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ABSTRACT

Because of the increasing interrelationships in the production, processing, and distribution of agricultural products, many persons require competencies gained through instructional programs of vocational agriculture. While it is not difficult to estimate the potential training requirements in the production sector alone, identification of occupations in allied industries is more complex. To make this determination, the Standard Terminology for Curriculum and Instruction in Local and State School Systems was used as standard reference to define such occupations. This was supplemented by the experience of Texas agricultural and agribusiness specialists who evaluated job titles used in classifying survey employment data from the 1970 Census of Population. Agricultural and related employment was grouped by the following criteria: Group 1--agricultural or related competencies in industry, and Group 2--selected industries or occupations in which only a portion of the work requires agriculture or related competencies. Recommendations for additional training by the Texas labor force in the fields of production agriculture, land economics and real estate, gardeners and groundskeepers are proposed. Five appendixes are included.
(Author/BP)

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EMPLOYMENT AND TRAINING NEEDS
IN TEXAS AGRIBUSINESS

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DIGEST

Development and evaluation of vocational education programs requires knowledge of current and projected occupations which utilize the competencies gained from instructional programs. Because of the increasing interrelationships involved in the production, processing and distribution of agricultural products many persons in this chain, in addition to persons in the production sector, require competencies gained through instructional programs of vocational agriculture. While not difficult to estimate the potential training requirements in the production sector alone, identification of occupations in allied industries involves a detailed search over all occupations and industries. The Standard Terminology for Curriculum and Instruction in Local and State School Systems, published by the Office of Education was used as a standard reference to determine occupations which may require agricultural or related competencies. This was supplemented by the experience of Texas agricultural and agribusiness specialists who evaluated job titles used in classifying survey employment data from the 1970 Census of Population.

In 1970, over 500,000 jobs existed in 141 occupations requiring agricultural or related knowledge. These jobs were found in 172 industries with approximately half in twelve industries involved in the production of agricultural, horticultural, forestry and fishery products and related services and processing industries. The remaining occupations were in areas such as education, agricultural and food product sales, banking and real estate. While not all occupations identified require formal agricultural training and many require training in addition to that received from programs of vocational agriculture, analysis of the data leads to several recommendations for Vo-Ag. curriculum development.

Production agriculture

Production agriculture, while becoming less labor intensive will in the future, require a higher quality of human input. With a technologically dynamic agriculture this means that vocational-agriculture instructional programs will require constant evaluation and revision to assist in the training of this manpower. Additional programs of continuing adult education stressing farm record keeping and farm equipment maintenance and operating safety is encouraged.

A larger number of wage and salaried workers than self employed operators identified agriculture as their major source of employment. Almost 90,000 wage and salaried persons were tabulated by the 1970 Census of Population compared with 73,536 farm operators and tenants who earned over half of their income from farm operations. New courses of instruction dealing with farm personnel management and increased emphasis on occupational safety is encouraged.

Land economics and real estate

Emphasis on land conservation practices relating both to agricultural and non agricultural land use is recommended. The establishment of the Texas Real Estate Center at Texas A&M University provides a new resource for developing courses of instruction in land management and appraisal.

Gardeners and Groundskeepers

The existence of almost 20,000 gardeners and groundskeepers in Texas suggests that further study should be undertaken to determine the feasibility of expanding cooperative education offerings in landscape and grounds maintenance. Gardeners and groundskeepers are employed in over 125 industries in Texas. The continuing emphasis on environmental beauty suggests that higher skilled employees will be required in the future.

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ACKNOWLEDGMENTS AND PROJECT STAFF

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In addition, Mr. J. A. Marshall and Mr. Garland Scroggins, Director and Assistant Director, Agricultural Education, Texas Education Agency provided valuable support and technical advise. Mr. Oscar Millican, Assistant Director, Division of Occupational Research and Development provided administrative guidance and liaison for the project.

Mr. Ed Ney and Mr. Randall Keeling of the Texas Employment Commission generously made available occupational data and provided encouragement and suggestions throughout the study. During all stages of the project, close liaison was maintained with members of the National Committee on Employment Opportunities and Training Needs in Agribusiness which assisted in development of consistent and meaningful guidelines to identify agricultural and related occupations. Comments and suggestions made by Mr. Walter Sellers on an earlier draft are especially appreciated.

Although benefiting greatly from the advise and assistance of the above people, any errors which remain are the sole responsibility of the authors.

PREFACE

Agriculture and the industries which it supports, more commonly known as the agribusiness sector, play an important role in the overall Texas economy. Total value has been estimated at upwards of \$10 billion annually. While research relating to total output and capital requirements in Texas agribusiness is well grounded, systematic research relating to employment and human resource needs in agricultural and related occupations is still nascent.

That the term agriculture is no longer synonymous with simply the production of crops and livestock has been known by agricultural leaders for several decades. In the mid 50's the President's Panel of Consultants on Vocational Education recommended that:

The vocational agriculture program, under Federal reimbursement, should be broadened to include instruction and increased emphasis on management, finance, farm mechanization, conservation, forestry, transportation, processing, marketing the products of the farm, and other similar topics.

The ideas expressed culminated in the passage of Public Law 88-210 in 1963, better known as the Vocational Education Act of 1963.

Furthermore, the increased emphasis on the "world of work" embodied in the concept of career education also points to the expanding awareness of the need for ongoing evaluation of existing instructional programs and development of new courses of instruction at the elementary, secondary and post-secondary levels.

The need for additional in depth data relating to current and projected manpower needs was recognized by The Advisory Council for Technical-Vocational Education in Texas when it recommended that compilation of "labor market data and information....is in all probability one of the most critical needs in the Management and Planning aspects of technical-vocational education in the state of Texas." The report of the Tri-Agency Task Force charged with developing a concept of the overall design of a manpower supply/demand system for Texas also recognized the critical need for data to provide an adequate base for making responsible decisions to meet the future educational and labor force requirements of the state.

This report uses data from the 1970 Census of Population to

provide guidelines for planning curricula in agriculture and its related fields. While oriented primarily towards needs which can be met by educational programs of vocational-agriculture, the results can also be generalized to include the broader aspects of career education at the elementary, secondary and college levels.

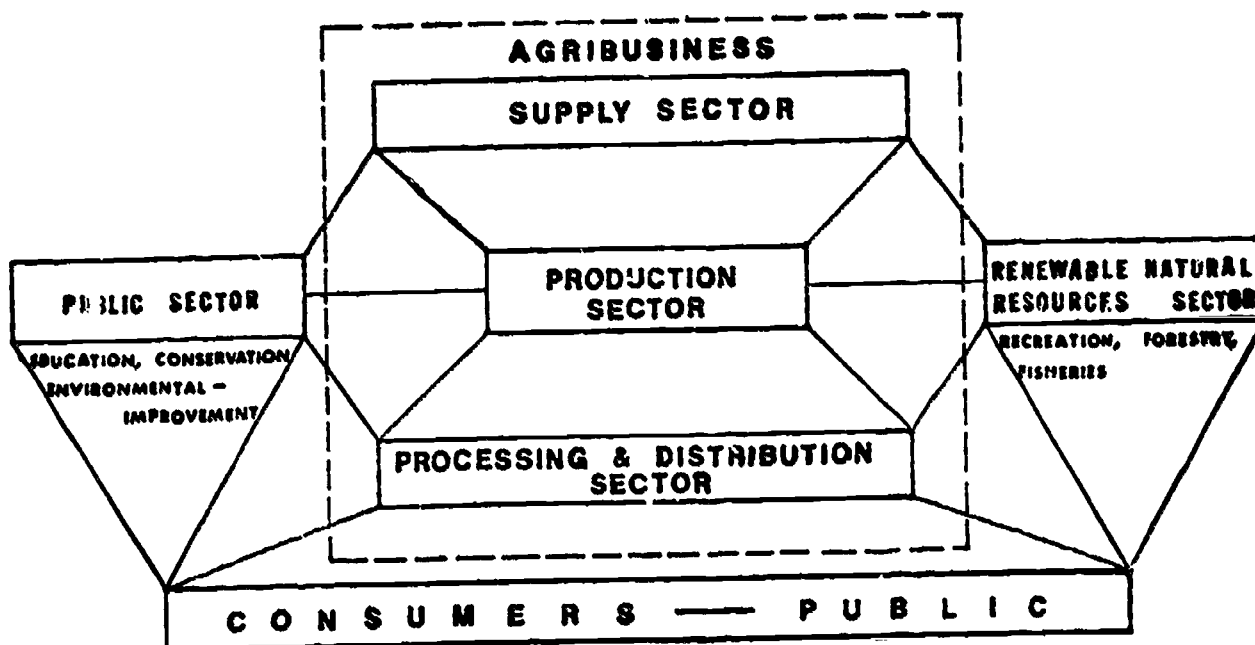
MANPOWER REQUIREMENTS IN AGRICULTURE AND RELATED OCCUPATIONS

INTRODUCTION

Over the past three decades agriculture has evolved in the public mind from simply a producer of raw agricultural output to a multifaceted complex of interrelated activities involving the production, processing and distribution of the nation's food and fiber. This complex is assisted by public services relating to conservation of natural resources and by formal and informal programs of education and research. Additionally, the forestry, fishery and recreation industries are closely tied to agricultural processes through efficient conservation and use of natural resources.

The term agricultural and related occupations used throughout the report refers to those occupations in the agribusiness sector defined here as including supply, production and processing and distribution sectors, as well as those occupations in the public sector and in the renewable natural resource sector, in which successful, on the job performance could be enhanced by knowledge of agriculture and agricultural processes (Figure 1).

Figure 1. Agribusiness and Related Industries



Development of Consistent Decision Criteria

To arrive at an acceptable, comprehensive and workable definition of agricultural and related competencies it is necessary to begin with a common source document which has basic acceptance to most people. Working in conjunction with the National Committee on Employment Opportunities and Training Needs in Agribusiness, composed of representatives from the U. S. Departments of Health, Education and Welfare; Agriculture; and Commerce (Bureau of the Census), initial concepts and ideas were developed.

The National Committee provided guidance to each of the states undertaking individual state studies. While the general guidelines and procedures were developed by the National Committee and the special Task Force working with the Committee, each state was encouraged to adapt the results developed at the national level to the conditions existing in the state.

