# OCCUPATIONAL COMPETENCIES NEEDED BY PERSONS ENTERING SELECTED FARMING OCCUPATIONS

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ABSTRACT

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By

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The purpose of this study was to provide one basis by which institutions of public higher education in Michigan, concerned with agricultural education, can define their role in providing less-than-baccalaureate degree career preparation for persons seeking to enter and become successfully established in selected farming occupations. More specifically, the objectives were to determine occupational competencies needed by all persons entering: (1) farm entrepreneurship, and technician/mid-management level farm employment and the specialized competencies more specifically associated with (2) farm size (large, small), and (3) farm type (livestock, crops).

Adult farmers, young farmers, county extension directors and experienced high school vocational agriculture instructors from 19 selected Michigan counties comprised the population of the study. Adult farmers were selected from the Michigan State University TELFARM (farm accounts) program. Young farmers were all graduates of the 18 month technical training program for young farmers in Michigan State University's Institute of Agricultural Technology in the classes completing in 1969, 70, 71, 72 and 73. All County Extension Directors and all vo-ag teachers with five or more years of experience were included. Two

hundred twenty-four usable responses included in the competency study represented 73.4 percent of the total eligible population.

The research instrument was a mailed questionnaire. It contained fifty-four competency statements that had been written particularly for this study. These were grouped into functional areas with: (1) 13 agricultural mechanics, (2) 13 farm management and economics, (3) 11 crop production, (4) 10 livestock and/or dairy production and, (5) 7 general (social-personal) competencies. Respondents were asked to identify performance needs of young farm entrepreneurs and technician/mid-management level farm workers entering their careers in the next five years, or in the case of the technical program graduates, previous competency experience, performance expectations and perceived training needs.

Eighty-eight adult farmers averaging 47.6 in age of whom 70.2 percent were sole proprietors and 29.8 percent were in farm business partnerships responses were included in the study. The 91 young farmers in the study represented 77.8 percent of the graduates of the classes 1969-1973 of the Agricultural Production Program at Michigan State University from the 19 counties studied. Of the adult farmers 59.1 percent operated small farms; 40.9 percent operated large farms; 65.9 percent operated livestock farms and 34.1 percent operated crops farms. Proportions of the young farmers in each grouping were: 54.9, 45.1, 64.8 and 35.2 percent respectively. Sixteen of the educator respondents were county directors of the Cooperative Extension Service and 29 were high school teachers of vocational agriculture. Educator respondents averaged 17.3 years of professional experience.

All but four of the competencies in the study were perceived to be necessary of young people entering farm entrepreneurship by more

than sixty percent of the adult farmer respondents. Twenty-seven competencies were rated necessary for all young farmers by at least sixty percent of the adult farmers. Nine competencies were specified explicitly for young livestock farmers by more than forty percent of each of the sub-groups of adult farmers (large, small, crops, livestock) and 23 competencies were identified as especially necessary for young crops farmers by at least twenty percent of at least one adult farmer sub-group.

Significant differences were observed between adult farmers and agricultural educator perceptions on fifteen competency areas. Professionals tended to differentiate more often on the basis of the performance of competencies associated with specialized types of farming enterprises. Professionals differed significantly from adult farmers on six competencies associated with technician/mid-management level farm employment. Only 51.7 percent of the responses provided by educators indicated the need for all young farm operators and all farm workers to have the same competencies. Fewer than 60 percent of either group ascribed the performance of "major overhaul of farm power and machinery" or "show animals in competition," to either young farmers or farm employees.

Young farmers and adult farmers agreed in relatively the same proportions about the competencies listed by group, but differed significantly (.05 level) on thirty-five competencies as measured by comparison of the same affirmative responses on "will performance be needed", answered by adult farmers, and "have performed", answered by young farmers. More adult farmers felt these competencies would be needed in the future than the experience of young farmers had shown to date.

Adult farmers differed significantly (.05 level) in their responses about young farmer competency needs on 32 of 33 occasions as a function of the type of farm they operated. Farm size accounted for only one significant difference. Adult farmers differed signficantly on five or eight times on the perceived competency needs of full-time farm workers on the basis of the type of farm operated.

Significant differences existing in the responses of young farmers on the dimensions, "have performed", "expect to perform", and "training needed", were attributed to type of farm operated by or upon which the respondent was employed 26 of 27 times over the entire field of competencies.

# OCCUPATIONAL COMPETENCIES NEEDED BY PERSONS ENTERING SELECTED FARMING OCCUPATIONS

By

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TABLE OF CONTENTS

LIST OF TABLES

APPENDIX TABLES

## LIST OF FIGURES

# CHAPTER I

## FARMERS' BOYS

> They are not so important for what they are, as for what they will be. At present, they are of but little consequence too often. But farmers' boys always have been, and we presume always will be, the material out of which the best men are made. They have health and strength; they have bone and muscle; they have heart and will; they have nerve and patience; they have ambition and endurance; and these are the materials that make men.[1]

## INTRODUCTION

Higher education in this country is based on a "philosophy moving toward the social equality of all useful labor."[2] This predisposition was first exemplified in the language of the Morrill Act of 1862. Grants of land were made to the states, to endow and maintain "at least one college...to teach...agriculture and the mechanical arts...in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life."[3]

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[1]William M. Doty, "Farmers' Boys", Michigan Farmer, NS, Vol. III (Sept. 28, 1861), 311.

[2]John S. Brubacher and Willis Rudy, Higher Education in Transition, An American History: 1636-1956 (New York: Harper and Row, 1958), p. 337, citing James B. Conant, "America Remakes the University," Atlantic Monthly, Vol. 177, (May 1946), p. 42.

[3]Statutes at Large and Treaties of the United States of America, Thirty-Seventh Congress, (1861-62). CXXX, Sec. 4., p. 504.

Prior to the land-grant act, higher education had primarily served the elite. Colleges were privately endowed. Their primary endeavor was to develop 'gentlemen'. They required Greek and Latin and focused on professions of the ministry, law and medicine. The Land-Grant Act was passed in Congress only after the Southern States had seceded from the Union and when the powerful plantation aristocracy had lost veto power over the bill which sought to elevate the educational opportunity for the common man.

Even though well-intentioned, the land-grant colleges found it difficult to muster rural support for college education. Many of the professors at the new colleges had taught previously at the existing private colleges and continued to cultivate 'gentlemen' rather than men versed in the practical application of science to daily life.

> Training fancy farmers...had little attractiveness for the men...in the fields who believed...a lesson in loading manure was a better way of teaching agriculture than a class in the laboratory. The way to keep boys down on the farm was not to send them away.[4]

Popularity of the land-grant college in Michigan improved when special winter short courses were first offered in the 1890's. "It was this development that did as much to win rural support for the College as any other single innovation."[5] By 1924, forty-six land-grant institutions around the country offered short courses in agriculture.[6]

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[4]Oscar Handlin and Mary F. Handlin, The American College and American Culture, (New York: McGraw Hill, 1970), p. 53.

[5]Madison Kuhn, Michigan State: The First Hundred Years, (East Lansing: Michigan State University Press, 1955), p. 178.

[6]Proceedings: Association of Land-Grant Colleges, Vol. 38 (Washington D.C.: Association of Land Grant Colleges, 1924), pp. 75-107.

Enrollments in these abbreviated college programs totaled about three thousand students each year from the early 1920's through the early 1950's.[7]

Land-grant colleges publicly continue to subscribe to the support of less-than baccalaureate programs at least to date. They have also accepted the role of providing preparation of vocational teachers for work at other academic levels. The policy statement appearing in two successive land-grant college association convention proceedings is illustrative:

> State colleges and universities make important contributions to vocational-technical education in two ways: (1) through occupational education...for a variety of technical occupations requiring less than a baccalaureate degree and (2) through training of teachers...of occupational education...[8]

Land-grant colleges have played a major part in improving the dignity of the work of the farm by providing instruction in modern agricultural technology. "Short courses" for young farmers have been an important method used to perform this role. Land-grant colleges apparently plan continued delivery of educational programs for young farmers in agricultural technology via the short course or technical institute method as seen by the maintenance of existing programs and the development of new technical programs in agricultural production at such schools as the University of Minnesota and The Ohio State University. Purdue University has a similar program on its drawing boards awaiting funding. Wisconsin has pursued development of area vocational-technical centers to provide post-secondary training in addition to the 'short courses'

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[7]Vernon Carl Larson, "A Survey of Short Course Programs," (Unpublished Ed D Dissertation, Michigan State University, 1955), p. 41.

[8]Chester K. Arnold, ed., Proceedings of the National Association of State Universities and Land-Grant Colleges, Vol. 80, (Washington D.C., 1964), p. 53. (also appeared in Vol. 81., pp. 69-70.)

at the University. In Illinois, a system of community colleges provides young farmer training, but the land-grant university has a major role in preparation of teachers and instructional materials for such programs. Pennsylvania State University and Cornell University also offer less-than-baccalaureate training in production agriculture. Enrollments in technical agriculture programs have increased in institutions where offered in recent years. The program at Michigan State University has also experienced increased enrollments. Among the central states, it appears that the technical training role of land-grant colleges in production agriculture is an accepted pattern for the future. Similar developments are demonstrable in the other regions of the country as well.

## NEED FOR THE STUDY

The passage of the Vocational Education Act of 1963 and subsequent amendments in 1968 marked a renewal of public interest in vocational education. This has been evidenced in the funding of a proliferation of educational programs in many fields and at many levels. Currently, over four hundred post-secondary educational institutions offer non-baccaulaureate programs in agriculture. This is nearly a five-fold growth since 1965. More than thirty thousand students are enrolled in formal non-degree technical programs in agriculture.[9]

Under the guidelines of the Vocational Education Act of 1963,

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[9]Maynard J. Iverson, Directory of Post-Secondary Education in Agribusiness and Natural Resources Occupations, 1971-72, (Lexington: University of Kentucky, January, 1972).

agricultural education no longer was to deal just with work of the farm. Vocational education in agriculture was also mandated for persons entering careers in agriculturally-related business and industry. As institutions prepared for this new responsibility, the needs of the potential work force in production agriculture seemed to lose the attention of the agricultural educators. Even though vocational agricultural education research and teaching experienced some increase in total, emphasis upon production agriculture declined.

In an age of food shortages, it is obvious that food production will continue to be important to our society. The needs of young people who replace farmers who retire or leave the farm will continue to be an important aspect of a complete educational program for agricultural occupations.

Traditional methods of providing such education may not be adequate to the task in the future. Technology is rapidly changing. The difference between an individual's success and failure in farming will depend on his ability to manage the resources in his control in the face of a dynamic technology...the demands of the market place, and the general social-political environment.

The family farm will undoubtedly dominate the organizational structure of the nation's farm enterprise for some time. In 1969, 98.2 percent of all farms in the U.S. were organized as sole proprietorships or partnerships.[10] While the total number of farms is

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[10]Bureau of the Census, U.S. Census of Agriculture, 1969, Vol. 1, Area Reports, (Washington: Government Printing Office, 1963).

declining, the remaining businesses are increasing in size, complexity and specialization. Arcus and Heady project "an eventual domination of American agriculture by two and three man farms...the second and third man will eventually be permanent hired personnel but with skill requirements entirely different from the conventional farm laborer of the past."[11] Movement has already been observed: census data show that in 1972, for the first time in recent years, the numbers of hired farm workers increased.[12]

If land-grant colleges hope to continue to serve the needs of persons entering farming occupations, they must recognize the need to provide innovative leadership in developing methods of delivery of appropriate educational experiences. Very little timely research has been published about the specific needs of persons entering farming occupations. Larger farms and increased opportunity for employment in technician, mid-management and professional positions on certain types of commercial farm enterprises provides the basis for the present concern about level, content, and type of education that will be needed by persons who will seek entry into viable farming occupations in the years ahead.

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[11]Peter Arcus and Earl O. Heady, Manpower Requirements and Demands in Agriculture By Regions and Nationally, With Estimation of Vocational Training and Educational Needs and Productivity, (Ames: Iowa State University of Science and Technology, November, 1966), p. 20.

[12]U.S. Handbook of Agricultural Charts - 1972, Department of Agriculture Publication, (Washington: Government Printing Office, 1973), p. 17.

## PURPOSE

The purpose of this study was to provide one basis for institutions of public higher education concerned with agricultural education in Michigan to determine their role in providing career preparation for persons seeking to enter and become established in farming occupations. It was specifically intended to focus upon the kinds of competenies needed by persons entering full-time farming occupations in Michigan.

## OBJECTIVES

The major objective of this study was to determine the occupational competencies needed by persons who enter established full-time family-type farm businesses as entrepreneurs and by persons who enter full-time technician or mid-management level farm employment.

More specifically, the objectives were:

1. To determine occupational competencies needed by:
    a. persons becoming established in farm businesses as entrepreneurs and
    b. persons entering technician/mid-management level farm employment.
2. To determine occupational competencies needed by persons established in:
    a. small farm businesses and
    b. large farm businesses.
3. To determine occupational competencies needed by person becoming established in:
    a. dairy or livestock farming occupations and

b. crops (cash crop, grain, vegetable or fruit) farming occupations.

