conditions, as compared to the indiscriminate use of purchased feeds and unbalanced farm-grown rations. Feed lot losses have been reduced 30 per cent by the proper use of roughages in corn field feeding and the mixing of grain and roughage when lambs are crowded to the limit on grain.

The use of purebred rams and the practice of treating lambs for stomach worms add $150,000 each year to the value of native lambs. An increased yearly return of $100,000 has resulted from lambing earlier and marketing "1-year" breeding ewes with their lambs before June 15.

It is evident, therefore, that the methods of feeding and management proposed by the agricultural college effect a saving to this State of approximately $500,000 a year.

Nevada and other western stations have contributed in similar ways to improve management of range flocks. Tennessee and other southern and southeastern stations have improved methods of sheep management for their sectional and regional conditions. Likewise contributions have been made by New York and other stations of that region.

Management of Hogs

Twenty-two institutions reporting on this type of contribution each gave one or more examples of how the work of the experiment stations has contributed to the industry in a measurable way. The following from Iowa serves as an illustration:

Work done during the last decade has indicated that further improvements may be made in our protein supplements for swine. The most recent development at this station along these lines is a 10-ingredient supplemental mixture which has been called the "Big Ten" supplemental mixture. In our comparisons this mixture has been more efficient than 60 per cent protein tankage when fed to growing and fattening pigs as a balancer of the farm grains. The "Big Ten" supplemental mixture has produced gains on the average of about $1 less the hundred. This would be equivalent to $2.25 for a 225-pound pig. Iowa produces nearly 10,000,000 hogs annually, hence here is a possible saving of millions of dollars annually to Iowa farmers.

Considerable work has been done at this station comparing the value of various forage crops. Our work has shown that alfalfa is the leading forage crop where it may be grown. However, red clover and Dwarf Essex rape are excellent swine forages. Our work has been particularly instrumental in bringing rape to the front as a swine forage. Hundreds of farmers that formerly pastured their pigs on dry, hard, almost worthless bluegrass in July and August now have these same pigs' descendents on rape, the leaves of which are green and luscious in July and August when the bluegrass is practically dried up.

It is estimated that this green forage—rape—will save some 50 cents' worth of corn and tankage per pig fed during the summer months. If all of our Iowa farmers would use rape in place of bluegrass during the hot summer months there would be a saving of millions of dollars.

The self-feeder for swine has been used at the Iowa station since 1913. A number of tests have been carried on comparing self-feeding with hand feeding. It is estimated, and we believe this to be a conservative estimate, that the self-feeding method is responsible for at least a saving of $1 per pig. Iowa markets practically 10,000,000 head of hogs per year. Assuming that one-fourth of the producers of these pigs follow the self-feeding practice, the saving to Iowa producers alone would be some $2,500,000.

Common salt has proved to be of vital importance in economic pork production. Its absence from the pig's ration very often results in changing an otherwise profitable feeding venture into a losing proposition. Salt has proven to be one of the most efficient of our mineral mixtures. Under some conditions, and particularly where a protein supplement of vegetable origin such as soybeans or soybean oil meal is fed as the protein supplement, 1 pound of salt has saved 15 to 20 pounds of feed on each 100 pounds of gain made. This means that about 1 cent's worth of salt saved 45 to 65 cents' worth of other feed on each hundredweight of gain made.

The addition of other ingredients containing calcium, phosphorus, iron, and iodine has also been instrumental in saving time and feed.

The value of a good mineral mixture will vary considerably, depending upon the basal feeds fed along with the mineral mixtures. In some cases 1 pound of minerals has saved as much as 25 pounds of feed. In other cases, where the basal ration has contained liberal allowances of a milk by-product, tankage, and alfalfa, the saving has been small. Many of the rations used in practice do not contain very much of such feeds, hence we would say that on the average a good mineral mixture will save some 25 cents' worth of feed per pig. In Iowa alone this would mean a saving of some $2,500,000.

The systems of agriculture and the combinations of crops and management of hogs varies. Each State station has contributed along the lines of the illustrations from Iowa, at times with new features, in other cases by working out adaptations to State and local conditions of principles and practices developed elsewhere.

Management of Poultry

As in the case of beef cattle and hogs, the research work of the stations on feeds and feeding of poultry are the main bases of present-day practice in this important industry. Even with their many shortcomings, these improved practices are of real importance in the commercial poultry industry.

Contributions of quite different character have also had much to do with the trends in the development of poultry keeping. The "day-old chick" enterprise originating in New Jersey has tended to revolutionize the general character of the poultry industry. The present-day culling practices followed results of research along lines of breeding and selection for egg production. Principles, practices, and equipment for incubation, brooding, and housing have been subjects of much investigation and many contributions. The country is dotted with poultry houses constructed from plans developed by the stations.

The Washington State College straw loft, controlled ventilation, unit-laying house developed by the Washington station has met with success in all parts of this section when it has been built according to specifications. In western Washington it helps to keep the litter dry in damp weather and to maintain production during the cool cloudy weather when usually a loss is experienced in flocks housed in other types of houses. In eastern and central Washington this laying house is cool in summer and insures enough warmth so that with proper lighting and feeding it is possible to maintain a maximum egg production under these temperature extremes. On the basis of experimental tests and estimates, not less than an increase of 1 dozen eggs per hen per year is credited on farms where this system of housing has been adopted.

The Western Washington Experiment Station pioneered in the development and use of lights for laying hens to obtain high egg production during the fall and winter when days are short and cloudy. This practice was developed in Washington from 1915 to 1918 and was adopted immediately by a large majority of the commercial poultrymen of the northwest. It is now in common use all over the United States and production of a maximum number of eggs during the season when egg production normally is low, has been the result. The lighting of poultry houses for laying hens has been one of a number of important factors in the development of the poultry industry of Washington from 21,356,576 dozen eggs in 1919 to 42,085,319 dozen in 1924.

Necessarily we are dealing here primarily with economic returns. The readers will better understand the relation of research to commercial practices by examination of statements such as the following from Kansas:

While studying the nutritional requirements of chickens, it was found that little chicks could not be grown successfully in the nutrition laboratory on any combination of ordinary feed. It was also found that laying hens did not lay many eggs when confined in the nutrition room and the eggs that were laid had very thin shells and gave poor hatchability although the ration contained an abundance of well-balanced minerals.

The solution of the difficulty was reached in 1923 when it was found that a lack of direct sunlight, which contains ultra-violet light, in the nutrition laboratory caused the rickets in growing chicks and the thin-shelled eggs from the laying hens. By opening the front of the poultry house to admit direct sunlight or by including in the diet cod-liver oil which contained vitamin D, both of these difficulties were eliminated. The real value of this discovery to the poultryman is found in the fact that he can now grow his young chicks in confinement and off the ground and thus eliminate certain serious diseases and parasites.

The egg production in about 1,000 demonstration farm flocks in Kansas which follow the recommendations of the college in managing and feeding their birds increased from an average of 123 eggs a hen in 1923 to 153 eggs in 1928. The assessor's figures as reported by the State board of agriculture, March 1, 1928, showed 16,286,171 hens on Kansas farms. The value of these methods applied more generally is apparent.

Animal Breeding

In the field of animal breeding the State stations have contributed to improvement of production through breeding as well as by working practices for economic application of breeding principles.

The Maine station, perhaps, can be credited in great measure for discoveries as to the mode of inheritance of egg production and for contributions to the knowledge that milk yield and butterfat percentage is transmitted by both bulls and cows. Transmission of these characters by the sire has been used widely and in an important way in the improvement of dairy herds for milk production. The value is difficult to express in money terms, but its economic importance through systematic improvement of production in a major industry is obvious.

The average dairy cow in Iowa produces about 175 pounds of butterfat annually. Experience has shown that higher production is necessary to bring profit to the owner. The results of an experiment carried on for 20 years at the Iowa Agricultural Experiment Station have shown the practicability of grading up a good dairy herd from poor or scrub cows. Dairy extension workers throughout other States as well as Iowa have made use of the lessons from this experiment. Scrub cows which produced with liberal feeding 192 pounds of butterfat annually were mated to selected, moderate-priced purebred sires of three dairy breeds. The grade daughters produced 267 pounds of butterfat, or 39 per cent more than their dams, and grade granddaughters by other purebred sires produced 363 pounds of butterfat, or 89 per cent more than their granddams.

Further matings in the Holstein line resulted in great-granddaughters which produced 419 pounds of butterfat, or 139 per cent more than the 175 pounds of butterfat which their scrub ancestors produced. Detailed records of feed costs showed that the great-granddaughters gave 286 per cent higher returns over feed cost than the scrubs.

What has taken place no doubt in other States in egg production is illustrated by a published statement of 1926 from the Oregon station:

Selective breeding for high producing flocks.—Experiment-station work for the poultry industry in Oregon was begun in 1908. There was not a commercial flock in the State at that time; there was not a trap nest in the State; farm flocks were about on a par with those throughout the country; poultry products were being shipped into the State in spite of the fact that agriculture had been developing for nearly a century.

Foundation breeding stock of white Leghorns and Barred Plymouth Rocks were gathered together from several flocks. During the first year, 1908–9, the 63 selected white Leghorns averaged 106.88 eggs, the 113 selected Barred Plymouth Rocks averaged 86.14 eggs.

The poultry work of the station was concentrated on this selective breeding project. Results were remarkable: During the year 1912–13 the white Leghorn flock averaged 208.93 eggs; the Barred Plymouth Rocks 179.56 eggs. In this year, too, these flocks produced the first 300-egg hen in the world, a white Leghorn. The value of this hen would be hard to estimate. More than 100 articles were written about her. The publisher of one article estimated that it was read by 16,000,000 people. Articles were published in national papers regarding the breeding, care, feeding, and management of the flocks to produce these records.

The breeding investigation was expanded and continued until 1922 when Dryden concluded and published: (1) High fecundity is inherited. (2) Selecting breeding stock on the basis of annual trap-nest records regardless of prepotency or tested qualities is a certain method of increasing egg production. (3) Some hens and some males have the power of transmitting high fecundity; others have not this power. More rapid progress will be made in increasing production of the strain if only those hens and those males be used in the breeding pens that have shown by the egg records of their pullets or by the progeny test that they possess the power of transmitting high egg production.

Meantime the poultry industry of Oregon developed rapidly. Instead of importing eggs, to-day high quality eggs are marketed on distant markets by the carload; the annual production of poultry and eggs is estimated at $10,000,000; Oregon has become known as a center of poultry breeding; commercial flocks averaging 200 eggs per bird are not uncommon; the general average increase in production since 1909 is estimated to be at least one-third, from 75 eggs to 100 eggs per bird.

That the station results from research in flock improvement have had a profound influence in bringing about this change and development, would hardly be doubted; any claim as to the tangible value of this influence is not easy to prove. It is a fact, however, that thousands of eggs from the station high-laying strains and hundreds of cockerels have been shipped to all parts of the State and have become the foundation stock for farm flocks. It is an advertised fact, also, that one of the most successful and widely known breeding farms in the State, with flocks making national and international records, is built upon foundation stock from the Oregon Agricultural College Experiment Station stock.

Considering these facts and the development of the present $10,000,000 annual industry in the State, it is, perhaps, not exaggerating to estimate the benefit of the results from station research at $1,000,000 annually.

Controlling Animal Diseases

The estimated value of animal disease control is based upon reports including outstanding specific examples, submitted by 23 institutions. While the losses annually still reach enormous sums, contributions from research have checked or minimized the loss which otherwise would occur annually or periodically for each class of livestock.

In a report for the year 1898, the United States Bureau of Animal Industry in discussing blackleg of cattle states: In regions where blackleg prevails the losses from this disease alone exceed those from all other causes combined, and in certain badly infected region amounts to more than 10 per cent of the annual calf crop.

Early methods of preventive vaccination reduced the annual loss from blackleg to 1 per cent or even less, but to the livestock owner—and this affects the public welfare as well—a loss of 1 per cent annually of the livestock wealth is a serious economic burden.

With these thoughts in mind—and with a knowledge of the imperfections and limitations of the blackleg vaccines in use up to about 1916—the veterinary department of the Kansas Agricultural Experiment Station in 1912 started research which resulted in the commercial development of modern blackleg vaccines. In June, 1916, the Federal Department of Agriculture issued to the veterinary department of the Kansas Agricultural Experiment Station, the first license for the manufacture and interstate sale of blackleg aggression—an almost perfect immunizing agent against "blackleg." As a result of the use of this and succeeding agents, the annual loss from blackleg is virtually negligible. In other words, modern blackleg vaccines, as developed in the Kansas Agricultural Experiment Station, are preventing every year an enormous economic loss.

The following statement from the Kentucky station illustrates contributions of a different character, but along lines undertaken by a number of stations for one or more classes of livestock.

In the region of central Kentucky noted for the production and development of valuable horses, the number of foals and the certainty of foaling are important features of the industry. Under ordinary practices, of the number of mares maintained for breeding purposes, often not to exceed 40 to 65 per cent of those bred, produced foals. The production was affected both by abortion and sterility.

The first case of abortion in the mare studied was in 1907. From 1911 to date, the study has been continuously conducted. As a result of these studies the specific cause of equine contagious abortion, Bacillus abortivo equinus, has been isolated and the characteristics of the disease determined. Following this, a vaccine was developed and a method of administration determined that has proved nearly 100 per cent effective.

The first detailed work on sterility in mares was begun in 1919. About 2,200 barren mares have received both clinical and bacteriological examination. As a result of the findings and of the studies made, the leading practices advocated are the determination of the potency of the sire; strict breeding hygiene for both mare and stallion at time of service; care of the foaling mare for the prevention of uterine infection; withholding from service all mares showing positive evidence of infection of the genital tract (this applies both to foaling and barren mares); the treatment of infected mares; the handling of individual cases of sterility as the conditions and circumstances may demand.

A check of a number of breeding farms that maintain from 25 to 150 brood mares shows that in practically every case where close attention has been given to the problem, the percentage of pregnancies in a band of mares which formerly ranged from 40 to 65 per cent will now average from 75 to 85 per cent; in some instances as high as 90 per cent of the mares bred have been found to be in foal.

Perhaps the most important factor that has resulted is the increase in the number of foals from a given number of brood mares maintained on the farm. Ten per cent would seem to be a conservative estimate. There are approximately 3,000 brood mares in central Kentucky and a 10 per cent increase in foal production would be 300 foals. When all the factors involved are taken into consideration $500,000 would seem to be a conservative estimate of the annual economic gain to the thoroughbred horse-breeding industry of Kentucky as a result of modified and improved practices based on the work done by the Kentucky Agricultural Experiment Station. These practices have been adopted by other States and foreign countries interested in the breeding of horses.

As in the case of blackleg of cattle, State experiment stations, especially of the Corn Belt region, have supplemented the work of the Federal department to improve control measures for hog cholera.

Infectious abortion of cattle has been, and still is, a subject of research by many State stations. The disease is widespread and results in enormous losses annually, especially to the dairy industry. Complete solution has not been found but research facts have been developed which aid materially in the maintenance of clean herds and in the elimination of the disease by methods similar to those followed in dealing with bovine tuberculosis. There is little doubt that adequate control measures for this disease alone would be of greater value annually than the cost of all agricultural research.

Discovery by the Nevada station of the casual organism of the so-called "red-water disease" in cattle and control or the prevention of the disease by vaccination is a contribution of real value to the Pacific coast cattle industry.

Much has been contributed during the past few years by the stations toward control of major diseases of poultry, including chicken pox, bacillary white diarrhea, coccidiosis, and rickets. A state-wide conference of poultrymen in Oregon in 1925 reported that "the disease problem with its contributing factors is the greatest limiting problem of all in the poultry industry." Losses were estimated at not less than $1,000,000 a year in that State alone. Contributions have since been made by research which should reduce this loss by about one-half.

New Methods of Utilizing Animal Products

The stations have not contributed as much that is outstanding in connection with utilization of animal products as perhaps might be expected. What has been contributed is not easy to trace in money value. Considerable has been contributed toward new or improved manufacturing processes which give new or increased outlet for dairy products and poultry products. Cottage cheese, chedder cheese made from pasteurized milk, the use of eggs in ice cream, are examples.

The following statement from Cornell illustrates a contribution of this character:

A new process for making a soluble milk sugar.—The only type of milk sugar heretofore on the market is the so-called alpha lactose. This product has an important therapeutic use in certain digestive disturbances, as well as certain industrial cases. Its chief limitation is its relative insolubility.

A method has been developed of making, on a practical basis, beta lactose. This form is more soluble and hence a very superior article for medical and industrial use. Beta lactose had never been made on a large scale before and hence was unknown as a market product. It is now being made commercially.

A number of stations have conducted research on quality of pork. The economic value of results is indicated by the following report from the Georgia station:

Our studies show that to most people the raw product of the peanut-fed hogs is less attractive in appearance in the uncooked state but is practically indistinguishable in appearance when properly cooked and is considered by many to be superior in flavor to that from corn-fed hogs. As a result of this work, the largest meat-packing firm operating in the State of Georgia has begun paying farmers of the State the same price per pound for live hogs that are fattened on peanuts as for those which have been fattened on corn. Until they made this change the farmers were penalized about 2 cents per pound on pigs that had been fed peanuts as compared with those which had been corn fed.

This packing company is slaughtering about 190,000 head of swine annually. The total annual weight of these is about 36,000,000 pounds. About 95 per cent of these produce soft pork. They estimate that 90 per cent of the hogs killed in Georgia produce soft pork. The increase of 2 cents per pound on the hogs bought by this packing house alone means an increased price to the Georgia farmers of about $700,000 per year.

There are other smaller operators who are now paying the same price for soft peanut-fed hogs as for hard corn-fed hogs and we believe that within a few years there will be a still further increase of those who are following this practice. It seems reasonable to us to estimate that Georgia farmers are now getting approximately a million dollars more per year for their peanut-fed hogs than they were previously getting.

Marketing Animals and Animal Products

Some of the station contributions to new methods of marketing animals and animal products are illustrated by the following examples:

On the average there is marketed from Nebraska about 5,000,000 hogs, 1,500,000 cattle, 1,250,000 sheep, and a large volume of dairy and poultry products. The annual gross sales value of such livestock and livestock products is in excess of $300,000,000. More efficient marketing has been advocated. The development of cooperative organizations for the marketing of such commodities has been encouraged. As a result of their development local buying margins have been reduced materially. The experiment station has been a constant exponent of the practice of the purchase of farm products on a graded basis. Because of the importance of the livestock enterprises in Nebraska, a small increase in the sales value of each unit sold would total a large amount, probably reaching a total of $2,000,000 per year.

As in Nebraska, so in other States, the stations have contributed facts and assistance toward purchase of farm products on the basis of grade. Also many studies have been conducted, the results of which have served useful purposes in guiding marketing practices. Their value in money terms is difficult to estimate with a degree of certainty. Considering the many animals and products involved, the value estimate given, whether high or low, serves to direct attention to research of a type important both to agriculture and general welfare.

In Iowa, prior to 1920, fowl were marketed primarily during the fall months. This meant large numbers of fowl marketed each year at the same time as the big surplus of spring chickens. This caused a general decline in price for both spring chickens and fowl.

About 1915 studies were made regarding culling and selection of laying hens for egg production, and the influence these surplus hens would have upon the market. It was determined that nonproducing hens could be eliminated from the farm flocks during the summer months and placed on the market for a better price than in the fall. As a result the bulk of the surplus fowl of Iowa is now being sold at an earlier date than prior to 1920, and a higher price per pound has been received by the producers.

The annual value of live poultry marketed in the State of Iowa is estimated to be about $35,000,000. Approximately one-third of this amount is realized from the sale of fowl. The average increase in price realized per pound by selling during the summer months is estimated to have been 2 cents.

Approximately 213,000 farms in Iowa market an average of at least 50 pounds of fowl each, a total of 10,650,000 pounds of fowl marketed. A 2-cent increase in price for poundage would give approximately $213,000 increase in the receipts of the sale of fowl annually. This change has taken place through the experimental studies and general recommendations made by the experiment station and the extension service.

These statements could be matched by contributions along the same line from most of the stations. Research in this field, however, is more recent than research in soils, crops, or plant and animal diseases.

Improvement in Methods of Farm Organization and Farm Accounting

The Babcock test made it possible for the dairy farmer to study the production performance of the individual cow. The nonprofitable animals can thus be eliminated and herds improved from the profitable ones. It made possible also the frequent examination of by-products of dairy manufacturing plants and reduction to a minimum of waste and of poor use of butterfat.

Research in organization of farm business, in costs of production and in farm accounting have aimed to accomplish something similar for the individual farm. Research in this field has developed to some magnitude in a number of States and to some extent in all. Agricultural extension workers have taken the results of research and assisted with their application. Farmers have been interested. Bankers and others have encouraged and assisted. The result is that the organization of farm business, records of costs and returns, are being given consideration to-day where little attention was paid two decades ago.

The following from the Cornell report serve as examples of such contributions:

Economic studies of dairy farming.—Farm management investigations on dairy farms in all the important dairy regions of the State have revealed why certain farmers are able to produce milk at low cost and secure profits when their neighbors lose money. Through the application of these results, New York dairymen have been able to secure materially better returns than would otherwise have been possible.

Economic studies of fruit farms.—Farm management studies on 190 farms during the past 15 years in Niagara County, a typical fruit producing region, have shown the important business factors which affect the efficiency of apple production and the incomes of apple growers. As the results are secured they are being carried to the fruit growers through the extension service.

In this study, reliable data have been secured on the yields of different varieties of apples and the prices for each. The investigations show that Baldwin and Greenings are still among the best paying varieties. Delicious trees yielded only one-sixth as much as Baldwin or Greening trees of the same age, although more Delicious trees have been sold in western New York by nurserymen, through advertising, than any other variety, with the possible exceptions of Baldwin, Greening, and McIntosh.

The relation of character of soil to profits has also been studied. In the past, great losses have occurred from planting orchards on soils not well adapted to fruit. These studies will make it possible to prevent such waste. In this investigation it has been found that the net returns were more than six times as high on the Dunkirk soil types as on Clyde soil types. For apple production one could not afford to take a farm on Clyde soil as a gift, when he could buy the Dunkirk farms at the average price of $271 an acre.

Cost accounts on New York farms.—Complete cost accounts are being secured on typical farms over a period of years, more than 500 complete sets of records having been thus far secured. These investigations have been of great value to farmers in showing the relative profitableness of different farm enterprises and in revealing the factors which make success possible.

The Cornell statement could be matched in kind by any State station and by one or more stations for about every agricultural enterprise.

Obviously, the economic value of such work as a whole is difficult to express in money terms. However, when the vast numbers of farmers are considered, together with the many variations and combinations of soils, enterprises, markets, and individuals, the conclusion is warranted that contributions from research in this field have already influenced the economic and general welfare to an important degree.

The following brief statement from Minnesota illustrates the methods as well as the magnitude of such influence.

Studies of production costs on Minnesota farms were initiated in 1902. The accounting methods used have revealed methods of lessening the expense for production and consequently increasing the profits from farming. An increase in the number of hours of productive work with a corresponding increase of the number of tillable acres worked per horse is a specific example of reduced costs. Other weaknesses were found in idle man labor, supported but not fully employed; in unbalanced and inadequate equipment; in wasteful feeding practices, and in uneconomic uses of land and invested capital. In one locality a 5-year study of production methods resulted in a 20 per cent decrease in the cost of producing dairy products. In another locality there was a 10 per cent decrease in costs. Increases of 10 per cent in net income have not been uncommon on farms where these studies were made. Much larger increases have been made on many of them.

The results of these studies have been widely used in published form and in extension education in the State. If it is assumed that for the State as a whole even a 1 per cent reduction in production costs has been made for the $500,000,000 agricultural income for the State, the full importance of the study is indicated.

Improvements in Agricultural Equipment

The State stations have had little money or opportunity for research in the field of agricultural equipment. Until recent years the research undertaken specifically to improve equipment has been negligible. There have, however, been contributions of considerable economic importance. One might to-day find in use on a considerable scale, a great many examples of incubators, brooders, feed grinders and choppers, special grain drills, weeders, equipment for dehydration, fruit-spray equipment, fruit-washing machines, seed-treating equipment, sterilizers, smut-extracting equipment, pressure testers for fruit, and water heaters, created or with improvements based upon the results of station research. Ordinarily farm equipment is thought of in terms of major field equipment such as plows, harvesters, wagons, and tractors, but modern agriculture makes use of many other mechanical devices. Mechanical sorters, graders, testers, washers, sterilizers, and the like play an important part in meeting consumer demand at a price consistent with volume consumption. Research has provided standards and has contributed equipment which make such standards of products and of labor efficiency profitable.

The economic value of such contributions is estimated by some of the institutions reporting. The figures are not included because of the newness of specific research in this line and because of difficulty of assigning economic values to contributions. The results of reports and field studies show that a money estimate of the value of such contributions for the country as a whole would have to be expressed in terms of several millions annually. A very small improvement which reduces labor, increases efficiency of operation, increases yield, or improves quality of product means large and quick returns on gross income of $12,000,000,000 or more annually, most of which is absorbed by production costs.

Contributions of Other Types

The foregoing contributions are roughly grouped by major types that the reader may more readily grasp without long explanation, the many ways in which agricultural research plays its part. Contributions of other types have great importance for economic general welfare. For example, control measures for injurious mammals; contributions to refrigeration and processing of farm products that they may reach market in prime condition with minimum labor and transportation costs; contributions to the big problem of weed control; contributions in the fields of rural economics and sociology, contributions to sanitary measures and to human nutrition are all difficult to evaluate yet of immense value.

Contributions to Public Welfare Through Federal, State, or Municipal Policies

There seems no doubt that the results from agricultural research have, in many ways, contributed to, and directly influenced, State or official municipal policies with reference to laws, regulations, administrative orders, or procedure in the interest of public welfare. In answer to survey questions regarding such contributions, 34 States submitted one or more examples. These are grouped by subjects in the following table:

TABLE 6.—*Contributions of agricultural research to official policies with reference to public welfare*

Subject	Number of States reporting examples	Number of examples	Subject	Number of States reporting examples	Number of examples
1	2	3	1	2	3
Taxation	14	16	Animal-insect control	7	7
Sanitation	14	16	Human-insect control	3	3
Plant-disease control	26	40	Inspection of foods	12	14
Animal-disease control	23	27	Inspection of fertilizers	16	18
Human-disease control	2	2	Others	11	19
Plant-insect control	21	40			

The policies having to do with plant and animal disease and insect control, and policies concerning inspection of fertilizers and of foods, that have been based in large measure upon results of agricultural research perhaps need no illustration or discussion. Contributions in the other fields may, for most readers, need explanation.

Contributions to betterment are illustrated by the following from the Kansas report:

Taxation.—A prominent Kansan, speaking of the period before 1924, states that, "tax revision has been discussed desultorily in Kansas for [illegible]0 years," despite the fact that every report of the State tax commission contained excellent suggestions for improvement. All the while taxes were increasing. Taxes on farm real estate in Kansas increased 132 per cent and selling value only 28 per cent from 1913 to 1923. The people wanted relief but they were not adequately supplied with facts concerning the operation of their taxation system. These facts and—what was more important—a complete and well worked out plan of tax revision were presented by the agricultural experiment station during the years 1923, 1924, and 1925. Discovery of concrete facts pertaining to assessment and equalization, trend in taxation relative to selling value, and comparative tax burdens resulted from extensive research and this knowledge was published in three experiment station bulletins. A complete and thoroughgoing plan of tax revision was presented in a series of newspaper articles as early as April, 1923, in addresses over the State, and in the station bulletins.

Four recommendations have been adopted and are now in effect in Kansas. The State tax code commission, a specially appointed body to study taxes, is now recommending to the legislature that it enact laws covering four other recommendations. The results of such study have been less far reaching, perhaps, in most States but have contributed to much-needed basic facts for tax programs.

Contributions to sanitary measures might be illustrated by many examples. Sanitary control governing milk and cream are cited by a number of institutions. Measures for elimination or control of "nuisances arising from trade wastes," contributions toward solution of water supply problems, and food inspections also are cited and specific examples given. As applying to human disease control, contribution to control of house flies, mosquitoes, and spotted fever tick, are cited.

Contributions of this nature do not always meet with unanimous public approval. Facts which lead to measures restrictive in character rarely do. Perhaps at times there may be overanxiety on the part of research workers as to the meaning of facts developed. The public, however, is responsible for the formulation and application of control policies. The national fight and its costs against corn borer, citrus fruit fly, white-pine blister rust, and other pests point to the importance of recognizing facts of this kind by prompt and careful consideration and appraisal. Any other public attitude is in league with the pests.

Contributions of Research on Plants or Animals Later Adopted for Use with Human Beings

In reply to the survey inquiry concerning the adoption of the results of plant and animal research for the benefit of humans, 17 institutions submitted 30 examples of findings from research on plants and animals which have value in nutrition or disease control of human beings.

Results of research on vitamins and protein are cited by the Connecticut, Illinois, Indiana, New Jersey, and Iowa stations as contributing to the fund of information on human nutrition. These claims would seem well founded. Research of the Washington and other stations upon the use of iodine in prevention of goiter and hairlessness in domestic animals contributed to the knowledge of iodine for prevention of goiter in human beings. Likewise, results of research on feeding small animals manganese and copper have contributed to practice with humans "in hemoglobin building," according to the Kansas station report. Botulinus antitoxin developed on animals has contributed to treatment of botulinus in humans, according to the Illinois and Kentucky reports. From Kansas comes the statement that "the heat method for the control of flour-stored grain insects which was developed at this station was adopted and became the most efficient method of control in the delousing camps of the World War. Body lice are the disseminators of typhus and trench fevers." The New Jersey station cites as a contribution facts from research regarding milk as a carrier of tuberculosis bacilli, and shell fish as carriers of typhoid bacilli.

The Texas station cites as a contribution part credit for control of Texas fever by immunization and eradication.

That station research and results in the use of ultra-violet light on small animals and fowls contributed toward its use on human beings is cited by one or more institutions.

The following from the report of the Utah station illustrates a recent contribution which has much promise:

It has been clearly demonstrated that there is a marked variation between the hardness and softness of the curd formed by the rennet or pepsin coagulation of milk from cows, irrespective of breed and feed, and, further, that this is independent of the fat content of the milk and the permanent characteristics of the cow. A hard curd may be associated with a high fat content; however, some cows give a milk with a high fat content and a soft curd.

Practical feeding tests with this milk have shown that the soft-curded milk is much more easily digested by infants. This is also true even though the milk may have a high fat content. A large number of cases are on record where infants, who have not been properly digesting hard-curded milk, have shown immediate improvement and complete digestion when soft-curded milk was substituted. Soft-curded milk does not require so great a modification for use with infants as does hard-curded milk, extremely soft-curded milk in a number of feeding cases requiring no modification whatever.

Research Contributions Through Activities of Other State Agencies

Major activities of other State agencies in the interest of agricultural and public welfare are based frequently upon results of research by the agricultural experiment stations. The administrative action taken, as well as the law or regulation authorizing action, are influenced or guided by assistance and suggestion from the research workers.

The contribution of research in this way most often is in connection with plant and animal inspection, certification, and quarantine measures, feed and seed inspection and certification, fertilizer inspection and certification, weed control, inspection of dairy products, and similar activities. Thirty-five States reported a total of 109 examples of research contributions which serve as the basis of practice of procedure in such subjects. The value of such contributions is best understood when one considers the importance of high quality of seed and nursery stock for planting; of dairy stock and poultry which can be purchased as certified free of certain diseases, the presence of which makes profitable production impossible; or quarantines wisely placed on the basis of facts. State or local control of mosquitos, sanitary measures for milk, control of insects in manufactured food products, sanitary measures for disposal of sewage and wastes, sanitary measures for domestic water supply, especially in rural districts, control of spotted fever are each cited by one or more stations as based upon or influenced by results of research by the agricultural experiment stations. Contributions of this nature to public health and welfare are hard to measure in terms of money, yet they are of no mean consequence in return for public funds expended.

Contributions of Research Through Educational Agencies

Undergraduate teaching in agriculture.—As stated in the chapter on the origin of the experiment stations, undergraduate teaching in its earlier years, from 1862 on, was handicapped by lack of scientifically tested facts. Effective teaching called for inquiry through experimentation and research. The body of knowledge needed could not be built up rapidly even by these methods.

According to 20 institutions reporting, an average of 8.45 courses listed in their 1887 catalogues would be classed at the present time as within the field of agriculture. As an average estimate by the same institutions, 16.3 per cent of the subject matter for these few courses was based upon the results of research. Reports of the same institutions for 1907–8 show an average of 45.5 courses with subject matter from research findings estimated at 41.06 per cent. By 1927–28 the average number of courses for these institutions is given as 143.4 and the subject matter based upon research is estimated at 67.11 per cent of the total.

Supplementing the foregoing information, 39 institutions report that effective teaching in undergraduate agriculture is dependent upon reliable subject-matter facts from research. Not only are the facts essential, but the experiments, projects, and plans of research are used to direct students in methods of attack upon new problems; contacts of the research staff with the farmers and industries aid in vitalizing the teaching; and national and world contacts of the stations and of their research staffs serve to bring ideas, facts, and methods which otherwise might come more slowly.

Graduate teaching in agriculture.—The relationship of agricultural research to graduate teaching in agriculture is more fully covered in the section on graduate work.[20] Here it is sufficient perhaps merely to quote briefly from a paper on the subject before the Association of Land-Grant Colleges and Universities in 1922:

> In earlier years it (the station) supplied the main examples of investigation in agriculture and by its usually close association with the teaching departments it afforded opportunity for occasional students to come into contact with research * * *. To an extent, therefore, the experiment station was the graduate school of the college, and took the place of one in limited form.
>
> The growth and extent of this practice has involved the stations quite closely in the graduate work for degrees.
>
> When the extent of this practice was smaller it was of less importance. Then it was included where now it is sometimes becoming a considerable feature—a recognized policy on the part of college and station authorities and conditioning the type of help employed in research.[21]

Agricultural extension service.—Thirty-seven institutions reporting agree that agricultural research is closely related to the work of agricultural extension. The points of agreement may be summarized as follows: (1) Extension service work originated in the States largely to promote practical application of results from agricultural research. (2) Under present conditions substantial research facts are a main factor in the effectiveness of the agricultural extension service. (3) Research in agriculture by the respective State stations is necessary. The results of research carried on by the Federal Government and by other outside agencies could not be used as the basis of extension service without danger of mistakes costly to farmers,

[20] Part X.

[21] Allen, E. W. Relation of the Experiment Station to Graduate Work of the Colleges. Land-Grant College Association Proceedings, 1922, pp. 140–149.

due to the wide variation in conditions and in combinations of problems.

Further, the State directors of extension service at their national meeting in 1929, passed a resolution urging the need for increased research as a basis for more effective extension work.

Agriculture in high schools.—The relationship of agricultural research to agricultural teaching in high schools is not so complete or definite as are the relationships to college teaching. However, according to the survey reports from 35 institutions, an estimated average of more than 64 per cent of Smith-Hughes teachers of agriculture visited research departments for information during 1927–28; 30 of 33 institutions reporting state that these teachers are aggressive in seeking all information available for distribution.

Demand by Smith-Hughes students for copies of station publications is such that 11 of 38 institutions reporting have found it necessary to restrict free distribution of such publications to teachers and school libraries within their own States; and 17 institutions have such refrictions upon out-of-State requests.

Other ways in which results of research are made available in service for economic, educational, and social betterment.—The main function of the experiment stations is research and experimentation to build up the fund of scientifically tested facts for practical application. For the most part these facts are used and applied by other agencies. Frequently, however, the best service requires that the research worker furnish information, for diagnoses, for tests, for educational exhibit material, and for similar purposes.

The following data, recognized as incomplete, are presented to give an idea as to the character and magnitude of service of this kind:

TABLE 7.—*Contribution of research to service for economic, educational, and social betterment in land-grant institutions, 1927–28*

Type of contribution	Number of institutions reporting	Total number (letters, consultations, etc.)	Type of contribution	Number of institutions reporting	Total number (letters, consultations, etc.)
Letters in reply to inquiries for information	32	822, 280	Identification of animal specimens	21	66, 919
Consultation with constituents	21	132, 977	Germination and purity tests of seeds	19	57, 791
Publications:			Purity tests of foods	9	12, 108
Number of	32	685	Purity tests of water	12	6, 023
Total number of copies	35	5, 504, 549	Soil analysis	21	8, 696
Technical articles	35	928	Manufacture and sale of special products:		
Popular articles	30	26, 032	Vaccines	7	[1] 4,042,281
Press notices	22	26, 502	Legume cultures	6	50, 692
Exhibits at State and county fairs	21	347	Others	4	12, 938
Radio talks	26	3, 880			
Addresses at public meetings	27	17, 183			
Identification of plant specimens	23	14, 110			

[1] Doses or cubic centimeters.

The economic returns from service of this kind are reflected in the estimates already discussed. In addition, however, the city and urban dweller requests and receives information through letters and personal inquiry. Many of the institutions frankly admit difficulty in meeting demands for services along these lines promptly and effectively and still maintain the continuity and intensity of labor required for productive research.

When Will All the Problems Be Solved?

Not infrequently the research worker is asked when this research and experimentation will be completed. The foregoing claims of accomplishment might, to some extent, prompt such inquiry. But research in any major field can never be completed. Growth in agricultural research is to be expected comparable to that in industry mentioned by President Hoover: "In 12 years our individual industries have increased their research laboratories from less than 100 to over 500.[22]

The problem of the experiment stations is constantly one of deciding which problems of many merit first attention and study. In answer to the survey request, "Give examples of important agricultural researches requested by constituents during 1927–28 which your institution has been unable to undertake," the following number and classes of problems were submitted by 30 institutions reporting.

TABLE 8.—*Major types of agricultural investigations requested which could not be undertaken by land-grant institutions, 1927–28*

Investigation	Number of institutions reporting	Total number of researches requested	Investigation	Number of institutions reporting	Total number of researches requested
Soil improvement and maintenance	12	16	Pastures	6	6
Introduction, development on improvement of crops	9	18	Grade and quality of product	6	9
Plant disease control	14	30	Agricultural enterprise studies	11	16
Plant insect control	11	19	Agricultural economics and sociology	13	19
Animal disease and insect control	15	37	Farm equipment	4	4
Feeds and feeding	11	14	Other	7	11

Examination of the 199 examples of requests for additional investigations, together with other data of the survey and information secured from conferences within and outside the land-grant college groups, is rather convincing in several respects: (1) The requests represent unanswered or inadequately answered questions of sufficient economic importance to merit study and research. (2) The

[22] Hoover, Herbert. The Nation and Science. Science, January, 1927.

unsolved problems are not confined to one or even to a few major types or fields of agricultural research. (3) Many of the problems will be adequately met only after research, fundamental in character, has established new facts and relationships as bases for working out the practical solution of the specific problems.

Much might be written on the need and justification for research, the character of research needed, individual problems or types of problems and their comparative importance, how the work should be allocated to different agencies, and who should pay for it. The picture, however, is changing constantly in one or another detail. Further, this is a national survey and discussion of individual problems or types of individual institutions or agencies is not intended. With this viewpoint, and considering all facts and findings of the survey, the following suggestions seem warranted concerning the future of agricultural research by the land-grant institutions: (1) The whole field is important and there should be a general strengthening of research rather than development in one field to the exclusion of others. (2) The pressure and need for results immediately applicable for relief or solution of problems will, perhaps, on the whole, continue to limit or defer much-needed research of more fundamental character unless there is general realization on the part of constituents that quick results for practical application depend upon the store of basic facts available. (3) The economic necessity for practical results will probably result in provision of funds, consistent with State financial limitations, for research of the more practical type. (4) For the best interests of agriculture, State and national welfare, more liberal and adequate support should be provided for and assigned to research of the more fundamental types. While such research may have as an objective the development of principles and facts underlying the practical solution of a problem, or group of problems, there should be general understanding that such research effort should not be diverted to temporary solutions of single problems.

Chapter V.—Station Organization and Management

The preceding facts and discussion have pictured the purposes, scope, relationships, and magnitude of the experiment station work. This chapter is concerned with facts and discussion that have to do primarily with organization and staffs. The treatment, suggestions, and recommendations are intended to make clear that with respect to these elements the stations must be adequate to the objectives, responsibilities, tasks, and relationships which are theirs to meet. The survey is national and, therefore, principles generally applicable rather than individual difficulties will be discussed.

Organization for Station Administration

As a basis for considering the administrative organization of the stations the following main points may be summarized from the preceding facts and discussion: (1) By law the station is to be organized as a unit of the college with which it is connected. (2) Agriculture in these institutions is now generally segregated upon the basis of the character of the work or functions into resident teaching, research or agricultural experiment station work, and agricultural extension service. The division promotes effective development and administration of the different broad divisions of work, but coordination and cooperation are imperative. (3) By law the stations are a part of a national system and have many and varied relationships with the Department of Agriculture and with each other. (4) As the State agency primarily responsible for subject matter secured by research in agriculture, the stations necessarily have close relationships with State and Federal agencies charged with the administration of agricultural laws and regulations affecting the development and practices of the agricultural industry. Some such laws and regulations are administered by the station or by the college, but ordinarily they are administered by other State agencies. In any case, there are relationships and problems of administration for the station. (5) Relationships of the station with commercial industries and agencies serving agriculture, or related to agriculture, have grown to considerable magnitude and involve policies and problems of administration for the station as a publicly supported agency. (6) As the main source of scientifically tested facts the station unavoidably must play a part in general service through correspondence and diagnosis. This service involves much administrative discretion and care if it is not to become a primary rather than a secondary responsibility. The foregoing are merely secondary problems or functions of administration arising out of the nature of station work.

The primary function and responsibility of administration is to bring science effectively to bear upon the problems of agriculture by means of: (1) Financing; (2) subject-matter organization for effective specialization, responsibility, and coordination; (3) staff selection, maintenance, and welfare; (4) decision as to researches which shall make up the research program at any given time; (5) cooperation with subject-matter heads and specialists in analysis of the individual problems in order to determine the methods of attack and to arrange for the most effective cooperation of all subject-matter specialists or groups who should take part in the investigation; (6) participation as a unifying factor in supervision of research by department heads and project leaders to an extent sufficient to determine whether supervision and direction are effective, to formulate means for the promotion of individual and staff morale, to understand the value of results secured, and to promote their application and publication; (7) coordination of agricultural research with research of other divisions of the institution.

Judging from printed reports and addresses the question of working out and establishing organization to function effectively on these many phases of administration has been a problem throughout the years since the stations were established in 1887. At first the station direction was under the president of the college in many institutions. As the work developed, station direction and resident teaching were often combined under one administrative head. Then as agricultural extension work developed there was increasing need for coordination of the three lines of work on the one hand, and at the same time growing need for more time for administrative direction and supervision of work in each division.

The administrative arrangement changes somewhat to meet local problems, institutional organization, and personnel. At the present time, November, 1929, the information available indicates the following arrangement as to administrative direction:

1. Station directors who devote full time to the work and report to the president of the college	17
2. Station directors who devote full time to the work and report to the dean of the college of agriculture	2
3. Station directors who devote full time to the work and are responsible to the governing board of the institution (Connecticut State, Georgia State, and Ohio stations)	3
4. Directors who are also deans of resident teaching	19
5. Directors who are also deans of resident teaching and directors of agricultural extension	8
6. Directors who are also directors of agricultural extension and report to the president	1

Survey reports from institutions where the director is also dean indicate that about one-half the time of such directors is devoted to the station work. A few of these institutions have vice directors or assistants to the director who devote a major part of their time to station administration under direction of the dean-director. Survey reports from institutions where the station director is also dean and director of extension indicate that the time devoted to station work is from one-third to one-half of full time.

In all cases the centralized administration is supplemented by assignment of certain administrative functions and responsibilities to subject-matter department heads. Certain functions, administrative in character, are assigned to committees in a few institutions.

The problems of organization vary among institutions. The main objective and main principles, however, are similar in all and involve primarily: (1) The development and efficient functioning of each of the three major lines—resident teaching, experiment station research, and agricultural extension. (2) Unification and coordination in development to maintain proper relative strength of these divisions, since the three must function together for best results. (3) Coordination and cooperation of effort, unification of subject matter, and recommendations to the end that there will be an institutional agricultural program supported by three divisions, each of proper relative strength to function effectively on its part of the program.

This analysis leads to the following suggestions: (1) That responsibility for the development and efficient functioning of the experiment station and its research is a task that in magnitude, in complexity, and in importance, requires the full time of an energetic, qualified executive. The executive should have full responsibility and authority commensurate to this task, subject only to coordination with other lines of institutional activity. (2) That coordination and unification is properly the function of one man who is in a position and qualified to secure results. This can best be done by one free from immediate, primary responsibility for development and functioning of any one of the three major fields—resident teaching, research, or extension. To be well done, this task calls for leadership, and not merely the settling of temporary difficulties or differences of opinion. This in turn requires time, not merely hurried moments borrowed from other primary duties.

To state that the institutions as a whole and their existing organizations are not functioning in these respects as effectively as they might, would require more supporting facts than are available. On the other hand, the importance of the question, the existing types of organization, the reports of the Office of Experiment Stations based upon annual review, and inspection of station work and expenditures, addresses, and reports before the Association of Land Grant Colleges and Universities and conferences with administrators and staff members point to opportunity for improvement through strengthening organization along the lines and for the reasons suggested.

Relationships of Station Administrative Organizations to Administration in Other Divisions and to the Institution as a Whole

Details as to relationships and procedure among and between administrative divisions is beyond the scope of this portion of the survey report. There are, however, several relationships and principles which merit brief consideration because of their bearing upon coordination to promote institutional unity of program and policy consistent with changing demands for public service through research.

Coordination of station research with research of the institution as a whole.—The survey returns indicate that research in many, perhaps most, of the institutions is limited very largely to the field of agriculture and is administered by the agricultural experiment stations. Where this is the case, two points are worthy of consideration. (1) It is highly desirable that station administrators be alert to strengthen research work by council and cooperation with chemists, physicists, biologists, economists, engineers, and others from other divisions of the institution. The responsibility of the station is to put all branches of science to work in most effective combination for the betterment of agriculture. (2) Considerable thought should be given by individual institutions to determine with reasonable certainly that research in the one field of agriculture is consistent with wise institutional policy.

As research in divisions other than agriculture is in demand or develops, either independently or as an outgrowth of graduate teaching, some agency or procedure for coordination of research of the institution as a whole may be desirable. Nine of 40 institutions reporting having an existing institutional agency to function in this capacity, in 3 cases a research council or board, in 3 a research committee, in 3 a graduate council or committee.

Membership is brought about mainly through appointment by the president. The functions and powers of such agencies vary. The returns indicate that perhaps functions and powers are not yet clearly determined. As set forth, they appear to be primarily as follows, in order of the frequency with which they are reported: (1) Advisory relations to the research program of separate divisions, such as agriculture, engineering, etc. (2) Preparing or directing occasional surveys of the research progress of the institution as a whole. (3) Joint responsibility in formulating institutional policy as regards the fields appropriate for development of research. (4) Joint responsibility in formulating institutional programs of research within such fields.

In a few cases functions and powers include consideration of all projects, plans, methods, reports, and publications to insure effective cooperation and coordination as well as to maintain desirable standards. In one case questions of this kind are considered only for projects referred to the coordinating agency by the division originating the projects.

Of the institutions reporting that no such coordinating agency has been established, 20 state that there is no apparent need of creating one. The main reasons given are that research is limited mainly to work in agriculture and that coordination can be cared for by the president. The latter is the reason given by small institutions.

Seven institutions report, with some qualification, that good might come from an institutional agency for consideration of all research, in that it would stimulate research activity, promote cooperation between divisions, and aid in the prosecution of extensive research programs about to be launched. The main qualifications are to the effect that any such agency should be for the promotion of cooperation and coordination and not for control or restriction as to research of divisions and individuals. These latter functions are considered the primary responsibilities of the director or other divisional head.

The objectives and advantages indicated in reports from institutions where activity along this line is under way include: (1) Focusing institutional attention on major problems; (2) prevention of unnecessary duplication of effort; (3) assignment of problems to take advantage of staff and facilities to best advantage.

The disadvantages cited by these and other institutions are: (1) The increased "red tape" of supervision; (2) interference with individual initiative; (3) lack of flexibility to meet changing conditions and demands for research; (4) too much time and difficulty due in part to the wide difference in the aims and functions of the research of different divisions.

Relationships and Procedure in Selection of Staff

A large proportion of the agricultural research staff are members of the teaching staff as well, and some are members also of the extension staff. The relationships and procedure in staff selection, control, and promotion as shown by the survey returns appear logical, well-founded, and working satisfactorily. The general practice in staff selection is briefly: (1) Station directors and deans act jointly in selection of subject-matter department heads. (2) Subject-matter department heads select specialists for positions in their departments subject to approval by the dean or the director or both if the appointee is to be a member of both divisions. Thirty-seven institutions indicate that department heads may reject appointees proposed by division heads. This is commendable practice for maintenance of morale. (3) All appointments are subject to approval by the president.

Similar cooperation is reported among deans, directors, and department heads of related divisions concerning division of time for teaching and research, absences, and promotions in rank and salary.

A few institutions report that deans, directors, and other division heads of the institution as a whole, confer regarding promotions in rank and salary. Ordinarily this function of institutional coordination rests with the president.

In a few institutions only, does the dean or institutional head of graduate work participate either in selection or management of research personnel. In this regard, perhaps, there is opportunity to promote further cooperation which might be helpful. This will depend upon institutional and staff organization.

Administrative Relationships of Agricultural Research and Agricultural Extension

The stations were established under the Hatch Act "in order to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture." Almost from the first the research staff, together with the resident teaching staff in agriculture, participated in meetings of agricultural societies, farmers, and other groups, and rendered service along the lines of what is now the primary function of agricultural extension. The growth of the extension service led to employment of full-time workers and later to separate administrative divisions.

The two lines are so closely related that a so-called "twilight zone" not infrequently has made necessary attempts to clarify administrative relationships. This twilight zone, however, does not lend itself to hard and fast lines of division and attempts to mechanize the relationships in this area have been, and no doubt will, continue to cause difficulties in administration. The recognition of these facts is fundamental to harmonious and effective administration and to effective service. Administrative lines should be flexible and supplemented by agreement on individual or type cases. Frequently joint responsibility and authority will be a more effective method of procedure than separation of responsibility.

"Research, whether purely scientific or essentially practical, is for the purpose of securing information that is sound, is scientifically tested, and can be interpreted.[23] On the other hand, extension is a process of teaching and implies reliable information to begin with. The division line, theoretically, is where reliable knowledge of a subject or problem begins or leaves off. New findings must be reduced to practice for application and until they are the field is experimental. Afterward it is teaching and extension.

If this statement is sound and generally recognized as the basic principle of division, certain other points seem naturally to follow: (1) The experiment station and its staff should have primary institutional responsibility for accumulation, testing, and decision as to soundness of knowledge and practices to be applied, including review, and, if necessary, testing of results of research before their adoption in the State. Extension workers may frequently assist and in so doing they are functioning with the station and their efforts should be in harmony with the methods and procedure of the station. (2) The extension service has primary responsibility for assisting in general application of knowledge and practices proved to be reliable. The research man at his work in the field may be answering questions and giving suggestions, whether he chooses to or not. In these and many other ways research is functioning in the extension field, often most effectively, but without opportunity for consultation with extension administration. However, the general principle that field assistance by the research staff should be rendered through the extension organization should be applied upon every possible occasion. (3) The two agencies should recognize clearly that the ultimate aim of both is betterment of agricultural and public welfare through discovery and its practical application. To this end minor differences of opinion as to who shall render a service or concerning credit for service should always be secondary. There should be constant recognition that practical application implies reliable knowledge. Discovery must come first, and usually comes most slowly. Extension and research workers should exercise combined effort to prevent interruption of investigation in order to assist in more popular and immediate tasks of application. The survey returns from 40 institutions indicate that the foregoing principles are generally accepted and applied. The administrative problems differ somewhat with organization, personnel, and individual cases. These differences are clearly the responsibility of local administration.

[23] [illegible]n, E. W. The Twilight Zone Between Research and Extension. Proceedings, Land-Grant College Association, 1926, pp. 258–264.

Department Organization, Relationships, and Coordination

As indicated in the discussion of organization for administration of the experiment stations, 27 of the stations are administered by directors who are also the deans and administrative heads of agricultural teaching. In two others the station director reports to the dean.

Research departments.—This relationship of research and teaching is even more complete in the departmental organization of station work. With but few exceptions departments of the station organization correspond to resident teaching departments for the same subject-matter fields. This means that station work is largely departmentalized. A total of 90 different titles or designations were included in reports of departmental organization by 36 institutions. Three institutions have as many as 15 departments. Eleven have 10 or more departments each; 16 have 8 or 9 each. This breaking up of station work into many administrative departments has both advantages and disadvantages which must be kept clearly in mind if research work is to be effective.

The main advantages of the departmental organization are that: Unity and coordination in subject matter is secured for all agricultural education, including resident teaching, research, and extension; and subject-matter responsibility and consciousness are promoted in units smaller than the station or research as a whole which correspond in part, at least, to major commercial groups in agriculture such as animal husbandry and horticulture.

The main disadvantage of such organization is that: There may be too much subject-matter or departmental consciousness and a tendency to controversy and jealousy over authority, responsibility, funds, and other questions pertaining to investigations where departmental lines should largely disappear in joint effort.

The experiment station has a prime responsibility for bringing science in any or all its phases to bear on problems of agriculture in effective cooperative or joint attack. Organization is a means to this end. It should be so considered. Administrative means should promote the marshalling of specialists and facilities for effective research work. Harmonious, effective cooperation of chemists, horticulturists, dairy husbandmen, animal pathologists, engineers, and physicists is the most difficult problem of station organization and should challenge administrative leadership.

The relationships between the research and the teaching duties of the experiment station staff are indicated in the following table which shows the number of the staff in each rank and the division of their time between research and teaching. These relations change constantly and the data presented do not, therefore, represent a permanent situation but are sufficiently correct to represent fairly both policy and practice.

TABLE 9.—*Departmental research staff and part of time devoted to research and other activities, 1927–1928*[1]

Staff members	Number of institutions reporting	Total number of staff	Number of staff devoting— Full time on research	Three-fourths to full time on research	One-half to three-fourths time on research	One-fourth to one-half time on research	Less than one-fourth time on research	Other duties: Resident teaching	Extension service
1	2	3	4	5	6	7	8	9	10
Heads of departments or major research units	33	339	68	33	78	76	56	191	61
Professors	29	254	64	28	55	53	46	139	56
Associate professors	34	255	91	24	63	41	32	117	41
Assistant professors	33	426	181	37	73	57	44	161	58
Instructors	30	239	108	30	44	25	23	72	32
Assistants	28	337	214	12	47	31	24	56	27

[1] Derived from institutional reports.

Twenty-six of the full-time workers shown in Table 9 are staff members of stations and substations located away from the educational institutions. This leaves only 42 research department heads at the educational institutions who are not also engaged in teaching or in extension or in both. For this reason the reduction in the number of full-time workers is less, proportionately, in other ranks.

While a large portion of the research staff in all ranks do teaching or extension work in addition to research, the proportion of full-time research workers to the total number doing research increases below the rank of department head. Of department heads, about 20 per cent of the total are full-time research workers; of professors, about 25 per cent; of associate professors, about 36.4 per cent; of assistant professors, about 42.5 per cent; of instructors, about 45.2 per cent; and of assistants, 63.5 per cent.

The tendency thus shown is commendable if it signifies development of research under the leadership and immediate direction of men in the higher ranks with the support and assistance of well-trained but less-experienced staff members in ranks below that of associate professor. A capable leader in well-organized research can use profitably capable assistants who have not had the experience essential to leadership. This policy also works to advantage in another way. Institutions are constantly losing leaders in research to industries and other organizations where remuneration is greater.

The younger staff members in training must be looked to for future leadership.

On the other hand, if research projects are parceled out to individuals rather than assigned to capable, experienced leaders supported by assistants, the number of staff members in each rank and the division of time shown by Table 9 may represent organizations of the type where responsibility for research is placed upon younger, less-experienced men who, as soon as they gain recognition in their respective special lines, must spend part of their time in teaching or extension, or both.

No doubt the policy of assigning research workers to teaching and, to a lesser degree, to extension work tends to promote organization of the latter type. However, the responsible heads of agriculture are apparently now doing their best to guard research against undue encroachment by the demands for teaching, extension, and general service. There is, perhaps, an increasing tendency to furnish leaders in research with qualified assistants to offset time required of such leaders for other duties. This is wise procedure if research leaders must divide their talents and energies. It will focus research effort under selected leadership and will coordinate research and its findings with the problems of agriculture, with teaching, and with extension.

There are certain well-recognized advantages and disadvantages in dividing the time of research workers between research and teaching. The reports of 21 of the 28 institutions reporting agree that on the whole the advantages to research from employing teachers outweigh the disadvantages. This divided opinion considered in connection with the qualifications and explanations reported indicates that this is still a problem for those administering research. In developing effective policy and practice the following opinions summarized from the survey returns may be helpful.

Division of time between research and teaching makes available qualified specialists in more subjects for research than is possible by expending available funds for full-time workers. Better men are secured for research at less expense in the case of investigations that require only part time but for long periods. Well-qualified subject-matter specialists are provided for seasonal projects at least expense. Research is put to the test in classroom and field.

In order of importance as rated by the institutions reporting, the main disadvantages are that research is interrupted by other duties at critical times; that continuity of thought and effort essential to effective research is difficult; and that the arrangement sometimes makes it hard to secure the time designated or budgeted for research. Opinion was almost unanimous in regard to these disadvantages.

If the only objective were the promotion of research these disadvantages might warrant abandonment of the practice of thus dividing the time of research men. However, other divisions of the institution must be considered. From this standpoint the employment of part-time research workers assists the institutions to retain qualified subject-matter specialists for teaching; permits employment of a greater variety of subject-matter specialists than would otherwise be practicable; tends to develop graduate work and aids in improving extension in specialized fields.

Cooperation in Research Between Departments of Different Divisions

Research in a majority of the land-grant institutions is limited largely to agriculture and is under the agricultural experiment station. This fact and incomplete returns make it difficult to report the cooperative effort between major divisions such as agriculture, arts and science, engineering, home economics, and veterinary medicine.

Sixteen institutions however report a total of 41 such cooperative projects; 18 between the agricultural experiment station and engineering; 9 between the agricultural station and home economics; 7 between the agricultural station and arts and science; 4 in which the agricultural station is in cooperation with veterinary medicine as a separate division; 2 between the agricultural experiment station and the division of agriculture; and 1 in cooperation with the "textile school."

The cooperation with engineering includes many phases of the application of electricity to agriculture, problems of harvesting corn stover and sweet clover, temperature investigations on floors of dairy barns, relation of chaffing hay to its storage value and keeping qualities, hydrogenium study of Maine sands, quack-grass eradication, and planning and operating storage houses.

Cooperation between agriculture and arts and science includes studies on relation of fertility to nutrition in the mammalia, a regional survey of the Northwest, the relation of fertilizer to the vitamin content of spinach, inheritance studies in cereals, factors influencing location and functioning of rural groups, and entomological studies.

Projects in cooperation with home economics are concerned with foods, household appliances, and dietary and consumption problems. With veterinary medicine cooperation involves studies of air requirements of poultry, transmission of bacillary white diarrhea in incubators, breeding for resistance to cholera in swine, and possible factors in the sterility of young heifers.

Such cooperation to date appears to be dependent upon the situation in the individual institution as regards funds and research personnel in the various divisions. Procedure in such cooperation varies. Ordinarily, and perhaps wisely, arrangements are concerned with occasional projects which offer real opportunity for cooperative effort. The development of cooperation on this basis apparently leads to effective joint effort.

As revealed by the survey returns the difficulties in organizing and conducting such cooperative research may be summed up in the statement that there is none that is insurmountable. Personalities, the habit of doing things another way, and finances are the main factors to be adjusted or overcome. One institution where progress in this respect is commendable, reports that, "The essential for success is the development of a spirit of mutual interdependence and helpfulness, a realization of the necessity for teamwork, and the gradual fostering of that spirit rather than the attempt to enforce cooperation by administrative fiat." Real leadership by administrative officers in building morale of this kind is more essential than administrative knowledge of techniques comparable to that of the subject-matter specialists.

Special Organization Relationships

The foregoing discussion applies to divisional cooperation without intermediate organization. The creation of departments such as agricultural engineering, agricultural economics, and the fact that in some institutions veterinary medicine is a division coordinate with the agricultural experiment station creates special questions of organization. In the end, decision on such questions is the responsibility of the central administration of the individual institution. However, a brief statement of data and principles may be helpful.

Agricultural engineering.—Theoretically a decision may be possible as to what is agricultural and what is engineering in agricultural research. An attempt to establish sharp lines of division in practice is impracticable. The agricultural engineering has a definite place in agricultural research work is agreed by 29 of 30 institutions reporting. That agriculture as an industry affords opportunity for engineering research would seem beyond question.

The responsibility is clearly upon the institution through the two divisions to effect such organization and cooperation as will produce effective results. Of 29 institutions reporting on the question 25 have institutional departments of agricultural engineering; 4 have not. In 3 institutions the department is jointly administered by agriculture and engineering; in 2 the administration is under engineering; in the remainder the department as a part of agriculture and the agricultural experiment station. In a few institutions the agricultural engineers, especially the department head, are members of both the agricultural and engineering staff. At least one other institution plans this arrangement.

There are at least three main reasons for the present close relationship of this department to the agricultural division: (1) What is now called agricultural engineering in many of the institutions grew out of work started as farm mechanics, or farm machinery in agriculture. (2) Organized engineering research is of recent date in most institutions and in many does not exist now. (3) The problems of this department thus far have largely originated as a result of needs in agriculture.

The need for engineering training, methods, equipment, and facilities has grown rapidly as agricultural research has expanded to meet more and a wider variety of problems. Development has reached a stage where there is justification for recognition of this relationship by centering in one department the responsibility for engineering technique and cooperation in agricultural research and for agricultural technique and cooperation in certain engineering projects. The object is to develop the art and science of agriculture. This end, rather than desires of individuals, groups, or divisions should be kept in mind.

Relationship of research in the veterinary field to research in agriculture.—Of 33 institutions reporting, 21 list veterinary research in a department of the agricultural experiment station; 2 as organized in a veterinary experiment station; 4 as departments under a dean of veterinary medicine; and 8 report that no veterinary research is undertaken. Where not under the agricultural station cooperation and coordination are accomplished mainly through cooperative research projects between departments of the respective divisions. In one institution the dean of the school of veterinary medicine is head of the department of veterinary medicine in the agricultural station.

That the State experiment stations as a whole will find it necessary to increase and strengthen their veterinary research is a safe prediction based upon the number, character, and importance of problems confronting them. This expansion can be accomplished under a department of the experiment station but will require research workers with training comparable to that in any other field of station work. In institutions where this need of thorough training is met by maintenance of veterinary schools qualified for the responsibility, such schools should have responsibility for veterinary research in agriculture. Veterinary science should recognize its relationship to agriculture and the advantages of close cooperation.

Relationship between research of agricultural experiment station and research of the resident division of agriculture.—On this question 28 institutions reported that little or no research is undertaken by the agricultural division other than that which is financed by the experiment station and all such research is under experiment station direction. Four institutions report that there is divisional research not under station direction. Of these, one reports joint consideration of such research by department heads, the dean, and the director. Three institutions report that there is no such joint consideration.

Such research of the division of agriculture must have as its ultimate purpose a contribution bearing upon agricultural problems in 14 institutions reporting. Final decision rests with the dean or director in charge. In five institutions reporting there is no such requirement. The departments in which research without an ultimate agricultural purpose is most frequent appear to be botany, zoology, plant physiology, plant nutrition, entomology, and genetics.

Cooperation Between Departments of the Experiment Station

To get information as to extent and character of joint research involving different subject-matter specialists of the experiment stations, each institution was asked to list its main research projects in which two or more major research departments of the agricultural experiment station are cooperating.

Forty institutions reported a total of 310 such projects. Of these 227 are cooperative between 2 major departments, such as agronomy and chemistry; 56 involve joint effort of 3 major departments; 20 involve 4 major departments; and 7 projects show 5 or more departments cooperating.

Agronomy, for example, is listed in each of 30 institutions as having cooperation from one or more of 14 other major departments—bacteriology, botany, chemistry, plant pathology, plant genetics, entomology, soils, agricultural economics and farm management, horticulture, dairy husbandry, animal husbandry, poultry husbandry, home economics, and agricultural engineering. A total of 94 cooperative efforts in this line are listed. Approximately the same number of cooperative efforts are listed for horticulture and a somewhat smaller number for animal husbandry, dairy husbandry, and poultry husbandry. In addition to this cooperation in commodity fields, a total of 48 cooperative efforts are listed which involve cooperation between or among chemistry, bacteriology, botany, plant pathology, biology, zoology, entomology, and physics.

The 59 projects submitted as examples from one institution, 51 from another, and from 13 to 19 from several of the stations of average size, indicate that other stations might profit from greater effort toward such cooperative research. The greater part of the projects indicate cooperation between 2 major departments. A study of these and of the 83 projects involving 3 or more major departments indicates a possibility of wider cooperation in more institutions and in more projects.

Organization and procedure to secure such cooperation and coordination.—Of 35 institutions reporting, only 3 have standing committees to deal with research projects. The general practice is to appoint committees as needed for a specific project or group of projects. Cooperation and coordination as a general practice are considered along with other questions in initiating and planning research on a problem.

The procedure reported is fairly represented as follows: A research project is proposed by the research department most concerned, by the director, or by the research committee in some cases. Conferences are first held with representatives of related departments and with research workers in related subjects and then with the director concerning the tentative outline of scope, method of attack, relationships and purpose of the proposed research. Decision is usually by agreement, but the director may make the decision as to subject-matter specialists who should take part. The project plan, including responsibilities and relationships of departments and workers who are to participate is then prepared. Funds to carry out plans are budgeted. Conferences may also be held during the progress of the research to include other departments or specialists if advisable.

These features are given almost as stated by a few institutions. Others give brief statements outlining procedure of this kind. Thirty institutions indicate that initiation of projects and cooperation rest largely with subject-matter departments subject to final scrutiny and approval by the director.

Coordination of graduate research with work of the agricultural experiment station.—Coordination of graduate work with the work of the agricultural experiment station is more completely discussed by the portion of this survey report dealing with graduate work.[21] However, brief record may be made at this point. Returns from 24 institutions show that the graduate research of 122 individuals working for master's degrees in the field of agriculture, and of 50 individuals studying for the doctorate was financed by, or coordinated with, work of the agricultural experiment station. In a similar way the research of 44 individuals working for master's degree and 5 for doctor's degree in arts and science; of 13 for master's and 2 for doctor's degree in home economics; and of 16 for the master's degree in teacher training was financed by or coordinated with agricultural experiment station work. Thus the research of 195 master's degree students and of 57 doctor's degree students was closely coordinated with station work.

Thirty-six of forty institutions reporting recognize as members of the graduate teaching staff, qualified outside individuals such as representatives of the United States Department of Agriculture stationed at the institution for research. Twenty-one institutions report that such individuals may serve as leaders for the research of graduate students. The development of research through Federal subsidy is rated by 10 institutions as the factor which has been of first importance in their program of initiating, expanding, or emphasizing graduate work. Federal subsidy is largely for agricultural experiment stations.

[21] Part X.

Internal Financial Problems and Procedure

The amount and sources of station funds, the purposes for which they may be used, the overhead agencies which exercise control, and the relationships of the station and its work to other agencies have been rather fully covered. Proper accounting to the public for funds made available and the importance of business-like procedure warrant consideration of the main features of procedure in budget estimates, appropriations, allotment of funds, and control of expenditures.

Budget estimates.—The State and institutional requirements vary as to the form and amount of detail in budget estimates submitted as a basis of appropriations. In one institution the main support for the station is by a mill levy. The funds thus derived are budgeted by the director with the approval of the overhead agencies. In 5 institutions the budget estimate is for a lump sum without items or details of segregation, but supported by explanation of the work to be undertaken. In 12 the station budget is submitted as one item but segregated into total for salaries and labor, maintenance, supplies, equipment, and other classifications. In 13 the total requested is segregated into total amounts for each major research unit, as soil investigators, dairy investigations. Or, as in 2 cases, the total is segregated in part by major problems such as diseases of poultry. In 12 institutions such estimates are further segregated to show by appropriation items the amounts proposed for salaries and labor, maintenance, travel, and other classifications. In some institutions segregations are carried to specify individual staff salaries. In a few institutions the total of estimates is made up of separate items each requiring a separate appropriation act specifying problems or lines of work for which each fund may be expended.

Form in which appropriations are made.—Segregation of proposed expenditures into detailed classifications, may be important as a basis of estimating funds needed for the maintenance of organization and of research to be undertaken. If, however, appropriations when made, specify exact amounts in too great detail, waste and inconvenience may result. Research is a study largely of the unknown. It is pioneering. Precise limitations in amounts for labor, supplies, and equipment and other classifications on a specific project in "the unknown" are undesirably restrictive. To keep within such estimates rather than within broad classifications may become the main task of the workers to an extent that reduces research effort. This difficulty is avoided if appropriations are segregated in broad classifications only.

For 24 institutions reporting the appropriation is based upon detailed budget estimates but is made in lump sum or segregated to the extent only of broad classification. In a few institutions the form of appropriations specify detail to an extent which restricts efficiency in expenditure.

Procedure in budgeting available funds.—Each institution was asked to rate as to order of importance the main principles and questions which influence the allotment of funds to station departments and individual research projects. This information was sought in part to determine general practice in this regard and in part as a check on the soundness of the policy and procedure in requests for funds.