The base document used to define occupations requiring agricultural and related competencies was developed from the agricultural section of the Standard Terminology for Curriculum and Instruction in Local and State School Systems published by the Office of Education. It is reproduced in Appendix I. Eight specific areas of competency are defined by this document as relating to agriculture.

- 1) agricultural production
- 2) agricultural supplies/services
- 3) agricultural mechanics
- 4) agricultural products
- 5) ornamental horticulture
- 6) renewable natural resources
- 7) forestry
- 8) other agribusiness

As a part of a national identification procedure, 30 specialists from Texas representing agricultural production and agribusiness, education and government were requested to select agricultural and related occupations within their specialty areas using the above source as a basic reference. The specialists were chosen based on their direct knowledge of agricultural and related occupations and were requested to augment the formal documentation by their own experience.

The occupation and industry classifications used were obtained from the Classified Index of Industries and Occupations, 1970 Census of Population, developed and published by the Bureau of the Census. This classification scheme conforms with industry and occupation data published from the 1970 Census of Population. The 215 industry groupings and 417 occupational groupings contained in the Index represent approximately 19,000 industry and 23,000 occupational titles. Even so, the reduced Census form contains upwards of 90,000 different combinations of industries and occupations.

Meeting in a two day conference November 8 and 9, 1972, the specialists representing the eight areas of concentration outlined above each made selections concerning the relevance of the particular occupation in each industry where the occupation was found.

The work performed by the Texas panel was similar to that done in eight other states. Included in this initial phase, in addition to Texas, were New York, Pennsylvania, South Carolina, Ohio, Minnesota, Iowa, California and Oregon.

The results of these special panels were collated and reviewed by the National Committee in December 1972.

Data Limitations

The data presented in this report are tabulations of results from the twenty percent sample of Texas households taken for the 1970 Census of Population. The employment data reflect the occupational distribution of the work force 16 years of age and older as of the last week in March, 1970. Although other data sources are available which provide estimates of either industry labor force distribution or occupational distribution, the Decennial Census of Population provides the only comprehensive source of occupational distribution within industries.^{1/}

Employment data is also obtained from the Bureau of Labor Statistics establishment surveys, i.e. direct surveys of industry establishments. These data are generally thought to provide greater accuracy than data

^{1/} The Census questions from which the data in this report are derived are reproduced in Appendix II.

from household surveys since they reflect actual industry employment at a given point in time.^{1/} Although providing more accurate estimates of industry employment, currently available establishment surveys underestimate total labor force participation since they cover only wage and salaried payrolls in non agricultural industries and include only people actually working during the survey period. Within this limitation there may be a slight overcount to the extent that workers are included on more than one payroll during the survey period.

Slight underestimation of the total labor force also occurs in the Census count. This is due to difficulties involved in definition of the household population from which samples are drawn.

When results from both household and establishment surveys are adjusted for conceptual differences, the household survey data consistently provide lower overall estimates of labor force participation although variations exist between industries. As seen in Table I, estimates from household surveys are lower than corresponding estimates from establishment surveys in mining, wholesale and retail trade and the service sector. They are higher in construction, manufacturing, transportation and public utilities and government. The discrepancy between the two data sources is largest in construction, wholesale and retail trade and services. While the figures in Table I reflect only national labor force estimates they provide an indication of potential discrepancies existing in state data.

^{1/} Christopher G. Geilner, "A 25-Year Look at Employment as Measured by Two Surveys," Monthly Labor Review, Washington, B.L.S., U.S. Department of Labor, July 1973, pp. 14-23. In addition to the Decennial Census of Population, the Bureau of the Census also conducts monthly surveys of 45,000 households-the Current Population Survey (CPS)-which provides occupation/industry data. These two sources provide the basis for the household employment estimates produced by the Bureau of Labor Statistics.

Table I. Comparison of Employment Estimates from Household and Establishment Surveys, by Industry Groups*

Industry	Comparison of Household Survey Estimates with Establishment Survey Estimates	Percent of Total Labor Force in each Industry (household estimate)
	-----Percent-----	
Mining	- 4.1	.8
Construction	+10.5	5.5
Manufacturing	+ 2.7	27.5
Transportation & Public Utilities	+ 1.3	6.4
Wholesale & retail Trade	- 9.0	20.3
Finance, Insurance & Real Estate Services	+ .2	5.6
Government	-16.0	15.0
	+ .3	18.9
Total	<u>- 2.9</u>	<u>100.0</u>

* The comparisons reflect household survey estimates beginning with 1972. This was the first year that estimates were adjusted to reflect the new totals from the 1970 Census of Population.

Source: Christopher G. Gellner, "A 25-Year Look at Employment as Measured by Two Surveys," *Monthly Labor Review*, Washington, B.L.S., U. S. Department of Labor, July 1973, pp. 14-23.

The data presented in this report are designed to provide estimates of the proportion of the labor force in which knowledge of agriculture and agricultural processes could improve on-the-job performance. While providing very good estimates of manpower requirements in production related occupations, estimates of employment in the remaining agriculturally related occupations contain both over and underestimates of the true values. Over estimates occur when the individual industry-occupation cell overaggregates employment requirements. For example, all officials of lodges, societies and unions are tabulated in one industry/occupation cell. Over 100 different organizations are represented under this heading, but only officials associated with agricultural organizations such as the

Farm Bureau, Growers marketing services, etc. require agricultural or related competencies. To exclude this occupation group would exclude many hundreds of persons who require very direct knowledge of agriculture in the course of daily business operations. Conversely, agriculture teachers are undercounted since this Census category includes only college level instructors.

A more serious source of undercount occurs in occupations such as recreation and conservation personnel employed by the state and federal government. Although appearing under the general heading of foresters and conservationists the future importance of this employment is underestimated by sole recourse to 1970 Census data.

Census data were adjusted to represent a more accurate occupation estimate in only one situation. Census tabulation combined all secondary school teachers regardless of area of specialty and reported them as a single occupation group. Data obtained from the Texas Education Agency, which included only science and vocational-agriculture teachers, were substituted to provide a more realistic figure.

Finally, when interpreting figures presented in this report it must be acknowledged that employment estimates provide only one criterion for measurement of training requirements. No attempt is made to determine the level or type of agricultural knowledge required in the identified occupations or the methods by which the agricultural competencies involved in each occupation can be obtained. These interpretations fall outside the scope of this report.

The Texas State Employment Matrix

The basic decisions made by the panel of specialists and reviewed by the National Committee were taken as a base for developing Texas agricultural and related occupations. In addition to this base, occupations relating to courses of instruction currently being offered through the Vocational-Agriculture program and in Colleges of Agriculture in the state were used to provide additional guidelines concerning the definition of an agricultural and related occupation.^{3/}

3/

See Appendix IV for a list of the areas of instruction in vocational agriculture currently being offered in Texas.

Of the 215 industry groupings and 417 occupational groupings, defined by the Bureau of the Census, a total of 141 different occupations in 172 different Texas industries were identified as including people requiring agricultural or related competencies. This reduces the decision matrix by approximately three-quarters or to slightly less than 25,000 potential occupation/industry combinations.

For ease of presentation, occupations are grouped by the following criteria:

Group I---Occupations that require or utilize agricultural or related competencies in any industry in which they are found.

Group II--a) occupations that require or utilize agricultural or related competencies only in selected industries, or
b) occupations within selected industries in which only a portion of the workers require agricultural or related competencies.

A major problem with the development of manpower data sufficiently precise for use in educational planning lies in the difficulty of relating employment needs jointly by occupations and industry. Identification of those occupations requiring agricultural or related competencies across all industries wherever they may exist is a more difficult task than simple determination of total employment in industries which have previously been defined as agribusiness. The matrix approach used to present the Census of Population data is the most direct method of arriving at this cross comparison.

It should be noted that this classification scheme uniquely separates occupations into either Group I or Group II. Nineteen individual occupations were identified in Group I with an additional 122 occupations in Group II. The occupations are further grouped by importance of agricultural and related occupations in total industry employment to provide easier identification of the major concentrations of agricultural and related employment.

AGRICULTURAL AND RELATED EMPLOYMENT IN TEXAS

To gain a perspective of the importance of agricultural and related employment within the occupations identified as including workers requiring agricultural or related competencies, the discussion in this chapter will utilize the importance of employment within industries as an aid to classifying agricultural or related employment. Because of the data limitations described earlier, not all employment in occupations defined as agricultural and related actually requires agricultural or related competencies. It is reasonable to assume however, that a much larger proportion of employment in identified occupations requires agricultural or related competencies when occurring in industries with a close association to agricultural production than when found in industries with more tenuous ties to agricultural production. Employment was therefore classified into five industry groups based on the proportion which employment in agricultural and related occupations is of total industry employment.

Agricultural and Related Employment within Industry Groupings

Of the 172 individual industries identified as having agricultural or related employment, 77 industries had employment in both Group I and Group II with the remaining 95 having occupations only in Group I or only in Group II (Table II).

It is also seen from Table II that the 77 industries with Group I and Group II employment account for 94 percent of the estimated 514,382 employees in occupations requiring agricultural or related competencies in 1970. Of this total, 207,817 or 40 percent were in Group I employment.

Almost half of the total employment in occupations identified as agricultural or related was concentrated in the 12 industries in which agricultural and related employment made up 50 percent or more of total industry employment. Almost 90 percent of the employment in these 12 industries was concentrated in ten industries having about three-quarters or more of their employment defined as agricultural or related (Table III). Because of the heavy concentration of employment

Table II. Summary Distribution of Major Industries With Agricultural and Related Occupations, Texas, 1970.

Percent Agricultural and Related Employment of Total Industry Employment	Number of Industries	Group I Agricultural and Related Employment	Group II Agricultural and Related Employment	Sum of Group I and II Employment
Greater than 50%*	12 (7.0)	180,001 (86.6)	68,802 (22.4)	248,803 (48.4)
25% to 49.9%*	16 (9.9)	10,858 (5.2)	105,744 (34.5)	116,602 (22.7)
10% to 24.9%*	17 (9.9)	7,441 (3.6)	71,413 (23.3)	78,854 (15.3)
Up to 10%*	32 (18.0)	2,632 (1.3)	38,731 (12.6)	41,363 (8.0)
All others with either agricultural or agriculturally related occupations	95 (55.2)	6,885 (3.3)	21,875 (7.1)	28,760 (5.6)
Totals	172 (100)	207,817 (100)	306,565 (100)	514,382 (100)

*Includes only industries with both Group I and Group II agricultural and related occupations.

directly associated with agricultural production, services and allied primary products almost three-quarters of the employment in the 12 industries on Table III is identified as Group I employment. However, the food processing and related products industry provided the second largest number of opportunities in occupations classified as agricultural or related.