## ASSUMPTIONS OF THE STUDY

1. Vocational preparation of youth and adults for careers in production agriculture will continue to be a function of the existing institutions of public higher education in Michigan for the forseeable future.
2. The economics of establishment of persons in farming occupations, while dynamic in nature, is independent of the competency needs judged important for young farmers as perceived by adult farmers.
3. Experienced agricultural educators in the general geographic locations of the respondent adult and young farmers represented the most appropriate group of educators to validate the competency needs projected by their clientele.
4. Graduates of the Agricultural Production Program at Michigan State University provided a reliable measure of the actual experience of young people entering similar sizes and types of farm businesses and associated occupations.
5. Cooperators of the Michigan State University TELFARM (farm management records) program adequately represented the types of farm businesses that young people will enter in the next five years and have the insight into competency needs of persons entering and capable of progressing in the sizes and types of farming businesses.
6. In the future, persons who will seek establishment in farming as entrepreneur are very likely to have the same range of experiences, abilities and life career aspirations as persons who will seek to

enter employment as technician/mid-management level farm workers.

## LIMITATIONS

The primary limitations that affect the interpretation of the findings of this study are as follows:

1. The adult farmers who participated in the study were selected from among the participants in Michigan State University's farm accounts program and do not represent a random sample of all farmers.
2. Young farmers who participated in the study were selected from graduates of the eighteen-month technical training program for young farmers in the Institute of Agricultural Technology at Michigan State University and do not represent a random sample of all farmers in their age group.
3. The entire population was drawn from nineteen Michigan counties. These counties were chosen because of relatively high interest in the post-secondary technical education for young farmers as evidenced by attendance levels in the eighteen month technical training program for young farmers at Michigan State University for several preceeding years. This method of selection of counties eliminated representation from Northern Michigan and the Upper Peninsula and the counties selected are not to be considered a random sample of the remainder of the state.
4. The scope of the competencies serving as the focus of this study was inclusive of the types of technical knowledge and skills associated with the operation and management of

farm businesses. The study was exclusive of any other types of competency requirements.

5. No attempt was made to evaluate the actual proficiency level of the respondents in the competency areas being evaluated. Respondent perceptions of competency needs provided the basis for analysis.

## HYPOTHESES

Adult farmers were considered to be the benchmark for this study. Their judgements about the competencies they expect will be needed by persons entering farming occupations in the years ahead, especially on their types of farms, was assumed to be a close approximation of what the actual needs will be. However, to increase the validity of the findings, to assure a measure of consistency between high school vocational agriculture programs, current non-formal agriculture extension programs in local areas, and the educational policy ultimately to be derived from this study, professional educators from both fields were included. Young farmers in early stages of their careers were also included to provide insight into their perspectives and experiences in these same competency areas.

Within the limitations of this study, it was hypothesized that the following relationships exist:

1. There are differences between the perceptions of adult farmers and professional agricultural educators regarding the needed performance of selected occupational competencies by persons who enter farming occupations in the next five years.

2. Occupational competencies needed by persons who enter entrepreneurship are different than those needed by persons who enter technician/mid-management level farm employment.
3. Occupational competencies which are needed by persons who enter large farm businesses are different than those needed by persons who enter small farm businesses.
4. Occupational competencies needed by persons entering livestock farming occupations are different than those needed by persons entering crops farming occupations.
5. Occupational competencies needed by persons recently entering farming occupations and their present training needs differ on the basis of farm type and size.

## DEFINITION OF TERMS

Farming Occupations: farm owner-operator, tenant farmer farm manager*, farm partner, farm employee, herdsman*, crops foreman*, and related job titles. The focus of this study is on entry level farming occupations which normally require or would benefit from post-secondary technical education in agriculture. (*Typically, technician or mid-management level farming occupations.)

Occupational Competencies: those skills, knowledges and abilities needed for successful performance in the roles of given farming occupations.

Competency Areas: the term used to define the broad fields or types of competency needed to perform successfully in a given occupation. A competency area might become the basis for a course of instruction or be grouped with others to provide the basis for a course of instruction in an educational institution. (also synonymous herein with the term "performance goals".)

Professional Agricultural Educators: persons who are employed by public schools and the cooperative extension service to provide: (1) vocational preparation of persons entering agricultural occupations or

advance agricultural education or (2) non-formal technical and managerial advice according to the needs of farmers. Teachers of Vocational Agriculture and County Extension Directors were the sole professional agricultural educator reference group used in the study. The terms "professional" or "educator" were used synonymously.

Adult Farmers: selected farm operators enrolled in the TELFARM program in 1972 at Michigan State University and who resided in the counties composing the geographical basis for the study.

Young Farmers: persons who have entered full or part-time farming as entrepreneurs or farm workers between 1969 and 1973 following graduation from the Institute of Agricultural Technology at Michigan State University during those years. This term is also used to characterize persons who will be entering farming occupations as entrepreneurs or technician/mid-management level farm workers in the future. Young farmers enrolled in TELFARM were included with the adult farmers.

Post-Secondary-Technical Education: education offered by community or junior colleges or vocational-technical schools and occasionally by four year baccalaureate colleges. It is normally based on scientific fields within which there are professionals with four or more years of education. It is occupation or job oriented and usually is two years or less in length.

Career Education: a comprehensive term which includes, among other things, organized instruction in careers and the world of work, beginning with the awareness stage in the early elementary, and including career preparation at the upper secondary school and post-secondary levels, and updating and retraining for persons in their adult years.

## OVERVIEW OF THE THESIS

This study is reported through five chapters. Chapter I has dealt with the need for, purposes and objectives of, and conceptural framework for the study. Chapter II includes a review of selected studies relevant to competency-based instruction and specific studies that bear on the nature of the thesis. Chapter III contains the methods used in this study for selection of the sample, collection of data, and analysis of data. Chapter IV contains a report of the findings of the study. In Chapter V, the findings of the study are related to the needs of young farmers for occupationally oriented educational programs.

The research conducted as the basis of this dissertation, and reported herein, is presented within the framework of policy and decision making prerogatives of administrators of educational programs for farming occupations at the post-secondary, non-degree level. The study identified numerous competencies about which there were high levels of agreement about expected performance of young farmers. It is anticipated that this type of information will be a valuable aid in identification of appropriate resources that might be brought to bear on an occupational training program for young farmers. It should also assist established institutions in developing alternate delivery systems for those subjects that might be taught or competencies that might be developed in other ways in addition to traditional formal schooling. However, it was not the function nor purpose of this dessertation to specify which delivery systems would be most desirable.

# CHAPTER II

## REVIEW OF LITERATURE

Farmers were long considered at the bottom of the employment ladder. "If you can't do anything else, son, you can still farm," was an oft repeated bit of fatherly wisdom. Today, it is known that that bit of advice is untrue. One could more accurately phrase it as did a prominent Michigan cattleman, before a class at Michigan State University, "Son, if you can't farm, you can do almost anything else you want to!" [1] The complexity of the business of farming is growing. Farming is not necessarily the easiest nor the most rewarding occupation for every farmer's son.

Democratic society, as we know it, was founded on the ethic of the "worth of the individual". The purpose of this study was to determine the areas of technical competence necessary for the individual to succeed in a farming occupation of his choosing. This was also an attempt to determine information which would be important in planning the role which institutions of public higher education may choose to play to assist people who enter farming careers to improve their occupational performance. It is believed that if this need is met, it will contribute to the growth in the stature and dignity of farming and the role of farmers in our society.

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[1] Presentation by Blaque Knirk, cattleman, before a class of young farmers in the Agricultural Production Program, East Lansing, Michigan, Michigan State University, Winter, 1971.

This chapter contains a review of selected publications and reports that relate to curriculum development in post-high school technical agricultural education. In it are identified (1) curriculum development theory in vocational education, (2) recent studies that have attempted to determine competency needs of farmers, (3) factors associated with establishment in farming occupations, (4) traits of successful farmers and, (5) the nature of technical education programs offering occupational instruction.

## CURRICULUM DEVELOPMENT

The purposes of vocational education differ philosophically from liberal education in that it is to educate for useful occupations rather than to develop mental discipline. The former seems to have grown out of "rational humanism"[2], a philosophy that was fostered in the land grant college act. The concept of usefulness is interpretated in vocational educational theory as the ability to participate in gainful and satisfying employment. Regardless of the delivery system, occupational or vocational education must be based on occupational needs in the industries being served. Mager and Beach remind us that "the object of vocational education is to send the student away: capable of performing satisfactorily on the job and...capable of improving his performance with further practice." For achievement of the first objective, "it is necessary to know what the job consists of, what one needs to do to perform each of the tasks, and how frequently each of the tasks

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[2] John S. Brubacher and Willis Rudy, Higher Education in Transition, op. cit., pp. 278-295.

is performed." To achieve the second objective, "it is essential that the student be taught enough about each task so that he can tell the difference between doing it right and doing it wrong."[3]

Bushnell and Morgan are cited in the literature for their six step curriculum development model for vocational education. They subscribe to the behavioral approach. The six steps are (paraphased):

1. Write behavioral definitions of instructional objective.
2. Consider relevancy, and validity of available information.
3. Generate curriculum decisions.
4. Test curriculum decisions through time implementation.
5. Measure curriculum outcomes against stated objectives.
6. Evaluation and feedback.[4]

Vocational education curriculum must be based on learner outcomes. Identification of learner outcomes (employee behavior) is essential to development of valid curriculum decisions.

Several alternatives were offered in the literature to determine desired behavioral outcomes. One method is task analysis, i.e., observation and organization of actual job tasks as basis for what learners must be able to do. Another method is called the "functions of industry" approach. The term 'function', used by Gleason in his study of the farm machinery industry, "denotes a normal process which requires the performance of closely related activities to achieve

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[3] Robert F. Mager and Kenneth M. Beach, Jr. Developing Vocational Instruction, (Belmont, California: Fearon Publishers, 1967), p. 2.

[4] "Summer Institute to Prepare Vocational Educators in Curriculum Development" (Corvalis: Oregon State University, July 1968), (n.p.).

a desired outcome".[5] He used these steps in determining the core around which a curriculum could be developed for training students for employment in the retail division of the industry:

(1) Determine the purposes of the industry as a basis for identifying the essential functions to be performed.
(2) Identify the activities which must be performed to fulfill each function.
(3) Identify the kinds of competencies required of persons who perform the activities of a function.
(4) Group the activities and competencies into appropriate areas to indicate the educational mix required in programs designed to prepare personnel for the industry.
(5) Select a "jury of experts" to verify the appropriateness of the substantive content defined.[6]

## EDUCATIONAL NEEDS OF YOUNG FARMERS

Neel[7], Long[8], and Bundy[9] have done comprehensive studies about the competency needs of persons in farming occupations. Neel interviewed 329 farmers in an eleven county area in Kentucky to determine their perceptions about competency requirements in their occupations. He defined competencies as knowledge and skill used.

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[5]William E. Gleason, "Functions of Industry Approach to Curriculum for Vocational Education" (Unpublished PhD dissertation, Michigan State University, 1967), p. 35.

[6]Ibid., p. 110.

[7]C. O. Neel, Jr. Employment Opportunities and Competencies in Selected Counties in Kentucky (Frankfort: Kentucky State Department of Education, March 1968).

[8]Gilbert A. Long, Clusters of Tasks Performed by Washington State Farm Operators Engaged in Several Types of Agricultural Production -- Grain, Dairy, Forestry, Livestock, Poultry, Horticulture and General Farming (Pullman, Washington: Washington State University, Report No. 127, June 1968).

[9]C. E. Bundy, et al., multiple titles in series Agricultural Education Research Publications (Ames: Iowa State University, 1962-1968)

His report of the relative importance of the competencies viewed by farmers was as follows:

| | Mean Score* of Subject Matter Areas[10] | |
|---|---|---|
| | Knowledge | Skill |
| 1. Agricultural Mechanics | 1.56 | 1.46 |
| 2. Soil and Soil Management | 1.44 | 1.38 |
| 3. Farmstead, Buildings, Fences and Water Systems | 1.26 | 1.31 |
| 4. Plant Science | 1.15 | 1.29 |
| 5. Animal Science | 1.09 | 1.05 |
| 6. Farm Business Management and Marketing | 1.08 | 1.00 |

*3 point scale: 2-necessary, 1-desireable, 0-not necessary

Long's study of Washington state farmer competency needs showed the relative importance of five areas of competencies as perceived by general farmers was as follows:

| | Average Percent* Response[11] |
|---|---|
| Farm Management Economics and Marketing | 71.1 |
| Agricultural Mechanics | 68.3 |
| Plant Science | 55.7 |
| Animal Science | 50.5 |
| Soil Science | 48.7 |

*Yes/No dichotomy

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[10]Neel, op. cit., p. 10.

[11]Long, op. cit., Table 17 (n.p.).

Both Neel and Long looked at the relative differences for persons in different types of farming. Long examined needs of farm operators, primarily, while Neel examined the competencies used in selected mid-management or technician level positions as well. Neel based his study on a predetermined list of 68 knowledges and 62 skills while Long had a list of 132 tasks.

The series of studies directed by Bundy in Iowa involved the efforts of at least eleven of the Masters and Ph.D. level graduate students in Agricultural Education at Iowa State University over a period of several years. Various techniques were employed to ascertain competencies used and needed. Personal interviews and mailed questionnaires to sample groups of Iowa farmers were the primary modes of data gathering. Initial lists of competencies were developed in conjunction with professionals in the subject fields being studied. It is difficult to ascertain any kind of ranking among the subject areas chosen by Bundy but a rank-order of presentation of specific competencies was reported within the abstracts of the individual studies. These studies included the following eleven competency areas: farm records, farm credit, livestock marketing, labor utilization, business analysis, soil management and fertilizer use, forage crop production and utilization, electricity, farm machinery program planning, farm machinery maintenance, and nutrition.

