R E P O R T R E S U M E S

ED 016 779 VT 001 919

EDUCATIONAL NEEDS OF ANIMAL SCIENCE TECHNICIANS, A DIGEST OF A PH.D. DISSERTATION. RESEARCH SERIES IN AGRICULTURAL EDUCATION.

BY- BAKER, JAMES K. WOODIN, RALPH J.
OHIO STATE UNIV., COLUMBUS, DEPT. OF AGR. EDUC.

PUB DATE NOV 66

EDRS PRICE MF-$0.25 HC-$2.36 57P.

DESCRIPTORS- TECHNICAL EDUCATION, *ANIMAL SCIENCE, CURRICULUM, *EDUCATIONAL NEEDS, *EMPLOYMENT OPPORTUNITIES, OCCUPATIONAL CLUSTERS, *AGRICULTURAL TECHNICIANS, EMPLOYMENT QUALIFICATIONS, OCCUPATIONAL SURVEYS, PROGRAM DEVELOPMENT, OHIO,

A STUDY WAS UNDERTAKEN TO (1) DETERMINE THE NEED FOR TECHNICIANS, (2) DETERMINE REQUIRED COMPETENCIES, (3) DETERMINE JOB CHARACTERISTICS, (4) IDENTIFY OCCUPATIONAL CLUSTERS, AND (5) DEVELOP CURRICULUMS. PERSONAL INTERVIEWS, MAILED QUESTIONNAIRES, AND FOLLOWUP LETTERS YIELDED DATA FROM 298 OF THE 914 EMPLOYERS CONTACTED. OF 13,958 EMPLOYEES OF THE OHIO ANIMAL SCIENCE INDUSTRY FIRMS, 1,145 OR 8.2 PERCENT WERE AT THE TECHNICIAN LEVEL, WHILE 73 PERCENT WERE SKILLED, SEMI-SKILLED, OR UNSKILLED. THE GREATEST NUMBER, 68 PERCENT, OF ALL WORKERS WERE IN SOME ASPECT OF PROCESSING. OF 1,119 FULL-TIME AND 199 PART-TIME PLACEMENT OPPORTUNITIES FOR 1964, 15 PERCENT WERE AT THE TECHNICIAN LEVEL. ENTRY LEVEL MONTHLY SALARIES FOR TECHNICIANS AVERAGED $431. EMPLOYERS PREFERRED BEGINNING TECHNICIANS NEAR AGE 27 WITH POST-HIGH SCHOOL EDUCATION, FARM EXPERIENCE, AND FARM PRODUCTION TRAINING. EMPLOYED TECHNICIANS AVERAGED 41 YEARS OF AGE AND HAD 15 YEARS OF EXPERIENCE AND NO POST-HIGH SCHOOL EDUCATION. OF TWO DIVERGENT OCCUPATIONAL CLUSTERS IDENTIFIED, ONE NEEDED TECHNICIANS WITH COMPETENCIES IN ANIMAL SCIENCE AND RELATED AGRICULTURE, AND THE OTHER TECHNICIANS WITH COMPETENCIES IN LABORATORY PROCEDURES, BASIC CHEMISTRY, AND BACTERIOLOGY. A SUMMARY OF RANKINGS BY EMPLOYERS AND TECHNICIANS INDICATED THAT IN A 2-YEAR TECHNICAL EDUCATION PROGRAM, THE PERCENTAGE OF TIME ALLOCATED TO SELECTED AREAS SHOULD BE (1) GENERAL EDUCATION, 25 PERCENT, (2) ANIMAL SCIENCE, 27 PERCENT, (3) OCCUPATIONAL EXPERIENCE, 18 PERCENT, (4) BUSINESS EDUCATION, 16 PERCENT, AND (5) SUPPORTING AGRICULTURE, 14 PERCENT. ALL EMPLOYEES NEEDED COMPETENCIES IN COMMUNICATION, MATHEMATICS, AND HUMAN RELATIONS, AND THOSE WORKING DIRECTLY WITH FARMERS NEEDED GREATER DEPTH IN SPECIALITIES SUCH AS ANIMAL DISEASES AND PARASITES, MARKETING, AND BREEDING AND SELECTION. THE COMPLETE DISSERTATION, "DETERMINING EMPLOYMENT OPPORTUNITIES AND EDUCATIONAL NEEDS FOR ANIMAL SCIENCE TECHNICIANS IN OHIO," BY JAMES K. BAKER IS AVAILABLE AS 66-6226 FOR $6.45 ON MICROFILM AND FOR $22.75 AS XEROXED COPY FROM UNIVERSITY MICROFILMS, INC., 300 NORTH ZEEB ROAD, ANN ARBOR, MICHIGAN 48106. (JM)

RESEARCH SERIES IN AGRICULTURAL EDUCATION

A Research Report of a Graduate Study

Issued by
The Department of Agricultural Education
College of Agriculture and Home Economics
The Ohio State University
Columbus, Ohio 43210

November, 1966

(RESEARCH SERIES IN AGRICULTURAL EDUCATION).

A Digest of a Ph.D. Dissertation

Educational Needs of Animal Science Technicians

by

James K. Baker and Ralph J. Woodin

Issued by

The Department of Agricultural Education
College of Agriculture and Home Economics
The Ohio State University
Columbus, Ohio 43210

November, 1966

TABLE OF CONTENTS

CONTENTS--Continued

DETERMINING EMPLOYMENT OPPORTUNITIES AND EDUCATIONAL NEEDS FOR ANIMAL SCIENCE TECHNICIANS IN OHIO

The political and social survival of the United States depends to a great extent on its ability to provide suitable employment for the people. Changes which are taking place in American social and economic life dictate an unprecedented need for providing citizens with salable skills.

The rapidly expanding population, combined with the effect of advanced technology and more efficient organization in agriculture, business and industry, has created tremendous competition for jobs. This competition, unparalleled since the days of the depression, will undoubtedly increase because of the population explosion of the 1940's, the increasing number of women entering the labor force, a high percentage of school dropouts and the displacement of unskilled workers by automation.

The paradox of the unemployment situation is that although there are millions of unemployed people in the United States, a shortage of skilled laborers, trained technicians, and professional people still exists. This employment problem is so vast and vital to our national welfare that it must be approached from many angles. Needless to say vocational education must play a major role in providing a solution.

Agriculture has not been immune to the complex problems of change resulting from the rapid advance of new technology. Larger operational units, expanded mechanization, and new technology have altered the occupational status of those employed in agriculture. Change in agricultural industry has resulted in decreased numbers of farm operators and increased employment opportunities in related agricultural occupations. There is an apparent need to identify the employment opportunities which exist in agriculture and provide pre-employment training for those persons who have the ability and motivation to acquire the skills and knowledge the occupation requires.

This chapter endeavors to explore the need for agricultural technicians in animal science and to present a brief analysis of a research proposal for training these technicians.

Statement of the Problem

The purpose of this study was to develop curricula for technician training programs in animal science based on educational needs and employment opportunities in Ohio.

Objectives of the Study

The following specific objectives were formulated in order to accomplish the purposes of the study:

1. To determine the need for animal science technicians in Ohio.

2. To determine the major competencies required to perform as a technician in animal science.

3. To determine other selected characteristics concerning technicians in animal science such as

a. Entry salary,

b. Desired age for entry,

c. Labor laws and union restrictions,

d. Desired formal education or experience,

e. Current licensing or certification requirements.

4. To identify clusters of technical occupations in animal science.

5. To develop curricula for training technicians in animal science.

Basic Assumptions

The following statements were believed to be generally acceptable in agricultural education and were not tested in this study:

1. Employers of technicians and technicians themselves could identify competencies necessary for successful job performance by technicians in animal science.