Industries with agricultural and agriculturally related occupations with 25 to 49.9 percent of all industry occupations are listed in Table IV. The distribution of Group I and Group II type employment is almost the reverse of that indicated for industries with half or more of total employment in agricultural or related occupations. Over 90 percent of the estimated employment is identified as Group II employment. Industries included in Table IV are heavily oriented toward tertiary service industries related to agriculture, fisheries and forestry, and include farm machinery and equipment, canning preservation and distribution of farm products, real estate, credit agencies and business management and consulting firms. In addition, non-profit membership organizations, which include agricultural trade associations and farm organizations and state public officials are included in this group.

Table V lists industries with less than 25 percent, but more than 10 percent of total employment identified as agricultural or related. The 17 industries are similar to the industries in Table IV in that they provide services to the primary agricultural, fisheries and forestry sector. In addition, occupations in recreation and entertainment industries are included in Table V. Persons employed in local and Federal government are also included.

The remaining industries in which both Group I and Group II employment are found are listed on Table VI. While accounting for almost 25,000 employees who may require agricultural or related competencies, this employment is spread over 31 different industries. Relevant occupations include sales personnel who may have direct business associations with agricultural production firms, employment related to conservation and environmental protection, as well as employment associated with conservation of land and water resources as by-products of the extractive industries. In other cases management positions will be included in this list. Additionally, draftsmen or engineers in

Table III. Industries with Agricultural and Related Occupations Totalling at Least 50 Percent of all Occupations in the Industry, Texas, 1970.*

Industry	Census Code	Group I Agricultural and Related Employment	Group II Agricultural and Related Employment	Total Group I and Group II	Total Industry Employment	Agricultural and Related Employment as a Percent of Industry Emp.
Agricultural production	017	159698	3891	163589	166947	98.0
Agricultural services except horticultural	018	6696	7155	13851	15541	89.1
Horticultural services	019	6071	1730	7801	8138	95.9
Forestry	027	308	557	865	994	87.0
Fisheries	028	1559	791	2350	2639	89.0
Logging	107	46	3517	3563	4555	78.2
Meat products	268	3168	8479	11647	14609	79.7
Food and related products	527	1162	20773	21935	39174	56.0
Farm products-raw materials	528	219	4518	4737	6255	75.7
Hardware & farm equipment stores	608	873	7272	8145	10949	74.4
Farm & garden supply stores	679	176	5434	5610	8499	66.0
Retail Florists	689	25	4685	4710	5817	81.0
TOTAL		180001	68802	248803	284117	87.6

*Includes only industries with Group I and Group II agricultural and related occupations.

Table IV. Industries with Agricultural and Related Occupations Totaling from 25 Percent to 49.9 Percent of All Occupations in the Industry, Texas, 1970.*

Industry	Census Code	Group I Agricultural and Related Employment	Group II Agricultural and Related Employment	Total Group I and Group II	Total Industry Employment	Agricultural and Related Employment as a Percent of Industry Emp.
Sawmills, planing mills & mill work	108	62	3576	3638	12700	28.6
Farm machinery & equipment	178	**	875	875	2032	43.1
Dairy products	269	121	2024	2145	5537	38.7
Canning & preserving fruits, vegetables & seafoods	278	94	2427	2521	7688	32.8
Grain-mill products	279	348	1738	2086	6821	30.6
Pulp, paper, & paperboard mills	328	48	1765	1813	7079	25.6
Services incidental to transportation	429	46	1081	1127	4017	28.1
Lumber & construction materials	569	**	2843	2843	7861	36.2
Grocery stores	628	7156	19490	26646	95614	27.9
Food stores, n.e.c.	638	861	581	1442	4529	31.8
Credit agencies	708	39	6234	6273	19744	31.8
Insurance	717	**	32784	32784	78492	41.8
Real estate, inc. real estate insurance-law offices	718	1725	18779	20504	45159	45.4
Business management & consulting services	738	**	1734	1734	6283	27.6
Nonprofit membership organizations	887	87	5322	5409	13624	39.7
State public administration	927	211	4551	4762	17399	27.4
TOTAL		10858	105744	116602	334579	34.9

*Includes only industries with Group I and Group II agricultural and related occupations.

**The expanded estimate was less than 25 and is included in the Group II industry estimate. The column totals reflect the original distribution and hence do not sum to the totals given.

Table V. Industries with Agricultural and Related Occupations Totaling from 10 Percent to 24.9 Percent of All Occupations in the Industry, Texas, 1970.*

Industry	Census Code	Group I Agricultural and Related Employment	Group II Agricultural and Related Employment	Total Group I and Group II	Total Industry Employment	Agricultural and Related Employment as a Percent of Industry Emp.
Misc. wood products	109	**	429	429	3187	13.5
Misc. food preparation & kindred products	297	146	1953	2099	10057	20.9
Agricultural chemicals	367	**	384	384	2106	18.2
Warehousing & storage	418	216	1611	1827	10545	17.3
Air transportation	427	**	3241	3241	25881	12.5
Wholesalers, n.e.c.	587	49	2745	2794	17380	15.5
Misc. general merchandise stores	627	34	2077	2111	16009	13.2
Banking	707	**	10356	10356	47517	21.8
Business services, n.e.c.	748	**	2832	2832	23802	11.9
Misc. repair services	759	433	2868	3301	19523	16.9
Lodging places exc. hotels and motels	778	97	805	902	6122	14.7
Misc. entertainment & recreation services	819	1566	1437	3003	15323	19.6
Colleges & universities	858	1619	9591	11200	81164	13.8
Educational services, n.e.c.	867	**	1142	1142	10504	10.9
Engineering & architectural services	888	**	2248	2248	17047	13.2
Federal public administration	917	1391	18704	20095	102254	19.7
Local public administration	937	<u>1804</u>	<u>9086</u>	<u>10890</u>	<u>65502</u>	<u>16.6</u>
TOTAL		7441	71413	78854	474523	16.6

*Includes only industries with Group I and Group II agricultural and related occupations.
 **The expanded estimate was less than 25 and is included in the Group II industry estimate. The column totals reflect the original distribution and hence do not sum to the totals given.

Table VI. Industries with Agricultural and Related Occupations Totaling up to 10 Percent of All Occupations in the Industry, Texas, 1970.*

Industry	Census Code	Group I Agricultural and Related Employment	Group II Agricultural and Related Employment	Total Agricultural and Related Employment	Total Industry Employment	Agricultural and Related Employment as a Percent of Industry Emp.
Crude petroleum & natural gas extractions	049	120	5,034	5,154	90,921	5.7
Nonmetallic mining & quarrying, exc. fuel	057	**	**	**	6,233	.3
General building contractors	067	142	509	651	64,086	1.0
General contractors, exc. building	068	396	4,403	4,799	78,690	6.1
Special trade contractors	069	**	**	91	121,056	.1
Not specified construction	077	**	**	100	27,483	.4
Furniture & fixtures	118	**	**	**	15,240	.1
Cement, concrete, gypsum, & plaster products	127	**	438	438	12,380	3.5
Fabricated structural metal products	158	**	129	129	23,869	.5
Machinery, except electrical, n.e.c.	197	**	1,055	1,055	30,127	3.5
Misc. manufacturing industries	259	**	829	829	11,544	7.2
Beverage industries	289	61	156	217	10,342	2.1
Yarn, thread, & fabric mills	317	**	213	213	5,752	3.7
Printing, publishing & allied industries, exc. newspapers	339	**	549	549	22,138	2.5
Industrial chemicals	347	35	893	928	27,326	3.4
Drugs & medicines	357	128	**	128	2,388	5.4
Misc. chemicals	368	**	54	54	3,546	1.5
Trucking service	417	54	2,918	2,972	51,986	5.7
Electric light & power	467	86	1,487	1,573	26,368	6.0
Water supply	477	86	747	833	9,953	8.4
Sanitary services	478	81	**	81	9,657	.8
Other & not specified utilities	479	**	36	36	869	4.1
Drugs, chemicals, & allied products	508	**	44	44	9,378	.5
Machinery equipment & supplies	539	302	977	1,279	33,478	3.8
Misc. Retail stores	697	133	1,071	1,204	29,652	4.1
Commercial research, development, & testing labs	729	105	211	316	4,463	7.1
Employment & temporary help agencies	737	**	**	25	6,318	.4
Theaters & motion pictures	807	29	31	60	10,032	.6
Health services, n.e.c.	848	120	661	781	13,059	6.0
Secondary schools	857	501	16,034	16,535	232,963	7.1
Welfare services	878	**	71	71	11,160	.6
Misc. professional & related services	897	**	180	180	7,009	2.6
TOTAL		2,632	38,731	41,363	1,009,466	4.1

*Includes only industries with Group I and Group II agricultural and related occupations.

**The expanded estimate was less than 25. The estimated values are included however, in the remaining industry entries. Because of this redistribution, the column totals presented do not equal the sum of the column entries.

manufacturing industries who are responsible for equipment design and performance require understanding of agricultural and related processes in order to develop equipment required in mechanized agriculture.

Of the remaining industries in which only Group I or Group II employment was identified, the dominant occupation cited is that of gardeners and groundskeepers. They are scattered over 127 industries with almost 20,000 employees included in this category. Turf management employees are included as a sub classification.

Agricultural and Related Occupations Within Occupation Groupings

Viewing occupational distributions within an industry context is suggestive of the overall importance of agricultural and related employment in the industry. The distribution of occupations within each of the four major industry groupings provides the framework for a more detailed discussion in this section of the type of competencies required. Whereas in the previous section the importance of agricultural and related employment was determined relative to total industry employment, in this section occupational importance within each of the four major Group II industry classifications will be discussed. Agricultural and related employment will be compared with total employment in each respective occupational classification for Group II occupations. Because of the close relationship of Group I employment to agricultural production and, by definition, the inclusion in Group I of only those occupations in which all occupation/industry combinations could be identified as agricultural or related, this employment will also be considered as a separate group.

Group I Employment

A large proportion of Group I employment is composed of direct agricultural production related employment as shown in Table VII.