Somewhat more recent studies have been reported that deal with competency needs of farmers in the specific area of agricultural mechanization. Knotts learned that among farmers 24-40 years of age, importance of particular competencies was unrelated to age of the

respondent except in 'their perceived needs to overhaul farm engines and to repair electric motors'. Type of farming was associated with importance assigned to about half the competencies listed. He found size of farm was relevant in only 12 percent of the cases. Job assignment within the farm firm was related to perceived competency needs.[12] On an importance scale of 1 to 5 (with 5 being extremely important), Weber reported the average response on inquiries of approximately two hundred Louisiana farmers as follows:

| | |
|---|---|
| Agricultural power units, tractors, and related field machines | 4.02 |
| Agricultural electricity | 3.48 |
| Agricultural construction and maintenance | 3.45 |
| Agricultural structure and environment | 3.40 |
| Processing, handling and storage of farm materials | 3.28 |
| Soil and water management | 2.96[13] |

Agricultural mechanics competence needs were most often mentioned by farmers as being important for occupational success. Other major functional areas referred to often in these studies include farm management, plant science and animal science. Very little has been

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[12]Clifton Don Knotts, "Agricultural Mechanics Skills Needed by Farmers in Texas," Dissertation Abstracts International, 32 (1971), 1190A (Texas A & M University).

[13]Richard C. Weber, "Agricultural Mechanization Competencies Needed by Selected Louisiana Farmers," Agricultural Education Magazine, 45 (December, 1972), p. 137.

reported about social-personal competencies that accompany successful farm employment or farm operation in these types of studies, however.

## FACTORS AFFECTING ESTABLISHMENT IN FARMING OCCUPATIONS

### Entrepreneurship

Level of education seems to be positively associated with success in farming. Knowledge of capital requirements, operating agreements, management techniques, and agriculture production technology are undoubtedly helpful in developing the opportunity to farm. There are other factors. Marvin characterizes the farm population he studied as follows:

1. Those becoming established in farming were the youngest group and had the highest level of educational attainment.
2. Those leaving farming operated considerably smaller farms and had greater reliance on government subsidies, hired help, and commitment to off-farm work.[14]

Nielsen found that training in vocational agriculture was positively associated with use of production and management practices.[15]

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[14]R. Paul Marvin, "The Flow of Agricultural Manpower: Its Vocational and Educational Correlates. Final Report.," (St. Paul: Minnesota University, December, 1969), p. 33.

[15]Duane M. Nielsen, "Relationship of High School Vocational Agriculture and Size of Home Farm to Establishment of Graduates in Farming," Dissertation Abstracts, 19 (1958), 472 (Iowa State College).

And Pearce concluded that "there is a need for programs of instruction in agriculture in order for farm operators to achieve establishment in farming."[16]

Crawford[17] reported that the average age in which young people in Iowa started to farm was 21.6 years in 1968. Twenty-one percent of those who became established during the years 1965-68, used a farm partnership as their primary means of getting started during their first year. Three percent used a combination partnership and individual operation. Percentage of partnerships and individual operations increased after the first year. Seven percent of the young farm operators were in combination arrangements at the close of the four year period. Young farmers relied heavily upon rented land during their early years. Note the following for persons starting to farm:

| | 1965-68[18] |
|---|---|
| Factors | Mean |
| Acres operated in 1968 | 229 |
| Acres owned in 1968 | 79 |
| Acres rented in 1968 | 150 |

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[16]Frank C. Pearce, "The Educational Needs of Beginning Farm Operators in New York," Dissertation Abstracts, 25 (1964), 4518 (Cornell University).

[17]Harold R. Crawford, Factors Affecting the Establishment of Young Farm Operators and Implications for Agricultural Education (Ames: Iowa State University of Science and Technology, 1969), from Table 1, p. 10.

[18]Ibid. , p. 16.

Shepard and Anibal reported, in separate studies, how young farmers became established in Michigan in the early 50's. Of ninety young farmers studied by Shepard,

> "46 started by developing business arrangements with their father; 23 worked for a wage, either at the home or on a farm in the community; 13 received income from their own enterprises on the home farm; 5 worked at home and received as their wages, the use of the father's tools and equipment with which they operated rented land away from home..."[19]

Anibal summarized his study by saying that "the young men who gained farm experience early in life had a distinct advantage over the young men with no experience." He continues, "attaining farm managerial ability and financial competence was very important in aiding young men to become successfully established in farming."[20]

Farm Workers

Since all farm occupations are not included under the title of farm operator, it is desireable to review a study of job preparation of farm workers preferred by potential farm employers. A study of agricultural training needs of farm workers showed Ventura County farm employers preferred people with these minimum levels of schooling for job entry qualifications:[21]

| | Number Citrus Growers | Number Floriculture Growers | Number Livestock Poultrymen | Number Vegetable Growers |
|---|---|---|---|---|
| 4 Year College | 4 | 2 | - | 3 |
| Jr. College | 8 | 8 | - | 7 |
| High School | 8 | 4 | 2 | 3 |

[19]Donald H. Shepard, "How Farm Sons Become Established as Farmers" (Unpublished MS thesis, Michigan State College, 1950), p. 45.

[20]John D. Anibal, "How Fifty Young Farmers Became Established in Farming in Lenawee County, Michigan 1939-1954" (Unpublished MS thesis, Michigan State University, 1955), p. 31.

[21]Donald F. Rodrigues, A Research Study of Agricultural Training Needs in Ventura County (Ventura: University of California, May, 1967), p.10.

The types of work that farm workers perform varies from stoop labor to professional farm management. At the technician-mid-management level, an analysis of selected job descriptions seems to be about the only convenient way to obtain a sense of specific requirements for entry into farm employment. The job description below, while not necessarily even typical for all jobs that might have the same title, is illustrative of the degree of specialization associated with technician-level of farm employment.

LIVESTOCK PERFORMANCE TECHNICIAN[22]

Function of Job:

Under general supervision conducts the official visual evaluation and weighing of all livestock enrolled in the Michigan Beef Cattle Performance Testing Program.

Characteristic Duties and Responsibilities:

1. Coordinates the scheduling of the on-the-farm weighing and grading activities involved in the program.
2. Conducts the official visual live animal evaluation and weighing of livestock enrolled.
3. Directly responsible for maintaining accurate and up-to-date records of all livestock enrolled.
4. Makes and maintains frequent contacts with the purebred livestock breeders of Michigan, youth groups and the general public.
5. Responsible for accurately relating the importance of performance testing of livestock to the purebred cattlemen of the state.
6. Performs related duties when necessary.

Minimum Acceptable Qualifications:

1. High school graduate.
2. Two years of formal agricultural training beyond high school, such as MSU agricultural technology training.
3. Experience in the evaluation of live animal with respect to the various U. S. Department of Agriculture livestock grading standards.
4. Five years experience working directly with the feeding, breeding and management of beef cattle.

Additional Desirable Qualifications:

1. Experience

[22]Copy of actual farm technician job description, Michigan State University Personnel Department (1973).

Job descriptions and entry qualifications for this level of farm employment tend to be as specialized and as varied as the conditions require. No adequate summary of these variations and employment parameters were located in the literature.

## TRAITS OF SUCCESSFUL FARMERS

### Farm Management

Successful farm operators have been described in the literature in many ways, two of which are presented below. The somewhat inter-related traits manifested in farm management performance and use of new technology have been studied and reported in two different disciplines: agricultural economics and rural sociology. The following is a review of these two perspectives about the characteristics of successful farmers.

A distinguishing feature between the successful and the unsuccessful farmer (measured by income level) is decision-making and farm management ability. Johnson closely examined these traits in a landmark farm management study in the 1950's. The study of information used by southern Michigan farmers revealed that "farmers who have completed higher grades in school use more sources of information" and "tend to depend more upon direct sources."[23] A positive relationship was reported between years of education, association with organizations

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[23]Glenn L. Johnson, et al. ed. A Study of Managerial Processes of Midwestern Farmers, (Ames: The Iowa State University Press, 1955), p. 33.

total debts, type of thinking process used and positive action in situations involving risk of loss due to wrong decisions and imperfect knowledge.[24] "Use of deductive reasoning was positively associated with formal education and figuring the costs and returns but negatively associated with age."[25] Farmers expectation models about future events varied with type of event depending on the knowledge and number of contracts with others made by the farmer.[26]

Travis' study of managerial traits of selected outstanding dairymen and a random sample of dairymen makes note of these distinguishing characteristics: (1) "their utilization of free-stall housing and milking parlors," (2) intensity of cropping system, (3) use of paid non-family labor, (4) labor income, and (5) costs of milk production.[27] Erickson[28] described dairymen with highest milk production as those who enjoyed dairying the most, had higher milk production goals and less participation in off-farm activities such as 4-H Club, leadership, etc.

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[24]Ibid., p. 51.

[25]Ibid., p. 82. Deductive reasoning was presumed to be more closely associated with more substantive or difficult problems.

[26]Ibid. pp. 85-104.

[27]Van Cleft Travis, Jr. "A Study of Some Personal and Managerial Traits of Southern Michigan Telfarm Dairymen to Determine Their Relationship to Business Success and Form of Business Organization," (M.S. Thesis. East Lansing: Michigan State University, 1971), pp. 81-85.

[28]Russell W. Erickson, "An Analysis of High and Average Milk Production Dairy Farms," (PhD thesis, East Lansing: Michigan State University, 1972) pp. 76-78.

The goals and attitudes of farm families was found to be related to farm management as measured by Nielson. Those whose goals orientations were placed in security had lowest capital investment whereas success or prestige oriented farmers were high investors. He also reported that more formal education had been attained by those who emphasized long term farm goals. The clarity with which the goals had been formulated was positively associated with income.[29]

Adoption of Innovations

Rate of adoption of relevant agricultural technology is often associated with progressiveness and likelihood for high farm income. Adoption theory conceptualizes that use of new technology occurs in natural stages in the population depending on the system of beliefs, and values and other important traits of the farm population. Much of the work carried on by the Cooperative Extension Service has been based on a 'fan-out' system relying upon the credibility of key, early adopters in the rate at which profitable new ideas would be picked up by the more conservative, traditional farmers.

In a comparison of findings from similar studies in Kansas and Wisconsin, Copp reveals high correlations between a farm practice adoption index and (1) gross farm income, (2) acres of cropland and (3) size of herd.[30] Attitudes toward one of the tools of farm management (record keeping) were also found to be related to farm practice

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[29]James Nielson, The Michigan Township Experiment: The Farm Families: Their Attitudes, Goals and Goal Achievement, Agricultural Experiment Station Technical Bulletin 287, (East Lansing: Michigan State University, 1962), pp. 24-26.

[30]James H. Copp, "Toward Generalization in Farm Practice Research," Rural Sociology, 43 (June, 1958), 106.

adoption. The more complete the farm record (if records were patterned after college recommended systems and perceived to have value in business analysis), the greater the adoption ratings of the farmers studied.[31]

The greater the level of formal education a farmer has achieved, the greater the likelihood that he will adopt recommended farming practices. From their observations, Rogers,[32] Anderson,[33] Copp,[34] Spencer,[35] Gross and Taves,[36] Finley,[37] and Lionberger,[38] consistently report the value of formal education in relation to adoption of improved farming practices. Lionberger also found that the kind of education was more important than the amount.

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[31]James H. Copp, Personal and Social Factors Associated with the Adoption of Recommended Farm Practices Among Cattlemen, Kansas Agricultural Experiment Station Technical Bulletin 83, (Manhattan: Kansas State University, 1956).

[32]Everett M. Rogers, "The Role of the Agricultural Innovator in Technological Change," (Paper presented at the American Sociological Society Meeting, Chicago, September 5, 1959), p. 12.

[33]M. A. Anderson and others. "An Appraisal of Factors Affecting ing the Acceptance and Use of Fertilizer in Iowa, 1953," (Ames: Iowa State College, 1953), p.3.

[34]Copp, "Toward Generalization...," op. cit., Table 1, p. 106.

[35]George E. Spencer, "Value Orientation and the Adoption of Farm Practices," (Unpublished Ph D thesis, Ithaca, New York: Cornell University, 1958), p. 114.

[36]Neal Gross and Marvin J. Taves, "Characteristics Associated with Acceptance of Recommended Farm Practice," Rural Sociology, XVII (1952), p. 322.

[37]James R. Finley, "Farm Practice Adoption: A Predictive Model," Rural Sociology, 33 (1968), p. 8.

[38]Herbert F. Lionberger,"Adoption of New Ideas and Practices", (Ames: Iowa State University Press, 1960). Also referred to by Warmbrod and Philips, Review and Synthesis of Research in Agricultural Education (Columbus: The Center for Research and Leadership Development in Vocational and Technical Education, The Ohio State University, August 1966), p. 11.

## EDUCATIONAL PROGRAMS FOR FARMING OCCUPATIONS

Some of the people who choose to enter farming occupations will find that standards of performance and the nature of the work assigned actually require very little understanding or prior experience. Much of the work of the farm is routine and laborious, requiring persistence, good health and congenial supervision. All indications point to a time, however, that persons of this capacity alone on the farm will find themselves inadequately prepared. High investments in land, machinery, equipment, and livestock underwritten by low-equity financing will cause the farmer or farm manager to be very careful about who is employed or taken into the business. Wages offered for the farm worker (or the farmer's son, for that matter) will be determined by his performance.

Educational programs maybe designed for specific purposes. In a period when public accountability is demanded of public institutions, it is necessary that planners and administrators carefully examine both the educational tasks to be done and the most efficient method, in this case, of providing educational opportunities for persons seeking entry into farming occupations.