2. A unique curriculum was needed for training technicians in animal science.

3. Competency lists were necessary for curriculum development.

4. An adequate number of students would elect to enter technical training programs in animal science.

5. Information collected by the questionnaire would provide desirable guides for developing curricula for training technicians in animal science.

Limitations

The following statements were prepared in order to adequately circumscribe the study:

1. This study was limited to responses from firms and businesses in Ohio whose employees were believed to need skills and understandings in animal science.

2. The study was concerned with employment opportunities and educational needs of occupations at the technician level.

3. The evaluations of competencies needed by animal science technicians was limited to technical workers in animal science and their employers.

4. The study was limited to the degree to which the respondents accurately interpreted the questionnaire and reported the data requested.

5. The study was limited by the accuracy of the instrument to secure accurate information due to its construction.

Summary of Findings

The major findings from this study were presented under the following headings: (1) the manpower force in animal science, (2) characteristics that employers prefer when hiring animal science technicians, (3) characteristics of animal science technicians in Ohio, and (4) educational needs of animal science technicians.

The findings reported concerning the manpower force in animal science are based upon an analysis of data collected from 31.54 per cent of the firms, businesses and institutions identified that employed animal science technicians in Ohio. Findings relative to

the educational needs of animal science technicians are based on data secured from 315 animal science technicians and employers.

The manpower force in animal science

1. Animal science firms, businesses and agencies engage in a variety of business activities such as retailing, processing, marketing, wholesaling, producing, sales and service. There was no single activity reported that dominated the animal science industry in Ohio.

2. Approximately 13,958 workers were employed full time by the firms responding to the survey. Seventy-three per cent of the workers were classified in the three lower levels of occupational preparation. The semi-skilled level accounted for the greatest number of workers (5,063 or 36.3 per cent of the total) and the professional level at the least number (188 or less than two per cent of the total).

3. Part-time employment of the firms, businesses and institutions surveyed was found to be approximately ten per cent of the total labor force in animal science.

4. There were 1,119 full-time and 199 part-time placement opportunities anticipated for workers in animal science at all levels of occupational preparation for 1964. Seventy-two per cent of the expected employment opportunities were in the skilled, semi-skilled and unskilled levels. The increase in anticipated employment opportunities for each level was found to be as follows: professional, fifteen per cent; managerial, four per cent; technical, fifteen per cent; skilled, seven per cent; semi-skilled 7.6 per cent; and unskilled, nine per cent.

5. There were 1,775 full-time and 423 part-time employment opportunities anticipated by employers for animal science workers by 1969. The increase in expected placement opportunities was found to be thirty-nine per cent and thirty-three per cent, respectively, for professional and technical workers, 8.4 per cent for managers, and between ten and twelve per cent for workers at the skilled, semi-skilled, and unskilled levels.

6. The entry salary per month for employees in animal science was found to be approximately $700 for professional workers, $621 for managers, $431 for technicians, $407 for skilled workers, $326 for semi-skilled workers and $267 for unskilled workers.

7. The need for farm production training was found to be greater at the technical, managerial, and professional levels than for the three lower levels of occupational preparation. Farm production training was reported to be necessary for 22.9 per cent of the workers, desirable for 41.5 per cent and unnecessary for 35.7 per cent. Animal science technicians had the greatest need for farm training, according to the employers responding to this item.

8. Approximately ninety-three per cent of the employees of animal science firms, businesses, and agencies spent a predominant part of their time working in the areas of processing, marketing, and production. The greatest number of workers (7,685 or 68 per cent) were engaged in some aspect of processing animals and/or their products.

Characteristics desired of technicians for employment

1. The most desirable age for animal science technicians to enter technical positions was approximately twenty-seven years. Employers indicated they preferred animal science technicians between twenty-two and forty-three years of age for initial employment.

2. A post-high school education was desired for initial employment as animal science technicians by seventy-five per cent of the employers. Forty-three per cent of these employers indicated that six months to three years of technical education was sufficient but thirty-two per cent preferred to hire animal science technicians with a college degree.

3. Farm production training was reported to be desirable or necessary for animal science technicians by approximately ninety per cent of the employers.

4. A farm background was preferred for employment as an animal science technicians by seventy-six per cent of the employers. Nineteen per cent of the employers indicated they had no preference concerning the residential background of animal science technicians.

Characteristics of animal science technicians

1. The age of animal science technicians responding to this inquiry ranged from twenty-two to seventy-one years with a mean age of forty-one.

2. A majority of the animal science technicians in this study have not had the benefit of formal post-high school education. Fifty-four per cent of the technicians had completed from eight to twelve years of school, thirteen per cent had attended college from one to three years and thirty-three per cent had completed four years of college.

3. Technicians responding to this inquiry had worked approximately fifteen years in animal science and approximately eleven years for their present employer.

4. A majority of the animal science technicians in this study (55 per cent) spend a predominant part of their time working in animal science.

5. There were 173 full-time and sixteen part-time employment opportunities anticipated for animal science technicians for 1964. Employers of firms, businesses, and institutions in animal science projected 378 full-time and 179 part-time placement opportunities by 1969.

6. The salary of animal science technicians ranged from $300 to $508 per month with a mean salary of $431 per month for all technicians responding to the inquiry.

7. A majority (51.9 per cent) of animal science technicians spent a predominant part of their time processing and marketing animals and/or their products. Thirty per cent of the remaining technicians spent a predominant part of their time working in the areas of production and artificial insemination.

Educational needs of animal science technicians

1. Employers of firms, businesses, and institutions and their technicians that participated in this study indicated that about twenty-five per cent of a two-year technical education program in animal science should be allocated to general education, twenty-seven per cent of the time to animal science, eighteen per cent to occupational experience, sixteen per cent to business education, and fourteen per cent to supporting agricultural subjects.

2. All animal science technicians identified in this study needed a common core of competencies in the areas of communication, mathematics and human relations.

3. Animal science technicians whose occupational assignment required close association and interaction with farmers indicated a need for a broad background in agriculture and depth in their particular specialty in animal science.

4. Technicians whose occupational assignments were laboratory orientated indicated a need for competencies in basic science and laboratory procedures. Quality control technicians reported a need for some knowledge of animal science in the area in which they work. Competencies in sales, business management, and agriculture were not needed.

5. Animal science technicians engaged in occupations requiring close association with farmers reported a need for the following areas of competencies in the order they are presented (1) animal diseases and parasites, (2) marketing, (3) feeding livestock and

poultry, (4) livestock and poultry management, (5) agricultural economics, and (6) breeding and selection.

Conclusions

The following conclusions were based on the writer's interpretations of the data presented in this study:

1. Animal science workers identified in this study represented approximately ten per cent of Ohio's non-farm agricultural work force.

2. A congestion of workers and employment opportunities were found at the lower levels of the occupational ladder. Seventy-three per cent of the total work force identified in this study was distributed among the skilled, semi-skilled, and unskilled levels of occupational classification. Seventy-two per cent of the current and sixty-three per cent of the anticipated employment opportunities were found in these three categories.

3. Workers designated by their employers as technicians accounted for 8.2 per cent of the total work force in Ohio's animal science industry (17.2 per cent managerial - 19.3 per cent skilled).

4. There was an immediate need for 173 more technical workers (a 15.5 per cent increase) in animal science and a projected demand for 378 (a 21 per cent increase) by 1969.

5. Five hundred fifty current and anticipated employment opportunities for animal science technicians in Ohio were deemed sufficient to justify technician training programs.

6. The areas of processing and marketing provided employment for over one-half of the animal science workers identified in this study.

7. Employers preferred animal science technicians with a farm background for positions requiring close association with farmers.

8. Animal science technicians in Ohio had desirable jobs in terms of salary, tenure, and per cent of time working in their area of specialization.