Over three quarters of these workers are either farmers or employed by farmers, with an additional 12 percent associated with marine industries, veterinary aides or other assistants in the care of livestock and animals and gardeners and groundskeepers. Meat cutters

Table VII. Group I Workers in Occupations that Require or Utilize Agricultural and Related Competencies in any Industry in Which They Exist

Occupation Cluster	Number	Percent of Total State Employment in Occupation Cluster
PROFESSIONAL, TECHNICAL & KINDRED WORKERS.....	5022	100
Farm management advisors	412	
Foresters & conservationists	1220	
Agricultural scientists	645	
Veterinarians	1332	
Agriculture teachers, college & university	285	
Agricultural & biological technicians	1128	
CRAFTSMEN & KINDRED WORKERS.....	2184	100
Farm implement mechanics	1875	
Millers, grain, flour & feed	309	
OPERATIVES.....	13113	100
Meat cutters & butchers	13113	
LABORERS, EXCEPT FARM.....	24512	100
Animal caretakers, except farm	3037	
Fishermen & oystermen	1737	
Gardeners & groundskeepers, except farm	19738	

Table VII. Continued

Occupation Cluster	Number	Percent of Total State Employment in Occupation Cluster
FARMERS & FARM LABORERS.....	162986	100
Farmers, owners & tenants	73536*	
Farm managers	8694	
Farm foremen	9882	
Farm laborers	<u>70874</u>	
TOTAL	207817	100

*The Census of Agriculture reports 133,216 operators of part-time and retirement farms and farms with total agricultural sales of less than \$5,000 in 1969. Farms with sales of \$5,000 or more totaled 80,254 which compares favorably with the Census of Population figures. The 133,216 figure represents the maximum under-count of farmers and farm operators by the Census of Population and occurs because of differences in sample design and Census orientation. The employment data from the Census of Population reflects the major time spent in a job. The Census of Agriculture counts all farm operators with no regard to major source of earnings.

The Census of Agriculture further estimates that 128,269 farm operators reported non-farm earnings of which 100,329 reported at least 100 days of non-farm employment. Some of this employment may already be included in the agricultural and related employment presented in this report, and hence should not be recounted.

and butchers provided employment for over thirteen thousand persons in 1970 and constitutes an important occupation group.

Slightly over five thousand professional, technical and kindred workers, or about 2.4 percent of total Group I employment in these occupations were identified. This number represents an underestimation of teachers requiring knowledge of agricultural or related processes due to the Census classification scheme. Others are included under the general heading of secondary schools and colleges and universities and appear as Group II employment.

As noted in the footnote to Table VII, a smaller number of farmers is identified by the Census of Population than by the Census of Agriculture. This is primarily due to a difference in definition by the two Censuses. The figure estimated by the Census of Population includes only persons whose major employment was in production agriculture while the Census of Agriculture figure includes operators of part time and retirement farms who also receive additional outside income. Technically, a portion of the additional 133,216 persons should also be included within the general Group I framework. However, since it is not known how many are primarily employed in other agriculturally related occupations, none are included in order to eliminate the possibility of double counting. It is interesting to note that when identified by major source of employment, farm wage and salaried workers outnumber self employed farmers and tenants.

Group II Employment

Whereas most of the occupations listed under Group I are related to agricultural production, employment in Group II occupations is more heavily oriented toward management, administration and sales. Employment in agricultural occupations included in Table VIII reflects the employment distribution in industries with at least 50 percent of total employment previously classified as agricultural and related. Tables IX and X present the employment distribution in industries with 25-49.9 percent and 10-24.9 percent of total employment in agricultural or related occupations and Table XI employment in industries with less than 10 percent of total employment in agricultural or related occupations.

A major assumption implied in the organization of data as presented above, is that the accuracy of employment estimates for persons requiring agricultural and related competencies is greater for occupations in industries with a higher proportion of total employment in these occupations than in those industries with a smaller percentage of total employment in agricultural and related occupations. The highly aggregated industry and occupation Census classifications may overestimate actual agricultural and related employment in certain industry/occupation cells in which specific agriculturally related jobs are included with many non agricultural variations of the same occupation.

For example, 3647 airplane pilots were identified in industries which could have hired aerial applicators for crop dusting purposes. But only 416 were identified in the agricultural production and agricultural service sectors, both with 50 percent or more of total employment identified in agricultural and related occupations. Therefore it can be safely assumed this represents an accurate estimate of aerial applicators in these industries. The remaining 3231 pilots were employed by firms in the air transportation industry which are included in industries with 10-24.9 percent of total employment in agricultural and related occupations. While highly conceivable that some of these pilots were employed as aerial applicators the true number is perhaps only a small fraction of the total employment of airplane pilots. However, without recourse to specific industry data the exact total is unobtainable. With the exception of secondary teacher classification, for which supplementary data were readily available, the total industry employment is reported as it appears on the Census printout.

A total Group II employment of 68,802 was estimated in industries with at least 50 percent of total employment in agricultural or related occupations (Table VIII). Managers, administrators, sales workers and operatives constituted almost two-thirds of this total. Professional, technical and kindred workers made up only a very small proportion (about 2 percent) of total employment in these industries. The total employment of 68,802 in the agricultural and related occupations included in Table VIII

Table VIII. Group II Employment in Industries with at Least Half of Total Employment in Occupations Identified as Agricultural and Related

Occupation Cluster	Number	Percent of Total State Employment in Occupation Cluster
PROFESSIONAL, TECHNICAL & KINDRED WORKERS.....	1313	.8
Accountants	156	.4
Architects & designers	263	3.7
Engineers: civil, industrial, mechanical, other	103	.3
Economists & home management advisors	**	.2
Librarians	**	.1
Scientists: biological, chemical	104	1.7
Personnel & labor relations workers	35	.2
Technicians: engineering, others	52	.1
Teachers: adult education, n.e.c.	**	.1
Surveyors	26	.7
Airplane pilots	416	8.5
Writers, editors, reporters, photographers & publicity	137	.8
MANAGERS & ADMINISTRATORS, EXCEPT FARM.....	13642	4.8
Bank officers, financial managers & creditmen	51	.3
Buyers, shipping agents & purchasers	2458	11.8
Officers, pilots & pursers; ship	422	19.8
Sales managers: retail & wholesale trade	1118	4.4
Managers & administrators; other	9593	4.6
SALES WORKERS.....	15235	7.8
Sales & advertising agents	15107	7.8

Table VIII. Continued

Occupation Cluster	Number	Percent of Total State Employment in Occupation Cluster
Auctioneers	84	30.3
Demonstrators	44	1.7
CLERICAL & KINDRED WORKERS.....	11548	3.5
Bookkeepers	3525	3.8
Estimators & investigators	47	.3
Expeditors & production control managers	**	.1
Real estate appraisers	**	.6
Secretaries, n.e.c.	7223	5.0
Shipping & stock clerks & storekeepers	558	1.3
Weighers	135	11.2
Misc. Clerical workers	44	.2
CRAFTSMEN & KINDRED WORKERS.....	7352	3.4
Blacksmiths	25	5.2
Excavating, grading & road machinery operators	528	2.3
Carpenters	33	.1
Decorators & window dressers	2182	52.5
Electrician apprentices	**	2.2
Foremen	3016	3.6
Inspectors, scalers & graders	257	3.4
Mechanics & repairmen	1269	3.1
Structural metal craftsmen	**	.4
Craftsmen & kindred workers, others	**	.1

Table VIII. Continued

Occupation Cluster	Number	Percent of Total State Employment in Occupation Cluster
OPERATIVES.....	13600	3.7
Assemblers	52	.1
Bottling & canning operatives	**	.3
Checkers, examiners & inspectors, manufacturing	264	1.2
Sawyers & cutting operatives	127	1.4
Graders, sorters, packers & wrappers	4955	22.0
Welders & flame cutters	325	.8
Machine operatives	4139	3.8
Deliverymen, motemen & truck drivers	3733	3.0
LABORERS, EXCEPT FARM.....	6095	5.9
Freight & stock handlers	1004	1.7
Lumbermen, raftsmen & wood choppers	1928	80.5
Teamsters	200	43.6
Vehicle washers & equipment cleaners	**	.2
Warehousemen	68	1.1
Laborers, other	2884	10.0
SERVICE WORKERS, EXCEPT PRIVATE HOUSEHOLD.....	**	.1
Guards & watchmen	**	.1
TOTAL	68802	3.6

**Less than 25. The total includes all values and is therefore greater than the sum of the occupation estimates.

was only 3.6 percent of all employment in the identified occupations.

Included under the general heading of managers and administrators are persons employed in agricultural and horticultural services, agricultural production, meat products, food and other related farm products. Managers in logging, fishery and marine industries, hardware, garden and farm supply stores, and retail florist shops are also included in the total count of 9593. In addition, 3576 sales managers, shipping agents and purchasers are employed in these industries.

Similar to the occupation cluster of managers and administrators, 15235 sales workers and 11548 clerical workers are employed in industries handling agricultural or related products. As seen in Table III, (page 11) the twelve industries with employment in agricultural or related occupations totaling at least 50 percent of industry employment are all very closely associated with agricultural production. This suggests that virtually all of the estimated 68,802 workers employed in agricultural and related occupations require agricultural or related competencies as a necessary part of their overall job performance.

The largest block of Group II employment, 105,744, was identified in industries with 25 to 49.9 percent of total employment in agricultural or related industries, (Table IX). This is about 5½ percent of all employment in the identified occupations. Due to overaggregation of data, several occupational clusters appear to overcount agricultural or related employment. Most accountants listed are employed by business management and consulting firms, of which only a small percentage require agricultural or related competencies. The identified personnel and labor relations workers are employed as state officials. While very few would have been associated with agriculture in 1970, the importance of this occupation within agriculture will most likely increase in the current decade.

The occupations of creditmen and officials of lodges, societies and unions are both overestimated; the overestimation in the former is perhaps greater than in the latter. A more precise estimate is not possible in either case since employment presented is associated with only one industry group.