For young adults and out-of-school older youth, at the post-high school level, there are essentially five options available for institutional preparation and updating for farming occupations. One option is to participate in the adult education programs of a local education agency. Another is to attend a community college or technical institute whereby formal schooling is provided during a one or two year period. Another option for some is to attain the baccalaureate degree. A fourth option is to participate in the non-formal educational services

provided by the Cooperative Extension Service. A fifth approach will be discussed more in depth later, but may emerge as an alternative to all other schemes in the future. It is perceived that providing adequate educational opportunity may depend on the capability to so package it that it is available at the time, form and place most convenient to the user and sufficiently practical to meet the learners long term as well as short term needs.

The focus of this study was upon the post-secondary non-degree educational option. The literature review was directed toward the general nature of technical education programs, the characteristics of individuals who have taken advantage of this type of education, and finally, examples of educational programs designed for preparation of persons for farming occupations.

## The Nature of Technical Education Programs

Graduates of technical education programs should be prepared for entry into the labor force at the technician level, i.e., somewhere between skilled vocational and professional job levels. M. R. Graney says there are five things which characterize the technical institute:

1. It is post secondary.
2. It is essentially terminal.
3. It is related to the fields of science and technology.
4. It offers intensive training in a brief period.
5. It relies heavily upon application.[39]

Lawrence suggests that post secondary education in agriculture should be intensive, special training for competencies at a technical

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[39]Maurice R. Graney, The Technical Institute (New York: Center for Applied Research in Education, Inc., April, 1967).

level.[40] Students of such programs should "exhibit maturity and sincerity of purpose."[41]

J. R. Clary's study of the nation's technical programs and an overview of the nature of technical education in agriculture. He reports:

> The types of agricultural technician training program to be offered should be determined with primary but not exclusive attention to occupational (job opportunity, educational and interest) surveys of people and industries to be served.
>
> Selection of students for agricultural technician training programs should be based on interests, aptitudes, previous education, intellectual capacity and background experience--the criteria varying with the occupations for which the training is given.[42]

According to Brooking and Hunsicker,

> With the increasing tendency for employers to favor the older and more mature employee, the two year period after high school might best be used to provide useful and substantial education to youth interested in agricultural occupations.[43]

## Characteristics of Students Entering Technical Programs

Becker's study revealed beliefs about technical training programs

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[40]C. M. Lawrence, "A Complete Program of Agricultural Education," Agricultural Education Magazine, 42 (July, 1969), p. 8.

[41]Criteria for Technician Education-A Suggested Guide, (Washington: U. S. Office of Education, August, 1966), p. 78.

[42]Joseph R. Clary, Guidelines for the Development of Programs for Training Agricultural Technicians (Columbus: The Ohio State University, 1964), p. 242.

[43]Walter J. Brooking and H. N. Hunsicker, "More Skilled Agricultural Technicians Are Needed," Agricultural Education Magazine, 38 (June, 1966), 277-279.

programs by students in those programs. Students indicated they planned to complete the technical agricultural program for the following reasons:

| | Mean Response*[44] |
|---|---|
| Believe it will help in advancement in an occupation. | 7.6 |
| Believe it will help in obtaining more desireable employment. | 7.5 |
| Believe the training will help get higher wages. | 7.0 |
| Foundation for additional education and training. | 6.5 |
| Enjoyed educational experience. | 5.4 |
| Desire of wife, parents, etc. | 4.9 |

*(9 point scale with 9 as highest)

He discovered that typical student (1) have a farm background, (2) have average ability as indicated by high school grades and high school class rank with the exception of having nearly a "B" average in vocational agriculture, (3) most have had high school vocational agriculture and were in FFA, and (4) were in their late teens when enrolled in the agricultural technician training program.[45] According to VanDerslice, the technical student (1) is usually a high school graduate or equivalent, (2) is above average in ability and achievement, (3) has completed two years of mathematics in high school (algebra and geometry), (4) had two years of science (usually general science and biology, few had chemistry and physics), (5) had three years of industrial or vocational education, and (6) performed at the 45th percentile on standard verbal tests.[46]

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[44]William J. Becker, "Technical Agriculture Programs in Ohio with Emphasis Upon Student and Program Characteristics," (Unpublished PhD thesis, Columbus: The Ohio State University, 1968), p. 129.

[45]Ibid, p. 63.

[46]John F. VanDerslice, "Technical Student Characteristics," Industrial Arts and Vocational Education, 57 (February, 1968), p. 82.

Students in technical agriculture programs in Ohio, according to Becker's study were 20.1 years of age but 83 percent were 20 years of age or younger. Fifty percent of the students' fathers were farmers. High school grades and courses appearing on transcripts of the Agricultural Technology students in Ohio were sources of data which described the typical academic preparation of a group of post high school agriculture students:

High School Grades and Courses
Among Ag. Tech. Students in Ohio[47]

| Subject | Grade Point Average | High School Credits Completed |
|---|---|---|
| English | 1.91 | 3.65 |
| Mathematics | 1.95 | 2.26 |
| Science | 2.00 | 2.32 |
| Vo-Agriculture | 3.09 | 3.09 |

Becker also found that these students, on the average, were in the 46th percentile of their high school class and had an Otis Self Administered I.Q. score of 103.2[48]

In terms of sociological factors, VanDerslice found that technical students tend to be from the lower socio-economic class but success in the technical program was not related to socio-economic level and that students tended to enter technical programs related to their father's occupation.[49] Brown discovered that 53 percent of the technical

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[47]Becker, op. cit., pp. 90-92.

[48]Ibid.

[49]VanDerslice, op. cit., p. 87

agriculture students at Michigan State University had a vocational agriculture background while 74 percent had farm or rural non-farm backgrounds.[50] Robinson also discovered a strong relationship between father's occupation and that pursued by sons.[51] Wood[52] had similar findings. Over 73 percent of the technical agriculture students he studied in Illinois had fathers in agricultural occupations. Kahler's study revealed that enrollment in post high school training was positively correlated with the level of education of the father. The expressed need for knowledge of agriculture tended to be associated with the length of the job retentions of the graduates who were employed.[53] Pearce found that "an analysis of reading habits is the best single criteria in predicting educational needs of farmers."[54]

Some psychological characteristics of technical students, according to VanDerslice are:

(1) Display early and active interest in the field they enter.

(2) Achieve better toward short term goals which students are able to identify as achievable.

(3) Desire related subject matter presented with technical area content as an interdisciplinary approach.

(4) Work better independently and are 'thing' oriented rather than people oriented.

(5) Are laboratory oriented rather than oriented toward the classroom.[55]

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[52]Wood, Eugene S., An Evaluation of Illinois Post High School Educational Programs in Agriculture, School of Agriculture, Publication 28, (Carbondale: Southern Illinois University, September, 1967), p. 83.

[53]Alan A. Kahler, "Factors Related to the Occupations of Nebraska Farm Male High School Graduates," (Unpublished PhD dissertation, Iowa State University, 1967).

[54]Pearce, "The Educational Needs of Beginning Farm Operators in New York," loc. cit.

[55]VanDerslice, op. cit., pp. 85-86.

Wood's study showed technical agriculture students preferences for different types of work situations.[56]

Sherman reported it was generally believed that (1) post-secondary agriculture students have rural backgrounds with some vocational agriculture in high school, (2) the agricultural technician must be the kind of person who is able to apply the scientific method in his technology and (3) generally have an interest about life and curiosity -- and some mechanical ability.[57]

Becker found no relationship between students' success in school and farm background or the lack of it. For those whose fathers were in ag-related occupations, the grade point averages were 3.12; 2.72 for students whose fathers were in non-agricultural occupations; and 2.43 average for those whose fathers had been deceased or retired. He found farm vs. non-farm employment during high school of no great influence on college GPA, although farm background did help. Those employed off the farm between high school and technical college did better than those employed on the farm or had no employment (3.06; 2.73; 2.53). Commuting made no significant difference in grades and those who worked as many as 27 hours per week during school did as well as those not working at all.[58]

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[56]Wood, op. cit., p. 13.

[57]G. Allen Sherman and Arden L. Pratt, Agriculture and Natural Resources Post-Secondary Programs (Washington: American Association of Junior Colleges, 1971), p. 14.

[58]Becker, op. cit., p. 173

## Education Programs For Farming Occupations

One approach to determining occupational competency areas that are important enough to be included in a curriculum is to examine what similar institutions include in their programs of instruction. Associate Degree programs in agricultural business options directed toward farming occupations were offered by about one hundred community colleges, area vocational-technical centers, two-year college branches of state universities and land grant colleges. A random selection of catalogues from those institutions provided some information about perceptions of occupational needs for farmers. Table 2.1 shows suggested program requirements in five geographically separated programs. Approximately 64 percent of the requirements (assuming electives are all taken in agricultural courses) listed by these colleges as a group are in agricultural subjects. Approximately 32 percent are in preparatory or general education.

Table 2.1

Summary of Course Offerings in Five Farming Occupational/Associate Degree Programs

| Courses | Colleges[1] | | | | | Average Percent of Total[4] |
|---|---|---|---|---|---|---|
| | A[2] | B[2] | C[3] | D[2] | E[3] | |
| General Education | ----------Credits---------- | | | | | |
| Social Science | 16 | 6 | 3 | 9 | 3 | 6.6 |
| English-Math-Chemistry | 13 | 18 | 12 | 9 | 12 | 16.6 |
| General Science | 7 | | 3 | | 3 | 3.5 |
| Physical Education | 3 | 2 | | | | 1.1 |
| General Orientation | | 6 | 8 | | | 4.0 |
| Agricultural Education | | | | | | |
| Occupational Experience | 3 | | | 16 | | 4.2 |
| Animal Science | 3 | 3 | 10 | 6 | 6 | 7.9 |
| Plant-Soil Science | 19 | 3 | 14 | 9 | 9 | 14.4 |
| Agricultural Economics | 3 | 12 | 19 | 12 | 18 | 18.2 |
| Agricultural Mechanization | 6 | | 13 | 3 | 6 | 8.2 |
| Electives | 13 | 16 | 10 | | 15 | 15.3 |
| Graduation Requirements | 76 | 66 | 94 | 64 | 72 | 100.0 |

[1]Sources: College Catalogues: (A) Arizona Western College, Yuma, (1970-71), (B) S.U.N.Y. Agricultural and Technical College at Cobleskill (1973-75), (C) Colorado Mountain College, Glenwood Springs (1971), (D) Illinois Central College (1971-72), East Peoria, (E) Pennsylvania State University, University Park (1971).

[2]Semester System

[3]Term System

[4]Corrected for variation in credit value

Of the technical agriculture requirements, 16 percent were listed as Animal Science, 30 percent as Plant and Soil Science, 37 percent in farm management and Agricultural Economics and 17 percent in mechanization programs. The institutions provide that an average of 15 percent of their course requirements must be taken as electives, so that students may follow their own specialized farming interests.

To complete a general description of a characterization of technical education in agricultural production, we refer to a summary prepared by Hensel of several types of post-secondary programs. There were programs of study in five geographically scattered post high school institutions. Categorized into major groupings there is a variation in depth and length of occupational curricula as shown in Table 2.2:

Table 2.2

Curricula In Agricultural Production Technology[59]

| | Institution | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Subject | ----------percent---------- | | | | |
| General Education | 16.7 | | 43.5 | 24.0 | 39.1 |
| Ag. Mechanics | 33.3 | | | 4.4 | 12.0 |
| Plant & Soil Sc. | 22.2 | 16.6 | 30.4 | 12.2 | 10.9 |
| Animal Science | 11.1 | 41.7 | 10.9 | 8.8 | |
| Agr. Economics | 16.7 | 41.7 | 15.2 | 40.3 | 9.8 |
| Related Agri. | | | | | 28.2 |
| Length of Program | 9 mo. | 2 sem. | 2 yrs. | 2 yrs. | 2 yrs. |

[59]James W. Hensel, Agriculture Programs at the Post High School Level: Special Report Prepared for the Pacific Regional Seminar in Agricultural Education, Olympia, (Columbus: Center for Vocational Technical Education, The Ohio State University, May 19, 1967), pp. 47-50. (Summary by reviewer).

## SUMMARY

Curriculum development in vocational technical education is based on the fundamental elements of the occupations for which programs are intended. Effective programs are 'performance' oriented. Competency--based instruction is based on job related understandings and skills rather than mental discipline.

There is a trend toward larger farms with full-time hired employees who are capable of independently managing segments of the farm business. Employees on larger units do not usually need the broad training in several diverse fields for job entry as do those who enter entrepreneurship. Young farmers in the past, have become established more readily if they had help from their fathers than if they had grown up without a farm or farm background. Grades achieved by students in technical programs are also positively associated with the presence of farm backgrounds and fathers who are farmers. Persons who are characterized as successful farmers are likely to have more formal education than less successful farmers. They are more likely to value education positively, be more independent of local norms, more likely to use credit and to enjoy their work.

Occupational competencies of farmers can be divided into five or six functional groupings: agricultural mechanics, plant and soil science, farm management and marketing, animal sciences and social or general. These functional groupings were based on activities normally performed by farmers. Many institutions offering formal training with provision of options which permit specialization. There are formal and informal methods of providing occupational preparation for young farmers. There is evidence to support the

proposition that type of farm and job assignment are more likely to be associated with competency needs than size of farm per se.

Formal post-secondary technical education programs are short (less than 4 years) and contain job-related training. Persons who take advantage of such training are unlikely to have followed a college preparatory programs in high school. Educational programs for farming occupations vary in length but usually contain studies in agricultural mechanics, farm management, plant science, animal science, and communications. Options are made available for specialization according to farm type.