9. Technical occupations could be grouped into clusters according to the similarity of work performed and competencies needed for technicians to successfully perform their occupational assignments. Two divergent clusters were identified in this study. The first cluster of technical occupations contained nineteen job titles which were characterized by a definite need for technicians with competencies in animal science and related agriculture. Technical specialties included in this cluster were: (1) Livestock Herdsman, (2) Livestock Inspection, (3) Livestock Marketing, (4) Artificial Insemination, (5) Dairy Fieldman, (6) Dairy Herdsman, (7) Dairy Inspector, Sanitarian, (8) Feed Fieldman, (9) Sales Manager, Meat Packing, and (10) Assistant Sales and Plant Manager, Feed and Grain.

The second cluster contained eleven job titles and was differentiated from the first by needing very little competence in agriculture and a strong background in laboratory procedures, basic chemistry and bacteriology.

10. The recommendations of animal science technicians and employers in this study concerning the per cent of time to be

allocated to general education, animal science, occupational experience, business, and supporting agriculture were consistent with recommendations from The National Seminar on Preparing Agricultural Technicians, and should be used as a guide for developing curricula for animal science technician training programs. These recommendations called for a time allocation of 26.91 per cent Animal Science, 24.55 per cent General Education, 18.48 per cent Occupational Experience, 16.10 per cent Business and Management, and 13.75 per cent Supporting Agricultural Areas.

11. There was a distinct difference in the educational needs of workers classified as animal science technicians. Animal science technicians whose work involved working with farm people regularly needed more competencies in the areas of animal diseases, livestock marketing, feeding and management than in the areas of laboratory procedures and agricultural mechanics. Technicians in this study whose work was laboratory oriented did not need a general background in animal production.

12. The ability to communicate effectively both orally and in writing, to make mathematical computations accurately, and to get along with people were assigned the highest mean values of all competencies evaluated by technicians and employers and should be emphasized in animal science technician training programs.

Recommendations

The following recommendations relative to the development of animal science technician training programs are based on the findings in this study, ideas gleaned from a review of literature in technical education, and the experience of the author:

1. An educational program for the preparation of animal science technicians as herdsmen, salesmen, inspectors, artificial inseminators, and fieldmen should be developed in Ohio.

2. Suggested curricula and course outlines presented in this study should be used by professional educators and advisory committees selected from animal science as a basis or point of departure for developing instructional programs for the preparation of animal science technicians in Ohio.

3. Consideration should be given to the feasibility of expanding the technical program at Springfield, Ohio, to include the preparation of animal science technicians since basic courses in general education and supporting agriculture are presently taught in that institution at the post-high school level.

4. Consideration should also be given to the feasibility of including animal science technician training programs in community colleges concerned with occupational education in Ohio.

5. Advisory committees composed of carefully selected representatives of firms, businesses, and institutions in animal science should be involved in planning, executing, and evaluating animal science technician training programs.

6. The data presented in this study should be used to apprise educational administrators, guidance counselors, teachers, students and their parents of the employment opportunities for adequately prepared technical workers in animal science.

7. Criteria should be developed for evaluating credits earned in technician training programs for transfer to four-year college and universities.

8. Occupational experience programs should be an integral part of animal science technician programs.

9. Consideration should be given to procedures for improving the status of occupational education.

10. Placement and follow-up services should be an essential part of technician programs.

11. Technician training programs in Ohio should be co-ordinated to avoid needless duplication.

Recommendations for Further Study

The writer recognized a need for additional study concerning:

1. The educational needs of workers in animal science whose occupations require other than technical preparation.

2. The development of criteria for analyzing job titles in animal science to determine occupational classification.

3. The compilation of job descriptions of occupations in animal science.

4. The in-service educational needs of animal science technicians in Ohio.

5. The feasibility of standardized technical curricula for animal science technician training programs.

6. The identification and preparation of simulated materials that can be effectively substituted for actual experience in the preparation of animal science technicians.

7. The development of effective occupational experience programs for animal science technicians.

8. The development of effective criteria for student selection in technician training programs.

9. The pre-service and in-service educational needs of teachers planning to teach at the technical level.

10. The development of criteria for the accreditation of technician training programs in agriculture.

Determining the Need for Animal Science Technicians in Ohio

The following procedures were employed in an endeavor to determine the need for animal science technicians in Ohio: (1) An advisory committee was assembled with representatives selected from the animal industry and educational institutions in Ohio, (2) criteria were selected to define the population, (3) a mailing list of animal science firms, businesses, and institutions in Ohio was prepared, (4) an instrument was designed to gather the data, (5) samples were drawn from the population, and (6) the data were collected, analyzed, and tabulated.

Methods of gathering data

The methods of gathering the data consisted of personal interviews, mailed questionnaires, and follow-up letters to the employers of animal science technicians in Ohio. A copy of the cover letters, questionnaires, and follow-up letters may be found in the Appendix of the complete report of the study.

Response to the first questionnaire

Nine hundred fourteen questionnaires were mailed to managers of firms, businesses, and institutions who were believed to employ animal science technicians. Two hundred eighty-eight questionnaires were returned giving a 31.54 per cent return.

An explanation of two of the groups in Table 1 is necessary in order that one may accurately interpret the table. The area of livestock marketing shows a 29.51 per cent return of the questionnaires mailed. This is correct; however, one of those respondents, The Producers Livestock Cooperative Marketing Association, provided data for sixteen auction markets, two terminal markets, and twelve sub-branches or concentration yards.

The grouping listed as general area includes responses from the following areas:

Central Ohio Breeding Association

Northern Ohio Breeding Association

Division of Animal Industry, Ohio State Department of Agriculture

Federal State Inspection and Grading Service, Poultry and Poultry Products

Ohio Department of Health, Milk Sanitarians

Ohio Institutional Farms, Department of Mental Health and Correction Farms

Dairy Herd Improvement Associations of Ohio

The following areas of the Ohio Agricultural Experiment Station:

Outlying Farms	Animal Science
Veterinary Science	Agronomy
Poultry Science	Dairy Science

TABLE 1.--Response of employers by occupational categories in animal science to the first questionnaire.

Occupational Categories	Questionnaires Mailed	Questionnaires Returned	Per Cent Returned
Feed and Grain	300	91	30.33
Meat Packers	111	30	27.03
Livestock Marketing	61	18	29.51
Swine Production	22	7	32.00
General Areas	13	13	100.00
Dairy Production	50	15	30.00
Milk Marketing Coop	12	6	50.00
Dairy Manufacturing	102	35	34.30
Hatcheries	80	20	25.00
Egg Processors	32	5	15.62
Poultry Processors	69	26	37.68
Poultry Producers	62	22	35.48
Total	914	288	31.54

An Overview of the Animal Science Industry

A global view of the animal science industry in Ohio was believed to be necessary for a clear interpretation of the employment opportunities and educational needs of workers classified as technicians. The term "technician" is new to many segments of the industry and it is conceivable that considerable overlapping had occurred between this level of occupational preparation and those immediately below and above it.

Major business activities

The data in Table 2 indicate that no one business activity dominated the animal science industry in Ohio. It is evident, from these data, that firms, businesses, and agencies in animal science engaged in a variety of business activities.

Retailing was reported most frequently as a major business activity of the firms responding. This was closely followed by processing, marketing, wholesaling, sales and services, and producing.

As may be expected inspection accounted for a very small per cent of the activities engaged in by businesses and agencies in animal science. Less than one per cent of the respondents indicated they participated in business activities other than those listed in Table 2.

TABLE 2.--Major business activities of firms surveyed in animal science, Ohio, 1964.

Major Activity	Number[a]	Per Cent of Total
Retailing	102	18
Processing	90	16
Marketing	88	15
Wholesaling	75	13
Sales or Service	74	13
Producing	67	12
Purchasing	66	11
Inspection	9	1.6
Other	5	.9
Total	576	100.5

[a]A number of firms indicated more than one major activity.