The classification of managers and administrators, while somewhat

Table IX. Group II Employment in Industries with 25-49.9 Percent of Total Employment in Occupations Identified as Agricultural and Related

Occupation Cluster	Number	Percent of Total State Employment in Occupation Cluster
PROFESSIONAL, TECHNICAL & KINDRED WORKERS.....	3552	2.5
Accountants	1202	3.1
Architects, draftsmen & designers	31	.2
Engineers: electrical, industrial, mechanical, sales, other	107	.4
Economists	291	11.9
Scientists: biological, chemical	138	2.3
Personnel & labor relations workers	1479	9.0
Technicians: engineering	44	.5
Surveyors	**	.2
Vocational & educational counselors	123	2.5
Authors, designers, editors & reporters & publicity	131	1.3
MANAGERS & ADMINISTRATORS, EXCEPT FARM.....	38265	13.2
Public administration: inspectors	2341	13.3
Creditmen	4356	21.6
Buyers, shipping agents & purchasers	944	4.5
Officials of lodges, societies & unions	1937	100.0
Sales managers: retail & wholesale trade	2557	10.1
Managers & administrators, other	26130	12.8
SALES WORKERS.....	43918	62.0
Sales & advertising agents	361	1.5
Demonstrators	25	1.0

Table IX. Continued

Occupation Cluster	Number	Percent of Total State Employment in Occupation Cluster
Insurance & real estate agents & brokers	43532	99.8
CLERICAL & KINDRED WORKERS.....	9999	4.9
Enumerators & interviewers	347	8.3
Estimators & investigators	793	5.7
Expeditors & production control managers	87	1.0
Insurance adjusters & real estate appraisers	5661	88.7
Secretaries	3080	2.1
Stock clerks & store keepers	31	.1
CRAFTSMEN & KINDRED WORKERS.....	670	.5
Blacksmiths	**	.6
Foremen	94	.1
Inspectors, scalers & graders	456	6.1
Mechanics & repairmen	111	.4
Pattern & model makers	**	.7
OPERATIVES.....	8124	2.9
Bottling & canning operatives	123	6.1
Checkers, examiners & inspectors, manufacturing	331	1.5
Graders, sorters, packers & wrappers	734	3.2
Sawyers	1142	31.7
Welders & flame cutters	274	.7
Machine operatives	4782	4.4
Truck Drivers	738	.9

Table IX. Continued

Occupation Cluster	Number	Percent of Total State Employment in Occupation Cluster
LABORERS, EXCEPT FARM.....	1216	1.6
Stock handlers	54	.2
Lumbermen, raftsmen & wood choppers	218	9.1
Teamsters	80	17.4
Vehicle washers & equipment clearers	40	.7
Warehousemen	57	.9
Laborers, other	<u>767</u>	<u>2.7</u>
TOTAL	105744	5.5

**Less than 25. The total includes all values and is therefore greater than the sum of the occupation estimates.

overestimated none-the-less provides a reasonably good estimate of agricultural or related employment. Almost two-thirds of the total are grocery store managers. Managers, as distinct from clerks, require and often receive training in management and economics in courses included in curricula in Colleges of Agriculture. Most of the remaining employees in this occupation cluster are employed by firms providing services to or processing of agricultural, fishery or forestry products.

The figure of 43,532 real estate agents and brokers appears at first glance to be highly overstated in relation to agricultural and related competencies. However, recent developments in rural land markets and a more active research role in real estate economics by the Texas Real Estate Research Center at Texas A&M University must be cited as evidence for inclusion of this occupational group. Over 15,000 real estate agents were estimated for 1970 with an additional 683 appraisers. Finally, machine operatives is singled out as a potential over estimate of agricultural or related employment. However, a majority of these workers are employed in the forestry, forest products and food industries thereby requiring agricultural or related competencies.

While not all of the 105,744 employees in occupations identified as agriculturally related require agricultural or related competencies it is reasonable to conclude that between 50 percent and 75 percent require some knowledge of agricultural processes as a part of their employment requirements or between 50,000 and 80,000 persons.

Table X presents the occupational distribution in industries with employment in agricultural or related occupations of 10 to 24.9 percent of all industry employment. The estimated 71,413 employees is slightly less than 4 percent of total employment in the included occupations. Over 80 percent were included in the professional, technical and kindred, and managers and administrators classifications, compared with only 40 percent of employment in these classes in industries with 25 to 49.9 percent of total employment in agricultural and related occupations. However, these estimates are considered by the authors to contain a large element of overestimation.

Overcounting of architects, engineers, personnel and labor relations workers, airplane pilots, public administration, bank officers and school

Table X. Group II Employment in Industries with 10-24.9 Percent of Total Employment in Occupations Identified as Agricultural and Related

Occupation Cluster	Number	Percent of Total State Employment in Occupation Cluster
PROFESSIONAL, TECHNICAL & KINDRED WORKERS.....	20134	17.6
Statisticians	169	22.4
Architects	2314	73.4
Engineers: electrical, industrial, other	1164	3.9
Economists	223	9.1
Scientists: atmospheric, biological, chemical	996	15.6
Personnel & labor relations workers	1637	10.0
Technicians: health, chemical, engineering, research	550	2.6
Teachers: biology, chemistry, engineering, health, trade, miscellaneous, adult, economics	6224	78.7
Surveyors	141	3.5
Airplane pilots	3231	66.2
Vocational & educational counselors	1687	34.7
Athletes & kindred workers	1158	45.4
Editors & reporters & publicity	640	6.6
MANAGERS & ADMINISTRATORS, EXCEPT FARM.....	39500	14.0
Public administration: assessors & inspectors	17235	85.5
Bank officers, financial managers & creditmen	10423	51.7
Buyers & purchasers	38	.3
Sales managers: retail & wholesale trade	786	3.1
School administrators: college	1900	100.0
Managers & administrators; other	9118	4.5

Table X. Continued

Occupation Cluster	Number	Percent of Total State Employment in Occupation Cluster
SALES WORKERS.....	280	1.1
Sales & advertising agents	173	.7
Auctioneers	107	38.6
CLERICAL & KINDRED WORKERS.....	6193	11.2
Enumerators & interviewers	2986	71.3
Estimators & investigators	1500	10.7
Expeditors & production control managers	**	.1
Real estate appraisers	120	11.2
Weighers	**	.3
Clerical workers, other	1578	6.1
CRAFTSMEN & KINDRED WORKERS.....	2557	2.1
Blacksmiths	260	53.8
Foremen	876	1.0
Inspectors, scalers & graders	**	.3
Mechanics & repairmen	1398	5.2
OPERATIVES.....	2353	1.7
Checkers, examiners & inspectors, manufacturing	50	.2
Graders, sorters & packers	110	2.7
Machine operatives	2193	2.0

Table X. Continued

Occupation Cluster	Number	Percent of Total State Employment in Occupation Cluster
LABORERS, EXCEPT FARM.....	99	.3
Lumbermen, raftsmen & wood choppers	59	2.5
Laborers, other	40	.1
SERVICE WORKERS, EXCEPT PRIVATE HOUSEHOLD.....	297	14.7
Attendants, personal service	<u>297</u>	<u>14.7</u>
TOTAL	71,413	3.7

**Less than 25. The total includes all values and is therefore greater than the sum of the occupation estimates.



administrators is evident. Only tenuous ties to agriculture can be developed for most of the clerical and kindred workers although some of the 2986 enumerators and interviewers in federal employment are associated with agricultural crop surveys and therefore require extensive agricultural knowledge. All identified clerical workers are employed by local governments and few would require knowledge of agriculture or related subjects as a part of their normal responsibilities.

The occupation cluster of athletes and kindred workers however, is a valid occupation since it includes animal handlers in amusement parks and race tracks. Overall, based upon the limited importance of agriculture in the industries included in Table X, agricultural or related employment is estimated at 20 percent of total identified employment, or about 15,000 persons. This is less than 1 percent of all employment in the identified occupations.

Similar to employment figures for industries with 10-24.9 percent of total employment identified in agricultural and related occupations only part of identified employment in industries with less than 10 percent of total employment in agricultural or related occupations requires knowledge of agricultural competencies. However, several important occupational clusters are included in the data presented in Table XI.

Almost 13,000 secondary school teachers including teachers of vocational agriculture and biology are counted in addition to 2669 vocational and educational counselors. These two occupations represent 40 percent of the total identified employment on Table XI. Based on these figures, a conservative figure of 20,000 total employees requiring some degree of agricultural or related competency appears reasonable.

Table XI. Group II Employment in Industries with less than 10 Percent of Total Employment in Occupations Identified as Agricultural and Related

Occupation Cluster	Number	Percent of Total State Employment in Occupation Cluster
PROFESSIONAL, TECHNICAL & KINDRED WORKERS.....	29665	19.1
Architects, designers	190	.4
Computer specialists, statisticians	**	1.3
Engineers: civil, electrical, industrial, mechanical, sales, other	6151	12.4
Scientists: biological, chemical, geological	6213	52.2
Technicians: health, electrical	366	3.0
Economists	55	2.2
Teachers: adult education	430	17.4
Secondary school teachers	12997	23.1
Vocational & educational counselors	2669	54.9
Authors, editors & reporters	575	8.7
MANAGERS & ADMINISTRATORS, EXCEPT FARM.....	5856	2.0
Buyers & purchasing agents	549	2.8
Sales managers: retail & wholesale	1523	6.0
Managers & administrators; other	3784	1.9
SALES WORKERS.....	1158	5.4
Sales & advertising agents	1158	5.4
CLERICAL & KINDRED WORKERS.....	510	3.4

Table XI. Continued

Occupation Cluster	Number	Percent of Total State Employment in Occupation Cluster
Estimators & investigators	439	3.1
Real estate appraisers	71	6.6
CRAFTSMEN & KINDRED WORKERS.....	719	.7
Blacksmiths	**	4.3
Foremen	31	.0
Inspectors, log & lumber	490	6.5
Pattern & model makers	43	5.0
Craftsmen & kindred workers, other	134	4.2
OPERATIVES.....	586	1.2
Chainmen, rodmen, axmen; surveying	276	26.4
Graders, sorters	58	4.5
Machine operatives, misc.	252	.6
SERVICE WORKERS, EXCEPT PRIVATE HOUSEHOLD.....	237	1.7
Guards & watchmen	<u>237</u>	<u>1.7</u>
TOTAL	38731	5.87

**Less than 25. The total includes all values and is therefore greater than the sum of the occupation estimates.

SUMMARY AND RECOMMENDATIONS

Summary

Development and evaluation of vocational education programs requires knowledge of current and projected occupations which utilize the competencies gained from instructional programs. Because of the increasing interrelationships involved in the production, processing and distribution of agricultural products many persons in this chain, in addition to persons in the production sector, require competencies gained through instructional programs of vocational agriculture. Programs of technical and professional training beyond the secondary level are also requisite for many of these positions. While not difficult to estimate the potential training requirements in the production sector alone, identification of occupations in allied industries involves a detailed search over all occupations and industries.