The main principles and questions in allotment of experiment station funds according to ratings by 35 institutions may be placed in the following three groups:

(*A*) Matters of first importance.—(1) Continuing research projects under way until they are completed or may be discontinued without undue sacrifice of work already done. (2) Maintenance of a well-balanced research staff. (3) Research on projects in order of immediate economic importance in the State. (4) Care to maintain relatively adequate research to establish new principles underlying later researches into specific problems.

(*B*) Questions of real importance but secondary to the foregoing group.—(1) To continue a program of research planned for a period of years. (2) Care not to have so great a proportion of funds tied up in long-time research that important short-time research on problems that arise can not be handled without stopping important research under way. (3) Assignment of funds according to qualifications of staff members. (4) Demand from constituents for research on particular problems.

The public frequently is impatient with the slowness of research in reaching conclusions of practical application. If administration of research is influenced to any marked degree by this impatience, which may at times take the form of pressure, there will be unwarranted loss and ineffectiveness. On the other hand, administrators have a real responsibility to see that the research agency is prepared to function on a reasonable amount of emergency research work throughout the interval between legislative sessions. Developments in work begun can not be foreseen. Under present conditions the need for greatly increased research to anticipate immediate problems may lead to overbudgeting on long-time research. The station director should maintain a reasonable working balance for short-time research.

(*C*) The following group of questions were rated as of lesser importance than groups (*A*) and (*B*) by most of the institutions: (1) Timely coordination of research with research on the same general problems by other stations or the United States Department of Agriculture. (2) The obligation to encourage and develop graduate work. (3) Cooperation in financing part-time research by the resident teaching staff.

Purposeful, well-founded procedure is essential in preparation of annual budgets covering expenditure of funds available for the experiment station if the questions just listed are to be given the consideration they merit. The survey returns indicate a variation of procedure in this regard. The main steps of practice for 38 institutions reporting are approximately shown in Table 10. A few institutions did not report on all items.

TABLE 10.—*Methods used in preparation of annual budgets for experiment stations*

Procedure	Number of institutions reporting—	
	Yes	No
Major research units or departments each furnished a tentative budget allotment in advance as a working basis for the unit or department program	27	11
Budget estimates required of each major unit or department of the experiment station	37	1
If budget estimates are required, are such estimates based upon estimates by research projects	30	8
Study of all departmental budget proposals by the director and adjustment by him	21	8
Study of all departmental budgets by director followed by joint conference with all department heads on budget adjustments	4	16
Study of all budgets followed by conference and agreement with each department head separately	27	2
Study of all budgets by director followed by conference on individual major projects to determine adequacy of estimates by projects	15	10
A combination of methods with attention directed to needs of individual projects	21	3
Does the director hold an unallotted reserve to meet emergency work, unforeseen expansion in approved projects, and error of judgment in estimates	33	6

Staff morale and cooperation are increased by a voice in the council. Estimates of the needs of project research are difficult to make at best. Shortage of funds after a research is under way is not uncommon and makes for inefficiency. Overbudgeting for an approved research defers other worth-while projects. Research workers may well learn to estimate needs for the research they propose.

The unallotted reserve fund varies from less than 1 per cent to 10 per cent. Eight stations report 5 per cent of total funds; 3 report 3 to 5 per cent; 2 report more than 5 per cent. The reserve will vary with probable needs and closeness with which funds are budgeted to minimum estimates.

On the whole the procedure shown indicates that in preparing annual budgets most of the institutions give serious, rather systematic consideration to the merits and needs of the individual researches proposed, and to the principle of joint discussion, understanding, and agreement, the director assuming final responsibility, as he should. However, comments supplementing the answers tabulated in Table 10 indicate that budget provision for research on State funds is not always on a project basis. This departure from normal practice is due no doubt in part to individuals not in sympathy with such procedure. Some have the idea that to budget funds by projects is belittling to research and "researchers." For research of the experiment station, financed by public funds made available on the basis of budget estimates, the need for expenditures should be established by careful analyses of purpose, methods, and estimated costs of the individual project. Businesslike procedure should promote the confidence and sympathetic support which come from understanding.

Budget provision for graduate research.—Experiment station funds as indicated are for the most part budgeted on the basis of projects and permanent staff. Under this arrangement allotments for graduate research are made out of departmental budgets upon the recommendation of the department and approval by the director.

Procedure for Checking on Expenditures Under Approved Budgets

The general procedure for administrative check by the station director to make sure that expenditures are in accordance with approved budgets is indicated in the following summary for 31 institutions reporting: (1) Requisition or order from research department approved by director before expenditure is made. This is the practice in 31 institutions. (2) Record of purchase, when made, submitted through office of director in 17 institutions. (3) Financial statements from business or financial office indicating status of budgets; monthly in 26 institutions; quarterly in 4; periodic in 4. (4) Record of all approved expenditures available for check: (*a*) In business office: Those paid in 34 institutions; outstanding 28. (*b*) In director's office: Those paid in 24 institutions; outstanding 21.

On Federal Adams and Purnell funds each voucher must bear the number of the approved project to which the expenditure is charged. The individual vouchers and total expenditures are then inspected and checked by a representative of the Federal Office of Experiment Stations. Expenditures not approved must be made up from other than Federal funds.

Conclusion.—The principles and procedures followed in requests for funds, in budgeting funds available, and in checking on expenditures appear to warrant public confidence both as to consideration of proposals for research funds and as to accounting for funds made available. The discussion of overhead control made clear the importance of reasonable accounting for public funds. The procedure exercised in proposals for funds, in budgeting such funds for research, and in check on expenditures should be such as to meet accounting requirements with the minimum interruption of research workers. To the extent that control and administrative agencies fail in this they should accept responsibility for delayed results.

Staff Problems

The selection and management of a research staff to attain the objectives of agricultural research work is an all-important but not an easy task. The work involves many public relations. The objective is the attainment of results that are of economic, educational, and social value. The research agency at times is expected to be "all things to all men" in agriculture, diagnostician, prescription clerk, and nurse. The following discussion aims to present briefly methods of selecting and managing the research staff in such fashion as to meet these somewhat complex requirements. Such suggestions are given as appear warranted from the survey facts.

Bases of selecting research staff.—As a means of determining the basis for selecting research staff members, each institution was asked to indicate the educational training required for appointment to positions in the different ranks. In addition, each was requested to rate, in order of importance, for positions in each rank, such factors as experience in research, experience in administration, accomplishments, personality, capacity for work, health, age, and recommendations. The questions were answered in full or in part by 30 institutions with qualifications by one-fourth or more.

There appears to be no standard set of rules by which applicants are measured mechanically. The basis of selection is indicated best, perhaps, by a composite of comments made by reports.

Training, experience, and individuality are all considered in selection of each research worker. The highest available attainments in scholastic training, experience, and ability are sought. Their relative importance varies with the position to be filled. Advanced degrees are desirable and count heavily in the matter of appointments and promotions, but academic training alone is sufficient only for eligibility to lower ranks. Attempt is made to obtain as good a combination of personal qualities as is possible. The following data from the reports may be included without unfairness to the institutions, representing as they do a composite of individual answers from 18 to 30 institutions. They indicate the trends and the more important factors in the selection of research workers.

TABLE 11.—*Educational training required for appointment to positions of a given rank*

Position	Number of institutions reporting	Number of institutions requiring—			
		Ph. D. degree	M. S. degree	B. S. degree	No degree
1	2	3	4	5	6
Directors	18	3	2	5	6
Heads of departments or research units	30	7	4	8	6
Professors	27	6	[illegible]	6	7
Associate professors	27	0	1	5	[illegible]
Assistant professors	27	0	8	9	6
Instructors	25	0	1	16	4

Factors other than educational training: For the position of director experience in administration is rated as of first importance by 14, second by 1, and fifth by 1, of 16 institutions rating this factor. Personality, experience in research, capacity for work, accomplishment, health, and recommendations as important factors follow in the order given.

For positions as head of a research department experience in research is rated as of first importance by 24, second by 4, third by 1, and fourth by 1, of 30 institutions rating this factor. Capacity for work, personality, and accomplishment follow with about equal rating. Experience in administration, health, and recommendations are of about equal rating but of less importance.

For positions with rank of professor experience in research is rated as of first importance by 23, second by 3, and third by 1, of 27 institutions reporting. Capacity for work, personality, and accomplishment follow with about equal rating. Administrative experience is a factor of second or third importance. Recommendations here, as for director and department head, are by no means overweighted.

For positions with rank of associate professor research experience is but slightly less important than for the rank of professor. Capacity for work, personality, accomplishment, and health follow as other important factors. The rating throughout for the 27 institutions reporting differs but little from that for the rank of professor. Slightly less expectation as regards experience is the main difference.

For positions of the rank of assistant professor experience in research is still rated first with capacity for work a close second. Personality, accomplishment, and health are rated ahead of recommendations. The indicated expectation as regards research experience compared with that expected for the rank of professor is about 70 per cent.

For positions in the rank of instructor capacity for work, recommendations, health, and experience in research are rated about equally, but with slight difference in the order named. Accomplishment and personality are near the others in importance.

Experience in research leading to definite accomplishment is a test generally applied for positions from the rank of instructor up. Ordinarily, this means that appointees have served an apprenticeship as graduate students or as assistants in research to a project leader. This practice, quite as much as the requirement that a degree be obtained, makes advanced study necessary. There appears to be an increasing tendency to supplement expectation of research experience by training equivalent to that of the Ph. D.

The highest academic training is recognized as desirable in station directors. Their task, however, is essentially administrative. Broad knowledge of agriculture and training sufficient to grasp quickly the essentials of a problem and the scientific avenues of attack are necessary. Beyond this, the best service of a director is rendered by selecting specialists who can do outstanding work, by providing facilities, maintaining staff enthusiasm and morale, and by securing for them freedom from interruptions and annoyance in research work. Qualifications for these tasks can not well be made secondary to educational training.

Salaries of research staff.—Of 35 institutions reporting, 26 state that salary scales for research workers are the same as for corresponding rank and responsibility in other divisions. The major features of the salary problem, therefore, are best dealt with in the section of the survey devoted to salary problems of the institution as a whole.[25] Only such features as have special significance in research are discussed here.

Range of salaries by ranks.—The following table although incomplete is probably a fair representation as to range of salaries, and in a general way, as to the extent of opportunity for advancement under present conditions:

[25] See Vol. I, Part VII, Staff.

TABLE 12.—*Salary range for research staff with number of institutions reporting for each rank and salary grade* [1]

Rank	Number of institutions reporting	Number of individual staff members reported	Salary range: More than $12,000	$11,001-$12,000	$10,000-$11,000	$9,001-$10,000	$8,501-$9,000	$8,001-$8,500	$7,501-$8,000	$7,001-$7,500	$6,501-$7,000	$6,001-$6,500	$5,501-$6,000	$5,001-$5,500	$4,501-$5,000	$4,001-$4,500	$3,751-$4,000	$3,501-$3,750	$3,251-$3,500	$3,001-$3,250	$2,751-$3,000	$2,501-$2,750	$2,251-$2,500	$2,001-$2,250	$1,751-$2,000	$1,501-$1,750	$1,251-$1,500	$1,001-$1,250	$751-$1,000
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Directors [2]	34	37	1	1	2	0	0	1	2	1	0	1	5	7	7	5	4												
Heads of departments or major units	32	353				2	3	0	2	3	9	5	10	12	43	100	56	43	33	12	14	3	1	1	0	0	0	0	1
Professors	29	341					3	0	3	6	9	6	15	24	47	40	71	40	36	14	13	7	0	0	1	0	1	1	4
Associate professors	31	342												1	6	15	49	65	80	33	46	18	7	4	9	2	4	1	2
Assistant professors	32	484												1	0	5	9	25	43	19	154	121	53	25	12	11	6	0	0
Instructors	28	271																2	1	2	13	30	71	44	71	14	10	10	3
Assistants	23	245																1	0	1	3	3	8	22	54	31	45	14	63

[1] Derived from institutional reports.
[2] Connecticut, Florida, and Georgia each have 2 stations and 2 directors; North Carolina director of engineering is included.

Under present salary scales the research man who looks forward to administration of station research can figure that his compensation as a director will not exceed $5,500 unless he is in an institution in the upper one-half of the salary range. This is not an especially attractive goal for a thoroughly trained man of outstanding research ability, combined with the high type of executive ability needed.

For appointment to positions as department head and professor, which may be termed the key positions of leadership in research, men are expected to have demonstrated their fitness through experience leading to recognized accomplishment. Upon these men, more than others, agriculture and the public are depending for preparedness against problems which mean millions of dollars for control and more millions of dollars in economic loss.

Out of 353 department heads reported, approximately 75 per cent, 264, receive salaries of $4,500 or less. Only 46, or about 13 per cent, are more than $5,000 in salary and to receive such salary the department head must be in one of 11 institutions out of 32 reporting.

Of 341 professors reported, 188, about 55 per cent, receive $4,000 or less in salary. About 25 per cent additional, 87, are in the grades between $4,000 and $5,000. About 19 per cent, 66, are in salary grades of more than $5,000, 39 of them $6,000 or less. To receive a salary of more than $4,500 a professor must be on the staff of 1 of 8 institutions out of 29 reporting on this item.

Of the associate professors, who likewise are expected to display worthwhile performance through experience in research 208 out of 342 reported, about 60 per cent receive salaries not exceeding $3,500. Less than 7 per cent receive salaries of more than $4,000 and to be in this class an associate professor must be in 1 of 4 institutions out of 31 included in the tabulation.

These salaries are for a full year's work, except for vacation of one month if the individual can leave his work at a time when vacation is desired. Deduct the expenditures expected for membership in scientific organizations and societies, expenditures for travel to scientific meetings, and occasional study to qualify for advancement and the expenditures necessary to maintain standards expected in their positions, and it becomes apparent that the margin is not excessive.

The experiment station and its research constitute a public agency. The public and not the staff member is most vitally concerned in securing the super effort of research workers, instead of merely an honest day's work. Much could be accomplished by salary standards enough higher to free the research workers from financial and home worries which come with small margins of funds for emergencies. A 25 per cent increase in salary scales would do much to attract men with outstanding qualifications for research, who now dismiss the idea on the ground of too low salary scales.

Salary Adjustment for 12 Months' Service Compared with Academic 10 Months' Service

In the discussion of agricultural research in relation to employment of agricultural teachers the privilege of part time on research was reported as an advantage in securing capable, ambitious teachers. This advantage disappears to a great extent if the individual finds that his part time for research requires that he render 11 months' actual service for the same salary that full-time teachers are paid for the 9 months in the academic year. On the other hand, not all teachers can find remunerative employment for the 3 months if they render 9 months' teaching service. Or they may be required to study during summer session.

Twenty-one of thirty-one institutions reporting usable data have recognized that there should be a salary differential in favor of 11 months' required service compared with the academic year of nine months.[26] In few is there a definite rule as to what the differential shall be.

In 10 institutions reporting there appears to be no additional compensation for 11 months' service compared with 9 months of full-time teaching. A few of these institutions admit that lack of such differential is harmful to the morale of research workers. As one institution states, staff members doing part-time teaching try to become full-time teachers in order to secure more pay for the same amount of work. If agricultural research could always be arranged so that research workers could be absent for study and recreation for three months each year perhaps the academic year basis for all would work satisfactorily. This is not feasible in practice. In the interest of research morale a salary differential in favor of the 12 months' employment basis would seem worthy of serious consideration in institutions where such provision has not already been made.

Measures of Efficiency and Comparative Efficiency of Research Staff

The comparative efficiency of staff members is necessarily determined to a degree by one method or another. In answer to a direct inquiry, the returns from 36 institutions reported that there is no special system of rating. Each of the institutions did, however, rate as to comparative importance the following factors. The order given is according to importance as determined by the 36 institutional ratings: (1) Success in solving problems of economic importance. (2) Amount and character of published results. (3)

[26] See Vol. I, Part VII, Staff, for comparisons of institutional salaries on the 9 and 11 months' basis.

Joint conference of director or dean and heads of research units. (4) General standing with constituents.

Points 1 and 2 are rated of equal importance by many and the total ratings indicate that the two are of practically equal importance as measures of efficiency. Published results may be important to progress and yet not mean the direct solution of problems of economic importance.

The significant feature of the 36 separate ratings is that accomplishment as expressed in points 1 and 2, rather than opinion, is the main basis of determining efficiency. Joint conference as to general standing in the profession and with constituents provide a measure of ability, results, and personality factors upon the basis of opinion.

Without advocating an attempt to devise a point system of rating the foregoing, as a composite of 36 reports, is commended for consideration. The separate reports indicate that a few institutions regard general standing with constituents as of first importance. Granting that such standing may be necessary for some positions, it would seem secondary to research accomplishment where the primary staff function is research.

Provisions for continuing staff training.—The survey returns are incomplete concerning provision for continuing training of the experiment station staff as regards agricultural research. This is due in part no doubt to difficulty of direct "yes" or "no" answers as to institutional policy. Individual cases are handled on merit. However, 37 institutions submitted statements. From these the data in Table 13 is presented as representing, more clearly than is possible by discussion alone, methods of encouraging continued training on the part of staff members.

TABLE 13.—*Institutional and divisional policy as to provisions for continuing training of research and graduate staff already employed*

Staff members	Number of institutions reporting—																	
	Graduate study allowed for credit		Summer school study				Sabbatical leave		Leave of absence				Visits to other research agencies		Attendance at scientific meetings			
			With pay		Without pay				With pay		Without pay				With pay		Without pay	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Dean or director	5	12	6	10	7	8	11	21	8	10	18	5	33	-----	32	1	7	2
Head of department or major research unit	9	9	8	10	10	6	14	20	7	8	23	1	33	-----	33	1	6	2
Professor or equivalent	10	11	9	9	9	6	15	19	8	9	23	1	31	-----	31	1	6	2
Associate professor or equivalent	10	10	9	7	11	5	13	21	7	10	24	2	30	1	31	1	6	3
Assistant professor or equivalent	16	5	11	5	11	5	13	21	9	9	26	1	26	3	25	3	7	3
Instructor or equivalent	24	1	11	4	10	3	3	24	8	8	19	2	16	5	16	4	5	4
Assistant	21	1	11	3	8	3	3	21	8	7	18	2	17	4	14	6	6	4

Without exception the reports indicate that graduate study is encouraged within limitations prescribed by the institutions. Practice under any policy is no doubt conditional upon circumstances in the individual case. The information in the foregoing table, therefore, does not probably fully represent actual practice. To allow study by staff members for advanced credit is quite general for workers in lower ranks. For the rank of associate professor and above adjustments to allow such study are not so common and depend more upon circumstances in the individual case.

Attention has been called to the importance of providing opportunities for the research staff to inspect the research in their respective subject-matter fields carried on elsewhere. This is an important factor in staff training. Opportunity for such study is encouraged within the practical limits of work and finances by all institutions. A few restrict financial help primarily to the rank of professor or above.

For 33 institutions reporting, an average of 31 per cent of the research staff visited other research agencies working in their respective subject-matter fields in 1928. In 10 institutions the number was 50 per cent or more; in 9 the number was 25 to 50 per cent; and in 14, less than 25 per cent of the total research staff.

In a majority of such cases, officially approved, the staff member is allowed reimbursement to the amount of half of the expense. In a few the allowance for travel expense is negligible.

Attendance at scientific meetings.—As in the case of visits to other research agencies the survey reports indicate institutional encouragement of attendance at scientific meetings.

In 1928 an average of 80 per cent of the heads and assistant heads of divisions having administrative duties in 30 institutions attended one or more scientific meetings. For 27 institutions the number was 50 per cent or more; for 3 institutions 25 per cent or less; for 14 the number was 90 to 100 per cent. Of the nonadministrative research staff in 24 of these institutions an average of 57 per cent of the professors, 57 per cent of the associate professors, 41 per cent of the assistant professors, and 26 per cent in the rank of instructor attended one or more scientific meetings.

The institutional allowance of travel and subsistence for attendance at such meetings depends upon a number of factors. The survey returns indicate reimbursement varying from 50 per cent to 100 per cent of transportation and subsistence costs in 15 institutions. Qualifying statements indicate, however, that decision is based upon the merits of the individual case. Since the number of organizations and of scientific meetings is constantly increasing, institutional contribution of salary time and travel expense for such meetings becomes a question of financial importance. The Association of Land-Grant Colleges and Universities in 1929 adopted the following statement from the report of the National Experiment Station Committee on Organization and Policy:

Attendance of technical workers on scientific meetings is desirable and justified within the means of the institution, and deserves liberality in its encouragement. In addition to the information and viewpoint which such meetings may impart, they are an important stimulus to workers and afford opportunity for personal growth and for recognition advantageous to the institution. Since the staff member and his institution both benefit from attendance at such meetings, it would seem just for the individual to meet a part of the expense when authorized to attend as an institutional representative with part of his expenses paid. The presentation of contributions should be encouraged, although attendance may not be conditioned on such participation. For the benefit of the staff who remain at home, the making of reports of attendance on important scientific gatherings is desirable in helping to extend the benefits of such occasions and developing the spirit and the fraternity of the science.

Lectures by outside professional men.—A few institutions report a budget allowance to assist in bringing to the institution professional men of recognized standing in research. In others contributions are made at times throughout the year as there is opportunity to secure visitors of outstanding qualifications. However, there appears to be opportunity for translating interest in this method of staff improvement into action to a greater extent by budgeting funds so that arrangement for such lectures can be made to best advantage.

Writing for compensation.—Twenty-seven of twenty-nine institutions reporting state that research staff members may write journal and press articles for compensation. In this connection there is understanding, ordinarily at least, that such writing will not interfere with regular duties, and that unpublished results of research will not be used without approval by the experiment station. Responsibility for adhering to this policy rests largely with the writer and his subject-matter department head. The returns indicate that such writing for compensation is not large and has not warranted control in greater degree than is here indicated. Greater encouragement rather than further restriction would be of advantage to the public.

The writing of textbooks by research staff members is encouraged by 15 institutions reporting on this question and not encouraged by 12. Such writing, however, according to 25 of the 27 institutions is with the proviso that the authors are required first to continue creditable work on their research problems. Only 2 institutions require approval of the subject matter of such textbooks.

As a general rule, and within reason, staff members are allowed to act with or without compensation as subject-matter editors of journals not subsidized by the institution. Except perhaps in a few institutions, the only restriction is a general staff understanding:

(1) That the main objective of such work is to render service in presentation of research facts, conclusions, and recommendations in ways helpful to the public as a whole or to special groups; (2) that such writing must not interfere with research work; and (3) that, if, for any reason, the staff member concerned is in doubt as to the advisability of accepting editorial assignment, the proper administrative officers will be consulted.

The survey returns indicate that increased service rather than compensation determines policy as to all writing for compensation. The demand for such writing and the compensation are not yet such as to divert research workers from their regular duties. Generally, research workers are inexpert at popular writing, and not infrequently are less interested, perhaps, than they should be in this means of securing application of research results. The need is not always easy to meet by interviews with correspondents of papers and journals or by experiment station editors. Better results may sometimes be obtained from popular articles by the research workers themselves.

Staff consideration in case results of research are patentable.—In most of the institutions, apparently, no definite policy has been formulated as to the consideration to be given a research worker in case results of his research are patentable. One institution reports that formulation of plans is now under way for handling patents based on research by staff members. In other institutions decision on individual cases has been the policy. In the future more than in the past this question will be one that will demand attention. In 1927 the National Committee on Experiment Station Organization and Policy presented the following statement which was approved by the Association of Land-Grant Colleges and Universities as a guide to formulation of institutional policy:

POLICY WITH REFERENCE TO INVENTIONS AND DISCOVERIES OF COMMERCIAL VALUE WHICH RESULT FROM STATION INVESTIGATIONS

It is the duty of the agricultural experiment station as a publicly supported research institution to protect and advance the interests of the general public in matters of discovery and invention made under its auspices and to guard its institutional rights in work done under its control. From time to time members of the station staff may make patentable discoveries and inventions while employed by the station and while using equipment furnished by it. In such cases, when it seems best to take out a patent, it is clearly the duty of the staff member concerned to assign the patent to the agricultural experiment station by whom he is employed.

It should be the policy of the station to make available to the American public its patented discoveries and inventions. With this policy in mind, the necessary steps should be taken in all cases to make available the use of such patents in a way that will provide for their widest use and greatest benefit to the general public.

The procedure to be followed in order to accomplish this end will depend upon the character of the discovery or invention. The greatest benefits to the public through the most extensive use of patented articles and discoveries will not always be attained by following the same procedure. It is the opinion of the committee that each case must be decided upon the basis of its character, but in general the following procedure is suggested:

(1) Discoveries having a broad application and which may easily be made available for practical use should be assigned to the public so that anyone who wishes to use them may do so.

(2) Inventions of a character that can be manufactured by only a few or a single establishment because of the capital required, or because of restricted demand, or because the use of the new discovery depends upon the utilization of things already patented and owned by others should be patented and assigned to the station and the manufacture of the article assured by giving a license, even a monopoly license, if necessary, for a limited period of time to a responsible manufacturer on a royalty or cash basis, the income from such royalties to be used by the station for further research, for exercising due control, or for protection of its rights under the patent. In case of restricted licensing, the public welfare should be safeguarded by securing the manufacture of the article at the lowest cost consistent with quality, and by securing its distribution to the public at a cost which will not provide an extraordinary profit to the manufacturer.

(3) The same principle of the institutional rights in patentable discoveries is believed to apply to foreign patents. The policy with reference to such foreign patents and remuneration of the discoverer should be left to the control of the institution concerned.[97]

The results of research that has been financed by taxation might well be considered the property of the institution and the public, to be made available and protected through patent assigned to the general public. On the other hand, there would seem to be need of a clear understanding on this point when staff members are employed. Probably also in the long run it is wise to provide for due recognition of the research worker in some appropriate way.

Operation of farm properties by staff members.—In the early days of the stations the ownership and operation of farm properties by members of the station staff were more generally considered an advantage to the work of the institution than is true to-day. Fourteen institutions, reporting from 1 to 20 per cent of station staff members operating their own farms, are about equally divided as to the advisability of such practice. There are cases, undoubtedly, where the successful direction of farm operations by a staff member helps to maintain confidence in his recommendations as to farm practices. Under modern conditions, however, successful operation of a farm requires a good deal of thought and time. If the result is financial

[97] National Committee on Experiment Station Organization. *In* Proceedings Forty-first Annual Convention, November, 1927, p. 198.

advantage to the staff member there frequently is criticism on the ground that he is spending official time for his personal interest. If his farm product is a special line, of high grade, and in competition with a few neighbors producing like products, there may be and usually is criticism. If the farm operations of staff members are not financially successful the case is pointed to as an example of "educated farming."

All factors considered, there would seem to be advantage to the institution and to the public in having the undivided interest and time of research staff members and salary compensation adequate to retain the full time and interest of qualified research men.

Tenure of Office

Table 14 is based upon the reports from 31 institutions relative to tenure of office of the agricultural experiment station staff. Not all institutions are represented in any one average.

TABLE 14.—*Average tenure of office of members of agricultural experiment-station staff in 31 land-grant institutions*

Staff members	Number of institutions reporting	Average tenure of those resigned (years)	Number of institutions reporting	Average tenure of those now employed (years)	Number of present staff members who have served the number of years indicated to year 1928					
					Number of institutions reporting	1 year	Number of institutions reporting	2 years	Number of institutions reporting	3 years
1	2	3	4	5	6	7	8	9	10	11
Dean or director	10	13.2	24	12.3	1	1	1	1	.....	.....
Heads of departments or major units	17	9.1	24	12	8	17	11	16	16	25
Professor or equivalent	8	10.5	17	11	4	5	7	9	9	12
Associate professor or equivalent	10	5.5	20	7.1	9	13	11	13	13	25
Assistant professor or equivalent	19	4.2	23	5.2	19	55	18	44	19	49
Instructor or equivalent	16	3.2	21	3.2	21	50	16	36	12	28
Assistant	13	2.9	17	6.6	11	83	15	53	12	43
Total	93	.....	146	.....	73	224	79	172	81	182

TABLE 14.—*Average tenure of office of members of agricultural experiment-station staff in 31 land-grant institutions*—Continued

Staff members	Number of present staff members who have served the number of years indicated to year 1928											
	Number of institutions reporting	4 years	Number of institutions reporting	5 years	Number of institutions reporting	6-10 years	Number of institutions reporting	11-15 years	Number of institutions reporting	16-20 years	Number of institutions reporting	More than 20 years
1	12	13	14	15	16	17	18	19	20	21	22	23
Dean or director	1	1	3	3	5	5	6	6	4	4	10	10
Heads of departments or major units	9	12	14	17	25	85	19	60	21	54	17	40
Professor or equivalent	10	10	3	4	16	51	12	34	11	28	10	16
Associate professor or equivalent	6	7	13	25	19	55	15	36	6	10	3	3
Assistant professor or equivalent	16	30	17	29	23	108	9	20	6	11	3	4
Instructor or equivalent	9	13	9	14	15	36	3	3	3	3	2	2
Assistant	7	17	5	13	11	32	8	15	2	2	3	4
Total	58	90	64	105	114	372	72	174	53	112	48	79

The significance of such tenure figures is at best difficult to determine. For use by individual institutions the following table in percentages may be helpful:

TABLE 15.—*Approximate per cent of present staff members who have served the number of years indicated below, to the year 1928*

Staff members	Number reporting [1]	1 year	2 years	3 years	4 years	5 years	6-10 years	11-15 years	16-20 years	More than 20 years
1	2	3	4	5	6	7	8	9	10	11
Dean or director	31	3.2	3.2	......	3.2	9.7	16.1	19.4	13.0	32.3
Heads of departments	326	5.2	4.9	7.8	3.7	5.2	26.0	18.4	16.6	12.3
Professor or equivalent	169	3.0	5.3	7.1	5.9	2.4	30.2	20.2	16.5	9.5
Associate professor or equivalent	187	7.0	7.0	13.3	3.7	13.3	29.4	19.3	5.3	1.7
Assistant professor or equivalent	350	15.7	12.6	14.0	8.6	8.3	31.0	5.7	3.1	1.1
Instructor or equivalent	185	27.0	19.5	15.1	7.0	7.6	19.5	1.6	1.6	1.1
Assistant	262	31.7	20.2	16.4	6.5	5.0	12.2	5.7	.8	1.5

[1] 1,510 staff members reported.

The total of 1,510 staff members in 31 institutions represents approximately one-half the total staff of the experiment stations. The turnover in staff varies naturally from year to year, yet the figures just given, in all probability, approximate an average by ranks. If so, about 80 per cent of directors and about 72 per cent of department heads responsible for administrative direction and supervision of the experiment-station work have served 6 or more years in their present positions. About 77 per cent of professors have had from 6 to 20 years of service, and, of associate professors, 62 per cent from 5 to 15 years. Upon these men more than others depends actual leadership in research. The larger replacement is in the lower ranks. More than 50 per cent of staff members in the rank of assistant and nearly 50 per cent of instructor rank have served 2 years or less in their present positions. All facts considered, this is not necessarily undesirable. Advanced degrees ordinarily are not required for appointment to positions in these grades, but are an important factor for advancement or appointment to the higher grades. The large replacement in the lower grades, while not wholly explained by resignations or release for study, is due to this factor in no small measure. This period, too, more than later years is one of adaptation. Many change to other lines of work and to new locations for personal as well as for professional reasons. On the other hand, if the large turnover is due to lack of opportunity for advancement, as it may be where there has been little increase in research funds, the condition is undesirable. With so few institutions having provisions for staff retirement on compensation, service beyond a period of reasonably effective work might be a problem. The foregoing figures, however, do not indicate that this condition is especially serious.

Chapter VI.—Standards and Special Problems

Any valuable measure of the adequacy of physical plant, equipment, and facilities for research can be determined only by thorough study in relation to present and probable future work of the individual institution. Such study is properly the function of State or institutional surveys rather than of a national survey. Certain principles and standards, however, are generally applicable and warrant discussion here.

Housing, Relationship for Teaching, Research, and Extension

In nearly all institutions reporting the agricultural research staff is housed in buildings with the teaching staff in agriculture. For the most part the agricultural extension staff, too, is in the same building. To a less extent, yet in a majority of cases, the research staff shares office space with the teaching staff and extension staff. These arrangements are of no little significance in unifying agricultural subject matter. The best arrangement would seem to be the centralization of subject-matter specialists of teaching, research, and extension by subject-matter departments. Subject-matter facts are used for teaching, research, and extension. The facts remain the same. Administration of units superior to subject-matter units or departments may divide according to character of work or functions into coordinate divisions under a dean or the president. Corresponding divisions of subject matter should be in coordinate sections under the subject-matter department heads. Where this organization exists, housing and facilities are most naturally a joint arrangement.

Where subject-matter specialists in teaching, research, and extension report to separate department heads, coordination may be promoted by unified subject-matter housing.

Individual office space for research workers.—Most of the research staff has teaching or extension service duties and in addition must share in taking care of correspondence and personal interviews. Individual office space, however small, where the research worker can at least avoid conferences between other staff members and their students and constituents, is vital to productive work. At best the interruptions are many and disturbing. They may easily become demoralizing to research effort where a number of research workers share an office. The opportunity for continuous effort may be even less if the office is a laboratory shared with graduate students and assistants, as sometimes happens.

Thirteen institutions out of 29 reporting on the point show 85 per cent to 100 per cent of the research staff provided with individual office space; 10 institutions show 50 per cent or less of the research staff thus provided; and 6 report 60 to 80 per cent. Where 50 per cent or more of the research staff are without space to which they can retreat for undisturbed work, improvement in working conditions would seem important. Conservation and effective use of staff time is quite as vital as scrutiny of other expenditures, but is not so easy to check. Productive effort, not merely clock hours, is the end to be sought.

This view apparently is not shared by all institutions reporting. Seven showing 60 per cent or less of research workers provided with individual office space state that housing facilities are reasonably adequate. On the other hand, however, 6 institutions showing 75 per cent or more of the staff provided with individual office space report a need for more space in the best interest of efficient work. The further fact that a number of leading institutions have made provision for every research man in this regard is significant.

Laboratories.—Research in agriculture, in the future as in the past, will involve both field and laboratory work. That the use of the laboratory has increased and will continue to increase relatively is probably a safe generalization. The need for laboratories has greatly increased in recent years, not only for strengthening research along lines previously under way but for problems and groups of problems new in character. Grading, processing, and standardization of agricultural products, for example, require laboratory facilities of many kinds. Problems of harvesting, storage, ripening, and transportation in relation to quality, likewise, have brought new laboratory needs, as have new uses of products and by-products. In every major field of agricultural research the laboratory is of increasing importance as problems become more complex and difficult.

Twenty-four of thirty-nine institutions reporting state that laboratory facilities are not adequate to meet present needs. Fifteen institutions report present facilities adequate for present needs. The number of laboratories and total space available at present vary so largely with the requirements of individual institutions that comparisons are of little value. Illinois with a total of 186,101 square feet of laboratory space, and California with 182 laboratories and a total of 53,300 square feet exclusively for research, report present facilities adequate for present needs. Minnesota with 49 laboratories and a total of 20,868 square feet of space exclusively for research, reports need for more laboratories for important lines of research. Kansas with 36 laboratories and 17,036 square feet, Florida with 52 laboratories and a total of 19,090 square feet of space exclusively for research also state that they need more laboratories. Not all institutions will require laboratories of as many kinds or as large in total space as the institutions listed. The cases mentioned, however, indicate to some extent the laboratory facilities which may be needed if agricultural research is developed to meet imminent problems.

Cold-storage facilities.—Research problems of agriculture which require cold storage with adequate control of all factors have greatly increased in number. The probability is that they will continue to increase and that proper facilities of this kind may be a factor in the character and standards of research in any subject-matter department. The need can be met in part, no doubt, by individual modern refrigeration units. There is much work, however, which will require larger, stationary storage facilities specially planned for research work. The survey returns indicate that this growing need is generally recognized. Fifteen institutions report facilities owned or rented as reasonably adequate at present. Three of these have additional storage facilities in prospect. Nineteen institutions report need of additional modern facilities for research under way or contemplated. Careful study of the space reported by subject-matter departments supports this conclusion.

Greenhouse space.—As with laboratories, so with greenhouse space. More problems in more fields of research each year require methods and control not practicable under field conditions. As in the case of laboratories, greenhouse facilities at present available, as well as present needs, vary among institutions. Comparison of one with another has little practical significance. In the survey returns, 15 institutions report that greenhouse facilities are reasonably adequate for present needs. Nineteen report that space is inadequate. In both groups additional space is planned for construction in the near future.

The University of California with some 55,000 square feet, Illinois with 41,615 square feet, and New Jersey with 11,250 square feet exclusively for research, are among the institutions reporting adequate facilities for present needs. Six others of this group have space between 5,000 square feet and 8,500 square feet, exclusively for research, and a varying amount of space used jointly with resident teaching. Omit California, Illinois, and New Jersey, and the average for the group reporting space reasonably adequate is about 4,800 square feet exclusively for research.

The group reporting inadequate space includes Iowa with 14,575 square feet, Kansas with 11,095 square feet, Purdue with 12,700 square feet exclusively for research. Additional facilities are planned for Iowa and Purdue. Four others in this group report present space of 6,500 to 7,600 square feet, exclusively for research. Eleven have less than 4,000 square feet each.

While the problem is one for the individual institution, there should be general recognition of the importance of such facilities in agricultural research. The figures given may be helpful to administrative officers in checking as to adequacy of present space and the much-increased space which may later be needed. The situation might be kept in hand somewhat better if greenhouse space available were assigned primarily by approved research projects rather than permanently to a department.

Twenty-six of thirty institutions report such permanent assignment. Eight report assignment by projects and 18 a combination depending upon the nature of work in question. Idle space is not productive and sometimes is as unsightly as vacant lots are. Permanent assignment of space regardless of current needs may be wasteful of facilities needed by others.

However important laboratories and facilities other than land may be, or may become, there will always be many problems of agricultural research that require land, if their solution is to be developed with reference to practical application. Existing systems as to the amount of land, its location, and ownership are shown in the following table for 39 experiment stations reporting on this question in full or in part. There have been changes, no doubt, since the data were submitted. The essential points of policy, needs, and relationships, however, are unchanged.

TABLE 16.—*Land available for agricultural research (acres)*

GROUP I.—LAND AVAILABLE REPORTED REASONABLY ADEQUATE FOR PRESENT RESEARCH PROGRAM

Institution	Home station				Branch or substations [1]		Experimental fields [2]		Cooperative experiments with farmers on land operated by farmers	
	Owned		Leased							
	Exclusively for research	Research and resident teaching	Exclusively for research	Research and resident teaching	Owned	Leased	Owned	Leased	Total acres	Number of experiments
1	2	3	4	5	6	7	8	9	10	11
University of Arkansas	8.50	455	2.25		505		315		120	92
Connecticut Agricultural College	38									
Do	100									
Georgia State College of Agriculture		770								
Do	200					5			80	80
University of Illinois	197	185					543	103	45	11
Purdue University	873				1,263	160	107	180		
Iowa State College	526.8	325	59	153	17			25	1,308	1,779
Kansas State Agricultural College	9	1,264			4,294	160		95	643	429
University of Kentucky				200						
Do	98	340		110	460		100	25		
University of Maine	10		5		530				26	
Massachusetts Agricultural College	143	298		12	78					
University of Minnesota	156	17.5			[1] 2,140			267	31	90
Mississippi Agricultural and Mechanical College	1,356	575			1,884	140			50	21
University of Missouri	24	434		317				77	40	20
Montana State College	669.2	270			1,730.5	960			16,530	18
University of Nebraska		653			86				162	13
University of Nevada	60					34				
Rutgers University		440				20			220	40
Clemson Agricultural College	280	920			1,680	40			170	52
University of Tennessee	31.25			880		17				
Agricultural and Mechanical College of Texas		634								
University of Wyoming	840	320			1,251	586				

GROUP II.—AVAILABLE LAND REPORTED INADEQUATE FOR RESEARCH PROGRAM

Alabama Polytechnic Institute	40	125	5	25	700		130	225	60	60
Colorado Agricultural College	1,018	5	40		510	640			835	10
University of Delaware		70		10		5		20	32	10
University of Florida	395				267				560	59
University of Maryland		350				70		94		
North Carolina State College	129	42			329				25	19
North Dakota Agricultural College	185	220			800			1,880	20,000	49
Oklahoma Agricultural and Mechanical College	372	688	167.5			60				43
Oregon Agricultural College	182	250	272	743	1,350	10		17	42	38
Rhode Island State College	38		1				38	1		
South Dakota State College	222	2			364			1	589	
Agricultural College of Utah	61		189		129.5	343			25	2
University of Vermont	85	465								
Virginia Agricultural and Mechanical College	150		150		116	210			40	2
West Virginia University	61	525		205	1,057	750				51

[1] Branch station applies to stations other than home station provided with buildings and equipment and a superintendent devoting all or most of his time to operation of such station.

[2] Experimental field applies to land owned or leased for specific purposes and not supplied with buildings, livestock, and equipment or superintendent but operated by the station.

[3] 395 used for research exclusively.

The first group of 24 stations report land facilities adequate for the present program. Five of this group, however, state that additional land selected for study of specific problems could be used to advantage. The second group of 15 stations and 2 additional for which acreage is not included in the table, report additional land needs at present varying from a few acres to 1,000. Comparison between institutions provides no legitimate standards to determine land requirements, but several comparative statements are of interest.

The average amount of land owned for home station research and resident teaching is about 380 acres for the group reporting insufficient provision. The average for the group reporting the amount of land adequate for the present is 560 acres. Only 2 of 15 in the former group have 600 acres or more, while in the latter group 9 of 24 exceed 600 acres. In the latter group only 3 of 24 lease land exclusively for research at the home station, while in the former group, reporting land inadequate, 7 of 15 lease land exclusively for research and, except in 2 instances, the acreage leased is large enough to indicate actual land shortage rather than temporary need for a specific problem. A study of the reports supplementing the acreage figures supports the contention that additional land for experiment station work is needed by the institutions reporting insufficient facilities.

Branch or substations, experimental fields, and cooperative experiments undoubtedly serve a useful purpose. Such undertakings are warranted for the experiment station, however, only when a special location provides conditions essential to specific types of research or as a means whereby new findings may be tested by practical application.

In planning such work the future needs and trends in research should be given most careful consideration, especially as to selection of land and the term of years for which it is to be available. Field investigations intended as a temporary expedient not infrequently develop to warrant more permanent study. The continuous information on land treatment and performance is a valuable and may be a necessary part, of experimental records. Shifting from one location to another breaks the continuity and destroys the value of research data of this kind. As far as practicable location and tenure of use of land should anticipate probable continuation of investigations.

Livestock.—The number and classes of livestock used in research work vary among institutions and for the individual institution from year to year and seasonably for a given year. Data reported by 34 experiment stations are presented in Table 17 to represent in a general way the relationship of this element to the work of the experiment stations, and to show relationships of resident teaching and research in the use of these facilities.

TABLE 17.—*Livestock available for research in the 38 institutions reporting*

Institution	Number of— Horses: Exclusively for research	Horses: Resident teaching and research	Beef cattle: Exclusively for research	Beef cattle: Resident teaching and research	Sheep: Exclusively for research	Sheep: Resident teaching and research	Goats: Exclusively for research	Goats: Resident teaching and research	Swine: Exclusively for research	Swine: Resident teaching and research	Dairy cattle: Exclusively for research	Dairy cattle: Resident teaching and research	Poultry: Exclusively for research	Poultry: Resident teaching and research
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Alabama Polytechnic Institute									30		15		1,500	
University of Arkansas	6	12		40		46			78	55	9	42	252	120
Colorado Agricultural College			170		550				100					
Connecticut Agricultural College											1,000	150		
University of Delaware		6								110		45	1,500	
University of Florida			14		13				44		[illegible]		16	
Georgia State College of Agriculture		23	15	29		54	21		125	64	26	92		2,500
University of Illinois	19	61	101	93	74	219	1	1	22	459	6	147	12	5,087
Purdue University			100	100	450				400				2,000	
Iowa State College		50	32		400				660		10	70	6,430	10,848
Kansas State Agricultural College	94	55	377	235	61	180			555	300	251	180	5,660	319
University of Kentucky	5	10	20	25	16	50			35	50		70	2,955	1,550
University of Maine											90		2,000	
University of Maryland		8				100						80		1,000
Massachusetts Agricultural College		18		15	6	50				25	21	150	4,000	5,500
University of Minnesota	7	87	92	136	542	272			263	260	158	245	1,250	1,055
Mississippi Agricultural and Mechanical College		40		225		120				75	106	25	80	345
University of Missouri		33	60	100		100			200	100	120	120	600	600
Montana State College		40	178	40	900	175			88	43		70		
University of Nebraska			100	150	250	200			100	200	75	50	1,000	1,000
Rutgers University						30				200		150		3,000
North Carolina State College			95		79				218	200	110	100	6,300	900
North Dakota Agricultural College	8	39	93	56	180	118			17	40		67	125	400
Oklahoma Agricultural and Mechanical College		30	90	95	126	140			120	117	41	82	750	750
Oregon Agricultural College		35	150	60	510	150	60	50	100	175	100	130	1,300	1,200

Pennsylvania State College		12		40		75				100	41	140	1,200	1,200
Clemson Agricultural College			100	30	100				250	75		100	400	1,500
South Dakota State College		16	28	57	293	124			88	130	20	40	650	1,300
University of Tennessee	8	8	100	75	400	125			75	125	40	60		800
Agricultural College of Utah	15	11	30	20	134	12			20	10	46	50		5,000
University of Vermont											10	60		
Virginia Agricultural and Mechanical College	16		30						90		22		50	
West Virginia University		20	75	60	470	75			100	50	125	80	150	1,200
University of Wyoming	56	12	130	48	2,650	117			240	63	129	35	1,180	200

Except for research which involves records continuing from foundation stock forward, livestock can ordinarily be secured by purchase as needed. Land, barns, yards, and other facilities for proper handling of the animals under experiment ordinarily are of greater immediate concern than the animals. The following table illustrates this situation:

TABLE 18.—*Housing, yard, and other facilities reasonably adequate for research*

Problem	Number of institutions reporting—	
	Yes	No
Segregation of animals for research on special problems	21	11
Segregation and isolation for control of animal diseases	17	15
Disposal of waste materials from experimental animals	23	8

The major additional needs specified include barns, yards, pasturage, isolation wards for disease control, and incinerators. The importance of such features can hardly be overemphasized if funds are to be expended in research upon which general practice is later to be based.

Attention is directed to these features rather than to maintenance of fine herds and flocks as a means of assisting livestock enterprises. The fact that so large a number of institutions report present facilities inadequate is worthy of public attention where enterprises so important as those involving livestock are concerned. Beyond this general suggestion the problem is institutional.

Library

Attention has been called to the importance of research staff members visiting other research agencies, attending scientific meetings, and in other ways continuing staff training. Such opportunities are not a substitute for study of published material. Rather, they increase interest and aid in giving direction to library study.

The number of agencies doing research in fields from which should come contributions of value to the research worker in agriculture is constantly increasing throughout the world. Each year adds new thousands of documents, books, and journals to the many thousands of past years for the research staff to consider when research is planned, while it is in progress and when the results are interpreted and conclusions drawn. The day is gone when the research worker can keep abreast of facts, methods, and work under way, through a few journals, books, and pamphlets filed in his office. The need grows each day for a library system and procedure which will accomplish the following purposes: (1) Bring together in convenient arrangement and to the degree of completeness consistent with high standards of research work, the published material pertinent to the fields of research carried on by the institution. (2) Provide such subject-matter assistance as may prove practicable and efficient for information service and reference work. (3) Provide telephone and messenger service within practicable limits. (4) Provide room and desk space where research workers may hold reference material for continued study if necessary.

The means of accomplishing these objectives are discussed in the library section of this survey report.[28] The interest, active cooperation, and assistance of the research staff, however, will be necessary for effective development of the library, its procedures, and its service to research and to the research staff. Failure to develop necessary library facilities for research can not be delegated entirely to the library staff or the institutional administration. Research workers as a group should vigorously support the librarian in changes of real significance to the research interests of the institution.

Subject-Matter Problems

The foregoing parts of this report have been concerned primarily with external and internal problems of control, relationships, organization, financing, staff, and physical plant. Several special subject-matter questions have been raised concerning standards of work and certain fields. The following discussion presents the facts and suggestions derived from survey data upon a number of these questions that are of most general interest.

Standards of research in agriculture.—Judgment as to standards of research is difficult at best. What may be said of one research may not apply or be fair if applied to another research of similar character but undertaken for a different purpose. The agricultural experiment stations have, from the beginning, been confronted with problems in excess of available funds. The task has been one of adjustment to meet the situation and render assistance upon the economic, social, or educational problems that are most pressing. The fact of pressure to undertake more than can be done does not warrant methods or standards inadequate to the purpose of a given research. It does, however, obligate those passing judgment to consider whether the qualifications of investigators are reasonably adequate for the research in question; whether the methods and technique employed are adequate for the purpose and scope of the investigation; whether equipment and surrounding conditions are suitable to the investigation; whether the attack upon problems is focused effectively upon the purpose or objective decided upon; whether all proper subject-matter units are participat-

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[28] See Vol. I, Part VIII.

ing; whether the purposes and methods decided upon are carried to execution, or, if changed, whether changes are made only after thorough consideration.

With these points in mind, 18 of 26 institutions reporting express the opinion that researches in some lines have been of doubtful quality, primarily because conclusions are based upon too few cases, or upon tests and research inadequate to represent conditions to which results must be applied. Examples given include varietal tests, especially with fruits but including field crops as well, feeding experiments, fertilizer experiments, control of pests and diseases, and agricultural economics. Five of the eighteen institutions reported examples of practical agriculture having been led to make unwise expenditures because of unreliable conclusions from such research. In the judgment of the majority of those reporting the weaknesses specified are due in part to lack of recognized standards and in part to lack of knowledge on the part of investigators as to standards generally recognized.

If the experiment stations are to function to the utmost advantage there will continue to be cases where progress statements will be necessary prior to final completion of investigations. There will be cases when tests less comprehensive than might be desirable may be imperative. To wait with advice or suggestions for practice until all possibility of error is removed will sometimes not meet the situation. There is a distinct obligation, however, to insure as far as practicable, standards of work adequate to the purpose, character, and scope of work undertaken. To this end, staff qualifications naturally are of first importance. But even with this requirement met to a reasonable degree, a general practice of scrutinizing each proposed research with reference to well-known standards will serve to safeguard further the standing of the stations, both scientifically and in public confidence.

Research in Agricultural Economics

Research in agricultural economics has been greatly expanded since 1925 as a result of additional Federal funds made available by the Purnell Act. A few illustrations of results which have been of economic significance were presented in the chapter upon the relations of agricultural research to economic, social, and educational welfare. Since development in this field is comparatively recent and because of the significance of such research to modern agriculture, further brief discussion seems warranted.

Thirty-two institutions reporting are unanimous in the statement that results of research in agricultural economics have already been of material assistance in solving problems of agriculture within their respective States. The figures in Table 19 indicate the number of institutions out of 33 replying which report material assistance rendered and those that report no material assistance has as yet resulted from the research in agricultural economics.

TABLE 19.—*Material assistance rendered institutions as a result of research in agricultural economics*

Problem	Number of institutions reporting—	
	Yes	No
Problems in adjustment of production to market demands	30	2
Problems of taxation	19	13
More economical production	30	3
Standardization of products to meet market demands	26	7
Adjustment of movement to market to meet market demand	23	9
Organization for marketing purposes	28	4
Securing for farmers premiums warranted for superior quality product	22	9

In support of these claims a total of 59 specific examples of definite accomplishments were reported. Twelve examples having to do with adjustment of production to market demands include studies such as the importance of variety, size, and quality in apples in relation to consumer demand, price, and net returns to the grower; studies of supply and demand and their relation to prices paid farmers, especially for such perishable products as melons; and studies of roadside markets.

Studies in taxation have not been so widely undertaken as have investigations in other lines. Outstanding results, however, have already been reported for Kansas. Missouri reports adjustments of real benefit to agriculture as a result of station research concerning earning value as compared to assessed value of land. In other States the facts contributed are publicly acknowledged as of value but not yet the basis for definite adjustments in taxation.

A total of 17 specific examples of definite accomplishments toward more economical production are reported. These are the result of "cost of production" and "agricultural enterprise" studies which have brought about changes in organization and practices, which in turn have brought about more economical production.

The standardization of agricultural products to meet market demands and at the same time bring maximum net returns to the producer is of constantly increasing importance. Such work is in the interest of both consumer and producer. The problems vary with products of different character and distance from market. The research to date has been concerned in some degree with most agricultural products and without doubt has been of material assistance. There is yet much to be done that is closely related to production practices, to processing, and to distribution and marketing.

The movement of products to market when there is market demand likewise is of utmost importance. At best this is difficult to accomplish under present agricultural organization. Even if agriculture were organized to control the quantity of shipping point loadings, problems of harmonizing the time of marketing with local conditions and practices would still require careful research. Shipping point quantities are made up of products assembled from many production units. The movement to the shipping point may be an important factor in the marketing problem by reason of opportunities that may exist for reducing transportation and storage costs. Five institutions reported specific examples of contributions along these lines beneficial to agriculture in the respective States. Most of the institutions report that such investigations have been under way too short a time to secure outstanding results.

Specific examples of changes in marketing organization as a result of facts from research are reported from nine institutions. These involve marketing of fruits, dairy products, livestock, poultry products, and relate both to assembling and distribution. Research in this field, too, is recent and the future is looked to for the main benefits.

Coordination with research by commodity departments.—Research in agricultural economics which is concerned with an agricultural product is closely related to research by the commodity department concerned with the same product. The research centers about the commodity. The subject-matter departments are merely organization units and should be secondary to such staff grouping and cooperation as are necessary to secure the most effective research upon all phases of the commodity problem.

Thirty-two institutions answered part or all of the survey inquiry as to the way or ways in which research in agricultural economics is coordinated with research concerning the same commodity in the commodity research department. See following table.

TABLE 20.—*Number of institutions reporting research in agricultural economics coordinated with research in the same commodity in the commodity research department*

Question	Number of institutions reporting— Yes	No
Are such economic researches conducted as joint projects with the commodity department	16	16
Are economic researches submitted to the commodity department for scrutiny and suggestions before research is undertaken	23	6
Are the results of such researches studied by both departments and recommendations approved by both	24	8
Are all researches of economic bearing submitted to the director of the agricultural experiment station for approval and coordination with agricultural research of the experiment station	32	0

The replies indicate that ordinarily the station director assumes responsibility for cooperation and coordination. Supplemental notes indicate that conferences and promotion of good cooperative relations are the measures most relied upon to attain these results.

The fact that all such researches are made joint projects between the commodity group and the economists in at least 16 institutions is encouraging. This plan would seem to merit general adoption to insure that research to be undertaken is jointly considered, that plans are drawn and agreed to before work is under way, that budget provision and authority make for cooperation through joint work, and that results and recommendations are jointly considered.

Research in rural sociology.—Seventeen of thirty-one institutions reporting list research under way in rural sociology. Fourteen report that research in this field has not been started. With few exceptions the studies in this field have been started since the passage of the Purnell Act in 1925. No great quantity of significant results could reasonably be expected until the work, methods, personnel, and results have had longer time for development. That there has been material progress in the past few years is generally evident. That results have been of assistance already in solving problems of the respective States in the following ways is claimed, to a modest degree, by some of the institutions.

TABLE 21.—*Number of institutions reporting research in rural sociology*

Study	Number of institutions reporting—	
	Yes	No
Improving rural living conditions	4	1
By directing attention to improvement of homes	4	1
By improving recreational facilities	6	1
By improving organization for social activity	6	1
By improvement of social institutions	4	1

The specific examples given in support of such claims include improvement in rural schools, library facilities, health facilities, community recreation, and improvement of homes and community organization. The claims as stated are modest and appear to be supported by the facts submitted. Naturally in a new field of this character development of research is attended by difficulties, and perhaps by some hesitation, when demands for research in other established lines is as pressing as it is.

TABLE 22.—*Main difficulties in order of importance determined from ratings by 20 institutions*

Rating	Difficulty	Number of institutions reporting—	
		Yes	No
1	Insufficient funds to develop program	19	1
2	Lack of standard methods of proved worth in obtaining results on a practical objective	14	3
3	Difficulty of selecting projects with a definite practical objective for conditions in the State	12	5
4	Difficulty of securing experienced research workers	15	5

The human element in economics and social research in agriculture.—Lack of human stability is by some thought to be a serious limiting factor in the ultimate solution of the economic and social problems of agriculture. Twenty-nine institutions reporting gave an opinion on this point apparently after some thought. Sixteen of the twenty-nine for various reasons voiced the opinion that the human element is such that results of social research can be only approximate and that conclusions are somewhat hazardous. On the other hand, 13 institutions, while recognizing the uncertainties of human behavior, do not consider this factor such as to prevent useful and effective research in this field. Although factors may be only partly controlled, the human element conforms to certain laws and reactions and the outcome can be predicted. A few claim that the human element is of little more consequence in this kind of research than in many other agricultural lines. Certainly the human element is a prominent factor in production and crop-protection problems which are being handled successfully by research.

Political entanglements.—That research within the field of agricultural economics will lead to political entanglements is sometimes contended. This may be true. But the results of research in the fields of sanitation, food preservation, manufacture of food products, control of plant and animal diseases, the character and use of fertilizers, purity of feeds and seeds, reclamation and conservation, also lead to political action. Laws, regulations, restrictions, inspections follow research and politics and entanglements have not been entirely lacking. Granting that economic research may lead to entanglements, 23 of 29 institutions reporting see no essential difference between institutional responsibility for research within the field of agricultural economics and research in fields such as those named. Good judgment concerning when and under what conditions a research should be undertaken is required in any case. There is much to be done on problems not involving political controversy to any marked extent. Some problems may well wait until there is general public understanding of the need for research facts.

Chapter VII.—Summary and Conclusions

(1) The State agricultural experiment stations, together with the Department of Agriculture, constitute a national system of research in agricultural and related subjects.

(2) Federal supervision of State stations with respect to inspection and approval of accounts and in regard to formulating and approving research projects under the Hatch and Adams funds is unanimously approved by the 40 stations that report upon these relationships. Two stations of the forty reporting believe that the use of Purnell funds might be made more effective if fewer restrictions were imposed. All stations agree that a scrutiny of research projects by the Federal Department of Agriculture results in improving and maintaining standards of research and promotes long-time investigations that otherwise might be discontinued prematurely.

(3) The State stations that report cooperative stations conducted with the Department of Agriculture favor the present methods of administration. However, slightly more than half believe that more coordination and cooperation might be maintained between Federal field stations conducted independently of the State stations.

(4) Only 10 of 39 institutions reporting indicate any dissatisfaction with the Department of Agriculture with reference to 321 separate investigations carried on cooperatively between the stations and the department. Such discontent as exists is concerned with delay in publication and delay in use. On the whole, the State stations acknowledge cordially aid on the part of the United States Department of Agriculture, and three-fourths of the States reporting express the belief that the Department of Agriculture should assume more leadership in planning researches of national scope.

(5) The State stations emphasize the importance and desirability of cooperation between the stations and the Department of Agriculture rather than attempts to divide the field of research activity upon the basis of national and local interests.

(6) Cooperation between State stations is carried on by 30 of the 34 institutions reporting. Ninety-four separate projects are involved, and of these projects in each of almost half the number of cases the project is being conducted through the cooperation of more than two States.

(7) Allocation of certain major researches to selected stations may possibly be developed to a point beyond present practice.

(8) There is little tendency to modify the present policy of the States in maintaining and supporting the agricultural experiment station as a recognized agency for research in the field of agriculture.

(9) The survey indorses the statement of policy adopted in 1925 by the Association of Land-Grant Colleges and Universities with reference to relationships between stations and commercial agencies.

(10) Station responsibility for regulatory activity should be confined to those aspects of this function which require first-hand technical information and skill, while the police functions of regulation should be handled by other State agencies.

(11) Exclusive of balances from the previous year, the State agricultural experiment stations had an income of slightly more than $14,200,000. These funds for research were supplemented by $11,300,000 available to the United States Department of Agriculture. A total of $25,500,000 was therefore available for research by the national system of research in agriculture and home economics. This amounted to approximately 43.5 cents for research to every $1,000 of capital invested in agricultural production, as compared with $13 expended for research to every $1,000 of capital invested in industry. Upon another basis the investment for research by the State stations and the Department of Agriculture represents about $2.09 for research to each $1,000 of gross income from agriculture, as compared with approximately $10 invested in research by industry for every $1,000 of gross sales. As compared with industry, the amount spent for agricultural experiment station research is not large. Nor does analysis show that the individual's tax bill is seriously increased by taxes for station purposes. For each $100 of taxes paid by the individual in 1928, the amount that went to the station was as small as 3.5 cents in some States, to as high as 50 cents in others.

(12) Support for the experiment station is secured largely on the basis of appeals to previous accomplishments and through the support of groups of constituents who have benefited directly from station work. There is on the part of the public too little appreciation of the need for fundamental research or for research that looks forward to a long period of development before tangible profit-making results can be attained.

(13) Upon the basis of specific estimates supported by evidence, it appears that the economic value to the agricultural industry during 1928 of the contributions made by the stations was approximately $841,470,000.

(14) The contribution of station research to undergraduate instruction may be measured roughly by the statement that 40 years

ago only approximately 16 per cent of the subject matter of the courses in agriculture was based upon the results of research, while at the present time more than 65 per cent of the subject matter in undergraduate courses in agriculture is based upon research findings. A further contribution of the experiment stations to education is indicated by the fact that more than 64 per cent of Smith-Hughes teachers of agriculture visited research departments for information during 1927–28, and that a large number of the institutions have been compelled by the demands of Smith-Hughes students for copies of station publications to restrict free distribution to the teachers and school libraries.

(15) The problems with which the station must deal increase in number as knowledge is extended and as society becomes more complex. The number of unsolved problems upon which aid was requested specifically by constituents during the year 1927–28 indicate continuous need for expansion of research work.

(16) Organized research requires the coordination of the efforts of many individuals, but the form of organization should be such as to avoid suppression of individuality and diversion of attention from research problems to control procedures.

(17) The main problem of institutional organization, so far as the experiment station is concerned, is the establishment of the proper relative strength of resident teaching, station research, and agricultural extension, together with the coordination of the efforts of these three divisions.

(18) The relationships of the stations with chemists, physicists, biologists, economists, engineers, and staff members from other divisions of the institution should be made closer. It seems desirable that institutional agencies and procedures be devised for the coordination of the research of the institution as a whole in order that an institutional research program may be developed. Careful consideration of such plans should result in focusing institutional attention on major problems, in prevention of unnecessary duplication of effort, and in assignment of problems to take advantage of staff and facilities in the largest measure. In the same way, further coordination and cooperation between the specialists and facilities attached to the station itself is a problem of administration that requires further attention and action.

(19) More attention either cooperatively or independently should be given by the stations to the problems of agricultural engineering and to research in veterinary medicine.

(20) Although commendable progress has been made in relating the work of graduate students to the research programs of the stations, further attention should be given to the possibility of

developing graduate work upon the basis of the institution's research program and of setting up limitations upon admission to graduate study in accordance with the range and purposes of these programs.

(21) The fact that 75 per cent of the heads of research departments in the experiment station receive salaries of $4,500 or less; that approximately 55 per cent of the experiment station staff ranking as professors receive $4,000 or less, and can not expect a salary of more than $4,500 unless they are on the staff of one of 8 institutions of the 29 reporting; the fact that 60 per cent of the experiment station staff ranking as associate professors do not receive more than $3,500, indicate need for decided salary increases for the research staffs of the land-grant institutions' experiment stations.

(22) Since the experiment station men are on duty for 11 out of 12 months, with no adequate differential in their favor over other employees of the institution who are on duty for only 9 months, it is urged that the land-grant institutions as a group inaugurate a standard practice which will equalize the difference of institutional service and the salary compensation.

(23) In the interest of the research and graduate programs of the institutions it is especially important that the experiment station staff support library expansion vigorously. If the libraries of the land-grant institutions are to provide facilities for research and graduate work, they will require the assistance of the persons most interested in these fields, and library development for these purposes may properly be guided in accordance with the research program of the institution.

(24) Charges that the character of the research in experiment stations is frequently of doubtful quality do not seem justified in general and arise in large part because of misunderstanding of the practical purposes involved in station research. Where weaknesses occur, they are due in part to lack of generally recognized standards and in part to lack of knowledge on the part of investigators concerning standards that are most frequently accepted.

(25) Research in economic problems is developing rapidly, although the difficulties of social and economic investigation as compared with study of the physical sciences have made the stations conservative in advancing claims and in undertaking work in the economic fields. Work, methods, and personnel for economic investigation must have a longer time for development before highly significant results may be expected. The assumption that the field of economics and social life will lead the station into political entanglements does not present any greater danger than researches in the past have presented when they touched upon sanitation, the manufacture of food products, control of plant and animal dis-

eases, the manufacture of fertilizers, and purity of feeds and seeds. The very fact of investigation of scientific matters for the purpose of application leads to laws and regulations and may involve the station in political entanglements no less easily than investigation of economic and social matters. The danger of his undesirable result can not be avoided if society is to maintain an agency with the courage to advise decision upon a factual rather than a prejudiced or traditional basis.

PART IX.—GRADUATE WORK

Chapter I.—Introduction

The axiomatic dependence of graduate work upon research, and the specific designation of the land-grant institutions by States and Nation as great research agencies make advisable a somewhat detailed review of the whole problem of graduate work in the land-grant fields. This is particularly desirable inasmuch as in some instances the initiation and development of such graduate work has proved highly controversial.

Objectives of the Survey of Graduate Work

The several objectives of the survey of graduate work in land-grant institutions may first be enumerated, as they determine in general the scope of the inquiry and the points of major emphasis. The objectives here listed do not constitute an outline of the study or a table of contents as to the results, but may be regarded as guiding principles in directing the trend of the investigation. They determine the method of treatment in each subdivision of the subject. It is proposed, as far as is practicable: (1) To outline with some degree of particularity the graduate land-grant field; (2) to formulate the specific objectives of graduate work in land-grant fields; (3) to formulate the criteria which may be used to evaluate accomplishments and progress in the graduate land-grant fields; (4) to summarize the past progress and accomplishments of graduate work in the land-grant fields; (5) to summarize the present status and tendency of graduate work in land-grant fields; (6) to indicate, where practicable, desirable or accepted standards for graduate work; and (7) to make certain specific recommendations looking to the possible better realization of the formulated objectives of graduate work.

A satisfactory review and analysis of these objectives and the complex problems involved in graduate work in land-grant fields make desirable a discussion of seven topics. These may be listed as follows: (1) It is advisable to delimit as clearly as is practicable the meaning of the phrase "Work on the graduate level in land-grant fields." (2) The origin and development of graduate work in land-grant institutions should be reviewed and the accelerative and inhibitive influences which have been active should be noted. (3) The specific objectives of graduate work in graduate schools should be reviewed, so that their applications in the land-grant fields may be noted. (4) The organizations of the graduate schools in the various institutions should be outlined and compared. (5) There should be a careful study of the teaching and administrative personnel of the graduate schools. (6) The constitution and recruiting of the graduate student bodies should be analyzed. (7) There should be an evaluation of the character and administration of the graduate offerings.

These studies are desirable not only for the institutional set-up as a whole, but for divisions and departments as well. These topics will be considered in order.

Delimitation of work on the graduate level in land-grant fields.—It has come to be generally conceded that the land-grant fields include agriculture (with the closely related veterinary medicine), engineering, and home economics. More recently, and with somewhat less unanimity, there has been included the field of commerce and business. It is apparent that work in these fields must be based upon and closely linked with the sciences, including not only the mathematical and natural sciences, but the economic and social sciences as well. In so far as these sciences are fundamental they must be regarded as among the acknowledged land-grant fields. There must also be added the obligation of teacher training for the vocational, industrial, and science fields. It is recognized, of course, that interpretations as to scope and consequent development of land-grant schools have been largely matters of local decisions and State policies. There has been as a result much diversity in growth, although the essentially technical and scientific character of the institutions has been retained. It does not follow, therefore, that there has been development of all these appropriate fields in every land-grant institution. On the whole, however, there is increasing unanimity of opinion and practice with reference to the broad areas of investigation that belong to these institutions.

For the purpose of this survey, therefore, the graduate land-grant field is defined as including training, beyond the bachelor's degree, in agriculture, engineering, home economics, veterinary medicine, commerce and business, the basic sciences (mathematical, physical, biological, social, and economic), and the training of teachers in all of these. The legitimacy of graduate work in all these subjects in land-grant schools where there is need and the facilities are available is regarded as a necessary postulate to the adequate development of the primary objectives of land-grant education.

Origins and development of graduate work in land-grant fields.—A consideration of this topic may profitably be grouped under several subheadings, which may be considered in order. They may be listed as follows: (1) Factors which influenced initiation and development of graduate work; (2) development of graduate work as shown by enrollments and degrees; (3) standardizing agencies and their effects; and (4) classification (present status) of graduate schools in land-grant institutions.

Factors which influenced the initiation and development of graduate work.—The origin of graduate work in the land-grant fields is to be found in the emphasis that practically from the beginning has been placed upon research. Its early development was more or less conditioned by several factors which are worthy of note.

In some cases the land-grant school either grew into or was incorporated into a State university. The land-grant fields were recognized as separate colleges more or less coordinate with the older constituent colleges. Graduate work in these fields developed, in general, as a part of the normal graduate growth of the institution as a whole, yet recognition of land-grant fields as appropriate to graduate expansion was not without its struggles even in these schools, largely because of the preponderance of the classical and "pure" science tradition in orthodox faculties. There are even yet occasional reverberations of some of these earlier misunderstandings.

A factor which was early operative both in the "combined" and the "separate" land-grant institutions was the clear realization of some of the pioneer workers in the land-grant fields that a great amount of fundamental research in science was essential before technical education could have a content of subject matter comparable to that of the older fields. Men such as Bessey at Iowa State and Nebraska, Beale at Michigan, Bailey at Cornell, Hilgard at California, Hopkins at Illinois, Osborne at Ohio State, and many others communicated to their students their own zeal for discovery, and graduate development was inevitable.