Distribution of workers by level of employment

A full-time employment of 13,958 workers in the animal science industry from a return of 31.54 per cent of the firms contacted indicated that this area of Ohio agriculture merits further study by vocational educators.

The distribution of workers in Table 3 reveals that the skilled, semi-skilled and unskilled levels contain 73 per cent or 10,219 employees of the animal science industry in Ohio. The largest segment of the work force was reported to be the semi-skilled level

with 5,063 employees or 36.3 per cent of the total. Only 188 or less than two per cent of the workers were classified as professional by their employers.

The technical level of preparation accounted for 1,145 employees or 8.2 per cent of the total. This percentage of technical workers was considerably higher than the 4.6 per cent reported by Bailey in his occupational study in West Virginia.[1] Halterman, however, in a study of the educational needs of agricultural engineering technicians in Ohio found 10.4 per cent of the workers to be classified as technicians.[2]

Part-time employment of approximately ten per cent of the total work force was reported. The distribution revealed the greatest number of part-time workers to be at the skilled level.

TABLE 3.--Distribution of employees in animal science by occupational classification, Ohio, 1964.

Occupational Classification	Number of Employees 1963		Per Cent of Total	
	Full-Time	Part-Time	Full-Time	Part-Time
Professional	188	8	1.3	.6
Managerial	2,406	17	17.2	1.3
Technical	1,145	159	8.2	12.0
Skilled	2,680	598	19.3	45.0
Semi-skilled	5,063	205	36.3	15.4
Unskilled	2,476	342	17.7	25.7
Total	13,958	1,329	100.0	100.0

[1]Joseph K. Bailey, "Non-Farm Employment in West Virginia, with Implications for Program Planning," Ph.D. dissertation, The Ohio State University, 1964, p. 84.

[2]Jerry J. Halterman, Technicians in Agriculture (Sacremento: California State Department of Education, Undated), p. 128.

Current employment opportunities

Placement opportunities, both present and in the immediate future, are vital ingredients of the foundation upon which successful vocational education programs are planned and projected. Table 4 shows a distribution of these employment opportunities for animal science workers in Ohio.

The data contained in this table reveal placement opportunities for 1,119 full-time workers and 199 part-time workers in 1964. It is interesting to note that seventy-two per cent of the employment opportunities in animal science were at the skilled, semi-skilled, and unskilled level. This was not surprising in light of the concentration of workers found at these three levels.

An analysis of placement opportunities with regard to the number of workers reported for each classification in this study revealed that the professional and technical levels afford greater placement opportunities, on a percentage basis, than did the other levels of occupational preparation. This analysis shows an increase in placement potential of 15 per cent at the professional level, 4 per cent at the managerial level, 15 per cent at the technical level, 7 per cent at the skilled level, 7.6 per cent at the semi-skilled level, and 9 per cent at the unskilled level for 1964.

An eight per cent increase in employment opportunities for workers in this study at all levels of occupational preparation, including normal attrition, seemed to indicate a cautious note as far as expansion of training for opportunities in the animal science industry in Ohio was concerned.

TABLE 4.--Distribution of current employment opportunities in animal science by occupational classification, Ohio, 1964.

Occupational Classification	Number of Employees 1963		Per Cent of Total	
	Full-Time	Part-Time	Full-Time	Part-Time
Professional	28	0	2.5	0
Managerial	108	16	9.7	8
Technical	173	16	15.5	8
Skilled	193	32	17.2	16
Semi-skilled	386	39	34.5	20
Unskilled	231	96	20.6	48
Total	1,119	199	100.0	100

Anticipated employment opportunities

Data in Table 5 indicate a continued increase in employment opportunities for workers in animal science in Ohio. These projections of placement opportunities by owners and managers of firms and businesses responding to this inquiry revealed a trend toward fewer workers at the lower levels of occupational classification and a greater number of employees at the technical and professional level of preparation.

This trend was graphically depicted by a comparison of the number of workers at each of the six levels of occupational classification to the anticipated number of employment opportunities for their corresponding classification. This comparison shows a projected increase in employment of professional and technical workers to be 39

per cent and 33 per cent, respectively. The increase for other levels of employment ranged between 10 and 12 per cent with the exception of management which fell to 8.7 per cent.

Part-time employment was projected to be an important part of the animal science employment pattern by employers responding to this item. Four hundred twenty-three part-time positions were anticipated by 1969. Forty-two per cent of the part-time employment opportunities were expected to be in the technical classification.

The data contained in this table show anticipated employment opportunities for 378 full-time animal science technicians and 179 part-time animal science technicians in Ohio by 1969.

TABLE 5.--Distribution of anticipated employment opportunities in animal science five years hence by occupational classification, Ohio, 1964.

Occupational Classification	Employment Opportunities 1969		Per Cent of Total	
	Full-Time	Part-Time	Full-Time	Part-Time
Professional	74	4	4	1
Managerial	209	8	12	2
Technical	378	179	21	42
Skilled	335	70	19	17
Semi-skilled	523	53	30	12
Unskilled	256	109	14	26
Total	1,775	423	100	100

Approximate entry salary

Entry salary is a factor of concern to one electing to enter an occupational endeavor. It is also a critical factor in recruiting and selecting students in vocational technical education programs.

Respondents to the questionnaire concerning the labor force in animal science were asked to report the approximate entry salary for workers in their firm at each level of occupational classification. Table 6 shows the range and mean salary distribution for each level.

The entry salary for animal science workers in Ohio was lower than that reported by Halterman for workers in agricultural engineering at all levels except managerial. The mean difference in entry salary for these two important segments of Ohio agriculture was greatest at the professional and technical levels with $150 and $83 per month, respectively, reported in favor of the agricultural engineering industry. Mean entry salary at the managerial level was $57 per month higher in animal science than in agricultural engineering according to findings in this study and the report by Halterman.[3]

TABLE 6.--Approximate entry salary of employees in animal science by occupational classification, Ohio, 1964.

Occupational Classification	Salary Per Month	
	Range	Mean
Professional	$ 500 - 833	$ 700
Managerial	486 - 800	621
Technical	250 - 526	431
Skilled	317 - 500	407
Semi-skilled	231 - 425	326
Unskilled	205 - 369	267

[3]Halterman, op. cit., p. 132.

Necessity of farm production training

The dramatic change in agriculture due to automation and new technology has resulted in a diminishing number of farm workers and an increasing number of workers in related agricultural occupations. This transition has caused vocational educators to review traditional concepts of vocational agriculture in an endeavor to meet the needs of youth and adults in a changing agriculture. A question of interest to those responsible for vocational education in agriculture is the necessity of farm production training at the high school level for successful performance of the many off-farm agricultural positions. Table 7 presents a summary of the opinions of respondents to the necessity of farm production training for employees in animal science.

These employers indicated that farm production training was necessary for 22.9 per cent of their employees, desirable for 41.5 per cent, and not necessary for 35.7 per cent.

The greatest need of farm production training was indicated for animal science technicians. Employers in this study reported that 42.7 per cent of their technicians need this basic farm training and that it was desirable for another 47.2 per cent of the workers classified at this level.

The data in this study indicate that farm production training was necessary for 36.4 per cent of the managers and 25 per cent of the professional workers in animal science.

Employers responding to this inquiry reported farm training to be unnecessary for workers at the unskilled level and desirable but not necessary for a majority of animal science employees classified at the semi-skilled and skilled level.

TABLE 7.--Employers response to the necessity of farm production training for employees in animal science by occupational classification, Ohio, 1964.

Occupational Classification	Necessity of Farm Production Training[a]		
	Necessary[b]	Desirable[b]	Not Necessary[b]
Professional	10	22	8
Managerial	87	102	50
Technical	76	84	18
Skilled	25	54	80
Semi-skilled	29	114	97
Unskilled	2	39	104
Total	229	415	357

[a]Sixty-six employers did not respond to this item.