Employment, both private and public, in areas of conservation and restoration of renewable natural resources such as land and water also utilize competencies basic to farm and ranch management and thereby qualify for inclusion under the general heading of agriculture. Additionally, occupations in the forestry, horticultural and fisheries industries utilize competencies associated with the production of food and fiber.

The Standard Terminology for Curriculum and Instruction in Local and State School Systems, published by the Office of Education was used as a standard reference to determine occupations which may require agricultural or related competencies. This was supplemented by the experience of agricultural and agribusiness specialists in nine states, including Texas, who evaluated job titles used in classifying survey employment data for the 1970 Census of Population. After compilation and re-evaluation by the interdepartmental National Committee on Employment Opportunities and Training Needs in Agribusiness, the selected occupations and industries were further evaluated within the context of Texas agriculture.

For ease of presentation, agricultural and related employment was grouped by the following criteria:

Group I---Occupations that require or utilize agricultural or related competencies in any industry in which they are found.

Group II--a) Occupations that require or utilize agricultural competencies only in selected industries, or b) occupations within selected industries in which only a portion of the workers require agricultural or related competencies.

Using these criteria, 141 occupations existing in 172 industries were identified as containing employment requiring agricultural or related competencies. Of a total 1970 labor force of 4,141,529, about 12½ percent or 514,382 persons were employed in occupations meeting the Group I or Group II criteria. These figures do not include 133,216 operators of part time and retirement farms identified by the Census of Agriculture who obviously require agricultural competencies. They were not included because of the possibility of double counting. Double counting would occur to the extent that these people are also employed in off farm jobs requiring agriculturally related competencies.

Employment in Group I occupations which are closely associated with agricultural production totaled 207,817 persons in 1970. An additional 68,802 persons required agricultural and related competencies in twelve related service industries and accounted for almost 90 percent of the employment in these industries. Only a portion of the remaining 237,763 persons employed in occupations requiring agricultural and related competencies actually require and utilize these competencies in the normal course of their employment. Data limitations prevent a precise estimate without bringing in additional judgmental factors. In the opinion of the authors approximately one half of these workers would require agricultural or related competencies. This suggests that about 400,000 persons required agricultural or related competencies in Texas in 1970.

Recommendations

Analysis of the employment counts from the 1970 Census of Population leads to several implications for increased training and educational

needs for that portion of the Texas labor force requiring agricultural or related competencies. Although additional training is required for occupations in rapidly expanding industries, more indepth training in existing fields of instruction is also important.

Production agriculture

Production agriculture, while becoming less labor intensive will in the future, require higher quality of human input. With a technologically dynamic agriculture this means that vocational-agriculture instructional programs will require constant evaluation and revision to assist in the training of this manpower. Additional programs of adult education stressing farm record keeping and farm equipment maintenance and operating safety is encouraged.

A larger number of wage and salaried workers than self employed operators identified agriculture as their major source of employment. Almost 90,000 wage and salaried persons were tabulated by the 1970 Census of Population compared with 73,536 farm operators and tenants who spent over half of their time in farming operations. New courses of instruction dealing with farm personnel management and increased emphasis on occupational safety is encouraged.

Land economics and real estate

Emphasis on land conservation practices relating both to agricultural and non agricultural land use is recommended. The establishment of the Texas Real Estate Center at Texas A&M University provides a new resource for developing courses of instruction in land management and appraisal.

Gardeners and Groundskeepers

The existence of almost 20,000 gardeners and groundskeepers in Texas suggests that further study should be undertaken to determine the feasibility of expanding cooperative education offerings in landscape and grounds maintenance. Gardeners and groundskeepers are employed in over 125 industries in Texas. The continuing emphasis on environmental beauty suggests that higher skilled employees will be required in the future.

Texas will continue to be one of the major agricultural states in the nation. Agriculture and related occupations will continue to provide an important source of income for many Texans. Although total employment in agricultural production will continue to decline as agriculture becomes less labor intensive, the quality of training and overall educational attainment of agricultural manpower must be continually upgraded in order to maintain a viable and competitive agricultural and rural economy.

Moreover, employment opportunities in off farm, agriculturally related occupations will undoubtedly increase. Only a few of the possibilities for expanded instructional offerings in these newer fields have been discussed in this report. However, the data developed for the report provide the necessary base for further evaluation of these possibilities in forthcoming publications.

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APPENDIX I

A Guide for Defining Agricultural and Related Competencies

A Guide for Defining Agricultural and Related Competencies^{1/}

- I. Summarized definition of agribusiness occupational competencies. Skills in and knowledge of 1) agricultural production - the production and propagation of animals (land and aquatic), animal products, plants (crops and ornamental), plant products and forests and forest products; and the provision of services associated with agricultural production; 2) the manufacture, distribution and servicing of supplies used in agricultural production; 3) the designing, installation, repair, operation and servicing of machinery, equipment and power sources and the construction of structures and conveniences used in agricultural production; 4) the inspection, processing and marketing of agricultural products and primary by-products; 5) aspects of greenhouse, nursery, landscaping and other ornamental horticultural operations; 6) the conservation, propagation, improvement and utilization of renewable natural resources; and 7) the multiple uses of forest lands and resources.

- II. Detailed definition of agribusiness competencies
 - A. AGRICULTURAL PRODUCTION - Skills in and knowledge of the production of plants, animals and their products.
 1. Animal science - Skills in and knowledge of the production of animals and animal products.
 - a. Animal propagation and production - Knowledge of animals produced for food, fiber and other purposes.
 - 1) Animals produced for food and fiber - Knowledge of cattle, swine, sheep, poultry, fish (see also II.F.7. Fish) and other animals produced for food and fiber.
 - 2) Other animals - Knowledge of pets, wildlife (see also II.F.4. Wildlife), laboratory animals and other animals produced and propagated for purposes

^{1/}

This definition has been adopted by the National Committee on Employment Opportunities and Training Needs in Agribusiness from Standard Terminology for Curriculum and Instruction in Local and State School Systems, HEW, Office of Education, 1966

other than food and fiber.

- b. Nutrition - Knowledge of the relationship of proteins, fats, carbohydrates, water, minerals and vitamins in the production of meat, milk, eggs and wool.
 - c. Genetics - Knowledge of the principles of inheritance and their applications for the breeding and selection of animals.
 - d. Physiology - Knowledge of the body processes and functions related to the production of animals and animal products (eg. lactation, reproduction, egg production, digestion, growth and wool production).
 - e. Animal health - Skills in and knowledge of the prevention and control of animal diseases and the treatment of injuries to animals.
 - f. Production management - Skills in and knowledge of the operation and management of a farm, ranch or other establishment involved in the production of animals and animal products.
 - 1) Feeding practices - Knowledge of the "least cost" combinations of feed ingredients for achieving maximum quality and quantity in production.
 - 2) Housing practices - Knowledge of the housing and other environmental needs of specific kinds of animals.
 - g. Other animal science - Competencies, not elsewhere included, in the propagation and production of animals and animal products.
2. Plant science - Skills in and knowledge of the production of plants and the products derived from plants.
 - a. Plant culture and production - Knowledge of plants produced for food, fiber and other purposes.
 - 1) Crops produced for food and fiber - Knowledge of cereal grain crops, fiber crops, forage crops, oil crops, tree fruit and nut crops, small fruit and berry crops, vegetable crops and other crops produced for food and fiber.

- 2) Other plants - Knowledge of shrubs, trees, flowers, turf and other plants cultivated and produced for ornamental, esthetic and other purposes except for food and fiber (see also II.E. Ornamental horticulture); and forest trees and forestry products (see also II.G. Forestry).
- b. Soils - Knowledge of the physical, chemical, biological and fertility properties of soils in relation to their management for crop and other agricultural production operations.
- c. Nutrition - Knowledge of the nutrient and soil fertility requirements of plants.
- d. Genetics - Knowledge of the principles of inheritance and their applications for the breeding and selection of plants.
- e. Physiology - Knowledge of the life processes in plants and their implications in the production of plants and plant products.
- f. Plant disease and pest control - Knowledge of the symptoms, causes and control of plant injuries and diseases; the impact and control of beneficial and harmful insects, nematodes, snails, mites, rodents and birds in relation to agricultural production; and the control of undesirable forms of plant life.
 - 1) Insecticides and rodenticides - Knowledge of and skills in the use of substances used to destroy or otherwise control harmful insects, rodents and other plant pests.
 - 2) Fungicides, bactericides, viricides and nematocides - Knowledge of and skills in the use of substances used to destroy or inhibit bacteria, viruses and other causes of plant diseases.
 - 3) Herbicides - Knowledge of and skills in the use of compounds used to destroy or inhibit the growth of selected plants.
 - 4) Nonchemical and other methods of controlling plant

- diseases and pests - Knowledge of biological, mechanical, cultural and other methods of control.
- g. Environmental biology - Knowledge of the interaction of plant life processes with factors of the environment and their characteristics and implications for managing plant production.
 - h. Other plant science - Competencies, not elsewhere included, in the culture and production of plant and plant products.
3. Agricultural mechanics - (See II.C. Agricultural mechanics).
4. Agricultural business management - Decision-making skills in and knowledge of production efficiency and resource analysis, accounting, finance and other business management factors applied to agricultural production operations.
- a. Accounting - Skills in accounting, including tax accounting, as applied to agricultural production operations.
 - b. Efficiency analysis - Skills in the use of performance records in determining and analyzing the efficiency of an agricultural production operation.
 - c. Agricultural economics - Skills in budget analysis and the use of quantitative input output relationships, costs and price expectations to secure optimum economic returns for agricultural production operations.
 - d. Manpower utilization - Decision-making skills in and knowledge of the economic use and management of labor resources.
 - e. Purchasing and marketing - Skills in purchasing agricultural production input (such as livestock, seed, machinery, etc.) and marketing animal and plant products for agricultural production operations.
 - f. Financial and legal management - Knowledge of the financial and legal aspects of managing an agricultural production business, such as agricultural loans and credit.
 - g. Agribusiness organizations - Knowledge of current programs of agribusiness organizations, including their development, purposes and usefulness.