Later there came from the National Government, States, or other agencies relatively generous subsidies for research work, first in agriculture and the related sciences, and afterwards in other "land-grant" fields. The sums which have become available to land-grant institutions have made possible and necessary the employment on their staffs of well-trained men, capable of carrying forward research in science and in technology. Inevitably these men trained their apprentices. Max Mason has well stated that the ideal graduate situation is such apprenticing of eager and capable students to the leaders in research. Whether formally so recognized or not, any great research agency which conducts its work in this manner is ipse facto a graduate school, and the formal recognition of the fact has not usually been long delayed.

Still another influence in shaping and stimulating the development of graduate work has been the Association of Land-Grant Colleges and Universities. In this organization there have been formed sections which deal with the research of the agricultural experiment station, with the administration of the colleges, and with the special problems of home economics and of engineering. In all of these there have been discussions of graduate work and its place in land-grant education.

It is suggested that even more emphasis and time might profitably be spent by this association in consideration of its graduate problems. There needs to be a clearer understanding of the implications of graduate work in land-grant fields.

It is evident that many factors other than those enumerated above have been operative in bringing about the development of graduate work in land-grant fields. They have not, however, been of equal importance in all divisions. A list was prepared of 18 of these factors which have been suggested as more or less significant in the respective institutions in determining the program of initiating, expanding, or emphasizing graduate work. These were checked on the basis of relative importance in each of the land-grant fields at each land-grant institution. Table 1 summarizes the results secured. It gives the total number of institutions which reported with reference to each division, and the percentage of cases in which the factors listed were regarded as of primary significance.

TABLE 1.—*Factors reported as significant in determining a program of initiating, expanding, or emphasizing graduate work in land-grant institutions*

Factors in order of rank	Percentage of total number of institutions reporting in each division which ranked the indicated factors as of primary significance						
	Agriculture [1]	Engineering [2]	Home economics [3]	Teacher training [4]	Arts and sciences [5]	Commerce and business [6]	Veterinary medicine [7]
1	2	3	4	5	6	7	8
Professional opportunities (demand) for men with graduate training	63	63	84	79	71	46	60
Development of research through Federal subsidy	37	10	23	8	4	8	20
Possession of specially suitable equipment or other facilities	37	32	15	12	17	0	20
Proved ability of staff to carry forward effective and scholarly research	37	32	23	21	54	23	20
Conviction that development of graduate work is advisable for prestige of institution as among educational institutions	33	42	46	37	29	30	40
Conviction that the field is appropriate to graduate development in a land-grant institution	33	26	30	8	12	15	20
Demand on part of graduate students	30	42	46	46	37	23	0
Special interests of influential staff members	30	26	23	17	29	8	0
Possession of an exceptional personnel for training of graduate students	26	26	15	25	50	38	40
Possession of adequate library facilities	26	10	15	21	25	15	40
Development of research through State subsidy	19	26	8	4	12	0	40
Specially favorable geographical location	19	16	8	0	4	8	0
Advisable for prestige among constituency	19	36	15	25	17	30	0
Development of research through subsidy by agencies other than Federal or State	11	10	0	4	4	8	0
Development of a large undergraduate enrollment	-------	5	25	21	4	23	0
Need of developing new graduate fields in order more adequately to support graduate work already undertaken	7	0	0	4	12	8	0
Recommendations arising from State or regional surveys of educational institutions	7	10	0	0	4	0	0

[1] Number institutions reporting, 27.
[2] Number institutions reporting, 19.
[3] Number institutions reporting, 13.
[4] Number institutions reporting, 24.
[5] Number institutions reporting, 24.
[6] Number institutions reporting, 13.
[7] Number institutions reporting, 5.

The table is instructive in that it shows the differences in the factors to which the development of graduate work in the several subject-matter divisions has been ascribed. Without exception the primary emphasis has been upon the demand for the graduate product; i. e., the vocational opportunities open to those with graduate training have been stressed. This is the only factor which was ranked as of primary importance in a majority of the replies from all divisions.

It is of interest to note that in not a single other instance did more than one-half of the divisions report any single factor as being of primary importance. Apparently the order of importance as recognized was about as follows: (1) Professional opportunities or demand for individuals with graduate training; (2) demand on the part of students for graduate work; (3) conviction that development of graduate work is advisable for the prestige of the institution in the higher educational world; (4) the proved ability of the staff to carry forward effective and scholarly research; and (5) possession of an exceptional personnel for the training of graduate students.

Other factors which ranked high were possession of specially suitable equipment or other facilities, and development of research through Federal and State subsidies.

It is surprising to note how little stress has been laid on the need of developing new graduate fields the better to support graduate work already undertaken. It might be anticipated that the development of graduate work in agriculture, for example, would have proved directly stimulating to the development of graduate work in the basic sciences. Possibly this lack of stress upon this point by the institutional statements may be attributed in part to the unfortunate limitations inferred from recommendations of various local and institutional surveys. These have failed in some cases to recognize in any adequate measure the absolute dependence of research in technical fields upon coordinated research in science fields.

It is likewise of interest to note that in not a single case has any regional or interinstitutional understanding between land-grant schools proved of major importance in stimulating graduate development.

Some factors which have retarded development of graduate work in land-grant fields.—Not all of the influences operative in the development of graduate work have been stimulating. There have been several factors which have retarded or hampered instead. Four of these have been of sufficient significance to warrant brief discussion.

In the earlier days of graduate development within faculties strongly imbued with the classical tradition, there was marked opposition to graduate work in the "applied" fields. This seriously interfered with proper recognition in some institutions. As an important or determining factor it has largely disappeared or become ineffective in recent years. In some cases the feeling still exists, but a "classical" majority has become a minority.

In later years opposition of another type has been particularly potent in retarding the development of graduate work in the "separated" land-grant institutions. This opposition, expressed or implied, has come in part from the separate State universities and in part from other educational institutions. Ex cathedra statements from staff members of some of our great universities have sometimes been rather unfortunate, as for example, that of Greenlaw (1926): "There should be fewer graduate schools, not more, in the sense of schools offering the highest research degree, the doctorate."[1] No

[1] Edwin Greenlaw. *In* Proceedings of Association of Colleges and Secondary Schools of the Southern States, 1926, p. 243.

proof is adduced. Such public utterances, in some cases quite evidently coming from uninformed individuals, have done much to create ill feeling.

In States with separated universities and technical schools there has been frequently at some stage in development more or less of antagonism. In some cases the provocation has been bilateral. The need of accord is nowhere more evident than in the development of graduate work. The difficulties and conflicting points of view have been cleverly contrasted by Elliott (1926).

Before the highly desirable ends of mutual understanding and of complete common effort can be reached, the separated State university must cease, assuming its condescending attitude toward the land-grant college * * *. You will recognize the condescension which, wittingly or otherwise, constantly insists that it is alone the leader and the head of the public-school system of the State * * *. On the other hand, the separated land-grant colleges must cease pretending as much as they do if there is to be progress toward unity and an economical progress toward social achievement through education, recognized by the great public we serve * * *. This pretense, I believe in all seriousness, displays itself by a marked disposition on the part of the land-grant institutions to pad their instructional offerings; and to exploit the quality of their scientific achievements * * *. There must be, on the part of all of us immediately responsible, a new variety of disinterested generosity, and a new mutual understanding and appreciation of the purposes and the limitations and the possibilities of each type of institution.[2]

As has been particularly emphasized by numerous surveys it is essential that in such States the two institutions be regarded as coordinated parts of a single State university system. This has been suggested by Jessup (1926) as follows:

The purpose of the Federal Government in fostering State institutions at all had to do with the completion of an educational system—elementary, secondary, and collegiate. The purpose of the creation of the land-grant college was to supplement this earlier conception to the end that higher educational facilities would be afforded in certain practical fields that had hitherto been neglected. Any close study of the program of higher education in any State of America would indicate that the argument advanced for the establishment and development of new departments has been based fundamentally on the idea of maintaining a system of higher education, supplementing the work of the lower schools and the work already offered in existing institutions of higher education. Indeed, one of the reasons for the establishment of the separated land-grant college of agriculture and mechanic arts was the lack of emphasis on these applied fields in the existing institutions.[3]

It is easy to understand how failure to understand these principles has led to endless difficulty and controversy in the development of graduate work in land-grant institutions which are separate. As

[2] Edward C. Elliott. *In* National Association of State Universities Transactions and Proceedings, 1926, Pt. I, p. 47.

[3] W. A. Jessup. *In* National Association of State Universities Transactions and Proceedings, 1926, Pt. I, pp. 42 and 43.

will be noted later, various coordinating agencies have been developed in the various States to harmonize differences. In general, these have functioned helpfully, but institutional rivalries have in some cases measurably and unquestionably interfered with a logical and defensible development of graduate work in land-grant fields.

The third factor which has been potent in retarding the development of graduate work in certain land-grant institutions has been the inadequacy of the staff from the standpoint of research interest and proved accomplishments. Graduate standards on a campus are largely set by those carrying on research, whether on the teaching staff or not. There has been, for example, great diversity in the research standards set by our various agricultural experiment stations. These variations in standards have not in all cases been directly correlated with the size of the institution or with the financial support of the institution. Some of the smaller schools have attracted men who have carried on research which is fundamental in character, and who have shown themselves thoroughly capable of directing the research problems of those working under them or with them. In other cases the men in responsible charge of research have emphasized almost exclusively somewhat superficial investigations having an immediate practical application. A faculty or staff made up largely of such individuals can not be expected to develop graduate work. There apparently is a relatively high degree of correlation between the amount of graduate training received by staff members themselves, and the tendency on the part of the institution with which they are connected to develop graduate work.

A fourth factor contributing to the retarded development of graduate work has been in some cases the lack of adequate State or other financial support. It is very difficult to determine just to what extent this factor is potent. It is unquestionably true that those institutions which have the largest financial backing are able to develop libraries, build laboratories, pay salaries, and provide the other facilities which are attractive to the leaders in their fields. Several such institutions have been able to develop large graduate schools offering opportunities for men desiring to go into a great variety of fields. It is equally true, however, that other institutions much smaller and with smaller budgets have been able by a high degree of specialization to make very splendid contributions in restricted fields. Where it has been possible to hold the graduate development to these fields, graduate work has prospered. It would seem that there is a high degree of correlation between the number of fields which can be covered adequately and the income of the institution, but not between the quality of work done in certain restricted fields and such total income.

Chapter II.—Development of Graduate Work

The growth of graduate work in all ~~land-grant~~ institutions in general has been much slower than that of the undergraduate work. The development of the graduate schools may be studied and portrayed by four principal groups of data: (1) The years in which the master's and the doctor's degrees were first conferred; (2) the growth of enrollments in graduate schools; (3) growth in graduate work as shown by the numbers of masters' degrees conferred; and (4) growth in graduate work as shown by the number of doctor's degrees conferred.

It is recognized, of course, that there have also been changes in the standards required for the attainment of these degrees. It would be of interest to analyze the growth and development of these standards from the beginnings down to the present time, but this is not practicable here.

Beginning of graduate work.—Inspection of the data of Table 2, shows that with few exceptions the land-grant institutions are now conferring masters' degrees, but only 22 institutions reported having conferred the degree doctor of philosophy. In all, 49 per cent of the institutions date the conferring of the degree master of arts or master of science before 1880, 17 per cent from 1880 to 1890, 21 per cent from 1890 to 1900, 10 per cent from 1900 to 1910, and 10 per cent from 1910 to 1928.

The years in which the doctor of philosophy degree was first conferred, where it has been given at all, were in general much later; in only 45 per cent of the land-grant institutions was there a beginning before 1900.

TABLE 2.—*Years in which the degrees of master of arts or master of science and doctor of philosophy in various land-grant institutions were first conferred*

Institution	Year the M.A. or M.S. degree was first conferred	Year the Ph.D. degree was first conferred
Alabama Polytechnic Institute	1872	----
Alaska Agricultural College and School of Mines	----	----
University of Arizona	1897	1922
University of Arkansas	1884	----
University of California	1870	1885
Colorado Agricultural College	1890	----
Connecticut Agricultural College	1920	----
University of Delaware	1874	----
University of Florida	1906	----
Georgia State College of Agriculture	1888	----
University of Hawaii	1914	----
University of Idaho	1898	----
University of Illinois	1877	1903
Purdue University	1886	1897
Iowa State College	1876	1916
Kansas State Agricultural College	1871	----
University of Kentucky	1876	----
Louisiana State University	1870	----
University of Maine	1881	1894
University of Maryland	1874	1920
Massachusetts Agricultural College	1896	1902
Massachusetts Institute of Technology	1886	1907
Michigan State College	1864	1924
University of Minnesota	1880	1888
Mississippi Agricultural and Mechanical College	1885	----
University of Missouri	1864	1905
Montana State College	1902	----
University of Nebraska	1877	1896
University of Nevada	1895	----
University of New Hampshire	1901	----
Rutgers University	1863	1884
New Mexico College of Agriculture and Mechanic Arts	----	----
Cornell University	1872	1872
North Carolina State College	1894	1926
North Dakota Agricultural College	1918	----
Ohio State University	1881	1879
Oklahoma Agricultural and Mechanical College	1912	----
Oregon Agricultural College	1876	----
Pennsylvania State College	1863	1926
University of Porto Rico	----	----
Rhode Island State College	1907	----
Clemson Agricultural College	----	----
South Dakota State College	1891	----
University of Tennessee	1875	1886
Agricultural and Mechanical College of Texas	1890	----
Agricultural College of Utah	1914	----
University of Vermont	1807	1888
Virginia Agricultural and Mechanical College	1892	----
State College of Washington	1902	----
West Virginia University	1877	1901
University of Wisconsin	1879	1892
University of Wyoming	1897	----

Growth in enrollments in graduate schools.—In many of the land-grant institutions during the decade 1918–1928 there has been a particularly rapid increase in graduate enrollments. A positive correlation is generally to be found also between the size of the undergraduate and graduate enrollments. In general, there is a tendency for the large graduate schools to be located in those institutions having the largest number of undergraduates.

These two tendencies may be illustrated by Table 3, which gives the enrollments of graduate students by institutions in certain years.

TABLE 3.—*Total enrollment of graduate students in land-grant institutions in certain years*

Institution	Enrollment in the following years— 1900	1910	1915	1920	1925	1926	1927	1928	Total undergraduate enrollment, 1928	Ratio of graduate to undergraduate enrollment, 1928
1	2	3	4	5	6	7	8	9	10	11
Alabama Polytechnical Institute	11	18	26	6	27	17	24	21	1, 564	1-55
Alaska Agricultural College and School of Mines							1	1	54	1-54
University of Arizona	4	13		54	117	132	103	111	1, 741	1-16
University of Arkansas	1	12		4	27	15	23	44	1, 534	1-35
University of California	21	50	47	963	1, 919	1, 896	1, 709	1, 029	17, 157	1-8. 8
Colorado Agricultural College	7		2		4	14	25	39	1, 182	1-30
Connecticut Agricultural College				1	6	11	9	1	528	1-528
University of Delaware	4	5	1		11	6	8	9	698	1-77
University of Florida	4	4	3	3	15	33	33	71	1, 935	1-27
Georgia State College of Agriculture	1	2	6		7	14	14	17	544	1-32
University of Hawaii			3		21	28	36	55	623	1-11
University of Idaho			2	13	68	70	84	86	1, 804	1-21
University of Illinois	72	79	121	372	644	784	906	930	11, 749	1-12. 3
Purdue University	52	102	115	39	82	108	123	127	3, 612	1-28
Iowa State College	24	20	69	123	656	381	460	444	3, 887	1-8. 7
Kansas State Agricultural College	27	26	50	44	185	182	179	167	2, 942	1-17. 6
University of Kentucky	9	15	56	[illegible]	93	115	157	202	2, 355	1-11. 7
Louisiana State University	3	6	28	28	53	51	89	88	1, 829	1-20. 8
University of Maine	8	12	2	21	70	73	55	35	1, 299	1-37. 1
University of Maryland		8	6	13	75	113	99	96	2, 588	1-27
Massachusetts Agricultural College	12	18	52	26	61	47	39	55	535	1-9. 7
Massachusetts Institute of Technology		35	43	91	286	348	362	374	2, 313	1-6. 1
Michigan State College	5	8	20	10	101	151	152	167	2, 872	1-17. 2
University of Minnesota	2	9	35	369	997	1, 137	1, 235	1, 394	11, 158	1-8. 0
Mississippi Agricultural and Mechanical College	6	16	17	6	7	10	13	24	1, 383	1-57. 6
University of Missouri	13	17	47	179	297	353	360	373	4, 317	1-11. 6
Montana State College		6	7	11	30	50	29	33	978	1-29. 6
University of Nebraska	46	6	17	271	636	356	378	386	6, 449	1-16. 8
University of Nevada	11	3	16	7	32	23	33	64	923	1-14
University of New Hampshire	3		7	3	16	18	26	33	1, 586	1-48. 1
Rutgers University		3	7	18	35	39	40	59	2, 626	1-44. 5
New Mexico College of Agriculture and Mechanic Arts	1	4	2	4	8	5	8	2	269	1-134. 5
Cornell University	103			408	583	662	685	777	4, 895	1-6. 3
North Carolina State College	9	10	33	12	89	78	74	65	1, 412	1-21. 7
North Dakota Agricultural College	1	3	5	10	38	26	34	22	1, 192	1-54. 2
Ohio State University	15	10		145	743	770	856	1, 045	10, 177	1-9. 7
Oklahoma Agricultural and Mechanical College	4		19	13	48	49	49	73	2, 594	1-35. 5
Oregon Agricultural College	19	21	41	41	51	57	60	86	3, 669	1-42. 7
Pennsylvania State College	2	2	60	66	155	155	109	165	3, 723	1-22. 6
University of Porto Rico			1			3	29	16	1, 192	1-74. 5
Rhode Island State College	5	6	1	5	7	7	4	4	518	1-129. 5
Clemson Agricultural College	18							13	1, 199	1-92. 2
South Dakota State College	9	10	8	4	16	50	39	22	867	1-39. 4
University of Tennessee	10	5	1	10	42	42	45	75	2, 922	1-39
Agricultural and Mechanical College of Texas			5	3	61	47	63	67	2, 436	1-36. 4
Agricultural College of Utah	2	2	26	13	41	38	29	43	1, 152	1-26. 8
University of Vermont	5			3					1, 223	
Virginia Agricultural and Mechanical College	22	13	16	18	42	43	47	64	1, 196	1-18. 7
State College of Washington	6	35	25	114	62	36	62	83	2, 897	1-34. 9
West Virginia University	40	1	3	36	139	214	236	312	2, 860	1-9. 2
University of Wisconsin	13	57	132	542	886	987	945	1, 088	8, 500	1-7. 8
University of Wyoming		3	2	3	28	40	47	40	1, 039	1-25. 9
Total	630	675	1, 185	4, 144	9, 616	9, 884	10, 285	11, 497	150, 697	1-13. 1

Growth in graduate work as shown by the numbers of master's degrees conferred.—The growth of graduate work in land-grant institutions is evidenced by the rapid increase in recent years in the number of degrees of master of science and master of arts conferred.

This is shown in Table 4, which gives the number of master's degrees conferred by each institution in each of several years. There are also given the ratios between the number of master's and the number of bachelor's degrees conferred in 1928.

TABLE 4.—*Number of master's degrees (M. S. and M. A.) conferred by land-grant institutions in certain years*

Institution	Master's degrees (M. S. and M. A.) conferred in the following years—									Number of bachelor's degrees conferred in 1928	Ratio of master's to bachelor's degrees in 1928
	1890	1900	1910	1915	1920	1925	1926	1927	1928		
1	2	3	4	5	6	7	8	9	10	11	12
Alabama Polytechnic Institute	0	6	7	9	2	10	8	7	11	276	1-25
University of Arizona				2	3	18	28	29	23	220	1-10
University of Arkansas			1		4	1	1	4	11	149	1-14
University of California		11	45	110	141	224	229	260	263	2,372	1-9
Colorado Agricultural College	1		1	1		10	13	19	10	135	1-14
Connecticut Agricultural College					1	5	3	4	1	73	1-73
University of Delaware	2		2	1		6	1	4	4	103	1-25
University of Florida					1	10	6	13	19	197	1-10
Georgia State College of Agriculture	1			4	5	16	13	26	32	255	1-8
University of Hawaii				1	1	4	3	8	5	85	1-17
University of Idaho				2	2	28	28	33	44	253	1-6
University of Illinois	2	11	73	117	115	192	244	288	259	1,730	1-7
Purdue University	7	1	3	4	10	27	32	36	23	467	1-20
Iowa State College	1		9	28	31	121	113	124	133	537	1-4
Kansas State Agricultural College	2	3	2	6	6	62	48	71	65	428	1-7
University of Kentucky		2	3	4	4	28	32	38	48	374	1-8
Louisiana State University		1	9	7	6	21	25	28	41	227	1-6
University of Maine	1	1	2	2	4	16	14	12	10	208	[illegible]
University of Maryland					2	14	38	26	28	160	1-6
Massachusetts Agricultural College		1	1	5	2	3	2	4	8	113	1-14
Massachusetts Institute of Technology	1		19	29	52	126	144	167	179	372	1-2
Michigan State College	7	2		9	4	26	27	41	41	341	1-8
University of Minnesota		6	30	56	65	131	129	161	182	1,643	1-9
Mississippi Agricultural and Mechanical College	1	2	5	5	1	5	2	4	3	164	1-55
University of Missouri	8	12	24	47	47	98	138	157	175	712	1-4
Montana State College			2				1	2	3	120	1-40
University of Nebraska	8	28	23	42	27	85	92	90	116	842	1-7
University of Nevada			2	3	1	5	3	1	2	141	1-71
University of New Hampshire					1	6	5	12	16	244	1-15
Rutgers University	12	12	7	9	6	8	10	12	12	357	1-30
Cornell University	15	14	30	48	43	117	121	116	160	1,009	1-6
North Carolina State College		2	4	2	2	19	26	17	23	190	1-8
North Dakota Agricultural College						10	3	7	10	131	1-13
Ohio State University	3	11	31	76	69	186	197	207	258	1,265	1-5
Oklahoma Agricultural and Mechanical College				2	1	13	13	12	21	332	1-15
Oregon Agricultural College		1	2	14	5	8	10	7	17	447	1-26
Pennsylvania State College	1	3	20	34	27	41	33	54	35	721	1-21
Rhode Island State College			1		1						
South Dakota State College			2	2	1	4	4	5	3	100	1-33
University of Tennessee		1	3	3	4	21	16	18	31	292	1-9
Agricultural and Mechanical College of Texas	2			1	2	26	23	25	25	295	1-12
Agricultural College of Utah					1	11	10	11	12	168	1-14
University of Vermont						9	12	4	8	[illegible]	1-24
Virginia Agricultural and Mechanical College		2	3	9	3	6	6	9	7	180	1-26
State College of Washington			2	11	7	23	19	23	39	414	1-11
West Virginia University	2	4	2	3	6	22	32	36	41	383	1-9
University of Wisconsin	[illegible]	8	93	157	169	302	305	292	344	1,330	1-4
University of Wyoming			1			7	6	16	18	102	1-6
Total	81	146	464	865	885	2,137	2,268	2,549	2,819	20,847	1-7

It is to be recognized, of course, that this tabulation includes all master's degrees conferred, and not those alone in the land-grant fields as defined previously. Perhaps a better criterion of growth in land-grant fields is the number of master of science degrees conferred as compared with the number of master of arts degrees. In comparatively few schools is the latter degree conferred upon those whose major interest is in land-grant fields. A comparison is given in Table 5.

TABLE 5.—*Number of master's degrees conferred by land-grant institutions from 1863–1928 by years*

Year	Master of science			Master of Arts			Other master's degrees			Total master's degrees		
	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total
1	2	3	4	5	6	7	8	9	10	11	12	13
1863	2		2	32		32				34		34
1864	1		1	19		19				20		20
1865	7		7	47		47				54		54
1866	1		1	17		17				18		18
1867	5		5	16		16				21		21
1868				18		18				18		18
1869				23		23	1		1	24		24
1870	6		6	23		23	1		1	30		30
1871	9		9	32		32	3		3	44		44
1872	15		15	28		28	2		2	45		45
1873	11		11	26		26	3		3	40		40
1874	21		21	42		42	20		20	83		83
1875	16	1	17	33		33	18		18	67	1	68
1876	27		27	41	1	42	40		40	108	1	109
1877	13		13	50		50	25	1	26	88	1	89
1878	14		14	34	1	35	30	1	31	78	2	80
1879	11	2	13	44	1	45	25	1	26	80	4	84
1880	21		21	26	2	28	96		96	143	2	145
1881	12		12	41		41	104		104	157		157
1882	16	2	18	40	2	42	105	2	107	161	6	167
1883	12	1	13	30	1	31	100		100	142	2	144
1884	16		16	44	3	47	108	2	110	168	5	173
1885	13	1	14	36	3	39	111	7	118	160	11	171
1886	26	2	28	44	4	48	101	4	105	171	10	181
1887	30	1	31	20	2	22	105		105	155	3	158
1888	27	1	28	25	2	27	109		109	161	3	164
1889	23	5	28	30	1	31	121	1	122	174	7	181
1890	34	6	40	32	9	41	159	1	160	225	16	241
1891	22	6	28	24	9	33	193	2	195	239	17	256
1892	59	5	64	22	13	35	174	9	183	255	27	282
1893	57	13	70	31	7	38	228	9	237	316	29	345
1894	62	8	70	58	7	65	118	11	129	238	26	264
1895	50	7	57	33	10	43	193	13	206	276	30	306
1896	67	14	81	49	10	59	182	22	204	298	46	344
1897	58	11	69	67	15	82	131	9	140	256	35	291
1898	74	16	90	66	29	95	167	9	176	307	54	361
1899	72	11	83	63	20	83	190	15	205	325	46	371
1900	41	10	51	69	26	95	190	13	203	300	49	34[illegible]
1901	85	13	98	69	28	97	201	11	212	355	52	407
1902	74	11	85	82	38	120	138	11	149	294	60	354
1903	62	6	68	96	36	132	208	16	224	3[illegible]	58	424
1904	69	9	78	66	50	116	216	16	232	351	75	426
1905	83	10	93	95	44	139	225	7	232	403	61	464
1906	90	4	94	93	59	152	180	15	195	363	78	441
1907	100	6	106	105	61	166	221	8	229	426	75	501
1908	103	9	112	169	54	223	248	16	264	520	79	599
1909	141	16	157	188	101	284	284	19	303	608	136	744
1910	156	20	176	182	106	288	248	16	264	586	142	728
1911	181	20	201	184	100	284	273	24	297	638	144	782
1912	223	16	239	232	132	364	287	19	306	742	167	909
1913	264	22	286	225	138	363	244	17	261	733	177	910
1914	311	35	346	264	175	439	316	33	349	891	243	1,134
1915	355	25	380	309	176	485	352	12	364	1,016	213	1,229
1916	442	30	472	329	233	562	503	10	513	1,274	273	1,547
1917	384	20	404	336	232	568	356	12	368	1,076	264	1,340
1918	217	33	250	204	200	404	282	12	294	703	245	948
1919	130	19	149	130	177	307	274	8	282	534	204	738
1920	368	46	414	252	219	471	852	9	361	972	274	1,246
1921	445	56	501	273	271	544	436	9	445	1,154	336	1,490
1922	711	57	768	392	282	674	496	4	500	1,599	853	1,942
1923	866	85	951	431	352	783	671	24	695	1,968	461	2,429
1924	883	89	972	488	363	851	622	34	656	1,993	486	2,479
1925	982	114	1,096	568	473	1,041	715	18	733	2,265	605	2,870
1926	1,005	111	1,116	634	518	1,152	659	35	694	2,298	664	2,962
1927	1,078	152	1,230	752	567	1,319	743	35	778	2,575	754	3,327
1928	1,156	189	1,345	784	690	1,474	824	64	888	2,764	943	3,707
Total	11,915	1,346	13,261	9,302	6,053	15,355	13,727	646	14,373	34,944	8,045	42,989

The evidence is good that the ratio of master of science degrees to those of master of arts is increasing. This illustrates a tendency to shift from the classics and philosophy to science and technology.

Growth in graduate work as shown by the number of doctor's degrees conferred.—The two doctorates conferred "in course" have in general been doctor of philosophy and doctor of science. The latter has been frequently used as an honorary degree. There is apparently no very marked tendency for the number of doctor of science degrees conferred to increase from year to year. The significant degree for our purpose is therefore doctor of philosophy.

Table 6 has been prepared to show the number of doctor's degrees conferred by years in land-grant schools. The first Ph. D. degree was conferred in 1872, and not until 1894 (a period of 22 years) did the number conferred annually reach 20, and an additional 20 years passed before the number reached 100. It is apparent that the fivefold increase from 1894 to 1914 will be fully equaled by at least a fivefold increase from 1914 to 1934.

Here again it is difficult to determine accurately what percentage of these degrees are conferred in subjects in the land-grant field.

TABLE 6.—*Degrees of doctor of philosophy and doctor of science conferred by land-grant institutions from 1872 to 1928, by years*

Year	Doctors of philosophy			Doctors of science, men[1]	Total doctor's degrees			Year	Doctors of philosophy			Doctors of science, men[1]	Total doctor's degrees		
	Men	Women	Total		Men	Women	Total		Men	Women	Total		Men	Women	Total
1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1872	1	----	1	----	1	----	1	1902	34	8	42	----	34	8	42
1873	1	----	1	----	1	----	1	1903	31	6	37	1	32	6	38
1874	1	----	1	----	1	----	1	1904	31	2	33	----	31	2	33
1875	----	----	----	----	----	----	----	1905	41	2	43	1	42	2	44
1876	----	----	----	----	----	----	----	1906	49	3	52	----	49	3	52
1877	1	----	1	----	1	----	1	1907	38	8	46	1	39	8	47
1878	----	----	----	----	----	----	----	1908	56	9	65	1	57	9	66
1879	2	----	2	----	2	----	2	1909	68	7	75	1	69	7	76
1880	----	1	1	----	----	1	1	1910	66	9	75	3	69	9	78
1881	----	----	----	----	----	----	----	1911	84	9	93	2	86	9	95
1882	----	----	----	----	----	----	----	1912	95	13	108	1	96	13	109
1883	----	----	----	----	----	----	----	1913	76	16	92	3	79	16	95
1884	3	----	3	----	3	----	3	1914	109	17	126	1	110	17	127
1885	4	----	4	----	4	----	4	1915	107	13	120	1	108	13	121
1886	1	----	1	2	3	----	3	1916	134	16	150	6	140	16	156
1887	1	----	1	----	1	----	1	1917	167	12	179	8	175	12	187
1888	4	----	4	1	5	----	5	1918	134	15	149	5	139	15	154
1889	1	----	1	----	1	----	1	1919	87	23	110	3	90	23	113
1890	2	----	2	----	2	----	2	1920	152	22	174	3	155	22	177
1891	1	----	1	3	4	----	4	1921	149	26	175	2	151	26	177
1892	3	----	3	----	3	----	3	1922	198	22	220	7	205	22	227
1893	7	2	9	4	11	2	13	1923	248	22	270	8	256	22	278
1894	21	5	26	4	25	5	30	1924	293	28	321	6	299	28	327
1895	11	6	17	7	18	6	24	1925	309	47	356	7	316	47	363
1896	19	4	23	3	22	4	26	1926	373	28	401	9	382	28	410
1897	25	2	27	3	28	2	30	1927	362	60	422	6	368	60	428
1898	31	4	35	----	31	4	35	1928	414	50	464	10	424	50	474
1899	15	4	19	----	15	4	19								
1900	28	3	31	----	28	3	31	Total	4,116	529	4,645	124	4,240	529	4,769
1901	28	5	33	1	29	5	34								

[1] No women were reported as receiving the degree of doctor of science.

The contribution of each of the institutions is detailed in Table 7. It is apparent that all of these degrees have been conferred by 18 institutions, and that 90 per cent have been conferred by 7 of them.

TABLE 7.—*Degree of doctor of philosophy conferred by ~~land-grant~~ institutions in each of several years*

Institution	Number of degrees conferred in—								Number of bachelor's degrees conferred in 1928	Ratio of doctor's degrees to bachelor's degrees conferred in 1928
	1900	1910	1915	1920	1925	1926	1927	1928		
1	2	3	4	5	6	7	8	9	10	11
University of Arizona							1			
University of California	2	6	22	23	49	57	60	56	2,372	1-42
University of Illinois		12	23	30	43	60	56	50	1,730	1-35
Purdue University								1	467	1-467
Iowa State College				2	12	14	13	26	537	1-21
University of Maryland				1	5	6	4	7	160	1-23
Massachusetts Agricultural College			5			1		1	113	1-113
Massachusetts Institute of Technology		2	2	5	11	4	11	8	372	1-47
Michigan State College					4	4	4	2	341	1-17
University of Minnesota	4	1	6	7	32	45	34	55	1,643	1-300
University of Missouri		2	2		6	9	7	5	712	1-142
University of Nebraska	1	1	4	3	10	2	3	5	842	1-168
Rutgers University				1	6	2	3	9	357	1-40
Cornell University	19	35	31	45	60	71	91	95	1,009	1-11
North Carolina State College						1		2	190	1-95
Ohio State University			1	7	38	31	46	44	1,265	1-29
Pennsylvania State College							1	4	721	1-180
University of Wisconsin	5	16	24	50	80	94	88	94	1,330	1-14
Total	31	75	120	174	356	401	422	464	14,161	1-31

The following facts are particularly striking. Eighty-seven per cent of the doctorates in philosophy conferred in 1928 were conferred by the 8 "combined" land-grant schools—members of the Association of American Universities, 3 per cent by 2 "combined" schools not members of this association, and 10 per cent by "separate" schools.

Chapter III.—Standardizing Agencies for Graduate Work, and Their Effects

Numerous more or less complete surveys of land-grant institutions by individuals, associations, or governmental agencies or commissions have been carried through. In most of these some attention has been paid to the position and appropriate development of graduate work. Some of these agencies have been responsible for compilation of information with respect to single institutions, or groups of institutions, and have made recommendations which have had to do with development of graduate work in particular cases. Other agencies have functioned primarily in the fixation of standards of graduate work, and have developed significance intentionally or unintentionally in the accrediting of graduate schools. It is appropriate therefore to note: (1) Previous surveys and compendia of information relating to graduate work in land grant fields; and (2) organizations which function as accrediting agencies.

Previous surveys and compendia of information relating to graduate work in land-grant fields.—Probably the first significant survey of graduate schools in the United States was entirely informal, and relatively incidental. It was the selection of the group which formed the initial membership of the Association of American Universities. This organization has probably been the most important single factor in determining the development and standards of graduate work in the United States. Certain details of its activities will be discussed later.

The Office of Education from time to time has published statistics and other information with reference to the land-grant schools. Included in this material are portions which have a bearing upon the development of graduate work. In several instances special studies were published in which the major emphasis was upon graduate work. Monahan (1911) prepared a bulletin on the subject "Opportunities for graduate study in agriculture in the United States."[4] Included also was a description of the opportunities in "those closely allied sciences which have a direct application in agriculture." The inquiry was confined to the land-grant institutions, the State universities, and the members of the Association of American Universities. The bulletin listed the courses offered for graduate credit in each institution under 19 headings, of which 11 were primarily agricultural and 8 science.

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[4] A. C. Monahan. U. S. Bureau of Education, Bulletin, 1911, No. 2.

Zook and Capen (1921)[5] compiled a valuable bulletin on the opportunities for study at American graduate schools. It was designed primarily for the guidance of foreign students. Of the 28 institutions listed as doing graduate work of interest to the foreign student, 24 constituted, at the time, the membership of the Association of American Universities. The 4 others included were Iowa State College, New York University, University of Texas, and University of Washington. Of the 28, 9 only were land-grant institutions. The authors state: "The institutions listed and described in this pamphlet are universities in the strictest sense of the term, i. e., universities maintaining professional divisions and conferring advanced degrees." They did not analyze the graduate work in the land-grant fields extensively.

Hughes (1925)[6] adopted a method of evaluating graduate schools of the country which led to some rather surprising results and to a considerable degree of deflation. Leading educators in each of several fields were asked to rank in order the several universities of the country on the basis of their research and graduate standing in each of a limited number of fields. While many interesting points were developed as a result of the survey, few of the fields were those typically "land-grant" in nature.

Robertson (1928)[7] in his book on American universities and colleges has compiled a large amount of useful information with reference to graduate work, its ideals, standards, and special techniques. It is probably our best source of information with reference to the graduate schools and their fields of specialization.

Various surveys of single institutions, State systems of higher education, and entire State systems of education have contributed certain facts and recommendations relative to graduate work in land-grant fields. In a few instances, as in the survey of Rutgers University[8] there is an analysis of the functions of graduate work in the land-grant fields and recommendations for advancement. Reference will be made later to some of these surveys.

Organizations which function as accrediting agencies.—Several associations and organizations have played more or less important parts in shaping the standards and activities of the graduate schools. Certain of these require special mention and consideration, particularly the Association of University Professors, the Society for the Promotion of Engineering Education, the Association of Ameri-

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[5] George F. Zook and Samuel P. Capen. U. S. Bureau of Education, Bulletin, 1921, No. 6.

[6] R. M. Hughes, A Study of the Graduate Schools of America, Miami University, Oxford, Ohio.

[7] David A. Robertson, American Universities and Colleges, edited for the American Council on Education.

[8] Survey of Rutgers University, directed by Arthur J. Klein, New Brunswick, N. J., 1927.

can Universities, the American Council on Education, and the Association of Land-Grant Colleges and Universities. The first two named have been active through their committees in the study and evaluation of standard practice. Their findings will be noted in subsequent portions of this report. The relationships of the other associations require some elaboration at this point.

The organization which probably has been most influential in the establishment of graduate standards in the United States is the Association of American Universities. While it has adopted no regulations and has formally approved no standards, nevertheless, the discussions of the excellent papers on various phases of graduate work, and their publication in the annual proceedings have done much to strengthen the policies of the constituent membership and to improve and set standards for other institutions. Its influence has been so potent that a careful analysis of its relationship to "accrediting" of graduate work is advisable.

The association was formed in 1900 by a group of 11 universities of the United States "for the purpose of considering matters of common interest relating to graduate study." The constitutional statement as to membership qualifications is: "It is composed of institutions on the American continent engaged in giving advanced or graduate instruction." At the time of its organization it included among its members the institutions having the strongest and best developed graduate work. Since its inception it has added to its membership until, in the proceedings for 1928, twenty-eight institutions are listed. (This includes two Canadian universities.)

The presumption is, of course, strong that the association as it exists to-day is made up of the institutions with the best-developed graduate work and standards. However, at least two factors militate against the validity of this assumption. In the first place, the association is so organized that reexamination and criticism of its constituent members is difficult, at least apparently not attempted. In the second place, the basis for election to membership has departed measurably from the early standards established. The constitutional criterion for membership is the development of graduate work on a satisfactory plane in the institution under consideration. A guiding standard early offered (in 1902) was the following declaration:

> The maintenance of a well-organized graduate school and the insistence upon high ideals of scholarship in graduate study shall constitute the basis of the selection; and the association invites to membership every university that can fairly meet such a standard. * * *.
>
> For the purpose of forming a just estimate of the claims of any institution to membership in the association we need to have definite answers to the capable students: Has it adequate funds, able teachers, a good organization, capable students, an environment of university ideals? In brief, does it main-

tain a well-organized graduate school and insist upon high ideals of scholarship in graduate study? * * *

If the requirement for membership be made to consist in the carrying on, with adequate facilities, of *bona fide* graduate work in the university sense, that is, research work of the kind required for the doctorate in a first-class university, then an enlargement of the membership could only prove beneficial. * * *[9]

In spite of these pronouncements seemingly other factors are also not only significant but controlling in decisions as to election to membership. Apparently the possession of a strong undergraduate arts college is essential, and the presence also of certain professional faculties, such as law and medicine. In other words, the association excludes automatically from consideration those institutions which confine their attention strictly to the land-grant fields, as previously defined. The connotations of the name "university" apparently have thus proved troublesome in selecting members. Only institutions with the designation of "university" have been invited to membership. The somewhat uncertain meaning of the term "university" in the United States has been pointed out and analyzed by Klein (1927) in the Rutgers survey. He says:

Usage in the United States applies the common title of "university" to institutions of most divergent character. Schools offering only undergraduate work in arts and sciences by correspondence are known as universities. Great State and private institutions with graduate work in every branch of human knowledge, with professional schools providing the highest type of education for all the traditional and many of the newer professions, with research programs devoted to broadening and deepening the fields of scientific, social, and philosophical thought are known by the same title. Neither usage nor law in the United States very precisely defines the term "university." Nevertheless, the educational world has a conception of its meaning much more exact than that of either law or common habitual practice. * * *.

The graduate school has come to be an essential part of every real university; indeed, in judging of the standing of a university there is no one factor that weighs so heavily as the character of its graduate school. No true university can exist without the spirit of productive scholarship and of research work and it is this spirit more than any other that the graduate school stands for and fosters. The institution that is not contributing something to the advancement of knowledge may be a very desirable institution, but it is not a university and calling it so does not make it one. It follows that any institution that hopes to develop into a great university must make ample provision for research work and must encourage the spirit of productive scholarship in every legitimate way.[10]

This detailed discussion of the make-up of the Association of American Universities has been necessary because of the relationship which it has come to have to graduate work in general, and incidentally, therefore, to graduate work in the land-grant fields. It is

[9] Association of American Universities, Proceedings, 1902, pp. 29, 31, and 34.

[10] Survey of Rutgers University, directed by Arthur J. Klein, New Brunswick, N. J., 1927, p. 211.

true that the association apparently has never formally announced its intentions of actually taking into membership all graduate schools that meet satisfactory standards or of accrediting the graduate schools of America. It has published no standards for graduate schools comparable to those given for the accrediting of colleges in its "Memorandum of procedure for institutions seeking approval of the association for inclusion in its accepted list." Nevertheless, informally it has taken the attitude that membership in the association is a prerequisite to acceptability of an institution's graduate work and standing. Such informal claims of jurisdiction are evidenced, for example, in the following quotations from the "Memorandum" just noted:

* * * acceptability of institutions would be determined by their demonstrated ability to prepare graduates for admission to standard graduate and professional schools.

The training of the members of the faculty of professional rank should include at least two years of study in their respective fields of teaching in a recognized graduate school.[11]

They ask to be supplied with—

The number and names of students in such classes who have entered upon graduate or professional studies in specified institutions, particularly those institutions which are members of the Association of American Universities.[12]

It will be noted that the terms "*standard* graduate school" and "*recognized* graduate school" are commonly used, but without definition. The clear inference is that these terms are used to designate the institutions making up the membership of the association, and this interpretation is applied in practice by many members of the association and by the educational world in general. Robertson, in an address before the association, recognizes this fact:

Although I am aware that there are some excellent opportunities for graduate study to be found in universities and institutes not members of this association, I have used your membership list as a kind of approved list of graduate schools. Such use is common in this country and abroad.[13]

The situation just outlined has proved particularly embarrassing to graduate development in the land-grant fields, in institutions not members of the association, and self-evidently it should be clarified. Additional reasons for this conclusion may be cited. (1) Administrative officers of some institutions which are members of the association are using lack of membership on the part of other institutions, quite without other warrant, in the determination of graduate standing of transfers, acceptance of credits, and advice to applicants for admission. In other words, they are interpreting the association as an accrediting organization. The position of the

[11] Association of American Universities, Proceedings, 1928, p. 25.
[12] Ibid., p. 26.
[13] Association of American Universities, Proceedings, 1927, p. 63.

association as a de facto accrediting organization with no published standards for accrediting has led to expression of suspicions as to the frankness with which it is facing its responsibilities. (2) The position of the association has led to serious embarrassments and misunderstandings between land-grant colleges and their alumni on the one hand and foreign governments and foreign students on the other. It is not the function of this survey to suggest to the association that it formulate reasonable standards for graduate work which might be applied to the accrediting of nonmembers as well as members. It is fully recognized also that the association is powerless to change current conceptions of its functions by any denial or repudiation of intention to accredit graduate schools or their work. Nevertheless, it is highly desirable in view of the misinterpretation commonly applied to the graduate work of land-grant institutions which are not members of the association that technical institutions take definite steps to free themselves from the handicap arising from the misunderstanding of the limited purposes of the Association of American Universities.

It is not the intention to advocate that any elaborate machinery for the accrediting of graduate schools be set up by any agency. However, united action on the part of the land-grant institutions in association with other technical institutions to protect the standing of their graduate work should be taken to meet the insistence of colleges, governments, and graduate schools themselves that some kind of guarantee of standards be developed.

It has been suggested that some other agency such as the American Council on Education should accredit a list of graduate schools. Robertson (1928) has outlined the difficulties in the following statement:

It has been argued that the American Council on Education or the Association of American Universities should issue a list of approved graduate schools. It is asserted that such a list would be a great convenience for college presidents and professors in guiding their gifted students into the best graduate schools and also choosing for themselves the best places for graduate study and research. But it has been urged also that such a list would be a convenience for superintendents who desire to find for their teachers qualifying for promotion some courses that would count for the master's degree, and thus would add to the crowding of the best institutions with students not engaged in advanced study or research. It should be noted also that a list already exists in the membership list of the Association of American Universities—a list, however, which does not include the University of Cincinnati, the University of Colorado, or the Massachusetts Institute of Technology. Even if the Association of American Universities were to increase the number of members and create a new group of associate members, there might remain a problem that the Association of State Universities did not solve in 1909, when it sought to define a university as an institution qualified to offer three years of training for the degree of doctor of philosophy in at least five departments. Must we determine how many departments make a graduate school? At the California

Institute of Technology a student can qualify under Millikan for the doctorate in physics; at Rice Institute the doctorate in physics can be secured under Wilson; at the Robert Brookings Graduate School of Economics training is offered in a single field. Shall we list approved graduate schools or opportunities for graduate study and research in specific departments?[14]

Hughes' survey or rating of graduate schools was memorable and suggestive because of the significant lack of uniformity of graduate standards as between different fields in a single institution. Any form of accrediting the graduate work of an institution as a whole must necessarily lack justification and validity. It is highly desirable that graduate work be evaluated by fields or departments. It is recommended, therefore, that any accrediting plan worked out for land-grant institutions use the subject-matter field and not the institution as the basis for evaluation.

The fact that an institution has developed leadership in the field of astronomy is not necessarily correlated with leadership or even strong work in zoology, and quite certainly not with preeminence in agriculture or engineering. The statement that "the proportion of doctors trained in the less-distinguished institutions, lacking in an eminent faculty, and lacking in proper library and laboratory equipment, is constantly increasing apparently," may possibly be true, but the evidence adduced is inconclusive and not necessarily pertinent.

It is, of course, urged that no system of any kind for accrediting is advisable or necessary, each institution should stand entirely upon its own merits and reputation. Further, it is contended that such accrediting would mean frequent reevaluation of the fields of each institution, and would fall by its own weight. The fact remains that there is a *de facto* accrediting by the Association of American Universities as pointed out above, and one that has proved quite unsatisfactory to technical institutions. The recognition of the degrees of graduates of these institutions in the foreign countries, the needs of students and graduates, the peregrinations of graduate students, all apparently tend to make some action inevitable.

It is believed that the Association of Land-Grant Colleges and Universities itself is in the strategic position to sponsor all such accrediting or standardization of graduate work so far as it may be found advisable or necessary.

It is recommended, therefore, that the Association of Land-Grant Colleges and Universities take steps (1) to set up the machinery for any standardization or accrediting that may be desirable or necessary in graduate work in land-grant fields; and (2) to adopt the general principle of accrediting of graduate work (so far as this may be needed) by fields of research or subject-matter fields rather than by institutions.

[14] D. A. Robertson. *In* Problems of College Education, University of Minnesota, 1928, p. 170.

Chapter IV.—Status of Graduate Work in Land-Grant Institutions

Several different bases may be used for the determination of the present status of the land-grant institutions from the standpoint of their graduate development. These may be listed as: (1) Classification of institutions on the basis of graduate offerings and degrees conferred in the several land-grant fields; (2) classification by the Association of American Universities; and (3) classification on the basis of graduate recognition and development.

These several groupings of the institutions will be discussed in turn.

Classification of land-grant institutions on the basis of graduate offerings and degrees.—The land-grant institutions may be classified on this basis into groups as follows: (*a*) Institutions which give no advanced degrees in land-grant fields—Alaska Agricultural College and School of Mines, University of Porto Rico; (*b*) institutions which confer advanced degrees in land-grant fields; (*c*) institutions which confer the master's degree (not the doctor's) in land-grant fields—those institutions, together with the land-grant fields in which the degrees are conferred are listed in Table 8 (a total of 31 institutions are included in this group); and (*d*) institutions which confer both master's and doctor's degrees in one or more land-grant fields—these are also indicated in Table 8 (a total of 19 institutions are included in this group).

TABLE 8.—*Fields in which the degrees of master of science (or master of arts) and doctor of philosophy are conferred in the various land-grant institutions*

Institution	Agriculture			Engineering			Home economics			Teacher training			Arts and science			Commerce and business			Veterinary medicine		
	Master's	Doctor's	No advanced degree	Master's	Doctor's	No advanced degree	Master's	Doctor's	No advanced degree	Master's	Doctor's	No advanced degree	Master's	Doctor's	No advanced degree	Master's	Doctor's	No advanced degree	Master's	Doctor's	No advanced degree
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Alabama Polytechnic Institute	x			x			x			x			x			x			x		
University of Arizona	x	x		x	x		x	x		x	x		x	x				x			x
University of Arkansas	x			x			x			x			x			x					x
University of California	x	x		x	x		x	x		x	x		x	x				x			x
Colorado Agricultural College	x			x			x			x			x					x	x		
Connecticut Agricultural College	x			x			x			x			x					x			x
University of Delaware	x			x			x			x			x					x			x
University of Florida	x			x					x	x			x			x					x
Georgia State College of Agriculture	x					x	x			x			x			x					x
University of Hawaii			x			x			x	x					x			x			x
University of Idaho	x			x			x			x			x			x					x
University of Illinois	x	x		x	x		x	x		x	x		x	x		x	x				x
Purdue University	x	x		x	x		x	x		x	x		x	x				x			x
Iowa State College	x	x		x	x		x	x		x	x		x	x				x	x	x	
Kansas State Agricultural College	x			x			x			x			x			x			x		
University of Kentucky	x					x	x			x	x		x	x		x					x
Louisiana State University	x			x			x			x			x			x					x
University of Maine	x			x					x	x			x					x			x
University of Maryland	x	x				x			x	x			x	x				x			x
Massachusetts Agricultural College	x	x				x			x	x	x		x	x				x			x
Massachusetts Institute of Technology			x	x	x				x			x	x	x				x			x
Michigan State College	x	x		x			x			x			x	x				x	x		
University of Minnesota	x	x		x	x		x	x		x	x		x	x		x	x		x		
Mississippi Agricultural and Mechanical College	x			x					x	x			x			x					x
University of Missouri	x	x		x	x		x	x		x	x		x	x		x	x		x		
Montana State College	x			x			x					x	x					x			x
University of Nebraska	x	x		x			x			x			x	x		x					x
University of Nevada	x			x			x			x			x			x					x
University of New Hampshire	x			x			x			x			x					x			x
Rutgers University	x	x				x			x	x	x		x	x		x	x				x

New Mexico College of Agriculture and Mechanic Arts	x			x			x			x			x			x					x
Cornell University	x	x		x	x		x	x		x	x		x	x				x	x	x	
North Carolina State College	x			x					x	x			x			x					x
North Dakota Agricultural College	x					x	x			x			x					x			x
Ohio State University	x	x		x	x		x			x	x		x	x		x			x		
Oklahoma Agricultural and Mechanical College	x			x			x					x	x			x					x
Oregon Agricultural College	x			x			x			x					x	x			x		
Pennsylvania State College	x	x		x			x			x	x		x	x		x					x
Rhode Island State College	x			x			x					x	x					x			x
Clemson Agricultural College	x					x			x	x			x					x			x
South Dakota State College	x			x					x	x			x					x			x
University of Tennessee	x			x			x			x			x					x			x
Agricultural and Mechanical College of Texas	x			x					x	x			x					x	x		
Agricultural College of Utah	x			x			x			x			x			x					x
University of Vermont	x					x			x	x			x					x			x
Virginia Agricultural and Mechanical College	x			x			x			x			x			x					x
State College of Washington	x	x		x			x			x			x	x		x					x
West Virginia University	x			x			x			x			x					x			x
University of Wisconsin	x	x		x			x	x		x	x		x	x		x					x
University of Wyoming	x			x			x			x			x			x					x
Total	48	17	2	41	10	9	37	9	13	46	14	4	48	19	2	26	4	24	11	2	39

A study of this table shows that in all but two land-grant institutions the master's degree is conferred in one or more land-grant fields. The fields in which it is conferred listed in decreasing order of frequency are: Agriculture and arts and sciences (same number), teacher training, engineering, home economics, commerce and business, and veterinary medicine. The doctor's degree is conferred in one or more land-grant fields by 19 institutions. The fields in which it is conferred listed in decreasing order are: Arts and sciences, agriculture, teacher training, engineering, home economics, commerce and business, and veterinary medicine.

A study of Table 2 indicates a continuing tendency for additional institutions to confer the doctorate, and for the institutions conferring it to increase the number of land-grant fields in which it is conferred.

An effort was made to determine whether in the opinion of the various institutions there had been a development of any schools to a point such that they might reasonably be termed regional graduate schools. In two instances the institution named itself. One school reported Minnesota and Wisconsin to have achieved such distinction in the field of biochemistry. It seems apparent either that there has been no such special development or that it is not generally recognized.

Classification of the Association of American Universities

The classificaion of American colleges and universities that has been developed is one for the purpose of accrediting undergraduate work, and to determine eligibility of graduates to admission to the graduate schools of the members of the association. The classification is of interest, however, in that it makes it possible to compare the status of the various land-grant institutions in this list of accredited colleges and universities with their offerings as outlined in the preceding section.

The Association of American Universities differentiates four groups of institutions. Three of these groups (separated on the basis of their organization) are recognized as having sufficiently strong undergraduate work that their baccalaureate degrees are recognized as meeting standards for admission to the graduate schools of the association. Each institution accredited is placed in one of the three groups. This classification may be somewhat expanded and used to advantage in grouping the land-grant institutions. Application of such a classification (for 1928) gives the following results:

Accredited institutions.—(*a*) *Universities of complex organization, usually with graduate schools and certain professional and technological schools.*—This includes 36 American institutions, of which 28 are members of the Association of American Universities. The following land-grant institutions are members of this group, and all are members of the association: Cornell University, Ohio State University; and the universities of California, Illinois, Minnesota, Missouri, Nebraska, and Wisconsin.

(*b*) *Technological institutions.*—No note is made as to whether these do or do not have strong graduate schools. There are 22 institutions included in this group; of these 11 are land-grant institutions: Agricultural College of Utah; Iowa State College; Kansas State Agricultural College; Louisiana State University; Massachusetts Agricultural College; Massachusetts Institute of Technology; Oregon Agricultural College; Pennsylvania State College; Purdue University; State College of Washington; and the University of Maryland.

(*c*) *Colleges primarily organized with undergraduate curricula leading to the B. A. or B. S., in some cases with strong technological divisions, and occasionally a strong professional school.*—Of the 178 institutions on this list, 14 are land grant: Rutgers University; and the universities of Arizona, Arkansas, Delaware, Florida, Hawaii, Idaho, Kentucky, Maine, Nevada, New Hampshire, Tennessee, Vermont, and Wyoming.

Institutions not accredited by the association.—There are among the institutions not upon the accredited list of the Association of American Universities 19 land-grant institutions. These may be again subdivided as follows:

(*a*) *State universities ("combined" institutions).*—University of Porto Rico and West Virginia University.

(*b*) "*Separate*" *land-grant institutions.*—Seventeen schools are here included: Alabama Polytechnic Institute, Alaska Agricultural College and School of Mines, Colorado Agricultural College, Connecticut Agricultural College, Georgia State College of Agriculture, Michigan State College, Mississippi Agricultural and Mechanical College, Montana State College, New Mexico College of Agriculture and Mechanic Arts, North Carolina State College, North Dakota Agricultural College, Oklahoma Agricultural and Mechanical College, Rhode Island State College, Clemson Agricultural College, South Dakota State College, Agricultural and Mechanical College of Texas, and Virginia Agricultural and Mechanical College.

It is of interest to note that of the 19 land-grant institutions not on the accredited lists of the association all but 2 confer the degree Master of Science in one or more fields and several confer the Ph. D.

It is to be recognized, of course, that institutions are examined only upon specific request, and that there are among these unaccredited institutions some which are eligible. The standards set by the association seem to be entirely reasonable. It is somewhat anomalous, therefore, that an institution on the unaccredited list presumes to offer graduate work. This may be justified in some cases, but it is urgently recommended that all land-grant schools qualify for accrediting by this association. The accrediting by a regional association is not enough. The list actually most frequently used by graduate schools is that of the association; it is the one recognized internationally.

It is urged that any technical reason debarring an institution from the accredited lists of the Association of American Universities should be removed as promptly as practicable. Until this is done the graduates are apt to be embarrassed in their admission to standard graduate schools, and, still more important, there will be a tendency for any graduate work which they do to be discredited by other institutions.

Classification on the basis of graduate recognition and development.—This third classification is an effort to give the present status of graduate development in the various land-grant institutions. It is recognized that in some instances there may be rapid development and that there might be changes in position since 1928. In its compilation there have been taken into consideration the offerings, size of graduate schools, and evaluation by associations.

(1) *Land-grant institutions admitted to membership in Association of American Universities, with well-developed graduate work leading to the doctorate in several land-grant fields.*—The universities of California, Illinois, Minnesota, Missouri, and Nebraska, Cornell University, Ohio State University, and the University of Wisconsin.

(2) *Land-grant institutions which are not members of the Association of American Universities.*—Institutions which have well-developed graduate work leading to the Ph. D., but which are primarily technological and apparently ineligible to membership. This group includes: Purdue University, Iowa State College, Massachusetts Agricultural College, Massachusetts Institute of Technology, Michigan State College, Pennsylvania State College, and the State College of Washington.

(3) Institutions which have well-developed graduate work (at least in some fields) which are offering the Ph. D. in several fields, but which have not been admitted to membership. This includes: University of Kentucky, University of Maryland, and Rutgers University.

(4) *Institutions offering little or no graduate work beyond the master's degree.*—(*a*) "Separate" land-grant colleges: Alabama Polytechnic Institute, Colorado Agricultural College, Connecticut Agricultural College, Georgia State College of Agriculture, Kansas State Agricultural College, Mississippi Agricultural and Mechanical College, Montana State College, New Mexico College of Agriculture and Mechanic Arts, North Carolina State College, North Dakota Agricultural College, Oklahoma Agricultural and Mechanical College, Oregon Agricultural College, Rhode Island State College, Clemson Agricultural College, South Dakota State College, Agricultural and Mechanical College of Texas, Agricultural College of Utah, and Virginia Agricultural and Mechanical College.

(*b*) "Combined" State universities: The universities of Arizona, Arkansas, Delaware, Florida, Hawaii, and Idaho, Louisiana State University, the universities of Maine, Nevada, New Hampshire, Tennessee, and Vermont, West Virginia University, and the University of Wyoming.

It is evident from a study of the survey returns that there is likely to be marked increase in emphasis upon graduate work in the land-grant fields in many institutions. In one instance it is expected that English will be developed to a point that it may be used as a minor by students whose major interests are in technical fields.

Fourteen institutions specifically indicate agriculture as a field to be strengthened in graduate development. Engineering is mentioned 15 times, arts and sciences or some specific department or group in this field 15 times, home economics 3 times, commerce and business 4 times, and teacher training 9 times. These facts emphasize the appropriateness of the recommendation made previously to the effect that there should be systematic consideration of graduate work and its administration in connection with the meetings of the Association of Land-Grant Colleges and Universities.

Chapter V.—Objectives and Character of Work

We may now turn from the discussion of the origins and development of graduate work in the land-grant fields to a consideration of the objectives of the graduate schools.

There would seem to be no good reason to assume for graduate work in land-grant fields objectives which differ in any material degree from those which have been suggested for graduate work in other fields. However, a study of the formulated objectives, functions, and purposes of graduate schools shows marked variations in the statements, as well as in points of view. It seems legitimate, therefore, to set forth clearly the objectives as they seem to be working out in land-grant education. Apparently there are four which are sufficiently important for enumeration and discussion. They are (1) the advancement of knowledge through research by staff and students; (2) the training of students for research; (3) the training of students for teaching; and (4) the training of students for leadership or management in certain industrial fields.

Advancement of Knowledge Through Research by Staff and Students

Development of graduate work in any institution should be preceded by, and quite certainly must be accompanied by, an active research interest and productivity on the part of the staff. This point has been emphasized by Zook and Capen (1921), as follows:

> Research is the life blood of the graduate school. The graduate school is differentiated from the ordinary professional schools by being devoted to the principle of research. As a rule, schools of medicine and engineering, for instance, aim primarily to pass on to the student a body of knowledge which is already organized and of accepted professional value, and so to train practitioners of already standardized professions. The graduate school places first emphasis upon the advancement of learning. Its teachers are expected to be actively engaged in extending the boundaries of knowledge and to direct students in the conduct of investigations. The vitality of the graduate school is properly judged by the amount and quality of its creative output.[15]

The necessary antecedence of research to graduate work is not always recognized; particularly has this been true in the development of work leading to the master's degree. It is being ignored or in part

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[15] George F. Zook and Samuel P. Capen. Opportunities for Study at American Graduate Schools. U. S. Bureau of Education Bulletin, 1921, No. 6, p. 14.

repudiated in some schools in their development of advanced degrees in the field of education.

Certainly in land-grant fields there can be no satisfactory graduate development without sincere devotion to research. The approach to research is easier in the land-grand fields than in the older fields of the classics.

The special importance of the basic sciences to the land-grant fields has been emphasized in the report of the Kansas survey:

> It should be realized that the development of the three original functions of the land-grant colleges depends in the future as in the past on research in the basic sciences underlying agriculture, home economics, and engineering. A State is wise, therefore, if it encourages research and graduate work at a separate land-grant college not only in the application of the three major lines of work but in the basic sciences on which they depend.[16]

Training of students for research.—From the standpoint of human advancement this is probably the second most important utilitarian objective of graduate work. Research has been defined by Flinn as "the earnest, persistent, intelligently directed effort to gain new knowledge of a selected subject." The inculcation of the method and spirit of research into every qualified and worthy graduate student is the goal of every graduate school, a goal which has never been completely attained by any, and perhaps is quite unattainable in its entirety. As will be noted later, there are many opportunities open to those well trained in the methods and ideals of research. Certainly this is markedly true in the "land-grant" fields.

Training of students for teaching.—The original purpose of the graduate school was to prepare college teachers. There is at present, however, marked diversity of opinion as to whether this is to be emphasized as a graduate school objective.

There are those who would insist that while a large proportion of students who take graduate work in the United States do so with the expectation of teaching, nevertheless it is in a sense a belittlement of true graduate work to indicate preparation for teaching as a major objective. Others agree that training in research is excellent preparation for teaching. As stated by Leuschner (1928):

> The student trained for teaching by research has learned to grow with his subject. Thereby he can teach its foundations and elements more intelligently. That is why we believe in the Ph. D., or equivalent training, even for college teachers.[17]

It has been estimated that between 75 and 90 per cent of those who take advanced degrees become teachers. These figures are probably

[16] Report of a Survey of the State Institutions of Higher Learning in Kansas. U. S. Bureau of Education Bulletin, 1923, No. 40, p. 57.

[17] A. O. Leuschner. *In* Association of American Universities, Proceedings, 1928, p. 57.

somewhat high for many of the land-grant fields; nevertheless, in all fields the proportion is relatively large. There are those who would swing the pendulum to the other extreme, and would make preparation of teachers the principal function of a graduate school. As stated by Walker (1926):

> Barring a few notable exceptions, the graduate schools of America are paying scant attention to this specific function, because most American universities have taken their cue from the German system and regard their specific function as that of research. Research, to be sure, is, and will continue to be, one of the chief functions of the graduate school, but it should not remain the primary one. Our graduate schools need to recognize this other and more important function of preparing teachers, especially for college work, and to some extent for high-school work.[18]

There has been the severest criticism of the failure of our graduate schools to recognize clearly the vocational objective (teaching) of many of their students. Walker (1926) puts it thus:

> The result is that our college teachers, with rare exceptions, are not teachers, but pedants. In working for their Ph. D. degrees they have mastered one, and only one, special field. Their mechanized labor has robbed them of broad knowledge, of sympathy, of human interest, of everything that might qualify them to teach. Outside of their specialty they are often as uninformed as if they had never been to college.[19]

The disputants in this field apparently are of three principal groups. One group argues that there needs to be no recognition of the teaching objectives of graduate students; that all efforts should be concentrated upon research and its methods. A second group contends that this vocational objective is sufficiently cared for under our present system; that training in research and contact with teachers and leaders is adequate preparation. The third insists that much more emphasis should be put upon the professional training of our graduate students who expect to teach.

Without specific commitment to any one of these schools of thought, it seems evident that the vocational objective of the majority of those enrolled in our graduate schools must definitely be kept in mind, and preparation of teachers listed as one among the important objectives of graduate training. Certainly this is true for the land-grant fields as previously defined.

Training of students for leadership in certain industrial fields.—The oft-repeated statement in college catalogues to the effect that college training is "training for leadership" has led to much cynical comment and criticism of our college curricula and their human product. While fully cognizant of the difficulties in training specifically for leadership by any means at our disposal, aware also of the

[18] N. W. Walker. *In* Proceedings of Association of Colleges and Secondary Schools of the Southern States, 1926, p. 217.
[19] Ibid., p. 213.

various connotations and interpretations of the term "leadership," it must, nevertheless, be admitted that research training is a most valuable experience in preparation for certain types of industrial responsibilities. Moreover, an increasing proportion of the graduate students in certain fields are going to such positions, and these positions are increasingly to be numbered among their vocational objectives. In consequence more and more, particularly in land-grant fields, this training for certain types of executive responsibility, for leadership in short, is to be counted among the objectives of graduate land-grant education.

It is believed that clear recognition of these four objectives of graduate work, advancement of knowledge, training in the methods of research, teacher preparation, and industrial leadership, is essential. All are believed to be important in the land-grant fields, and will be stressed in the subsequent discussion and review. It is appropriate, therefore, to consider next the factors which function in the determination of the quality and character of the graduate work of an institution. Those, for example, who have taken the doctorate in fields such as that of chemical engineering have found their most important function that of supervision of industrial research establishments, and the coordination of science with industry. There are those among educators who regard this objective with considerable cynicism. Heller (1928), for example, says:

> The utilitarian trend in Ph. D. work is casually related to the lately acquired importance of the degree as a trade-mark. Having at first looked too formidably "highbrow" to the business man, its significance has been leveled down to normal commercial respectability with such success that more than one kind of job has sprung up for which the Ph. D. is next to indispensable.[20]

Factors Which Determine the Character and Quality of the Graduate Work of an Institution

Before further analysis of the graduate work in land-grant institutions, it is advisable to indicate as clearly as possible those factors which have in general proved significant in the determination of the quality and character of graduate work.

It is recognized that the evaluation of graduate work in an institution by any set of criteria is beset with many difficulties. It is highly important that results secured rather than methods used should be regarded as important. Yet it is to be emphasized that there is commonly a positive correlation between good methods and satisfactory results. Many of the land-grant colleges are at the present time endeavoring to establish their graduate work on a high plane. It is probable that the methods and experiences of institu-

[20] Otto Heller. *In* Association of American Universities, Proceedings, 1928, p. 87.

tions farther advanced may prove helpful. In other words, certain general conditions may be indicated, with strict avoidance of any desire to formulate set rules.

Analysis of survey data and of the pronouncements of various reports on the subject indicate rather clearly that six factors are of prime importance in determining the character and quality of graduate work. These may be enumerated as follows:

(1) *Training, ability, and productivity of the staff.*—Undoubtedly the best single criterion as to the graduate work of an institution is the staff. This is largely true because it is not impossible to determine the training, ability, and productivity of the members.

(2) *Time permitted to staff for research and direction of graduate work.*—A staff overloaded with undergraduate teaching or with administrative responsibilities can not develop graduate work on a very satisfactory basis. The facts in regard to this matter are also relatively easy to determine objectively with a fair degree of accuracy.

(3) *Facilities (laboratory, library, clerical, and laboratory assistants, etc.) available to staff and students.*—These are probably the most readily determined of the factors influencing graduate work.

(4) *The training and character of the graduate student body.*—This is comparatively difficult of evaluation, although the methods used, entrance standards, etc., provide considerable basis for judgment.

(5) *Organization and supervision.*—An ideal graduate school has been thought to be one in which there exists the minimum of organization and supervision. When graduate students are few in number, and are "apprenticed" to experienced and sympathetic researchers, this may be satisfactory. With larger numbers, however, the necessity arises for organization and some degree of supervision. Without some regulation, conditions would become chaotic. As long as the goal of the graduate student is the attainment of a degree, some amount of standardization is inevitable. The problem is to hold this to a minimum.

(6) *Character of graduate offerings.*—This factor involves several highly controversial problems. There is a fundamental lack of agreement among those administering graduate schools as to the relationships of so-called undergraduate and graduate work. One group would differentiate the graduate work very sharply from the undergraduate; the other believes that this line of demarcation should be drawn between the junior and senior college, rather than between the senior college and the graduate school. The problem of standards for graduate offerings is difficult.

It is evident that our further study of the graduate status in land-grant institutions will be concerned largely with these six factors.