[b]Number of employees.

Distribution of technicians by occupational categories

Fourteen categories of animal science were identified that employed 1,145 full-time and 159 part-time animal science technicians in Ohio. A distribution by the number of technicians working in the various categories of animal science is presented in Table 8.

Dairy manufacturing, feed and grain, artificial insemination, and the meat packing industry reported the largest number of animal science technicians. These four categories accounted for 65.2 per cent of the total number of technicians identified.

The number of part-time workers reported is surprisingly high. Of the 159 part-time technical workers in animal science, 100 or 62.9 per cent were employed in the public health category as milk sanitarians.

TABLE 8.--Distribution of animal science technicians by occupational categories, Ohio, 1964.

Occupational Categories	Number of Technicians 1963		Per Cent of Total	
	Full Time	Part Time	Full Time	Part Time
Dairy Manufacturing	251	3	21.9	1.9
Feed and Grain	211	7	18.4	4.4
Artificial Insemination	150	31	13.1	19.5
Meat Packing	135	3	11.8	1.9
Institutional Farms	90	0	7.9	.0
Livestock Marketing	84	0	7.3	.0
Poultry Grading	61	4	5.3	2.5
Public Health	50	100	4.4	62.9
Milk Marketing Coop	27	1	2.4	.6
Hatcheries	21	0	1.8	.0
Livestock Inspection	20	6	1.7	3.8
Agricultural Experiment Station	19	1	1.7	.6
Total	1,145	159	100.0	100.0

Current employment opportunities for animal science technicians

Respondents to the questionnaire were instructed to indicate the number of technicians they would employ if such employees were available. Table 9 shows that employers of animal science firms in this study had indicated current placement opportunities for 173 full-time technicians and sixteen part-time technicians.

The categories reporting the greatest number of current employment opportunities were feed and grain, seventy-six; meat packing, forty-three; dairy manufacturing, seventeen; and artificial insemination, ten.

TABLE 9.--Distribution of current employment opportunities for animal science technicians by occupational categories, Ohio, 1964.

Occupational Categories	Employment Opportunities 1964		Per Cent of Total	
	Full Time	Part Time	Full Time	Part Time
Feed and Grain	76	10	43.9	62.50
Meat Packing	43	0	24.9	.00
Dairy Manufacturing	17	0	9.8	.00
Artificial Insemination	10	5	5.8	31.25
Livestock Marketing	8	0	4.6	.00
Livestock Inspection	6	0	3.5	.00
Poultry Grading	4	1	2.3	6.25
Livestock Producers	3	0	1.7	.00
Milk Marketing Coop	3	0	1.7	.00
Poultry Processing	2	0	1.2	.00
Hatcheries	1	0	.6	.00
Public Health	0	0	.0	.00
Institutional Farms	0	0	.0	.00
Agricultural Experiment Station	0	0	.0	.00
Total	173	16	100.0	100.00

Anticipated employment opportunities for animal science technicians

Employers of animal science firms and businesses in this study indicate the need for 378 full-time and 179 part-time animal science technicians by 1969.

The greatest potential for placement of animal science technicians was in the feed and grain business according to data presented in Table 10. They reported an estimated need of 175 animal science technicians by 1969. Artificial insemination co-operatives indicated a need for fifty more technicians and meat packing, forty.

The public health service reported the greatest need for part-time technicians. They anticipated placement opportunities for 150 part-time technicians. The only other category indicating employment opportunities for part-time animal science technicians was artificial insemination.

Data in this table indicate that a need for animal science technicians exists. Since there have been virtually no training programs for the preparation of animal science technicians in Ohio, it seems logical that the estimated employment opportunities would expand if properly prepared attractive applicants were available. A number of employers in the animal science industry indicated to this writer, in personal interview, the desire to employ fewer skilled workers and more technical workers but the latter were not available.

The estimate of 378 full-time and 179 part-time animal science technicians by 1969 appears to be a cautious projection by owners and managers in the field. This estimate represents about a 6 per cent turnover in the number of technicians reported earlier in this study.

TABLE 10.--Distribution of anticipated employment opportunities five years hence for animal science technicians by occupational categories, Ohio, 1964.

Occupational Categories	Employment Opportunities 1969		Per Cent of Total	
	Full Time	Part Time	Full Time	Part Time
Feed and Grain	175	3	46.3	1.7
Artificial Insemination	50	25	13.2	13.9
Meat Packing	40	0	10.6	.0
Public Health	35	150	9.3	83.8
Dairy Manufacturing	17	0	4.5	.0
Agricultural Experiment Station	14	0	3.7	.0
Livestock Marketing	13	0	3.4	.0
Milk Marketing Coop	8	0	2.1	.0
Livestock Inspection	6	0	1.6	.0
Institutional Farms	5	0	1.3	.0
Poultry Processing	5	0	1.3	.0
Poultry Grading	4	0	1.1	.0
Livestock Producers	3	1	.8	.6
Hatcheries	3	0	.8	.0
Total	378	179	100.0	100.0

Educational needs of animal science technicians

The data presented in Table 11 show composite mean score evaluations of competencies needed by animal science technicians in thirty job titles. Competencies were grouped into four areas of education in order to summarize the data and compare the educational requirements of technicians in the various job titles.

An analysis of the composite mean scores by job titles revealed two major groups. One of the groups indicated a need for agricultural competencies and in most cases very little need for laboratory procedures. The second group acknowledged a need for laboratory procedures but did not indicate a need for agricultural competencies. Both groups indicated that competencies in general education were necessary for successful job performance.

The purpose of this analysis was to identify homogeneous groups or clusters of job titles with similar educational requirements. In order to do this a composite mean score of 2.00 in the agricultural area was used to divide the job titles into the following groups.

Group A -- Needs competencies in animal production

Livestock Inspection, Ohio Department of Agriculture

Cattle Salesman, Livestock Marketing

Swine Salesman, Livestock Marketing

Sheep Salesman, Livestock Marketing

Swine Herdsman, Ohio Institutional Farms

Livestock Herdsman, Ohio Agricultural Experiment Station

Assistant Sales and Plant Managers

Fieldman, Feed and Grain Companies

Field Salesman, Feed and Grain Companies

Sales Manager, Meat Packing

Poultryman, Ohio Institutional Farms

Poultryman, Ohio Agricultural Experiment Station

Salesman, Hatcheries

Dairyman, Ohio Institutional Farms

Dairy Herdsman, Ohio Agricultural Experiment Station

Artificial Inseminators

Dairy Fieldman, Dairy Manufacturing

Dairy Fieldman, Milk Marketing Cooperatives

Public Health Sanitarians

An analysis of the educational requirements of workers within this group of job titles suggested the need for basic understandings and abilities in general education, agriculture and animal science for all workers. In addition to these basic competencies, additional specialities were indicated for certain job titles.

Group B -- Competencies in animal production not necessary

Laboratory Technician, Veterinary Science, Ohio Agricultural Experiment Station

Laboratory Technician, Animal Science, Ohio Agricultural Experiment Station

Laboratory Technician, Dairy Science, Ohio Agricultural Experiment Station

Quality Control Technician, Dairy Manufacturing

Quality Control Technician, Milk Marketing Cooperatives

Quality Control Technician, Meat Packing

Shell Egg Graders, Ohio Department of Agriculture

Poultry Graders, Ohio Department of Agriculture

Plant Managers, Dairy Manufacturing

Sales Managers, Dairy Manufacturing

Caretaker Experimental Animals, Ohio Agricultural Experiment Station

The educational requirements for technicians within this group suggested that a common core of skills, abilities, and understandings were needed for quality control and laboratory technicians.

The competencies needed by poultry graders, shell egg graders, and caretakers of experimental animals were not determined by this inquiry. They indicated some need for understandings and abilities in communications, mathematics, and working with people but reported very little interest in the science or agricultural areas listed.