There seems to be little research about the occupational competency needs of persons who seek entry into farming occupations. Studies have either been too narrow in scope or devised for purposes of developing programs of adult farmer education via vocational agriculture or the extension service. Additional attention must be paid to the specific needs of the beginning farmer and of persons who seek full-time technician level farm employment. The next and subsequent chapters attempt to relate to this need.

# CHAPTER III

## DESIGN OF THE STUDY

The objective of this study was to determine the occupational competency areas within which it will be necessary for young people to perform if they expect to succeed in selected farming occupations. The rationale used in determining the methodology used in this study is predicated on the principle of expertise. Persons who are most qualified to judge the competency needs for particular occupations are those directly engaged in the occupations and those in close professional contact with such persons. The population used in this study included adult farmers, young farmers, and professional agricultural educators who resided in selected Michigan counties.

## THE SAMPLE

Enrollment records for the Agricultural Production Program[1] show that nineteen Michigan counties accounted for more than fifty percent of the first term enrollments and program graduates cumulatively, since 1968-69.[2] These counties are located in the lower two-thirds of

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[1]The Agricultural Production Program is an 18 month technical training program conducted at Michigan State University to serve the specific educational needs of young farmers.

[2]"Annual Report of the Agricultural Production Program, Institute of Agricultural Technology, Michigan State University," for the years 1968-69, 1969-70, 1970-71, 1971-72, 1972-73, and from student records maintained in the Institute.

the Lower Peninsula of Michigan. Although in a limited area, it was reasoned that selection of these particular counties would yield a high percentage of needed data given the considerations of the cost of conducting the study, yet provide some basis for generalization to statewide needs. Figure 3.1 shows the counties from which the sample population for this study was drawn. Table 3.1 shows numbers of graduates by year in these counties. Table 3.2 shows a characterization of these counties.

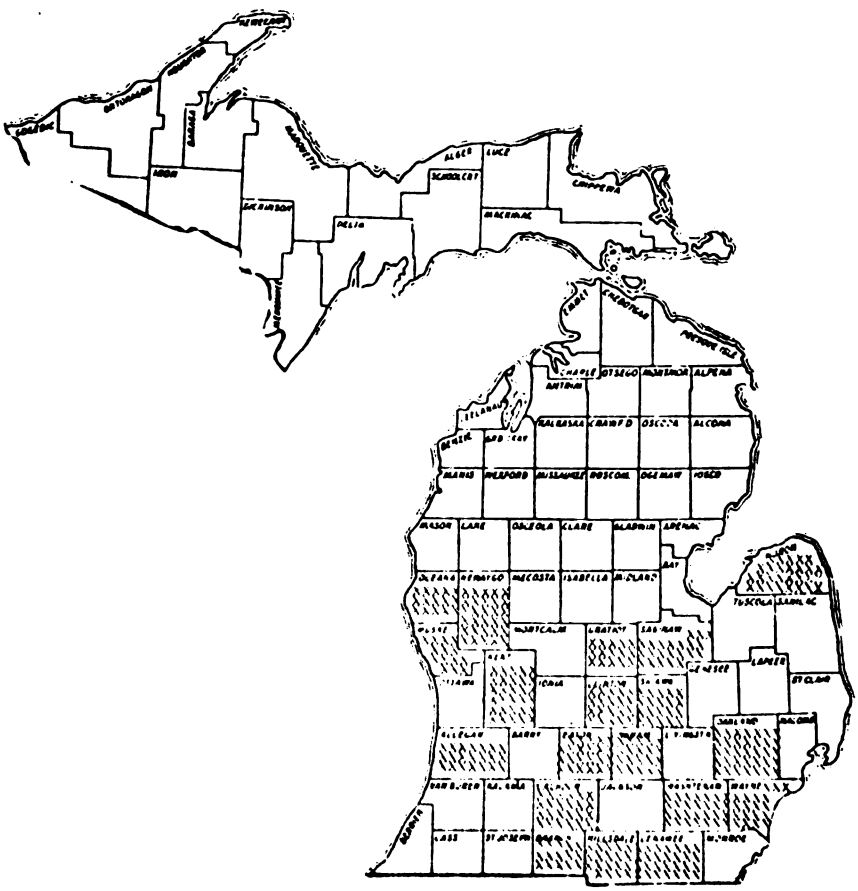

Figure 3.1
Counties Used in "Young Farmer Research Study"

Table 3.1

Graduates of the Agricultural Production Program by Year of Graduation and County of Residence. (1969-1973)

| COUNTY | 1969 | 1970 | 1971 | 1972 | 1973 | Total |
|---|---|---|---|---|---|---|
| Allegan | - | 2 | 4 | 1 | 1 | 8 |
| Branch | 2 | 1 | 5 | - | 2 | 10 |
| Calhoun | 5 | 1 | 2 | - | 1 | 9 |
| Clinton | 1 | - | - | - | 2 | 3 |
| Eaton | 1 | 1 | 4 | 2 | - | 8 |
| Gratiot | - | 1 | 2 | - | 1 | 4 |
| Hillsdale | - | 3 | 4 | 3 | 3 | 13 |
| Huron | 1 | 4 | 1 | 2 | 1 | 9 |
| Ingham | - | 3 | 3 | 2 | 1 | 9 |
| Kent | 1 | - | - | 3 | 5 | 9 |
| Lenawee | 1 | 2 | 1 | 3 | - | 7 |
| Muskegon | - | 1 | 1 | - | 2 | 4 |
| Newaygo | - | - | 1 | - | - | 1 |
| Oakland | - | 1 | - | 2 | 1 | 4 |
| Oceana | - | - | 1 | 1 | 1 | 3 |
| Saginaw | - | 4 | 1 | 2 | 1 | 8 |
| Shiawassee | 5 | 2 | 3 | 1 | - | 11 |
| Washtenaw | 2 | - | 3 | 2 | 3 | 10 |
| Wayne | - | - | 1 | 1 | 1 | 3 |
| Total | 19 | 26 | 37 | 25 | 26 | 133 |
| Michigan Resident Total | 42 | 60 | 45 | 37 | 36 | 220 |
| Percent of Michigan Graduates | 45.2 | 43.3 | 82.2 | 67.6 | 72.2 | 60.4 |

Table 3.2

Characterization of 19 Selected Counties
in Michigan by Type of Farms*

| | Number of Farms** | | Percentage | |
|---|---|---|---|---|
| DESCRIPTOR | Michigan | 19 Counties | % of Michigan | % of All Farms |
| Dairy Farms | 12586 | 4702 | 37.4 | 30.1 |
| Livestock Farms | 9922 | 4192 | 42.2 | 23.7 |
| Poultry Farms | 929 | 402 | 43.3 | 2.2 |
| Cash Grain Farms | 10843 | 5792 | 53.4 | 25.9 |
| Vegetable Farms | 1326 | 412 | 31.1 | 3.2 |
| Fruit and Nut Farms | 3308 | 1041 | 31.5 | 7.9 |
| General Farms | 2908 | 1122 | 38.6 | 7.0 |
| Total | 44822 | 17663 | 42.2 | 100.0 |

*Sales Classes 1-5 ($2500 + gross sales)

**Source: U.S. Census of Agriculture - 1969

Adult Farmers

In Michigan, there were 77,946 farm operators in 1969.[3] There were 41,822 farms with gross sales over $2500 and 11,434 with sales over $20,000. While the trend has been toward decreased numbers of farms (there were 53,956 farms with sales over $2500 in 1964)[4], the relative number of commercial farms with $20,000 is increasing (27.3% in 1969 vs. 17.5% in 1964). This is strong evidence that farmers who persist are likely to be those with higher than average sales.

[3] U. S. Census of Agriculture, 1969.

[4] Karl T. Wright, "Characteristics of Michigan Farms and Farmers by Income Level," Research Report 134, Agricultural Experiment Station, (East Lansing, Michigan State University, March 1971), p. 4.

One hundred twenty-one adult farmers were selected for this study from among TELFARM[5] Cooperators whose records were sufficiently complete to be selected for analysis and inclusion in the Michigan State University farm business analysis summary series for 1972.[6] It is generally believed that cooperators on this program are above average in their management ability. According to Dexter:

> The farms summarized do not represent a research sample of Michigan farms. Only farms enrolled in TELFARM were sampled, but the characteristics of these farms do compare closely with commercial farms in the last census that were classified into Economic Classes I and II (over $20,000 gross sales).[7]

Since this group of farmers fell into the higher sales classes, it was assumed that they represented the types of farmers who are most likely to persist in farming.

Eight major farm types were selected as representative of production agriculture in the state. They were (1) Dairy, (2) Cattle Feeding, (3) Swine, (4) Poultry, (5) Cash Crop, (6) Potato-Vegetable,

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[5]TELFARM is the acronym for "Today's Electronic Farm Records for Management". The program provides computerized farm accounts and business analysis and is a tool used to provide farm management education for adult farmers in Michigan. The program is operated by the Department of Agricultural Economics, Michigan State University, (East Lansing, Michigan.)

[6]W. A. Dexter, et. al., "Michigan Farm Business Analysis Summary - 1972 Data", Agricultural Economics Report Number 254, and Reports Numbered 242, 243, 244, 246, 247, 248, 249, 250 and 252, (East Lansing, Michigan State University, 1973).

[7]Wilbur A. Dexter. "Michigan Farm Business Analysis Summary - 1972 Data". Agricultural Economics Report Number 254, (East Lansing, Michigan State University, July, 1973), p. 2.

(7) Fruit and (8) General. These farm types generally conform to the census classification of farms and the way in which selected farm business analysis summaries are drawn. Composition of the adult farmer sample is shown in Table 3.3.

Table 3.3

Adult Farmers Selected for Study by Type of Farm

| Type of Farm | Number | Percent |
|---|---|---|
| Southern Dairy - General | 15 | 12.4 |
| Specialized Southern Dairy | 46 | 38.0 |
| Beef Cattle Feeding | 11 | 9.1 |
| Swine | 9 | 7.4 |
| Poultry | 6 | 5.0 |
| Cash Crop | 18 | 14.9 |
| Potato (vegetable) | 7 | 5.8 |
| Tree Fruit | 9 | 7.4 |
| Total | 121 | 100.0 |

The adult farmer sample represents one fourth of the specialized southern dairy farms (to a minimum of one per county) and all the other farms summarized from the 19 counties in the MSU "1972 Farm Business Analysis Summaries".

The average size farm for Telfarmers in the 1972 business analysis varied according to farm type. For purposes of this study 'small' farmers were those whose tillable acreage (or crop acreage) was below average for those summarized. Large farmers were those with average or above average numbers of tillable acres. Table 3.4 shows

average acreages used for determination of the large-small dichotomy.

Table 3.4

Average Farm Size of Telfarm Businesses Summarized in 1972 Business Analysis

| Farm Type | Average Tillable Acres |
|---|---|
| General-Southern Dairy | 434 |
| Specialized Southern Dairy | 334 |
| Beef Cattle Feeding | 661 |
| Swine | 387 |
| Poultry | 224 |
| Cash Crop (Saginaw Valley) | 505 |
| Potato (including some vegetable) | 375 |
| Tree Fruit | 174 |

Source: Michigan Farm Business Analysis Series, op. cit.

Young Farmers

Young farmers were included in the study to determine the extent their experiences to date agreed with the expectations of adult farmers Young farmers up to the age of 25 are normally in the early stages of becoming established in their farming occupations. Graduates of the Agricultural Production Program for the years 1969, 1970, 1971, 1972, and 1973 were generally between the ages of twenty and twenty-five during the year of the study, based on ages recorded in student records. There have been one hundred thirty-three graduates for the years mentioned who resided in the 19 Michigan counties at the time they were in school. (See table 3.1). It was not assumed that all graduates were farming at the time of the study. Since no adequate information

was available to determine this, one aspect of the study was to conduct the necessary follow-up and to ascertain the judgements of those who actually did enter farming occupations. Table 3.5 shows a summary of the population in the study.

Table 3.5

Summary of Population Included in Study
by County of Home Residence

| County | Farmers | Graduates | Professional Educators | Total | Percent |
|---|---|---|---|---|---|
| Allegan | 20 | 8 | 3 | 31 | 9.8 |
| Branch | 5 | 10 | 2 | 17 | 5.4 |
| Calhoun | 6 | 9 | 3 | 18 | 5.7 |
| Clinton | 7 | 3 | 3 | 13 | 4.1 |
| Eaton | 4 | 8 | 3 | 15 | 4.7 |
| Gratiot | 2 | 4 | 2 | 8 | 2.5 |
| Hillsdale | 9 | 13 | 5 | 27 | 8.5 |
| Huron | 9 | 9 | 5 | 23 | 7.3 |
| Ingham | 6 | 9 | 6 | 20 | 6.3 |
| Kent | 10 | 9 | 2 | 22 | 6.9 |
| Lenawee | 6 | 7 | 7 | 20 | 6.3 |
| Muskegon | 2 | 4 | 3 | 9 | 2.8 |
| Newaygo | 1 | 1 | 3 | 5 | 1.6 |
| Oakland | 2 | 4 | 2 | 8 | 2.5 |
| Oceana | 6 | 3 | 2 | 11 | 3.5 |
| Saginaw | 18 | 8 | 4 | 30 | 9.5 |
| Shiawassee | 3 | 11 | 4 | 18 | 5.7 |
| Washtenaw | 5 | 10 | 2 | 17 | 5.4 |
| Wayne | 1 | 3 | 1 | 5 | 1.5 |
| Total | 122 | 133 | 62 | 317 | 100.0 |
| Percent of total | 38.5 | 42.0 | 19.5 | 100.0 | |

Demographic data provided by the graduates were used to determine employment status, farm size, and major enterprise. The clustering of individuals was made on the basis of these variables just as was done with the adult farmer respondents.