Chapter VI.—Organization and Administration

Numerous agencies exercise overhead control of graduate work and the functions of these are quite variable. In every instance the president of the institution, or the chancellor, is probably the most important agency of control. Almost as universal is the control exercised by the governing board of the institution. In three cases there is likewise responsibility to a State board of education. In several cases the governing board is a State board of agriculture. In the majority of cases there is an academic or institutional council of some kind (board of deans, senate, administrative board, etc.). In many there is an institutional business manager. More or less control may also be exercised by various other State officers, organizations, or commissions such as a State board of business control (in 3 cases), in at least 11 cases the governor of the State, in 9 a State budget director, in 2 a board of higher curricula, in 1 the State executive council. In at least 3 institutions the State printing commission supervises publications in some degree. In nearly all cases the State legislature through its control of appropriations exercises a major financial influence, though rarely is there any further degree of direct administrative control by this body.

These overhead control agencies exercise a variety of functions. They pass finally upon recommendations of the graduate school with reference to the conduct of its graduate work; they coordinate its activities with those of the undergraduate colleges; perhaps most important they determine the factors which affect primarily the external relationships. In particular they coordinate the work of the graduate school with various external agencies such as other schools. These functions of control of external relationships of the graduate schools are deserving of further analysis, as they have been critically important in many States.

Organizations and Agencies which Affect the External Relationships of Graduate Schools

Practically all of the land-grant schools are State institutions. It follows, therefore, that one of the important functions exercised by the various overhead agencies is the coordination of graduate work in land-grant schools with that of other State institutions.

In 26 of the States the land-grant fields are incorporated in the State universities. In these, problems of overlapping and coordination with other State institutions are not common, though they occur in a few instances. In three the land-grant school is the only State institution and there can be, therefore, no conflict of interests.

In 21 States, however, the land-grant institution is separate from the State university, and many problems have arisen in the development of graduate work at the two institutions. The States which have thus chosen to divide the field between two institutions are Alabama, Colorado, Georgia, Indiana, Iowa, Kansas, Michigan, Mississippi, Montana, New Mexico, North Carolina, North Dakota, Oklahoma, Oregon, South Carolina, South Dakota, Texas, Utah, Virginia, and Washington. It is of interest to note the devices which have been employed with varying degrees of success in handling the overlapping of graduate interests in these States.

As stated in the survey of the educational system of South Dakota:

> Experience and theory apparently justify two principles for the organization of higher education: (a) That, whenever possible, all higher education, other than that of the normal schools, should be consolidated in a single State university; (b) that, whenever two or more higher institutions are established definite fields should be assigned to the different institutions, and great care should be taken to so coordinate the work of the institutions as to prevent wasteful duplication of courses or departments.[a]

This need of coordination becomes particularly manifest in the graduate work. The fields in which duplication occurs and the extent of the duplication vary widely in different States. The situation may be briefly reviewed.

Duplication in agriculture (including forestry).—This is the field in which there exists the minimum of duplication and consequent need of coordination of graduate work between separated land-grant colleges and universities. In one State (New York) a school of forestry was established by the State legislature at an institution other than the land-grant school; both Cornell University and Syracuse University offer graduate work in forestry. It is possible also that the development in agriculture at the recently created agricultural school on Long Island may lead to difficulties or duplications. In a few cases, a field which in most States is regarded as a land-grant field primarily, is allocated to the State university, as forestry in Washington.

Perhaps the tendency to duplication has been most pronounced in certain applications of the social sciences. Because of their great economic importance the subjects of agricultural economics and rural

[a] Educational System of South Dakota. U. S. Bureau of Education Bulletin, 1918, No. 31, p. 256.

sociology have shown considerable graduate development in the separate land-grant schools. Similarly they have developed in the separate State universities as a part of the normal growth of departments of economics and of sociology. It should be noted, however, that those "combined" universities which have shown maximum growth in these fields have developed them largely independently of the social science departments of the arts college. On the whole, however, there have been relatively few conflicts of interest between State schools over graduate development in agriculture.

Duplication in engineering.—This field has not infrequently been duplicated in separated land-grant schools and State universities in the same State. Of the separate land-grant schools, only Massachusetts Agricultural College and the Agricultural College of Utah report no college of engineering. In these institutions the engineering courses taught are purely service in character, i. e., there are no engineering curricula. In the former State the land-grant engineering institution is the Massachusetts Institute of Technology, in the latter all engineering curricula are located at the State University of Utah. There is, therefore, apparently almost complete unanimity of opinion as to the propriety of inclusion of engineering as a major land-grant field. On the other hand, in most States in which the land-grant institution is separate from a State university, there is development also of an engineering college at the university as well. This expensive duplication of effort has led to numerous surveys and reports. In practically all cases the duplication has been decried as unnecessary and wasteful, but in very few instances has there been any entirely satisfactory disposition of the matter. Attempts to adjust duplication have in general been based upon one or other of the following concepts.

(1) *Differentiation on the basis of level of instruction.*—It has been suggested that one institution might give the elementary and professional work—that is, administer the curriculum of the standard engineering college—and the other provide for the graduate and special fields of work, and develop the research. The fallacies of such a proposal are evident, and such segregation has not been and probably can not be carried out in practice.

(2) *Differentiation on the basis of advantageous locations or facilities.*—In Alabama a survey commission recommended special emphasis on mining engineering at the State university because of its advantageous location near the mining district of the State. Apparently this recommendation was followed, for no curriculum in mining engineering is offered by the Alabama Polytechnic Institute. In Iowa, the location of the State university at the site of a hydraulic plant has led to special emphasis at this institution on graduate work

and research in hydraulic engineering, while at the land-grant institution this has been regarded as a service subject only.

In other cases the advice given has not been so satisfactory. It has been suggested, for example (as in Iowa) that the development in civil engineering should be emphasized at the land-grant institution, and the closely related sanitary engineering at the State university where there is a strongly developed medical school. Such a suggestion ignores the facts that the relationships between civil engineering and sanitary engineering are far more intimate and vital than between medicine and sanitary engineering.

It is not improbable that the maintenance of two engineering schools by a State will prove increasingly burdensome with the lapse of time. Graduate and research work are rapidly becoming more significant in engineering. They are relatively expensive. One land-grant school (largely through industrial grants) is expending several hundreds of thousands of dollars annually on research and industrial service.

Apparently land-grant institutions which are in States in which this duplication exists are relatively complacent as to the situation, for in no case was there evidence in the statements in the replies to the questionnaires of serious or impending difficulties.

It should be noted that engineering, unlike certain other divisions, does not usually provide service work to any considerable degree to any division other than agriculture. Its consolidation in one place does not, therefore, to any marked degree deprive students in other fields of needed opportunity to take engineering studies as supporting work. The results of such consolidation would, therefore, not be disastrous, as would the consolidation, for example, of all work in arts and science at one institution.

Duplication in home economics.—The subject of home economics is taught by all land-grant institutions which are coeducational. It is also taught in many of the separate State universities. Home economics differs from agriculture and from engineering in that it is a common and satisfactory constituent of other curricula in which women enroll. In general the greatest demand for instruction in home economics comes from those who expect to teach this subject. It is evident that some duplication of home economics between land-grant school and State university is justifiable. In most cases, however, the graduate development, the specialized curricula in home economics, and the development of home economics for teachers, and as a professional field is primarily a land-grant college function. This type of allocation, as a service subject in the university and as a major field in the land-grant school is recognized increasingly by the States concerned. This type of segregation is also increasingly necessitated by the development of graduate work in the field of home economics.

It is apparent, however, from a study of the research developments in home economics that there is growing emphasis upon sociology and consumption economics in their relationships to the home. These are stressed particularly in the home economics research projects of the agricultural experiment stations. The situation in these fields is apparently developing in a manner analogous to the development in agricultural economics and rural sociology, and may give rise to some duplication.

Duplication in arts and sciences.—The maximum of duplication between State schools, particularly in their graduate development, is to be found in arts and sciences. This is because these must be integral parts of satisfactory graduate work in all technical or professional fields. While the points of emphasis may be differentiated in the graduate growth in the sciences as between a land-grant school and a State university, and coordination with minimizing of expensive duplication may be effected, nevertheless, there must be in both types of institution adequate opportunity for upreach of the basic sciences into the graduate school. In several cases it is apparent that land-grant institutions are suffering from unwise endeavors to restrict reasonable development in these fields. In some cases this has arisen from recommendations that have grown out of surveys.

Duplication in teacher training.—The common allocation of vocational (Smith-Hughes) teacher training to land-grant colleges has led in recent years to considerable graduate growth. Practically all the land-grant schools are conferring the master's degree in this field. In most separate State universities, on the other hand, there are well-developed schools or colleges of education, likewise giving graduate work. This simultaneous development of two graduate schools of education in the two State institutions brings many problems. There are those who insist that all work beyond the bachelor's degree should be handled by the school of education of the State university. Others insist that graduate work in the field of vocational education can be given satisfactorily only in a technical institution. It is believed practicable in most cases for the fields of general and vocational education to be sufficiently sharply delimited on the graduate plane so that there will be a minimum of duplication. Quite certainly the development of the work in vocational education to the master's level in land-grant institutions is entirely justified and should be encouraged where facilities can be made adequate. In some instances it may be possible to develop such graduate work to the doctorate level; in many cases it would be advisable for land-grant school and university to cooperate.

Much of the course work required beyond the master's degree may well be concentrated at the university. On the other hand, the land-grant institutions in general possess much better contacts and facilities for directing research work in vocational education. The problem of suitable coordination and cooperation is relatively complex, and requires adjustment on the basis of local conditions and State needs, but no single means of adjustment will prove more valuable than free movement of students between the two separated institutions. It is urged that teacher training in certain technical fields is a legitimate land-grant function, and that opportunity for reasonable graduate development should not be denied to separate land-grant schools.

Duplication in commerce and business.—There has been comparatively little graduate development in most land-grant schools in this field. In States with separate universities the college of commerce and business is sometimes a part of the university, in others a part of the land-grant school. In one case at least (Oregon) there has been some attempt to allocate the undergraduate work to the land-grant school and the graduate work to the university. This type of horizontal allocation on the basis of level of instruction is probably inadvisable and seems bound to failure.

It seems that local and State conditions have been largely instrumental in determining the allocation of this work to one school or to another. Where it has been allocated to a State university the following facts need clear recognition: (1) Certain phases of commerce and business are necessarily integral parts of the curricula of colleges of agriculture, engineering, etc.; (2) research in agriculture, engineering, etc. (as in the agricultural experiment stations), necessitates research to some degree in the commercial and business aspects of these professions; (3) strong graduate work in agriculture, engineering, etc., requires some work on the graduate level in commerce and business.

It should be possible, in most cases at least, to find vertical lines of cleavage which will prevent undue and wasteful duplication between schools in the field of commerce and business.

Duplication in veterinary medicine.—No State institution other than a land-grant school operates a college of veterinary medicine. It would seem, therefore, that the necessary development of graduate work in veterinary medicine can give rise to no duplication or controversy between State schools. In some aspects, research and consequently graduate work in human medicine and in certain of the sciences may overlap or duplicate in part that in veterinary medicine. There are diseases of animals which are of major significance in human medicine because of their transmissibility to man. Many problems in histology, pathology, and physiology must be attacked both by researchers in medical and veterinary schools in the same general manner. However, the probable overlapping or duplication is so inconsiderable as scarcely to warrant any special consideration. Graduate work in veterinary medicine, as in agriculture, is distinctively and almost exclusively a land-grant problem.

The agencies which are designed to serve as a check upon unnecessary or undesirable duplication have been varied. In one State the two institutions have been placed under a single chancellor. In several States the schools are under a single governing board of regents. In still others committees of presidents and faculty members have served to coordinate the work and present undue duplication.

In several instances, even though the statement is not made directly by the institutions, it is apparent that the problems with respect to duplication have not been solved, and the situation is unsatisfactory. Expensive duplication in engineering has not been corrected in several States and will almost inevitably lead to duplication of set-ups for expensive research and graduate work. In other cases there has not been a proper appreciation of the necessity of science development on the graduate plane as an essential adjunct to research in the technical fields.

Previous Surveys of Specific Land-Grant Colleges and Their Results

Several survey commissions or committees have been called upon to study the problems of land-grant institutions in various States. In some cases the problems investigated were those of organization wholly within the institution, in others the land-grant school was included as a part of the educational system of the State as a whole, in still others emphasis was upon a coordinated system of higher education for the State.

Enough "surveying" has been done in which some attention has been paid to graduate development in land-grant fields to warrant a brief review of certain recommendations as to coordination.

A principle laid down by the first Iowa Survey,[22] and one which has found wide acceptance in all endeavors to avoid wasteful duplication between State institutions, is that of "major lines." While too narrowly interpreted in some cases, this principle has proved most useful. From the standpoint of graduate work it may be paraphrased as follows for States with separate land-grant schools and State universities: (1) In graduate development the two institutions should be regarded as coordinate parts of the university

[22] State Higher Educational Institutions of Iowa. U. S. Bureau of Education Bulletin, 1916, No. 19.

system of the State; (2) in general the major land-grant fields previously enumerated should be developed at the land-grant institutions. Specifically wherever undergraduate colleges of engineering, home economics, agriculture, teacher training, and veterinary medicine are located at land-grant institutions, graduate work in these fields, if developed at all, should be developed at the same institutions; (3) it must be clearly recognized that graduate work in the technical and professional fields already noted can not be developed satisfactorily in an institution which is severely limited as to its graduate work in the sciences. Reasonable interinstitutional understandings are possible which will prevent serious duplication and in some cases the well-developed offerings of each institution may be made to serve the needs of students in the others; (4) In general there should be some functioning interinstitutional faculty committee constituted to consider problems of duplication or overlapping in the graduate field. Possibly in some cases final authority with reference to any field represented in both institutions might well be vested in a joint graduate committee.

A review of the results of various surveys so far as they have affected graduate work indicates that occasionally there has been a tendency to draw a horizontal rather than a vertical line of demarcation between the two State schools, the possession of the name "university" by one of the schools has apparently led to a misapprehension as to the relative position of the two. This has sometimes proved unfortunate.

Particularly in some of the surveys there has been manifested a tendency to regard graduate work and research in the science fields as more or less exclusively the prerogative of the university.

Organization of the Graduate Work and Factors which Primarily Affect Internal Relationships

Inasmuch as practically all land-grant institutions confer advanced degrees in one or more land-grant fields it is evident that there must be in each some organization which functions more or less definitely as a graduate school.

Administrative officers.—The graduate schools which are more fully organized usually possess a dean (or director), an executive committee, and less frequently, a graduate faculty. Several others have a chairman of an executive committee who performs many of the functions of a dean.

Of the land-grant schools the following have deans or directors of the graduate school (a total of 23): Alabama Polytechnic Institute, University of Arkansas, University of California, Georgia State College of Agriculture, University of Idaho, University of Illinois, Iowa State College, University of Kentucky, Louisiana State University, University of Maine, University of Maryland, Massachusetts Agricultural College, Massachusetts Institute of Technology, University of Missouri, University of Nebraska, University of New Hampshire, Cornell University, North Carolina State College, Ohio State University, Pennsylvania State College, Agricultural and Mechanical College of Texas, and University of Wisconsin.

Graduate committee.—A committee on graduate work is organized at practically all the institutions which offer any graduate work. It is an appointed committee at all institutions except Maine, where it is elected by the college faculties. Appointment of the members of the committee in one school is by the academic senate, in four cases by the dean of the graduate school, in one by the director of agriculture, and in all other cases by the president or the chancellor.

In recommending the establishment of such a committee, the Rutgers (1927) survey commission[29] clearly outlined its duties. The functions as there outlined may be thus condensed into the following paraphrase: (1) The committee should formulate a graduate code, to be submitted for approval to the graduate faculty, senate, or corresponding legislative academic body; and (2) the committee should administer the graduate work under the provisions of the code, and particularly (*a*) pass upon all applications for admission to the graduate school; (*b*) pass upon courses offered for graduate credit; (*c*) be represented by one or more of its members at oral examinations for each graduate degree; (*d*) pass by suitable methods on the suitability and adequacy of theses; (*e*) pass upon candidates for scholarships and fellowships; and (*f*) encourage productive scholarship and research.

In the succeeding discussions of the details of graduate administration, there will be frequent mention of functions performed by the graduate committees of various institutions.

The names given to this committee in different institutions are of some interest. Details as to the name and constitution of this committee are given for each institution in the accompanying table.

[29] Survey of Rutgers University, directed by Arthur J. Klein. New Brunswick, N. J., 1927.

TABLE 9.—*Name applied to graduate committee and its size in land-grant institutions*

Institution	Name of committee	Number of members
Alabama Polytechnic Institute	Committee on graduate studies	8
University of Arizona	Graduate study committee	5
University of Arkansas	Committee on honorary and higher degrees	6
University of California	Council of the graduate division	23
Colorado Agricultural College	Committee on advanced degrees	3
Connecticut Agricultural College	Graduate committee	5
University of Delaware	Committee on advanced degrees	5
University of Florida	Committee on graduate studies	8
Georgia State College of Agriculture	Post graduate committee	Large.
University of Hawaii	Committee on graduate work	8
University of Idaho	Graduate council	7
University of Illinois	Executive faculty of graduate school	14
Purdue University	Committee on graduate study	16
Iowa State College	Graduate committee	13
Kansas State Agricultural College	Graduate council	7
University of Kentucky	Graduate school committee	5
Louisiana State University	Executive committee of graduate council	3
University of Maine	Executive committee	7
University of Maryland	Graduate council	14
Massachusetts Agricultural College		7
Michigan State College	Committee on advanced degrees	6
University of Minnesota	Executive committee of the graduate school	8
Mississippi Agricultural and Mechanical College	Graduate studies committee	3
University of Missouri	Administrative committee of the graduate school	5
Montana State College	Committee on graduate study	3
University of Nebraska	Graduate council	9
University of Nevada	Graduate committee	3
Rutgers University	Committee on graduate study	5
New Mexico College of Agriculture and Mechanic Arts	Committee on graduate study and advanced degrees	6
Cornell University		13
North Carolina State College	None	
North Dakota Agricultural College	Graduate committee	[illegible]
Oklahoma Agricultural and Mechanical College	Committee on graduate study	4
Pennsylvania State College	Executive committee of graduate faculty	6
Rhode Island State College	Committee on advanced degrees	3
South Dakota State College	do	5
University of Tennessee	Committee on graduate study	8
Agricultural and Mechanical College of Texas	Executive committee of the graduate school	5
Agricultural College of Utah	Committee on graduate work	5
University of Vermont	Committee on degrees	7
Virginia Agricultural and Mechanical College	Committee on graduate work (School of Agriculture)	5
State College of Washington	Committee on graduate studies	9
West Virginia University	Committee on graduate work	5
University of Wyoming	Committee graduate students	7

Graduate faculties.—In none of the institutions is there a graduate faculty made up of staff members who teach exclusively in the graduate school. It is evident, therefore, that wherever organized, the graduate faculty must consist, in part at least, of the members of other faculties.

About half the institutions report the recognition of a graduate faculty, in some instances a paper organization only, in others as an organization with distinct functions and authority. The membership varies from 10 (the smallest reported) to several hundred.

From the standpoint of the future of the "land-grant" fields it is important that those who are acting as administrators have a sympathetic understanding of its implications. A survey of the fields of specialization of those who act in these capacities reveals some interesting facts, which are shown in Table 10.

TABLE 10.—*Fields of specialization of those who act as deans of graduate schools or as chairmen of graduate committees in land-grant institutions*

Institution	Position with reference to graduate work	Other college or university position
Alabama Polytechnic Institute	Dean, school of graduate studies.	Head, professor of history.
University of Arizona	Chairman, graduate study committee.	Professor, agricultural chemistry.
University of Arkansas	Dean, graduate school	Professor, English.
University of California	Dean, graduate division	(Soil bacteriology and plant nutrition.)
Colorado Agricultural College	Committee on advanced degrees.	Professor, zoology and entomology; State entomologist; director, agricultural experiment station.
University of Delaware	Chairman, graduate studies and research.	Professor, English.
University of Florida	Committee on graduate studies	Dean, college of arts and sciences; professor, ancient languages.
Georgia State College of Agriculture.	Dean, graduate school	Professor, mathematics.
University of Hawaii	Chairman, committee on graduate study.	Professor, geology.
University of Idaho	Acting dean, graduate school	Dean, university faculty; acting dean, college of letters and sciences; professor and head, modern languages; acting director, premedical studies.
University of Illinois	Dean, graduate school	Professor, philosophy.
Purdue University	Chairman, committee on graduate study.	Head, department of applied mechanics.
Iowa State College	Dean, graduate school	Head, department of bacteriology; chief in bacteriology, agricultural experiment station.
Kansas State Agricultural College.	Chairman, graduate council	Professor, zoology; parasitologist, agricultural experiment station.
University of Kentucky	Dean, graduate school	Professor, zoology.
Louisiana State University	Chairman, committee on graduate courses.	Professor, chemistry.
University of Maine	Dean, graduate study	Professor, Latin.
University of Maryland	Dean, graduate school	Professor, plant physiology and biochemistry.
Massachusetts Agricultural College.	Director, graduate school	Professor and head, entomology.
Massachusetts Institute of Technology.	Dean, graduate students	Head, electrochemistry.
Michigan State College	Committee on advanced degrees	Professor, botany.
University of Minnesota	Dean, graduate school	Professor, history.
Mississippi Agricultural and Mechanical College.	Chairman, committee on graduate study.	President.
University of Missouri	Dean, graduate school	Professor, Latin.
Montana State College	Chairman, committee on graduate studies.	Professor, entomology.
University of Nebraska	Dean, graduate college	Professor, chemistry.
University of Nevada	Chairman, graduate committee	Professor, chemistry; dean, college of arts and sciences; vice president.
University of New Hampshire	Director, graduate school	Professor, mathematics.
Cornell University	Dean, graduate school	Professor, botany.
Rutgers University	Chairman, committee on graduate work.	Professor, chemistry.
New Mexico College of Agriculture and Mechanic Arts	Chairman, committee on graduate study and advanced degrees.	President; dean, school of agriculture.
North Carolina State College	Dean, graduate school	Director, bureau of economics and social research.
North Dakota Agricultural College.	Chairman, graduate committee.	Professor, English and philosophy.
Ohio State University	Dean, graduate school	Professor, chemistry.
Oklahoma Agricultural and Mechanical College.	Chairman, graduate courses	Professor and head, entomology.

TABLE 10.—*Fields of specialization of those who act as deans of graduate schools or as chairmen of graduate committees in land-grant institutions*—Continued

Institution	Position with reference to graduate work	Other college or university position
Oregon Agricultural College	Chairman, graduate committee.	Professor, highway engineering.
Pennsylvania State College	Dean, graduate school	Professor, botany.
Rhode Island State College	Chairman, committee on advanced degrees.	Dean, science; professor, zoology.
Clemson Agricultural College	Chairman, graduate studies	Professor, geology.
South Dakota State College	Chairman, committee on advanced degrees.	
University of Tennessee	Chairman, committee on graduate study.	Professor, Greek and Greek archeology.
Agricultural and Mechanical College of Texas.	Dean, college; dean, graduate school.	Professor, mathematics.
Agricultural College of Utah	Chairman, committee on graduate work.	Dean, faculty; professor, physics.
University of Vermont	Chairman, committee on undergraduate and graduate degrees.	Professor, botany.
Virginia Agricultural and Mechanical College.	Chairman, committee on graduate programs and degrees.	Professor, applied mathematics.
State College of Washington	Chairman, committee on graduate study.	Head, botany.
West Virginia University	Chairman, committee on graduate work.	Professor, romance languages.
University of Wisconsin	Dean, graduate school	Professor, applied mathematics.
University of Wyoming	Chairman, committee on graduate students.	Professor of philosophy and psychology.

In 25 "combined" institutions the fields of specialization of those administering graduate work either as deans of graduate schools or as chairmen of graduate committees are as follows: Of 11 in the humanities, there are 4 in ancient languages, 2 in English, 2 in modern languages, 1 in history, and 2 in philosophy; of 14 in sciences, there are 1 in bacteriology, 3 in botanical sciences, 6 in chemistry, 1 in geology, 2 in mathematics, and 1 in zoological sciences.

In 19 "separate" institutions the fields of specialization of administrators of graduate work are: Of 3 in the humanities, there are 1 in English, 1 in history, and 1 in economics; of 16 in science or technology, there are 1 in agriculture, 3 in botanical sciences, 1 in electrochemistry, 1 in geology, 1 in highway engineering, 2 in mathematics, 1 in mechanics, 1 in physics, and 6 in zoology or entomology.

In 56 per cent of the "combined" schools the administrative head of the graduate work is one whose field of specialization has been in a land-grant or closely allied field. The corresponding per cent in the "separate" institutions is 84. It is not to be inferred that graduate administrators should be drawn necessarily from among the "land-grant" specializations.

If a graduate faculty is to be a functioning organization, that is, one which constitutes the final authority in graduate matters, the manner in which membership is determined is a matter of some importance. This is particularly true in any institution in which graduate work is developing, and the standards are in process of being fixed. It is urged that a graduate legislative faculty be made up only of those who by training and experience have proved themselves fully competent in research and to direct graduate work. The various land-grant institutions have used several methods of determining membership of graduate faculties where these have been designated. In three the president appoints the members. In three membership is determined by rank in the staff, and in others it is made up of all of those who have been designated by departments as in charge of courses open only to graduate students.

The method of selection favored by several institutions, and one which probably has proved most satisfactory in the institutions in which graduate work is relatively plastic, is election by the graduate faculty itself upon nomination of a committee, usually the graduate committee. This method of selection was indicated by 5 institutions. The president is usually included in the membership in 4 cases, the librarian in 2, the deans of the colleges or divisions in 10, and the director of the agricultural experiment station in 10.

Finances and budget of the graduate school.—In ~~land-~~grant institutions generally there is no distinct segregation of budgets and funds of the graduate school from those of the undergraduate colleges and research agencies. This does not mean that there is no "graduate budget" at all, but that in use of buildings, apparatus, materials, and staff, dissociation of graduate costs is difficult. It is quite possible that in spite of the difficulties involved, a budgetary allocation of costs of graduate work may be developed. Salaries are among the most important of the costs and might readily be allocated. The solution of the problem of developing a satisfactory allocation of building and equipment costs is not impossible. Such assistance to our educational accounting is desirable, and must be accomplished in the future if an adequate objective view of the graduate and research work of an institution is to be obtained or if it is to be evaluated in its entirety.

While no satisfactory system has as yet been developed to segregate the funds used for graduate work in any of the ~~land-grant~~ institutions, nevertheless, it is of interest to note to what extent special research or other funds are made available to the graduate school for the promotion of its graduate program. In several institutions there is a provision of a fund to be allocated for the development of research at the discretion of a competent committee of investigators from the graduate faculty. Such funds vary in amount in different land-grant institutions from a few hundred dollars to $50,000 or more.

Among the institutions which have reported some provision of this type may be mentioned the University of Florida, Georgia State College of Agriculture, University of California, University of Minnesota, Purdue University, Iowa State College, Agricultural and Mechanical College of Texas, University of Vermont, Virginia Agricultural and Mechanical College, and the University of Wisconsin. In some cases the funds are allotted to departments, or individuals, by special research committees, in some cases by deans of subject-matter divisions, in other cases directly by the president of the institution. In most instances the funds for this purpose have been allotted only within comparatively recent years and methods of allocation are not standardized.

It is recommended that land-grant institutions which plan to develop graduate work to any degree should definitely make avail-

able funds for the financing of the research problems of the graduate staff and students. It is true that in most institutions the major portion of such funds will be designated in the budgets of departments, sections of experiment stations, etc., but it is highly desirable that there be a mobile general fund to care for the shifting needs of the departments offering graduate work. A suitable central administration of such a fund may be extremely useful in building a graduate school. It should be available if practicable for a variety of purposes, among them the specific financing of the research of graduate students, the allotment of funds to staff members for research which can not be satisfactorily financed otherwise, the financing of visits of speakers of importance in scientific and technical fields, the financing of exchange and visiting professorships, the financing of special studies of graduate administration and development, the publication of monographs, and the financing of scholarships and fellowships. Where such mobile funds have been available they have proved most useful and stimulating.

Chapter VII.—The Graduate Staff

The most important single factor in the development of satisfactory graduate work is a suitable graduate staff. It is not easy, however, to formulate a statement which will serve as a defensible or universal criterion of such staff adequacy. The problem has been particularly difficult in technical fields; such as agriculture, home economics, and engineering.

Dean Mumford has well characterized the situation to be avoided in technical graduate schools in choice of members of the graduate staff. His points are made with reference to agriculture; they apply equally well to other fields.

Until we are willing to make a professorship in a college of agriculture a prize which may be won only by those of the highest preparation, as well as successful experience, we may not hope for great improvement. There has recently come to the writer's attention a young man, recently graduated from a college of agriculture with the degree of bachelor of science in agriculture, who is directing the work of graduate students who are candidates for the doctor of philosophy degree. It would seem to be self-evident that a man of limited experience who has not himself been trained in graduate work can not be fully qualified to direct others in advanced study. This is particularly true in the case of young men who have recently received an undergraduate degree and who have not had opportunity for advanced study. It is conceivable that a man of large experience and successful achievement in scientific research might direct a group of graduate students, but it is difficult to understand how the inexperienced man, without advanced training, can satisfy the requirements which should obtain in a graduate faculty. In the writer's opinion, there has been a material improvement in the past 15 years and this improvement has been coextensive with the progressive development of graduate study to a higher type of fundamental research in institutions where colleges of agriculture are important divisions. If our institutions are to maintain their place among higher institutions of learning, then we must insist upon a higher appreciation of scholarship and must develop among ourselves and our faculties the scholarly point of view. It is certain that we can not safely ignore or neglect an appreciation of those fundamental intellectual values in higher education which have been recognized for generations as essential in the development of colleges and universities.[21]

An efficient graduate staff must likewise be a research staff. The development of the research staff depends not only upon securing individuals with adequate training, but in securing those who are interested and insistent upon research, in providing them with essential facilities, and in seeing that they have the time to do their work properly.

[21] F. B. Mumford. *In* Proceedings of Association of Land Grant Colleges, 1922, p. 143.

An analysis of the situation with reference to the personnel responsible for the development of graduate work would seem to require consideration of the following topics: (1) The academic training of the graduate staff as a whole; (2) the academic training of faculty advisors, chairmen of students' committees, etc.; (3) the size of the staff as shown by the numbers in charge of courses of graduate and other grades; (4) the policy as to recognition of qualified individuals not on the staff as directors of graduate work; (5) the evaluation and distribution of the teaching and service loads of members of the graduate staff.

Academic Training of Staff

It is of interest to note that "degree" tests have been suggested or used to determine eligibility of staff members of the graduate faculty or to teach graduate students. Some examples may be given to illustrate variations in practice. One institution which offers graduate work leading to the degree of master of science (not the Ph. D.) requires that members of the graduate faculty in agriculture and in engineering have at least the bachelor's degree, in teacher training the Ph. D. or its equivalent, in arts and sciences the Ph. D. "for new heads," in commerce and business and in home economics the master's degree (in case of additions). A second institution states as prerequisite to membership in the graduate faculty "the master's degree and some productive research." Another institution usually requires the Ph. D. of graduate faculty members; in certain technical departments the criterion is the possession of a professional degree; head of departments who have a master's degree may qualify as members. Another quite appropriately specifies "Demonstrated ability and scholarship," another, "College training. Foreign study desired. Professional preparation for teaching. Teaching experience. Publications." The statement of another is, "Any faculty member with the master's degree is eligible to teach graduate work."

It is apparent that degree qualifications in practice are quite unstandardized. Some efforts have been made by associations and individuals to formulate qualifications. One such group is the home economics section of the Land Grant College Association, which has studied the problem of teacher qualifications in graduate home economics. The following recommendation of the research committee was approved by the council in 1922.

> The research committee recommends that the association indorse the following qualifications as essential in those college faculty members who assume charge of, or responsibility for, research work prosecuted by home economics students.
>
> Graduate courses and research work equivalent to that required for a doctor's degree, if this be possible and practicable to secure. Otherwise one or two years of graduate work in some graduate school of recognized standing should

be insisted upon and evidence should be presented of the successful prosecution of original investigation in the form of written or published reports of such investigation. This evidence should be such as to be satisfactory to the dean or faculty committee of the graduate school concerning the fitness of the candidate for directing research work.

This committee recognizes the fact that not only do the qualifications required of teachers of graduate courses vary in different institutions, but so also do the qualifications required of candidates for advanced degrees and that if we set an arbitrary standard of qualifications for teachers of graduate courses we shall have to face the very practical questions: Are there suitable and available candidates in sufficient numbers to go around? If not, what can be done about it?[25]

One index to the character of the personnel of the graduate "faculty" (even though not so designated) and to the current tendency in development of standards in graduate work, is a compilation of the highest degrees possessed by those added to the faculty in the past five years (1924–1928, inclusive). Of particular significance are the different "degree" standards set by recent appointments in different institutions and in various land-grant fields. The situation in two "combined" universities with strong graduate schools (members of the Association of American Universities) may first be analyzed. The pertinent data are given in Table 11.

TABLE 11.—*Degrees possessed by new appointees to graduate faculty in two land-grant universities, 1924–1928*

Institution	Number of appointees in field of—											
	Agriculture		Engineering		Home economics		Teacher training		Arts and sciences		Commerce and business	
	With Ph. D.	Without Ph. D.	With Ph. D.	Without Ph. D.	With Ph. D.	Without Ph. D.	With Ph. D.	Without Ph. D.	With Ph. D.	Without Ph. D.	With Ph. D.	Without Ph. D.
1	2	3	4	5	6	7	8	9	10	11	12	13
No. 1	7	1	3	10	1	1	9	1	43	0	8	2
No. 2	13	4	9	13	2	4	......	......	31	5	4	0
Total	20	5	12	23	3	5	9	1	74	5	12	2

Both of these institutions possess strong colleges of agriculture and are emphasizing graduate work. At least 80 per cent of the appointments being made are of men with the doctorate. The situation in engineering is complicated by the fact that in one case the school of chemistry is included. Probably less than 20 per cent of the appointees in this period possessed the doctorate. The appointments in home economics were small in number, fewer than half had the Ph. D. In teacher training, in arts and sciences, and in commerce and business appointees generally possess the degree.

[25] Proceedings of the Association of Land-Grant Colleges, 1922, p. 326.

An examination of the practice in other graduate schools of the same scope and standing gives very similar results. Apparently the best practice may be summarized as follows:

(1) *Appointments to a graduate staff or graduate faculty in the fields of arts and sciences, teacher training, or commerce and business should rarely be made from those who have not completed graduate work to the Ph. D.*—It should be recognized clearly that this is not the sole qualification, but it is one among several that should be emphasized. It is evident that research accomplishment and scholarship are preeminently necessary.

(2) Appointment to graduate faculties in the field of agriculture can now be made predominantly from those with the Ph. D. Exceptions will be more numerous here than in the fields included under (1), but these exceptions should rapidly decrease in the future. This requirement apparently should hold for 80 per cent or more of the appointments.

(3) *Appointments to graduate faculties in engineering should be made increasingly from those who have taken the doctorate.*—It is recognized that the development in this field has been somewhat different than in the others, and that for the present the number with the highest advanced degree will be relatively small. In other words, many of the most satisfactory additions for a time must be from those who have research experience and scholarship but who do not possess advanced degrees.

(4) *Appointments in home economics should likewise be made increasingly from those who have the Ph. D.*—The graduate development in this field is sufficiently advanced so that at least 80 per cent of the appointments should be of this nature. There is no reason why the standard should be lower than in agriculture. Very few, if any, institutions now meet such a standard. In many cases the appointments should be made of individuals who have taken their degrees in the related sciences.

(5) *Increasing attention should be paid to the graduate training of men in veterinary graduate staffs.*—Satisfactory progress in veterinary medical research must wait upon better training of the personnel in the basic sciences.

It is of interest to note the practice of several of the land-grant institutions with reference to conformity to the standards indicated above. For comparison several groups of institutions may be considered.

Certain separate land-grant institutions have well-developed graduate schools, and are conferring the Ph. D. in several land-grant fields. In one of these, 25 of 34 appointees to the graduate staff during the period 1924–1928 in arts and sciences, none of 7 in engineering, 4 of 21 in agriculture, 5 of 11 in home economics, none of

4 in veterinary medicine possess the Ph. D. In another institution the figures are 4 of 14 in arts and sciences, 3 of 6 in teacher training, none of 2 in home economics, none of 1 in engineering, and 4 of 20 in agriculture. Consultation of recent catalogs indicates that a resurvey of these two institutions would show a somewhat better present record. It is apparent that in these cases there in increasing emphasis upon the academic preparation of the graduate staff. It should be emphasized that even in these institutions care should be exercised in opening up additional graduate work leading to the Ph. D. in certain of the land-grant fields until staffs are strengthened.

In contrast to the foregoing may be cited the record of one school advertising extensive graduate offerings for the degree master of science. Of the appointees to the graduate staff in the period 1924–1928, a total of 2 of 8 in arts and sciences had taken the Ph. D., but none of a total of 11 distributed among agriculture, engineering, home economics, teacher training, and commerce and business. In another institution offering work to the M. S. degree, none of 2 in agriculture, 1 of 3 in engineering, none of 1 in teacher training, and 2 of 2 in arts and sciences had the Ph. D.

Another separate school, offering work to the M. S. only, shows the following much more creditable record for additions to the graduate staff, 7 of 18 appointees in arts and sciences, 1 of 1 in teacher training, 3 of 5 in home economics, 7 of 7 in agriculture, and 1 of 7 in commerce and business had completed the satisfactory academic training.

It can not be too emphatically recommended that land-grant institutions conform measurably well to accepted standards of academic training of graduate faculty personnel before developing graduate work.

Academic Training of Faculty Advisers, Committee Chairman, etc.

In practically all schools which offer graduate work leading to the Ph. D. degree a faculty member is designated to act as the adviser of each candidate, as chairman of the student's committee, or as a member of an examining committee. In most cases the individual designated as chairman is the one under whose guidance the research problem of the student is being worked. The "degree" qualifications of individuals having such special responsibility for graduate work may thus be checked. It is possibly the best single criterion as to the adequacy of the training of the graduate staff. For the purpose of establishing a norm the practice of three "combined" institutions, members of the Association of American Universities may be noted.

TABLE 12.—*Degree qualifications of staff members acting as advisers, chairmen of advisory committee, and members of examination committees (either preliminary or final) of students enrolled for the Ph. D. degree in 1927–28*

Institution	Agriculture		Engineering		Home economics		Teacher training		Arts and sciences		Commerce and business	
	With Ph. D.	Without Ph. D.	With Ph. D.	Without Ph. D.	With Ph. D.	Without Ph. D.	With Ph. D.	Without Ph. D.	With Ph. D.	Without Ph. D.	With Ph. D.	Without Ph. D.
A	15	17	0	7			6	2	98	9	9	1
B [1]	7	0	6	1			5	0	57	1	8	1
C	24	20	16	2	2	1	14	0	80	8	10	1
Total	46	37	22	10	2	1	25	2	235	18	27	3

[1] Final examining committee checked by institution B.

The data with reference to engineering are confused by the fact that in one instance they include chemistry, in other instances chemical engineering. The degree of Ph. D. is held by members of these departments far more commonly than by members of other engineering departments. The results seem to indicate that appointments to such committees are from staff members with the degree of Ph. D. in 55 per cent of the cases in agriculture, certainly less than half in engineering, about 65 per cent in home economics (number of cases too small to be significant), 93 per cent in teacher training, 92 per cent in arts and sciences, and 90 per cent in commerce and business.

With these may be compared the utilization of staff in other land-grant institutions (not members of the Association of American Universities).

TABLE 13.—*Degree qualifications of staff members acting as advisers, chairmen of advisory committee, and members of examination committees (either preliminary or final) of students enrolled for the Ph. D. degree in land-grant institutions, 1927–28, but which are not members of the Association of American Universities*

Type of institution	Agriculture			Engineering			Teacher training			Arts and sciences			Veterinary medicine		
	With Ph. D.	Without Ph. D.	Per cent with Ph. D.	With Ph. D.	Without Ph. D.	Per cent with Ph. D.	With Ph. D.	Without Ph. D.	Per cent with Ph. D.	With Ph. D.	Without Ph. D.	Per cent with Ph. D.	With Ph. D.	Without Ph. D.	Per cent with Ph. D.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
State University	6	1	86							12		92			
Do										15	2	88			
Do	13	9	60				4	1	80	8	0	100			
"Separate" institution	7	7	50	1	5	16				40	6	87	0	2	0
Do	12	17	41							12	7	63			
Do										5	0	100			
Do										18	5	78			
Do	4	0	100							1	1	100			

It would seem, in so far as these records provide a basis for judgment, that the standards as to degree requirements for the members of examining committees for candidates for the Ph. D. are about the same in the institutions which are members and in those not members of the Association of American Universities, and in both combined and separate institutions. It is urged that probably the most important single factor in determining the quality of graduate work (leading to the Ph. D.) is the training of the staff members in immediate charge. There is apparently manifest in this respect a well-marked and commendable conservatism on the part of the land-grant institutions.

Size of Staff in Charge of Courses of Graduate Grade

Still another index to the graduate personnel of the institution is the relationship to the classification of work taught or handled by the members of the staff. In most institutions there is some basis of differentiation of work offered on the basis of the "grade" of student to which it is opened. In some cases, two, three, or even four grades may be recognized. For convenience, these may be designated as follows:

Group 1 courses.—Courses open for credit only to graduate students.

Group 2 courses.—Courses open for credit to graduate students for major or minor credit, but also open to advanced (usually senior) undergraduates.

Group 3 courses.—Courses primarily for advanced undergraduates; if taken by graduates not used for major credit.

Group 4 courses.—Courses primarily for undergraduates; if taken by graduates, without "credit."

The accompanying table includes an analysis of staff responsibility for the various groups of courses. In many institutions the work is so organized as to make such segregation of offerings impossible, and these institutions are not included in the table. In not all of those included, however, are all groups represented. It should be recognized that not all of these institutions confer the Ph. D.

The table indicates the number of staff members who are designated as in charge of one or more Group 1 courses. In most cases these individuals also teach subjects in other groups. It also indicates the number who teach one or more Group 2 subjects, but not Group 1; likewise who teach Group 3, but not 1 or 2; and those who teach Group 4 subjects, but not 1, 2, or 3.

TABLE 14.—*Classification of staff on the basis of responsibility for graduate instruction (only highest group taught is designated)*

Institution	Number of members of staff designated to teach—																															
	Total number of staff	Group 1 subjects							Total number of staff	Group 2 subjects							Total number of staff	Group 3 subjects							Total number of staff	Group 4 subjects						
		Agriculture	Engineering	Home economics	Teacher training	Arts and sciences	Commerce and business	Veterinary medicine		Agriculture	Engineering	Home economics	Teacher training	Arts and sciences	Commerce and business	Veterinary medicine		Agriculture	Engineering	Home economics	Teacher training	Arts and sciences	Commerce and business	Veterinary medicine		Agriculture	Engineering	Home economics	Teacher training	Arts and sciences	Commerce and business	Veterinary medicine
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Alabama Polytechnic Institute	29	9	6	1	3	6	2	2																								
University of California	306	85	48		10	183	5		93	21	30			19	16	7									10		6			4		
Colorado Agricultural College	2				2												1				1											
University of Delaware									4	4							4				2	2										
University of Illinois	190	26	34	2	7	100	21		76	13	11	10	1	27	14		(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	510	32	85	5	32	327	29	
Purdue University	74	19	25	5	6	19			64	21	21	4	6	12			26					26			202	18	53	10	7	114		
Iowa State College	148	29	29	14	6	64		6	91	5	16	24	15	31			77	9	29	0	1	36		2	215	19	30	16	6	139		5
Kansas State Agricultural College	119	22	13	15	5	54	9	3	73	7	20	9	3	26	4	4									161	17	26	11	6	92	6	3
University of Kentucky	57	12	10	0	6	26	3		62	9	1	4	11	33	4										105	3	22	3	2	74	1	
Louisiana State University	49	6	3	1	4	35	3	0	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	19	4	6	1	0	6	1	1	49	5	4	4	0	34	4	0
University of Maine	25	6	5	1	0	13	0	0																								
University of Maryland	33	9			2	22			30	3			5	22											46	10	10	4	3	19		
University of Minnesota	193	44	39	4	16	79	11		95	12	9	4	13	41	16		10	10							103	14	22	21	30		16	
Rutgers University	52	21	5		2	24			45	6				39											47	19	9		0	19		
North Carolina State College	69	23	16		4	26			24	5	10		1	8			92	23	23	0	23	23			44	11	11		11	11		
North Dakota Agricultural College									18	7		1	4	6			7	2	1			4										
Oklahoma Agricultural and Mechanical College	17	8	0	2	2	4	1		52	14	0	6	7	18	4	3									23	10		9	1		3	
Oregon Agricultural College	41	16	6	4	4	11			22	4	2	1	3	12			54	7	1	21		24	10		105	10	18	14	4	49	10	
Rhode Island State College	13	3				10											8	3				5			29	3				26		
University of Tennessee	27	6		3	3	12	3																									
Agricultural and Mechanical College of Texas	17	7	4		2	2		2	21	7	8		1			3									256	28	47		4	73		4
Agricultural College of Utah	17	8	2		1	4	2		25	7	6	1	2	6	2	1	20	6	3	1		8	2		14	4	1	2	1	5	1	
Virginia Agricultural and Mechanical College	28	5	5		3	14	1		11	1	1			7	2		13	3	4			4	2			13	10			13	2	
State College of Washington	58	13	9	4	8	24	0		27	7	5	3	0	6	6		8	3	3	1	0	1				2	1	5	1	26	11	
West Virginia University	62	10	13		4	35			48	13	2		1	22			1	1							14	14						
University of Wyoming	31	5	4	1	4	15	2		8	1			2	5			10	3			2	4	1		52	8	4	3	7	28	2	

[1] Included in group 2.

[2] Included in group 1.

It seems that there is a marked correlation, as would be expected, between the number of staff designated as teaching Group 1 subjects and the development of graduate work as shown by the advanced degrees conferred.

Graduate development in several of the land-grant fields is almost exclusively a development of the past 20 years. It has been difficult to turn to the older fields for staff with graduate training and experience who at the same time have the viewpoint of the field to be developed. This is particularly true in fields such as textiles and clothing in home economics. To a somewhat lesser degree it has been true of foods and nutrition. For example, while graduate training in nutritional chemistry is essential to any person who is to have the responsibility of foods and nutrition in home economics, it must be recognized that graduate work in this branch of home economics involves much more than nutritional chemistry. When once established satisfactorily as a field for graduate work in an institution, there might be a tendency because of the small number of schools offering graduate work in this field to reemploy exclusively graduates of the one department to develop the graduate work. An examination of the data submitted shows, however, that in most institutions a real effort is made to build the graduate staff in large part from those who have received at least one degree, baccalaureate or advanced, from another institution.

While it may be that too much "inbreeding" is undesirable, the point is repeatedly emphasized that an institution must look to a "man's ability and record of performance, more than to any tag he may wear on his name." One institution requires that at least half the staff members of each department should have received at least half their training in another department. A suggestion in this connection has been made by Ford (1928) in the following statement:

> If an institution is to have its own graduates on its faculty, they should be those who have gone forth into larger institutions and have come back with a wider vision and with a surviving respect for their alma mater and who also will do certain work more readily and self-sacrificingly than will graduates from another institution. You should have a few such teaching alumni, but what the right proportion is I don't know. Not more than one-third might well be the maximum.[38]

Recognition of qualified individuals not on staff as directors of graduate work.—Not infrequently there are resident at land-grant institutions individuals who are employed by Federal or other agencies to collaborate in research. This occurs most frequently perhaps in the agricultural, engineering, and veterinary divisions. In some cases these individuals are recognized authorities in their fields and

[38] Guy S. Ford. *In* Problems of College Education, p. 100. University of Minnesota, 1928.

are fully qualified to direct research. It is evident that such men might be of real service in graduate development. Thirty-four institutions noted that such individuals are recognized as having staff status in the institution, in four they are not. Of those which grant staff status, 22 recognize such individuals on occasion as directors of the research of graduate students, 6 do not, in several others the question has never been raised.

Evaluation and distribution of graduate teaching load.—A major problem in graduate work in land-grant fields is the allotment to those in charge of graduate work of sufficient time adequately to perform the task. Most members of the staffs have responsibilities for undergraduate work, or for work in agricultural experiment stations, engineering experiment stations, etc. Particularly in those institutions which have relatively small amounts of graduate work the evaluation and distribution of the graduate teaching load is important.

Some attempts have been made by various investigators to secure data on teaching loads in colleges. Statistical records, however, are incomplete and unsatisfactory in most cases.

It should be recognized that in most cases it is clearly to the advantage of a college staff, including the graduate staff, that adequate provision be made in any system of listing teaching load to indicate all pertinent data.

While provision of time for research and for direction of graduate work should frequently be made, it should not be inferred that much valuable work can not be done in these fields even by those carrying rather heavy undergraduate teaching schedules. Koos (1919), in an interesting study of the teaching load in a State university, found that—

> The correlation between time spent in teaching work and that spent in personal research is "negligible." That is to say, an instructor who devotes a relatively large amount of time to teaching is almost as likely to devote a relatively large amount as he is to devote a relatively small amount of time to personal research; and, again, one who devotes a relatively small amount of time to teaching is almost as likely to spend a relatively large amount of time to personal research.[8]

While intermingling of graduate and undergraduate functions of a staff member is undoubtedly valuable, in some respects it is troublesome. In general, the teaching of graduate students, the conferences, and the supervision of graduate research are time consuming. With the rapid growth in student enrollment at the institutions there has been real need for efficient use of teaching personnel, consequently in most land-grant institutions some kind of report of teaching load is

[8] L. V. Koos. Adjustment of the Teaching Load in a University. U. S. Bureau of Education Bulletin, 1919, No. 15.

required for each member of the staff. The fact that undergraduate instruction bulks large has sometimes led to a tendency on the part of administrators to determine or evaluate the teaching load on the basis of credit hours, or student clock hours. Difficult as such standards are when applied to undergraduate work, they are quite impossible when applied indiscriminately to graduate work. It is therefore advisable to inquire what systems of determining the graduate load of a teacher are used in the better-developed graduate schools.

Reports of one type or another relating to teaching loads are required of staff members by all but five of the institutions replying. An examination of the forms used for this purpose shows a tendency in some institutions totally to ignore the graduate load carried by a teacher, while in others there is adequate provision to show graduate responsibilities. It is self-evident that graduate work might well be abandoned in any institution which completely ignores its existence in the determination of the service loads of its staff members.

The most common and at the same time the most inadequate report is a "time schedule" which specifically calls for hours spent in regularly scheduled lecture and laboratory teaching, with number of students. There is usually no provision for indicating the time spent in conferences with graduate students and in supervising their research problems. There is not even opportunity to indicate the time spent in staff research.

In some cases these service reports are modified to give an opportunity to indicate any "additional" college duties not provided for in the schedules. This is, of course, better, but still gives the impression that teaching of graduate students and research are matters of minor or incidental importance, and is deadening in its effects.

Purdue requires of its staff members a list of the subjects taught, and makes provision not only for noting recitations, regular laboratory supervision, etc., but also for "preparation of material," "graduate papers," and "student conferences." Such a statement is, of course, far more satisfactory in the case of instructors with graduate responsibilities. However, even in this case these university duties are listed under the rather anomalous title of "outside time, hours per week."

At least three institutions require as additional information on the service report an initial statement indicating the percentage distribution of services under several headings. The headings used by the University of Illinois may be taken as illustrative: (1) Teaching of undergraduate courses, per cent—To include preparation, recitation, conference, clerical work in connection with instructors' own classes, and departmental committee work relating to teaching.

(2) Teaching of graduate courses, per cent—As under 1. (3) Research and investigations, per cent—By research shall be understood all scholarly work and investigation not concerned with the actual teaching of classes, but not including work for advanced degrees. (4) Administrative work, per cent—To include departmental or university administration services and college or university committee work. (5) Extension or public service, per cent—To include extension, field service and services rendered to the general public as a representative of the university. (6) Other, per cent—Total per cent.

This is followed by a list of courses taught, the credit hours, and segregation of students by sex, college, and classes. Such a record at least gives an opportunity for the staff member who has graduate responsibility to indicate the fact adequately.

A somewhat similar analysis of service load is called for in the reports required by Ohio State University and by Iowa State College. The latter calls for percentage distribution of time as among the following items: (1) Instructional work; (2) research; (3) administration; (4) extension; and (5) other activities.

In addition the instructor's record of personal teaching includes provision not only for details of time required by lectures, recitations, laboratory periods, etc., but also for the time spent in subjects (usually graduate) which are conducted by conferences, and the time spent in the supervision of research.

Procedure in determining the service load of the staff places the administration in a puzzling dilemma. If the report is made adequate, with inevitable increase in length, there will be faculty protest because of the red tape, the time required for filling out blanks, and the difficulty in indicating time segregation and utilization on a percentage basis. On the other hand, if the service report is shortened it gives no opportunity to indicate the true service load of those active in graduate work and research, this likewise leading to faculty protest. Any report which makes difficult the presentation of the actual graduate load will tend to smother and discredit graduate work. If true graduate work is to be fostered, there must be ample recognition of the teacher and time allowed for it.

There is apparently an increasing tendency on the part of land-grant schools to institute methods of educational accounting. In practically all cases these institutions are supported by public taxation. Notwithstanding the evident inconvenience, the principle of accountability for expenditure of public funds is fundamental, and can not be safely ignored. Service loads of the teaching faculty constitute one item in such accountability. The statements as to these loads, however, are subject to grave misinterpretations. Where such service reports are required, an institution should not encourage the development of graduate work until there can be ample recognition upon such reports of the graduate teaching responsibility.

It is therefore suggested that if for administrative or statistical reasons service reports from the staff engaged in graduate work are to be required by any institution there should be ample opportunity to show on such schedule the following: (1) The proportion of "institutional time" spent on the various major activities; teaching undergraduates, teaching graduates, in research and investigation, in administrative work, in extension work, in other activities; and (2) if numbers of students are listed by courses or sections, there should be opportunity to indicate the number of graduate students who are being directed through conference and research, and the time required.

Chapter VIII.—Graduate Student Body

A study of the graduate student body in land-grant institutions should include: (1) Recognition of their geographical and institutional distributions and origins; (2) a study of the problems of admission of graduate students and the results evidenced by the methods adopted; (3) an analysis of special awards, such as scholarships and fellowships in their relations to graduate work; (4) a survey of the graduate opportunities of staff members; and (5) a consideration of the graduate product, i. e., the economic and social results of graduate work.

Geographical and Institutional Distribution of Graduate Students

The accompanying table gives the enrollment of graduate students in each of the land-grant colleges in 1927–28, segregated on the basis of location of institutions from which their last degree was received.

TABLE 15.—*Segregation of graduate students for the year 1927–28 by institutions from which they received their preceding degree*

Institution	Enrollment—graduate students 1927–28, exclusive of summer session			Percentage receiving preceding degree from—			
	Men	Women	Total	Same institution	Other institutions in same State	Other States	Foreign countries
1	2	3	4	5	6	7	8
Alabama Polytechnic Institution	17	4	21	67	0	33	0
Alaska Agricultural College and School of Mines	1	0	1	100			
University of Arizona	62	49	111				
University of Arkansas	19	25	44	64	10	26	
University of California	897	1,032	1,929	58	6	32	4
Colorado Agricultural College	25	14	39	57		43	
Connecticut Agricultural College	1	0	1	100			
University of Delaware	9	0	9	67		33	
University of Florida	65	6	71	78	4	18	
Georgia State College of Agriculture	14	3	17	54	33	13	
University of Hawaii	23	32	55	44		56	
University of Idaho	60	26	86	53	4	43	
University of Illinois	687	243	930	46			
Purdue University	112	15	127	49	8	43	
Iowa State College	330	114	444	29	13	53	5
Kansas State Agricultural College	110	57	167	43	15	42	
University of Kentucky	119	83	202	45	28	27	
Louisiana State University	61	27	88	65	13	21	1
University of Maine	19	16	35	46	15	39	
University of Maryland	89	7	96	26	8	66	
Massachusetts Agricultural College	49	6	[illegible]	36	20	44	
Massachusetts Institution of Technology	372	2	[illegible]				
Michigan State College	133	34	[illegible]	58	8	34	
University of Minnesota	1,008	386	1,394	47	6	41	6
Mississippi Agricultural and Mechanical College	24	0	24				
University of Missouri	231	142	373	70	20	0	1
Montana State College	19	14	33			100	
University of Nebraska	221	165	386	58	21	20	1
University of Nevada	25	39	64	43		57	
University of New Hampshire	24	9	33	53	1	45	1
Rutgers University	53	6	59	34		61	5
New Mexico College of Agriculture and Mechanic Arts	1	1	2				
Cornell University	614	163	777	36	7	47	10
North Carolina State College	60	5	65	52	11	37	
North Dakota Agricultural College	15	7	22	85		15	
Ohio State University	713	332	1,045	34	42	24	
Oklahoma Agricultural and Mechanical College	48	25	73				
Oregon Agricultural College	59	27	86	60	7	33	
Pennsylvania State College	133	32	165	46	23	30	1
University of Porto Rico	5	11	16				
Rhode Island State College	4	0	4	25		75	
Clemson Agricultural College	13	0	13				
South Dakota State College	17	5	22	50		50	
University of Tennessee	44	31	75	48	24	28	
Agricultural and Mechanical College of Texas	67	0	67	46	14	40	
Agricultural College of Utah	33	10	43	76	10	14	
University of Vermont	5	7	12	42	58		
Virginia Agricultural and Mechanical College	60	4	64	61	11	25	3
State College of Washington	56	27	83	67	4	28	1
West Virginia University	220	92	312	33	39	27	
University of Wisconsin	726	362	1,088	51	4	40	5
University of Wyoming	18	22	40	56		44	
Total	7,790	3,719	11,509				

On the basis of sizes of graduate enrollments, exclusive of summer terms, the institutions may be divided into several groups:

(1) *Graduate enrollment more than 1,000.*—University of California, University of Minnesota, Ohio State University, and University of Wisconsin.

(2) *Graduate enrollment from 500 to 1,000.*—University of Illinois and Cornell University.

(3) *Graduate enrollment from 250 to 500.*—Iowa State College, Massachusetts Institute of Technology, University of Missouri, University of Nebraska, and West Virginia University.

(4) *Graduate enrollment 100 to 250.*—University of Arizona, Purdue University, Kansas State Agricultural College, University of Kentucky, Michigan State College, and Pennsylvania State College.

(5) *Graduate enrollment fewer than 100.*—The remaining land-grant institutions.

Of particular interest in the table are the figures which indicate the continuation of those who have taken baccalaureate degrees in graduate work at the same institution. Likewise important are the percentages of students who come from other States and from foreign countries. While not perfect as indices, these percentages indicate in a measure the attracting power, and to some degree, the standing of the institution.

Admissions to the Graduate School

There are numerous problems of graduate school administration which relate to entrance requirements and admissions, and problems which arise with reference to deficiencies in training evidenced by matriculants. Solutions to certain of these problems as they have been worked out by land-grant institutions here concern us. The principal topics to be considered are: (1) Relationships of undergraduate curricula to graduate work; (2) English deficiencies; (3) other deficiencies; (4) encouragement of gifted undergraduates to continue in graduate work; (5) accredited colleges, and general admission problems; (6) transfer of graduate credits; and (7) graduate utilization of credits secured while undergraduates.

Relationship of undergraduate curricula to graduate work.—Each land-grant graduate school is concerned with the suitability of the undergraduate curricula of the institution as preparation for graduate work. As has been frequently emphasized in recent years, it is to be recognized that every institution of higher learning has several distinct levels of work. In the land-grant institutions these are: (1) Junior college work (freshman and sophomore years). (2) Senior college work (junior and senior years). (3) Graduate work; (*a*) leading to the master's degree; (*b*) leading to the Ph. D. degree.

Students of three types enter each of these grades.—(1) Those whose aptitudes and abilities are such that they are unable satisfactorily to carry on work at this level. Such students should be eliminated. (2) Those able to profit by the work of the grade, but who have neither aptitude nor ability to pursue profitably the work of higher grade or level. Such students should have special provision in their training to fit them for their life work at the conclusion of this grade; and in general every curriculum should provide for them. (3) Those who by aptitude and ability are fully able to enter upon the next higher grade. It is not expected that all will do this; many will prefer to complete their education at the grade level. Every curriculum should provide for this group of students.

It is urged that this twofold educational duty is to be emphasized for each grade. It is therefore to be regarded as one important function of every senior college undergraduate curriculum to fit students to enter upon graduate work without undue handicap. As stated by Ford (1926):

> It should be taken, and commonly is taken, as basic that preparation of the graduates for advanced study and research is not the sole business of the college. Such preparation may be its most important function if the future of society is dependent on the progress of the physical and biological sciences and on the equally necessary advance in the social sciences dealing with human conduct and the cultural appreciations that make life worth while by reason of its leisures quite as much as by reason of its labors.[a]

Six of the land-grant colleges, University of Delaware, University of Maine, North Carolina State College, North Dakota Agricultural College, State College of Washington, and the University of Wyoming, specifically denied training for admission to the graduate schools as among the objectives of the undergraduate curriculum. This is somewhat surprising as in one case at least (State College of Washington) there is a marked graduate development in the school itself. In general, the other land-grant schools agree that this is one of their objectives, even in those cases where there has been little or no graduate development within the institution. One (South Dakota) states that such preparation is not an objective of the undergraduate curricula, but that it is one of the major objectives of all divisions and departments to encourage promising students to continue in graduate work.

It is quite evident that many curricula are planned with the primary purpose of fitting the student who receives his baccalaureate

[a] Guy S. Ford. *In* Association of American Universities, Proceedings, 1926, p. 71.

degree to enter at once into his profession. In most cases the professional and technical undergraduate curricula are so specific in their requirements and offer so little opportunity for election, that they are not entirely satisfactory as preparation for graduate work. This has been true and is still true in most land-grant institutions in engineering, in agriculture, in home economics, and in veterinary medicine. It has been less true in arts and sciences, and in teacher training.

What has been said does not apply to all institutions. In some cases, as in agriculture at the University of Minnesota, there have been outlined specific undergraduate curricula designed to fit the student for work on the graduate level. In these there is ample provision for securing such scientific, linguistic, and technical background as may be necessary.

The majority of students who enter land-grant colleges present no entrance (high-school or secondary) credits in modern foreign languages (particularly German and French). As a result of mistaken propaganda following the Great War there has been a marked decrease in teaching of German in the secondary schools in many sections of the United States. In the last several decades modern languages have disappeared as required elements in the technical curricula in most land-grant institutions. It is quite possible that this elimination may be justified for those students whose limit of attainment is represented by the bachelor's degree. It is most serious for those who enter into graduate work. By far the most frequent deficiency of those entering upon graduate work is lack of a reading knowledge of German or French. This has led to great pressure in many schools to eliminate a language requirement for the master's degree, and in the field of education particularly, even for the doctor's degree.

In most fields the researcher or teacher without at least a reading knowledge of these languages is seriously handicapped. As stated by Ford (1926):

> In many fields such a student could profitably forego the multiplication of courses in the field of his major interest in order to make a place early in his training for the mastery of the languages which will unlock the contributions of other great cultural people and make richer all future years of study, either here or abroad. The attempt by graduate students to master foreign languages after the years for such acquisition are past is one of the most distressing incidents in the struggle of those who have so many other omissions to make good in their struggle for learning after they graduate.[5]

Quite emphatically any undergraduate curriculum which makes impossible the acquisition by the more promising students of a read-

[5] Ibid., p. 74.

ing knowledge of at least one foreign language is sacrificing the best interests of such students.

Among the other common deficiencies of those entering upon graduate work is insufficient training in mathematics. There are comparatively few fields where thorough mathematical undergraduate training is not highly desirable; in many it is quite essential. Such training has not been secured by most students entering upon graduate work in agriculture, biology, home economics, and frequently in chemistry. There are very few research fields which can be developed satisfactorily without a thorough grounding in the use of logarithms, and in the preparation of graphs and their mathematical interpretations. Data can not be satisfactorily analyzed in any field without some mathematical background. The sterility of attempted research in some branches of home economics, for example, is to be attributed directly to this lack of preparation on the part of the investigators.

Further, there is sometimes a lack of appreciation of the potentialities and relationships of subjects even when introduced into the undergraduate curricula. For example, chemistry and physics as taught to undergraduate students are often not properly integrated with the major interest. Lack of knowledge of chemistry is one of the most common handicaps encountered by graduate students in certain fields of engineering. It is usually included as an element in the undergraduate curriculum, but without apparent coordination.

The rigidity, the inflexibility of the undergraduate curricula in many institutions, is appalling. It is quite apparent that these curricula represent compromises between the idiosyncrasies of staff members, rather than carefully planned courses of study. If they are to function satisfactorily in training students who are not to be handicapped in their graduate work, they must be susceptible of modification. It is of interest, therefore, to see what provisions are made to allow such modifications or adaptations.

The undergraduate curricula in technical fields are of two principal types, those which allow considerable freedom of choice of subjects, and those in which the requirements are fixed. The former gives opportunity to the student to prepare himself for entrance to graduate work without deficiency; the latter, unless modified, does not.

It is suggested that those land-grant schools which indicate preparation for entrance to the graduate school to be one among the objectives of the undergraduate curriculum definitely outline sequences to be pursued by those students who expect to enter upon graduate work, if necessary, substituting for certain of the technical subjects others more fundamental and useful. Under present conditions and curricula there is a great waste of time on the part of students who as graduates must make good these deficiencies.

Land-grant work in all its technical developments is based upon science. It is pertinent, therefore, to inquire whether the undergraduate curricula in each of the specified land-grant fields is adequate in that it affords special opportunities in basic sciences requisite for preparation of students for graduate work.

With very few exceptions institutions reporting on undergraduate agricultural curricula regard them as adequate in their content of the basic sciences. However, an examination of these curricula reveals that institutional conceptions of what is adequate show wide variations. In some institutions the curriculum is so narrowly prescribed that it is entirely inadequate. The deficiencies are particularly evident in the lack of adequate mathematics, physics, and chemistry, less frequently biology. Other institutions have clearly recognized the graduate objective in developing curricula.

In engineering five institutions report inadequate preparation in basic sciences; others consider the preparation adequate. In most schools the undergraduate engineering curricula allow but little freedom of choice. An examination of the curricula shows defects in many cases apparently not recognized, at least not reported. Probably most common are the lack of chemistry for mechanical, electrical, and civil engineers and of bacteriology for sanitary and civil engineers.

With few exceptions all institutions report undergraduate home economics curricula as reasonably adequate in their requirements of basic science. This is quite commonly true for the biological and chemical sciences, but, in general, it is emphatically not true for the mathematical and physical sciences. Graduate students at present in home economics are not infrequently penalized because of these deficiencies. In most cases it is true that the curricula are sufficiently elastic so that these needed subjects may be elected, but those institutions which have the most highly developed graduate work in home economics report that quite evidently those who continue into graduate work have not always been wisely guided in their undergraduate choices. In other words, while the opportunity is afforded, the need is not understood by some of the home economics staffs.

Most teacher-training curricula are adequate as preparation for those who wish to continue graduate work in the same field. They are frequently, but, of course, quite naturally, poorly adapted to those who wish to continue in scientific or technical fields.

Curricula in arts and sciences are in general the best planned for those expecting to continue in graduate work. In many institutions such curricula are much better adapted to prepare students for graduate work in many technical fields than are the undergraduate technical curricula themselves. For example, in some land-grant institutions a student who plans to pursue graduate work in agriculture may secure much better preparation by enrolling in a general science course, securing therein the basic science training and electing the necessary technical subjects to secure proper orientation.

The curricula in commerce and business are rather highly specialized, and their adequacy as satisfactory preparation for graduate work is problematical. There is so little graduate development in this field that results are difficult to secure.

In veterinary medicine four institutions report the undergraduate preparation for graduate work in veterinary medicine as adequate in the basic sciences. This quite evidently shows a lack of appreciation of the basic needs for satisfactory graduate work in this field. As long as the technical and nontechnical subjects in the curriculum in veterinary medicine are all crowded into four years instead of the six deemed necessary in human medicine, it is quite impracticable to find time for the languages, mathematics, chemistry, and biology needed or desirable for graduate work in such fields as veterinary physiology, pathology, and anatomy. Apparently only those who have some preliminary college training or who do much make-up work are really qualified to enter upon graduate work in some of the branches of veterinary medicine.

The opportunity to secure a reading knowledge of one foreign language is practically always found in curricula in arts and sciences, in a considerable number of curricula in agriculture, in only eight of the engineering curricula reported, in a considerable proportion of those in home economics and teacher training, and in none in veterinary medicine.

The acquisition of a reading knowledge of two foreign languages is possible in many arts and science curricula, but only occasionally in others.

One type of course particularly useful in preparation of undergraduates for graduate work is that which is frequently given the general designation of "special problems." It may be termed "undergraduate research," or known by other names. It has for its purpose the introduction of the student to the method and spirit of research. It is gratifying to note that 24 of the land-grant schools indicated the presence of such courses in one or more of the land-grant curricula.

It is also important to know whether the undergraduate curricula are inflexible, or whether there is some provision for modifying outlined curricula for students who have definitely signified their intention to undertake graduate work. Such permission is frequently indicated in agriculture, probably least frequently in engineering. Such provisions in one or more curricula were indicated by 18 institutions. When to these are added those which have adequate elective provisions in their curricula, it is apparent that in many schools it is possible to give reasonable adequate preparation for entrance to the graduate school. The records of admission to graduate schools show that, however adequate these provisions may be, the students frequently have not been properly advised.