The last cluster within Group B is that of plant and sales managers working in dairy manufacturing. The inquiry failed to elicit from these technicians and their employers competencies that were necessary for successful performance of their jobs.

TABLE 11.--Composite mean scores of competencies needed by animal science technicians distributed by selected areas of education and job titles.

Job Titles	Composite Mean Scores[a]			
	General Education	Business and Sales	Laboratory Procedures	Agriculture
Livestock Inspection Technician	3.07	1.49	.98	2.02
Livestock Marketing				
Cattle Salesman	3.43	2.18	.53	2.40
Swine Salesman	3.43	2.18	.64	2.59
Sheep Salesman	3.16	2.81	1.00	2.61
Institutional Farms				
Dairy Herdsman	3.01	2.34	1.79	2.67
Swine Herdsman	2.72	1.73	1.01	2.39
Poultryman	3.08	2.15	1.50	2.58
Ohio Agricultural Experiment Station				
Caretaker Experimental Animals	1.91	.37	1.32	1.13
Laboratory Technician (Veterinary Science)	2.16	.87	2.18	1.05

TABLE 11.--Continued

Job Titles	Composite Mean Scores[a] General Education	Business and Sales	Laboratory Procedures	Agriculture
Ohio Agricultural Experiment Station (cont'd)				
Herdsman (Livestock)	3.31	2.04	.66	2.88
Poultryman	3.02	1.66	1.03	2.09
Laboratory Technician (Animal Husbandry)	2.29	.31	2.53	1.16
Dairy Herdsman	3.26	1.96	1.64	2.61
Laboratory Technician (Dairy)	2.53	1.21	2.35	.95
Feed and Grain				
Assistant Sales & Plant Managers	3.33	2.36	1.11	2.08
Fieldman	3.50	2.77	1.67	2.73
Field Salesman	3.43	2.45	1.00	2.43
Artificial Insemination	3.13	2.79	.67	2.14
Poultry Inspection				
Shell Egg Grader	3.43	1.29	.71	.91
Poultry Graders	3.61	1.64	1.35	1.43

TABLE 11.--Continued

Job Titles	Composite Mean Scores[a] General Education	Business and Sales	Laboratory Procedures	Agriculture
Dairy Manufacturing				
Fieldman	3.48	2.47	2.60	2.48
Plant Manager	3.31	2.07	2.03	1.56
Sales Manager	3.50	1.90	1.87	1.06
Quality Control Technician	3.64	1.74	2.98	.87
Milk Marketing Cooperatives				
Fieldman	3.25	1.98	2.12	2.04
Quality Control Technician	3.46	1.72	3.14	1.55
Meat Packing				
Sales Manager	3.46	2.11	1.59	2.21
Quality Control Technician	2.45	.68	2.00	1.02
Public Health Sanitarians	3.41	1.69	2.41	2.03
Hatcheries				
Field Salesman	3.06	2.88	1.93	2.61
Total	3.12	1.86	1.61	1.94

[a]Scale: Very Much (4) Much (3) Some (2) Little (1) No (0)

Time allocation for areas of education

Animal science technicians and their employers from the twelve occupational categories identified in this study were asked to indicate the percentage of time that should be allocated to selected areas of education in a two-year animal science technician training program. The areas selected for consideration included: general education, business and management, animal science supporting agricultural and occupational experience.

Table 12 shows the response of animal science technicians in mean per cent of time recommended for the five areas of education. Public health sanitarians and technicians at the Ohio Agricultural Experiment Station indicated that approximately 1/3 to 1/2 of the time in a two-year animal science technician training program should be allocated to general education. Technicians working on Ohio's Institutional Farms were at the other extreme as far as time recommended for general education. They indicated that 1/6 of the time should be allocated to this area of education.

Technicians working in milk marketing, livestock marketing, poultry processing, and institutional farms reported that about 1/3 of the time in technician training programs should be allocated to animal science. Technicians in the remaining eight categories were in general agreement concerning the time that should be devoted to animal science but reported slightly lower percentages.

Artificial insemination technicians and technical workers in the feed and grain industry recommended that approximately 1/4 to

1/5 of the training time in animal science technician programs be allocated to business and management. Concensus among other technicians responding seemed to center around twelve to fourteen per cent of the training time for business education.

Time allocation for the area of supporting agriculture ranged from a low of 8.33 mean per cent recommended by technicians in meat packing to a high of 17.28 mean per cent recommended by technical workers in livestock marketing.

Animal science technicians recommended that approximately twenty per cent of the time in a two-year training program be allocated to occupational experience. The highest per cent of time recommended for work experience was reported by technicians in poultry inspection, meat packing, and livestock inspection.

Table 13 shows the recommendations of employers to the time distribution for animal science technician training programs. Their recommendations were quite similar to those proposed by technicians.

Table 14 shows composite mean scores of recommendations by technicians and employers to the per cent of time that should be allocated to the five areas of education. These data indicated that technicians and their employers agreed rather closely on the per cent of time that should be allocated to selected areas of education in a two-year animal science technician training program.

The respondents to this inquiry recommended that a predominant part (59%) of an animal science training program should be allocated to the areas of technical specialization and approximately 1/4 of the time spent in general education.

A brief analysis of curricular offerings at the Springfield Technical Education Program, Springfield, Ohio, showed that a minimum of twenty per cent of the training time in that institution was allocated to general education and approximately sixty-five per cent of the time was spent in technical agricultural areas.

Students with a vocational major at Modesto Junior College, Modesto, California, were required to take eighteen units of general education, twenty units in subjects approved by the major department, and the remaining twenty-four units were taken as electives.

The curricula developed at Mt. San Antonio Junior College, Walnut, California, for the preparation of animal science technicians required a minimum of sixteen units in general education, twenty-one units in animal science, and the remaining units in supporting areas of agriculture.

The analysis of time allocated to various areas of education in several two-year post-high school agricultural education programs indicated that recommendations of the respondents in this study concerning the time distribution for technician programs in Ohio were worthy of consideration by professional educators and lay leaders assigned to develop curricula for animal science technician training programs.

TABLE 12.--Mean scores of technician recommendations to the percentage of time that should be allocated to selected areas of education in a two-year animal science technician training program, Ohio, 1964.

Occupational Categories	Mean Per Cent				
	General Education	Business Education	Animal Science	Supporting Agriculture	Occupational Experience
Livestock Inspection	18.76	13.37	29.53	14.91	23.47
Livestock Marketing	18.05	13.33	34.86	17.28	16.55
Institutional Farms	16.52	14.54	33.64	13.44	21.83
Agricultural Experiment Sta.	37.83	9.95	22.96	13.95	15.26
Feed and Grain	21.89	20.17	24.72	17.01	16.21
Artificial Insemination	18.81	23.18	25.21	13.50	18.75
Poultry Inspection	18.63	11.89	25.20	10.68	33.28
Dairy Manufacturing	27.10	14.84	28.85	13.17	15.77
Milk Marketing Coop	20.83	12.08	35.42	15.21	16.45
Meat Packing	27.08	17.50	22.50	8.33	24.58
Public Health	44.37	13.47	18.29	12.20	12.52
Poultry Processing	18.77	14.66	33.11	16.11	17.33

TABLE 13.--Mean scores of employer recommendations to the percentage of time that should be allocated to selected areas of education in a two-year animal science technician training program, Ohio, 1964.