Professional Agricultural Educators

The findings of this study were intended to have primary usage in post-secondary technical level educational programs for persons entering farming occupations. But there are two other levels of education also available to a preponderance of young people seeking farming careers. These include formal high school training in vocational agriculture and non-formal training through the Cooperative Extension Service..

Experienced teachers of vocational agriculture have often been influential in helping young farmers become established. They have provided classroom instruction and directed development of supervised farming programs leading to careers in farming. This guidance and instruction is founded upon certain perceptions of the needs of young farmers. There are approximately one hundred eighty high school teachers of vocational agriculture in Michigan. Of this, an estimated sixty percent have more than five years experience. Forty-three (43) teachers with this minimum level of professional experience and who were actively employed during the time of the study were asked to participate.

County Extension Directors work with farmers of all ages to meet their needs for technical information and provide advice on farm management. Michigan has eighty-three (83) counties. An "extension" office serves each Michigan county. Each has a person

designated as "director". Nineteen (19) County Extension Directors were asked to participate in the study.

In the initial design of the study, there were 317 individuals to be contacted. Response rates and patterns are treated in Chapter IV.

## INSTRUMENTATION

The instrument was a mailed questionnaire. (See Appendix B) The type of data needed required development of an instrument specifically designed to obtain both factual information about the respondents and their judgements about the competency needs of persons who will seek entry into farming occupations. No previous instrument existed of the type needed for mailed survey. Both Long[8] and Neel[9] conducted similar studies but used the interview technique.

The original draft of the questionnaire was administered during the last classes of winter term (1974) to first and second year Agricultural Production students at Michigan State University. Students were instructed about the purpose of the study and directed to complete the questionnaire in class. From this 'dry run' it was determined that, while the questions seemed germane to the bulk of the students, the length and form of the questionnaire needed revision.

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[8] Long, op. cit.

[9] Neel, op. cit.

A revised and condensed listing of competency statements was prepared for examination by several visiting farmers during Farmers' Week in late March. Four farmers examined the revised list and suggested minor improvements.

Instrument Design. The final questionnaire contained two basic elements:

(1) Part One was designed to ascertain values for the control variables such as: major farm enterprise, farm size, ownership or employment status, and years of experience. Each of the three forms of the questionnaire was prefaced by its own 'Part One';

(2) Part Two contained fifty-four statements describing farming occupation competency areas. They were presented according to five major functional groupings:

(1) agricultural mechanics, (2) farm management and economics, (3) livestock, (4) crops production, (5) and general. An open-ended response option was permitted at the end of each grouping.

Additional design features of the questionnaire included a precoded response grid accompanying each of five competency dimensions. Respondents were directed to write in numbers which best expressed their judgements in each dimension.

The five dimensions varied with each respondent sub-group. They were most similar between adult farmers and professional agricultural educators. Adult farmers were asked whether the competency was needed by employees on their types of farms and professionals were asked to designate type of farm for which employee competency would be necessary. The five dimensions of response for these groups were:

| Dimension | Question |
|---|---|
| 1 | Will performance be necessary? |
| 2 | At what age (or stage) will performance be necessary? |
| 3 | How often will performance be necessary? |
| 4 | How proficient must the young farmer be? |
| 5 | Is this competency needed by mid-management or technician level farm employees? |

Young farmers were asked to evaluate the same competency statements in terms of their own experience or expectations:

| Dimension | Question |
|---|---|
| 1 | Have you performed in this competency area? |
| 2 | Do you expect to in the future? |
| 3 | How often? |
| 4 | How proficient are you? |
| 5 | Do you need training in this area? |

## Reliability Measures

As a method of measuring instrument stability over time, and subsequent reliability of data, a test-retest of the questionnaire was conducted with a jury of alumni of the Institute of Agricultural Technology. Five members of the Agricultural Technology Alumni Association Board of Directors[10] were mailed the questionnaire on April 1. They were

[10]Agricultural Technology Alumni Association if composed of graduates of the severl "Ag Tech" programs. It was organized in the early twenties and its board of directors has served in an advisory capacity to the Institute of Agricultural Technology on many occasions. See Appendix A for names and addresses and occupations of Board members respondents.

given a second questionnaire and an explanation of the items personally at their April 24th board meeting. The second questionnaires were returned by mail within six weeks of the meeting. This is a summary of the extent to which their responses agreed between the first and second test (adult farmer survey form). Table 3.6 shows consistency of alumni responses.

Table 3.6

Alumni Test - Retest Measure of Instrument Reliability
Percent Unchanged - By Alumnus

| Alumnus | Percent Responses Unchanged |
|---|---|
| 01 | 87.4 |
| 02 | 73.3 |
| 03 | 67.8 |
| 04 | 71.9 |
| 05 | 75.9 |
| Average | 75.3 |

Among the responses analyzed there were some items that were more likely to be judged differently the second time than others. There were 270 variables in the body of the questionnaire, of these:

| | | | |
|---|---|---|---|
| 88 | were unchanged | 29 | were changed by three people |
| 81 | were changed by one person | 10 | were changed by four people |
| 62 | were changed by two people | 0 | Were changed by five people |

The questionnaire was devised to elicit five types of judgements. To determine the extent to which each of these five dimensions were scored consistently note table 3.7. Catergories regarding (1) "performance needed" by young farmers and (5) "performance needed" by mid-management-technician level farm employees were marked most consistently in the retest by the five alumni.

Table 3.7

Alumni Test - Retest & Measure of Instrument Reliability by Response Category

| Response Category | Number of Items | | Percent Unchanged |
|---|---|---|---|
| 1. Performance Necessary | 54 | | 86.3 |
| 2. Age | 54 | | 63.7 |
| 3. Frequency | 54 | | 66.7 |
| 4. Proficiency | 54 | | 64.4 |
| 5. Needed by Employee | 54 | | 95.2 |
| Total | 270 | Average | 75.3 |

There was a high degree of similarity of instrument design and question wording among the three forms of the questionnaire. While the adult farmer form was used for the test - retest study, three of the five alumni were in the same age group as the young farmer respondents in the study (one was included). One alumnus was a graduate of the class of 1960 and would have been categorized as an adult farmer. The fifth alumnus works with farmers as management consultant in the elevator and farm supply industry. It was assumed that these individuals were a valid source of expertise.

Because of the questionable stability on three of the five dimensions of competency evaluation, they are not included in the report of the findings. Consult Appendix E .

## DATA GATHERING

Questionnaires were mailed to all persons identified for the study in nineteen counties on April 1, 1974. Separate cover letters[11] were devised for each of the four groups (vo-ag teachers, county agents, adult farmers, and young farmers were treated separately at this point). Return post-paid self addressed envelopes were enclosed.

On April 12, a reminder card was mailed to the non-respondents. By this time an over-all return of twenty-five percent had been achieved. One hundred eighty-eight (or 59.3 percent) questionnaires had been returned by the date of the second follow-up mailing to non-respondents on April 25. At this time an additional questionnaire and return envelope were enclosed with an individually typed cover letter. The individually typed thank you note was mailed to each respondent upon receipt of his questionnaire.

Visitations and telephone calls were made during the latter days of April and early May to determine attitudes about the study and to encourage additional responses. All of the graduates had either returned a questionnaire or were called on by phone by June 1st. Personal visits were made in ten of the nineteen counties to county agents, vo-ag teachers, farmers, and graduates. Approximately sixty personal contacts were made by phone or visit. Reception was cordial and the effort generated additional responses.

The study was primarily descriptive in nature. Hypotheses were posed regarding the expected difference between the judgements offered by various respondent sub-groups. Selection of the population was not

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[11] See Appendix B

random. Statistical inference to the farming population at large was not intended or possible.

## HYPOTHESES

### Hypothesis One

$H_{10}$ (null form): There are no differences between adult farmers and professional agricultural educators in their perceptions of the occupational competency needs of persons entering farming occupations in the next five years.

$H_{101}$ (null test hypothesis): There are no differences between adult farmers and professional agricultural educators in their perceptions of occupational competency needs of persons entering farm entrepreneurship in the next five years.

$H_{102}$ (null test hypothesis): There are no differences between adult farmers and professional agricultural educators in their perceptions of occupational competency needs of persons entering full-time farm employment in the next five years.

### Hypothesis Two

$H_{20}$ (null test hypothesis): There are no differences between the occupational competency needs of persons entering farming occupations in the next five years as perceived by adult farmers and the competencies performed by persons who have entered similar farming occupations in the past five years.

### Hypothesis Three

$H_{30}$ (null form): There are no differences between the

occupational competencies needed by persons entering farming occupations as perceived by adults who operate small farms and those who operate on large farms.

$H_{301}$ (null test hypothesis): There are no differences between adult farmers who operate small farms and those who operate large farms in their perceptions of the occupational competencies needed by persons who enter farm entrepreneurship.

$H_{302}$ (null test hypothesis): There are no differences between adult farmers who operate small farms and by those who operate large farms in their perceptions of the occupational competencies needed by persons who enter full-time farm employment on their types of farms.

Hypothesis Four

$H_{40}$ (null form): There are no differences between adult farmers who operate livestock farms and those who operate crops farms in their perceptions of occupational competencies needed by persons entering farming occupations.

$H_{401}$ (null test hypothesis): There are no differences between adult farmers who operate livestock farms and those who operate crops farms in their perceptions about the occupational competencies needed by persons entering farming entreprenurships.

$H_{402}$ (null test hypothesis): There are no differences between adult farmers who operate livestock farms and those who operate crops farms in their perceptions about the occupational competencies needed by persons entering full-time farm employment on their types of farms.

Hypothesis Five

$H_{50}$ (null form): There are no differences in the occupational competency experience, performance expectations or training needs perceived by graduates engaged in farming occupations based on farm type or size upon which they are engaged or within which they are employed.

$H_{501}$ (null test hypothesis): There are no differences in the occupational competencies graduates have experienced in farming occupations based on type or size of farm which they operate or on which they are employed.

$H_{502}$ (null test hypothesis): There are no differences in the competency performance expectations of graduates engaged in farming occupations based on type or size of farm which they operate or on which they are employed.

$H_{503}$ (null test hypothesis): There are no differences in the occupational training needs perceived by graduates engaged in farming occupations based on type or size of farm which they operate or on which they are employed.

## ANALYSES

All questionnaires were coded and the data were key-punched onto cards as the questionnaires were received. Cards were processed via the Michigan State University CDC 6500 computer. The Computer Institute for Social Science Research (CISSR) and the Office of Research Consultation, College of Education, were consulted about analysis procedures. The ACT computer program from the CISSR library was selected

for the analysis. It provided frequency counts, totals, percentages, means, and chi-square and degrees of freedom in each contingency table on each of the dependent variables (the competency statements).

The value of the chi-square statistic as used to discover whether significant differences existed within responses for each analysis. The Kruskall-Wallis H was used to approximate the chi-square distribution in one analysis reported in the appendices. Because the adult farmer population represented a proportionally stratified group of individuals, it was assumed that sub-group differences would satisfactorily represent the real differences that did exist among similar groups of farmers. The .05 level of signifiance was chosen to reject the null hypothesis.

The Spearman Rank Order Correlation coefficient was computed with a desk calculator on each of the functional competency groupings to compare relative agreement in rates of responses between the three respondent groups. Certain data were collapsed during analysis to achieve large cell sizes. The 't' test of differences in population proportions was also used where chi-square was not appropriate.

## RESPONSE RATES

There were 238 responses received by the time the data were analyzed, this was 75.0 percent of the initial sample (75.3 percent of the net accessible population). Two hundred twenty-four usable questionnaires were included in the analysis of competency needs. The unused responses included eight from graduates who were not farming; one duplicate response which could have been used as adult farmer response and young farmer response was deleted from the latter; two questionnaires

returned by the Postal Service marked "address unknown"; two questionnaires that could not be identified; and three that were not usable for other reasons. By the time of completion of the study additional questionnaires had been received for a total response rate of 79.5 percent.

## SUMMARY

This study was designed to elicit the judgements of selected adult farmers, young farmers, county agents and vocational agriculture instructors about the competency needs of persons entering farming occupations. The population for the study was limited to residents in nineteen Michigan counties. These counties had consistently accounted for slightly less or more than half the students attending the Agricultural Production Program at Michigan State University from 1968-69 through 1972-73. These counties also accounted for approximately forty percent of the states dairy, poultry, and livestock farms, over fifty percent of the cash grain farms, and over thirty percent of the fruit and vegetable farms.

Adult farmers were cooperators with Michigan State University's TELFARM program. Young farmers were graduates of the MSU Agricultural Production Program. All county extension directors and all vo-ag teachers with five or more years of professional experience in these counties were asked to respond. Over seventy-four percent responded adequately and were used in the study.

Determination of the validity of the competency statements was a function of this study. Hypotheses tested via chi-square statistics were associated with the similarity or differences of response patterns

due to farm size, farm type, farm employment vs. farm entrepreneurship and perceptions of young farmers vs. professional agricultural educators.

# CHAPTER IV

## FINDINGS AND ANALYSIS OF DATA

The purpose of this study was to provide one basis for decisions which institutions of public higher education in Michigan must make about occupational training of persons who will seek to enter farming occupations in the next five years. The findings presented in this chapter represent an analysis of the judgements of eight-eight adult farmers, ninety-one graduates, of the Michigan State University Agricultural Production Program, and forty-five professional agricultural educators that comprised the respondents for the study. This chapter begins with a description of respondents, followed by an overview of response patterns, and finally, the testing of the hypotheses listed in Chapter III.