The technique used in correcting curricula in which requirements are inadequate for graduate preparation may be classified as follows: (1) Ample opportunity is allowed for suitable electives in the curriculum in question, the student will secure the needed subjects if properly advised or guided in his selection; (2) the classifying officer or major professor in some cases has the power to replace required subjects by others more appropriate to the objective; (3) by petition by student to appropriate committee or faculty the unsatisfactory curriculum may be modified.

One answer returned indicates one type of difficulty in securing adequate guidances—

I do not believe in too much "correcting" of student intellectual activities. He should browse around and "find himself" with little external pressure by assumed "authorities."

In general, it is assumed that the graduate student well prepared is one who should be able to pursue his graduate work in his field of specialization to the master's degree in a single academic year.

English deficiencies.—Lack of an adequate mastery of English, spoken and written, is one of the most common deficiencies of students in our graduate schools. The difficulty has been expressed by Dean Ford (1926) as follows:

If I were to put simple, obvious things first, I should like to have all students who come to my office able to speak English. Such a platitude sounds pathetic when uttered by a dean of a graduate school. It is more than that; it is tragic because it is pertinent.[30]

Not only do graduate students not infrequently lack a speaking knowledge of English, but a reading knowledge and a writing knowledge. These defects are not peculiar to graduate students in land-grant institutions; the problem of defective mastery of English is one that is encountered in graduate work in all universities. As stated by Dean Haskins, of Harvard:

The use of English by graduate students is often defective, irrespective of universities or departments of study. * * * At Harvard we have appointed a graduate advisor to students who need suggestions or help. It happens, how-

[30] Ibid., p. 72.

ever, that students in certain departments present little or no formal written work to their professors in advance of the doctor's thesis, so that defects which might often have been corrected at the outset appear only toward the end of the student's period of study. The whole subject seems to me to require more careful and personal attention than it has generally received in American graduate schools."

Apparently this problem is one to which comparatively little attention has been paid by the land-grant schools, if one is to judge from the replies. There is no institution which reported any qualifying examination or test in English. In other words, students are in general admitted to the graduate school on the assumption that graduation from an accredited college includes certification as to English attainments.

After matriculation in the graduate school, one institution (University of Tennessee) places all students on "probation" with reference to English.

Two institutions (Iowa State College and University of Missouri) report that graduate students showing serious English deficiencies may be dropped. In a much larger proportion (11) admission to candidacy for an advanced degree is denied to those not showing reasonable proficiency. In these and five others (16 in all) admission is delayed until proficiency is evidenced.

A considerable variety of mechanisms have been provided by the various institutions to deal with this matter. It is apparent that in many cases the method is quite inadequate or desultory.

Typical comments follow: "Use discretion in special cases; no rule required" (Colorado Agricultural College). "Problem not arisen" (University of Delaware). "Degree obtained is enough safeguard" (University of Florida). "Not passed if generally deficient in English" (Georgia State College of Agriculture). "Major instructor requires special instruction in English" (Kansas State Agricultural College). "Thesis must be in good English; case rarely occurs" (Louisiana State University). "Committee on English" (University of Maine). "Constant supervision of all English work" (Massachusetts Agricultural College). "More English when required; rely on instructors in major and minor work; not very satisfactory" (University of Minnesota). "Faculty supervision" (Rutgers University). "Undergraduate record in English" (North Dakota Agricultural College). "Handled by major professor, and thesis must be in good English" (Oregon Agricultural College). "Discourage men known to be deficient in English" (Rhode Island State College). "Thesis must be in good English" (Agricultural and Mechanical College of Texas). "English courses without credit" (University of Vermont). "If undergraduate work in English poor, advised not to take graduate work" (Virginia Agricultural and Mechanical College).

The most definite and detailed method of handling this problem included in the replies was one which adapted the basic principles of the plan used at Harvard University to the institution in question.

[a] Charles H. Haskins. *In* Association of American Universities, Proceedings, 1921, p. 58.

The plan in essentials follows: (1) A member of the staff in English has been designated as advisor in English to graduate students. (2) The credentials, transcripts, and correspondence of all graduate students are carefully scrutinized upon admission to the graduate school. If in any case there is reasonable doubt as to English proficiency, the student is notified that admission to candidacy for any degree must wait upon certification of the advisor in English as to proficiency in English. (3) In all cases the staff member in charge of major work must make formal certification as to proficiency in English before a student may be admitted to candidacy. Any staff member who discovers serious English deficiency on the part of a graduate student refers him to the graduate advisor in English, who will certify if proficiency is attained. (4) The graduate advisor in English assists graduate students in the diagnosis of their difficulties and gives suggestions as to suitable methods of remedying deficiencies. He also determines progress from time to time. He is not responsible for the thesis or dissertation, nor is he a special tutor.

It is suggested that the serious attention of the graduate schools be directed to the problem of satisfactory use of English by graduate students before admission to candidacy to an advanced degree.

Other deficiencies.—The deficiencies in training most frequently exhibited by graduate students entering the graduate schools, other than defects in preparation for major work, are in modern language, chemistry, and mathematics. The advisability of securing an adequate background in these fields has already been emphasized. The degree to which deficiency in these subjects is manifested by graduate students will be evident in the study of the enrollments of graduate students in subjects which carry no graduate credit.

Reading knowledge of modern foreign languages, particularly German and French, is the most frequent deficiency. This knowledge is tested by some type of examination in most institutions. In several institutions special classes are organized for graduate students, the purpose being the acquisition of a reading knowledge of the literature of the student's major field as rapidly as possible. In other institutions the student must enroll in the standard elementary language courses, which are frequently ill adapted to his needs. On the whole, the modern language needs are probably better met in those institutions in which modern language is purely a service department than in those in which it is a major field. Overemphasis upon the spoken language or upon the "literary" aspects frequently results from a lack of appreciation of the needs of the graduate student who is anxious to secure that command of the language which will enable him to use it as a tool in his work. A study of the efficiency of the modern language staff in assisting these students to make good their deficiencies would be of value in convincing them of the importance of the task. The assumption of the right attitude toward his task on the part of modern language departments is of very real and tangible value in the graduate school.

It has been assumed in the preceding discussion that the student entering the graduate school has had reasonably adequate undergraduate training in the field of his graduate specialization. This assumption is erroneous in a great many cases. The amount of preliminary preparation required before graduate work may be begun in a particular major field shows wide variations among subjects and among schools.

Encouragement of gifted undergraduates to continue in graduate work.—The graduate school is made up for the most part of two groups of students. There are those who have proved to be failures or partial failures in their chosen vocation, and who feel confident from observation that the possession of an advanced degree will enable them to secure more satisfactory positions, usually teaching positions. In some cases they should not have been graduated; certainly they should never have been encouraged to enter upon teaching. They may meet the technical requirements for admission to the graduate school, but they can never become graduate students in any true sense. The other group includes those who are able and ambitious. The problem before every graduate school is sifting out the first group and encouragement of the latter. It is almost axiomatic that in general those students who show most promise in their undergraduate work are those who should be encouraged to continue in graduate work.

It is of interest to note the methods which have been suggested and used for this purpose. Twenty-six land-grant schools report that there are special provisions of some kind for gifted undergraduate students; 8 report none. Sixteen report undergraduate scholarship awards or prizes.

Nineteen schools provide "special problems" courses in which gifted undergraduate students may secure an introduction to some of the ideals and methods of research. Nineteen provide more or less of vacation employment for students by research agencies which enable them to come into contact with research and its problems. Sixteen reported distribution of copies of the National Research Council Bulletin on Research as a Career.

Specific comments were:

"'Smart' or senior may do some graduate work." "Extra courses in lines of prospective graduate work." "Honors courses in some colleges." "Faculty advisors find promising students." "Honors courses." "Honor seniors, free choice of all courses during year." "Personal contacts." "Elect as student assistant." "Start him on honors graduation course."

Seashore[32] (1922) has described a method of directing the attention of the gifted undergraduate to the desirability of graduate work which has many possibilities, and which might well be used in whole or in part in the land-grant schools. Those students who rank in the highest 10 per cent when admitted to college are met by the dean of the liberal arts college, and the special opportunities and obligations of the superior student emphasized. At the beginning of the sophomore year each is summoned by the dean of the graduate school, and certain analyzed ratings and the achievements of the freshman year discussed, likewise the selection of the major field to be entered at the beginning of the junior year.

In recent years there has come a marked development of personnel work in certain land-grant institutions. Where this has reached its highest development (as at Purdue and Iowa State College) it is proving of distinct advantage in selection and guidance of those who should continue in graduate work.

Accredited colleges and general admission problems.—The problem of determining eligibility of college graduates for admission to a graduate college has proved to be somewhat perplexing. The Association of American Universities has developed an accredited list of institutions whose graduates are in general admitted to the graduate schools of the members of the association. It is the most inclusive of the lists geographically. There are also the regional accrediting associations which have passed upon the grade of work and standing of colleges.

The accredited list of the Association of American Universities is divided into three sections, the "University List," the list of "Technological Institutions," and the "College List." With very few exceptions the graduate schools of all of the land-grant institutions replying accepted the accrediting of this association and admitted students from colleges on all its approved lists. Apparently one exception is Rutgers, which recognizes the lists of no accrediting agency other than itself. It is stated, "There is no graduate school; candidates for advanced degrees are accepted as graduate students when they have had the requisite preliminary training." West Virginia apparently uses only the lists of the regional accrediting association in determining eligibility.

It would seem that this list maintained by the Association of American Universities is the most comprehensive and satisfactory from the standpoint of graduate admissions; in fact, it (alone among the lists) was prepared primarily for graduate admission.

[32] Carl E. Seashore. The Gifted Student and Research. Association of American Universities, Proceedings, 1922, pp. 39–48.

It is suggested that in land-grant schools graduate admission be determined first by reference to this list. It should not, however, be regarded as the safe criterion of eligibility. Student qualifications are determined only in part by the institution conferring the baccalaureate degree.

The lists of the various regional accrediting associations were not prepared primarily with a view to certification of graduates to graduate standing in graduate schools. These lists, however, may prove very helpful.

The graduates of colleges on the regional accredited list of the "Association of Colleges and Secondary Schools of the Southern States" are accepted by 19 graduate schools. They are not accepted by California, Maine, Kansas, and Rutgers; they are accepted by Louisiana if degrees are recent; and the lists are not used by Illinois, Oregon, Rhode Island, Utah, and Washington.

The graduates of colleges on the regional accredited lists of the "North Central Association of Colleges and Secondary Schools" are admitted by 25 graduate schools. The list is not recognized or used by California, Maine, Rutgers, Massachusetts, Oregon, Rhode Island, and Utah.

The graduates of colleges on the regional accredited lists of the "Association of Colleges and Preparatory Schools of the Middle States and Maryland" are admitted by 14 graduate schools. The list is not recognized or used by California, Kansas, Maine, Rutgers, West Virginia, Massachusetts, Illinois, Oklahoma, Oregon, Rhode Island, Utah, and Washington.

Some institutions maintain a list of institutions which have been accredited on the basis of personal investigation and record of performance of the matriculants. Institutions located within the same State are thus accredited by Georgia, Purdue, Iowa, Kansas, Kentucky, Maryland, Massachusetts, Mississippi, Missouri, Rutgers, Oklahoma, Oregon, Rhode Island, South Dakota, Virginia, West Virginia, but not by California, Colorado, Florida, Illinois, Louisiana, Maine, and North Dakota.

Some institutions also maintain an accredited list of colleges outside of the State which have been thus accredited on the basis of personal investigation and records of matriculants. Such lists have been prepared by Delaware, Purdue, Iowa, Maryland, Massachusetts, Mississippi, Missouri, Nevada, Rutgers, Oregon, Rhode Island, South Dakota, Virginia, West Virginia, and Wyoming, but not by California, Colorado, Florida, Hawaii, Illinois, Kansas, Kentucky, Louisiana, Maine, and North Dakota.

All graduate schools are faced with the responsibility of fixing upon reliable means for determination of the status of graduates from institutions not on any accredited list recognized by the institution in question. Various methods have been developed by various land-grant institutions for handling such cases. They may be outlined as follows: (1) Rating is secured from the State university in the State in question (four graduate schools). (2) Rating or accrediting by the graduate school of the college in question (one graduate school). (3) Evaluation by university examiner of all transcripts (high school and college) and their suitability. This in some cases includes also an evaluation of the teachers in the undergraduate field of specialization. Special recommendations may be required (10 graduate schools). (4) Graduates admitted provisionally on basis of good undergraduate record; status determined by results (three graduate schools). (5) Rating based upon practice is secured from nearest recognized institution having a well-developed graduate school; acceptance in any case provisional. Institution consulted usually a member of Association of American Universities (two graduate schools). (6) Admission not granted. Applicant required to enroll as an undergraduate with advanced standing and required to qualify for a baccalaureate degree (one graduate school). (7) Admission (provisional) to the graduate college is granted provided record makes it probable that there is less than a year of undergraduate training required to qualify the student for full standing. Students with high records only are granted this privilege (one graduate school). (8) Admission determined by head of department in which student expects to pursue major work (two graduate schools).

Inquiry was made to determine whether the graduate students admitted from unaccredited institutions are always accepted provisionally or upon probation. Affirmative answers were returned by 17 graduate schools and negative by 11. The minimum length of time for such probation varies from one summer term, or one quarter, to one year. The most common length specified is one semester.

It is evident that there is no marked degree of standardization in matriculation requirements among the graduate schools. In general the maintenance of reasonable standards seem to be indicated.

Transfer of graduate credits.—The desirability of encouraging or discouraging migration of graduate students is one which has been frequently debated. Such migration is greatly facilitated if institutions accept readily the graduate work completed at other graduate schools. Twenty-four land-grant institutions state that they will accept such credits (if applicable), when transferred from institutions holding membership in the Association of American Universities. This is not the practice in the Universities of Delaware, Florida, Illinois, and Maine, Massachusetts Agricultural College, Rutgers University, or the University of Vermont.

The practice as to the recognition or acceptance of graduate work done in institutions not members of the Association of American Universities is not entirely uniform. There is no land-grant institution which uniformly denies all credit from graduate schools in institutions not members of the Association of American Universities. Most frequently the problem is considered an individual one, and each case is settled upon its merits. This is true of 29 institutions. In at least 17 graduate schools final acceptance of transferred credits is determined by the type of work done after matriculation.

The proportion of the total credit requirements for a degree that may be thus accepted from a satisfactory institution varies markedly among the different graduate schools. The credit requirements which may be thus satisfied should not be confused with residence (time) requirements.

The maximum proportion of work which may be thus accepted for the master's degree by transfer is one-half at Colorado Agricultural College, University of Delaware, University of Hawaii, Kansas State Agricultural College, University of Maine, Massachusetts Agricultural College, Agricultural and Mechanical College of Texas, and the State College of Washington. At the University of California four units will be accepted. One-fourth of the credits will be accepted at Georgia State College of Agriculture, one-fourth to one-third at South Dakota State College, one-sixth at the University of Kentucky, one-third at Iowa State College, University of Maryland, North Carolina State College, Oklahoma Agricultural and Mechanical College, Oregon Agricultural College, Virginia Agricultural and Mechanical College, eight semester hours at Louisiana State University and the University of Missouri, three-fourths at University of Nevada, 30 per cent at University of Wyoming, and none at Purdue University or Rutgers University.

The situation with reference to the transfer of "credits" for the Ph. D. is much less definite. In very few of the graduate schools is there an announced credit requirement for this degree. "Credits" may be necessary, but are relatively incidental. Emphasis is upon residence, mastery of a field as shown by examination, and proved research ability. In general, the determination of the recognition of the graduate work done at another institution is one of the functions of the directing or examining committee appointed for each student or of the graduate committee or council. The maximum which may be thus accepted is stated to be one-half by University of California and Iowa State College, and two-thirds by Purdue University, University of Kentucky, University of Maryland, Massachusetts Agricultural College, University of Missouri, and Rutgers University.

It may be emphasized that in many cases migration is highly advisable. Particularly is it to be recommended that both bachelor's and doctor's degrees should rarely be conferred upon an individual by the same institution without an intervening period of graduate work at another institution. In some cases this migration should be encouraged systematically, as between a State university and a separate land-grant institution in the same State. It is rare that a single institution has reached such preeminence in any particular field of research that a sojourn on another campus with new contacts and point of view would not prove advantageous to the student.

Graduate utilization of credits secured while an undergraduate.—The question sometimes arises in graduate school administration as to whether it is good practice ever to utilize any of the work or credits secured by an undergraduate for credit toward an advanced degree, particularly toward the master's degree. Probably no institution ever allows double credit for such courses, that is, credits them both toward the bachelor's and toward the master's degrees. A problem of this type may arise if a student as an undergraduate fails for a time to meet some technical requirement for graduation and yet has completed all the subjects prerequisite to satisfactory work in certain advanced courses which are primarily for graduate students. For example, a student in the advanced (senior college) course of the Reserve Officers' Training Corps may have completed all the standard requirements for a bachelor's degree but may still be deficient one quarter or a semester of military training, which he has agreed to take upon enrollment in such advanced course and which the institution through its agreement with the War Department is to require before graduation. The fact that he is not yet technically a graduate would not necessarily interfere with his carrying graduate work satisfactorily. In other instances the student who has accumulated "extra" credits as an undergraduate asks that certain selected subjects be included in his graduate curriculum.

The problem is handled variously by different institutions. In 14 institutions work of graduate grade taken under these conditions is not credited toward an advanced degree. In 22 institutions there is provision whereby upon appropriate petition and examination of the facts such courses may be credited as graduate work. In some institutions a distinction is made between allowing such courses for graduate credit and allowing the time to count as graduate residence. In one institution, for such credits to be acceptable they must have been approved by the major professor and dean of the graduate school before they are taken by the undergraduate.

The justification for graduate acceptance of undergraduate work is at best debatable. On the one hand it may be urged that frequently the lack of the baccalaureate degree is due to a nonessential technicality, and that the label of "senior" or "graduate student" after the name in the office of the registrar has no essential relationship to the quality of work or the accomplishment of the student. It may be pointed out that in every graduate school in America there is a certain overlapping of undergraduate and graduate work. It is urged that this tendency is particularly shown by the complete fusion at Johns Hopkins of the senior college with the graduate school. On the other hand, such acceptance is deprecated because usually as an undergraduate there has been no definite formulation of a program of study for an advanced degree, the undergraduate standards may not be as high as those demanded of graduate students, and the credits presented may be ill-chosen.

The reports from the land-grant graduate schools indicate that the number of cases which arise is relatively small. It is suggested that where such transfer of credit is considered advisable (1) the transfer should not decrease the residence required for the master's degree to less than one year, (2) the transfer should not occur except upon due petition and after agreement by a competent committee that the credit is fully justified.

Special awards to graduate students.—Most graduate schools give special awards to certain graduate students. These are of many types, and bear a variety of names. Most commonly they are termed scholarships, fellowships, and graduate assistantships. The names are derived from British custom, but there has been marked departure in America from British tradition. Detailed treatment of the scholarships and fellowships in land-grant institutions will be found in another part of the Land-Grant College Survey report.[33] It is, therefore, necessary here to call attention to only one or two aspects of such awards that have a direct bearing on graduate work.

In some of the land-grant schools certain fellowships are designated as teaching fellowships. The student who holds such an appointment is required (under supervision) to assist in class and laboratory instruction. It would seem that in many cases this might well constitute a most valuable part of the training of the student. As was noted previously, there is insistent demand that the graduate school recognize more clearly the training of college teachers as one of its objectives. If no teaching is required (or permitted) of fellows who are to go into teaching, it is difficult to see just how the graduate school may determine their capacities in this field. While formal courses in education may be of advantage, "practice teaching" must always be highly desirable. The experience thus gained by the graduate student will frequently prove quite as valuable to him as course work or research.

It should be emphasized further that in many cases research fellowships are granted by experiment stations, industrial concerns, and various research agencies. It is entirely reasonable to expect that some return be made to the institution through assisting in research; if properly handled there should be a considerable educational return to the student.

Awards of the type of graduate assistantship, teaching fellowship, research fellowship, etc., are criticized from two points of view. It has been contended on the one hand that they affect detrimentally the standards of teaching and on the other that their employment in agricultural experiment stations and similar land-grant college research agencies is not for the best interests of the research program. These items may be considered briefly.

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[33] See Vol. I, Part VI, "Student relations and welfare."

The effect of the employment of graduate students in teaching has been most thoroughly reviewed by committee E of the American Association of University Professors on The Extent of Employment of Graduate Student Assistants and the Effect on the Quality of Undergraduate Instruction and on the Graduate Work of Student Assistants (1926). In a carefully prepared questionnaire they endeavored to determine the standards of teaching as affected by the employment of graduate students. About 90 per cent of the replies indicated that the graduate student-teachers were sufficiently prepared to teach but about half expressed the opinion that "full-time" teachers would give more efficient service. They state:

> Analysis of the answers to all the questions of this section clearly shows that the weight of opinion considers graduate student teachers adequately trained for the type of teaching they are called upon to do, and continually enthusiastic since they are putting forth their best efforts as apprentices in their chosen profession. Therefore although, theoretically, experienced teachers always would be better, practically this would be true only for a short term of service except in very rare instances and in the other instances they would be increasingly less successful and at the same time increasingly less available for more special branches of teaching and research.
>
> It would appear, accordingly, if we may judge from the consensus of opinion afforded the committee by the questionnaires, that the standards of teaching have not in general been lowered by the employment of graduate student-teachers. What they lack in experience is compensated for by the enthusiasm which they bring to their work.[34]

The overwhelming opinion was to the effect that a graduate student might successfully devote himself to study toward his degree and undertake teaching at the same time. Furthermore, with few exceptions, the replies indicated that the "experience and confidence obtained and the reviews required in teaching these add sufficiently to the education of the graduate student to make the teaching worth while with him in this respect." They concluded further that common sense must be employed by the department in assigning teaching work to the graduate student. Of particular interest were the replies to the question as to whether the better class of graduate students devote themselves solely to study, or combined teaching and study. More than 80 per cent of the replies stated that the better class of graduate students both taught and studied "and for two chief reasons, only the better are allowed to teach, and all realize, whether they need financial aid or not, that teaching is the equivalent of the ever desirable apprenticeship in any field of work." More than 75 per cent approve, in general, of the policy of offering part-time opportunity as an inducement to graduate students. "The great majority feel that graduate student-teaching should be en-

[34] American Association of University Professors, Bulletin Vol. XII, Nos. 2–3, February–March, 1926, pp. 100–114.

couraged, or at least not discouraged, and that a 'reform' of the methods now employed in our institutions is not called for." They conclude finally that—

One of the most important problems for the improvement of undergraduate teaching is to keep the exceptional teacher actually teaching elementary classes, and at the same time give him the opportunity for a reasonable amount of research work, without which, in nearly every case, he is sooner or later a stereotyped and listless surveyor of lifeless facts. The employment of graduate student teachers in our larger institutions of learning can legitimately, and we believe profitably, be made to further this object; that is, to retain the services of the best teachers, and maintain them at their best, in the basic courses of a department. If this opinion is well-founded, the employment of graduate student-teachers to carry on certain types of work certainly does not lower the general standard of teaching in a department. But it should be emphasized that this conclusion is based on the conditions which appear to prevail in the great majority of our larger institutions, and should by no means be interpreted to sanction the employment of graduate student-teachers to the exclusion of experienced teachers to carry large responsibilities in a departmental staff.

It may be concluded, therefore, that within reasonable limits the land-grant graduate schools may well emphasize and continue the utilization of graduate student-teachers, i. e., teaching fellows and graduate assistants.

The second question, as already noted, is whether or not research fellows, research scholars, and graduate assistants may profitably be utilized in connection with the research programs of the standard research agencies of these institutions. The oldest of these institutional agencies, and the one found in most cases closely coordinated with land-grant schools is the agricultural experiment station. The problem is one which has been considered at some length by the Association of Land-Grant Colleges and Universities in its meetings. Certainly the advancement of knowledge (research) is a legitimate activity on the part of the college itself, and increasingly the experiment stations are being recognized as instruments for the carrying on of a legitimate college function. It must be emphasized that graduate work is not only a teaching function in the ordinary sense but a research function as well.

Allen (1922) emphasized some of the difficulties and pointed out some of the safeguards.

If students are utilized on routine or prescribed details of investigation, they will not be doing the independent work expected in advanced-degree courses. The temptation to use the technical skill of the graduate student in this way may be strong. It is the easiest course for the investigator and contributes most to the progress of his own line of investigation. It may yield the greatest return to the station, but it is obviously unfair to the student.

On the other hand, care must be exercised not to assign to the graduate assistant problems which are too ambitious for him to do independent work upon. Direction and close supervision are opposed to the spirit of graduate study, in which independence of thought and action are encouraged. The student needs to be given more latitude in what he does and the way he does it than in the case of regular assistants. He must find out for himself what to do, and how to do it, and what the results mean. Otherwise an important part of the pedagogic value is sacrificed.

Manifestly the course of the experiment station can not properly be determined by the demands for graduate instruction. Its program reflects the needs of the agricultural industry for systematic lines of inquiry, which have been determined upon deliberately and must usually extend over a considerable period. The systematic and orderly progress of its studies, therefore, constitutes its first concern. These need to be adequately provided for, and in the nature of the case they can not be contingent on registration in the graduate school. If graduate assistants can be used to advantage, as they often may be, well and good; but the station should not weaken itself or its force by reliance upon them.[35]

The problem has also been reviewed by Johnson[36] (1922). In 25 of 36 replies from station directors it was stated that more or less use was made of graduate students in connection with experiment station projects. In some cases it was noted that graduate students were used more largely in departments where the research is conducted by members of the teaching staff or where teaching staff and research staff were one and the same. He found, however, that in some stations where research is well-emphasized and differentiated, graduate students often were used in the most highly developed research departments. In some cases as much as $15,000 per year was definitely budgeted for this purpose. In general, those directors who had experience with graduate students had found their services satisfactory. It was noted by Dean Mumford of Missouri:

From the standpoint of the director I have often remarked that the services rendered to the experiment station by some of our scholars have been equal in importance to that rendered by men holding a permanent position in that university.[37]

Twenty-five of 28 directors reported that the efficiency of investigators in charge of experiment-station work was, in general, increased by a limited number of graduate students. In the majority of cases it was believed that the use of graduate fellowships and scholarships increased the amount of productive work of the station. An interesting comment was that of Dean Hills, of Vermont, who stated:

I am rather inclined to believe that if we look at it purely from the point of view of the study at hand a larger output will be secured by the use of well-trained, full-time staff members. If, however, we look at the matter from

[35] E. W. Allen. *In* Proceedings of Association of Land-Grant Colleges, 1922, p. 143.
[36] Edward C. Johnson. *In* Proceedings of Association of Land-Grant Colleges, 1922, p. 146.
[37] F. B. Mumford. *In* Proceedings of Land-Grant College Association, 1922, p. 147.

a broader standpoint of research, in general, and if we take into account the necessity of keeping the reservoir reasonably filled, it is doubtless better to use fellowship funds to some extent in the encouragement and support of recent graduates.[38]

Director Johnson summarizes his findings as follows:

In conclusion, while it is quite clear that there are some differences in policy in the several States with reference to the relation of the experiment station and graduate work, a large proportion of the stations already are using some station funds for research fellowships and scholarships. The preponderance of opinion seems to be that the services of graduate students in the main are satisfactory, an inspiration to the investigators, and a help to the station program. That it is of benefit to the student and that some such relation of experiment station or graduate work is needed in order that the "reservoir" of station men may be filled seems to be quite generally accepted. Coupled with this, however, there seems to be almost a universal sentiment that the number of graduate students working with any one investigator should be small, the quality high, and the amount of station funds used in this way limited, or the program of the station will suffer in consequence.[39]

If the great concentration of support for agricultural investigation functions properly, it will mean increasingly that great scientists will be included in our experiment-station staffs. The experiment station is not properly performing its function if it does not consider the development of a human product as well as of station bulletins. Proper integration with the graduate school is essential. One of the best methods for developing such integration is the proper utilization of scholarships, fellowships, and graduate assistantships. This point of view is well summarized by Dean Mumford (1922) as follows:

The great agricultural experiment stations of the future will be those that are intimately associated with colleges and universities. The experiment station will recognize as a part of its function the necessity and duty of cooperating with the college and university in the training of the investigators who are to be responsible for the work of the institutions of the future. The success of the agricultural experiment station in such cooperative relation will have a profound influence upon the quality of the educational effort of the college and university with which it is associated. Through such cooperative relation the experiment station will not only have a large staff primarily devoting itself to fundamental research, but will influence the whole university and college staff in the direction of a higher appreciation for research. And finally, if fundamental research languishes in an institution, it may be and probably is due in large part to a lack of appreciation on the part of the administrative officers.[40]

It is apparent from the preceding review that several sound principles of coordination of graduate school and experiment station may be formulated, namely: (1) It is wise to make provision by

[38] J. L. Hills. *In* Proceedings of Land-Grant College Association, 1922, p. 147.
[39] Edward C. Johnson. *In* Proceedings of Land-Grant College Association, 1922, p. 148.
[40] F. B. Mumford. *In* Proceedings of Land-Grant College Association, 1922, pp. 181–182.

agreement between graduate school and experiment station for the financing and directing by the latter of the research of students in areas in which the station is in any case carrying on investigations. (2) The graduate school may well make provision for the financing of fellowships and research for students to be directed by station personnel in fields acceptable for station research. (3) There should be more recognition by graduate schools and academic bodies generally of excellent pieces of research published by the experiment stations, and a willingness to accept such in partial fulfillment of the requirements for advanced degree. Without any lowering of standards, it is quite possible that it would prove advantageous to break down certain of the mechanical formalities for advanced degrees. The Ph. D. is supposed to represent ability and accomplishment; recognition of this as shown by performance in the experiment station would seem to be legitimate.

It is possible that with a rapid development of the land-grant schools and of the research work of our experiment stations there may be a tendency to create fellowships and graduate assistantships in excess of the real needs. This has been emphasized by Cross (1919) in the following words:

Let the universities recognize that it is a crime against one another and against society for them to subsidize graduate students to study with them by the offer of fellowships or of free tuition, unless there is prospect that the students thus subsidized will find a demand for their services afterward. The failure to recognize this fact means an overproduction of third-rate research men, who drift into low-salaried teaching because they find nothing else to do, and thus crowd down the standards and compensation of the whole profession.[a]

Distribution of awards by divisions.—It is of interest to note whether or not these awards are distributed among all land-grant fields.

Awards in agriculture.—Scholarships, fellowships, and graduate assistantships are awarded both by the agricultural experiment stations and by the divisions of agriculture. They may be separately considered.

Agricultural experiment station.—Scholarships are granted in the agricultural experiment station in 3 institutions. At 1 institution service required for the station is 21 hours per week, at the other, 6 hours per week. In 1 institution no specific service is required.

Fellowships are awarded in the agricultural experiment station by at least 6 institutions. The time of service required in 1 institution with 22 such fellowships is 10 to 12 hours per week and in another 22 hours per week. In 3 of the institutions the service is not specified. At least 12 of the experiment sta-

[a] Wilbur L. Cross, quoting from a memorandum prepared by Arthur T. Hadley. *In* Proceedings of Association of Land-Grant Colleges, 1919, p. 45.

tions make use of graduate assistants. The number of such fellowships together with hours of service required in various institutions are as follows: 11 with 15 hours, 15 with 20 hours, 10 with one-half time service, 15 with 15 to 35 hours, 17 with 22 hours, 1 with 24 hours, 3 with 18 hours, 1 with 25 hours, 3 with one-half time, 1 with 20 hours, 1 with not more than half-time, and 15 with time unspecified.

Agricultural division.—Scholars were reported as appointed in agricultural divisions in 3 institutions, fellows in 7 institutions, and graduate assistants in 14 institutions. The time required to perform specific institutional service varied from none to 6 hours per week with scholars, from none to 24 hours a week with fellows, and from 4 to 35 hours per week with graduate assistants.

Engineering.—Many land-grant institutions have engineering experiment stations. These and the engineering colleges (divisions) both may give awards.

Engineering experiment station.—Fellows are appointed in the engineering experiment station in at least 6 institutions. The numbers appointed, respectively, are: 4, 4, 5, 1, 2, and 3. The service time required varies from 10 to 24 hours per week. Graduate assistants are appointed by 3 engineering experiment stations, the service time per week varying from 15 to 44 hours. It is apparent in the latter case that no time is allowed for graduate work outside the research problem upon which the student is engaged.

Engineering division.—Scholars are appointed by 4 engineering divisions. Fellows are appointed by 8 institutions, graduate assistants by 9. Bissell (1927) in a questionnaire survey of the awards in land-grant engineering schools reported 13 granting fellowships and 22 graduate assistantships. This included the engineering experiment stations.

Home economics.—No home economics division reports the awarding of any scholarship. Fellowships are reported by several and graduate assistantships by 6.

Veterinary medicine.—Fellows are reported from one institution only. None report higher scholars or graduate assistants.

Commerce and business.—Fellows are reported by 1 institution and graduate assistants by 7.

Arts and sciences.—Scholarships are reported by 3 institutions, fellows by a considerable number of institutions. Graduate assistants are also apparently used quite extensively. They are reported by 16 institutions.

Teacher training.—Fellowships are reported by 2 institutions and graduate assistantships by 7.

It is evident that a considerable number of awards are annually made by land-grant institutions to graduate students and that they are granted in each of the land-grant fields.

Details of making awards.—Methods of making applications for awards such as scholarships and fellowships have not been standardized. In many institutions the application is forwarded directly to the dean of the graduate school. In other cases the application is made directly to the head of the department in which the student desires to pursue his major work. In a few institutions the application is made directly to a special committee. It is probable that this lack of standardization is inevitable because of the great variety of awards which are to be made. In general, the awards which entail no teaching or other institutional obligations upon the recipient are made by a committee. Those awards which involve institutional service usually involve recommendation of the head of the department in which such service is to be rendered.

Even more striking is the variation in the time at which applications for awards must be received. One institution requires that applications shall be in by January 1, one by February 20, several by March 1, likewise several by April 1. In one institution they must be received by April 15, and in another by May 15. In one institution applications are received until the 1st of July. A considerable number do not designate a definite time by which application must be made.

It is of interest in this connection to note the provision approved by the Association of American Universities. The conference of deans of the association in 1913 adopted the following recommendation to the members.

(1) That a provisional selection of fellows and scholars be made as nearly as possible simultaneously (say), during the last week of March in each year.

(2) That the results of such selection be communicated at once to every member of the association.

(3) That no person be asked to accept any such appointment and no formal elections to such positions be made until a sufficient time shall have elapsed for communication among all the universities concerned (say), April 15.

(4) There shall be annexed to the communication provided under rule 2 a list of fellowships and scholarships (if any) for which selection has not yet been made. Persons whose names are included in the lists provided in rule 2 shall be considered as prima facie ineligible for appointment to these or other vacancies.

(5) If a candidate who has accepted an appointment to a fellowship withdraw from his agreements without sufficient cause, it is recommended that the facts in the case be communicated to the other universities of the association.

(6) That the substance of Nos. 3, 4, and 5 be communicated to applicants.[a]

There are grave doubts as to the advisability of such a "closed-shop" procedure.

There is also considerable variation as to the individual or committee which finally recommends the awards. In a considerable number of institutions such recommendations are made either by the graduate council or by the graduate committee. In a still larger number it is the head of the department primarily concerned. In a few institutions the recommendation is made by the dean of the graduate school, and in at least one institution by the president.

The time for making the awards is not definitely fixed in most institutions. Five institutions report April 1, one April 15, and one June 1.

With the rapid growth in graduate enrollment and correspondingly rapid increase in the number and variety of awards to be made, it is believed that a somewhat higher degree of standardization

[a] Association of American Universities, Proceedings, 1913, p. 21.

among land-grant colleges is desirable. It is suggested, therefore, that the problem of selection and appointment of scholars, fellows, and graduate assistants be made the theme of an early discussion in the appropriate section of the Association of Land-Grant Colleges and Universities and that an effort be made to develop a higher degree of uniformity. This is a topic which might well be considered at a meeting of the executive officers of the graduate schools of the land-grant colleges.

Distribution of awards among institutions.—The administrator of the graduate school is sometimes confronted with a task of determining apportionment of awards between graduates of the school making the awards and graduates of other institutions. Table 16 gives for 1927-28 the percentage of awards made to graduates of the institution making the award, also of awards to graduates of other institutions in the same State, awards to graduates of colleges of other States in the United States, and awards to graduates of colleges in foreign countries. It should be of assistance in determining what is standard practice in some of the larger schools.

TABLE 16.—*Distribution of awards by graduate schools in land-grant institutions*

Institution making award	Per cent of awards to graduates of same institution	Per cent of awards to graduates of other institutions in same State	Per cent of awards to graduates of colleges in other States	Per cent of awards to students from foreign countries
1	2	3	4	5
University of California	52.5	10.0	33.8	3.7
Connecticut Agricultural College	----------	33.3	66.7	----------
University of Delaware	----------	----------	100.0	----------
University of Florida	----------	60.0	40.0	----------
Georgia State College of Agriculture	----------	50.0	50.0	----------
University of Illinois	36.2	26.1	34.8	2.9
Purdue University	----------	----------	100.0	----------
Iowa State College	22.2	11.1	61.1	5.6
Kansas State Agricultural College	48.3	3.4	48.3	----------
University of Kentucky	55.9	17.7	26.4	----------
University of Maine	66.7	----------	33.3	----------
University of Maryland	44.4	----------	55.6	----------
Massachusetts Agricultural College	50.0	----------	50.0	----------
University of Minnesota	47.1	5.9	41.6	5.4
Mississippi Agricultural and Mechanical College	----------	----------	100.0	----------
University of Missouri	33.3	23.3	43.4	----------
Rutgers University	23.3	----------	69.8	6.9
North Carolina State College	7.7	7.7	76.9	7.7
Oklahoma Agricultural and Mechanical College	30.7	7.7	61.6	----------
Pennsylvania State College	39.3	8.2	50.8	1.7
Agricultural and Mechanical College of Texas	45.4	9.2	45.4	----------
Agricultural College of Utah	100.0	----------	----------	----------
University of Vermont	55.5	----------	44.5	----------
Washington State College	4.6	4.6	86.2	4.6
West Virginia University	66.7	----------	33.3	----------
University of Wyoming	----------	----------	100.0	----------

It is probably not advisable to generalize from the table. However, there would seem to be in some cases an evident lack of attracting power, or a mistaken conception that an institution should reward its own graduates exclusively. A large amount of student migration is apparent.

Graduate opportunities of staff members.—A varying percentage of the graduate student enrollment of most land-grant institutions is made up of staff members of the rank of instructor or above.

In many fields (particularly the sciences) any considerable advancement either in salary or rank is usually dependent in large part upon graduate training. In these fields a few institutions usually demand that an instructor when appointed should have completed the requirements for the Ph. D. In larger number, advancement to the grade of assistant professor has among its prerequisites the possession of the degree. Appointments in these fields to higher grades are now rarely made of those who have neither the degree nor proved research training and demonstrated ability.

In the technical fields the appointments to the higher grades even yet do not always and in all institutions presuppose graduate training. Quite certainly the great majority of these of the rank of assistant professor and instructor (or even those of higher rank) in the technical fields (engineering, agriculture, home economics, etc.) do not possess the Ph. D. The proportion of those who do is increasing. The goal in practically all of these is insistence as soon as practicable that the staff should meet the qualifications as to graduate preparation laid down in the stronger institutions in the science fields.

The institutions are demanding of their staffs better preparation and better teaching. The fact that any department to function most satisfactorily must be not only a teaching but a research organization is being emphasized. Staff members without graduate training must usually at least begin their research under some direction, and such research constitutes in itself the best possible type of graduate work. It is quite inevitable, therefore, that both from staff and administration there should be suggested the opportunities for combining some graduate work with staff membership. Obviously safeguards must be developed, to prevent undue interference of graduate work with teaching or other responsibilities, but in general the best interests of staff and institution are served by permitting and encouraging a limited amount of graduate work where facilities and guidance are satisfactory and available.

The Association of Land-Grant Colleges and Universities, the Association of American Universities, and the Association of State Universities, as well as other organizations, have considered at various times the problems involved. Most of the discussion has centered about the training of college teachers in service. In some cases this involves special organization and development in the subject-matter departments.

Four groups or types of work are usually of interest to staff members desirous of self-improvement. In some cases there is desire to correct some deficiency, usually of undergraduate training, as mathematics in an agricultural staff, modern languages in various technical staffs, etc. Frequently there is desire to take advanced courses in the field of major interest. There is often pressure for improvement in the technique of teaching, and this may in some instances involve enrollment in courses in education. Finally, in most scientific and technical fields in properly constituted and functioning departments there is incentive to attempt research. This is the essence of graduate work, and in many cases it is carried on under the direction of the graduate college.

The pressure or insistence of these four types of opportunities is quite variable, depending upon individual tastes and capacities, the department, and the institution. In recent years the pressure to secure better teaching preparation is becoming more insistent. The college and university associations are debating it, administrators are much interested in it. This increased emphasis is bound to react eventually upon departments, though in general they at present apparently have little respect for the contributions that can be made to the teaching of their subject matter by those in the field of education.

The Committee on Instruction in Agriculture, Home Economics, and Mechanic Arts of the Association of Land-Grant Colleges and Universities finds that:

> There are relatively few land-grant colleges in which it would be impossible for members of the teaching staff to become students in courses in education, especially if they are willing to take such courses with undergraduate students. In answer to the question, "Are your college teachers of technical subjects permitted and encouraged to pursue graduate work while in service?" 38 of the replies were affirmative and only 7 negative. Apparently "the spirit is willing, though the flesh be weak." It is also a matter of record that within the past two years 147 teachers of technical subjects in 20 of the land-grant colleges have taken courses in education while in service.

In general, the tendency in land-grant schools is to permit the instructing force of the lower grades to enroll in graduate work.

There is considerable variety as to the opportunities allowed to staff members to continue or complete their graduate training. In most of the agricultural experiment stations this privilege is granted or encouraged on the part of the members of the staff in the minor positions. Similar provision is usually made also for those in the instructing staff in the institutions.

In most institutions some organization known as the "faculty" or the "graduate faculty" votes upon the conferring of advanced degrees. The anomalous situation whereby faculty members may vote upon their own degrees should be avoided.

There are also marked variations in the "number of hours," "number of credits," or "proportion of time" of staff members which may be devoted to graduate work. Table 17 gives the proportion of time which may be carried in graduate work by staff members of various ranks in the several institutions.

TABLE 17.—*Proportion of full-time graduate work that may be carried by teachers of various ranks in several land-grant institutions*

Institution	Assistant professor	Instructor	Assistant	Others
1	2	3	4	5
Alabama Polytechnic Institute	1/4	1/3	1/2	...
University of California	1/4	1/4	1/4-3/4	...
Colorado Agricultural College	1/4	1/4	1/4	...
University of Delaware	1/3	1/3	...	...
University of Florida	1/4	1/4	1/4	...
Georgia State College of Agriculture	1/4	1/4	1/4	...
Purdue University	0	1/4	1/4	1/4
Iowa State College	1/3	1/3	...	...
Kansas State Agricultural College	5/16	5/16	...	...
University of Kentucky	0	(1)	...	...
Louisiana State University	0	1/3	1/3	...
University of Missouri	...	...	1/3-3/4	...
Montana State College	1/5	1/3	1/3	...
Rutgers University	0	1/3	1/2	...
North Carolina State College	0	0	0	...
North Dakota Agricultural College	0	0	0	...
Oklahoma Agricultural and Mechanical College	1/3	1/3	1/2	...
Oregon Agricultural College	...	[2] 15	[2] 50	...
University of Tennessee	...	1/3	...	...
Agricultural and Mechanical College of Texas	1/4	1/4	1/2	...
Agricultural College of Utah	1/3	1/3	1/3	...
Virginia Agricultural and Mechanical College	...	1/3	1/2	...
State College of Washington	...	1/4	...	...
West Virginia University	1/3	1/3	...	...
University of Wyoming	1/5-1/3	1/6-1/2	...	...

[1] Specific provisions. [2] Per cent.

It would be of interest to learn to what extent staff members are availing themselves of this privilege of graduate work. The returns are insufficient to warrant any extended discussion. The following conclusions seem to be justified, however. In practically all cases staff members with the rank of assistant in institutions with well-developed graduate schools are registered in graduate work. Those with rank of instructor commonly are so enrolled, but more frequently this is true in agriculture, home economics, or engineering. This is, of course, due to the fact that arts and science teachers have, in a greater proportion of the cases, completed their graduate training before appointment. This does not hold apparently in veterinary medicine, as in one institution only were any instructors enrolled in graduate work.

Several land-grant institutions report one or more holding the rank of professor or associate professor as enrolled in the graduate school. There is serious question as to the advisability of this practice. It would seem that in general admission to graduate work or candidacy to an advanced degree should not be granted to those who are voting members of faculties. It may be noted that these registrations are in institutions having graduate work most poorly developed.

The human product of graduate work.—It is to be anticipated that those who enter upon graduate work, and specialize in some major field, will more commonly continue in such selected field than do those taking baccalaureate degrees.

The estimated proportion of those who received a master's degree in the decade ending 1928 who have continued in the major field or one closely allied to it is with very few exceptions at least 75 per cent.

Table 18 indicates the number of those who have received advanced degrees from the various land-grant institutions and have continued in positions involving more or less research activity.

TABLE 18.—*Number of students in land-grant institutions receiving advanced degrees during the decade ending 1928 who entered positions involving research*

Institution	Agricultural experiment stations	United States Department of Agriculture	Engineering experiment stations	Members of college teaching staffs, but not in column 2 or 4	Commercial or industrial concerns	Public health agencies	Animal health agencies other than in column 2 or 5
1	2	3	4	5	6	7	8
Alabama Polytechnic Institute	(1)	...	...	...	...		...
University of California	13	2	...	332	53	...	...
Colorado Agricultural College	22	9	...	...	(2)	...	...
Connecticut Agricultural College	...	...	...	10	8	2	...
University of Delaware	7	...	...	...	10	...	...
University of Florida	...	1	...	8	7	2	...
Georgia State College of Agriculture	5	5	...	50			...
Purdue University	10	5	...	...	2	...	...
Iowa State College	186	41	8	154	93	14	2
Kansas State Agricultural College	64	19	6	34	8	2	...
University of Maine	5	...	...	...	2		...
University of Maryland	28	28	...	25	21	5	...
Massachusetts Agricultural College	13	2	...	2	4	...	...
University of Minnesota	139	26	...	32	20	...	...
University of Missouri	150	40	...	150	10	...	...
University of Nebraska	16	4	1	7	1	...	...
Rutgers University	65	4	...	1	7	1	...
North Carolina State College	12	2	2	8	5	1	1
Oregon Agricultural College	9	4	1	2	4	...	3
Rhode Island State College	2	...	1	1	4	1	...
Clemson Agricultural College	15	4	...	10	10	...	...
South Dakota State College	6	1	...	5	3	...	...
Agricultural College of Utah	11	2	...	...	...	...	...
University of Vermont	10	1	...	21	...	...	...
Virginia Agricultural and Mechanical College	7	2	1	1	1	1	2
State College of Washington	18	4	...	10	9	...	1

[1] Report 40 to 50 per cent.

[2] Very few.

The number of those who have received advanced degrees during the past 10 years who have found employment in nonresearch activities of certain special types as reported by certain institutions are given in Table 19.

TABLE 19.—*Number of students receiving advanced degrees in land-grant institutions during the decade ending 1928, who entered positions not involving research*

Institution	College teaching or administration	Secondary school teaching and administration	Home makers	Business	Others
1	2	3	4	5	6
University of California	36	9	10	8	
Colorado Agricultural College	21	18	2	4	
Connecticut Agricultural College	2	2	0		
University of Delaware	4	1	0		4
University of Florida	10	14	0		
Georgia State College of Agriculture	20	30	0		
Purdue University	8	3	0		
Iowa State College	274	73	0		
Kansas State Agricultural College	111	49	22	15	
University of Maine	9				
University of Maryland	19	11	2	4	19
Massachusetts Agricultural College	14	14	2	2	15
University of Minnesota	32	10	10	20	36
University of Missouri		175			
University of Nebraska	9	4		4	6
Rutgers University	10	4	3	13	1
North Carolina State College	20	10			
Oregon Agricultural College	15	9	3	4	
Rhode Island State College	1		1	4	
Clemson Agricultural College	20	5	15	15	
South Dakota State College		5			6
Agricultural College of Utah	8	23	3		19
University of Vermont		5			
Virginia Agricultural and Mechanical College	24	19		16	43
State College of Washington	6	12			
West Virginia University		18			

It is the opinion in general of those who have answered the questionnaire that the average person who takes an advanced degree from an institution makes a greater contribution to the economic, social, and educational well-being of State and Nation than one who receives the bachelor's degree only. Affirmative replies were made by 29 institutions. Two institutions—University of Delaware and South Dakota State College—replied "no." Some of the reasons which are given for affirmative replies are as follows: Alabama Polytechnic Institute—"Comparison will support the statement"; University of California—"Greater breadth of viewpoint and superior training for attacking problems. The men who do not have the ambition to take postgraduate work are those, largely, who are least successful. There are exceptions"; University of Illinois—"The average person will be better qualified to make useful contributions with the addition of a year of special training"; Kansas State Agricultural College—"(1) Students with advanced degrees are holding the more responsible positions, (2) they are more able and ambitious as shown by their working for the advanced degrees, (3) the study and training in earning the degrees make them more competent to do further work"; University of Maine—"As a rule, only those of exceptional ability have the determination to pursue graduate work."

The probable future need for men trained as graduate students will justify an increase in the graduate work offered in the various land-grant fields.

The responses in general show the belief that in all of the following fields there is need for future expansion. These fields will absorb a larger number of those receiving graduate training in the future: Agricultural experiment stations, United States Department of Agriculture, engineering experiment stations, college teaching staffs, commercial and industrial organizations, public-health agencies, animal-health agencies, teachers for secondary schools, and others. Other fields mentioned frequently as requiring an increased number of individuals with advanced degrees were the Bureau of Mines, research institutions, commercial agriculture, teaching in junior colleges, social-service agencies, extension service, scientific control of manufacturing plants, various State and public agencies, industries dealing with agricultural products, farm managers, agricultural advisors for banks and insurance companies, State departments of public works, professional engineering fields, and textile research.

Whatever may be true of certain liberal arts or general education fields, it is apparently clearly the consensus of opinion that the saturation point for placing the product of land-grant graduate work will not be reached in the immediate future.

Chapter IX.—Graduate Offerings

There has been a most significant growth in offerings of work in the graduate level by land-grant institutions. The development and administration of these offerings brings many problems. Several of these may be listed for special consideration. (1) The technique of determining in an institution or department when the facilities and staff are adequate to undertake a program of graduate development should be studied. Coordination between graduate school and special research agencies should be noted. (2) A study should be made of the classification and characteristics of the graduate offerings, together with enrollments. (3) There should be considered certain problems relating to administration of these offerings.

In some of these matters there has been developed a considerable degree of standardization, in others comparatively little. It may be well to indicate what may be considered desirable standards wherever possible.

Evaluation of Facilities and Staff Preliminary to Offering Graduate Work

There is apparently marked variation in the methods used in land-grant institutions in the determination of whether or not a department or division is satisfactorily equipped and staffed to offer graduate work. In the majority of institutions no special technique has been worked out to determine when a department has such equipment and facilities. The methods followed by certain representative institutions may therefore be of interest. In one institution before any department is authorized to offer major graduate work for the master's degree, and again before it can undertake work leading toward the Ph. D., it must request approval, which is granted only upon investigation by a special faculty committee and approval of the graduate committee and graduate faculty. This committee examines carefully into the material, equipment, laboratory facilities, land, etc., which may be available, as well as all personnel factors pertinent. In several other cases the method is similar, authorization comes only after examination of equipment, library, teachers, and all factors involved, but the technique is less formidable. One of the larger graduate schools states that this is not a matter apparently of the graduate school administration at all, but of divisions and departments. In another a questionnaire study is made, followed by a general discussion in the graduate faculty with final action by this body. Another makes the graduate committee directly responsible for the investigation and approval. Another states that such special study is made only upon request of departments desirous of conferring the Ph. D., and in such cases the training of personnel, library facilities, laboratory facilities, research problems completed, in progress, and to be undertaken, and such other information as may be required is secured and passed upon by the graduate studies committee. About 25 institutions report that no special technique has been worked out for making this determination.

In general it is apparent that special studies are not commonly made when permission is given to a department to offer work leading to the master's degree, but are somewhat more frequent for departments wishing to offer work leading to the Ph. D. This is a matter of the greatest importance. It is urgently recommended that in all institutions the greatest care be exercised in authorizing graduate work, particularly work for the Ph. D. in departments until careful study has shown facilities and personnel adequate.

Too frequently the library facilities are not given the consideration which they deserve. As has been said by Ford (1913):

> Without access to adequate library facilities no university is a university, or in other words, no graduate school is a graduate school. For the library there is no substitute or counterfeit. Nothing we can hand over the academic counter is "just as good." The new building for entomology, the $600,000 chemistry building, the new library building, or a materials-testing plant may fill in space in the catalogue, and the student or prospective student may be impressed thereby, but the fact remains that the entomology department may need the Biologia Centrali Americani worse than it does floor space, the Berichte and Abhandlungen of a single learned society may save half the efforts of the chemistry department doing something new, a complete file of engineering experiment bulletins may put half the equipment of the materials-testing labbratory on the scrap heap, and a library building that forces economy in book-buying stands as a melancholy monument of the possibilities it has destroyed. Let no one connected with the promotion of graduate work deceive himself—no single thing is more important in advanced work, that really advances, than the literature on the subject.[48]

The technique for determining whether or not a department has adequate library facilities for good graduate work has been discussed elsewhere in the report under the heading of the library. However, two additional points of special interest to the graduate school may be here emphasized. It is increasingly difficult to secure the scientific and technical periodical sets which are of such fundamental significance. It is of the greatest importance that departments contemplating or giving graduate work should recognize the fact

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[48] Guy S. Ford. *In* Association of American Universities, Proceedings, 1913, pp. 38–39.

that many important sets can be secured at the present time with difficulty and that if the land-grant college libraries are to be adequate in their support of research, special diligence is needed in building up the collections.

While it is primarily the duty of the various departments of the institution to foster the development of its library facilities, it should be recognized that this can be accomplished only by efficient library leadership on the part of the library staff and the librarian.

It should be noted that graduate students in proportion to their numbers make much larger demands upon library facilities than do undergraduates, all of which should be taken into consideration in determining the library status of a department. A certain proportion of graduate students' work is taken in classes with other graduate students, or in seminars in which the students are directed to certain books and periodicals for collateral reading. Where there are many graduate students in a department or in a class or seminar, this may make extraordinary demands upon the library facilities, and it may require duplicate copies of material to be used. A second need is for the files of satisfactory bibliographic aids, card indices, reviews, abstract journals, etc., which are so necessary to the individual who is carrying on research. There needs to be a well-selected and representative group of periodicals in the major fields at least so that the student may be familiar with the present trend of his chosen field.

Certain it is that in any evaluation of the set-up for graduate work, a most careful study of the library facilities should be made. The technique for evaluating the library facilities in a particular field is not difficult.

The determination of the material facilities other than those of the library should not usually prove troublesome. Far more difficult is it to judge the staff.

An attempt was made to determine to what extent the various institutions have developed techniques for evaluating the quality and character of the staff of a division, a college, or a department before granting permission for giving advanced or graduate work. Most institutions apparently have not developed any special technique for this purpose. Among the suggestions which have been made as to the items to be taken into consideration, the following may be noted. California judges largely on the basis of the quality of publications which have been issued by the staff members. Iowa appoints a special committee to study the training, research interest, and productivity of the staff. Massachusetts studies the educational and research ability of the members of the staff as shown by publications, the ability to teach successfully as shown by an investigation and by consultation with outside experts in the field of the department under consideration. At one institution a group committee must examine and approve those nominated to direct graduate work and recommend suitable action to the executive committee of the graduate school. At another the staff is evaluated on the basis of its advanced degrees and of the actual research work that it has been doing. Another conducts an examination through the executive committee of the graduate school, and the findings are based upon the graduate training, research results, and the experience of the members of the staff.

At least one institution has found it highly desirable and profitable to bring in outside expert assistance. Evaluation of research and graduate teaching ability of members of the staff by other members of the same staff is sometimes relatively difficult. If it is possible to bring in from the outside some one whose ability and standing in the field is unquestioned and who is trusted by the department under investigation, this may prove extremely helpful.

One of the most quoted criteria for the determination of the adequacy of a staff giving graduate work, particularly work leading toward the Ph. D., is the possession by all, or by a considerable proportion of the staff members, of the degree doctor of philosophy. While this should not be minimized, it is felt that far more important is the active participation in research and the quality of research being done as shown by publications. In technical fields at the present time it is very frequently impossible to find individuals who have the degree Ph. D., although it may not be impossible to find those who, by training and experience, are fully qualified to direct advanced graduate work.

The factors which have to do with the development of graduate work in an institution have already been reviewed. It should be emphasized at this point again, however, that it is by no means necessary that every land-grant institution attempt to build strong graduate work in everyone of those undergraduate departments and fields. It is well to recall the caution enunciated by Cross (1919).

> It is in general more for the advantage of each university to have its well-endowed lines of research made stronger in resources and students than to develop its weaker ones up to a common level, which will in most instances remain a low level.[44]

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[44] Wilbur L. Cross, quoting from memorandum by Arthur T. Hadley. *In* Association of American Universities, Proceedings, 1919, p. 45.

There is occasionally raised an objection to recognition of graduate work in some of the so-called applied fields. The controversy between such applied fields and the older, so-called pure sciences and liberal arts has already been discussed. In general, it would seem logical to permit graduate work wherever research work on the proper level can be satisfactorily carried out and directed, particularly wherever there is fine research work being carried on by members of the staff. It is well to bear in mind in this connection the statement by Angell (1919). He says:

A distinction often drawn, and having a certain practical validity, is that between research in pure science and research in applied science. It is easy to magnify this distinction quite out of proportion to the actual facts. The objects of research in pure science and the motives inspiring the work may be appreciably different from those encountered in the field of applied science. But the technique of the procedure in the two cases may be all but indistinguishable and either variety of research, if it is to survive the test of scientific criticism, must be based upon absolutely fundamental scientific principles. In the last analysis, the difference reduces almost wholly to the psychological question of motivation. The man working in the field of applied science has before him a concrete specific issue involving some immediate practical exigency. The worker in pure science has quite as definite a specific problem, but it is not one which has arisen out of, nor which necessarily exists in obvious relation to, an immediate demand. Beyond this I doubt if significant differences exist.[45]

Coordination of Graduate Work with Special Research Divisions

It was earlier emphasized that one principal justification for the development of graduate work in land-grant institutions has been the possession by these institutions of agricultural experiment stations, and in recent years of engineering experiment stations and various other special research agencies. The problems of scholarships, fellowships, and graduate assistantships in these research agencies likewise have been reviewed.

It is of interest to note to what exteht the research facilities of such institutions are being made available to graduate students. The following table gives the number of students who were preparing theses or dissertations for the degree master of science or master of arts and doctor of philosophy and doctor of science, and the number of these whose research work was financed in whole or in part through the various research agencies characteristic of land-grant institutions.

[45] James R. Angell. *In* Association of American Universities, Proceedings, 1919, pp. 27–28.

TABLE 20.—*Extent to which various specific agencies assisted in the financing of the research problems of graduate students in land-grant institutions*

Institution	Candidates for Ph. D. degree			Candidates for M. S. (or M. A.) degree		
	Total	Number assisted by—		Total	Number assisted by—	
		Agricultural experiment stations	Engineering experiment stations		Agricultural experiment stations	Engineering experiment stations
1	2	3	4	5	6	7
Alabama Polytechnic Institute				83	3	
Colorado Agricultural College				7	7	
University of Delaware				2	2	
University of Florida				60	9	
Georgia State College of Agriculture				40	40	
University of Hawaii				10	[illegible]	
Purdue University	1		1	16		16
Iowa State College [1]	26	11		133	48	
Kansas State Agricultural College				82	23	
University of Kentucky					3	
University of Maryland	21	13		40	22	
University of Minnesota	420	24	5	1,563	27	
Mississippi Agricultural and Mechanical College					1	
Montana State College					2	
Rutgers University	17	15		40	19	
North Carolina State College	5	2		64	4	
North Dakota Agricultural College					7	
Oklahoma Agricultural and Mechanical College					1	
Oregon Agricultural College				17	8	
Pennsylvania State College	13	1		309	1	1
Rhode Island State College				3	1	
Agricultural and Mechanical College of Texas				111	1	
Agricultural College of Utah					3	
University of Vermont					1	
Virginia Agricultural and Mechanical College					3	2
State College of Washington		2			5	4
West Virginia University					6	3
University of Wyoming				30	3	

[1] Other special research agencies, 2.

Classification and Characteristics of Offerings

There has been very little standardization of the courses offered to graduate students. The characteristics of a graduate course are necessarily somewhat difficult to define. In practically every university of the United States a considerable proportion of the work credited toward advanced degrees is taken by graduate students in classes to which undergraduates are also admitted. Statistics published in 1926 by Wilkins indicated that about 40 per cent of the registrations at the University of Chicago on the part of graduate students were in courses designated as primarily senior college courses. The same was true for Harvard and Wisconsin. At Minnesota the percentage of graduate registrations in upper classes of undergraduate courses was found to be about 25. He concludes, "From the viewpoint of the graduate school, the senior college is an indispensable companion."[46]

There are those who disagree very sharply with the policy of utilizing undergraduate courses for graduate students and also with the policy of admitting undergraduates to the same classes with graduate students. Greenlaw (1926), for example, insists that there should be—

Sharp differentiation between graduate and undergraduate work. The two can not be combined except in very elementary courses. The difference is in content and in method. An undergraduate course, handled as knowledge reduced to systematic form by a master and transmitted to students, may be more advanced in content than a purely graduate course which is conducted as training in the method of research.[47]

One group would differentiate the graduate work very sharply, the other believes that the sharp line of demarcation should come at the end of the junior college.

The survey of the situation not only in land-grant institutions, but in others as well, indicates that in many cases four groups of courses may be recognized. For the purposes of the present survey, these may be defined as follows:

Group 1 courses.—These are courses or subjects usually open to graduate students only. They are usually advanced in character and differ in purpose and content from the undergraduate courses. Here are to be included the opportunities for research, the conferences, and the graduate seminars. Here also will usually be included those courses which individual professors have made distinguished because of their own contributions to the field or to their unusual ability to organize and present material in subjects which are undergoing fluctuations.

Group 2 courses.—These are courses usually defined as open both to graduates and to undergraduates of the senior college or upper division. If we are to follow the reasoning of Wilkins, who insists that the line of demarcation between junior and senior colleges is much more real and should be much more emphasized than that between the senior and graduate college, it is quite apparent that some of the courses offered to advanced undergraduates may be entirely suitable for graduates. These are usually advanced courses

[46] Ernest H. Wilkins. *In* Association of American Universities, Proceedings, 1926, p. 63.
[47] Edwin Greenlaw. *In* Association of Colleges and Secondary Schools of the Southern States, Proceedings, 1926, p. 243.

frequently having a long list of prerequisites. In many cases they are the tool courses. As previously stated, a considerable proportion of the work taken by candidates for master's degrees in our standard universities is in courses belonging to this group. It seems self-evident that not every course offered to senior college students should be available for graduate credit, certainly not for major graduate credit. There is, of course, the danger that inadequate courses may be included by a faculty anxious to increase its list of graduate offerings. It would seem that in many fields such a mixture of senior college students and graduates is entirely defensible in certain courses. This is particularly true in some of the technical and scientific fields.

Group 3 courses.—These may be defined as courses primarily of senior college grade which may be taken by graduate students for minor but not for major credit. They include subjects which may be essential to the proper development of the major but do not require as long a sequence of prerequisities. Very frequently, particularly in land-grant graduate fields, the research problem of a student will involve the securing of some special course or technique with which he is unfamiliar. For example, graduate students in a field such as horticulture may require for their research certain techniques which are taught in senior college chemistry, courses usually taken only by students who are specializing in this field. They are courses which are not sufficiently advanced to be appropriate to a graduate in the field of chemistry but are entirely appropriate as supporting work to students majoring in other fields. Whether or not these are actually granted graduate credit is somewhat beside the point, for it is inevitable that the majority of graduate students must needs have the training secured in such courses. This does not mean that relatively elementary courses should be utilized for this purpose. A graduate student in genetics, for example, may find an advanced course in statistical methods in mathematics very helpful, even essential. Very probably it would be a course not ordinarily taken by undergraduates except those who are taking mathematics as the field of specialization.

Group 4 courses.—These are undergraduate courses which should not be allowed to graduate students for graduate credit, though frequently they must be taken by graduate students to make good deficiencies. Not infrequently there are deficiencies in mathematics or modern languages. These should be corrected as promptly as possible. If such deficiencies are present to any great degree, it is probable that the student should be registered as an undergraduate until such work has been completed. If the deficiencies are not extreme, it is customary to allow them to be made up during the term of residence as a graduate student. In some cases, certain of these subjects and the manner in which they are taught or handled will be of considerable significance to the graduate school.

Enrollment of graduate students in courses of the various groups.—It is quite apparent that any arbitrary scheme of classifying graduate courses such as that already outlined will not fit the customs or practices of all institutions. An attempt was made, however, to get an idea as to the proportion of such courses which are offered in various land-grant institutions. The results are tabulated in Table 21 in so far as the methods or classifications in use at these institutions made it possible.

TABLE 21.—*Distribution of courses among Groups 1, 2, 3, and 4 in several land-grant institutions*

Institution	Group 1 subjects—strictly graduate: Courses taught in class			Group 1 subjects—strictly graduate: Courses taught by conference			Group 2 subjects—for graduates and advanced undergraduates			Group 3 subjects—undergraduates, giving minor credit only to graduates			Group 4 subjects—strictly undergraduate		
	Courses offered	Courses taught	Enrollment	Courses offered	Courses taught	Enrollment	Courses offered	Courses taught	Enrollment	Courses offered	Courses taught	Enrollment	Courses offered	Courses taught	Enrollment
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Alabama Polytechnic Institute				25	25	19									
University of California	395	374	1,671	155	142	846	1.053	988	4,181				210	212	368
Colorado Agricultural College	19	17													137
University of Delaware					5	2	5	1	2						
University of Hawaii				3	3	9	14	14	67	2			57	57	
University of Illinois	294					874				404					
Purdue University	147			33			268			62			298		
Iowa State College	171	99	797	150	110	629	359	290	1,629	266	235	349	829	785	643
Kansas State Agricultural College	33	21	94	65	46	146	442	373	687						96
Massachusetts Institute of Technology	61	31	27	56	33	40	74	24	26	53	14	17	88	20	15
University of Minnesota	598	298	1,857	[1] 12	12	94	505	293	726				26	22	22
University of Nebraska (home economics only)	3	2	7			[2] 1,028	24	23	14				15	13	1
University of Nevada				20	4	63	326		63				191		
Rutgers University	55	36	132	16	15	170	9	6	31	69	56	57	39	29	12
Oklahoma Agricultural and Mechanical College	73	26	72	34	9	33	398	93	159						
Oregon Agricultural College	115	48		96	60		167	115							
Rhode Island State College (agriculture only)										14	14		35	35	
Agricultural and Mechanical College of Texas	90	41	146												
Virginia Agricultural and Mechanical College	10	14	23	45	36	46	12	12	25				10	10	5
University of Wyoming	9	2	5	19	8	8	223	124	101				197	153	

[1] Data for home economics.
[2] Total number of graduate students supervised through conference (3 quarters).

It is of interest to note the size of classes given in subjects open to graduate students only. In comparatively few cases are classes of more than 20 reported (one institution reported 36 such classes, one 5, and one 4 in arts and sciences). It is apparent that the problem of large sections is not troublesome in most instances. One institution replied, "Fortunately we are not large enough to be forced to mass production."

Methods of Administration of Offerings and Instruction

There are numerous functions to be performed in the administration of the graduate work, and they may be performed by a variety of agencies. A review of the practices of the various institutions should prove of interest and value, particularly to those institutions whose graduate schools are in the initial stages of development. Among the functions thus to be performed are the following: Accrediting of schools for admission of graduates to graduate standing; accrediting schools for transfer of graduate credit; making of rules governing the classification of graduate students; fixing of requirements for advanced degrees (master's and doctor's); fixing of requirements for professional degrees; determination of requirements for honorary degrees; determination of courses carrying graduate credit; appointment of student's advisor or student's committee; the admission to candidacy for a degree; approval of research problem of thesis topic; administration of modern language requirements; action on special petitions; and keeping of graduate student's records.

Accrediting of schools for admission of graduates to graduate standing.—This is handled in a variety of ways. Of 37 reporting on this item, 10 stated it to be a function of the registrar, and in 4 of these the registrar had the power of final action. In 6 institutions it was handled by the dean of the graduate school, and in 4 of these he was the ultimate authority. In addition there were 8 in which the matter was handled by the chairman of the graduate committee or council. In 4 of these cases he had ultimate authority. The graduate committee or council itself took action in 19 cases, and it constituted the ultimate authority in 11 of these. In 1 case the graduate faculty possessed the power of recommendation. In 7 the matter was handled by some other faculty, usually the general faculty, and this was the ultimate authority in 6 cases. The duty was assumed by the president in 2 institutions, and he constituted the ultimate authority in 1. The University of Missouri reports that this is a function of the board of regents and the Mississippi Agricultural and Mechanical College, that it is handled by the director of one of the research divisions.

Accrediting schools for transfer of graduate credit.—This practically implies the recognition of the institution from which the transfers are made as one which is giving standard graduate work in the field in question.

In practically every case the same agencies act upon this as with the accrediting of schools for admission of graduates to graduate standing. The exceptions are as follows: University of Minnesota reports that the action of both the graduate dean and the graduate council is necessary. At the University of Missouri the graduate council and graduate faculty recommend to the dean of the graduate school, who has the ultimate authority.