- h. Government programs - Knowledge of current government policies, regulations and programs available to and having influence upon agricultural production, management and prices and income of rural people.
 - i. Other agricultural business management - Competencies, not elsewhere included, in the business management of agricultural production operations.
- B. AGRICULTURAL SUPPLIES/SERVICES - Knowledge of and skills in the production, processing, distribution and use of consumable supplies used in the production of animals, plants and their products; and the provision of services associated with the distribution of such supplies. Examples are agricultural chemicals, feeds, seeds and fertilizers (plant food).
- C. AGRICULTURAL MECHANICS - Knowledge of the power, machinery, tools, equipment, structures and conveniences utilized in the production of animals, plants and their products; and skills in soil and water management for agricultural production.
 - 1. Agricultural power and machinery - Knowledge of and skills in the selection, operation, servicing, maintenance, repair and safety of agricultural power -- engines, electricity and hydraulics; and the planning, installation, servicing, assembling, adjusting, operating, repairing and distribution of agricultural machinery.
 - 2. Agricultural structures and conveniences - Knowledge of and skills in the planning, selection of materials for and construction and maintenance of agricultural structures and conveniences.
 - 3. Soil management - Knowledge of and skills in surveying and classifying soils; determining cropping systems and fertilizer; and conditioning and cultural practices for increasing agricultural production efficiency.
 - 4. Water management - Knowledge of and skills in surveying, planning, laying out, constructing, using and maintaining irrigation, drainage, water conservation, runoff and erosion control systems; and maintaining proper soil-water-plant relationships.

5. Agricultural tools and equipment - Knowledge of and skills in the planning, fabrication, selection, use, maintenance and distribution of agricultural hand and power tools and equipment and the planning and establishing of home farm shops.
 6. Agricultural electrification - Skills in making effective use of electricity and electrical equipment in agricultural production operations.
 7. Other agricultural mechanics - Competencies, not elsewhere included, in the mechanical aspects of agricultural production.
- D. AGRICULTURAL PRODUCTS - Skills in the inspection, sorting, grading and storing of and knowledge of the use, nutritive value and other qualities of agricultural products (in their original state of production) and primary by-products (in the first processed stage), including the processing of agricultural products. Also, skills in the marketing of agricultural products and primary by-products when combined with other agricultural product competencies, for operations other than agricultural production (compare II.A.4.e Purchasing and marketing). Included are food products such as meat, milk, cheese, fruit, grain and oilseeds; and nonfood products such as cotton, tobacco, wool, furs and wood.
1. Food products and primary by-products - Knowledge of and skills in the preparation and processing of food products and primary by-products for sale and consumption and knowledge of the nutritive value of such products.
 - a. Food products - Knowledge of the information, processes and science and decision-making skills associated with meats, fish, poultry, eggs, milk, fruits, vegetables, cereal grains, oilseeds, mushrooms, nuts, sugar, sap and other food products.
 - b. Primary food by-products - Knowledge of the information, processes and science and decision-making skills associated with the primary by-products of the food products listed above, such as cream, ice cream, butter, cheese, flour,

cottonseed oil, alcohol and syrup.

2. Nonfood products and primary by-products - Knowledge of and skills in the processing, inspection, grading, sorting and storing of nonfood products and primary by-products for domestic and industrial uses.
 - a. Nonfood products - Knowledge of and skills in processing, marketing and other activities involving nonfood products, such as ginning and baling cotton, grading and storing tobacco, sorting and grading wool and other nonfood products such as furs, hemp, gum and wood.
 - b. Primary nonfood by-products - Knowledge of and skills in processing, marketing and other activities involving primary nonfood by-products, such as cotton yarn, wool yarn, processed tobacco and wood pulp.
 3. Other agricultural products - Competencies, not elsewhere included, associated with agricultural products and primary by-products.
- E. ORNAMENTAL HORTICULTURE - Knowledge of and skills in the culture of plants used principally for ornamental and esthetic purposes, including establishing, maintaining and managing ornamental horticulture enterprises.
1. Arboriculture - Knowledge of and skills in the culture and maintenance of woody plants used for decoration and shade purposes.
 2. Floriculture - Knowledge of and skills in field or greenhouse production of flowers and the arrangement of such flowers for ornamental purposes.
 3. Greenhouse operation and management - Skills in and knowledge of producing plants under glass and in other artificial environments.
 4. Landscaping - Knowledge of and skills in locating, planting and maintaining turf, plants, shrubs, trees or devices for the beautification of home grounds and other areas of human habitation and recreation.
 5. Nursery operation and management - Knowledge of and skills in the production of turf, plants, shrubs and trees for

purposes of transplanting or propagating them.

6. Turf management - Knowledge of and skills in establishing, managing and maintaining grassed areas for ornamental and recreational purposes.
 7. Other ornamental horticulture - Competencies, not elsewhere included, associated with ornamental horticulture production, processing, marketing and services.
- F. RENEWABLE NATURAL RESOURCES - Skills in and knowledge of the conservation, propagation, improvement and utilization of renewable natural resources such as air, forests, soil, water, fish, plants and wildlife, for economic and recreational purposes.
1. Forests - Skills in and knowledge of the conservation, propagation, improvement and utilization of forests for economic and recreational purposes (see also II.G. Forestry).
 2. Recreational use of natural resources - Skills in and knowledge of the multiple uses of land, water and other natural resources for recreational activities such as fishing, picnicking, hunting, camping and nature study.
 3. Soil - Skills in and knowledge of maintaining soil stability and productivity including the prevention of erosion, pollution, water logging, exhaustion of plant nutrients and the accumulation of toxic salts.
 4. Wildlife - Skills in and knowledge of the propagation, preservation and improvement of wildlife, such as used in the operation of game farms and commercial hunting enterprises and the management of hunting areas (see also II.A.1.a.2. other animals).
 5. Water - Skills in and knowledge of water conservation practices such as the prevention of soil erosion and water pollution; flood control; aquatic weed control; and the development, conservation and management of water supplies for agricultural, domestic, industrial and recreational purposes.
 6. Air - Knowledge of and skills in the control of air pollution, including the effects of agricultural activities

on pollution and the effects of pollution on plants and animals.

7. Fish - Skills in and knowledge of the propagation, rearing, stocking and management of fish in public and private waters, such as used in fish farming and hatchery operations and commercial fishing enterprises (see also II.A.1.a.1. Animals produced for food and fiber).
 8. Range - Skills in and knowledge of the preservation and improvement of natural range lands.
 9. Other renewable natural resources - Competencies, not included elsewhere, associated with the conservation, propagation, improvement and utilization of renewable natural resources.
- G. Forestry - Skills in and knowledge of the multiple uses of forest lands and resources, including their protection and management for economic and recreational purposes and related services.
1. Forestry production and propagation - Skills and competencies in the propagation of forest trees, including Christmas trees and the production of forest products, including initial collective activities such as harvesting trees and transporting logs (see also II.A.2.a.2 Other plants).
 2. Forest protection - Knowledge of the behavior of and skills in the control of elements harmful to forests and forest resources (see also II.F.1. Forests).
 3. Forest products - Skills in and knowledge of the processing, selection, grading and marketing of wood, gum, sap, nuts and other forest raw materials (see also II.D. Agricultural products).
 4. Primary forest by-products - Skills in and knowledge of the processing, marketing and other functions associated with maple syrup, wood pulp and other forest by-products in the first processed stage (see also II.D. Agricultural products).
 5. Recreational use of forest lands - (see II.F.2 Recreational use of natural resources).
 6. Other forestry - Competencies, not included elsewhere, associated with the multiple uses of forest lands and resources.

- H. OTHER AGRIBUSINESS - Competencies, not included elsewhere, associated with agricultural production, supplies/services, mechanics and products; ornamental horticulture; renewable natural resources; and forestry.

APPENDIX II

Census of Population Reference Questions

The occupation and industry data were obtained from answers to questions 33-35 of the 1970 Census of Population. These questions are reproduced below:

Census of Population Reference Questions

- 33-35. Current or most recent job activity or business.
Describe clearly your chief job activity or business last week, if any. If you had more than one job, describe the one at which you worked the most hours.
If you had no job or business last week, give information for last job or business since 1960.
-

33. Industry

- a. For who did you work? *If now on active duty in the Armed Forces, print "AF" and skip to question 37.*

(Name of company, business, organization, or other employer)

- b. What kind of business or industry was this?
Describe activity at location where employed.

(For example: Junior high school, retail supermarket, dairy farm, TV and radio service, auto assembly plant, road construction)

- c. Is this mainly -- (Check one box)

Manufacturing

Retail trade

Wholesale trade

Other (agriculture, construction, service, government, etc.)

34. Occupation

- a. What kind of work were you doing?

(For example: TV repairman, sewing machine operator, spray painter, civil engineer, farm operator, farm hand, bulldozer operator, junior high English teacher)

- b. What were your most important activities or duties?

(For example: Types, keeps account books, files, sells cars, operates printing press, cleans buildings, finishes concrete)

c. What was your job title?

35. Were you -- (Check one box)

- Employee of private company, business, or individual,
for wages, salary, or commissions
- Federal government employee
- State government employee
- Local government employee (city, county, etc.)
- Self-employed in own business, professional practice or farm -
- Own business not incorporated
- Own business incorporated
- Working without pay in a family business or farm
-

The questions obtained information from the employed, the experienced unemployed and the experienced workers not in the labor force. The reference week for the requested information from employed persons was the last full week in March 1970. For the unemployed persons and those in the experienced out of labor force the information was obtained for the most recent position. If a worker was employed at two or more jobs during the reference week, the only job recorded was the one in which he worked the greatest number of hours.