## POPULATION AND RESPONDENTS

More than seventy percent of the population of the study returned usable responses which were included in the findings of the study. In total, 252 mailed questionnaires were returned, of which 224 were used on analysis of young farmer competencies. The unused responses consisted of some received too late for analysis, some returned by graduates who were not farming, and some that were unusable for other reasons. Three graduates could not be located. Of the 317 persons identified as the study population, 79.5 percent responded and 70.7 percent provided adequate data for analysis of competency needs. (See Appendix C for the

composite respondent population used in the study by county of home residence.)

Adult Farmers

The eighty-eight adult farmers reported operating farms ranging from less than 100 to more than 1,000 tillable acres in size, as shown in Table 4.1. The average tillable acreage per farm was approximately 388 acres. Of these, 52 (59.1 percent) were defined (according to criteria in Chapter III) as small farm operators and 36 (40.9 percent) were operators of large farms. Fifty-eight of the adult farmers were classified as livestock farmers and 30 were crops farmers. Most of the livestock farmers were operators of dairy farms (38 of 58) and most of the crops farmers were operators of cash crop farms (grain, beans, sugar beets, etc.) (17 of 30). The ages of the adult farmers ranged from the mid-twenties to late sixties with an average of 47.6 years. Twenty-nine out of the 70 farmers who reported their age, were in the age range of 40-49, with 18 in the age range of 50-59. Of the 84 farmers supplying information about proprietorship status 59 (or 70.2 percent) were sole proprietors; 14.3 percent were in partnership with a father and; 15.5 percent were in partnership with a son. Thirty-two (or 36.8 percent) of farmers reported employing full-time farm workers in their businesses.

Table 4.1

Farm, Age and Educational Characteristics
of Adult Farmer Respondents

| Characteristic | | Number | | Percent |
|---|---|---|---|---|
| **Farm Size** | | | | |
| Under 300 acres | | 41 | | 46.6 |
| 300 - 699 acres | | 34 | | 38.6 |
| 700 - acres and over | | 11 | | 12.5 |
| Unknown | | 2 | | 2.3 |
| Total | | 88 | | 100.0 |
| **Farm Type** | | | | |
| Livestock | | 58 | | 65.9 |
| Dairy | (38) | | (43.2) | |
| Beef | ( 6) | | ( 6.8) | |
| Swine | ( 8) | | ( 9.1) | |
| Poultry | ( 6) | | ( 6.8) | |
| Crops | | 30 | | 34.1 |
| Cash Crop | (17) | | (19.3) | |
| Potato (Vegetable) | ( 6) | | ( 6.8) | |
| Tree Fruit | ( 7) | | ( 8.0) | |
| Total | | 88 | | 100.0 |
| **Age** | | | | |
| 20 - 29 | | 4 | | 4.5 |
| 30 - 39 | | 10 | | 11.5 |
| 40 - 49 | | 29 | | 33.0 |
| 50 - 59 | | 18 | | 20.4 |
| 60 - 69 | | 9 | | 10.2 |
| Unknown | | 18 | | 20.4 |
| Total | | 88 | | 100.0 |
| **Education** | | | | |
| Less than High School Diploma | | 23 | | 26.3 |
| High School Diploma | | 31 | | 35.2 |
| Ag. Tech., MSU | | 14 | | 15.8 |
| 4 year Degree in Agriculture | | 11 | | 12.5 |
| Other | | 9 | | 10.2 |
| Total | | 88 | | 100.0 |

Young Farmers

One hundred thirty-three graduates of the 18-month technical training program for young farmers for years 1969-1973 were identified as having permanent residences in the nineteen selected counties at the time they attended college. Of the 130 who were located, 117 or 90 percent were found to be engaged in farming occupations at the time of the study. (See Appendix Table 2 for the home county of residence of the graduates engaged in farming and the number of respondents included in the study.)

Fifty of the 91 young farmers reported working on or entering small farm businesses. Forty-one (45.1 percent) reported working on or entering large farm businesses. The same acreage levels were used to determine this dichotomy as for adult farmers presented in Chapter III. Response rate by year of graduation was reasonably consistent for each class as Table 4.2 illustrates.

Fifty-one (57.3 percent) of the young farmers were married at the time of the study. Fourteen (15.4 percent) reported that their primary income source was from off-farm employment. Fifty-seven (62.6 percent) said they were in partnership with their fathers. Of these, 45.6 percent reported their share was less than 10 percent, 22.8 percent reported 10 to 29 percent shares and 19.3 percent reported shares of 30 percent or more. Seventy-one (or 78.0 percent) of the young farmers considered themselves full-time farmers. Nineteen and eight tenths percent considered themselves part-time farmers.

Table 4.2

Farm, Farming Status, Year of Graduation and Other Characteristics of Young Farmer Respondents

| Characteristic | Respondents Number | Percent |
|---|---|---|
| **Farm Type** | | |
| Livestock | 59 | 64.8 |
| Dairy | (35) | (38.4) |
| Beef | (18) | (19.8) |
| Swine | ( 4) | ( 4.4) |
| Poultry | ( 2) | ( 2.2) |
| Crops | 29 | 31.9 |
| Cash Crop | (22) | (24.2) |
| Potato (Vegetable) | ( 5) | ( 5.5) |
| Tree Fruit | ( 2) | ( 2.2) |
| Other (or unknown) | 3 | 3.3 |
| Total | 91 | 100.0 |
| **Size of Farm*** | | |
| Large (average or above average for telfarmers) | 41 | 45.1 |
| Small (below average for telfarmers | 50 | 54.9 |
| **Year of Graduation from Ag. Tech. Program (MSU)** | | |
| 1969 | 14 | 15.4 |
| 1970 | 16 | 17.6 |
| 1971 | 22 | 24.2 |
| 1972 | 23 | 25.3 |
| 1973 | 16 | 17.5 |
| **Farming Status** | | |
| Full-time | 71 | 78.0 |
| Part-time | 18 | 19.8 |
| Unknown | 2 | 2.2 |

*See Chapter III, p. 46 for additional details about actual acreage.

Professional Agricultural Educators

Sixty-two professional agricultural educators were asked to participate in the study. Forty-five, or 72.6 percent, usable responses were received by the deadline: 16 from the 19 County Extension Directors and 29 from 43 vocational agriculture instructors. Among this group of professionals there was a total of 777 years of combined professional experience or an average of 17.3 years per respondent. Data in Table 4.3 illustrates how this was distributed.

Table 4.3

Years of Professional Experience by Educator Respondents

| Years | Under 5 | 6-10 | 11-15 | 16-20 | 21-25 | 26-30 | over 31 |
|---|---|---|---|---|---|---|---|
| Number | 2 | 12 | 8 | 5 | 9 | 6 | 3 |

## YOUNG FARMER COMPETENCY NEEDS

Fifty-four pre-determined occupational competency statements were grouped in the survey instrument according to five functional areas: (1) agricultural mechanics, (2) farm management and economics, (3) crop production, (4) livestock production, and (5) general personal-social competencies. Adult farmers evaluated the competencies according to the performance needs they perceived necessary for persons who will be entering farm entrepreneurship and full-time farm employment in the next five years. Agricultural educators evaluated the same competencies. Young farmers reported the competencies within which they had had experience, or which they had to perform in the future, and their own perceived training needs.

Young Farm Entrepreneurs

Fifty of the 54 competencies in the study were judged "necessary" of young people becoming established as farm entrepreneurs in the next five years, by more than sixty percent of the adult farmers responding to any given item. As can be noted in Table 4.4, the competencies judged necessary least often were as follows:

Agricultural Mechanics Competencies

7. "Perform major overhaul and/or structural repair of farm power units and/or farm machinery." (35.8 percent)

10. "Select, install, operate, and maintain farm crop irrigation systems." (44.3 percent)

Crop Production Competency

34. "Merchandise specialized farm products (i.e., certified seed, truck crops, fruit, etc., where applicable)." (56.4 percent)

Livestock and/or Dairy Production Competency

49. "Prepare and show animals in competition with other producers." (46.3 percent)

Twenty-four of the remaining competencies were rated necessary by over ninety-five percent of the adult farmers. Ninety-five percent, or more of the agricultural educators responded affirmatively about occupational competencies needed on 38 of the 54 competencies. Fewer than sixty percent of the educator respondents felt "major overhaul..." or to "prepare and show animals," would be necessary for young farmers as a group.

Table 4.4

Proportions of Adult Farmers and Agricultural Educators Indicating Performance Will be Needed by Young Farmers and Technician/Mid-Management Level Farm Workers[a]

| Agricultural Mechanics Competencies | Adult Farmer Responses[b] | | Educator Responses[c] | |
|---|---|---|---|---|
| | Young Farmers | Farm Workers | Young Farmers | Farm Workers |
| | Percent | Percent | Percent | Percent |
| 1. Establish and/or maintain a farm shop (or farm service center) | 95.4 | 81.4 | 97.8 | 66.6 |
| 2. Perform shop skills at least to the extent necessary to repair minor breakage and wear on farm equipment. | 100.0 | 92.9 | 100.0 | 100.0 |
| 3. Calibrate farm application equipment (sprayers, fertilizer spreaders, etc.) | 98.8 | 86.8 | 100.0 | 95.6 |
| 4. Plan and conduct a coordinated program of mechanization of field and farmstead operations. | 96.3 | 57.0 | 100.0 | 59.1 |
| 5. Operate and perform routine maintenance of both gasoline and diesel farm power units to obtain maximum efficiency and machine life. | 97.7 | 89.2 | 100.0 | 95.6 |
| 6. Operate and perform routine maintenance on farm machinery to obtain maximum efficiency and machine life. | 100.0 | 92.7 | 100.0 | 97.8 |
| 7. Perform major overhaul and/or structural repair of farm power units and/or farm machinery. | 35.8 | 28.8 | 33.3 | 29.7 |
| 8. Utilize topographical farm maps for purposes of planning systems of drainage and/or erosion control. | 66.8 | 35.8 | 71.1 | 26.2 |
| 9. Maintain surface and subsurface farm drainage systems. | 82.3 | 58.7 | 97.8 | 60.0 |
| 10. Select, install, operate, and maintain farm crop irrigation systems. | 44.3 | 38.2 | 79.0 | 57.2 |
| 11. Select, install, and maintain electrical motors, wiring, controls, outlets and lighting required in the farmstead. | 75.9 | 67.1 | 77.8 | 72.1 |
| 12. Plan, construct, (and/or renovate) and maintain livestock housing and/or crop storage facilities. | 83.3 | 65.3 | 88.9 | 56.8 |
| 13. Plan, operate, and maintain grain drying, waste and/or other farm materials handling systems. | 84.3 | 62.2 | 93.2 | 72.1 |
| 14. Other (Please state) _____ | ----------open-ended---------- | | | |

Table 4.4 (continued)

| Farm Management & Economics Competencies | Adult Farmer Responses[b] | | Educator Responses[c] | |
|---|---|---|---|---|
| | Young Farmers | Farm Workers | Young Farmers | Farm Workers |
| | Percent | Percent | Percent | Percent |
| 15. Keep financial records for purposes of income tax reporting and business analysis. | 97.7 | 53.7 | 100.0 | 48.9 |
| 16. Prepare farm and/or personal income taxes. | 76.2 | 51.5 | 79.6 | 46.5 |
| 17. Participate in day-to-day decision-making and management of the farm. | 100.0 | 75.0 | 100.0 | 84.4 |
| 18. Participate in long term planning of growth and development of the farm business. | 95.5 | 53.2 | 100.0 | 53.3 |
| 19. Determine personal role in the farm business and evaluate opportunities for realization of occupational and personal goals. | 96.3 | 66.2 | 97.7 | 85.7 |
| 20. Supervise the work of farm employees. | 82.6 | 53.5 | 93.3 | 51.2 |
| 21. Establish farm operating and/or sales agreements (partnerships, loans, land purchases, etc.) with minimum of unnecessary professional legal assistance. | 83.5 | 32.9 | 93.2 | 30.2 |
| 22. Determine the extent to which formal insurance may be used to protect farm equity, personal property, and family. | 92.0 | 44.0 | 95.5 | 61.4 |
| 23. Procure farm supplies and services. | 96.5 | 68.3 | 100.0 | 79.6 |
| 24. Forward contract sales of farm products. | 67.5 | 26.6 | 90.5 | 45.2 |
| 25. Develop a system of orderly marketing of farm products that will maximize profits. | 88.2 | 43.2 | 100.0 | 42.2 |
| 26. Select credit sources that will provide greatest long term security and flexibility at minimum cost. | 95.0 | 36.5 | 100.0 | 35.6 |
| 27. Evaluate public economic and social policies and/or issues as they affect the costs and returns of farm production and participate in their solution. | 86.6 | 47.2 | 100.0 | 57.8 |
| 28. Other (Please state) _____ | ----------open-ended---------- | | | |