Making of rules governing the admission of graduate students.—These are determined in several ways.

Rules governing the admission of graduate students are fixed or recommended by the graduate committee or graduate council in 28 of the institutions reporting. In the majority of cases this is the organization possessing power of final action. In some cases the dean of the graduate school is jointly responsible, as in Alabama, Illinois, Iowa State, Massachusetts, Missouri, and North Carolina. At California, Delaware, Georgia, Purdue, Kansas, Rutgers, North Dakota, Rhode Island, Tennessee, and Texas these regulations must be approved by some faculty other than the graduate faculty. At Iowa State the final decision is with the graduate faculty. At the University of Kentucky the whole matter is handled by the registrar. At the University of Missouri the dean, the graduate committee, the registrar, the board of regents all have power of recommendation, with final decision by the graduate faculty. At Nebraska and Pennsylvania State College, the entire matter is handled by the graduate faculty. At Virginia this matter is determined by the chairman of the student's major department and the student's advisor.

Making of rules governing the classification of graduate students.—In general, the rules governing the classification of graduate students are determined by the same authorities as fix the rules for admission to graduate work.

The following exceptions may be noted:

At Illinois the rules for classification are recommended by the dean and determined by the graduate committee. At Kansas and Louisiana they are recommended by the chairman of the graduate committee and determined by the committee. At North Carolina these are fixed by the dean of the graduate school and the president.

Fixing of requirements for advanced degrees.—It might be expected that there would be some uniformity in the fixing of requirements for advanced degrees, inasmuch as these have been reasonably well standardized, but little is apparent.

In the majority of cases, nearly 27, the requirements are fixed by the graduate committee, and in 8 cases this committee has power of final action. In 10 of these recommendation is made to some faculty other than the graduate faculty. In 9 cases the requirements are passed upon by the graduate faculty, and in 8 cases this faculty has power of final action. In 1 case the power of final action is vested in the president upon the recommendation of the graduate committee. In 2 others—Illinois and West Virginia—the power of final action is vested in the board of regents. In no case are the requirements fixed either by the chairman or by the dean of the graduate school.

Fixing of requirements for professional degrees.—The custom in 19 institutions was determined. In 9 of these the requirements are fixed by the graduate committee, in 6 by some faculty other than the graduate faculty, at Iowa and North Carolina by the graduate faculty, and at Kentucky by the president. At Massachusetts Agricultural College final action is taken by the director of one of the research divisions.

The determination of which courses listed in the catalogue should carry graduate status.—This determination is made by the graduate dean acting alone at Alabama, by the chairman of the graduate committee acting alone at West Virginia; by the graduate committee at Colorado, Delaware, Florida, Illinois, Maryland, Louisiana, Minnesota, Mississippi, Missouri, Oklahoma, Oregon, Rhode Island, Tennessee, Texas, Virginia, Washington, and Wyoming. Final action is taken by the graduate faculty at Iowa, Massachusetts, and by some faculty other than the graduate faculty at California, Connecticut, Georgia, Purdue, Kansas, Montana, Nevada, Rutgers, North Dakota, and Pennsylvania.

The material for the graduate catalogue is generally edited by the dean of the graduate college at Alabama, Illinois, Kentucky, Maine, Maryland, Massachusetts Agricultural College, Minnesota, Missouri, Nebraska, North Carolina, Pennsylvania, and Texas, and by the chairman of the graduate committee at Connecticut, Florida, Hawaii, Purdue, Louisiana, Utah, Vermont, Washington, and West Virginia, by the graduate committee at Colorado, Iowa, Kansas, Maryland, Montana, North Dakota, Oklahoma, Tennessee, and Wyoming, and by the president at Oregon.

The records of the graduate students are generally kept by the registrar.—Out of a total of 37 replies, this was true in 30 cases. They are kept by the chairman of the graduate committee at Connecticut, Florida, Vermont, by the faculty at Georgia, by the dean of the graduate school at Massachusetts Agricultural College, and Minnesota.

Appointment of student's advisor or student's committee.—It is customary in many institutions to appoint a special committee for each graduate student to supervise his work and to conduct his examinations. The appointment of this committee is one of the most important functions of the graduate school.

It is made in a variety of ways. In 2 institutions, Wyoming and Virginia, such committees are appointed by the president, in 7 by the dean of the graduate school, in 9 by the graduate committee, in 1 (Utah) by the head of the student's major department, and in 1 (West Virginia) by the board of regents.

The admission of students to candidacy for a degree.—At most institutions there is differentiation between the admission of a student to enrollment in the graduate college and his admission to candidacy.

Final admission to candidacy for a degree is determined in 6 institutions by the dean of the graduate school, at Purdue, Vermont, and West Virginia by the chairman of the graduate committee; by the graduate committee itself in 23 institutions; by the graduate faculty at Massachusetts Agricultural College; by some faculty other than the graduate faculty at Delaware, Georgia, and Kansas; and by the head of the student's major department at Virginia, Washington, and Wyoming.

Approval of research problem or thesis topic.—Final approval of the research problem or thesis topic is given by the dean of the graduate school in 3 institutions, by the chairman of the graduate committee in 3 institutions, by the graduate committee itself in 20 institutions, by the student's advisor or advisory committee in 1 institution (Kansas). In 6 institutions, Louisiana, Nevada, North Carolina, Pennsylvania, Virginia, and Wyoming, it is approved by the head of the student's major department.

Final approval of students for a degree is given by the graduate committee in 12 institutions, by some faculty other than the graduate faculty in 10, by the graduate faculty in 2, by the board of regents in 3, and by the director of a research division in 1.

Administration of modern language requirements.—In many institutions the modern language requirements frequently specified for an advanced degree are waived or modified in certain lines of work. Where provision is made for this, it is of interest to note by what agencies it is accomplished.

This matter is determined by the graduate committee in 7 institutions, by the department of modern languages in 1, by the head of the student's major department in 4, by the dean of the graduate school in 2, by the student's advisor in 1, by the student's committee in 1, and by a faculty other than the graduate faculty in 1.

The examination in modern languages or their acceptance to meet the foreign language requirements for advanced degrees is made directly by the graduate dean in 3 institutions, by the graduate committee in 5, by the department of modern language or modern language examiner in 10, by the registrar in 2, by the head of the student's major line of work in 3, and by the student's advisory committee in 2.

Final approval of the thesis or dissertation of a graduate student is given by the dean of the graduate school at Kentucky, by the chairman of the graduate committee at West Virginia, by the graduate faculty in 2 institutions, by the student's committee in 5, by the head of the student's major department in 11, and by the graduate committee itself in 18.

Action on special petitions.—The special petitions of graduate students are acted upon by the graduate dean in 3 institutions, by the chairman of the graduate committee in 2, by the graduate committee itself in 25, by the president in 1, by the graduate faculty in 3, and by the head of the student's major department in 1.

The approval of an outlined course or sequence of studies for a graduate student is made in 2 cases by the graduate dean, in 1 case by a faculty other than the graduate faculty, and in 4 cases by the head of the student's major department, in 1 case by the chairman of the graduate committee, in 21 cases by the graduate committee.

Determination of grading system.—There is great diversity among the land-grant institutions in the grading system which is used in reporting graduate credits to the office of the registrar.

There is, of course, some question as to the usefulness of grades in graduate work. In some institutions the work of graduate students is reported as satisfactory or unsatisfactory, in others as passed or not passed. In general, however, it is found convenient to make a larger number of groups of those whose work is satisfactory or at least acceptable. The registrar, the director of personnel, the graduate dean, the head of the student's major department, and other individuals not infrequently must consult records to assist them in evaluating the work of students. In some cases the graduate work is accepted at other institutions providing the student can be certified as having been in the top half or the top third of his class. Those who will become the employers of graduate students later, either in educational institutions or in industry, frequently demand some evaluation of a student's standing. There are many reasons, therefore, why it is desirable to record definite grades whereever it is practicable. This point of view is opposed by certain authorities, who insist that grades really mean nothing so far as determining the mastery of the subject is concerned and that the oral examination is much more important in showing the caliber of the student.

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Chapter X.—The Master's and Doctor's Degrees

The Master's Degree—Requirements and Administration

The advanced degrees usually conferred by land-grant colleges may be grouped under the headings: Master's degrees, usually master of science or master of arts, the so-called professional degrees such as civil engineer, mechanical engineer, etc., and the doctor of philosophy or occasionally doctor of science.

Perhaps the most authoritative definitions of these degrees are those of the committee on academic and professional higher degrees in its report to the Association of American Universities in 1916. The report states:

> M. A., M. S.—Conferred after at least one year of advanced work in a graduate school subsequent to absolving the requirements for the B. A., B. S., or equivalent degree.[48]
>
> Ph. D.—Conferred for advanced work in which independent investigation occupies an essential place. The results of this investigation should be set forth in a thesis worthy of publication. The amount and character of the work should be such that the degree rarely could be attained in less than three years following the attainment of a bachelor's degree or its equivalent.
>
> Professional study beyond that corresponding to a master's degree should lead to a degree which your committee provisionally calls a practitioner's degree. Satisfactory types of such degree are found in the engineering profession, e. g., civil engineer, mechanical engineer.[49]

There has been some question as to the relationship of the master's degree to true graduate work. Harper (1926) says:

> In many graduate schools in America the requirements for the master's degree make it little less than a fifth-year bachelor's degree. This is not a very commendable situation. In my judgment the master's degree should represent a well-coordinated plan of graduate study, including a thesis, the prepartion of which would sufficiently qualify the student to later enter upon the work of his doctor's dissertation with confidence and assurance of success.[50]

In most land-grant fields it is customary to use as a designation for the degree, master of science rather than master of arts. The discussion of the requirements will center, therefore, about the requirements for master of science.

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[48] Association of American Universities, Proceedings, 1916, p. 65.

[49] Ibid., pp. 65–66.

[50] Henry W. Harper. *In* Proceedings of Association of Colleges and Secondary Schools of the Southern States, 1926, p. 241.

Requirements for the Degree Master of Science

There has been a considerable degree of standardization as to the requirements for the degree master of science. The topics requiring brief discussion are: Residence requirements; time limit on availability of courses for degree; credits required for degree; distribution of graduate credits between major and minor; modern language requirements; admission to candidacy; thesis or dissertation; examination; and M. S. as an honorary degree.

Minimum residence requirements.—It is found that the term residence is not entirely standardized; as here used it is defined as actual intramural residence as a graduate student, irrespective of the amount of graduate work which is being carried. The inquiry shows that in practically every institution the residence requirement is stated to be one year of three quarters or two semesters. In two institutions the minimum was placed as usually three quarters, but might in exceptional cases be reduced to 30 weeks.

In some cases differentiation is made between the length of time required in residence during summer sessions and that required during the regular "academic" year. In at least 4 institutions the residence for the degree can not be completed in summer sessions, and in at least 19 it may be. The number of weeks' residence required in the latter cases is 24 in 5 cases, 27 in 1 case, 30 in 2 cases, and 36 in 4 cases.

Some confusion arises due to differences in methods of evaluating graduate load in terms of credits. For example, while at Iowa the actual minimum residence is 30 weeks, a sufficient number of graduate credits to secure the master's degree can not be secured in this length of time. In practice, therefore, it is necessary either that graduate credits be transferred from some other institution or that more than 30 weeks be spent in residence.

Another question which not infrequently arises is whether or not the work accepted on field trips conducted by members of the graduate staff may be counted as residence credits. For example, a teacher may work with a group of graduate students in a study of the geology of some particular region. Similarly, botanical and zoological surveys may be made. If academic standards are maintained, there would seem to be no good reason why work accepted on such trips should not carry residence credit.

It is so recognized by Alabama, Colorado, Delaware, Iowa, Kentucky, Maryland, Massachusetts Agricultural College, Rutgers, North Carolina, Rhode Island, Oregon, South Dakota, Utah, and Virginia; but is not recognized according to the reports made by California, Florida, Purdue, Kansas, and Oklahoma.

Time limit on availability of courses for degree.—Institutions have experienced some difficulty with students who scatter their graduate work over long periods of time. This is particularly true of teachers who are in attendance regularly only in summer sessions. In some cases the work may be scattered over a period of 10 to 15 years.

It is interesting to note that no restriction has been found thus far necessary by Alabama, California, Colorado, Kansas, Kentucky, Maryland, Massachusetts, North Carolina, Oklahoma, Utah, and Virginia. Other institutions report restrictions as follows: Florida, 7 years; Hawaii, Purdue, and Rhode Island restrict, but give no time limit; Iowa State College, 5 years; and Oregon, 3 years.

The minimum number of semester credits required for the master's degree.—This shows considerable variation. It is most commonly 30 semester hours. In two institutions it is 24; in one, 40; in one, 36; in one, 34; in one, 36; and in one, 50. It is perhaps unfortunate that it should be customary to designate definite accumulations of credits for any advanced degrees. It is mechanical, and detracts from the standing of the degree.

Distribution of graduate work between major and minor.—It is apparently customary to require the candidate for the master's degree to choose a major field or department. Affirmative replies were received from 19 institutions and none replied in the negative. But there is a marked difference of opinion as to whether or not in addition to the major some minor field should be chosen.

The following institutions report that minor work must be taken in addition to the major: Alabama, Colorado, Delaware, Florida, Purdue, Kansas, Kentucky, Maryland, Massachusetts Agricultural College, Oklahoma, Oregon, Rhode Island, South Dakota, and Virginia. It is not required, or at least not required in all cases, in California, Hawaii, Iowa, North Carolina, and Utah. No institution indicated that any definite proportion of the work must be carried in major and minor, respectively.

Modern-language requirement.—It should be recognized clearly that the land-grant fields are primarily scientific and technical fields. This is true with perhaps the possible exception of that of teacher training. It has been previously noted that there are comparatively few undergraduate curricula in agriculture, engineering, home economics, veterinary medicine, teacher training, or commerce and business, which require a reading knowledge of at least one modern language as a prerequisite to graduation. This proves a most serious handicap to many of those who enter upon graduate work. A very considerable proportion of the technical and scientific literature is to be found in the foreign-language journals. The student who does not have access to this literature and is not able to utilize it satisfactorily is at a serious disadvantage. There has been pressure from several sources to abolish the common requirement of a reading knowledge of one or more foreign languages as prerequisite to candidacy for the master's degree. These may be enumerated as follows: (1) The fact that students so frequently enter the graduate school deficient in modern-language preparation usually makes them relatively reluctant to acquire such knowledge. (2) In many cases the staffs that attempt to do graduate work in fields like home economics and engineering are themselves deficient in a reading knowledge of any foreign modern language and are incapable of directing students in the foreign literature even if the student is equipped. There is in consequence a reluctance upon the part of such individuals to require language training. (3) Those in the fields of professional education have by means of their questionnaires attempted to throw doubt upon the need of a modern foreign language even for the doctor's degree. There is marked opposition, therefore, in land-grant institutions upon the part of teacher-training departments to any modern-language requirement.

As a result of these pressures a survey of the situation makes it quite apparent that the master's degree is being conferred in the land-grant institutions upon two levels. Some departments and some institutions require the utilization of the language in connection with the development of research problems and insist upon some knowledge of the foreign literature publications. Others use the foreign literature only through abstracts if at all.

The requirement for modern language for the degree master of science can be justified only upon the basis of its being a very useful tool to the student during the time he is working for the degree and one which can be used to advantage later. The expression of opinion in formal education is so decidedly against the need for foreign languages that it is improbable that this requirement could well be enforced. From the standpoint of those working in the sciences and technical fields the attitude of those in the field of education would appear to be most unfortunate. The field of vocational education is that portion of education which is generally recognized as falling within the land-grant field. To argue that modern Europe has not made and is not making any contribution in the field of vocational education is, of course, an absurdity. The answer usually given is that there is already so much printed in English that the student may be sure that anything worth while will quite immediately be translated and made available. This exception is not justified by fact. A knowledge of a modern language should be a most valuable asset to any student in science or technology.

It is interesting to note the distribution of these requirements. The reading knowledge of at least one foreign language is required of all candidates by two institutions. In Iowa it is required by most departments but not in teacher training, or in a few of the technical departments. It is not required by Alabama, California, Colorado, Delaware, Florida, Hawaii, Purdue, Kansas, Kentucky, Louisiana, Maryland, North Dakota, Oklahoma, Oregon, South Dakota, Utah, and Virginia. It is interesting to note that apparently one institution only, among those reporting, made special provisions for classes made up of graduate students who are deficient in modern language; classes which are intended as rapidly as practicable to bring the student to a reading knowledge of the technical literature in the field in which he is interested. In all cases reporting there is opportunity for students to make up such deficiences by enrolling in a standard undergraduate course in the subject.

Admission to candidacy for the degree master of science.—In many institutions a distinction is made between the matriculation as a graduate student and admission to candidacy for a master's degree.

Such distinction is made in Alabama, California, Hawaii, Iowa, Kentucky, Maryland, North Carolina, Oklahoma, Rhode Island, Utah, and Virginia. No such distinction is made at Colorado, Delaware, Florida, Purdue, Kansas, Massachusetts Agricultural College, Oregon, and South Dakota.

As has been several times noted, there is a tendency in some institutions to treat the candidate for the degree master of science on much the same basis as though he were taking a post-senior year. In other cases it is regarded as highly advisable to check up the student definitely some time in advance of the possible conferring of the degree in order to determine whether or not certain specified requirements have been met. This is a convenient time to determine whether or not supporting or prerequisite work has been satisfactorily assimilated, whether the record of performance, scholastic ability, etc., has been satisfactory, whether the language requirements have been met and English deficiencies removed. It also gives an opportunity to indicate formal approval of the major research subject to be undertaken by the student for his thesis if one is required.

It is believed that the land-grant graduate schools in general may to advantage lay increased emphasis upon this differentiation between admission to graduate work and admission to candidacy, even for the master's degree. It would seem to be particularly important in those institutions having considerable numbers of graduate students; in fact it is in just such institutions that this formality is most frequently emphasized.

Certain details of administration with reference to admission to candidacy may be of interest.

(1) *Length of residence as a graduate student required before admission to candidacy* is not specified in 5 schools, is fixed at least one semester in 4, at least one quarter in 2.

(2) *Admission to candidacy for the degree* is determined by the dean of the graduate school in 4 institutions, by the graduate committee or council in 9, by the head of the major department in 2.

(3) *Length of time which must elapse between admission to candidacy and the conferring of the master's degree* was designated as one semester in 7 institutions, one quarter in 1 institution, and one year in 2 institutions.

Thesis or dissertation.—One of the common requirements for the master's degree is the preparation of a thesis or dissertation. In a few cases apparently this is little more than an essay written as a result of a certain amount of work in the library, frequently a historical survey of a particular topic. Such essays have become particularly common in some of the so-called liberal arts subjects. In most cases the effort is to have the work on the thesis introduce the student in some sense to the methods and ideals of research. Science and technology have such a vast number of unsolved problems that it is usually not difficult to find a topic which can be worked upon with some degree of satisfaction by the candidate for the master's degree. There is a tendency in many institutions to make the master's degree a little doctorate. On the whole, this tendency is probably to be commended. A thesis embodying the results of a candidate's research is required by 16 institutions. Two institutions, California and Kentucky, do not require such a thesis of all candidates.

The determination of the acceptability of a thesis as to data and conclusions is made in Alabama, Florida, North Carolina, Oklahoma, South Dakota, and Utah by the head of the department; in California, Hawaii, Maryland by the examining committee; in Colorado jointly by examining committee head of department, and chairman of the graduate council; in Delaware by head of department, and chairman of the graduate council. In Purdue by the examining committee and the head of department; in Iowa by the examining committee, head of department, and dean of graduate school; in Kansas by the advisor, chairman of graduate committee, and head of department; in Massachusetts Agricultural College by the head of the major department and dean of graduate school, and entire major department; in Rhode Island by the graduate committee; in Virginia by the head of the major department and dean of the graduate school. The acceptability of the thesis may depend not only upon the data and conclusions but also upon the form, makeup, and organization of the material. In general, the same group determines thesis acceptability from this point of view, except that in several instances, as in Colorado, Iowa, and Virginia, the librarian also approves.

In practically all cases the thesis presented must be an independent piece of work by the individual student, that is to say, two or more students can not be associated in the development of the thesis.

Publication of the master's thesis is not encouraged in Utah, but is encouraged in Alabama, California, Colorado, Delaware, Florida, Hawaii, Purdue, Iowa, Kansas, Kentucky, Maryland, Massachusetts Agricultural College, North Carolina, Oklahoma, Oregon, Rhode Island, South Dakota, and Virginia. This does not mean, of course, that all theses are published or even recommended for publication. Apparently, in these schools, however, the thesis is regarded as in some cases constituting a sufficient contribution to science or technology to warrant publication in whole or in part. In most cases the channels of publication of the experiment station are available for the publication of appropriate theses. This is not true at the University of Kentucky or in South Dakota, but is true for 13 other institutions which replied. In 11 others institutional channels of publication are open.

Examination.—With the exception of Virginia all of 18 institutions replying require a final examination of candidates for the master's degree. In the majority of cases the examination is oral. This is true in 12 institutions. In 2 it is both oral and written, and in 3 it is written or oral at the option of the examining committee. A written examination only is given at 1 institution.

In most cases the examination is given by a special committee. In general, the committee consists of the individuals under whom the major work has been taken and sometimes others are added. The committee has a membership as small as 3 in Delaware and as large as 5 to 18 in Purdue. The committee in some cases is appointed by the graduate dean, in others by the graduate advisor, by the president, by the chairman of the department, by the graduate committee or by the graduate council.

The degree master of science as an honorary degree.—In only one institution was the degree reported as having been conferred as an honorary degree, in this case twice in the course of five years preceding 1928. Apparently the once prevalent practice of utilizing this as an honorary degree has largely disappeared.

Differentiation of the requirements for the degree of master of science and the degree of master of arts.—It is of interest to note that there is no difference in subject matter required of students enrolled for the degree master of arts as compared with the degree master of science in the report of three institutions, namely, Illinois, Maine, and Mississippi. In 18 others reporting, such differentiations in subject matter were noted.

A differentiation made is between the modern language requirements for the degrees master of science and master of arts in Georgia, Purdue, Louisiana, Massachusetts, Tennessee, and Wyoming. There is no such distinction in 14 other institutions reporting.

Whether the degree master of science or master of arts should be conferred may be determined in part at least upon the basis of whether the candidate holds a B. S. or a B. A. degree. Such differentiation is made according to the reports of 12 institutions and is not taken into consideration in 8 institutions.

Doctor's Degrees: Requirements and Administration

The doctorate most frequently conferred is the degree doctor of philosophy, less frequently the degree doctor of science. The latter degree has come to be used quite commonly as an honorary degree. Most recently in certain institutions there has been an attempt to establish the degree doctor of education on a parity with doctor of philosophy but with a somewhat different objective.

There is no a priori reason why any of these degrees should be inappropriate within land-grant fields. The degree doctor of philosophy is so much more frequently given, and has been so generally recognized as appropriate in land-grant fields that attention may be directed to it primarily.

Objectives of the work leading to the degree doctor of philosophy.—It is almost axiomatic that the specific objectives of work leading to the Ph. D. should be those of the graduate school. They may be reenumerated as: (1) The training of the students in the methods and purposes of research with opportunity for independent creative work so that they may fill positions as investigators. (2) the training of students so that they may later qualify as teachers in colleges and universities.

As previously noted, it is frequently contended that these objectives are in a sense antithetic; in fact, the recent development of the degree doctor of education has been largely due to the feeling that training in research is not the best training for teaching, and that for this a professional degree analogous to J. D., M. D., and D. D. is desirable. Such a degree as Ed. D. may somewhat relieve the pressure on the graduate school on the part of those wishing to qualify as teachers and administrators in secondary schools and junior colleges, and satisfy those who are insisting that candidates for positions possess the doctor's degree. But quite certainly it is not the degree which usually is secured by those who expect to go into college and university teaching.

It is not strictly true that graduate schools in their training of students for the Ph. D. are wholly ignoring the training for teaching and completely subordinating it to training for research. This has been well stated by Leuschner (1928):

> Candidates for degrees are generally in constant touch with their professors, as assistants, teaching fellows, or observers. During the weekly staff meetings, in which the substance of the subject matter of undergraduate courses, the methods of instruction, the nature of the quizzes and problems, the appraisal of students, and many other matters pertinent to efficient teaching are discussed, they become conversant with the practice of experienced teachers. In this sense every large department may, and in many cases is, operating as a training school for prospective teachers. Yet, no matter by what process they may have been trained, an obligation rests on the college which appoints them to incorporate them into its own organization by proper informal guidance and follow-up methods. To my mind, if a Ph. D. fails as a college teacher the reason for the failure probably lies rather in the lack of organization of the college, particularly of the college faculty, than in the defects of the appointees. Without doubt from year to year the Ph. D. graduates of leading institutions are turned out better than before, but they must be properly introduced to systems under which they are to serve.[51]

Within the land-grant field the following facts are quite evident: (1) A considerable proportion of the teachers (particularly of the technical and science subjects) in the various land-grant institutions receive their graduate training in whole or in part in the land-grant graduate schools. (2) Increasingly department heads and administrators are insisting that teachers employed shall have two qualifications: (*a*) The Ph. D. with major in the subject-matter field: (*b*) certified successful teaching experience or special training in the teaching

[51] A. O. Leuschner. *In* Association of American Universities, Proceedings, 1928, p. 68.

of college subjects. (3) The land-grant graduate schools should clearly recognize their obligations to their students and endeavor to meet the conditions enumerated without prejudice to the quality of work demanded. (4) Consideration of the research-teaching-training dilemma is a most appropriate topic for the conferences of directors of graduate work in land-grant institutions.

Requirements for the Degree Doctor of Philosophy

Protests are not infrequent to the effect that there is a tendency toward overstandardization of the requirements. This has been stated:

In some institutions the M. A. and even the Ph. D. degrees are attained by docile students or others made docile by sad experience taking the various set hurdles placed regularly for them by an overconscientious and devoted faculty. Certainly at least for the Ph. D. degree standards should be so elastic as to permit this one degree to stand for original work and individual achievement without too much attention to units, courses, and other evidences of the meshwork apparently needed to give stability to the ordinary reinforced concrete of our academic structure.[53]

This has also been phrased by Wilbur (1924):

The standard for the degree of doctor of philosophy should be so changed that the recipient of that degree should be freed from the necessity of taking set courses of any kind during the latter part of his work. It should be a degree conferred upon one who has done original research. Standardization of this degree so that its recipient reads certain languages and has covered certain minors and majors is a mistake. The departments recommending candidates for this degree should take full responsibility for them.[53]

The practices of the various institutions may for convenience be discussed under the general headings of entrance requirements, student's committee or advisor, regulations governing major and minor work, distinctions between matriculation in the graduate school and admission to candidacy for the Ph. D., the preliminary or qualifying examination, the final examination, and thesis or dissertation.

One of the most complete outlines or tabulations of standard requirements and one that has exerted considerable influence is that prepared by a committee of which Dean Angell acted as chairman. In succeeding sections this will be noted as the "committee" report.

Residence requirements.—The "committee" formulation is as follows:

There should be a minimum time requirement for the doctor's degree, to be disregarded only in the most exceptional cases. Not less than three years should

[53] Ray L. Wilbur. *In* Association of American Universities, Proceedings, 1924, pp. 62 and 65.

be thus required, of which at least one year should be in the institution granting the degree.[53]

This provision is almost, but not quite, universal. An exception to this rule is the practice of the University of California. The regulations state:

> A program of study must be approved by the graduate council embracing a field of study previously approved by the department or group of departments concerned and extending over a period of at least two years, the second or last of which ordinarily must be spent in continuous residence at this university.[54]

It is of interest to observe that it is customary to make provision for relatively easy transfer of graduate students from one institution to another. This is in accord with the "committee" recommendation. "Work in other institutions of substantially equal rank should be accepted at par value," and "The committee has expressed approval of the encouragement of migration, but no satisfactory methods for promoting it have thus far been discovered."

The phrase "All three years must be spent in resident graduate study at some accredited educational institution" probably does not represent standard practice, inasmuch as there are certain research agencies which may in some cases deserve recognition, though they could scarcely be termed "accredited educational institutions." The "committee" states:

> The committee believes that approval should be given to work done in Government bureaus or similar institutions when a careful scrutiny of the situation indicates that conditions are substantially equivalent to those of properly organized university work. The committee believes that such work would often have to be accepted at some discount, and to a limited extent.

Among such agencies of particular interest in land-grant graduate schools would be the experiment stations when organized separately. Perhaps even more important than the minimum residence required is the actual length of residence of those who receive the degree. In relatively few instances has the degree been conferred in the minimum length of residence. It has been so conferred during the years 1923–1928 only 13 times by the University of California, three times by North Carolina State College, and not more than once by any other institution. The average actual residence time in the institutions conferring the degree varied from 2 to 4 years. The average time at the University of California was between 3½ and 4 years. At Purdue it was shortest (2 years).

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[53] Committee on Requirements for the Ph. D. Degree (James R. Angell, chairman), American Association of University Professors, Bulletin, Vol. V, January–February, 1919, p. 15.

[54] University of California, Announcement of the Graduate Division, 1929–30, p. 55.

In every institution, apparently, there have been instances within the last five years in which the minimum time only elapsed between the conferring of the bachelor's degree and the conferring of the doctor's degree, i. e., 2 years at the University of California and 3 years at all other institutions.

The average time which elapsed between the conferring of the bachelor's degree and the conferring of the doctor's degree was for the University of California 7 years, and for certain other institutions reporting 9 years, 6.27 years, 5.4 years, 4.5 years, 4 years, 3.5 years and more than 3 years.

Faculty or advisory committees.—The direction or supervision of the program of a student desirous of taking the Ph. D. is most frequently handled by a committee appointed for each student.

This is true at the University of California, Iowa State College, University of Kentucky, Massachusetts Agricultural College, University of Minnesota, University of Missouri, Rutgers University, Cornell University, Pennsylvania State College, University of Tennessee, and the University of Vermont. This is not the case at the University of Illinois, Purdue University, or State College of Washington.

In general, the appointment of this committee is made by the dean, the chairman of the graduate council, or by the council itself. In one institution, University of Tennessee, the appointment is by the president of the institution.

Apparently in some institutions a student may choose a major field and work more or less informally under a faculty advisor for some time before the committee is appointed. In some instances the committee must be appointed at the time he enters upon his graduate work. In other cases the appointment of the committee may be deferred until the student is ready for admission to candidacy. The minimum time indicated in any instance is one year before the student could come up for his degree. In actual practice, the length of time between the appointment of the committee and the conferring of the degree is somewhat longer. In general, this committee checks carefully the preliminary training and accomplishments of the student. In every instance the committee thus appointed outlines the program of the student, and, usually, constitutes the examining committee of the student. In several institutions the make-up of the committee may be somewhat modified to constitute the examining committee.

An attempt was made to determine the proportion of the cases in which the committee, after an examination of credentials, advised against the continuation of graduate work by the student. Definite replies were available from only two institutions, which gave 5 per cent and 20 per cent, respectively.

In those cases in which no committee is appointed, the problems arising are usually handled, apparently, by the student's advisor or head of the department in which the student is taking his major work, in some cases with the assistance of the graduate council or general committee.

Modern foreign language requirement.—The specification of a reading knowledge of French and German as prerequisite to the conferring of the Ph. D. is uniform in all institutions.

Apparently this is the requirement that is actually met in most instances. At California it is occasionally permitted that oriental students substitute English for one of the languages in certain departments. In most institutions some modern foreign language other than French or German may be substituted for one of those usually specified, providing it is one equally good or better for the pursuit of research in the major field. In two instances, the University of Vermont and State College of Washington, apparently the alternative is not open. The situation with reference to substitution of another language for German and French is one which is somewhat difficult to administer.

The problems of administration are summarized (Leuschner, 1921) as follows:

The graduate council is receiving numerous requests from prospective candidates for the Ph. D. to be allowed to substitute some other language for either French or German. These requests are usually made for the following reasons: (1) Either, a foreign student wishes to offer his native language; (2) or a student proposes to offer in fulfillment of the thesis requirement results of research which demand knowledge of a language other than French or German; (3) or he has studied a language other than French or German in his undergraduate course; (4) or he has no language equipment.

In most of these cases the student desires to proceed along the line of least resistance without regard to whether the language which he proposes is necessary for a thorough scholarly background in the field of his major subject, so as to properly equip him to keep abreast with scholarly work in his chosen field. It is recognized, however, by the graduate council that in certain subjects other languages than French or German may be of equal or greater importance with reference to the historical development and present activities on the part of foreign nations, and that therefore the language requirement should be made more elastic.[55]

Apparently the only group seriously restive under the requirement is that representing education. Apparently there exists a breach in point of view which is ever widening. In part the willingness of faculties to recognize such a degree as doctor of education may have developed from the insistence on the part of men in the educational field that language training is nonessential. Koos[56] (1921) notes that in 1921 among 24 institutions conferring the Ph. D.

[55] A. O. Leuschner. *In* Association of American Universities, Proceedings, 1921, p. 57.

[56] L. V. Koos. Standards in Graduate Work in Education. U. S. Bureau of Education, Bulletin, 1921, No. 38, p. 16.

in education, 2 specified no foreign language requirements and 1 only "such as are necessary for research."

Certification as to the possession of a reading knowledge of a foreign language is made by the modern language department concerned, in Illinois, Iowa, Kentucky, Maryland, Minnesota, Pennsylvania, Vermont, and by the department in which the major work is being taken at California, Massachusetts, Missouri, and Washington, by special committee at Purdue, and by the chairman of the graduate committee at Rutgers. An examination as to proficiency is required except at Massachusetts Agriculture College, where it is at the discretion of the department.

This examination must be passed at least one year (one academic year) before the conferring of the degree in all institutions except Vermont, which specified two years, and Massachusetts Agricultural College, which simply requires that it be passed before the degree is conferred. Were it not for manifest difficulties in administration a rule providing that proficiency must be attained in the languages at least two years before the final examination would be advisable. If the language is an essential tool for research, it should be in shape for use before research is attempted.

Distinction between matriculation and candidacy for a degree.—A distinction is maintained between matriculation in the graduate school and candidacy for a degree in all institutions except Vermont. The student must be admitted to candidacy at least one year before he can come up for a degree in most institutions. Pennsylvania specifies that the time is usually two years, and California states that it is upon completion of the qualifying examination.

Lipman (1925) has phrased the California procedure, which is much like that of most standard institutions, as follows:

With reports before the executive committee of the graduate council or graduate faculty on the applicant's success in passing the examination in the reading knowledge of French and German and in the qualifying examinations in the major and minor subjects, that committee may, after a personal interview, admit the applicant to candidacy for the Ph. D. degree; provided it has satisfied itself that the applicant possesses a good scholarly background, the temperament, character, and originality and independence of thought necessary to successful work in research.[57]

The "committee" gave its recommendation in the following statement:

It is recommended that sharp distinction be made between admission to the graduate school and admission to candidacy for the doctor's degree. The first should depend upon the presentation of a standard bachelor's degree, or in the case of foreign students of some unquestionable equivalent. Admission to candidacy should involve in addition written assurance by the head of the department in which the candidate desires to do his major work that he deserves the opportunity to secure the degree.[58]

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[57] Charles B. Lipman. *In* Association of American Universities, Proceedings, 1925, p. 80.
[58] Committee O on requirements for the Ph. D. degree (James R. Angell, chairman), American Association of University Professors, Bulletin, Vol. V. January–February, 1919, p. 15.

Major and minor work.—There is a decided tendency not to prescribe definite major and minor fields for the doctoral candidate. In some institutions this takes the form of doing away with all minor requirements except as fixed by the student's committee.

In others the student is required to select a field of specialization, with the understanding that departmental boundaries may be largely disregarded.

Examinations.—One of the distinguishing characteristics of the doctorate is that in all institutions it may be conferred only upon those who have passed satisfactorily a formal examination before a committee. In most institutions there are two such examinations—a preliminary or qualifying examination and a final examination. In general the "committee" recommendations are standard practice.

1. The committee recommends that more than one department should always be represented on the examining committee.

2. In the judgment of the committee both oral and written examinations should be given.

3. The committee recommends that there should be preliminary examinations held at a considerable period in advance of the final examination as a protection both for the candidate and the institution.

4. The committee is of the opinion that the final examination should cover the capacities of the candidate in the widest possible way, with distinct emphasis, however, upon the subject of the thesis.[59]

Preliminary or qualifying examination.—A preliminary or qualifying examination of some type is required apparently by all institutions which confer the doctor's degree with the exception of the University of Maryland, where it is optional with the department concerned. The examination when given is in all cases by a committee, usually the committee in charge of the student's work.

The type of preliminary or qualifying examination (oral, written, or both), is at the option of the examining committee in California, Iowa, Massachusetts Agricultural College, Minnesota, Missouri, Pennsylvania, and Washington. It is in part written and in part oral at the University of Illinois, Purdue, Kentucky, Vermont; Rutgers University states that it is entirely oral.

The length of time which must elapse between the taking up of residence by the student and the examination varies considerably. At the University of Missouri the examination may be given upon matriculation; at Iowa State College there must be at least one quarter of residence. In most institutions it is specified as approximately one year. The latter qualification manifestly can not fit the student who is in residence for the degree only during his last year.

The period which must elapse between the qualifying and the final examination is one year in most cases. It is one semester at the University of California;

[59] Committee O on requirements for the Ph. D. degree (James R. Angell, chairman), American Association of University Professors, Bulletin, Vol. V, January–February, 1919, p. 17.

from a week to 10 days at the Massachusetts Agricultural College. The University of Vermont specifies two years. Passing the preliminary examination is a prerequisite to admission to candidacy except in California and Pennsylvania.

Of those who have taken the preliminary examination during the past five years, 20 per cent failed to qualify at Pennsylvania State College. In the other institutions the percentage of those failing to qualify was 10 per cent or less. It is noted as 10 per cent at Massachusetts Agricultural College and Missouri, 3.9 per cent at Iowa, 8.4 per cent at California, and there had been no failures at Purdue, Rutgers, Vermont, or Washington.

Inasmuch as at most institutions a preliminary examination is in part at least oral, it is of interest to note that in all institutions except Maryland and Missouri members of the faculty other than those appointed on the committee may be invited to be present. In one institution other graduate students or the public may be admitted.

The procedure following admission to candidacy, after passing the preliminary examination, likewise shows some variation. An interesting procedure is that at California as outlined by Lipman (1925).

After a person has been admitted to candidacy in accordance with the foregoing conditions he may be allowed to spend the entire period of his candidacy on his research work for his thesis if he chooses, under the guidance of one or more members of the major department, or he may give most of his time to his research and small portions of his time preferably to seminar work which may be of assistance to him. During this period of candidacy the candidate shall be entirely free to seek any advice which he chooses in carrying on his research in his own way. He shall not be subject to any further examinations until the time arrives for his final examination. When his research work is finished and his thesis is written, the major department, through a properly constituted committee, will pass upon the thesis and report to the executive committee of the graduate council or the graduate faculty.[80]

Final examination for Ph. D.—A final examination is required of all candidates for the Ph. D. in every institution conferring the degree. Usually the committee which gives the examination is the same as that which is responsible for the preliminary or qualifying examination.

The final examination is entirely oral at the University of California, Iowa State College, University of Kentucky, University of Maryland, Massachusetts Agricultural College, Rutgers University, Pennsylvania State College, and University of Vermont. It is both oral and written at Purdue University and University of Minnesota, and at the option of the committee at Iowa State College, University of Missouri, and State College of Washington.

The question as to the extent to which there needs to be general supervision (by the graduate dean or graduate college) of these examinations is debated. Should departments or agencies other than those directly responsible for the candidate have a part in the examination?

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[80] Charles B. Lipman. *In* Association of American Universities, Proceedings, 1925, pp. 80–81.

One theory, that of general university responsibility, has been developed at California. The reasons as given by Lipman (1925) are:

It has seemed inevitable that American universities should carry over in general to the graduate school the system of control of the student's work which has characterized the undergraduate college. As a result, the professors immediately in charge of the guidance or instruction of candidates for the highest degree in course—the doctorate have also become his judges. The professor concerned with candidates for the degree of doctor of philosophy has thus been placed in the somewhat anomalous position of serving on the one hand as guide, philosopher, and friend to his students and on the other as advocate, jury, and judge all rolled into one. This is distasteful to many university professors who are perfectly willing to place their intellectual powers and their friendly guidance at the disposal of the student but refuse to be his judges at the same time. They feel that this also involves judgment of their own handiwork, which naturally seems to them to be unreasonable and unfair from every point of view.[81]

Research problem and direction.—The relations of leader to student and to the research problem of the student show great variations as among departments, divisions, and institutions. Certain individuals have a highly developed program of research into which they fit the research of their graduate students; they have developed highly organized and efficient machines which they use to grind out research, there is little opportunity for student initiative, the topic is "assigned" to the student, and eventuates in a joint publication with the teacher and student as authors. The student who wishes to work on a problem not in the field of the leader's immediate interest is discouraged or refused.

Others encourage their students to browse around for a time, they give suggestions as to leads which might eventuate in a satisfactory research problem, they cooperate in giving advice and help, but the student retains a large part of the initiative. The student who has a problem on which he wishes to work is welcomed. Naturally the problems worked tend to fall in the field of the leader's major interest, for one reason, because of that major interest the graduate student has been attracted to him.

It is obvious that from the standpoint of enhancement of prestige of staff members the first type of research noted is advantageous, while "well-designed to the maintenance of quality in research, is deficient as a means to the qualification of the researcher (Eaton, 1928)." From the standpoint of *student good*, which certainly should be one of the objectives of the graduate school, the second method should be most productive.

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[81] Ibid., p. 79.

Thesis or dissertation.—Every institution requires that typewritten copies of the thesis be filed. In general, it is required that these be filed with the dean of the graduate school. In several instances they are filed finally in the library.

The number of typewritten copies required is 1 at 2 institutions, 2 at 6 institutions, 3 at 3 institutions, and 5 at 1 institution. Publication of the thesis is required at Illinois, Purdue, Iowa, Kentucky, Maryland, Minnesota, Missouri, Pennsylvania, Vermont, and Washington. It is not required at California, Massachusetts Agricultural College, North Carolina, and Rutgers. Twenty-five copies of the printed thesis must be filed with the librarian at Vermont, 50 at Maryland, 100 at Illinois, Purdue, Iowa, Kentucky, Minnesota, and Pennsylvania, and 150 at the University of Missouri. In every instance the degree may be conferred before the printed copies of the thesis are deposited. In most cases a cash deposit or bond is required until the printed copies are so deposited. The amount of the bond or cash deposit is $50 in 3 instances, $75 in 1, $100 in 2, and is not specified as to amount in 1 case.

Joint authorship of thesis between two candidates is permitted at Massachusetts Agricultural College and Pennsylvania State College, at Massachusetts Agricultural College, however, such theses are rare and permitted only by special agreement. Joint authorship between candidate and teacher is permitted at Iowa State College, University of Maryland, University of Minnesota, Rutgers University, Pennsylvania State College, but not at the University of Illinois, University of California, Purdue University, or the University of Kentucky.

The publication of abstract of a thesis fulfills the publication requirements at the University of Illinois, Iowa State College, University of Minnesota, University of Missouri, North Carolina State College, and State College of Washington, but does not at Purdue University, University of Kentucky, University of Maryland, Massachusetts Agricultural College, Pennsylvania State College, or University of Vermont.

In no case are candidates required to fill out and file the forms provided by the United States Office of Education for record of researches in education in progress or completed.

Appropriate doctoral theses may be published by the experiment stations at Illinois, Purdue, Iowa, Maryland, Massachusetts Agricultural College, Minnesota, Missouri, Rutgers, Pennsylvania, and Washington, but not at Kentucky or North Carolina. The research periodicals of the institution are open to doctoral dissertations at Illinois, Iowa, Kentucky, Minnesota, Missouri, Rutgers, Pennsylvania, and Washington.

In no institution reporting is it a present practice to confer the degree doctor of philosophy as an honorary degree, and none acknowledged having so conferred it during the past five years.

Chapter XI.—Finding and Conclusion

For the purposes of this survey, the graduate land-grant field has been defined as including training on the graduate level in agriculture, engineering, home economics, veterinary medicine, commerce and business, and the basic sciences, and the training of teachers in all of these. The legitimacy of graduate work in any or all of these subjects in land-grant schools where there is need and the facilities are adequate is regarded as a necessary postulate to the realization of the primary objective of land-grant education.

Among factors which have been particularly significant in determining the initiation and development of graduate work in land-grant fields have been: (1) Recognition that much fundamental research in science is essential before technical education could have a content of subject matter comparable to that of the older fields and (2) subsidy of research in agriculture and in other fields by the Federal and State governments and by gifts from private individuals.

Graduate work in land-grant fields has been offered for more than half a century in certain of the land-grant institutions. It is only within the last two decades that the numbers enrolled in such work have been very large. The ratio of graduate to undergraduate enrollments in various land-grant institutions vary from 1 graduate to 6 undergraduates on the one hand to 1 graduate to 528 undergraduates on the other. In general, the stronger graduate schools show a proportion of graduates to undergraduates of 1 graduate to 15 undergraduates or less. The total enrollment of graduate students in 1928 was 11,497. The total undergraduate enrollment in these institutions during the same year was 150,697. The development of graduate work may also be shown by the number of degrees master of science and master of arts. The total number of master's degrees conferred in land-grant institutions in 1928 was 3,707, of which number 1,474 were master of arts, 1,345 master of science, and 888 other master's degrees. During the same year the same number of bachelor's degrees conferred was 21,141. In those institutions which conferred the master's degrees the ratio of the master's and bachelor's degrees in 1928 varied from 1 to 2 at one extreme to 1 to 73 at the other. In 1898, 35 doctor's degrees were conferred by land-grant institutions, in 1908, 66; in 1918, 154; in 1928, 474.

United action on the part of land-grant institutions in association with other technical institutions to protect the standing of this graduate work should be taken to meet the insistence of colleges and governments and of graduate schools themselves that some kind of guarantee of standards be developed. There has thus far been no satisfactory agency for this purpose. It is recommended, therefore, that the Association of Land-Grant Colleges and Universities take steps to set up the machinery for any standardization and accrediting that may be desirable and necessary in graduate work in land-grant fields and to adopt the general principle of accrediting of graduate work (so far as this may be needed) by fields of research or subject-matter fields rather than by institutions.

In 1928, 48 land-grant institutions offered the master's degree and 17 the doctor's degree in the field of agriculture. In engineering 41 offered the master's degree and 10 the doctor's degree. In home economics 37 offered the master's degree and 9 the doctor's degree. In teacher training 46 offered the master's degree and 14 the doctor's degree. In arts and sciences 48 offered the master's degree and 19 the doctor's degree. In commerce and business 26 offered the master's degree and 4 the doctor's degree. In veterinary medicine 11 offered the master's degree and 2 the degree doctor of philosophy.

It should be noted that in 1928, 19 of the land-grant institutions were not accredited as to their undergraduate work by the Association of American Universities and that all but 2 of these conferred the degree master of science in one or more fields and several conferred the Ph. D. It is urgently recommended that all land-grant institutions qualify for undergraduate accrediting by this association and that any technical reason barring the institution from the accredited list be removed as promptly as practicable.

Four objectives of graduate schools and land-grant fields may be recognized. They are: The advancement of knowledge through research by staff and students, the training of students for research, the training of students for teaching, and the training of students for management in certain industrial or related fields. Facts which are of primary importance in determining the character and quality of graduate work are: (1) The training, ability, and productivity of the staff; (2) time permitted to the staff for research and for direction of graduate work; (3) the facilities (laboratory, library, clerical, laboratory assistance, etc.) available to staff and students; (4) the training and character of the graduate student body; (5) the organization and supervision of the graduate school; and (6) the character of the graduate offerings.

One of the most important functions exercised by the various overhead agencies controlling the graduate schools is the coordination of graduate work in land-grant institutions with that of other

State institutions. It is recognized that a certain amount of duplication is necessary. This is at a minimum in agriculture. There are numerous institutions in which there is duplication in engineering. It is urged that where it is necessary to differentiate between institutions it be done on the basis of advantageous locations or facilities rather than on the basis of the level to which the instruction may reach. Attention is specifically called to the fact that there is a danger in separated land-grant institutions that there may be evidenced a lack of the proper appreciation of the necessity for the development of basic sciences on the graduate plane as an essential adjunct to research and graduate development in the technical fields.

The principal or major lines as a method of preventing wasteful duplication by the State institutions is again emphasized. From the standpoint of graduate work for States with separate land-grant institutions and State universities it may be phrased as follows: (1) In graduate development the two institutions should be regarded as coordinate parts of the university system of the State. (2) In general, the major land-grant fields as defined should be developed at the land-grant institutions. Specifically, wherever undergraduate colleges of engineering, home economics, agriculture, teacher training, and veterinary medicine are located in land-grant institutions graduate work in these fields, if developed at all, should be developed at the same institution. (3) Graduate work in technical and professional fields can not be developed satisfactorily in any institution which is severely limited as to its graduate development in the sciences. Reasonable inter-institutional understandings are possible which will prevent serious duplication, and in some cases the well-developed offerings of each institution may be made to serve the needs of students in the other. (4) In general, there should be some functioning inter-institutional faculty committee constituted to consider problems of duplication or overlapping in the graduate field. Possibly in some cases final authority with reference to any field represented in both institutions might well be vested in a joint graduate committee.

Fundamental to proper graduate development is a staff which is adequate from the standpoint of training. Appointments to graduate staffs or graduate facilities in the fields of the arts and sciences, teacher training, or commerce and business should rarely be made from those who have not completed graduate work leading to the Ph. D. It is also necessary to emphasize research accomplishment and scholarship. Appointments to graduate faculties in the field of agriculture should be made predominantly from those with the degree Ph. D. Exceptions will be more numerous here than in the fields already noted, but these exceptions should rapidly decrease in the future. Graduate faculties in engineering should be recruited increasingly from those who have taken the doctorate. It is recognized that development in this field has been somewhat different than in the others noted, and that some of the most satisfactory additions for a time must be from those who have had research experience and scholarship but who do not possess the advanced degree. Appointments in home economics should likewise be increasingly made from those who have taken the Ph. D. Certainly the graduate development in this field is sufficiently advanced so that in a graduate faculty at least 80 per cent of the appointments should be of this nature. In many cases the appointments should be made from among individuals who have taken their advanced degrees in related sciences. Increasing attention should be called to the graduate training of men in veterinary graduate staffs. Satisfactory progress in veterinary medicine research must wait upon better training of the personnel in the basic sciences.

If any land-grant institution, for administrative or statistical reasons requires periodical reports from members of the staff engaged in graduate or research work there should be ample opportunity to show on such schedules the following items: (1) The proportion of institutional time spent on the various major activities; teaching undergraduates, teaching graduates, in research and investigation, in administrative work, in extension work, in other activities. (2) If numbers of students are listed by courses or sections there should be opportunity to regulate the number of graduate students who are being directed through conferences and research and the time required for this. It seems that in some cases at least the system of educational accounting is apt to interfere seriously with proper graduate development and research on the part of staff members.

It should be regarded as one important function of every senior college (upper division) undergraduate curriculum to fit the capable student to enter upon graduate work in the field of his major without undue handicap. Any undergraduate curriculum so planned as to make impossible the acquisition by the more promising students of a reading knowledge of at least one foreign language is sacrificing the best interests of such students. It is suggested that land-grant institutions which indicate preparation for entrance to the graduate school as one among the objectives of undergraduate curricula should definitely outline sequences to be pursued by those students who expect to enter upon graduate work.

Suitable methods for handling the common deficiencies of graduate students should be developed by each graduate school. The deficiencies of students entering upon graduate work in land-grant fields are found to be most commonly English, modern languages, chemistry, and mathematics.

It is suggested that provision be made by the Association of Land-Grant Colleges and Universities for regular conferences on graduate work or for the creation of a section of the association devoted primarily to the consideration of graduate problems. Perhaps this should take the form of an annual or biennial meeting of those in responsible charge of the administration of the land-grant graduate schools.

Every graduate school should work out a satisfactory technique for determining whether a department or division is satisfactorily equipped and staffed to offer graduate work. This should include a survey of academic and other preparation of the members of the staff. Particular attention should be paid to the library facilities. Methods for determining whether or not library facilities are adequate for any given field have been developed and should be applied. Not infrequently valuable assistance in such evaluation may come to an institution by bringing in someone who has ability and standing in the particular fields in question and who can give a frank and unbiased opinion as to the standards of work in a particular department or field.

There should be careful classification of courses open to graduates.

Such standardization as may be necessary for work leading to the master's or doctor's degree in land-grant fields may well be undertaken by special conferences of land-grant college administrators called together under the auspices of the Association of Land-Grant Colleges and Universities.

PART X.—NEGRO LAND-GRANT COLLEGES

Chapter I.—Introduction and Historical Summary

The negro land-grant colleges constitute one of the more important groups of colleges among the 90 or more institutions of collegiate rank for negroes in the United States. Seventeen in number, they are among the principal centers for negro higher education in the 15 Southern States, in Delaware, and West Virginia.

As in the case of the white land-grant colleges these negro institutions came into existence under the impetus of the original Morrill Act and the second Morrill Act. They are complementary to the white land-grant colleges and serve the negro populations of the States in which they are located. Their primary purpose is to furnish theoretical and practical higher education, including agriculture, mechanic arts, home economics, English, mathematics, physical, natural, and economic sciences, to negro youth in order to train them to engage in the pursuits and vocations of life. Their educational objectives, therefore, are precisely the same as the white land-grant institutions. While State controlled and State operated with the major share of their support derived from State sources, the negro colleges receive their proportionate part of Federal funds contributed by the National Government for the maintenance of land-grant colleges in their respective States.

The historic background of the negro colleges, however, is far different from that of the white institutions. Confronted with prejudices that existed against the members of the Negro race, with their lack of material resources and possessions, and with the shortage of elementary and secondary schools to prepare negro students for college entrance, formation of the institutions as colleges offering the land-grant type of education was seriously retarded. The original Morrill Act, which comprised the initial legislation providing for the establishment of the land-grant colleges in all the States, included no provision for a racial division of students. The result was that the proceeds from the sale of the Federal grants of public land or scrip were devoted in most instances to the creation of endowments for the benefit of white institutions. Only four States in the South actually set aside a part of the land-grant endowment of the National Government for the support of negro land-grant colleges. Three of them were established shortly after the close of the Civil War, while the other was organized at a later date.

The first negro land-grant college founded in the United States was the Alcorn Agricultural and Mechanical College, established by the State of Mississippi in 1871. Its original name was Alcorn University. In this year the State received 210,000 acres of scrip under the Morrill Act and disposed of it for $188,928. Three-fifths of the income was given to Alcorn University, the newly established negro land-grant college, and two-fifths to the University of Mississippi that was designated at that time as the white land-grant college. Having been granted also liberal appropriations from the State, it was discovered within a short time that Alcorn University could not expend its large income. The State legislature, therefore, deprived the institution of a part of the land-grant yield and transferred it in 1874 to Oxford University, another college for negro youth in the State. Four years later, in 1878, the State legislature reversed itself and taking the income from Oxford University again conferred it upon the Alcorn University, which was reorganized as the Alcorn Agricultural and Mechanical College, its present name. Under this act one-half of the income from the land-grant endowment was assigned to the negro land-grant colleges and one-half to the white land-grant college of the State.

The second State to provide support for a negro land-grant college from land grants made under the original Morrill Act was Virginia. This State received 300,000 acres of scrip from the United States Government, and in 1872 it was disposed of for the sum of $285,000. After a somewhat prolonged struggle in the State legislature over the question, an act was finally passed for the division of the income between a white and a negro land-grant college. The Hampton Normal and Agricultural Institute, a private negro school, was named as the negro land-grant college to receive one-half of the yield of the endowment, while the other half was assigned to the white college. This arrangement continued until 1920, when the Virginia Legislature decided to concentrate the Federal funds on a State-operated institution located at Ettrick, known as the Virginia Normal and Industrial Institute. Later the name of the institute was changed to Virginia State College for Negroes. The income from the land-grant endowment was withdrawn from the Hampton Normal and Agricultural Institute and assigned to the new institution.

South Carolina was the third State to establish a negro land-grant college with Federal land grants under the first Morrill Act. In 1872 scrip amounting to 180,000 acres was received from the United States Government by the State and was sold for $191,800. The State legislature was under the control of negroes at this time. In establishing the land-grant college to receive the income from the land-grant endowment, Claflin University, a private school, was selected. The institution was a negro college, and the result was that white students did not attend. In the meantime it was discovered that the money received for the land-grant scrip had been used for other purposes and although Claflin University was entitled to the income none was available. This situation continued for seven years when in 1879 the State legislature recreated the land-grant endowment through the appropriation of State funds. A white land-grant college was organized to receive one-half of the interest from the endowment while Claflin University continued as a negro land-grant college receiving the other half.

In 1896 support was withdrawn from Claflin University and a State-controlled negro land-grant college was established at Orangeburg. It was first named the Colored Normal, Industrial and Agricultural College of South Carolina which was later changed to the State Agricultural and Mechanical College. The annual yield from the original land-grant endowment is still divided equally between this institution and the white land-grant college. Kentucky, the fourth State to assign a part of the land-grant endowment under the original Morrill Act to a negro land-grant college, did not take this step until many years after the endowment had been created. Until 1897 the white land-grant college received the entire annual interest but in this year the State legislature passed an act providing that the Kentucky State Industrial School, then a State normal college for negroes, should receive one-twelfth of the annual income.

It is evident from the foregoing sketch that only a small beginning had been made under the first Morrill Act toward the establishment of negro land-grant colleges. The real incentive came with the enactment by Congress of the second Morrill Act in 1890. Under its terms the Federal Government in appropriating an annual subsidy to each State for land-grant college support specifically provided for the establishment of negro land-grant colleges in the Southern States so that the negro population would receive the same benefit of this type of education as the white population. The provisions of this act included the following:

> That no money shall be paid out under this act to any State or Territory for the support and maintenance of a college where a distinction of race or color is made in the admission of students, but the establishment and maintenance of such colleges separately for white and colored students will be held to be in compliance with the provisions of this act if the funds received in such State or Territory be equitably divided as hereinafter set forth.
>
> That in any State in which there has been one college established in pursuance of the act of July 2, 1862 (first Morrill Act), and also in which an educational institution of like character has been established, or may be hereafter established, and is now aided by such States from its own revenues, for the education of colored students in agriculture and the mechanic arts, however named or styled, or whether or not it has received money heretofore under the act to which this act is an amendment, the legislature of such State may propose and report to the Secretary of the Interior a just and equitable division of the fund to be received under this act, between one college for white students and one institution for colored students, established as aforesaid, which shall be divided into two parts and paid accordingly, and thereupon such institution for colored students shall be entitled to the benefits of this act and subject to its provisions, as much as it would have been if it had been included under the act of 1862, and the fulfillment of the foregoing provisions shall be taken as a compliance with the provision in reference to separate colleges for white and colored students.

Almost immediately upon the enactment of the second Morrill Act, the Southern States proceeded to comply with its terms. In order to receive the funds it was necessary for the States to assent officially to its provisions through their State legislatures. Four of the Southern States accepted the second Morrill Act in 1890, the same year it was passed by Congress, eight in 1891, one in 1892, two in 1893, one in 1896, and one in 1899. Thus within a period of nine years every one of the Southern States, including Delaware and West Virginia, had agreed to organize negro land-grant colleges. The States adopted different plans of organizing the new institutions and allotting them a share of the annual subsidy granted by the Federal Government. In Table 1 are presented data showing the dates of the original receipt of the funds by the colleges under the first Morrill Act, dates of acceptance of the second Morrill Act and of the establishment of the present institutions.

TABLE 1.—*Organization of negro land-grant colleges under first and second Morrill Acts and date of their establishment*

Name and location of negro land-grant colleges	Dates when negro land-grant colleges received funds under first Morrill Act of 1862	Dates when States accepted terms for negro land-grant colleges under second Morrill Act of 1890	Dates when present institutions were established [1]
1	2	3	4
State Agricultural and Mechanical Institute, Normal, Ala.		1891	1875
Agricultural, Mechanical, and Normal College, Pine Bluff, Ark.		1891	1872
State College for Colored Students, Dover, Del.		1891	1891
Florida Agricultural and Mechanical College, Tallahassee, Fla.		1893	1887
Georgia State Industrial College, Industrial College, Ga.		1890	1890
Kentucky State Industrial College, Frankfort, Ky.	1897	1893	1886
Southern University and Agricultural and Mechanical College, Baton Rouge, La.		1890	1880
Princess Anne Academy; Eastern Branch, University of Maryland, Princess Anne, Md.		1892	1886
Alcorn Agricultural and Mechanical College, Alcorn, Miss.	[2] 1871	1890	1871
Lincoln University, Jefferson City, Mo.		1891	1866
Agricultural and Technical College of North Carolina, Greensboro, N. C.		1891	1891
Colored Agricultural and Normal University, Langston, Okla.		1899	1897
State Agricultural and Mechanical College, Orangeburg, S. C.	[3] 1872	1896	1896
Tennessee Agricultural and Industrial State Teachers College, Nashville, Tenn.		1891	1912
Prairie View State Normal and Industrial College, Prairie View, Tex.		1891	1891
Virginia State College for Negroes, Ettrick, Va.	[4] 1872	1891	1920
West Virginia State College, Institute, W. Va.		1890	1890

[1] A number of these institutions were established under other names which were changed when they became negro land-grant colleges.
[2] Alcorn University.
[3] Claflin University.
[4] Hampton Normal and Agricultural Institute.

As already shown, Mississippi, South Carolina, and Virginia had established negro land-grant colleges under the first Morrill Act so that the proportionate share of funds received by these States under the second Morrill Act were turned over to these institutions. In the case of Kentucky, a State normal school was designated as the recipient of the funds and made the negro land-grant college. Five other States adopted the same plan. In 1875 Alabama had organized the Huntsville Normal and Industrial School for Negroes at Huntsville. Upon accepting the terms of the second Morrill Act in 1891, the State legislature made this institution the negro land-grant college of the State. Later its name was changed to the State Agricultural and Mechanical Institute and it was moved to Normal, located a short distance from Huntsville. The State of Arkansas had been operating the Branch Normal College at Pine Bluff for negroes under the control of the University of Arkansas since 1872 and designated this institution as its negro land-grant college. In 1922 its name was changed to the Agricultural, Mechanical, and Normal College of Arkansas.

Ten years prior to the enactment of the second Morrill Act, the State of Louisiana had established the Southern University for negroes at the city of New Orleans. In accepting its terms the State legislature made this institution the negro land-grant college. In 1914 the name was changed to Southern University and Agricultural and Mechanical College of Louisiana and it was moved to Baton Rouge. Florida had also been operating a State normal school for negroes, having established it in 1887. With the acceptance of the second Morrill Act this school was converted into the State's negro land-grant college. In 1909 it was named the Florida Agricultural and Mechanical College. The institution is located at Tallahassee. In the case of the State of Missouri, Lincoln University, formerly known as Lincoln Institute, located at Jefferson City and a State-operated teacher-training school for negroes, was designated as the negro land-grant college. This institution established in 1866 was originally a private negro college.

Two States, Maryland and Tennessee, adopted the plan of assigning the Federal funds to private negro colleges with the understanding that they were to provide agricultural, mechanic arts, and other types of education specified in the second Morrill Act. Later one of these States established a regular State-operated negro land-grant college. Maryland made a contract with Princess Anne Academy, a negro institution on the eastern shore of the State and operated as a branch of Morgan College of Baltimore, to provide the negro instruction and paid over the share of the Federal funds to it annually. By a subsequent act of the legislature the negro land-grant work conducted by the school was placed under the control of the University of Maryland although Princess Anne Academy, itself, remained under the control of Morgan College. Upon accepting the terms of the second Morrill Act, the State of Tennessee, through its legislature, made arrangements to pay over the share of the funds for negro education to the Knoxville College, a private negro institution at Knoxville. This college was recognized as the Tennessee negro college until 1912 when the State established the Agricultural and Industrial Normal School at Nashville, which became the official negro land-grant college. Later its name was changed to the Tennessee Agricultural and Industrial State Teachers College.

There were six States that proceeded immediately upon the acceptance of the second Morrill Act to establish new negro land-grant colleges under State control. By an act of the Georgia State Legislature in 1890, the Georgia State Industrial College was organized at Savannah as a branch of the State university for the purpose of educating and training negro youth in a program embracing the studies required under the Morrill Act. The State General Assembly of Delaware in 1891 passed an act for the establishment of the State College for Colored Students of Delaware, located just outside of Dover, as its negro land-grant college. In the same year the Legislature of North Carolina organized the Agricultural and Technical College of North Carolina, which was designated as its negro land-grant college. The West Virginia Legislature passed an act also in 1891 establishing the West Virginia Collegiate Institute and in addition to State support provided that it should receive a share of the funds under the second Morrill Act. The institution is located at Normal, a short distance from Charleston, and in 1929 the legislature changed its name to the West Virginia State College. The Prairie View State Normal and Industrial College was established by an act of the Texas Legislature in 1891 as the negro land-grant college of Texas and became a part of a system of agricultural and mechanical colleges organized by the State at this time. As Oklahoma was a Territory at the time of the enactment of the second Morrill Act, the State did not establish its negro land-grant college until 1897. In this year the Colored Agricultural and Normal University located outside of Langston was organized by an act of the legislature.

The development of the negro land-grant colleges has been profoundly influenced by private negro institutions of higher education established in the Southern States. During the period preceding and following the Civil War, 18 such colleges for negroes were organized through private enterprise which were missionary and philanthropic in character. Between 1870 and 1890 an additional 13 colleges were founded by southern negro church organizations in the different States and operated under the auspices of State church organizations in the different States and under the auspices of State church conferences and assemblies. Subsequently other private negro colleges were organized largely through private endowment and support of church organizations. Except for the Hampton Normal and Agricultural Institute of Virginia, established in 1870, and the Tuskegee Institute of Alabama, founded in 1880, which concentrated almost exclusively on vocational and agricultural education of a secondary grade, these colleges devoted themselves to the old type of higher learning, the classics, theology, letters, and humanities. The negro youth was imbued with the idea that a collegiate education consisted of cultural instruction as embodied in the liberal arts and sciences. A prejudice was developed against the practical type of agricultural and mechanic arts education, the principal objective of the curricula of the newly established negro land-grant colleges.

The effect of the existence of so many private negro colleges in the Southern States emphasizing the cultural against the practical resulted in a distortion of the collegiate work of the negro land-grant colleges. The attempt to establish industrial and agricultural courses, except on a secondary level, failed because of the shortage of enrollments and because negro students in attending college preferred to go to private institutions where a liberal arts higher education was available. To meet this situation, many of the institutions concentrated their work on the classical and cultural, throwing aside at least temporarily any effort to give instruction in agriculture, mechanic arts, and home economics of a collegiate grade. Even with this reversal of their objectives, the large number of private negro colleges in the Southern States continued to retard the growth of the negro land-grant colleges. In Table 2 are shown the negro population of the Southern States, including Delaware and West Virginia, the total enrollments in all the negro colleges, the enrollments in the negro land-grant colleges only, and the percentage of the total enrollments actually attending negro land-grant colleges.

TABLE 2.—*Colored population in Southern States for 1928 with comparison of college enrollments in negro colleges and in negro land-grant colleges*

State	Total colored population	Total negro college enrollments	Enrollment in all negro colleges except negro land-grant colleges	Enrollments in negro land-grant colleges	Percentage of total negro college students enrolled in land-grant colleges
1	2	3	4	5	6
Alabama	892,700	657	631	26	4
Arkansas	503,800	374	338	36	10
Delaware	29,100	21	0	21	100
Florida	441,7[illegible]	153	45	108	70
Georgia	1,237,800	1,673	[1] 1,567	106	6
Kentucky	208,800	336	173	163	49
Louisiana	687,400	552	442	110	20
Maryland	258,400	433	416	17	4
Mississippi	936,656	439	326	113	26
Missouri	201,300	184	([2])	184	100
North Carolina	849,800	1,398	[3] 1,241	157	11
Oklahoma	201,100	238	0	238	100
South Carolina	896,200	545	348	197	36
Tennessee	428,400	2,031	1,461	570	28
Texas	802,100	2,068	1,330	738	35
Virginia	711,900	1,336	952	384	29
West Virginia	110,200	484	125	359	74
Total	9,397,356	12,922	9,395	3,527	27

[1] Includes enrollments in Georgia Normal and Industrial College.
[2] Data not available on enrollment in one other negro institution in State.
[3] Includes enrollments in four State-supported negro normal schools.

As shown in the table, the total enrollment of negro students in the 17 States amounted in 1928 to 12,922, of which 9,395, or 73 per cent, were enrolled in colleges other than negro land-grant colleges, while only 3,527 students, or 27 per cent, were enrolled in negro land-grant colleges. In three of the States, the land-grant colleges are the only negro institutions of higher education so that their percentage of the total enrollment of negro college enrollments is 100. There are two other cases where the percentage ranges as high as 74 and 70 per cent. In the remaining States, however, a much smaller proportion of the total number of negro students are enrolled in land-grant colleges. In five States the percentage varied between 20 and 36 per cent, while in six others it is 11 per cent or less. It is evident, therefore, that the existence of other negro colleges in these States has had the effect of reducing the attendance of negro land-grant institutions to a material extent.

A still greater difficulty encountered by the colleges was the lack of an extensive system of public education for negroes in the South. For years only a limited number of negro elementary schools were conducted and in only the larger communities were public high schools operated. From the very beginning, therefore, the major problem of the negro land-grant colleges was to provide both elementary and secondary education in order to secure properly qualified entrants for their college departments. It has only been within recent years that the retardation of the public-school systems of the Southern States has been largely overcome and that the negro population has been given greater educational opportunities. At the present time, however, the actual enrollment of high-school and elementary students in the negro land-grant colleges far exceeds the enrollment of college students.