APPENDIX III

Advisory Committees on Agricultural and Related Occupations

- A. National Committee on Employment Opportunities and Training Needs in Agribusiness
- B. Texas Committee on Employment and Training in Agribusiness
- C. Panel of Agribusiness Specialists, Texas

A. National Committee on Employment Opportunities and Training
Needs in Agribusiness^{1/}

Maurice L. Hill
Rural Manpower Service
Office of Rural Program Development

Neville Hunsicker (Chairman)
Vocational Education in Agriculture
Office of Education
U. S. Department of HEW

Melvin Janssen
Economic Research Service
U. S. Department of Agriculture

Kenneth R. Norell
Bureau of the Census
U. S. Department of Commerce

N. P. Ralston
U. S. Department of Agriculture

Willis J. Sloan
Rural Manpower Service

Phillip R. Teske
Office of Education
U. S. Department of HEW

Sheldon Ziman
Agriculture Division
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Joseph McCluskey
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U. S. Department of Labor

Walter Sellers
Farm Production Economics
Division
Economic Research Service
U. S. Department of Agriculture

Glenn Z. Stevens, Head
Department of Agricultural
Education
Pennsylvania State University

^{1/} As constituted June 1972

B. Texas Committee on Employment and Training in Agribusiness

J. A. Marshall
Director
Agricultural Education
Texas Education Agency (Chairman)

H. O. Kunkel
Dean
College of Agriculture
Texas A&M University

John C. White
Commissioner
Texas Department of Agriculture

W. J. Hood
Chief
Rural Manpower Development
Texas Employment Commission

C. Panel of Agribusiness Specialists, Texas

D. A. (Andy) Anderson
Texas Forest Service
Texas A&M University

Chesley Auten
Lake Whitney State Park

John Barnes
Farmers Home Administration

Sam Barnes
Central Power and Light

Paul Sweetland
U. S. Forest Service

Dale E. Elms, President
Elms Equipment Company, Inc.

H. J. Ewald, Jr.
Red Ewald Fiber Glass

Mark Fowler, Chairman
Department of Ag. Economics
Texas Tech University

B. W. Glade
Southland Paper Mills, Inc.

Robert Gooch, Vice President
Gooch Packing Company

Frank Gross, Manager
Texas Valley Citrus Committee

Bluefford G. Hancock
Plant Sciences Department
Texas A&M University

Larry Hunt
Placement Department
Texas Employment Commission

Alton Ice, Executive Director
The State Advisory Council of
Technical-Vocational Education

Ira Kiker
Public Relations Department
Safeway Incorporated

Reese Killion, Vice President
Wolfe Wholesale Florist

Bill Lane
Farmer

Gordon McKee, Soil Scientist
SCS - USDA
First National Life Building

Wilbert Meischen, Executive
Director
Vocational Agriculture Teachers
Association of Texas

Robert (Bob) G. Merrifield, Head
Department of Forest Science
Texas A&M University

Howard Mitchell
Texas Ag. Limestone Association

Clemon Montgomery
Assistant Director, Marketing
Division
Texas Department of Agriculture

Kenneth Nelson
Temple Industries

J. H. (Tony) Price
Executive Director
Texas Cotton Ginners Association

Wilmer Smith
Farmer

E. R. Wagoner, Ex. Vice President
Texas Forestry Association

Clyde Wells
Business Executive and Rancher

Kenneth Wolf
Texas Ag. Extension Service
Texas A&M University

APPENDIX IV

**Courses of Instruction in Vocational-Agriculture
in Texas, 1971**

**Courses of Instruction in Vocational-Agriculture
in Texas, 1971**

I. Production Agriculture

01.01 00 Agricultural Production
 01.01 10 Vocational Agriculture I
 01.01 20 Vocational Agriculture II
 01.01 30 Vocational Agriculture III
 01.01 40 Vocational Agriculture IV

II. Agricultural Cooperative Part-Time Training

01.01 00 Agricultural Production
 01.01 11 Ranch Employee
 01.01 21 Dairy Farm Worker
 01.01 31 Poultry Hatchery Employee
 01.01 41 Swine Farm Employee
 01.01 51 Horse Farm Employee
 01.01 61 Livestock Auction Employee
 01.01 71 Feedlot Employee
 01.01 81 Poultry Farm Worker - Broiler Production
 01.01 91 Poultry Farm Worker - Commercial Egg Flock
 01.01 12 Crop Farm Employee
 01.01 22 Plant Scientist Assistant
 01.02 00 Agricultural Supplies/Services
 01.02 11 Agricultural Chemical Sales and Serviceman
 01.02 12 Feed Sales and Serviceman
 01.02 22 Feed Warehouse Employee
 01.02 32 Grain Elevator Employee
 01.02 13 Seed Sales Serviceman
 01.02 14 Fertilizer Sales and Serviceman
 01.02 99 Agri Supplies/Services (Other)
 01.12 99 Horseshoer
 01.22 99 Veterinarian Assistant
 01.03 00 Agricultural Mechanics
 01.03 11 Agricultural Machinery Repairman
 01.03 21 Agricultural Machinery Set-up and Deliveryman
 01.03 31 Irrigation Equipment Sales and Serviceman
 01.03 41 Farm Equipment Operator
 01.03 51 Agricultural Machinery Mechanic's Helper
 01.03 61 Agricultural Machinery Partsman
 01.03 71 Agricultural Machinery Service Supervisor
 01.03 12 Agricultural Structures and Conveniences Employee
 01.03 13 Soil Management Employee
 01.03 14 Water Management Employee
 01.03 15 Agricultural Welding and Serviceman
 01.03 25 Agricultural Hand and Power Tools Serviceman
 01.03 16 Agricultural Construction and Maintenance Employee
 01.03 17 Farm and Ranch Electrification Employee
 01.04 00 Agricultural Products

01.04 11 Meat Processing Plant Employee
 01.04 21 Fruit and Vegetable Packing Plant Employee
 01.04 31 Poultry Products Employee
 01.04 41 Dairy Products Employee
 01.04 51 Wool and Mohair Warehouse Employee
 01.04 61 Cotton Gin Employee
 01.04 71 Seafood Processing Employee
 01.05 00 Ornamental Horticulture
 01.05 10 Garden Center Employee
 01.05 13 Greenhouse Worker
 01.05 14 Parks Employee
 01.05 24 Park and Landscape Employee
 01.05 34 Assistant Groundskeeper
 01.05 15 Nursery Worker
 01.05 16 Assistant Greenskeeper
 01.06 00 Agricultural Resources
 01.06 12 Recreation Farm Employee
 01.06 13 Soil Conservationist Assistant
 01.06 14 Wildlife Conservation Employee
 01.06 24 Game and Hunting Farm Employee
 01.06 17 Fish Hatcheryman Employee
 01.07 00 Forestry (Production, Processing, Management, Marketing
 & Services)
 01.07 10 Forestry Worker
 01.07 14 Wood Products Employee
 01.07 24 Sawmill Employee
 01.99 00 Other

III. Agricultural Pre-Employment Laboratory

01.01 00 Agricultural Production
 01.11 01 Feedlot Employment I-II
 01.02 00 Agricultural Supplies/Services
 01.02 01 Agricultural Chemicals & Fertilizers I-II
 01.03 00 Agricultural Mechanics
 01.03 01 Agricultural Power & Machinery Repair I-II
 01.03 10 General Agricultural Mechanics I-II
 01.03 81 Farm & Ranch Mechanical Repair (CVAE)
 01.04 00 Agricultural Products
 01.04 01 Meat Processing I-II
 01.05 00 Ornamental Horticulture I-II
 01.05 20 Horticultural Related Occupations (CVAE)
 01.06 00 Agricultural Resources Development I-II
 01.07 00 Forest Products Harvesting I-II

APPENDIX V

Census Coding Scheme for Occupation Combinations

Census Coding Scheme for Occupation Combinations

PROFESSIONAL, TECHNICAL & KINDRED WORKERS 001 - 195

Accountants 001; computer specialists 003,004,005; statisticians 036
 Architects 002; draftsmen 152; designers 183
 Engineers: civil 011, electrical 012, industrial 013, mechanical 014,
 sales 022, other 023
 Economists 091; home management advisors 026
 Librarians 032,033
 Scientists: atmospheric 043, biological 044, chemical 045,
 physical 042, 051, 052, 054
 Personnel and labor relations workers 056
 Technicians: health 085, chemical 151, electrical 153, engineering
 154, 155, 162, 173, 195
 Teachers: college & university, science, engineering, health, trade
 economics 102-143,145
 Surveyors 161
 Airplane pilots 163
 Vocational & educational counselors 174
 Athletes & kindred workers 180
 Writers, editors, reporters, photographers, publicity 181-194

MANAGERS AND ADMINISTRATORS, EXCEPT FARM 201 - 246

Public administration: assessors 201, controllers, inspectors 213,
 215,222
 Bank officers, financial managers 202; creditmen 210
 Buyers, shipping agents 203,205; purchasers 225
 Officers, pilots, pursers: ship 220,221
 Officials of lodges, societies, unions 223
 Sales managers: retail & wholesale trade 231,233
 School administrators: college 235
 Managers and administrators, other 245 & 246

SALES WORKERS 260 - 284

Sales & advertising agents 260,281,282,283,284
 Auctioneers 261
 Demonstrators 262
 Insurance & real estate agents & brokers 265, 270
 Stock & bond salesmen 271

CLERICAL & KINDRED WORKERS 305 - 396

Bookkeepers 305
 Enumerators & interviewers 320
 Estimators & investigators 321
 Expeditors & production control managers 323
 Insurance adjuster & real estate appraisers 326, 363
 Secretaries 370, 364, 372
 Shipping & stock clerks & storekeepers 374, 381
 Weighers 392
 Clerical workers, other 394, 395, 396

CRAFTSMEN & KINDRED WORKERS 403 - 586

Blacksmiths 403
 Excavating, grading, road machinery operators 436, 412
 Carpenters 415, 416
 Decorators & window dressers 425
 Electrician apprentices 431
 Foremen 441
 Inspectors, scalers, graders 450, 452
 Mechanics & repairmen 470-495
 Pattern & model makers 514
 Structural metal craftsmen 550
 Craftsmen & kindred workers, other 575, 586

OPERATIVES 602 - 715

Assemblers 602
 Bottling & canning operatives 604
 Chainmen, rodmen, axmen: surveying 605
 Checkers, examiners, inspectors, manufacturing 610
 Sawyers & cutting operatives 662, 612
 Graders, sorters, packers, wrappers 624, 625, 634, 643
 Welders & flame cutters 680
 Machine operatives 690, 692, 696, 694, 695
 Deliverymen, motermen, truck drivers 705, 710, 715

LABORERS, EXCEPT FARM 753 - 796

Freight & stock handlers 753, 762
 Lumbermen, raftsmen, woodchoppers 761
 Teamsters 763
 Vehicle washers & equipment cleaners 764
 Warehousemen 770
 Laborers, other 780, 785, 796

SERVICE WORKERS, EXCEPT PRIVATE HOUSEHOLD 933 - 962

Attendants, personal service 933
 Guards & watchmen 962