Occupational Categories	Mean Per Cent				
	General Education	Business Education	Animal Science	Supporting Agriculture	Occupational Experience
Livestock Inspection	25.00	25.00	25.00	25.00	.00
Livestock Marketing	21.95	14.62	30.66	12.41	20.29
Institutional Farms	25.33	16.13	28.69	11.05	18.83
Agricultural Experiment Sta.	35.00	7.85	30.00	14.28	11.98
Feed and Grain	19.74	19.73	23.37	19.32	18.03
Artificial Insemination	23.00	17.00	34.00	13.00	13.00
Poultry Inspection	13.33	11.66	23.33	10.00	41.66
Dairy Manufacturing	25.56	20.56	29.44	8.04	16.63
Milk Marketing Coops	26.25	23.75	24.37	15.00	10.62
Meat Packing	30.50	18.75	6.75	6.75	32.50
Public Health	40.00	10.00	22.00	17.00	11.00
Poultry Processing	15.00	22.08	33.92	12.66	17.08

TABLE 14.--Composite mean scores and rankings of recommendations to the percentage of time that should be allocated to selected areas of education in a two-year animal science technician training program, Ohio, 1964.

Area of Education	Composite Mean Per Cent		
	Technician	Employer	Total
Animal Science (production, marketing, and/or processing animals or animal products)	27.86	25.96	26.91
General Education (English and speech; physical, biological and social science; mathematics, etc.)	24.05	25.05	24.55
Occupational Experience (Placement in industry for job training experience)	19.33	17.64	18.48
Business and Management (accounting, salesmanship, bookkeeping, office machines, etc.)	14.92	17.28	16.10
Supporting Agricultural Areas (soil management, crop production, agricultural mechanics, farm business analysis, etc.)	13.81	13.71	13.75

Suggested Curricula for Training Animal Science Technicians

The writer recognized that curricula for the preparation of technical workers cannot be successfully prepared without the involvement of key people in industry and those who will be responsible for administering and teaching the technicians. There was, however, a

definite need for suggested curricula and suggested course content for those initiating such programs to use as a point of departure.

Educational objectives

The development of curricula for the preparation of animal science technicians should be guided by the educational objectives of the training program. The following educational objectives are suggested for an animal science training program:

1. To prepare the student for entrance into his chosen technical specialty in animal science.

2. To help the student develop an appreciation for the importance of getting along well with people.

3. To assist the student in developing a professional attitude toward his work, employer, and fellow employees.

4. To help the student develop a better understanding of himself and his fellow man.

5. To assist the student in improving his sense of social responsibility at home, in his community, and in the world.

6. To provide the opportunity for the student to improve his appreciation of cultural values.

7. To help the student develop an attitude of intellectual curiosity and an appreciation that education is a life-long process.

Identification of technical specialities for curriculum development

The data presented in Chapter V indicated a need for two kinds of animal science technicians in Ohio. According to the educational needs reported by technicians and their employers, one group, containing nineteen job titles, was characterized by a definite need

for competencies in animal science and related agriculture. The second group contained eleven job titles and was differentiated from the first by needing very little competency in agriculture and a strong background in laboratory procedures, basic chemistry, and bacteriology.

An analysis of the occupations within the group reporting a definite need for competencies in animal science revealed that educational needs of technicians in the nineteen job titles could feasibly be grouped into ten technical specialties that would require the preparation of six separate curriculums.

A review of the data in Chapter IV showed only thirty-six technicians reported working in hatcheries and poultry processing with anticipated employment opportunities of three full-time technicians in 1964 and eight by 1969. The writer determined from this data that employment opportunities reported in this study were not sufficient to justify the preparation of curricula for poultry technicians at this time. The technical specialties in this group for which curricula were suggested are as follows:

1. Livestock Marketing
2. Livestock Herdsman
3. Livestock Inspection
4. Artificial Insemination
5. Dairy Fieldman
6. Dairy Herdsman
7. Dairy Inspector, Sanitarian
8. Assistant Sales and Plant Managers, Feed and Grain
9. Feed Fieldman
10. Sales Manager, Meat Packing

In the development of curricula for the foregoing technical specialties, a core of understandings and abilities were identified from the data presented in Chapter V that were common to all technicians in this group. These competencies and others selected by the investigator were assembled into courses and were proposed for the preparation of animal science technicians in each of the options listed.

Core courses recommended for the preparation of all animal science technicians in this occupational cluster.

First Semester

Courses	Units	Hours/Week Lecture	Laboratory
Communications	3	3	-
Mathematics	3	3	-

Second Semester

Report Writing	3	3	-
Introduction to Agricultural Economics	3	3	2
Applied Psychology	3	3	-

Summer Program Between 1st and 2nd Years

Seminar in Animal Science	2	-	-
Animal Science Occupational Experience Program	7	-	-

Third Semester

Speech	3	3	-
Animal Diseases and Parasites	3	2	3
Livestock and Dairy Feeding	3	2	3

Fourth Semester

No core courses.

Options for animal science technicians preparing for positions as livestock marketing salesmen or livestock herdsmen.[a]

Course	Units	Hours/Week Lecture	Laboratory
First Semester			
Beef Production	3	2	3
Pasture Management	3	2	3
Elective in General Education	3	3	-
Second Semester			
Swine Production	3	2	3
Agricultural Economics Records	3	2	2
Third Semester			
Sheep Production	3	2	3
Animal Breeding and Selection	3	2	3
Fourth Semester			
Livestock Management	3	2	3
Salesmanship	3	3	-
Agricultural Marketing	3	2	2
Elective in Business	3	3	
Elective in Agriculture	3	2	3

[a]Substitute Agriculture Mechanics for Salesmanship for those preparing for positions as livestock herdsmen.

Option for technicians preparing for positions in livestock inspection.

Course	Units	Hours/Week Lecture	Laboratory
First Semester			
Agricultural Inspection	3	2	3
Beef Production	3	2	3
Laboratory Procedures	3	2	3
Second Semester			
Swine Production	3	2	3
Elective in General Education	3	3	-
Third Semester			
Dairy Production	3	2	3
Introduction to Business	3	2	3
Fourth Semester			
Sheep Production	3	2	3
Agricultural Marketing	3	2	3
Animal Breeding and Selection	3	2	3
Electives in Business or Agriculture	6	6	-

Option for technicians preparing for positions in artificial insemination.

First Semester

Course	Units	Hours/Week Lecture	Laboratory
Swine Production[a]	3	2	3
Agricultural Economics Records	3	2	2
Elective in General Education	3	3	-
Second Semester			
Beef Production	3	2	2
Laboratory Procedures	3	2	3
Third Semester			
Dairy Production	3	2	3
Animal Breeding and Selection	3	2	3
Fourth Semester			
Artificial Insemination	5	3	6
Salesmanship	3	3	-
Bookkeeping	3	3	-
Elective in Business or Agriculture	3	3	-

[a]May substitute Sheep Production.

Options for technicians preparing for positions as dairy fieldmen, dairy herdsmen,[a] & dairy inspector sanitarian.[b]

First Semester

Course	Units	Hours/Week Lecture	Laboratory
Dairy Production	3	2	3
Pasture Management	3	2	3
Agricultural Economics Records	3	2	3
Second Semester			
Introduction to Business	3	2	3
Animal Breeding and Selection	3	2	3

Third Semester

Course	Units	Hours/Week Lecture	Laboratory
Milk Production	3	2	3
Laboratory Procedures	3	2	3
Fourth Semester			
Dairy Manufacturing	3	2	3
Agricultural Marketing	3	2	3
Agricultural Mechanics	3	2	3
Electives in Business or Agriculture	6	6	-

[a]Substitute Field Crops for Introduction to Business and Soils and Fertilizers for Laboratory Procedures.

[b]Substitute Agricultural Inspection for Pasture Management and Bacteriology for Agricultural Economics Records.

Options for technicians preparing for positions as assistant sales and plant managers or fieldmen[a] in the feed and grain industry.