As already explained, the negro land-grant colleges are supposed to be similar in type to the white land-grant colleges. To comply with the terms of the Morrill Act under which they were established and under which they receive annual Federal subsidies, the education offered by them should be on a college level. It should also be concentrated in agriculture, mechanic arts, and home economics, including English, education, mathematics, physical, natural, and economic sciences. That most of the institutions are largely secondary schools and that the college courses actually provided are centered in classical training based upon a study of the humanities rather than in a scientific, technical, and practical training for the industrial classics have already been indicated. In their early history the colleges were justified in maintaining such a program considering the difficulties under which they were laboring. But with the rapid growth of public high schools for negroes in the South, the time would seem to be at hand when the institutions should be converted into real land-grant colleges conducted for the benefit of the great mass of the negro people of the Southern States, offering work of a full college standard in all phases of industrial higher education as prescribed in the different land-grant college acts. The institutions should come to their full stature as agricultural and mechanical colleges.

Steps to attain this end have been taken within the past few years by the Office of Education. With the definite purpose of bringing the colleges to a full collegiate status in conformity with Federal law, the United States Commissioner of Education called a preliminary conference in 1919 to which were invited the presidents of the negro land-grant institutions. It was found that there was little clear understanding of the true objectives of the land-grant colleges in general, and of the negro land-grant colleges in particular, by the controlling authorities. In order to make more clear these objectives and the legal responsibilities of the institutions to the Federal Government in carrying out the terms of the Morrill Acts and Nelson amendment, the Commissioner of Education arranged for a citizens' conference on negro education and the training of negro teachers in the senate chamber of the capitol at Atlanta, Ga., November 19 and 20, 1920. A carefully prepared report on the development of the negro land-grant colleges was presented by representatives of the Office of Education to a large group of white and negro educators and prominent laymen, including members of the governing boards of the institutions. This report was based upon a series of conferences with all of the boards of trustees of these colleges as well as with leading citizens of the South regarding the future policies of the negro land-grant institutions. With one or two exceptions the members of the several boards expressed themselves to be heartily in favor of a reorganization and an expansion of the collegiate work of their respective institutions in accordance with the Federal laws.

As a result of the Atlanta conference a series of annual conferences have been held at Nashville, Tenn., Tuskegee, Ala., Hampton, Va., Greensboro, N. C., College Park, Md., Chicago, Ill., and at Washington, D. C., in which the collegiate functions of these institutions have been carefully studied. The programs evolved as a result of these conferences have been adopted generally with slight modifications by the colleges, with the full backing of the boards of control or trustees. The trustees by their cooperation in these annual conferences have brought greater unity of purpose into these schools and have made it possible for the legislatures to give more liberally to their support. The interest of the board of trustees or governing boards in the development of any higher educational institution is of great importance, but in the case of the negro land-grant college it can not be overemphasized. Notwithstanding the great progress that has been made, much yet remains to be done before the negro land-grant colleges can reach maturity.

Chapter II.—Control and Finance

The government of the negro land-grant colleges constitutes a vital factor in their progress and advancement.

Being publicly supported institutions, it is important that the agencies in control of them command the public confidence, maintain constant contact with their affairs, and be actively interested in their development. The success of the colleges is dependent in a large measure upon the maintenance of the highest efficiency in governmental administration and control. In the group of 17 negro land-grant institutions, four different types of government are found. They are classified as follows:

Two colleges governed by State boards of control, which are charged with the government of all public institutions of higher learning in their States.

Three colleges governed by the State boards of education.[1]

Two colleges governed by joint boards of trustees controlling other publicly supported institutions in their States.

Ten colleges governed by their own individual boards of trustees.

The effectiveness of these different types of government is difficult to appraise. Some of the larger and more influential negro land-grant institutions are under the jurisdiction of all of these types—State board of control, State board of education, joint board of trustees, or individual boards of trustees. At the same time a number of the colleges which have not made such rapid progress are governed by one or the other of these methods. The colleges under the government of State boards of control are the Florida Agricultural and Mechanical College and the West Virginia State College. In the latter case, the State board of control has supervision only over the financial and administrative affairs of the institution while the State board of education has complete authority over its academic and educational functions. The three institutions governed by the State boards of education are the State Agricultural and Mechanical College of Alabama, Southern University and Agricultural and Mechanical College of Louisiana, and the Tennessee Agricultural and Industrial State Teachers' College. Of the two colleges under joint boards controlling other publicly supported institutions in their

[1] Since this survey was inaugurated an additional negro land-grant college has been placed under the control of the State board of education.

States are the Princess Anne Academy of Maryland and the Prairie View Normal and Industrial College of Texas. The Princess Anne Academy is operated under the combined government of Morgan College of Baltimore and the University of Maryland, the trustees of the latter institution controlling the finances and educational functions connected with its land-grant college work. The joint governing board of the Prairie View Normal and Industrial College has jurisdiction also over the white land-grant college of Texas and two other junior colleges. The remaining 10 colleges are governed by individual boards of trustees, but recently the Virginia State College for Negroes has been placed under the control of the State board of education.

With a few exceptions the governing bodies of the negro land-grant colleges are small and compact in size. Large and unwieldy boards difficult to assemble have been generally avoided with the result that the entire body is able to act in most cases in conducting the affairs of the institution rather than delegating its powers to a small standing committee. In Table 3 are given the number of members of the governing bodies of each institution, methods of selection, length of terms, and similar data.

As indicated by the table, the total number of members of the governing bodies of the 17 colleges amounts to 128. The size of the boards varies from 15 down to 3 members.

There is one institution with a board of 15 members, two with 12 members, one with 10, three with 9, three with 7, one with 6, three with 5, one with 4, and two with 3. More than half of the colleges, therefore, are governed by boards of seven members or less. Of the total number, 120 are men and 8 are women.

Considering the large number of women students enrolled in the institutions, which in some instances exceeds the men students, and considering that their educational programs in many cases place special emphasis on teacher training and home economics, it would seem that a larger number of women members would be found on the boards. There are only five colleges with women members on their governing bodies, three having two each and two having one each. An unusual situation in the negro land-grant institutions is that there is not a single former student serving on the governing boards of any of the colleges.

The number of ex-officio members totals 16, all of the boards with five exceptions having at least one or two ex-officio members. According to the reports, the governor of the State serves as ex-officio member of five governing bodies, the State superintendent of education of seven, and the president of the institution of four. The policy of having the State superintendent serve as ex-officio member in view of the close relationship of the colleges with the State department of education is advantageous. Since no former students are members of the boards, recognition may well be given the negro people in the government of the institutions by placing the president on the board as an ex-officio member. It is found that in 10 colleges, ex-officio members have voting powers. In only one case, however, is the president as an ex-officio member permitted to vote.

TABLE 3.—*Number of members of governing bodies of negro land-grant colleges, methods of their selection, and length of terms*

Institution	Total number of members	Number of men on board	Number of women on board	Number of ex officio members	Methods by which members of governing boards are chosen—			Length of term of members in years	Greatest number of years any member has served	
					Appointed by governor	Appointed by legislature	Elected by people		On present board	During life of institution
1	2	3	4	5	6	7	8	9	10	11
State Agricultural and Mechanical Institute of Alabama	12	11	1	......	......	......	......	......	......	......
Agricultural, Mechanical, and Normal College of Arkansas	9	7	2	2	×	......	......	6	2	......
State College for Colored Students of Delaware	7	7	......	1	×	......	......	4	37	37
Florida Agricultural and Mechanical College	5	5	......	......	×	......	......	4	23	23
Georgia State Industrial College	5	5	......	2	×	......	......	4	......	......
Kentucky State Industrial College	3	3	......	2	×	......	......	4	4	4
Southern University and Agricultural and Mechanical College of Louisiana	12	11	1	1	[1] ×	......	[1] ×	([2])	[3] 8	38
Princess Anne Academy of Maryland	9	9	......	......	×	......	......	9	4	12
Alcorn Agricultural and Mechanical College of Mississippi	7	5	2	2	×	......	......	6	8	12
Lincoln University of Missouri	7	7	......	1	×	......	......	4	20	20
Agricultural and Technical College of North Carolina	15	15	......	......	×	......	......	6	4	4
Colored Agricultural and Normal University of Oklahoma	5	5	......	......	×	......	......	4	29	29
State Agricultural and Normal Mechanical College of South Carolina	6	6	......	1	......	×	......	6	18	17
Tennessee Agricultural and Industrial State Teachers College	10	8	2	1	×	......	......	6	6	6
Prairie View State Normal and Industrial College of Texas	9	9	......	1	×	......	......	6	14	20
Virginia State College for Negroes	4	4	......	1	×	......	......	4	10	15
West Virginia State College [3]	3	3	......	1	×	......	......	([4])	......	......
Total	128	120	8	16	15	1	1	......	......	......

[1] 3 appointed by governor and 9 elected by people.
[2] Length of term of appointed members is 4 years, of elected members 8 years.
[3] State board of education composed of 7 members has control of academic functions.
[4] Alternating terms of 2, 4, and 6 years.

Appointment of the members of the governing boards is vested in most cases in the governor of each State. On the basis of the data presented in the table, the governor appoints the entire membership in 14 institutions and a part of the membership in one college. Information was not furnished as to whether the appointment of the governor must be ratified by the State senate or whether he makes the appointment outright.

One college reported that its entire governing body was elected by the people and another that a part of its membership was chosen by this method. There was one institution that failed to make a report on this question. The length of the terms of the board members varies to a considerable extent. Although a term of office sufficient in length to prevent the appointment of a large proportion of the board by the same State political administration is preferable, it is found that in seven institutions the term of the board members is four years. In six colleges, however, the length of the term is six years and in one it is nine years. The members of the governing board of an additional college serve for two, four, and six years alternately, while in another institution the term of the appointed members is four years in length and the elected members eight years in length.

Notwithstanding the shortness of the length of term, a fairly long continuity—and in a number of colleges a long tenure of office—of the members of the governing bodies prevails, many of the trustees having served from 15 to as high as 38 years during the life of the institution.

In the conduct of the affairs of the institutions, the governing bodies of the negro land-grant colleges do not confine themselves entirely to legislative matters. Reports received in the survey show that at seven institutions, the boards exercise administrative functions and that at five policies are initiated without recommendation of the president. The governing body in one instance issues all checks and vouchers. The boards, however, have adopted the practice of electing officials and members of the teaching staff only upon the recommendation of the president in all cases with one exception where the secretary-treasurer is selected without regard to this executive officer. An orderly procedure for handling the business of the boards does not prevail in all the colleges. According to the reports, briefs of matters to be considered by the governing bodies are prepared in advance of the meetings in only nine cases, while in the remainder apparently the members are not informed of the business to be transacted until the meetings are convened. Where briefs are prepared in advance, they are submitted one week prior to the meeting to the board members in three institutions, 10 days in three, 10 to 15 days in one, and 30 days in one.

The president of the college presents all matters to the board for its consideration at 16 of the colleges while the treasurer-business manager performs this function at one. One governing body does not hold its meetings at the institution, but at the capital of the State. The trustees serve without pay in nine institutions while the compensation is so small as to be practically negligible in the other cases. The reports show that the members receive $10 per day while the board is actually in session at two colleges, $5 per day at two, and $4 per day at one. Two institutions report that the secretary-treasurer is the only member of the board receiving compensation, his salary being $900 per year in one instance and $5 per day in another. One college did not furnish information on the point. The traveling expenses of the trustees are paid in all cases.

As already indicated, the governing bodies of the negro land-grant colleges are generally small and well organized for the conduct of the affairs of the institutions. The absence of any former students and of any representation of the Negro race on the boards would seem to indicate a tendency to exclude the negroes from participation in the government of the colleges which are conducted for their benefit. The plan of having the president of the institution serve as a trustee with full voting power would result in the removal of this criticism. It is also desirable in view of the large numbers of women enrolled in the colleges that a qualified woman be given membership on the governing body. A close relationship should also be maintained between the trustees of the negro and white land-grant colleges for the purpose of improving educational standards and coordinating as far as possible their curricula in the agricultural and mechanic arts fields in the light of the needs of the State. There is a need that the negro land-grant colleges collect statistical data and educational information not only for the use of the governing bodies but also for the public. Doubtless the work of the boards would be greatly strengthened if an association were established similar to the organization of the governing boards of white State universities and allied institutions for the discussion of mutual problems confronting the colleges.

Chief Executive Officer

Administration of the internal affairs of the negro land-grant colleges is generally vested in the president as chief executive officer. In two institutions the term "president" is not used, the chief executive officer being designated as "principal." The length of president's term of office varied in the different colleges, it being one year in length in 10 institution, two years in 1, four years in 1, and indefinite in 4. Regardless of the limitation of the term, the governing boards make it a practice to reelect the presidents automatically at the expiration of their terms unless a complete change in administrative policy is planned.

Of more importance than the length of term is the actual tenure of office of the president. Frequent changes in the chief executive office lead to a lack of continuity in the management of the institutions and a consequent retardation in their development. The reports received from 16 of the 17 institutions included in the survey show that a total of 77 presidents have served since the negro land-grant colleges were established.

The president with the longest tenure of office in any single institution served continuously for 34 years. There were 5 presidents who remained in office from 25 to 30 years, 1 from 20 to 25 years, 4 from 15 to 20 years, 8 from 10 to 15 years, 14 from 5 to 10 years, and 25 from 1 to 5 years. Of the total number 50 severed their connections with the college by resignation and 7 by death. These figures do not include the chief executive officers now in office, the records disclosing that one has served for 18 years, one for 17 years, one for 16 years, two for 14 years, one for 9 years, one for 8 years, two for 5 years, one for 3 years, two for 2 years, and four for 1 year.

On a basis of these data it is evident that the tenure of office of approximately half of the presidents ranges from one to five years, a rather short period of time although comparing favorably with the tenure of the chief executive of the white land-grant institutions. No information was supplied on the length of office of four presidents nor the method of their retirement.

In the administration of his office, the chief executive is assisted by a number of officers in the different negro land-grant institutions. The number is dependent upon their size and type of organization.

Of the 16 colleges filing returns, the office of assistant to the president exists in 3. Eleven of the institutions have full-time registrars while in the remainder the work is handled by the business office or by clerks. The position of dean of men is found in 9 of the institutions and the position of dean of women in 11.

While no such offices exist in the others, the functions connected with student relations and welfare are performed by the president himself or academic officers. Five colleges have deans or directors of administration working directly under the authority of the president.

The line of procedure for the routing of business to the president is not uniform throughout the group of colleges. For the proper internal operations, business should be routed from the individual staff member to the head of the department, thence to the dean except in matters pertaining to the business office, and from the dean to the president. In 11 of the negro land-grant colleges this arrangement is generally followed. It is the practice in one college, however, for the individual staff member to deal directly with the president, in another for the individual member to route business to the dean instead of through the department head, in three others for the head of the department to go direct to the president in place of the dean. As is evident, such a procedure results in conflict of authority and disorganized methods of conducting routine affairs.

Business Management

Business and financial management is not under the direct jurisdiction of the president in all of the negro land-grant institutions. A considerable variation of practices exists.

According to the reports received in the survey there are six colleges with central business officers in charge of a treasurer or chief business officer. This officer is appointed outright by the board of trustees in two cases and upon the president's recommendation in four. However, he is not responsible to the president except in three colleges. In the remainder he reports direct to the board of trustees, or a committee of the board. One institution reports that the chairman of the board of trustees is in complete charge of business and financial matters, the president merely supervising the collection of student fees, revenues from auxiliary enterprises, and similar income. In another college the principal as chief executive has no control over its business affairs, which are handled through the business office of the State university. The government of this institution is vested in the board of regents of the State university. The State board of control exercises supervision over the receipts and disbursements of another negro land-grant college.

Of the remaining seven institutions filing returns, the president acts as the business officer being assisted by an accountant or clerk. Where the president exercises control, he is responsible for the keeping of accounts, collection of fees, board and other revenues, preparing pay rolls and vouchers, signing checks, and rendering regular financial statements. He also handles all purchasing of the institutions. Notwithstanding the different arrangements existing for the conduct of business and financial affairs of the colleges, the tendency is to centralize control and responsibility over them in the chief executive officer, where it belongs. During the early history of these institutions, they were not in a position to employ full-time business officers and even efficient clerical help was lacking. With the rapid growth of the colleges and the training of negroes in business administration, accounting, and bookkeeping, this situation has changed. At the present time such work is performed entirely by negroes in the colleges. Of the six institutions having treasurers or chief business officers, only one of them is white.

As in the case of the white land-grant colleges the accounting systems of the negro institutions are in wide variance. Although requested to submit outlines of their accounting systems in the survey, only 8 of the 17 colleges responded. In most of these cases a general ledger, budget ledger, disbursement voucher register, register of receipts, cash book, and daily cash balance are maintained. The classifications and headings used in keeping the accounts are not uniform. As a basis for financial reports the so-called "Carnegie Forms" are not in use in any of the institutions. In response to a request for a copy of the balance sheet as of June 30, 1928, 10 of the colleges were able to submit such a financial statement, a considerably larger proportion of returns than were received from the white land-grant colleges. Of the balance sheets received there were eight that were in good shape, while two showed only assets without any record of liabilities. Two of the colleges report that their accounts are kept in accordance with a system prescribed by the State.

An important question is the time when the business procedure of the colleges permits the payment of bills. In 2 of the institutions the bills are paid daily; in 1, daily and monthly; in 3, daily, weekly, and monthly; and in 9, monthly. Two colleges did not furnish data on this question. The advantage of the daily payment of bills is that the institutions are enabled to take advantage of discounts. This practice has been adopted in 7 of the colleges. Where monthly payments are in force, resulting in an inability to discount bills, the reports disclose that the governing board is responsible for the arrangement in 3 institutions, State regulations in 3, and the president in 1. In the case of 1 college the sum of $1,000 is set aside permanently to meet discounts on bills.

The accounts of all the negro land-grant colleges are the subject of regular audits; the State law providing for them in 14 cases. Where there is no State law the governing boards have adopted regulations to the effect.

Regularly constituted State agencies conduct the audit of the accounts of 14 institutions and outside accountants of 2. The audits are made annually at 11 colleges, semiannually at 2, quarterly at 1, while no information was furnished regarding the time of the audit of the 3 remaining institutions. Detailed verification of asset values, income, and expenditures is included in the audit in most of the cases. In addition to outside audits a system of continuous internal audit control is maintained in seven institutions. The continuous audit is conducted by the chief business officer at 5 colleges, by an accountant at 1, and by a faculty auditor at 1. The officer in charge is responsible to the president in 4 instances, to the board of trustees in 1, to the comptroller in 1, and to the budget bureau in 1. Reports are made monthly.

The institutions having an internal check control of finances in nearly all cases are under the government of State agencies or State boards of control, but considering the advantages of a continuous check audit it would appear that more of the negro land-grant colleges should install such a system.

Finances

Finances comprise a vital phase of the administration of the negro land-grant colleges. The appraisal of resources, balancing of disbursements with revenues, and equitable distribution of expenditures among the different institutional departments are essential if educational objectives are to be achieved.

Receipts of the 17 negro land-grant colleges have shown a large augmentation during the past decade. A comparison discloses that in 1918 their total revenues for operation and maintenance amounted to $1,436,451, and in 1928 to $3,052,639. This represents an increase of $1,616,188, or 112 per cent. Revenues for capital outlays in 1918 totaled $112,134 as compared with $762,083 in 1928, an advance of $549,949. The institutions, therefore, are receiving greatly increased income for physical plant extension as well as operating expenses. The gains in revenues are due chiefly to enhanced support from the States, the operating income of the colleges from this source being only $296,064 in 1918, while it was $1,379,484 in 1928, an increase of $1,083,420.

It must be understood, however, that these total figures showing increased revenues deal with the negro land-grant colleges as a whole. While there has been a general gain in funds supplied by the States to the institutions as a group, this situation does not apply to each individual college. Moreover, it does not necessarily imply that the State support as compared with other sources of income is sufficient to meet the needs of the various institutions. As the colleges are State owned and State controlled an obligation rests upon the State to provide the major portion of their income. Other sources of revenues should be merely contributory or auxiliary. In an effort to analyze the question, a tabulation has been compiled of the revenues of the 17 colleges for the fiscal year of 1928 showing the receipts from each different source with the proportion of the total. These data are contained in Table 4.

TABLE 4.—*Receipts of negro land-grant colleges, excluding capital outlays for fiscal year of 1928, showing percentages from various sources*

Institution	Federal funds: Land-grant and Morrill-Nelson Acts	Per-cent-age	Smith-Hughes Vocational Teacher-Training Act	Per-cent-age	State funds: Operation and maintenance	Per-cent-age	Private gifts	Per-cent-age	Institutional funds from—: Student fees, tuition [1]	Per-cent-age	Board and lodging	Per-cent-age	Departmental earnings	Per-cent-age	Miscellaneous and other sources	Per-cent-age	Total receipts
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
State Agricultural and Mechanical Institute of Alabama	$18,860	27.2	$2,360	3.4	$22,500	32.6			$2,807	4.0	$13,206	19.0	$3,267	4.7	$6,263	9.1	$69,263
Agricultural, Mechanical, and Normal College of Arkansas	13,636	12.7	200		76,706	71.8			3,926	3.7	12,522	11.8					106,990
State College for Colored Students of Delaware	10,000	16.1			22,700	32.1			237	.6	18,911	30.1	12,257	20.1			64,105
Florida Agricultural and Mechanical College	25,000	14.0	1,822	1.1	50,000	28.0	$250		2,709	1.6	85,197	47.8	2,851	1.6	10,550	5.9	178,379
Georgia State Industrial College	16,666	15.7	3,000	2.8	57,666	54.2			3,096	2.9	15,408	14.5	4,400	4.1	6,174	5.8	106,410
Kentucky State Industrial College	7,250	8.3	1,256	1.5	60,000	68.3			1,690	2.0	17,581	19.9			210		87,987
Southern University and Agricultural and Mechanical College of Louisiana	20,170	11.4	2,961	1.6	55,000	31.1	47,187	26.8	1,160	.6	25,212	14.2	3,667	2.4	21,114	11.9	176,411
Princess Anne Academy of Maryland	10,000	23.1			23,120	53.3	1,178	2.7	2,498	5.7	4,724	10.8	1,845	4.2			43,365
Alcorn Agricultural and Mechanical College of Mississippi	28,085	20.0	12,591	8.9	40,000	28.3			12,599	8.9	42,157	29.9	3,219	2.2	2,487	1.8	141,138
Lincoln University of Missouri	3,125	1.8	870	.6	136,666	75.6			6,715	3.3	30,414	16.8	970	.6	2,110	1.3	180,870
Agricultural and Technical College of North Carolina	16,500	10.3	2,752	1.7	73,785	45.9			21,145	13.1	34,369	21.4	7,905	4.9	4,317	2.7	160,773
Colored Agricultural and Normal University of Oklahoma	5,000	2.7	1,300	.7	95,000	51.5	25,000	13.6	9,031	4.9	41,638	22.7	805	.4	6,475	3.5	184,249
State Agricultural and Mechanical College of South Carolina	25,000	13.1	[2] 32,553	17.1	112,836	59.1			15,604	6.8			766	.7	5,750	3.2	192,509
Tennessee Agricultural and Industrial State Teachers College	12,000	4.2	8,963	1.4	105,000	37.4	30,000	10.7	14,809	5.3	86,784	30.9	26,168	9.3	2,250	.8	280,974
Prairie View State Normal and Industrial College of Texas	12,640	2.4	6,015	1.1	184,352	34.6			36,793	6.9	155,533	29.2	59,873	11.2	77,917	14.6	533,123
Virginia State College for Negroes	26,996	9.8	5,617	2.0	101,653	36.9	22,500	8.2	22,381	8.1	35,464	12.8			61,259	22.2	275,870
West Virginia State College	10,000	3.7	201	.1	162,500	60.1			16,188	6.0	69,120	25.6			12,214	4.5	270,223
Total	260,928	8.5	77,461	2.6	1,379,484	45.2	126,115	4.2	173,388	5.6	688,240	22.5	127,933	4.2	219,090	7.2	3,052,639

[1] Less refunds; includes all instruction and laboratory fees; excludes athletic, social, and health fees.
[2] Including $20,749 from Smith-Lever funds.

The total income of the 17 institutions for 1928, exclusive of capital outlays, was $3,052,639. Of this amount, $260,928, or 8.5 per cent, was derived from Federal land-grant and Morrill-Nelson funds; $77,461, or 2.6 per cent, from Federal Smith-Hughes vocational funds; $1,379.484, or 45.2 per cent, from State funds for operation and maintenance; $126,115, or 4.2 per cent, from private gifts; $173,388, or 5.6 per cent, from student fees; $688,240, or 22.5 per cent, from board and lodging; $127,933, or 4.2 per cent from departmental earnings; and $219,090, or 7.2 per cent, from miscellaneous and other sources.

As disclosed by the table, the income of the individual colleges from Federal land-grant and Morrill-Nelson funds varies not only in amounts but in the proportion of their total receipts. There are 11 out of the 16 institutions where this proportion exceeds the average of 8.5 per cent for the entire group. The receipts from this source are as high as from 27.2 per cent to 20 per cent in the case of three colleges, while eight others range from 16.1 per cent to 9.8 per cent. As Federal funds for the support of the land-grant colleges are intended to be supplementary to other sources of income, it is obvious that a number of these institutions are depending too much upon the revenues of the National Government to defray their operating costs rather than upon their State governments and other sources. A similar situation was found in some of the white land-grant colleges. In the case of the six colleges with smaller proportions of their total revenues from Federal land-grant and Morrill-Nelson funds the percentages varied from 8.3 per cent down to 1.8 per cent.

Revenues of the institutions from Federal Smith-Hughes vocational funds represent a minor proportion of the total income in most instances. Two of the colleges do not receive such funds. The average proportion of receipts from this source for the entire group is 2.6 per cent. One institutiton is listed as deriving 17.1 per cent of its entire revenues from Federal Smith-Hughes funds, but the item in the case of this college includes also Federal Smith-Lever funds. Of the remaining institutions there are 3 with proportions from this source ranging from 8.9 to 2.8 per cent of their total income while in 10 others the percentage is below the average of 2.6 per cent, varying from 2 per cent down as low as 0.4 per cent.

While the proportionate income from Federal sources is valuable in showing the support given by the National Government, of far more importance is the percentage of total revenues provided by the States for the operation and maintenance of the negro land-grant colleges. Upon a basis of these figures it is possible to ascertain whether the States are meeting their full responsibilities. According to the table the States supplied 45.2 per cent of the total revenues of the 17 institutions in 1928 as compared with 50 per cent furnished by the States in the 52 white land-grant colleges. The income of nine negro land-grant institutions from the State exceeded this percentage while in eight others it fell below the figure.

The college receiving the largest proportion of its total revenues from State sources was Lincoln University of Missouri with 75.6 per cent, while the second on the list was the Agricultural, Mechanical and Normal College of Arkansas with 71.8 per cent. Of the 7 other institutions having a larger proportion of their income derived from State sources, there were 2 with percentages from 60.1 to 68.2 per cent and 5 with percentages between 45.9 and 59.1 per cent. The colleges with percentages of their total income below the average of 45.2 per cent are in most cases depending upon revenues from institutional sources and Federal subsidies for their support rather than upon State sources. The proportions of State income to total revenues ranged from 37.4 down to as low as 28 per cent. Among the colleges with small proportions were the Southern University and Agricultural and Mechanical College of Louisiana with 31.1 per cent, the Alcorn Agricultural and Mechanical College, of Mississippi, with 28.3 per cent, and the Florida Agricultural and Mechanical College with 28 per cent.

Being publicly supported institutions, it is not to be expected that the negro land colleges would receive a material portion of their income from private gifts. Table 4 discloses, however, that for 1928 there were six colleges that were the beneficiaries of private gifts which in several instances represented large proportions of their total revenues. The average for all of them was 4.2 per cent. One institution received as high as 26.8 per cent of its entire income from this source, another 13.6 per cent, and a third 10.7 per cent, while others received as low as 2.7 per cent. That these colleges enjoy public confidence to a high degree is indicated by the receipt of such substantial donations from private sources for their support.

The negro land-grant colleges are not depending to such a large extent as the white land-grant institutions upon student fees for their support. The proportion of the total income of the 17 negro colleges in 1928 derived from students amounted to 5.6 per cent, as contrasted with 10.8 per cent for the white institutions.

As indicated by Table 4, all of the negro land-grant colleges received a part of their income from student fees. There were seven institutions with proportions in excess of the average of 5.6 per cent. One college, the Agricultural and Technical College of North Carolina, had revenues from student fees amounting to 13.1 per cent of its entire income. The proportion in two others was 8.9 and 8.1 per cent, while in four others the percentages were from 6.9 to 5.7 per cent. Ten negro land-grant colleges, however, received comparatively small amounts from student fees, the percentage of their total incomes varying from 5.3 to as low as 0.6.

Considering the present status of the institutions, the necessity for increasing their collegiate enrollment, and the development and upbuilding of their agricultural and mechanical departments, it is advisable that revenues from student fees be held to the lowest limit. No attempt should be made to secure increased income from this source. Free tuition should be maintained and the general policy of offering a gratuitous higher education to the Negro race by these institutions should be followed in the future.

Other sources of revenues of the colleges are board and lodging, departmental earnings, and miscellaneous items. While the receipts from these sources can not be generally regarded as educational income, they are, as a rule, included as a part of the regular institutional funds. In the case of board most of the revenues are immediately expended. Receipts from lodging and residence halls, however, are sometimes used for expenditure to cover general operating expenses. The same situation applies to departmental earnings and miscellaneous expenses in most cases.

Of the total income of the 17 colleges, 22.5 per cent was derived from board and lodging in 1928. In the case of the individual institutions 7 received income from this source in excess of this proportion and the remaining 10 less. The average percentage of the total income from departmental earnings was 4.2. Among the 13 institutions having revenues from this source, there were 5 with a proportion above 4.2 per cent and 8 below it. Thirteen colleges had receipts derived from miscellaneous sources representing a percentage of 7.2 of the total revenues. In the case of four institutions their miscellaneous income constituted a higher proportion than this percentage, while in the remaining nine colleges it was less.

Expenditures

No greater responsibility rests upon the governing and administrative heads of the institutions than the expenditure of their annual resources. If academic programs are to be successfully prosecuted and if educational objectives are to be attained, it is essential that the expenditures should be distributed so that the greatest possible proportion be utilized for these purposes.

The grand total expenditures of the 17 negro land-grant colleges for 1928 amounted to $3,347,990. Of this sum, $495,128 was expended for administration and general expenses, $968,517 for resident instruction, $34,411 for general library, $5,956 for extension, $467,713 for physical plant operation and maintenance, $155,492 for supplementary operations, $504,550 for residence and dining halls, $48,982 for athletics, $666,841 for physical plant extensions, and $500 for trust funds. As is evident, a considerable portion of these expenditures is for noneducational functions, including residence and dining halls, athletics, and supplementary operations. In many instances, they also consist of rotary funds. In order to appraise properly the expenditures, it is necessary to eliminate such items and consider only expenditures made directly for educational or contributory purposes. Table 5 presents the expenditures compiled on this basis with the proportions of the total by institutions for 1928.

TABLE 5.—*Expenditures of negro land-grant colleges for fiscal year of 1928 for educational and contributory purposes with percentages*

Institution	Administration and general	Percentage	Resident instruction	Percentage	General library	Percentage	General extension	Percentage	Physical plant, operation and maintenance	Percentage	Total
1	2	3	4	5	6	7	8	9	10	11	12
State Agricultural and Mechanical Institute of Alabama	$14, 104	23. 2	$17, 168	28. 3	$167	0. 3			$29, 208	48. 2	$60, 647
Agricultural, Mechanical, and Normal College of Arkansas	9, 052	16. 0	33, 814	59. 6	1, 812	3. 2			12, 068	21. 2	56, 746
State College for Colored Students of Delaware	5, 298	9. 0	28, 179	48. 0					25, 316	43. 0	58, 793
Florida Agricultural and Mechanical College	[1] 228, 806	[1] 94. 2			2, 900	1. 2			11, 270	4. 6	242, 976
Georgia State Industrial College	8, 904	12. 4	27, 807	38. 6	568	. 8			34, 813	48. 2	72, 092
Kentucky State Industrial College	11, 939	15. 9	37, 080	49. 4	2, 731	3. 7			28, 325	31. 0	75, 075
Southern University and Agricultural and Mechanical College of Louisiana	8, 484	10. 4	46, 752	57. 2	594	. 7	1, 579	1. 9	24, 372	29. 8	81, 781
Princess Anne Academy of Maryland	7, 368	21. 8	17, 140	50. 7	155	. 5			9, 138	27. 0	33, 801
Alcorn Agricultural and Mechanical College of Mississippi	20, 864	28. 9	43, 442	59. 9					8, 098	11. 2	72, 404
Lincoln University of Missouri	24, 846	16. 8	72, 734	49. 2	3, 870	2. 6			46, 487	31. 4	147, 937
Agricultural and Technical College of North Carolina	22, 992	18. 5	68, 826	55. 4	2, 794	2. 3			29, 548	23. 8	124, 160
Colored Agricultural and Normal University of Oklahoma	13, 165	11. 3	63, 800	54. 9	2, 095	1. 8	1, 500	1. 3	35, 686	30. 7	116, 246
State Agricultural and Mechanical College of South Carolina	24, 317	15. 2	95, 983	59. 9	2, 457	1. 5			37, 459	23. 4	160, 216
Tennessee Agricultural and Industrial State Teachers College	15, 577	14. 9	73, 016	70. 0					15, 769	15. 1	104, 362
Prairie View State Normal and Industrial College of Texas	39, 210	12. 9	168, 855	55. 5	3, 167	1. 0			92, 953	30. 6	304, 185
Virginia State College for Negroes	18, 352	12. 7	86, 317	59. 9	4, 801	3. 3	2, 400	1. 7	32, 203	22. 4	144, 073
West Virginia State College	21, 850	18. 8	87, 604	75. 4	6, 200	5. 1	477	. 4			116, 131
Total	495, 128	[2] 15. 3	968, 517	55. 6	34, 311	1. 9	5, 956	. 3	467, 713	26. 9	1, 971, 625

[1] Resident instruction included in administration and general.
[2] Percentage does not include Florida Agricultural and Mechanical College.

As revealed by the tabulation, the total sum expended by the colleges for educational and contributory purposes in 1928 was $1,971,625, of which $495,128, or 15.3 per cent, was expended for administrative and general purposes; $968,517, or 55.6 per cent, for resident instruction; $34,311, or 1.9 per cent, for general library; $5,956, or 0.3 per cent, for extension; and $467,713, or 26.9 per cent, for physical plant operation and maintenance. Because of the failure of the Florida Agricultural and Mechanical College to segregate its expenditures for administration and general expenses from its expenditures for resident instruction, figures covering its expenditures have not been included in the calculation of percentages presented in the table. Resident instruction, general library, and extension comprise the expenditures exclusively for educational purposes. These items as shown in the table make up 57.8 per cent of the total expenditures. Expenditures for administration and general, together with physical plant operation and maintenance, are for purposes contributory to educational functions. They include 42.2 per cent of the total expenditures. It is obvious that the proportion expended for strictly educational purposes is small as compared with contributory purposes. While this may be due to lack of uniformity in the classification and headings of the accounting systems of the colleges, little doubt exists that a careful analysis of expenditures should be made by governing bodies and executives of the institutions with a view of ascertaining the cause of the situation. Since these figures deal with the 17 colleges as a group, it is now proposed to appraise expenditures of individual colleges.

The cost of the administration and general overhead of the negro land-grant institutions is high, being 15.3 per cent of the total educational and contributory expenditures as compared with 6.8 per cent for the white land-grant colleges. In the case of 8 negro institutions, expenditures for this item exceeds the average of 15.3 per cent.

There is one college where the expenditures for administration and general is 28.9 per cent of its total expenditures, another 23.2 per cent, and a third 21.8 per cent. Unless the bookkeeping systems provide for the charging of educational items to administration and general accounts, such large expenditures for this purpose are difficult to comprehend. The proportion of expenditures of five other colleges ranges from 18.8 per cent to 15.9 per cent of their total expenditures. A reduced cost of administrative and general overhead is found in the eight other institutions, the proportion being below the average. Two of the colleges expended 15.2 and 14.9 per cent for this purpose while the percentage in five others varied from 12.9 to 10.4. One institution reduced its administrative and general overhead to as low as 9 per cent of the total expenditures for educational and contributory purposes or 6.3 per cent below the average for the entire group of colleges.

Resident instruction is the principal educational function of the negro land-grant colleges. By far the greater proportion of their expenditures should, therefore, be made for this purpose. According to the figures presented in Table 5, expenditures for resident instruction comprised 55.6 per cent of the total expenditures for

16 of the institutions, data not being provided in one case. There were seven colleges that expended in excess of this figure. One institution spent as high as 75.4 per cent for resident instruction and another 70 per cent. The proportions of the remaining five varied from 59.9 to 57.2 per cent. Expenditures of nine colleges were less than the average of 55.6 per cent. The percentages of two institutions were 55.5 and 55.4, while six others ranged from 54.9 down to 38.6. In the case of one college, the proportion of expenditures for resident instruction was 28.3 per cent, but this low percentage is traceable in all probability to the fact that the figures do not include all the expenditures for this purpose, some being charged to other items.

In the distribution of the annual expenditures, the general library as a central service branch of the institution, should receive primary consideration. Yet for the year 1928 it is evident from the compilation that the expenditures for the library constitute only a minor portion of the total educational and contributory expenditures. Three institutions reported no expenditures for this purpose. The average for the remaining 14 colleges was 1.9 per cent, a small proportion. Six institutions, however, spent greater percentages than this figure, the expenditures for general library being 5.4 per cent of the total expenditures in one case and between 3.7 and 2.3 per cent in the other five. Of the eight remaining colleges the library expenditures were generally low and in some instances so small as to be practically negligible. Four institutions expended between 1 and 1.8 per cent for this purpose while the proportion of the four others was less than 1 per cent varying from 0.8 to 0.3 per cent. Obviously high academic standards can not be maintained by the negro land-grant colleges unless increased expenditures for the general library are made. At least 2.5 per cent of the total educational expenditures should be devoted to library upbuilding and operation.

Only four of the negro land-grant colleges had expenditures for general extension in 1928, the proportion being 0.3 per cent. Three of the colleges expended between 1.9 and 1.3 per cent while one expended 0.4 per cent for this purpose.

Operation and maintenance of the physical plant is one of the significant items of expense in the colleges. Because of the heterogeneous systems of accounting, difficulty is encountered in ascertaining the exact cost in the negro land-grant institutions. One institution failed to furnish figures and in the case of another college the total expense is not included. As the negro land-grant colleges are located in the Southern States where the climate is fairly mild throughout the year, the cost of operation and maintenance of the physical plant should be comparatively low since large expenditures for fuel are not necessary. Yet according to Table 5, expenditures for this purpose in the entire group of colleges consist of 26.9 per cent of the total expenditures. This is a high proportion. In the white land-grant institutions the cost of physical plant operation and maintenance is only 11 per cent, but the situation in the negro colleges is undoubtedly due, in part, to the charging of items of expense into physical plant expenditures that belong in other accounts.

Using the figures contained in the compilation, it is found that nine of the individual institutions expended a greater proportion than 26.9 per cent for this purpose. The percentages in two instances ran as high as 48.2 of the total expenditures, while in seven others they varied from 43 to 27 per cent. The expenditures of six colleges were less than the average of 26.9 per cent, ranging down from 23.8 to 11.2 per cent, an indication that these institutions have reduced the cost of physical plant operation and maintenance to minimum proportions.

In the foregoing discussion an attempt has been made to analyze the expenditures of the negro land-grant colleges for educational and contributory purposes. It is obvious from the actual figures given by the institutions and the proportions computed for the various items that the data are of little value. The reason is the dissimilarity of bookkeeping methods employed by the colleges, the absence of uniformity in the classification of accounts, and use of different headings in the ledgers and accounting systems. A similar situation exists in the 52 white land-grant institutions, but as there are only 17 negro land-grant colleges and their functions are almost identical, it would seem that their bookkeeping would be more uniform. No phase of handling the finances of the colleges is more important than an adequate system of cost accounting. The opportunity, therefore, presents itself for the negro land-grant institutions to adopt the same headings and classifications for keeping their books and for installing uniform accounting systems. Such an arrangement will prove highly advantageous, not only in the appraisal of the resources of the colleges, but also in the distribution of their expenditures on an equitable basis.

Salaries

Salaries paid in the negro land-grant colleges are generally low both in the administrative and academic branches.

Considering the compensation it is difficult to comprehend how either administrative officers or members of the teaching staff of the highest training and qualifications can be secured to perform the services demanded in the conduct of the institutions. The establishment of the work of the colleges upon a collegiate basis and in conformity with modern standards would seem to make it essential that the pay be sufficient to attract educators of the highest type of leadership.

An examination of the remuneration of the administrative officers discloses a particularly low salary scale. In Table 6 are shown the salaries paid the presidents, assistants to the president, business managers, registrars, deans of men and women, and deans of administration.

TABLE 6.—*Annual salaries of administrative officers of negro land-grant colleges*

Institution	President [1]	Assistant to the president	Business manager	Registrar	Dean of men	Dean of women	Dean of administration
1	2	3	4	5	6	7	8
State Agricultural and Mechanical Institute of Alabama	$2,700	....	....	....	....	$1,000	$1,350
Agricultural, Mechanical, and Normal College of Arkansas	2,700	$1,800	....	$1,500	....	1,200	....
State College for Colored Students of Delaware	3,000	....	....	....	....	....	....
Georgia State Industrial College	3,600	....	....	1,500	$1,800	1,200	....
Kentucky State Industrial College	4,500	....	$1,500	....	900	650	1,800
Southern University and Agricultural and Mechanical College of Louisiana	3,000	2,100	....	1,500	1,510	1,500	....
Princess Anne Academy of Maryland	2,400	....	....	....	....	....	....
Alcorn Agricultural and Mechanical College of Mississippi	3,000	....	....	....	....	....	....
Lincoln University of Missouri	4,000	....	3,000	2,100	1,800	1,800	3,000
Agricultural and Technical College of North Carolina	4,020	....	3,720	1,900	1,760	....	....
Colored Agricultural and Normal University of Oklahoma	3,600	....	....	2,000	....	1,800	2,100
State Agricultural and Mechanical College of South Carolina	3,600	1,500	....	1,400	1,000	1,000	....
Tennessee Agricultural and Industrial State Teachers' College	4,000	....	....	1,800	1,800	1,500	....
Prairie View State Normal and Industrial College of Texas	3,600	....	2,200	1,672	1,680	1,572	....
Virginia State College for Negroes	4,000	....	3,000	1,600	2,000	1,800	....
West Virginia State College	4,800	....	....	2,200	....	....	3,000

[1] Does not include perquisites.

The highest annual salary paid the chief executive officer of any of the negro land-grant colleges is $4,800. There is one president that receives $4,500, another $4,020, and three $4,000 yearly. Of the remaining 10 presidents, their compensation ranges from $3,600 down to $2,400, four receiving $3,600, three $3,000, two $2,700, and one $2,400. While a limited number of the chief executive officers are paid adequate salaries, the remuneration of a majority of them is incompatible with the responsibilities of the office. One college failed to furnish information on the salary of its president and other administrative officials. The salaries of the assistants to the president in three institutions having such an officer vary from $2,100 to $1,500.

As shown by the table, the remuneration paid business managers by the five institutions having them ranges from $3,750 to $1,500. The largest salary paid any business manager is $3,750 and his salary exceeds the compensation of the president of a number of other institutions.

There are two additional business managers that receive $3,000 while the pay of the other two is small, one receiving $2,200 and one but $1,500. Among the 11 colleges employing full-time registrars, the salaries of this official is low in most cases. The highest pay received by any registrar is $2,200 annually, while another receives $2,100, and a third $2,000. The remainder are paid salaries ranging from $1,900 to $1,400.

Among the important administrative positions in the colleges are the deans of men and deans of women. Of the nine institutions employing deans of men, an examination of the tabulation shows that their salaries are approximately on the same salary scale as the registrars. One dean of men receives as high as $2,000 annually.

In the case of the remainder, three are paid $1,800, one $1,760, one $1,680, and one $1,510, while two others receive as low as $1,000 and $900. The latter compensation is so small as to scarcely provide a living wage. Deans of women are employed in 11 colleges. Their pay is even smaller than that of the deans of men, the highest salary paid being $1,800 while the lowest is $650. According to the figures contained in Table 6, two deans of women receive $1,800 annually, one $1,572, three $1,500, two $1,200, two $1,000, and one $650. The office of dean of administration has been established in five institutions. While two deans of administration receive fairly satisfactory salaries, the amount being $3,000, the pay of the three others is low, ranging from $2,100 to $1,350.

Although the salaries of the administrative officers of the negro land-grant colleges are low, their general level is higher than the teaching staffs. With only a few exceptions members of the faculties of the institutions receive lamentably small compensation in all the different ranks. For the purpose of obtaining unabridged information on the subject, a detailed analysis of the salaries paid the teachers in the various colleges was made. The results are presented in Table 7, which gives the range of salaries in the different ranks with the number of teachers and with the amounts of their compensation according to the different ranges. The data include 16 of the negro land-grant colleges, no return being made by one institution.

On the basis of the figures given in the tabulation, there are 380 full-time collegiate members of the teaching staff in the 16 negro land-grant colleges filing reports. Of this number, 52 are deans, 143 are professors, 35 are associate professors, 30 are assistant professors, and 120 are instructors.

The median salary paid the deans is $2,167, the range being from $3,250 to $1,000. In the entire group of institutions it is found that only two deans receive compensation ranging as high as $3,001 to $3,250. The next highest scale is $2,501 to $2,750, and there are but two deans whose salaries reach these figures. The remuneration of the remaining deans is less than $2,250. Eighteen of the deans received between $2,001 and $2,250, 22 between $1,501 and $2,000, and 8 between $1,001 and $1,500.

It can not be too strongly emphasized that the payment of such low salaries to deans can only result in the retardation of the growth of the negro land-grant colleges. The achievements of the institutions depend to a large extent upon their work in developing the major divisions. Trained educators can not be secured for salaries ranging from $1,000 to $2,000, the remuneration now paid the majority of deans in the colleges. As shown in Table 7, three institutions do not have any deans.

TABLE 7.—*Salaries by ranks of the full-time members of the teaching staff of negro land-grant colleges*

Institution	Deans						Professors									Associate professors							Assistant professors						Instructors							Total number
	$3,001-$3,250	$2,751-$3,000	$2,501-$2,750	$2,001-$2,500	$1,501-$2,000	$1,001-$1,500	$3,001-$3,250	$2,751-$3,000	$2,501-$2,750	$2,000-$2,250	$1,751-$2,000	$1,501-$1,750	$1,251-$1,500	$1,001-$1,250	Less than $1,000	$2,251-$2,500	$2,001-$2,250	$1,751-$2,000	$1,501-$1,750	$1,251-$1,500	$1,001-$1,250	Less than $1,000	$2,001-$2,250	$1,751-$2,000	$1,501-$1,750	$1,251-$1,500	$1,001-$1,250	Less than $1,000	$2,251-$2,500	$2,001-$2,250	$1,751-$2,000	$1,501-$1,750	$1,251-$1,500	$1,001-$1,250	Less than $1,000	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
State Agricultural and Mechanical Institute of Alabama																																		8	3	11
Agricultural, Mechanical, and Normal College of Arkansas																																5				5
State College for Colorel Students of Delaware					3																												1			4
Georgia State Industrial College					1	1					2	3	1	3	1					2	2															16
Kentucky State Industrial Collgee																													1			1	11	3		16
Southern University and Agricultural and Mechanical College of Louisiana				4	1						6	10	7							8																36
Princess Anne Academy of Maryland					1	2																												1	1	5
Alcorn Agricultural and Mechanical College of Mississippi					1	2					1	1	5	3	1				1								5					2	1	3		26
Lincoln University of Missouri	1						10				1												4	1							1					18
Agricultural and Technical College of North Carolina				3						1	2					1			1													1				9
Colored Agricultural and Normal University of Oklahoma					5						8			1				1	2		1													10		28
State Agricultural and Mechanical College of South Carolina					4	1				1	10	5	5	1	1																		12	9	3	52
Tennessee Agricultural and Industrial State Teachers College				3	2	1				4	5	3	1	1															1			3	6			30
Prairie View State Normal and Industrial College of Texas				4							9								3	11						10	9						1	10		57
Virginia State College for Negroes				2	2	1						1	7	4							1	1					1						1	6		27
West Virginia State College	1		2	2	2				6	1	5	6																			5	4	5	1		40
Total number	2	...	2	18	22	8	10	...	6	7	49	29	26	13	3	1	...	1	7	21	4	1	4	1	...	10	15	...	2	...	6	16	38	51	7	[1]380

[1] Total does not include Florida Agricultural and Mechanical College, which did not submit data.

Salaries paid the full professors are also on a low scale. The median salary is $1,754. One college pays its 10 professors between $3,001 and $3,250 and another pays 6 professors between $2,501 and $2,750. The remaining 127 professors receive salaries varying from $2,250 to less than $1,000. According to the compilation, 7 professors are paid between $2,001 and $2,250, 49 between $1,751 and $2,000, 29 between $1,501 and $1;750, 26 between $1,251 and $1,500, 13 between $1,001 and $1,250, and 3 less than $1,000. The pay of half of the professors in the colleges, therefore, is less than $1,750, an amount below the wages paid a relatively untrained person in many private business enterprises. In the case of five institutions no members of their teaching staff hold the rank of professor.

The compensation of the rank of both associate and assistant professors is generally small. The median salary for an associate professor is $1,400 and for an assistant professor $1,250. Among the 35 associate professors 1 receives an annual salary ranging between $2,251 and $2,250, 1 between $1,751 and $2,000, and 7 between $1,501 and $1,750, but the salaries of the other 26 ranges from $1,500 to less than $1,000. Of this latter number there are 21 associate professors that receive between $1,251 and $1,500, 4 between $1,001 and $1,250, and 1 less than $1,000. In the case of assistant professors, it is found that 4 are paid as high as $2,001 to $2,250, and 1 from $1,751 to $2,000, while the compensation of the remaining 25 varies from $1,500 down to $1,001. Only four colleges have established the rank of assistant professors in their faculties.

Out of the total of 380 members of the teaching staffs of the negro land-grant colleges, approximately 31 per cent hold the rank of instructor. The median salary for instructors is $1,265 annually, a strikingly low figure. As revealed by Table 7, instructors receiving the highest compensation in this group include 2 whose salaries range from $2,251 to $2,500, 6 from $1,751 to $2,000, and 16 between $1,501 and $1,750, but the other 96 receive less than $1,500 annually. The salaries of 38 instructors vary from $1,251 to $1,500, 51 from $1,001 to $1,250, and 7 less than $1,000. Two of the institutions have only instructors on their staff, no higher academic ranks having been established.

The foregoing presentation indicates that an adjustment of the salaries of the administrative and academic staffs is one of the important problems confronting the negro land-grant colleges. The mere raising of salaries is not the primary question. What is needed is a careful revaluation of the work of the different officers of the institutions, including presidents, deans, professors, and other staff members, in view of the new standards that they are compelled to meet under the stimulation of State boards of education and accrediting agencies. Salary increases should not necessarily be given administrators and teachers of mediocre ability or of long tenure of service, but the general level of compensation should be raised throughout the negro land-grant colleges, particularly in favor of negro educators who have gone to the expense of securing the best type of graduate training afforded in the leading universities of the country.

Physical Plants

The physical plants of the negro land-grant institutions are being rapidly expanded to meet their growing needs.

Figures have already been presented showing capital outlays made for physical plant extensions, but further evidence is provided in a comparison of the actual value of the physical properties owned by the colleges. In 1918 the total value of the properties of the 17 institutions was $7,192,698, as compared with $11,804,541 in 1928, a gain of $4,611,843. The percentage of increase is approximately 60 per cent. A large proportion of the increased valuation is due to the construction of new buildings as a result of appropriations made by some of the States for the upbuilding of the colleges. In the case of one institution, the Agricultural, Mechanical, and Normal College of Arkansas, an entire new physical plant, modern in every respect, has recently been completed.

The colleges in most instances have ample land for both campus and farm purposes. The total area of land owned by the 17 colleges amounts to 5,638 acres, of which 2,903 acres are utilized for campus and 2,735 acres for farms. While some of the campuses are extensive, it is the practice in the majority of the colleges to have small campuses, an arrangement that results in considerable saving in plant operation and maintenance. The size of the cultivated farms range from 375 to 34 acres in the individual institutions. Not all of the colleges utilize the entire acreage under cultivation for instructional purposes, a part being rented. Lincoln University of Missouri has a farm of 88 which is cultivated wholly by tenants, no courses in agriculture being offered. In Table 8 are presented the acres of land owned by institutions, together with the values of different types of properties included in their capital investments.

TABLE 8.—*Amount of land and value of physical plants owned by the negro land-grant colleges*

Institution	Acres of land: Campus and farms	Acres of land: Under cultivation	Value of property: Apparatus, machinery, and furniture	Live-stock	Campus and grounds	Buildings, excluding dormitories	Dormitories	Federal endowment	Other property	Total
1	2	3	4	5	6	7	8	9	10	11
State Agricultural and Mechanical Institute of Alabama	187	90	$31,000	$1,500	$183,000	$97,500	$80,000			$393,000
Agricultural, Mechanical, and Normal College of Arkansas	182	132	45,000	2,400	55,000	75,000	25,000			202,400
State College for Colored Students of Delaware	200	180	13,120	2,790	31,000	91,295			$11,102	149,307
Florida Agricultural and Mechanical College	225	125	70,840	35,000	25,000	507,500	200,000		135,000	973,340
Georgia State Industrial College	116	70	1,500	1,800	151,000	140,500	135,900			430,700
Kentucky State Industrial College	300	180	3,400	3,860	45,625	141,900	185,000	[1] $70,922		450,707
Southern University and Agricultural and Mechanical College of Louisiana	500	200	20,536	5,500	300,000	367,000	100,000			793,036
Princess Anne Academy of Maryland	117	85	24,000	4,000	11,000	55,000	60,000			154,000
Alcorn Agricultural and Mechanical College of Mississippi	960	375	56,443	4,315	9,000	142,930	122,000	209,871		544,559
Lincoln University of Missouri	98	88	10,000	1,600	80,000	462,500	213,000			767,100
Agricultural and Technical College of North Carolina	281	256	272,170	3,652	177,961	384,275	143,000		13,804	994,862
Colored Agricultural and Normal University of Oklahoma	320	200	70,000	4,500	9,600	162,800	154,000			400,900
State Agricultural and Normal University of South Carolina	140	85	169,650	5,000	76,000	771,903	240,000	95,900		1,358,453
Tennessee Agricultural and Industrial State College	231	140	60,000	4,500	101,250	425,000	315,000			905,750
Prairie View State Normal and Industrial College of Texas	1,435	300	231,454	9,671	60,122	359,897	282,443		188,606	1,132,193
Virginia State College for Negroes	297	195	139,479	6,362	109,625	666,187		172,156	37,598	1,131,407
West Virginia State College	49	34	160,000	2,070	49,000	443,775	337,982		30,000	1,022,827
Total	5,638	2,735	1,378,592	98,520	1,474,183	5,294,962	2,593,325	548,849	416,110	11,804,541

[1] Includes $50,000 from State funds.

An examination of this compilation shows that the valuation of the properties of all the colleges in 1928 amounted to $11,804,541. Of the total capital outlay, $1,378,592, or 11.7 per cent, was invested in apparatus, machinery, and furniture; $98,520, or 0.8 per cent, in livestock; $1,474,183, or 12.5 per cent, in campus and grounds; $5,294,962, or 44.9 per cent, in buildings, exclusive of dormitories; $2,593,325, or 21.9 per cent, in dormitories; $548,849, or 4.7 per cent, in Federal endowments; and $416,110, or 3.5 per cent, in other property. These percentages show the proportion of the capital investments in the various items for the group of colleges as a whole. Properties of many of the individual institutions, however, are extremely limited and necessary facilities, both for educational and other purposes, are lacking.

A number of the colleges are particularly in need of apparatus, equipment, machinery, and furniture. One institution reports the total value of such properties as only $1,500. In another case the amount is given as $3,400, while two others show only $10,000 and $13,120. It is evident that with such small capital investments in equipment, apparatus, and similar properties, the colleges are seriously handicapped. With one exception all the negro land-grant institutions have made small capital outlays in livestock, an essential facility if courses of instruction are to be effectively taught in agriculture. One college has an outlay of $35,000 in livestock, but in the case of remaining 16 institutions all have invested less than $10,000 for this purpose. The livestock in several colleges is not used for educational purposes, but to supply dining halls and boarding departments.

Figures showing valuation of buildings also indicate that a number of the institutions are without necessary space. Four of the colleges have less than $100,000 invested in buildings, exclusive of dormitories, and four others report between $100,000 and $200,000 capital outlays for buildings. If these colleges are to be developed into modern institutions of higher education for the Negro race in their States, new structures will have to be erected upon their campuses. There is also need of additional dormitories and residence halls. Two colleges failed to furnish information on the valuation of their dormitories. In three instances the valuation of dormitories owned by the institutions was placed at less than $80,000. As shown in Table 8, four of the colleges have Federal land-grant endowments, a subject that has already been discussed in a previous part of the report.

Management of the physical plant, including its operation and maintenance, is one of the important administrative responsibilities in the institutions. If the buildings are to be used to their full capacity, a systematic procedure should be enforced for the assignment of space and for keeping a record of all space available. An inquiry into these questions revealed that 10 colleges maintain an accurate record of the capacity of rooms in the different buildings together with the blackboard space, equipment, and other facilities. Six institutions reported that no such record is maintained. The official or officials having authority over the assignment of building and room space vary in the different colleges. The president is responsible for this function in 2 cases, a housing committee in 4, the dean in 6, the vice principal in 1, the superintendent of buildings and grounds in 1, the deans of men and women in 1, and in 2 no information was furnished. As is evident the practice in at least 10 of the colleges is to place the responsibility for space assignment upon academic officers or committees made up largely from the teaching staff. Such extraneous work interferes with the educational duties of these faculty members. The most efficacious plan of physical plant management is to centralize the authority in a single noneducational official, responsible not only for the assignment of space but also for keeping records of its use and availability.

Janitor service in the negro land-grant colleges is performed in nearly all cases by students working part time, an arrangement which provides opportunity for the students to defray a part of their expenses. The number employed ranges from 7 up to 112. One institution does not employ student help, its janitor service being performed by 3 full-time employees. Janitors are responsible to a variety of officials in the different colleges. The president has authority over the janitors in 2 institutions, the deans of men and women in 2, the matrons and housekeepers in 6, the superintendent of buildings and grounds in 3, the principal in 1, the head janitor in 1, and the proctor in 1. Inspections of the buildings and rooms are made daily in 14 of the colleges while 3 failed to make reports on the point. The practice has been adopted by several institutions of compelling deans and instructors to inspect buildings and report on the work of the janitors, a duty that should be assigned to a nonacademic officer. Students are employed also in the care of the grounds of nearly all the colleges. Supervision of the work is under the jurisdiction of the president in 1 institution, the superintendent of buildings and grounds or farm manager in 7, the head of the agricultural or horticultural department in 4, a landscape gardener in 1, and the director of mechanic arts in 1.

The construction of new buildings at the negro land-grant colleges is carried on under the authority of the governing board in 12 of the institutions. In 4 others a State agency exercises jurisdiction either partially or wholly. A State architect draws up the plans and supervises the work on new buildings at 1 college while in another a regularly employed college architect serves in this capacity. There are 2 institutions where the State agency employs the architect while in the remainder the architectural services are secured by the governing body. Architects are paid on a contract basis in 6 colleges, on a per cent of cost basis in 6, and on a direct salary basis in 2. Three institutions made no report regarding the basis upon which the architects are employed.

Chapter III.—Educational Organization and Accomplishments

One of the most difficult problems confronting the negro land-grant colleges is the creation of an appropriate educational structure for the accomplishment of their objectives.

In each of the States where negro land-grant colleges have been established the economic and social condition of the negro has interferred to a material extent with the development of the institutions on a collegiate grade in accordance with the intent of Federal law. The opposition of the whites toward collegiate education for negroes was strong and persistent in some States. Only the simplest type of practical training was permitted. As long as public education lagged the number of negro high-school graduates was not sufficient to warrant the establishment of collegiate work in any field. The dearth of technically trained teachers was another serious obstacle in the way of achievement.

As already pointed out, many of the negro land-grant colleges in the early period of their development organized collegiate branches, but they were concentrated upon classical education rather than industrial training. However, as the material welfare of the South increased and its public educational program came under the stimulating direction of a strong group of educational leaders, the restrictions against the development of negro land-grant colleges were removed. At the present time there is not a single State in the South that is not committed to a broad program of education for negroes, including collegiate training.

From the standpoint of the purposes of the Federal acts under which they came into existence, the majority of the negro land-grant colleges were named in such a specific way as to indicate their objectives more or less directly. Two of the institutions are known as agricultural and mechanical colleges, 2 as State industrial colleges, 3 as State colleges, 1 as an institute, 3 as normal colleges, 1 as an academy, 1 as a State teachers college, and 3 as universities. While the nomenclature of the colleges is not of prime importance, yet it is essential to consider the question in the light of the programs of study that are offered. In a number of the institutions the names fail to express the actual purpose of the college. One institution designated as a university is a State teachers college, pure and simple.[1] Two other negro land-grant institutions bearing the titles of university are concerned principally with undergraduate teacher training. Little work in the technical fields included under the stipulations of the Morrill Acts and Nelson amendments are offered in them.

The chief function in the other types of colleges appears to be centered in teacher training for general educational work and for the vocations, such as agriculture, mechanic arts, and home economics. In many of the negro land-grant colleges the internal organization does not fit in any way the name of the institution which results in considerable misunderstanding as to their true status. In recent years there has been a tendency to simplify the long and complicated names given the negro land-grant institutions. In several instances, the title "State college" has been used. Under this general term are included all of the specialized activities, such as agriculture, mechanic arts, home economics, teacher training, liberal arts, and sciences, which are now represented in a majority of the institutions. While absolute uniformity is not essential, it would seem that some of the colleges should be renamed to correspond more accurately with their objectives and with the character of work offered in them.

Type of College Organization

Three general types of college organization are found in the negro land-grant group of institutions, the 2-year junior college, the 4-year senior college, and the 4-year teachers college.

The institutions organized as junior colleges include the State Agricultural and Mechanical Institute of Alabama, State College for Colored Students of Delaware, and Princess Anne Academy of Maryland. Junior college programs are also offered at the Florida Agricultural and Mechanical College and the Kentucky State Industrial College. The 4-year senior colleges are the Agricultural, Mechanical, and Normal College of Arkansas, Florida Agricultural and Mechanical College, Georgia State Industrial College, Kentucky State Industrial College, Southern University and Agricultural and Mechanical College of Louisiana, Alcorn Agricultural and Mechanical College of Mississippi, Agricultural and Technical College of North Carolina, Colored Agricultural and Normal University of Oklahoma, State Agricultural and Mechanical College of South Carolina, Prairie View State Normal and Industrial College of Texas, Virginia State College for Negroes, and West Virginia State College. Lincoln University of Missouri and Tennessee Agricultural and Industrial State Teachers College are primarily 4-year teachers colleges.

In an institution with the complex educational program of the land-grant college it is difficult to state general objectives or purposes, yet the fact that most of the land-grant colleges for negroes are offering many diversified programs makes it essential that a clear statement should be made of objectives. The nature of American civilization is such that the student should be trained so that he can do his share not only in the spiritual and intellectual growth of the country, but also in its material advancement. While a number of the negro land-grant colleges make a clear statement of the general purposes of their educational programs, it is found that in other cases the aim is expressed in vague terms or is merely implied in a historical statement. There are three colleges that have failed altogether to outline their general aim. That these institutions are at a disadvantage is evident. Not only are the people that they are intended to serve in ignorance of their general objectives, but also the legislatures of the States upon which they depend for their support have no real conception of their true functions.

A similar confusion of these specific objectives exists as evidenced in an examination of the educational organizations of the negro land-grant colleges. The designations given the major units in the different institutions are widely diversified.

There are 3 colleges where the educational organization is separated into colleges, 3 where it is divided into schools, and 7 where it is segregated into departments. Seven other institutions have no distinct units, but their educational organization is based on the several curricula offered. In Table 9 are presented the divisions, schools, major departments or curricula of the negro land-grant colleges. According to this tabulation, 16 of the colleges have educational units of agriculture, 12 of mechanic arts, 13 of home economics, 12 of arts and science, 1 of science, 17 of education, 4 of commerce and business, 1 of fine arts, 3 of music, 1 of physical education, 1 of nursing, and 9 of extension.

A lack of precision is found in the segregation of the units listed in the table and many of the titles are misnomers. Since these institutions are colleges and not universities, it would appear advisable that the use of such terms as colleges and schools be abandoned and that the educational units be designated as departments with the exception of the few that have the minimum standards required for separate colleges. Such a system would be more in accordance with the general plan of modern college organization.

TABLE 9.—*Divisions, schools, or major departments of negro land-grant colleges*

Institution	Agriculture	Mechanic arts	Home economics	Arts and sciences	Science	Education	Commerce and business	Fine arts	Music	Physical education	Nursing	Extension
1	2	3	4	5	6	7	8	9	10	11	12	13
State Agricultural and Mechanical Institute of Alabama	×	×				×						
Agricultural, Mechanical and Normal College of Arkansas	×		×	×		×						
State College for Colored Students of Delaware	×	×	×	×		×			×			
Florida Agricultural and Mechanical College	×	×	×	×		×					×	×
Georgia State Industrial College	×	×	×	×		×						
Kentucky State Industrial College	×		×	×		×						×
Southern University and Agricultural and Mechanical College of Louisiana	×		×	×		×						×
Princess Anne Academy of Maryland	×			×		×						
Alcorn Agricultural and Mechanical College of Mississippi	×		×	×		×						
Lincoln University of Missouri				×		×						×
Agricultural and Technical College of North Carolina	×	×			×	×						×
Colored Agricultural and Normal University of Oklahoma	×	×	×	×		×	×	×				×
State Agricultural and Mechanical College of South Carolina	×	×	×	×		×	×					
Tennessee Agricultural and Industrial State Teachers College	[1] ×	[1] ×	[1] ×			×	[1] ×					
Prairie View State Normal and Industrial College of Texas	×	×	×			×					×	×
Virginia State College for Negroes	×	[1] ×	×			×			×	×		×
West Virginia State College	×	×	×	×		×	×		×			×
Total	16	12	13	12	1	17	4	1	3	1	2	[2] 9

[1] Teacher training.
[2] In all cases extension is not organized as a separate unit.

Curricula and Academic Programs

While the educational structure disclosed the character of organization set up for the performance of the functions of the colleges, the curricula and the academic programs reveal the type of education that they are attempting to provide to their constituency. In a number of instances these curricula and programs are mere paper outlines printed in the catalogues rather than courses actually taught in classroom and laboratory. It is proposed to discuss the various curricula offered in the institutions in detail.

One of the principal functions of the negro land-grant college is the teaching of agriculture. In all the institutions some courses are offered in agriculture with the exception of Lincoln University of Missouri. Their exact status, however, is difficult to appraise, some being of a secondary grade while others are on a collegiate standard. There is a general lack of students pursuing the agricultural courses, due no doubt to the failure of the colleges to present the aims of the work and to organize it upon a proper basis. Eleven of the institutions offer the degree of bachelor of science in agriculture, while the agricultural curricula of the remaining colleges consist of 2-year or isolated courses. The agricultural instruction in one case consists of agricultural cost accounting in connection with a farm operated for profit. In another students are required to select either agriculture or some other industry in which labor must be done daily without college credit. The departmental offerings in the colleges where agriculture has been placed on a collegiate basis include agronomy, animal husbandry, horticulture, entomology, rural economics, and sociology.

The development of college curricula in mechanic arts and related subjects presents one of the intricate educational problems of the negro land-grant colleges. For a great many years the only instruction given under the term "mechanic arts" was manual-training trades and to a certain extent machine-shop practice. In some of the institutions this situation still prevails. As mechanic arts of a collegiate grade include several branches of the engineering profession, the negro land-grant colleges have been handicapped in offering highly technical courses in electrical, mechanical, civil, and chemical engineering because of the expensive equipment required and the difficulties in securing highly trained personnel to give instruction. Little opportunity has also existed for negro engineering graduates to secure employment except in isolated instances. As a result it became necessary to develop specific types of technical curricula of a collegiate grade within the fields of mechanic arts, trades, and industries to be offered in the negro land-grant institutions that might be profitably pursued by their students. The curricula include auto mechanics, building construction, power-plant engineering, and industrial management. There are seven institutions offering courses in one or more of these fields in which degrees are granted. Two-year curricula in trades and industries are offered in two institutions, while in the case of the other colleges most of the mechanic arts instruction is on a high-school level.

Collegiate programs in home economics have been developed more rapidly and more consistently than agricultural and mechanic arts curricula in the negro land-grant colleges. This is largely due to the fact that home economics in its different branches is specially adapted to the needs of negro women students in an immediate and practical way. There are also lacking many of the economic drawbacks as to employment which operate to a certain extent in the other technical fields. It is found, therefore, that there is greater uniformity in the home economics instruction in the institution. Twelve negro land-grant colleges offer 4-year curricula in home economics leading to a bachelor's degree. Another college has home economics teacher-training courses. Two other institutions conduct 2-year college courses in home economics while one offers a noncredit elective course in its junior college. The courses of instruction in most of the 4-year curricula include foods, dietetics or nutrition, clothing, millinery or tailoring, textiles, home management, home planning, home accounting, child and invalid care, home nursing, education, cafeteria or institutional management, laundering, and household physics. Practice homes or cottages are provided by nine institutions giving 4-year college work.