First Semester

Course	Units	Hours/Week Lecture	Laboratory
Introduction to Business	3	3	-
Agricultural Mechanics	3	2	3
Soils and Fertilizers	3	2	3
Second Semester			
Bookkeeping	3	3	-
Animal Breeding and Selection	3	2	3
Third Semester			
Agricultural Marketing	3	2	3
Dairy Production	3	2	3
Fourth Semester			
Salesmanship	3	2	3
Livestock Management	3	2	3
Field Crops	3	2	3
Electives in Business or Agriculture	6	6	-

[a]Substitute Beef, Sheep or Dairy Production for Bookkeeping.

Option for technicians preparing for positions as sales managers in the meat packing industry.

Course	Units	Hours/Week Lecture	Laboratory
First Semester			
Introduction to Business	3	3	-
Agricultural Mechanics	3	2	3
Elective in General Education	3	3	-
Second Semester			
Beef Production[a]	3	2	3
Pasture Management	3	2	3
Third Semester			
Bookkeeping	3	2	-
Animal Breeding and Selection	3	2	3
Fourth Semester			
Agricultural Marketing	3	2	3
Meats and Meat Products	3	2	3
Livestock Management	3	2	3
Electives in Business or Agriculture	6	6	-

[a]May substitute Sheep or Swine Production.

A similar curriculum for the preparation of quality control technicians was also designed and is included in the original study.

BIBLIOGRAPHY

Public Documents

Emerson, Lynn A. Technical Training in the United States. A report made for the Panel of Consultants on Vocational Education. Office of Education. Washington: U.S. Government Printing Office, 1963.

U.S. Congress. Public Law 87-415, 87th Congress. Manpower Development and Training Act of 1962, 1962.

U.S. Department of Health, Education, and Welfare. Education for a Changing World of Work. Report of the Panel of Consultants on Vocational Education. Office of Education. Washington: U.S. Government Printing Office, 1960.

U.S. Congress. Public Law 88-210, 88th Congress. Vocational Education Act of 1963, 1963.

U.S. Department of Health, Education, and Welfare. Summaries of Studies in Agricultural Education. Vocational Division, Office of Education. Washington: U.S. Government Printing Office.

U.S. Department of Labor. Manpower, Challenge of the 1960's. Washington: U.S. Government Printing Office, 1961.

Books

Henninger, G. Ross. The Technical Institute in America, New York: McGraw-Hill Book Company, Inc., 1959.

Henry, Nelson B. (Editor). The Public Junior College, Part I, Fifty-fifth Yearbook of the National Society for the Study of Education, Chicago, 1956.

Roberts, Roy W. Vocational and Practical Arts Education, New York: Harper, 1957.

Rummel, J. Francis. An Introduction to Research Procedures in Education. New York: Harper & Bros., 1958.

Smith, Leo F. and Lipsett, Lawrence. The Technical Institute, New York: McGraw-Hill Book Company, Inc., 1956.

Venn, Grant. Man, Education, and Work: Post Secondary Vocational and Technical Education, Washington: American Council on Education, 1964.

Articles and Periodicals

Arnold, Walter M. "Meeting Manpower's Needs Through Technical Education," American Vocational Journal, XXXVII, No. 9 (December, 1962).

Arnold, Walter M. "A Look Ahead in Technical Education," American Vocational Journal, XXXIX, No. 4 (April, 1964).

Blackman, J. H. and Dawson, C. G. "Technical Education in the Agricultural Education Program," The Agricultural Education Magazine (November, 1963).

Hamilton, William H. and Bundy, Clarence. "Agricultural Competencies in Retail Feed Business," Agricultural Education Magazine (January, 1965).

Henneman, H. A. "Agricultural Technician Training is No Fantasy," American Vocational Journal (March, 1962).

Mobley, M. D. "Manpower . . . A Serious National Problem," American Vocational Journal (May, 1963).

Unpublished Material

Bailey, Joseph K. "Non-Farm Employment in West Virginia, With Implications for Program Planning." Unpublished Ph.D. dissertation, The Ohio State University, 1964.

Clary, Joseph R. "Guidelines for the Development of Training Programs for Agricultural Technicians." Unpublished Ph.D. dissertation, The Ohio State University, 1964.

Cotrell, Calvin James. "A Study of Factors Essential to Staffing Post-Secondary Technical Education Programs." Unpublished Ph.D. dissertation, The Ohio State University, 1958.

Halterman, Jerry Jack. "Determination of the Educational Needs of Agricultural Engineering Technicians in Ohio." Unpublished Ph.D. dissertation, The Ohio State University, 1964.

Morrison, Richard G. "Development of Techniques and Procedures for Determining Training Needs and Occupational Opportunities for Students of Vocational Agriculture within the Baton Rouge Agri-Business Complex." Unpublished Ph.D. dissertation, Louisiana State University.

Snepp, Neil Owen. "Agricultural Offerings in Community Colleges in the United States." Unpublished Ph.D. dissertation, The Ohio State University, 1963.

Reports

Clark, Raymond M. The Nature of Non-Farm Agricultural Occupations. East Lansing, Michigan: Michigan State University, College of Education, 1962.

Clark, Raymond M. Vocational Competencies Needed in Non-Farm Agricultural Occupations. East Lansing Michigan: Michigan State University, College of Education, 1954.

Cooperative Research Project 629 (8186). Explorations in Research Design: Curricula for Technicians. East Lansing: College of Education, Michigan State University, 1960.

Department of Curriculum Study and Research. A Guide to the Further Development of Industrial Education Centers in North Carolina. Raleigh: State Board of Education, 1963.

Donker, Luverne. Agricultural Technicians. Modesto, California: Modesto Junior College, Department of Agriculture, 1963.

Emerson, Lynn A. Technician Training Beyond the High School. Raleigh: Vocational Materials Laboratory, Division of Vocational Education, North Carolina Department of Public Instruction, 1962.

Frederick, K. T., Hill, Charles W., and Greene, Kingsley L. Employment Opportunities in Certain Occupations Related to Farming in the Syracuse, New York Economic Area. Ithaca, New York: Cornell University Rural Education Department, Division of Agricultural Education, 1961.

Halterman, Jerry J. Technicians in Agriculture. Sacramento: California State Department of Education, Undated.

Horner, J. T. A Study of Non-Farm Agricultural Occupations in Nebraska. Lincoln: Department of Agricultural Education, University of Nebraska, 1964.

McLure, William P. et al. Vocational and Technical Education in Illinois: Tomorrow's Challenge. Urbana: Bureau of Educational Research, College of Education, University of Illinois, 1960.

Phipps, Lloyd J. et al. Technical Education for Rural Areas. Urbana: Vocational and Technical Education Department, College of Education, University of Illinois, 1964.

Reese, Robert M. and Woodin, Ralph J. Meeting Ohio's Needs for Vocational and Technical Education. Ohio Department of Education, 1957.

Sherman, G. Allen. Technicians in Agriculture. Walnut, California: Mt. San Antonio College, Department of Agriculture, 1963.

Sutherland, S. S. and Thompson, O. E. Developing Agricultural Business Curricula in California Junior Colleges. Sacramento: California State Department of Education, 1962.

_____. Proceedings of the Second Coordination Conference on State Research Projects in Agricultural Education. National Center for Advanced Study and Research on Agricultural Education, The Ohio State University, January, 1964.

_____. Proceedings of the National Seminar on Agricultural Education for Preparing Agricultural Technicians. National Center for Advanced Study and Research in Agricultural Education, The Ohio State University, July, 1964.

Other Sources

Catalog, Modesto Junior College, Modesto, California, 1963-64.

Catalog, State University of New York, Agricultural and Technical Institute, Cobleskill, 1963-64.

Catalog, State University of New York, Agricultural and Technical Institute, Farmingdale, 1963-64.

Catalog, State University of New York, Agricultural and Technical Institute, Delhi, 1963-64.

Catalog, State University of New York, Agricultural and Technical Institute, Canton, 1963-64.

END

7 25 68