Commerce and business curricula have been established in four of the negro land-grant colleges. One of them confines its instruction to the teacher training in this field. The work is on a collegiate basis in most instances. Courses of instruction given in the institutions comprise general commerce and business, such as real estate, banking, insurance, building, and agricultural business. Increasing concentration of the negro population in urban centers has resulted in the establishment of business enterprises of every type which are owned, managed, and conducted by negroes. The professions of law, medicine, education, and related activities have also opened new avenues of business activities for negro youth. A demand, therefore, has been created for expert accountants, secretaries, expert clerks, and similar positions in which collegiate training is essential. It is highly important that more of the negro land-grant colleges introduce commerce and business curricula to meet these new needs. The courses should be maintained on a college level and should not consist of stenography, typewriting, or simple bookkeeping, which are high-school subjects. No college credit in commerce and business should be allowed for such courses.

Curricula in arts and sciences have been a part of the educational programs of most of the land-grant colleges for negroes from the time of their establishment. Some of the earlier curricula followed as far as possible the set traditional 4-year classical course with emphasis on Latin and Greek. Ten years ago, however, foreign languages began to take the place of the ancient languages and science commenced to be recognized. Inadequate support of the colleges made it difficult to furnish properly equipped laboratories for the teaching of the sciences. There was likewise a lack of negro teachers in sciences who had been trained according to modern methods with genuine experience in laboratory procedure. But with the development of the college programs in technical fields their work has been materially strengthened in science and placed on a genuine scientific basis. Laboratories have been established in chemistry, biology, physics, and other natural sciences. The arts and science curricula of practically all the institutions include courses in the different sciences, while in the case of one college a special science division has been established. Within the past few years many of the institutions have been able to obtain instructors in the several sciences who are graduates of the leading northern universities and who are capable teachers. Under their direction the place of science in the general curriculum has been firmly entrenched. It is the present tendency in the negro land-grant colleges to make the arts and sciences unit the general service division for teacher-training and technical departments, which should be encouraged. However, these institutions can not meet their objectives as agricultural and mechanical colleges providing higher education for the industrial classes if the liberal arts curriculum is emphasized to the detriment of practical education.

Teacher training has developed into one of the foremost educational functions of the negro land-grant colleges. This is largely due to the specific demand of the Southern States for the preparation of teachers for the negro public schools. Enrollments in the elementary schools for negroes in the 17 Southern States and the District of Columbia have increased from 1,944,068 in 1918 to 2,180,942 in 1928, a gain of 236,874, or 12.2 per cent. Negro students attending high schools have also increased from 19,504 in 1918 to 93,329 in 1928, the gain being 73,825, or 378 per cent. Responsibility for supplying trained teachers for this tremendous increase in public-school enrollments has fallen to a considerable extent on the negro land-grant colleges.

For the purpose of obtaining more accurate information on this subject a special inquiry was conducted into the supply and demand for negro public-school teachers in the different subject-matter fields.

The data furnished by 14 land-grant institutions show that there is an undersupply of teachers of vocational agriculture in Alabama, Arkansas, Georgia, Louisiana, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia. With the exception of South Carolina and Virginia, all of these States are also confronted with a shortage of home economics teachers. The same States are likewise undersupplied with teachers of trades and industries, except in Louisiana and Virginia, where a balance between the demand and supply exists. There is an undersupply of science teachers in Arkansas, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Texas. A shortage of negro high-school teachers of liberal arts subjects exists in Arkansas, Louisiana, Mississippi, North Carolina, and South Carolina, while in Alabama, Georgia, Missouri, Oklahoma, Tennessee, Texas, Virginia, and West Virginia the supply is sufficient to meet the existing demands. The States of Alabama, Arkansas, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and West Virginia are undersupplied with teachers of commercial subjects. A similar situation exists with regard to teachers of physical education both for girls and boys in Alabama, Arkansas, Louisiana, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Texas, and West Virginia. The supply of elementary school teachers meets the demand in most of the States. Delaware, Mississippi, South Carolina, and Virginia are the exception where a shortage is found. Oklahoma and Texas have an oversupply of elementary public-school teachers.

As a result of the situation just presented the development of teacher-training programs in all the fields by the negro land-grant colleges is of primary importance. At present 10 of the institutions offer 4-year teacher-training curricula leading to a bachelor's degree, while the remaining 7 offer 2-year normal and vocational education courses. These curricula are largely governed by the standards set up by the State boards of education for the granting of State teachers' certificates. Three general types of certificates are given to graduates, elementary and primary school certificates, high-school certificates, and vocational-teaching certificates. The teacher-training work is on a fairly high level in most of the colleges, due to the enforcement of the requirements of the State board of education through surveys and inspections, but in a number of cases where 2-year normal courses are conducted and where no examinations are made by the State board the programs are poorly organized and the instruction is not of the best type.

Other curricula of a college grade offered by the negro land-grant colleges include fine arts, music, and physical education. Three institutions offer music courses leading to bachelor's degrees and one includes fine arts in its academic program. There is one college that offers a curriculum in physical education leading to a bachelor's degree. Special services designed to meet the particular needs of the negro community or the negro population of the State are conducted by several colleges. In two cases courses in nurse training and health are offered while in another an institute for the blind is operated. General extension and correspondence courses are conducted by nine colleges, four of which carry on agricultural and home economics extension on a limited scale.

Subcollegiate Education

The principal education activities of the negro land-grant colleges have been concentrated in the fields of secondary and elementary education. While a tendency has developed within recent years to eliminate the high schools and elementary schools or to limit them to demonstration teaching, all the institutions except one maintain secondary schools and 14 out of the 17 operate elementary schools. The latter are largely conducted for practice teaching. One institution, the Prairie View State Normal and Industrial College of Texas, conducts only a single subcollegiate course which includes the last grade of high school.

Secondary education provided by the negro land-grant colleges is on an extensive scale, a wide variety of practical, vocational, and industrial courses being offered in addition to the regular high-school curricula. Thirteen institutions have organized their secondary work on the basis of the 4-year high school. In three others junior and senior high schools are conducted, the junior high school combining the seventh, eighth, and ninth grades, and the senior high school being composed of the tenth, eleventh, and twelfth grades. Colleges operating junior and senior high schools are the State Agricultural and Mechanical Institute of Alabama, Florida Agricultural and Mechanical College, and Georgia State Industrial College.

An important phase of the secondary instruction given in the colleges is vocational training as provided by the Smith-Hughes Act. Four-year vocational courses in agriculture are given in 11 institutions under the terms of this Federal law. Four colleges also offer 4-year vocational courses in trades and industries and five others give similar courses in home economics. It is through unit courses in manual training, however, that the colleges are rendering the greatest service in preparing the members of the Negro race for trades and industries in the Southern States. This work is particularly important since the public high schools for negroes have not yet been sufficiently expanded to assume this type of education on a large scale. In Table 10 are presented the colleges with the trades industries of a subcollegiate grade given in them.

TABLE 10.—*Trades and industries of subcollegiate grade taught in negro land-grant colleges*

Institution	Agriculture	Home economics	Auto mechanics	Brick masonry and plastering	Carpentry and woodworking	Blacksmithing and iron working	Electricity	Printing	Furniture repairing	Plumbing	Shoe-making and leather work	Tailoring	Painting	Shorthand and typewriting	Mechanical drawing	Stationary engineer and shop work	Broom and mattress making	Laundry and dry cleaning	Wagon and carriage building
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
State Agricultural and Mechanical Institute of Alabama			×					×			×	×							
Agricultural, Mechanical, and Normal College of Arkansas	×		×	×	×					×					×	×			
State College for Colored Students of Delaware				×	×		×			×			×						
Florida Agricultural and Mechanical College	×	×	×	×	×		×	×		×		×	×						
Georgia State Industrial College	×	×	×	×	×					×	×		×	×	×				
Kentucky State Industrial College	×	×		×	×			×	×		×	×				×			
Southern University and Agricultural and Mechanical College of Louisiana	×	×	×	×	×	×		×				×							
Princess Anne Academy of Maryland	×		×		×	×		×											
Alcorn Agricultural and Mechanical College of Mississippi	×	×			×						×		×						×
Lincoln University of Missouri		×			×										×	×			
Agricultural and Technical College of North Carolina	×	×	×	×	×	×			×	×	×	×				×			
Colored Agricultural and Normal University of Oklahoma	×	×	×		×		×	×			×	×							
State Agricultural and Mechanical College of South Carolina	×		×	×	×	×	×				×	×	×						
Tennessee Agricultural and Industrial State Teachers College	×		×	×	×		×								×				
Prairie View State Normal and Industrial College of Texas			×	×	×	×	×	×		×	×	×				×	×	×	
Virginia State College for Negroes	×	×	×	×	×		×					×							
West Virginia State College	×		×	×				×							×	×			

A total of 127 different manual training courses are offered in the 17 negro land-grant colleges. They vary from one to three years in length and include nearly every type of secondary vocational education.

Thirteen of the institutions have courses in the various phases of agriculture; 9 in home economics; 13 in auto mechanics; 12 in brick masonry and plastering; 15 in carpentry, woodworking, and cabinet-making; 5 in blacksmithing, forging, welding, and iron work; 7 in applied electricity, electrical repairing, electrical repair work, and radio; 8 in printing or linotype operating; 2 in furniture repairing and upholstering; 6 in plumbing, steam-fitting, heating, and ventilating; 8 in shoe-making and shoe-repairing; 9 in tailoring; 5 in painting; 5 in architectural and mechanical drawing; 1 in typewriting and shorthand; 6 in stationary engineering and machine shop work; 1 in broom and mattress making; 1 in laundry and dry-cleaning; and 1 in wagon and carriage making. A considerable number of special vocational courses are offered under each of these headings.

As already explained, the negro land-grant colleges are performing a distinct service in furnishing vocational and trade education of the secondary grade since the negro high schools of the different States are failing to provide it. As soon as the public schools assume this responsibility the colleges should abandon such work and concentrate their aims on higher technical courses of a college level. By adopting this policy the institutions will become in reality agricultural and mechanical colleges of the land-grant type in accordance with the terms of the Federal law under which they were created.

Teaching Staff

Large and comprehensive programs of college curricula in agriculture, home economics, mechanic arts, education, and arts and sciences can only be effectively prosecuted with an adequate and well-trained teaching staff. For many years the negro land-grant colleges have suffered both from a shortage of teachers and a lack of properly qualified teachers.

According to the information submitted in the survey, there were 381 members of the staff teaching college classes in 1928. Because of confusion in the reports it is difficult to ascertain the exact number of the teachers who in addition to their college work are compelled to give instruction in the secondary schools conducted by the institution. An estimate fixes the number at 141, or approximately 37 per cent.

The most important measure of the efficiency of the modern college is the number of full-time teachers. The generally accepted standard for the 4-year college is a minimum of eight full-time college instructors. In the case of the negro land-grant colleges, but eight of the institutions conducting senior colleges meet this requirement. Similarly the minimum number of college teachers for a junior college is five full-time college teachers. None of the junior colleges meet this standard. If the work of the negro land-grant institutions is to be placed on a college basis and if they are to receive recognition from the accrediting agencies, it is essential that steps be taken at once to increase the number of their teaching staff. The plan of expanding their curricula to include a wide variety of subject-matter fields without teachers to furnish adequate instruction, such as many of the colleges have adopted, can only result in lowering standards.

In order to meet the norms set up for the modern college, not only must an adequate staff be provided, but also a properly qualified staff. While the qualifications of the faculties of the negro land-grant colleges have undergone an improvement during the past few years, there is still a considerable proportion of the teachers who are not sufficiently trained for the work they are attempting to perform. Of the total of 381 college teachers in the institutions, 99, or 26 per cent, hold graduate degrees, 232, or 61 per cent, hold only first degrees, and 50, or 13 per cent, hold no degrees. In the case of a large number of the staff members with first degrees, it was found that these teachers are pursuing graduate work leading to higher degrees for the purpose of improving their qualifications. Because of the importance of proper training for the faculties of the institutions, the survey conducted a detailed inquiry into the subject. In Table 11 is presented the number of teachers by institutions with their training in the various subject-matter fields in which they teach.

TABLE 11.—*Training of teachers in negro land-grant colleges in various subject-matter fields*

Institution	Agriculture: First degrees	Agriculture: Graduate degrees	Agriculture: No degrees	Mechanic arts: First degrees	Mechanic arts: Graduate degrees	Mechanic arts: No degrees	Home economics: First degrees	Home economics: Graduate degrees	Home economics: No degrees	English: First degrees	English: Graduate degrees	English: No degrees	Foreign languages: First degrees	Foreign languages: Graduate degrees	Foreign languages: No degrees	Mathematics: First degrees	Mathematics: Graduate degrees	Mathematics: No degrees	Natural sciences: First degrees	Natural sciences: Graduate degrees	Natural sciences: No degrees	Social sciences: First degrees	Social sciences: Graduate degrees	Social sciences: No degrees	Education, psychology, philisophy: First degrees	Education, psychology, philisophy: Graduate degrees	Education, psychology, philisophy: No degrees
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
State Agricultural and Mechanical Institute of Alabama							1			2						1			1			3			4		
Agricultural, Mechanical, and Normal College of Arkansas	1					2	1		3	1			1			1		1	1	1		3	1		1		2
State College for Colored Students of Delaware	1						1	1		1			1			1			2		1	1			1		
Florida Agricultural and Mechanical College	3		4	2		2	2			2	1		1			1	1		2			3	2		3	1	
Georgia State Industrial College	2			1			1		1	2						1			2			1		1	1		
Kentucky State Industrial College	2		1				1		1	1		1	1			1			2			1		1	5	1	
Southern University and Agricultural and Mechanical College of Louisiana	5	1	1				2	1	4	4	1		2	1		3			3			3	1		4	1	1
Princess Anne Academy of Maryland	1		1						1	1		1	1	1		1	1				1	1			1	1	
Alcorn Agricultural and Mechanical College of Mississippi	6						2		1	3	2					1			3	1		1			3	1	
Lincoln University of Missouri							2	1		1	1		3	2		1	1		3	3		2	2		2	2	
Agricultural and Technical College of North Carolina	7		3	4						3	2		1	1		3			3	1		3	2		3	1	
Colored Agricultural and Normal University of Oklahoma	3			1					1	4			1			1			3	1		2	1		2	2	
State Agricultural and Mechanical College of South Carolina	8	1	1	3	1	1	3	1	4	2			1			1	1		3			2	2		3	1	
Tennessee Agricultural and Industrial State Teachers College	2						1			3			1		1	2	1		3	2		3	2		4	2	
Prairie View State Normal and Industrial College of Texas	6			7			4		3	6	1		1			3			3	1		6	2		7	1	
Virginia State College for Negroes	5		2	2	1		3			4	3		3	2		2	1		6	2		4	4		3	2	
West Virginia State College	2		1	1	1		3	1	1	4	4		2	2		2	2		3	2		6	6		4	3	
Total	54	2	14	21	3	5	27	5	20	44	15	2	20	9	1	26	8	1	43	14	2	45	25	2	51	19	3

As shown by the tabulation, there are 68 teachers in agriculture in 15 of the colleges. Only two of them hold graduate degrees. There are 54 others who hold bachelor's degrees, while 14 of them hold no degrees. Since preparation for the teaching of agriculture requires scientific training of the highest order, it is evident that instructors without any degrees or holding only a bachelor's degree are not in a position to give instruction of a collegiate grade in this subject-matter field. The result is that few of the institutions are able to provide a thorough training in the science of agriculture. A solution of the situation depends largely on the encouragement of the present teachers to secure additional training by doing graduate work in northern white land-grant colleges. In the employment of new staff members in agriculture, the institution should select only teachers with graduate degrees and advanced training. Such a policy should be persistently pursued until each of the negro land-grant colleges has secured a highly trained agricultural faculty.

Qualifications of the teaching staff in mechanic arts are also below the standards required for the modern college. Of the 26 teachers in 9 institutions, 3 have graduate degrees, 21 have bachelor's degrees, and 5 hold no degrees. No doubt the lack of training of the faculty in the field of mechanic arts is responsible for the failure of many of the colleges to offer college curricula. The fact that much of the work is devoted to secondary courses in trades and industries and that the instructors are compelled to teach both college and secondary classes has made it difficult to find well-qualified teachers interested in directing two divergent educational programs. If the mechanic arts curricula is to be conducted on a college level in the negro land-grant institutions, it is necessary that teachers with technical training and graduate degrees be placed on the staff. An opportunity exists for improving the members of the present faculty by encouraging them to secure advanced degrees.

The training of the home economics teaching staffs in 16 negro land-grant colleges offering curricula in this field is generally inadequate. With a total of 47 home economics teachers, only 5 hold graduate degrees and 27 bachelor's degrees. There are 20 teachers, or approximately 43 per cent, who have no degree, a large proportion considering that much of the home economics instruction consists of teacher training. Instructors in home economics must have a high training along special technical lines, such as foods, clothing, home management, and other fields, if they are to conduct collegiate work. It is obvious that many of the teachers at present giving instruction in the institutions are lacking in the necessary qualifications. A great effort should be made by the negro land-grant colleges to strengthen the training of their college staffs in home economics. This field is becoming more and more important in the development of negro home life and in the betterment of the negro civilization. In the preparation of home economics teachers a staff of highly qualified members should be provided.

Teachers of English are well trained in most instances. There is a total of 46 English teachers in the 17 colleges. Of this number 15 have graduate degrees, 44 bachelors' degrees, and only 2 hold no degrees. Twelve teachers of English with first degrees are pursuing graduate work in recognized universities for the purpose of securing advanced degrees. A similar favorable situation is found with respect to the foreign-language teaching staffs of the 14 institutions conducting such departments. Table 11 discloses that there are 21 teachers of foreign languages of whom 9 have secured graduate degrees and 20 hold bachelors' degrees. Only one foreign-language teacher in the entire list of institutions is without a degree. In three cases the teachers have degrees or diplomas from foreign universities, including Sorbonne in Paris, University of Dijon, University of Marseilles, and Oxford University.

While there are a number of well-qualified teachers of mathematics included in the faculties of the negro land-grant colleges, opportunities still exist for raising the standards of the instructors in this field. Out of the 27 teachers of mathematics, 8 hold graduate degrees and 26 hold bachelors' degrees. There is one teacher in this subject-matter field who has no degree. Instructors holding only the bachelor's degree should be encouraged to secure advanced training.

As already indicated, the institutions have made a special effort to develop their curricula in the natural sciences within the past few years. The result is that the teaching staff in the sciences are generally well trained. The number of science teachers in the 17 colleges totals 45. Fourteen hold graduate degrees, 43 have obtained first degrees, and 2 are without degrees. To provide instruction of a collegiate grade in the natural sciences, specialization is required. Every effort should be made, therefore, to improve further the staff by arranging for the teachers holding only first degrees to take advanced and graduate study in their particular fields.

Teachers in social sciences in the negro land-grant colleges are better qualified and more highly trained than any other subject-matter group. All of the 47 social-science instructors with 2 exceptions have obtained bachelors' degrees, and there are 25 who hold graduate degrees. The higher degrees were obtained in leading northern universities. The training of the members of the teaching staffs in education, psychology, and philosophy is partly satisfactory.

Of the 54 teachers in these subjects, 19 hold graduate degrees and 51 bachelors' degrees. Only three are reported without any degree. Considering the fact that much of the work of the colleges is concentrated in teacher training, there are too many teachers with only first degrees. Arrangements should be made not only to provide additional training for the present staff, but also to employ new teachers of higher qualifications.

The foregoing review has pointed out in more or less detail the shortcomings of the teaching organizations of the negro land-grant colleges in the various subject-matter fields. In some cases the inadequacy of the training of the staff justifies its complete reorganization before any program of placing the work on a full collegiate basis can be effected. In other instances replacements of inefficient and poorly qualified teachers will have to be made. One essential is that the institutions adopt a definite policy setting a minimum standard of training in the employment of new staff members in the future. No teachers should be added to the faculties unless they hold at least a master's degree in their specialized field.

Library

The library is the most valuable asset of the modern college next to an efficient and qualified teaching staff. It constitutes a service branch for all the academic departments and educational units of the institutions.

To meet the requirements and standards set up by accrediting agencies, a senior college library should contain not fewer than 8,000 well-selected volumes and a junior college at least 2,500 volumes. The books in the library should be of a type to furnish collateral reading for the courses of study offered in the colleges. A well-trained librarian should also be employed.

Although improvements are being made in the libraries of the negro land-grant institutions, many of them are inadequate and insufficient to meet their academic needs. Of the 17 colleges, only 13 filed reports in the survey on the status of their libraries. In several cases the information furnished was confused and conflicting, indicating that satisfactory records on the libraries are not being kept. Data on the income and expenditures of the libraries in a number of instances supplied in the survey were out of harmony with official figures included in the regular annual reports made to the Office of Education by the land-grant colleges. Table 12 presents the number of volumes and pamphlets in the libraries in 1928, together with the additions through purchase and other means.

TABLE 12.—*Number of volumes and pamphlets in libraries of negro land-grant colleges with additions in 1928*

Institution	Number of volumes	Number of pamphlets	Number of volumes added to library by— Purchase	Binding periodicals	Gifts	Other additions
1	2	3	4	5	6	7
State Agricultural and Mechanical Institute of Alabama	7,000	3,050	77	--------	6	--------
Agricultural, Mechanical, and Normal College of Arkansas	700	12	--------	--------	--------	--------
State College for Colored Students of Delaware	2,300	1,064	--------	--------	--------	--------
Georgia State Industrial College	--------	30	--------	--------	126	50
Alcorn Agricultural and Mechanical College of Mississippi	2,633	1,929	150	--------	19	--------
Lincoln University of Missouri	3,480	1,000	1,000	--------	--------	--------
Agricultural and Technical College of North Carolina	5,733	550	338	--------	289	--------
Colored Agricultural and Normal University of Oklahoma	4,750	1,260	825	--------	--------	400
State Agricultural and Mechanical College of South Carolina	4,000	--------	500	--------	1	--------
Tennessee Agricultural and Industrial State Teachers College	4,000	3,790	1,040	62	97	--------
Prairie View State Normal and Industrial College of Texas	8,935	2,875	335	--------	--------	--------
Virginia State College of Negroes	9,264	379	1,477	209	32	--------
West Virginia State College	13,187	28,000	1,875	--------	--------	125
Total	65,982	45,939	7,617	271	570	575

The total number of volumes in the libraries of the 13 colleges shown in the tabulation amounts to 65,982. The number in the individual institutions varies from 13,187 to 700. There are only three institutions operating as senior colleges that have libraries with 8,000 volumes, the recognized standard number for a college of this type. One institution conducting a junior college has 7,000 volumes in its library, an amount in excess of the standard requirement of 2,500 volumes. Quite a large collection of pamphlets is found in the negro land-grant college libraries, the number for 1928 being 45,939. Of this total, 28,000 pamphlets, or 60 per cent, are found in a single institution, the West Virginia State College. Pamphlets in the remaining colleges range from 3,790 to 12 in number.

Volumes added to the libraries of the colleges shown in Table 12 amounted to 9,033, there being 7,617 secured by purchase, 271 by binding periodicals, 570 by gifts, and 575 by other additions. To build up the libraries it is essential that regular annual purchases of volumes be made. Dependence upon gifts is an unstable means of securing books, and in many instances the books received through such sources do not meet the needs of the colleges. Three institutions reported no purchases of books in 1928, while in the 10 others the number of volumes purchased varied from 1,875 to 77.

One of the principal handicaps with which the libraries are confronted is the failure of the colleges to segregate their finances from the other institutional funds. Apparently no regular annual library budget is maintained. The result is that accurate figures on the amount of annual income for library purposes are not available. A similar situation exists with regard to expenditures. It is obvious that a library meeting college standards and fulfilling modern requirements can not be built up when no separate record of its finances is kept. In the survey, only 10 of the 17 institutions were able to supply figures on the income of their libraries. The remainder reported that such data were not available. In Table 13 is shown the funds available for library purposes from different sources in 1928.

TABLE 13.—*Income available for libraries in negro land-grant colleges in 1928*

Institution	Direct State appropriation	State funds allotted by institution	Tuition, student fees	Library fines for lost books	Other revenue	Total
1	2	3	4	5	6	7
Georgia State Industrial College		$750				$750
Southern University and Agricultural and Mechanical College of Louisiana	$9,250			$18	$1,225	10,493
Alcorn Agricultural and Mechanical College of Mississippi		303				303
Lincoln University of Missouri	4,080			10		4,090
Agricultural and Technical Colleage of North Carolina	894	1,469	$408	5		2,776
Colored Agricultural and Normal University of Oklahoma	2,200		517	12		2,729
State Agricultural and Mechanical College of South Carolina	1,200	128	1,250			2,578
Prairie View State Normal and Industrial College of Texas	3,950	4,200		8		8,158
Virginia State College for Negroes		5,250		144		5,394
West Virginia State College	3,500					3,500
Total	25,074	12,100	2,175	197	1,225	40,771

According to the tabulation the total income of the libraries in the 10 colleges was $40,771, of which $25,074 consisted of direct State appropriations, $12,100 of State funds allotted by the institutions, $2,175 of tuition and student fees, $197 of library fines for lost books, and $1,225 of funds derived from other purposes. By far the best method of financing the libraries is through direct State appropriations. When the funds are furnished in this way they are available for expenditure only on the library and can not be used for other purposes. It is also possible for the institutions to make specific appeals to State legislature for library support.

In 1928 seven negro land-grant colleges received direct State library appropriations, the amounts varying from $9,250 to $894. The library income was made up either wholly or in part of State funds allotted by the colleges in six cases. Two institutions made allotments as high as $5,250 and $4,200, while the remaining amounts were small. There are three institutions assisting in the support of their libraries by levying student fees, the income from this source being $1,250 in one college and $517 and $408 in two others. Fines for lost books furnish little, if any, revenues for the maintenance of the libraries, most of the receipts being expended for replacements.

The most effective method of appraising the libraries is by an analysis of the expenditures. In Chapter II, dealing with control and finance, attention has already been called to the low proportion of total expenditures made for library purposes. Of the 17 institutions only 12 were able to furnish figures for 1928. In four instances the colleges reported that the information was not available. One institution supplied figures greatly in excess of figures included in its official reports to the Office of Education. Table 14 contains the 1928 library expenditures classified under different headings.

TABLE 14.—*Expenditures for libraries in negro land-grant colleges in 1928*

Institution	For salaries	For wages, student assistants, and others paid on hourly basis	For books	For periodicals	For binding	For equipment other than books	Total
1	2	3	4	5	6	7	8
State Agricultural and Mechanical Institute of Alabama	$700		$167	$40			$907
Agricultural, Mechanical, and Normal College of Arkansas	1,312						1,312
Georgia State Industrial College			200				200
Southern University and Agricultural and Mechanical College of Louisiana	1,250	$288	5,000	270		$4,000	10,808
Alcorn Agricultural and Mechanical College of Mississippi		90	72	132		10	304
Lincoln University of Missouri	1,800	280	3,445	200			5,725
Agricultural and Technical College of North Carolina	1,500	90	982	200			2,772
Colored Agricultural and Normal University of Oklahoma	1,100	186	934	76			2,296
State Agricultural and Mechanical College of South Carolina	1,200	128	804	214		186	2,532
Prairie View State Normal and Industrial College of Texas	2,300	136	1,230	120	$129	242	4,157
Virginia State College for Negroes	1,450	936	1,816	389	100	49	4,800
West Virginia State College	1,800	840	3,250	250	87		6,227
Total	14,412	2,974	17,900	1,891	376	4,487	42,040

Expenditures for library purposes in the 12 colleges filing reports in 1928 totaled $42,040. There was $14,412 expended for salaries, $2,974 for wages of students working on a per diem basis, $17,900 for books, $1,891 for periodicals, $376 for binding, and $4,487 for equipment. The highest expenditure made for salaries in any single college was $2,300 where both a librarian and an assistant librarian are employed, one receiving $1,400 and the other $900. Two others expended $1,800 each for salaries, the librarian receiving this amount annually in compensation. Expenditures for the salaries of the librarian range from $1,500 to $700 in the remaining institutions.

Nine of the colleges reported expenditures for wages to student assistants paid on a part-time or hourly basis. The amounts varied from $840 to $90 for the year.

As shown by the table fairly large expenditures were made for books in a number of the colleges while in other cases the expenditures for this purpose were extremely low. One college expended $5,000 to purchase books and two others expended $3,445 and $3,250. Expenditures in five institutions ranged from $1,816 to $804 for books, while three colleges expended less than $200. Among the most valuable services rendered by the librarians is through their lists of current periodicals. The number of paid subscriptions varies, although in some cases from 50 to 125 periodicals are purchased. Ten colleges made expenditures for this purpose in 1928, the amounts ranging from $389 to $400. It is the practice of only a few negro college libraries to expend library funds for bindings, three institutions reporting binding expenditures. Of particular importance in improving the libraries is the installation of adequate equipment, yet little apparently is being done to accomplish this object. In 1928 expenditures for equipment in one institution amounted to $4,000, but in the other colleges either no expenditures were made or the amounts were so small as to be practically negligible.

In order to develop a college library of standard grade, it is essential that the services of a trained and experienced librarian be secured. Only 11 of the negro land-grand colleges made reports on this subject in the survey.

According to the returns, two librarians have secured masters' degrees and five others hold bachelors' degrees. The other librarians have no degrees. With regard to actual library experience, six librarians have had 1 year's experience, another 2 years, a third 3 years, a fourth 7 years, and a fifth 10 years. The librarians of 3 institutions were not experienced in library work upon assuming their present positions. There are two librarians holding bachelors' degrees who are pursuing graduate work while two others without degrees are attending library science schools. The librarians of five colleges report that they are able to read both the French and German languages. Three others report that they read French.

It is obvious from the foregoing presentation that one of the important duties devolving upon the administrative authorities of the negro land-grant colleges is the strengthening and upbuilding of their libraries and library services. The first step should be the complete reorganization of the methods of library budget making. Income and expenditures for library purposes should be segregated from other institutional funds in order that a proper appraisal may be made of them. The outstanding deficiency of the libraries is the lack of books both for general and reference reading. A trained librarian should be employed in each institution who is sensitive to the needs of both the faculty and student body. Such services can only be secured by the payment of an adequate salary.

Chapter IV.—Entrance Requirements, Student Enrollments, and Degrees

The effectiveness of an educational institution is largely measured by the number of students who take advantage of its offerings. No appraisal of the negro land-grant colleges is complete, therefore, without a thorough analysis of its student body.

An important question affecting not only the size of the student body but also its character is the requirement set up for college entrance and the methods adopted for the admission of students. Due to the lack of standard and accredited public high schools for negroes in the Southern States, considerable confusion exists in the practices of the different colleges in admitting students. The general requirement for admission is 14 or 15 high-school units or credits. In an attempt to ascertain the methods by which students were admitted, the survey presented specific questions to the institutions. Returns were received from only 13 out of the 17 negro land-grant colleges. The results of this inquiry are presented in Table 15.

TABLE 15.—*Number of students and methods of admission to negro land-grant colleges in 1928*

Institution	Admitted by certificate			Admitted by examination		
	Men	Women	Total	Men	Women	Total
1	2	3	4	5	6	7
State Agricultural and Mechanical Institute of Alabama	7	4	11			
Agricultural, Mechanical, and Normal College of Arkansas	28	32	60			
State College for Colored Students of Delaware	4	1	5			
Georgia State Industrial College	26	25	51			
Southern University and Agricultural and Mechanical College of Louisiana	18	36	54			
Princess Anne Academy of Maryland	10	2	12			
Alcorn Agricultural and Mechanical College of Mississippi	26	18	44	2	1	3
Lincoln University of Missouri	36	55	91			
Agricultural and Technical College of North Carolina	85		85	[1] 7		[1] 7
State Agricultural and Mechanical College of South Carolina	31	57	88			
Prairie View State Normal and Industrial College of Texas	97	501	598	[1] 34	[1] 116	[1] 150
Virginia State College for Negroes	54	39	93			
West Virginia State College	[1] 96	[1] 140	[1] 236			
Total	518	910	1,428	43	117	160

[1] Some students admitted by combination of examination and certificate.

The vast majority of the college students are admitted on a basis of the presentation of high-school certificates. According to the tabulation, nine colleges admit all their students exclusively by this method. One institution has adopted the policy of admitting some of its students by examination, while three others admit them by a combination of examination and certificates. The latter plan has been put into effect largely because the credentials furnished by applicants for admission are unsatisfactory, and it is necessary to hold examinations in specific subjects in which the students are deficient. In 1928 the total number of students admitted in the 13 colleges reported by certificates was 1,428, of which 910 were women and 518 men. There was a total of 160 admitted by examination or combination of examination and certificates, 117 being women and 43 being men.

It is evident from the foregoing that most of the institutions admit students by high-school certificates rather than entrance examinations or other methods, but a significant question is whether the secondary schools from which the certificates are accepted have been recognized by some standard accrediting agencies. Information on the point was not furnished from three institutions. In the case of four colleges only students holding certificates from accredited high schools are admitted unless they successfully pass entrance examinations. In Table 16 are shown the institutions admitting students from nonaccredited secondary schools, together with the requirements for admission of students from defunct institutions.

TABLE 16.—*Conditions of acceptance of students from nonaccredited high schools*

Institution	Students admitted from nonaccredited high schools on certificate	Students admitted from nonaccredited high schools with required units	Requirements for students with advanced standing from a defunct institution
1	2	3	4
State Agricultural and Mechanical Institute of Alabama.	×	×	Extra work required.
Agricultural, Mechanical, and Normal College of Arkansas.	....	×	Certified records required or an examination.
State College for Colored Students of Delaware.	....	[1] ×	"B" grade required in all contingent subjects.
Southern University and Agricultural and Mechanical College of Louisiana.	....	×	Examination required and proof of ability to do acceptable work in the course approved by the dean.
Kentucky State Industrial College......	×	×	Admitted; but quality of classroom work is considered.
Princess Anne Academy of Maryland...	×	....	Admitted; but must show ability to do satisfactory work for a limited period.
Lincoln University of Missouri.........	....	....	Admitted upon an affidavit.
Agricultural and Technical College of North Carolina.	....	[2] ×	Admitted on examination.
Colored Agricultural and Normal University of Oklahoma.	....	....	Must show 14 units of high-school work.
State Agricultural and Mechanical College of South Carolina.	....	....	Admitted, on basis of reports of officer who can verify facts regarding student.
Tennessee Agricultural and Industrial State Teachers College.	×	×	Admitted on examination.
Prairie View State Normal and Industrial College of Texas.	....	....	Admitted; but accredited work must be done.
Virginia State College for Negroes.......	....	....	Admitted on examination.
West Virginia State College............	....	....	Admitted on probation for 1 semester.

[1] Each case considered individually.

[2] Work must be above average.

As indicated by the compilation, four of the colleges admit students from nonaccredited high schools upon certificates. There are seven other institutions that accept students from nonaccredited high schools who have the required number of units for admission. In one instance, however, each particular application is considered individually. In another, it is stipulated that the work of the student in the nonaccredited high school must be above the average grade. The table further shows that there is considerable variation in the regulations dealing with the admission of students with advanced standing from defunct institutions. Five colleges require the applicant to pass examinations. In five others, the applicants are admitted providing they are able to show a good quality of work. Certified records or an examination are required in 1 college, an affidavit in 1, extra work in 1, and reports of former officers of the defunct institution in 1. The student must show that he has earned 14 high-school units in another case.

Admission of students from nonaccredited high schools is found more prevalent in the Southern States where the development of secondary education for negroes is still retarded. Not only is there a shortage of negro high schools but in a number of instances no official accrediting agency has been set up. Every effort should be made by the negro land-grant colleges to make their own temporary classification in such States until the number and quality of high schools warrant the limitation of entrants to applicants from accredited schools. The institutions should also assist in strengthening the high schools by a close scrutiny of the candidates for admission and by a careful check for their performance in college. Deficient students should be reported to the principals of the high schools from which they came with the subject in which they are poorly prepared.

However, within a short time negro colleges as well as high schools will be able to prepare themselves for official accrediting by the agency being set up by the Southern Association of Colleges and Secondary Schools. This long-expected service should accelerate the development of negro land-grant colleges and bring ultimately all negro universities and colleges to the same level of standards required of universities and colleges for whites.

Enrollments

Enrollment of students of all types in the 17 negro land-grant colleges for the year 1928 totaled 17,556.

The number of college students was 3,691; of secondary students, 4,124; of elementary students, 2,008; of summer-session students, 6,459; and of extension students, 1,274. Attention has already been called to the fact that the noncollegiate students enrolled in the institutions exceed the college students. Of the total resident enrollment, exclusively of summer session, the proportion of collegiate students was 37.5 per cent, of secondary students 41.9 per cent, and of elementary students 20.6 per cent. The enrollment of noncollegiate students, therefore, was 62.5 per cent as compared with a college enrollment of 37.5 per cent. The secondary enrollment also exceeds the collegiate enrollment by 4.4 per cent. Of the grand total of students attending the institutions, 12,265 were women and 5,291 were men. In Table 17 are presented the college students by class and sex enrolled in the 17 colleges.

TABLE 17.—*College students enrolled by years and sex in negro land-grant colleges in 1928*

Institution	First year		Second year		Third year		Fourth year		Total (including special students)[1]		Grand total
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	
1	2	3	4	5	6	7	8	9	10	11	12
State Agricultural and Mechanical Institute of Alabama	12	4	7	3					19	7	26
Agricultural, Mechanical, and Normal College of Arkansas	12	10	4	8					16	20	36
State College for Colored Students of Delaware	1	4							3	18	21
Florida Agricultural and Mechanical College	23	26	13	21	4	4	14	3	54	54	118
Georgia State Industrial College	21	13	7	3	4	2	3		70	36	106
Kentucky State Industrial College	33	87	14	20	3	2		1	53	110	163
Southern University and Agricultural and Mechanical College of Louisiana	17	33	14	27	2	8	5	4	38	72	110
Princess Anne Academy of Maryland	10	2	1	4					11	6	17
Alcorn Agricultural and Mechanical College of Mississippi	33	22	16	4	12	8	16	3	76	37	113
Lincoln University of Missouri	35	56	20	37	11	11	11	5	77	109	186
Agricultural and Technical College of North Carolina	82		30		24		14		157		157
Colored Agricultural and Normal University of Oklahoma	31	88	21	68	7	10	11	2	70	168	238
State Agricultural and Mechanical College of South Carolina	31	57	30	48	27	4	25	6	113	115	228
Tennessee Agricultural and Industrial State Teachers College	82	236	37	81	29	43	29	32	177	393	570
Prairie View State Normal and Industrial College of Texas	90	282	38	100	40	28	31	52	235	503	738
Virginia State College for Negroes	50	106	30	108	23	34	4	20	109	275	384
West Virginia State College	97	143	66	127	44	83	18	36	218	272	490
Total	660	1,169	348	659	230	247	181	164	1,496	2,195	3,691

[1] Excluding duplicates.

An examination of the compilation discloses that out of the 3,691 collegiate students, 1,829 are enrolled in their first year, 1,007 in their second year, 477 in their third year, and 345 in their fourth year. Three institutions conducting junior colleges have no enrollments in the third and fourth years. The figures show that of the total number there are 609 more women students attending the colleges than men. A significant fact is that the enrollment of women is in excess of men students in both the first and second years, but in the third and fourth years there are more men students. This indicates that the men students remain in college to secure their degrees while a large number of women drop out at the end of the second year after completing their normal-school training. The total figures given in the tabulation include special students but exclude duplicates. Table 18 shows the enrollments in the secondary and elementary grades by sex.

TABLE 18.—*Subcollegiate students enrolled in negro land-grant colleges in 1928*

Institution	Secondary grades			Elementary grades			Grand total
	Men	Women	Total	Men	Women	Total	
1	2	3	4	5	6	7	8
State Agricultural and Mechanical Institute of Alabama	65	67	132	110	111	221	353
Agricultural, Mechanical, and Normal College of Arkansas	120	146	266	31	41	72	338
State College for Colored Students of Delaware	54	90	144				144
Florida Agricultural and Mechanical College	97	151	248	85	120	205	453
Georgia State Industrial College	126	90	216	91	59	150	366
Kentucky State Industrial College	53	59	112	28	32	60	172
Southern University and Agricultural and Mechanical College of Louisiana	96	126	222	51	65	116	338
Princess Anne Academy of Maryland	51	59	110	12	13	25	135
Alcorn Agricultural and Mechanical College of Mississippi	257	162	419	119	81	200	619
Lincoln University of Missouri	75	90	165	36	50	86	251
Agricultural and Technical College of North Carolina	208		208				208
Colored Agricultural and Normal University of Oklahoma	57	134	191	15	10	25	216
State Agricultural and Mechanical College of South Carolina	182	216	398	59	58	117	515
Tennessee Agricultural and Industrial State Teachers College	102	211	313	9	12	21	334
Prairie View State Normal and Industrial College of Texas	75	217	292				292
Virginia State College for Negroes	153	337	490	328	306	634	1,124
West Virginia State College	87	111	198	41	35	76	274
Total	1,858	2,266	4,124	1,015	993	2,008	6,132

A conception of the preponderance of noncollegiate enrollments in the negro land-grant colleges is obtained by an examination of the compilation. All of the institutions have large enrollments of secondary students:

In two colleges the number ranges as high as 490 and 419. Two others have 398 and 313 secondary students. Of the remainder, there are two colleges with between 250 and 300 high-school students, four between 200 and 250, three between 150 and 200, and four between 100 and 150. Of the total secondary students, 2,266 are women and 1,858 are men, an excess of 408 women students. Fourteen of the seventeen negro land-grant colleges enroll elementary students, the number in the individual institutions varying from as high as 634 to 21.

While the elementary schools are designed for practice teaching and demonstration in most of the colleges, it is evident that where the enrollments are large they are being operated to supplement the work of local county schools. The institutions in some instances receive public funds to conduct the schools. Summer session and extension enrollments of the colleges are presented in Table 19.

TABLE 19.—*Students enrolled in summer session and extension classes in 1928*

Institution	Summer session			Extension classes		
	Men	Women	Total	Men	Women	Total
1	2	3	4	5	6	7
State Agricultural and Mechanical Institute of Alabama	5	58	63			
Agricultural, Mechanical, and Normal College of Arkansas	15	212	227			
State College for Colored Students of Delaware	5	47	52			
Florida Agricultural and Mechanical College	44	299	343	20	194	214
Georgia State Industrial College	35	224	259			
Kentucky State Industrial College	25	191	216	12	138	150
Southern University and Agricultural and Mechanical College of Louisiana	58	327	385	2	36	38
Alcorn Agricultural and Mechanical College of Mississippi	41	201	242			
Lincoln University of Missouri	33	115	148	30	89	119
Agricultural and Technical College of North Carolina	51	321	372	18	95	113
Colored Agricultural and Normal University of Oklahoma	103	643	746	25	112	137
State Agricultural and Mechanical College of South Carolina	31	325	356	17		17
Tennessee Agricultural and Industrial State Teachers College	95	769	864			
Prairie View State Normal and Industrial College of Texas	51	1,060	1,111	44	139	183
Virginia State College for Negroes	41	663	704	14	199	213
West Virginia State College	92	279	371	15	75	90
Total	725	5,734	6,459	197	1,077	1,274

The size of the enrollments in the summer session of the negro land-grant colleges is indicative of the important work being accomplished by the institutions in this branch of educational service. Students enrolled in the summer session for 1928 total 6,459, which exceeded the collegiate enrollment in the colleges by 1,768.

A great majority of the students attending the summer sessions are elementary school teachers studying to improve their training and qualifications as shown by the fact that women students numbered 5,734, as compared with 725 men students. The largest enrollment in the summer session at a single institution was 1,111, while another college enrolled 864 students, a third 746 students, and a fourth 704 students. Four other colleges had summer-session enrollments between 350 and 400 students, one between 300 and 350, one between 250 and 300, three between 200 and 250, one between 100 and 150, and two between 50 and 100.

There is only one negro land-grant college that does not conduct a summer session. As shown by the tabulation, 10 of the institutions conduct extension or correspondence courses, the enrollments ranging from 214 students to 17 in the different colleges. The number of women students amounts to 1,077 for the whole group, as compared with 197 men students. An interesting question in connection with the enrollments is the distance from which the students come to attend the colleges. The survey attempted to collect full data on the subject, but reports were received from only nine institutions. Enrollments of students according to distance from these colleges are presented in Table 20.

TABLE 20.—*Enrollment of students according to distance from institution in 1928*

Institution	Number of students living within—																			
	25 miles				25 to 50 miles				50 to 100 miles				100 to 150 miles				More than 500 miles			
	Men	Women	Total	Per cent	Men	Women	Total	Per cent	Men	Women	Total	Per cent	Men	Women	Total	Per cent	Men	Women	Total	Per cent
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
State Agricultural and Mechanical Institute of Alabama	5	21	26	31	7	18	25	30	1	17	18	21	6	8	14	17	1	0	1	1
State College for Colored Students of Delaware	5	7	12	60	0	3	3	15	1	4	5	25								
Southern University and Agricultural and Mechanical College of Louisiana	16	35	51	29	5	10	15	9	7	13	20	11	25	56	81	47	3	3	6	4
Princess Anne Academy of Maryland	3	3	6	35	1	0	1	6	1	3	4	23	6	0	6	35				
Alcorn Agricultural and Mechanical College of Mississippi	11	12	23	20	9	5	14	13	34	10	44	39	22	11	33	28				
Lincoln University of Missouri	20	7	27	14	7	13	20	11	39	59	98	53	11	30	41	22				
Agricultural and Technical College of North Carolina	24		24	15	40	0	40	26	54		54	34	38		38	24	2		2	1
Prairie View State Normal and Industrial College of Texas	45	99	144	10	78	152	230	17	63	439	502	36	49	455	504	36	4	7	11	1
West Vriginia State College	33	154	187	39	71	29	100	20	72	51	123	25	24	28	52	11	18	10	28	5

As institutions operated for the benefit of the entire negro populations of their States, the geographic distribution of their students is important since it shows whether they come from all parts of the State or merely from near-by local communities. On the basis of the figures presented in the compilation this distribution is widespread in the case of most of the colleges.

For the nine colleges as a whole, 19 per cent of their students live within 25 miles of the institutions, 17 per cent between 25 and 50 miles, 33 per cent between 50 and 100 miles, 29 between 100 and 500 miles, and 2 per cent more than 500 miles. It is evident, therefore, that a large proportion of the student bodies come from considerable distances throughout their respectives States. This situation, however, does not exist with regard to all the individual institutions. In one college as high as 60 per cent of its students live within a distance of 25 miles of the institution, in a second case 39 per cent, in a third 35 per cent, and in a fourth 31 per cent. The table shows that in these same institutions an additional 15 per cent of the students live between 25 and 50 miles in the first instance, 20 per cent in the second, 6 per cent in the third, and 30 per cent in the fourth.

With one exception, all of these colleges are drawing at least 50 per cent or more of their students from local communities situated within 50 miles of their campuses. The compilation also shows that few students who live in excess of 500 miles attend the institutions, four reporting no students from such distances, while in other five the proportions range from as low as 1 to 5 per cent.

Enrollments by Major Divisions

The efficacy of the educational program of an institution of higher learning is reflected in the enrollments in the various major divisions. No better test of whether specific aims and objectives are being attained can be found than in the number of students actually pursuing courses of study in particular subject-matter fields. Considering the present status of the negro land-grant colleges with their numerous collegiate curricula, a large part of which are paper offerings, it is incumbent upon the institutions to appraise carefully their enrollments.

In the reports received from the colleges showing students enrolled in the various major divisions, considerable confusion existed in the figures presented, due to duplicates, special and part-time students. As a result, difficulty was encountered in segregating enrollments in the various curricula, a situation that should be rectified if proper records are to be maintained. It was discovered, also, that the figures submitted in the survey did not correspond with data contained in the official annual land-grant college reports made to the Office of Education. In Table 21 are shown the enrollments by major divisions for 1928 taken from both the information furnished in the survey and in official reports.

TABLE 21.—*College enrollments by subject-matter fields in negro land-grant colleges in 1928*

Institution	Agriculture	Mechanic arts	Home economics	Education	Arts and science or general courses	Nursing	Total [1]
1	2	3	4	5	6	7	8
State Agricultural and Mechanical Institute of Alabama		4	4	26			26
Agricultural, Mechanical, and Normal College of Arkansas					36		36
State College for Colored Students of Delaware				16	5		21
Florida Agricultural and Mechanical College		23	10	21	38	5	108
Georgia State Industrial College	11		6	11	73		106
Kentucky State Industrial College		18	6	32	111		163
Southern University and Agricultural and Mechanical College of Louisiana	62		13	29	68		110
Princess Anne Academy of Maryland					17		17
Alcorn Agricultural and Mechanical College of Mississippi	40		8	15	58		113
Lincoln University of Missouri				69	117		186
Agricultural and Technical College of North Carolina	47	68			42		157
Colored Agricultural and Normal University of Oklahoma	19	16	27	130	46		238
State Agricultural and Mechanical College of South Carolina	37	26	42	36	87		228
Tennessee Agricultural and Industrial State Teachers College	24	27	63	195	261		570
Prairie View State Normal and Industrial College of Texas	71	25	206		415	21	738
Virginia State College for Negroes	18	13	27	130	196		384
West Virginia State College	9	5	45	76	353		490
Total	338	225	457	786	1,919	26	3,691

[1] Excluding duplicates.

Of the total collegiate enrollments amounting to 3,671 students for the 17 colleges, 338, or 9.1 per cent, were enrolled in the major division of agriculture; 225, or 6 per cent, in mechanic arts; 457, or 12 per cent, in home economics; 786, or 21.1 per cent, in education; 1,921, or 52.1 per cent, in arts and science; and 26, or 0.7 per cent, in nursing. The figures indicate that arts and science is the principal major division in which are found the largest enrollments and in which are concentrated the educational efforts of the colleges, a fact that has already been pointed out. In the technical divisions, such as agriculture, mechanic arts, and home economics that typify the land-grant type of education, students enrolled for the group of colleges as a whole represent from 6 to 12 per cent of the total enrollment, an extremely small proportion. In many individual institutions even smaller proportions are found registered in these divisions.

An examination of the enrollments in agriculture as presented in the table reveals that seven of the colleges had no students registered in this field of work in 1928. In the remaining 10 institutions, 1 had as high as 71 students registered in agriculture, a second 62 students, a third 47 students, a fourth 40 students, and a fifth 37 students. The number of agricultural students in the 5 other colleges was less than 25. Two colleges reported as low as 11 and 9 students in agriculture. It is obvious that in view of the small number of students the need exists for stimulation of the work in this field. A similar situation is found in the record of enrollments in the mechanic arts divisions. Only 10 of the colleges had students pursuing such curricula in 1928, the highest mechanic arts enrollment in any single institution being 68. There were 3 colleges with from 25 to 30 students enrolled in mechanic arts, 1 with 20 to 25 students, 2 with 15 to 20 students, 1 with 10 to 15 students, 1 with 5 to 10 students, and 1 with fewer than 5 students. A necessity exists for a complete appraisal of the mechanic arts programs for the purpose of upbuilding and improving them.

Larger enrollments in the field of home economics are found generally throughout the negro land-grant colleges. While five colleges reported no enrollments in this work, the number of students pursuing home economics in a considerable proportion of the remaining cases is fairly large, indicating that the work is being developed on an extensive basis.

One institution had 206 students in its home-economics division in 1928, a second 63 students, a third 45 students, and a fourth 42 students. Two colleges enrolled between 25 and 30 students in this field. In the other institutions the home-economics students were small in number varying from 13 to 4, indicating the need for the improvement of their work.

The emphasis being placed on teacher training by the negro land-grant colleges is exemplified by the enrollments in the division of education as shown in Table 21. Only four institutions had no students enrolled in education in 1928. The number of students pursuing educational curricula in the other 13 colleges was generally large.

In one case the enrollment was as high as 195 students, in two 130 students, in one 76 students, and in one 69 students. The records of the remaining institutions show one college with between 35 and 40 students enrolled in teacher training, one between 30 and 35, two between 25 and 30, one between 20 and 25, two between 15 and 20, and one between 10 and 15.

Due to the lack of adequate data the enrollments in education represent only students taking normal school courses. There are, therefore, a considerable number of other students pursuing work leading to the first degree in education that are not included in these figures.

That the educational programs of the negro land-grant colleges are concentrated on arts and science curricula or general college courses in nearly every instance is evidenced by the preponderance of enrollments in this field. There is only 1 of the 17 institutions that had no arts and science students in 1928.

In the 16 other colleges the enrollments varied from as high as 415 to 5 students. The tabulation discloses one institution with 415 students in arts and sciences, one with 353 students, one with 261, one with 196 students, one with 117 students, and one with 111 students. The number of arts and science students ranged from 80 to 90 in one of the remaining institutions, from 70 to 80 in one, from 60 to 70 in one, from 50 to 60 in one, from 40 to 50 in two, from 30 to 40 in one, from 10 to 20 in one, and fewer than 10 in one.

Attention has already been called to the fact that the emphasis placed upon liberal arts education has had the effect of retarding the development of technical and practical education in the fields of agriculture, mechanic arts, and home economics. It has also resulted in the failure of the negro land-grant college to comply to the fullest extent with the terms of the Morrill Acts. In compiling data on the enrollments by major divisions, no accurate information was obtainable on the number of students pursuing courses in commerce and business offered by several institutions. As shown by the compilation, 26 students were enrolled in nursing in two colleges.

Student Mortality

The loss of students in the collegiate divisions of the negro land-grant colleges constitutes a vital problem in the achievement of their objectives. With heavy mortality in their student enrollments, it is impossible for the institutions to render satisfactory educational service.

In an effort to secure accurate data upon the subject, the survey undertook the study of a single class graduating from the colleges in the year, 1928. The institutions were requested to submit information on the number of students entering the class in 1924 together with the number leaving college in their freshman, sophomore, junior, and senior years, and the number who finally received degrees in 1928. Of the 17 institutions, reports were received from only nine, but the figures are representative of the mortality prevailing generally in the negro land-grant college group. In Table 22 are given the results of the inquiry.

TABLE 22.—*College student mortality as shown by study of class of 1928*

Institution	Freshmen enrolled in 1924			Number who left college in freshman year			Number who left college in sophomore year			Number who left college in junior year			Number who left college in senior year			Number who received degrees in 1928		
	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Southern University and Agricultural and Mechanical College of Louisiana	16	6	22				8	3	11	3		3				5	3	8
Alcorn Agricultural and Mechanical College of Mississippi	19	4	23	1	3	4	1		1	1		1				16	1	17
Agricultural and Technical College of North Carolina	19		19	6		6				1		1	1		1	11		11
Colored Agricultural and Normal University of Oklahoma	16	1	17	1		1	2		2							13	1	14
State Agricultural and Mechanical College of South Carolina	47	7	54	17	1	18	10	3	13	1		1				19	3	22
Tennessee Agricultural and Industrial State Teachers College	49	320	369													13	23	36
Prairie View, State Normal and Industrial College of Texas	71	134	205	38	67	105	21	32	53	6	14	20				6	21	27
Virginia State College for Negroes	21	24	45	3	8	11	6		6	3	1	4	4	1	5	2	10	12
West Virginia State College	45	57	102	15	25	40	9	14	23	5	3	8	1		1	9	11	20
Total	303	553	856	81	104	185	57	52	109	20	18	38	6	1	7	94	73	167

Using the figures presented in the tabulation as a basis, heavy losses were suffered by the nine colleges in the students making up the class of 1928. The number of freshmen enrolled in 1924 amounted to 856 of which 303 were men and 553 were women. Of this total, but 167 received degrees in 1928 of which 94 were men and 73 were women. The number of students who failed to remain at college to graduate totaled 689 which showed a mortality of 80.5 per cent. Loss of men students was 209, or 69 per cent, and of women students 480, or 86.8 per cent. This heavy mortality of women students was due chiefly to the fact that many of them pursued normal-school courses and left college at the end of the two years upon completion of the work. A further analysis of the table indicates that the greatest loss of students occurred in the freshman year, the proportion being 38 per cent, while in the sophomore year the mortality was 22 per cent. Losses in the junior and senior years were comparatively small. Such serious student mortality as exists in the negro land-grant colleges should be the subject of a careful study by the institutions. Economic conditions are in part responsible for the failure of a large number of students to continue their college work. A remedy for this condition is the granting of scholarships.

Another important factor in the heavy student mortality is poor scholarship. Although the institutions failed to furnish complete information upon the subject, little doubt exists that this is one of the principal reasons that many of the students leave college. Poor scholarship may be traced partially to the lack of proper preparation, which involves the improvement of the high schools that supply the colleges with students and a more careful scrutiny of candidates seeking admissions. Reports were received from nine institutions on the proportion of students dropped on account of poor scholarship.

In the case of one college 20 per cent of the students fail in their work, in a second 8 per cent, in a third 6 per cent, in a fourth 5 per cent, and in a fifth 4 per cent. The remainder fixed the proportion of students dropped because of poor scholarship from 1.4 to 2.5 per cent. Two of the colleges do not permit the return of students who have been eliminated for lack of scholarship while in six cases they are allowed to return either the following semester or school year. There is one institution that decides the question of the return of students who have failed on the individual merits of the case.

Degrees and Certificates

The number of degrees granted in course by the negro land-grant colleges as compared with the total enrollment is small, indicating that only a minor proportion of the students remain to complete their college work. As most of the institutions specialize in education, there is a considerable volume of certificates received by students for 2-year normal-school work. Six of the colleges granted no degrees in 1928. In Table 23 are presented the number of different degrees and certificates granted by each institution for this year.

TABLE 23.—*Degrees and certificates granted in negro land-grant colleges in 1928*

Institution	Bachelor of arts	Bachelor of science	B. S. in agriculture	B. S. in mechanics	B. S. in home economics	B. S. in business administration	A. B. in education	B. S. in education	B. S. in music	Total degrees	Total certificates
1	2	3	4	5	6	7	8	9	10	11	12
State Agricultural and Mechanical College of Alabama											9
Agricultural Mechanical and Normal College of Arkansas											12
Florida Agricultural and Mechanical College											25
Georgia State Industrial College	3									3	6
Kentucky State Industrial College											42
Southern University and Agricultural and Mechanical College of Maryland	9									9	14
Prairie Ann Academy of Maryland											5
Alcorn Agricultural and Mechanical College of Mississippi	8	13								21	
Lincoln University of Missouri	5	5								10	33
Agricultural and Technical College of North Carolina		8	5							13	
Co ored Agricultural and Normal University of klahoma		13								13	8
St te Agricultural and Mechanical College of South Carolina	8	6	7	7						28	44
Tennessee Agricultural and Industrial State Teachers College		42								42	21
Prairie View State Normal and Industrial College of Texas		100								100	138
Virginia State College for Negroes	9	8								17	42
West Virginia State College	18	5			6	2	6	1	2	40	10
Total	60	200	12	7	6	2	6	1	2	296	409

As shown by the tabulation, a total of 296 degrees was granted by 11 of the institutions in 1928. While seven different types of degrees are awarded by the colleges, by far the greater proportion is either bachelor of arts or bachelor of science degrees. Seven institutions granted bachelor of arts degrees, the total being 60. The largest award by any college was 18, while in the remainder the number varied from 9 to 3. Bachelor of science degrees were granted by 9 institutions and exceeded in number all other types of degrees. The total was 200 of which 100 were awarded by one institution and 42 by another. In the remaining 7 colleges the number ranged from 13 to 5. Only two colleges granted bachelor of science degrees in agriculture, the number being 5 in one and 7 in the other, while bachelors' degrees in mechanics and home economics were awarded by 2 other institutions. Two bachelor of arts degrees in business education, 6 bachelor of arts degrees in education, 1 bachelor of science degree in education, and 2 bachelor of science degrees in music were granted by another college. Of the total number of degrees, 53 per cent were granted to men students and 47 per cent to women students.

Certificates granted by the negro land-grant colleges in 1928 totaled 409. All of the institutions with three exceptions awarded certificates. One institution granted as high as 138 certificates. There were three other colleges that granted between 40 and 50 certificates, one between 30 and 40, two between 20 and 30, four between 10 and 20, and three fewer than 10. Authority for granting of degrees or certificates varies in the different colleges. In six institutions the board of trustees authorizes the awarding of degrees at their regular sessions. This authority is delegated to the president in 3 colleges, to the president and a committee in 1, to the president and the faculty in 1, to the local administration in 1, and to the classification committee in 1.

Summer Sessions

The operation of summer sessions is one of the important educational services rendered by the negro land-grant colleges to their States.

With the work largely concentrated in education, the institutions provide opportunity for negro public-school teachers to secure additional training during their summer vacation. All the colleges with one exception conduct summer sessions. Figures have already been presented on the enrollments which indicate that attendance at the schools is very large.

The summer session is administered by the president of the institution in 11 cases, by the dean of the college of arts and science in 2, by the dean of the teacher training in 1, and by a special director in 2. Three of the colleges report that the summer session is operated as a separate enterprise from the regular college program. In 11 others it is conducted as a part of the collegiate work of the institutions. Two colleges did not submit information on this point.

Regular college credit is allowed students attending in the summer sessions in most instances. The maximum number of semester hours for which the student may register varies in the different schools, depending on the length of the summer session. The amount ranges from 8 semester hours in the 5-weeks summer session to 13 hours in the 8-weeks summer session. The teaching staff is fairly well organized in the summer schools, the number of instructors being sufficient to meet the needs. In some cases the teachers are lacking in training. An inquiry into the subject revealed that the academic standing of the work in the summer session of eight institutions is on the same basis as the regular college work while in the seven others a difference exists. The negro land-grant colleges do not exchange professors for summer-session work, a practice which would prove mutually beneficial both to the teachers and the students.

Chapter V.—Conclusions and Recommendations

In the foregoing chapters the present status of the 17 negro land-grant colleges has been described in its broader aspects. Some comparisons have been made showing tendencies of growth. From the standpoint of the future of these institutions it is necessary to consider the influences that have a bearing on their development and on the improvement of their service.

Because of the conditions under which the institutions were established and under which they have grown, the program of the negro land-grant colleges constitutes a unique and highly important educational experiment. Instead of coming into being as the result of a slow and steady period of evolution with educational programs crystallizing after a long period of trial and error and with a large and growing body of well-prepared college students supporting them, the negro land-grant colleges were established for the most part in haste and without an adequate supporting student body. For years the attempt to bring the negro land-grant colleges to the full stature of agricultural and mechanical colleges has failed because of an inadequate medium in which to grow and because of artificial remedies used to develop them.

The negro land-grant colleges have nevertheless gained strength and prestige. It still remains to be seen whether collegiate curricula strongly infused with vocational courses can prove their worth as a compromise between the stricter types of professional courses in agriculture and the mechanic arts and those purely vocational in character. The experiment is not the same for each institution or for each State.

During the past decade the negro land-grant colleges became conscious of the need for higher and more uniform concepts of collegiate training as they apply to the major training divisions. This has been brought about by the demands for standardized courses in teacher training and premedical work and by the desire to bring technical training to the same level as that given in the white land-grant colleges. Having become conscious of their responsibilities as colleges the program for the coming decade must be one of diversification, not on the basis of opinions or traditional views, but rather on the basis of scientific knowledge of the needs of both the negro and white populations in each State.

The problem of the negro land-grant colleges in terms of the law and in terms of the needs of the people is to universalize self-support and individual development for the rising generation of negro youth not on the single level of effort which was formerly emphasized, but on higher educational planes that are now open and that are gradually opening to those who are adequately prepared. Emphasis should also be placed on the importance of cooperative effort in the realm of business endeavor.

The leaders of negro land-grant colleges must, therefore, refocus their objectives. With the cooperation of their States they must prepare leaders and teachers who will be devoted to the complete rehabilitation of the economic, social, and spiritual activities of their people. Fortunately, two forces are now actively at work in strengthening the negro land-grant colleges. The student medium is rapidly increasing through the increased support of negro elementary schools and high schools. Educational standards are being set up for the institutions by the State boards of education, regional accrediting organizations, and the professional schools.

Furthermore, the negro land-grant colleges should look forward to an exceptional period of development within the next decade because of the rapid growth of industrial activity in the Southern States. The increase in wealth resulting from these activities should continually release opportunities for those who are prepared.

It should continually be borne in mind that the negro land-grant colleges are designed to give both technical and general training. However, as nearly two-thirds of the students in negro colleges are taught in privately endowed colleges and universities which emphasize cultural and religious training, it is particularly incumbent upon the negro land-grant colleges to give the proper stress to technical objectives and in no case allow these objectives to be lost to sight.

To this end it is desirable that the authorities of the negro land-grant colleges develop a program of publicity which will make clear to negro parents and youth the advantage of the types of training that are offered in these colleges. Particular attention should be given in the future to the selection of officials of all ranks who are not only in sympathy with the technical programs of these colleges, but who have been thoroughly trained in technical fields and who have had sufficient experience with the agricultural, industrial, and educational activities of the Southern States. Confidence may thus be developed in the special work of these schools.

If the negro land-grant colleges are to fulfill their destiny, if they are to become the prime instruments of development of the Negro race, and if they are to achieve a joint contribution with white universities and colleges in the development of an intelligent and prosperous citizenship, the leaders of both races must have a greater understanding of the functions of the negro land-grant colleges. When the leaders have come to appreciate their significance, the public can then be taught that the State has provided and will provide an education and training which will give to every ambitious negro youth a chance to attain his fullest development at a minimum cost of money.

No one who has regularly visited the negro land-grant colleges over a long period of years can fail to be impressed with the great changes that have been wrought in the character of the students, in their personal appearance, their attitudes toward work and study, and their increasing sense of responsibility. This is caused in a large part by the improvement in teaching. A decade past much of the college work was formal and vague. It was out of "adjustment with real life," with the purpose of the land-grant college. This vagueness of knowledge led to pretentiousness, and in some cases a flippancy which was discouraging to those who had been induced to support higher education for the negroes. To-day the negro student comes in contact with men and women of better preparation; teachers who are capable of imparting scientific truth, and imparting a true love of knowledge for its own sake and with some consciousness of the meaning of intellectual honesty. In the decades past humility of the student was obtained largely through social restraint both in and out of the college; to-day there is a quietness and dignity entering the negro student body developed through a clearer knowledge of the laws of nature and of the historic forces that are advancing or retarding civilization. The confraternity of white and negro college students in leading centers of the South working in behalf of civic betterment is a recent development which points the way to greater opportunities in which the negro college graduate may participate in building up a common life.

As the future points to an unlimited economic development in the South, it appears that the well-trained negro youth can look forward toward a greater participation in the different kinds of work which this development promises. The negro land-grant colleges should unite more closely with the white land-grant colleges in establishing their programs of agricultural training. Surveys should be made in the industrial fields which will disclose new openings for those with training in the mechanic arts or in the trades, and at the same time expand and develop opportunities already open. Home-economics education should create high standards of home living that will eventually bring increased happiness to thousands of families who lack only such stimulation and leadership to enable them to move forward.

The equalizing of the standards of preparation and of compensation for the teachers of both races doing equal or equivalent service is steadily moving forward. While much time must elapse before equality of professional opportunities and rewards becomes universal, yet it can only be achieved by the negro teacher giving himself the same training as the white teacher. If other obstacles are a bar to equal professional recognition, there can only be one true method of solving the problem—professional improvement and greater public service. As a result of the facts developed in the report a number of outstanding changes should be made in the government, administration, organization, and educational programs of the negro land-grant colleges.

1. The presidents of the negro land-grant colleges should be made members ex officio of the boards of trustees of their respective schools in such States where this practice has not yet been adopted.

2. Cooperative relationships should be maintained between the negro land-grant colleges, the white land-grant colleges, the agricultural experiment stations, and other State institutions concerned with the agricultural and industrial interests of the State by means of local committees of boards of coordination to be composed of a suitable number of white and negro leaders.

3. For the purpose of mutual assistance in dealing with the many complex problems connected with the administration of the negro land-grant colleges the boards of trustees or similar organizations should establish an association of governing boards of negro land-grant colleges, similar to the association of governing boards of State universities and allied institutions.

4. Increased opportunities should be given the deans, registrars, and treasurers of the negro land-grant colleges to associate themselves actively with the national societies promoting their work. Accounting systems of the colleges should be made uniform as far as possible with the same classifications and headings to facilitate appraisals of income and expenditures.

5. In view of the need for increased contact with both the white and negro public for the purpose of stimulating interest in their institutions and in obtaining for themselves professional information of importance, the presidents should be relieved as far as possible of the minor details of handling business and office work and be provided with adequate assistance for the performance of such duties.

6. The executives and heads of major divisions should be required to visit and make suitable contacts with white land-grant colleges

and other institutions of higher learning in different parts of the country and to make reports on such visits.

7. The colleges should send reports regarding students who show inadequate high-school preparation or deficient entrance requirements to the principals of the high schools concerned and to the proper county and State officials.

8. A careful revision of salaries now paid administrative officers and staff members should be made in the light of the demands which are now being made on teachers to meet the same educational standards as white teachers. Salary ranges should also be adopted for the different professional ranks.

9. The negro land-grant colleges of junior college rank should bring up their standards to meet the minimum requirements as to teachers, namely, five full-time college teachers, who devote themselves to college classes exclusively. The standards of the courses in biology, chemistry, and physics should be raised so that premedical courses may be offered meeting the requirements of the leading accrediting agencies.

10. The negro land-grant colleges on a senior college basis should bring their faculties up to a minimum of eight full-time college teachers. The educational organizations should be reconstructed on a basis of the standard college organization.

11. Surveys of agricultural, industrial, business, and home conditions should be made in each State, with the object of opening up new avenues of employment of graduates of negro land-grant colleges. A reorganization of curricula in these different subject-matter fields should be made upon the basis of such surveys when findings are complete.

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