Table 4.4 (continued)

| Crop Production Competencies | Adult Farmer Responses[b] | | Educator Responses[c] | |
|---|---|---|---|---|
| | Young Farmers | Farm Workers | Young Farmers | Farm Workers |
| | Percent | Percent | Percent | Percent |
| 29. Conduct crop production program (including fruits and vegetables, if) applicable) that maximizes production profits. | 97.7 | 57.3 | 100.0 | 66.7 |
| 30. Determine fertilizer requirements for crop production. | 93.3 | 56.3 | 100.0 | 73.4 |
| 31. Identify common economic pests such as crop insects. | 96.5 | 72.2 | 100.0 | 93.2 |
| 32. Select and conduct insect, weed, and disease control programs that will minimize losses and help maximize production profits. | 96.7 | 58.5 | 100.0 | 72.8 |
| 33. Harvest, handle and store farm crops and/or produce to retain maximum crop quality and yield. | 100.0 | 81.0 | 97.8 | 91.1 |
| 34. Merchandise specialized farm products (i.e. certified seed, truck crops, fruit, etc., where applicable). | 56.4 | 32.8 | 91.1 | 56.8 |
| 35. Plan and conduct a soil management program to conserve topsoil and preserve or enhance its productivity. | 93.1 | 59.0 | 97.8 | 66.6 |
| 36. Conduct soil management practices that are responsive to bacteriological activity and organic matter constituents of the soil. | 85.8 | 55.6 | 95.5 | 65.9 |
| 37. Minimize waste of all recycleable farm products and supplies (manure, straw, etc.) | 91.7 | 75.3 | 95.5 | 79.5 |
| 38. Identify and develop natural resources of the farm that may be used to benefit the farm and community. | 87.8 | 55.1 | 91.0 | 61.9 |
| 39. Utilize weather information to plan daily and seasonal farming activities. | 98.8 | 80.0 | 100.0 | 81.4 |
| 40. Other (Please state)_____ | ----------open-ended---------- | | | |

Table 4.4 (continued)

| Livestock and/or Dairy Production Competencies | Adult Farmer Responses[b] | | Educator Responses[c] | |
|---|---|---|---|---|
| | Young Farmers | Farm Workers | Young Farmers | Farm Workers |
| | Percent | Percent | Percent | Percent |
| 41. Perform routine dairy and/or livestock (including poultry) related activities (milking, feeding, manure removal, egg gathering, etc.) | 95.6 | 95.2 | 100.0 | 97.8 |
| 42. Feed and care for livestock (dairy and/or beef) in such a way as to maximize farm profits. | 95.5 | 93.3 | 100.0 | 97.7 |
| 43. Select homegrown and/or purchased feeds which meet nutritional requirements of animals (for whatever purpose that applies: milk production, eggs, maintenance, fattening, etc.) | 92.6 | 70.5 | 100.0 | 75.0 |
| 44. Identify common animal insects and diseases; Conduct animal health programs that will maximize utilization of genetic production capacity. | 95.5 | 83.6 | 100.0 | 90.9 |
| 45. Perform certain veterinary-type herd health tasks ( such as calf pulling, intravascular injections, palpation for pregnancy, etc.) | 89.5 | 82.5 | 89.7 | 75.0 |
| 46. Select and use detergents, disinfectants and etc. necessary for sanitation and disease prevention. | 94.2 | 82.3 | 97.8 | 84.1 |
| 47. Design and conduct a breeding program that will lead to improved genetic capability for meat, and/or milk production. | 82.3 | 56.3 | 100.0 | 69.1 |
| 48. Evaluate and select animals to join the herd or flock that meet the specifications of the market for the products of such animals. | 82.3 | 55.3 | 97.8 | 55.8 |
| 49. Prepare and show animals in competition with other producers. | 46.3 | 53.9 | 46.6 | 42.2 |
| 50. Maintain animal related production records for purposes of selection and/or sales of animals and/or animal products. | 85.0 | 57.1 | 97.6 | 72.0 |
| 51. Other (Please state) _____ | ----------open-ended---------- | | | |

Table 4.4 (continued)

| General Competencies | Adult Farmer Responses[b] | | Educator Responses[c] | |
|---|---|---|---|---|
| | Young Farmers | Farm Workers | Young Farmers | Farm Workers |
| | Percent | Percent | Percent | Percent |
| 52. Read sufficiently well to enable continued updating of technical competence. | 98.9 | 84.2 | 100.0 | 94.5 |
| 53. Speak in public meetings and lead group discussions on topics related to welfare of farm people. | 73.9 | 44.8 | 86.4 | 53.7 |
| 54. Write business letters and other communications necessary for the normal conduct of farm business. | 91.7 | 52.0 | 97.7 | 60.5 |
| 55. Perform mathematic computations needed in determining measures of efficiency, farm accounts, etc. (with the aid of calculators and computers where necessary). | 95.4 | 60.8 | 100.0 | 77.3 |
| 56. Identify key opinion leaders and decision-makers in farm related professions. | 83.0 | 50.0 | 90.9 | 58.5 |
| 57. Participate in local government farm, and community organizations. | 97.4 | 64.1 | 90.9 | 65.1 |
| 58. Develop the ability to enjoy and appreciate family, friends, non-farm people and other personal interests. | 100.0 | 90.0 | 97.7 | 97.7 |

[a]Data collapsed from responses differentiated as to perceptions about competency needs of all young farmers, all young livestock farmers, and all young crops farmers. See Appendix Table 3 for expanded data.

[b]Average number of adult farmers responding in a given competency area: 67.6 (livestock grouping) to 86.3 (general). Percentages based on number responding to individual items.

[c]Average number of educators responding in a given competency area: 43.6 to 44.5. Percentages based on number responding to individual items.

Needs of "All" Young Farmers. Using expanded data, the various proportions of adult farmers who felt all young farmers entering entrepreneurship in the next five years will need to perform given competencies are presented in Table 4.5. Forty-one out of the 54 competencies were judged necessary by 40.0 percent or more of any of the sub-groups of respondent adult farmers (i.e., operators of (1) small farms, (2) large farms, (3) livestock farms and (4) crops farms). Seven of the 13 agricultural mechanics, 12 of 13 farm management, one of the crop production, and all 7 general competencies were judged necessary by at least 60 percent of any respondent sub-group. (See Appendix E)

Table 4.5

Competencies About Which All Sub-groups of Adult Farmers Perceived Performance Will Be Necessary by "All" Young Farmers

| Competency* | | | | |
|---|---|---|---|---|
| Agricultural Mechanics | Farm Management | Crop Production | Livestock Production | General |
| | (At least 80.0 percent or more) | | | |
| 2, 5, 6 | 17, 18, 23 | | | 52, 55, 58 |
| | (At least 60.0 percent to 79.9 percent) | | | |
| 1, 3, 4 13 | 15, 16, 19, 20, 21, 22, 25, 26, 27 | 39 | | 53, 54, 56, 57 |
| | (At least 40.0 percent to 59.9 percent) | | | |
| 8, 9, 11, 12 | 24 | 29, 30, 31, 32, 33, 35, 36, 37, 38 | | |
| | (At least 0.0 percent to 39.9 percent) | | | |
| 7, 10 | | 34 | 41, 42, 43, 44, 45, 46, 47, 48, 49, 50 | |

*Consult Table 4.4 for description of competencies listed here by number.

Needs of All Young "Livestock" Farmers. The ten livestock competencies were perceived to be necessary only for young livestock farmers by more than 20 percent of the individuals in each adult farmer respondent sub-group. The remaining 44 competencies were not designated especially for livestock producers by any more than 15 percent of the respondents on any given item. Table 4.6 shows percentages of respondents designating competencies specifically as 'livestock' young farmer competency needs.

Table 4.6

Competencies About Which Twenty Percent or More of Adult Farmers Felt Performance Will Be Necessary Specifically by Young "Livestock" Farmers

| Competency* | Respondent Farmer Group | | | |
|---|---|---|---|---|
| | Small % | Large % | Livestock % | Crop % |
| 41 | 52.4 | 48.2 | 53.5 | 36.4 |
| 42 | 56.1 | 50.0 | 57.1 | 36.4 |
| 43 | 57.1 | 50.0 | 56.9 | 40.0 |
| 44 | 54.8 | 56.0 | 57.9 | 40.0 |
| 45 | 54.8 | 56.0 | 57.9 | 40.0 |
| 46 | 47.6 | 53.9 | 51.7 | 40.0 |
| 47 | 57.1 | 46.2 | 56.1 | 36.4 |
| 48 | 50.0 | 46.2 | 50.9 | 36.4 |
| 49 | 35.7 | 20.0 | 28.6 | 36.4 |
| 50 | 57.1 | 44.0 | 54.4 | 40.0 |

*Consult Table 4.4 for description of competencies listed here by number.

Needs by All Young "Crops" Farmers. Seven of the competencies were perceived necessary for young 'crops' farmers by more than 20 percent of all adult farmers respondent sub-groups. However, more than 20 percent of the crops farmers responded affirmatively on behalf of young crops farmers about fifteen additional competencies as shown in Table 4.7.

Table 4.7

Competencies About Which Twenty Percent or More of Adult Farmers Felt Performance Will Be Necessary By Young "Crops" Farmers

| | Respondent Farmer Group | | | |
|---|---|---|---|---|
| Competency* | Small % | Large % | Livestock % | Crop % |
| 3 | | | | 23.3 |
| 4 | | | | 25.0 |
| 6 | | | | 20.0 |
| 8 | 20.0 | | 20.0 | |
| 10 | | 25.8 | | 20.7 |
| 12 | | 24.2 | | 22.2 |
| 13 | | | | 22.2 |
| 15 | | | | 20.0 |
| 18 | | | | 20.0 |
| 24 | | | | 29.6 |
| 25 | | | | 20.7 |
| 29 | 26.9 | 40.0 | 29.3 | 37.9 |
| 30 | 21.2 | 27.8 | 22.4 | 26.7 |
| 31 | 24.0 | 30.6 | 26.8 | 26.7 |
| 32 | 23.1 | 27.8 | 22.4 | 30.0 |
| 33 | 23.1 | 33.3 | 24.1 | 33.3 |
| 34 | 20.8 | | | 22.0 |
| 35 | 21.6 | 30.6 | 22.8 | 30.0 |
| 36 | 24.0 | 26.5 | 21.8 | 31.0 |
| 37 | | | | 24.1 |
| 38 | | | | 21.4 |
| 39 | | | | 26.4 |
| 56 | | | | 21.4 |

*Consult Table 4.4 for description of competencies listed here by number.

The Spearman Rank Order Correlation Coefficient was calculated to determine extent of agreement between the adult farmer responses and educator responses, on the young farmer "performance needed" dimension just discussed. Affirmative response proportions were ranked within each functional grouping of competencies. Table 4.8 shows that the degree of agreement between the two groups was greatest in the basic fields of mechanics and economics (.93 and .85 respectively).

Table 4.8

Spearman Rank Order Correlation Of Agreement Between Adult Farmer and Professional Educator Responses Within Functional Competency Groupings

| Functional Group | $r_s$ |
|---|---|
| Agricultural Mechanics | .93[a] |
| Farm Management and Economics | .85[a] |
| Crop Production | .73[a] |
| Livestock Production | .62[a] |
| General | .77[a] |

[a]Significant at .05 level.

Technician/Mid-Management Level Farm Workers

The pattern of affirmative responses that projected the competencies perceived necessary for farm workers, seen in Table 4.4, was a much different situation than discussed in the previous section on farm operators. Only one competency, "Perform routine...[chores]," was identified as necessary by 95 percent or more of the adult farmer responding to any given item. Twenty-six competencies were evaluated as necessary

for persons who would likely be employed on farms like those operated by adult farmer respondents in the opinions of fewer than sixty percent of the latter.

Analysis of restructured data (again found in Appendix E) about the competencies that will be needed is shown in Table 4.9. Only 5 competencies were designated by 80.0 percent or more of any sub-group of adult farmer respondents as needed by persons entering full-time farm employment. These five competencies appeared on a similar list of competencies necessary for all young farmers. Four competencies thought necessary by at least 60.0 to 79.9 percent of the adult farmers also appeared to have similar importance on the list for young farmers. Differences between the needs of young farmers and farm workers are presented later in the chapter.

Table 4.9

Competencies About Which All Sub-groups of Adult Farmers Perceived Performance Necessary by Technician Level Farm Workers

| Competency* | | | | |
|---|---|---|---|---|
| Agricultural Mechanics | Farm Management | Crop Production | Livestock Production | General |
| | | (At least 80.0 percent or more) | | |
| 2, 5, 6 | 17 | | | 58 |
| | | (At least 60.0 percent to 79.9 percent) | | |
| 1, 3, 11 | 23 | 31, 33, 39 | 41, 42, 44<br>45, 46 | |
| | | (At least 40.0 percent to 59.9 percent) | | |
| 4, 9, 12 | 15, 18, 19, | 30, 32, 35 | 43 | 52, 53, 54 |
| 13 | 27 | 36, 37, 38 | | 55, 56, 57 |
| | | (At least 0.0 percent to 39.9 percent) | | |
| 7, 8, 10 | 16, 20, 21<br>22, 24, 25<br>26 | 34 | 47, 48, 49<br>50 | |

*Consult Table 4.4 for description of competencies listed here by number.

Adult farmers did not perceived that technician/mid-management level farm employees, as described in the questionnaire, will need many competencies related to the management of the farm enterprise. In only three instances shown in Table 4.4 where the word 'plan' appeared in the description of the competency area, did the competency fall outside the lower ordered listing. Conversely, competency statements emphasizing performance of manipulative types of competencies were more often cited affirmatively by adult farmers. While professional agricultural educators normally perceived that farm workers will need competency in given areas more often than did adult farmers, cases in which this was not true most often dealt with 'planning'.

## HYPOTHESIS TESTING

The data were examined for significant differences which were hypothesized to have existed within and between sub-groups comprising the study respondents. To test the five hypotheses, the null hypothesis forms stated in Chapter III, were used. The basis for rejecting the null hypothesis was a significance level of .05. At the .05 level there is a 95 percent probability that differences between the two groups could not have occurred as a result of chance. This significance level was used throughout as the basis for rejecting the null hypotheses (that there are no differences). Predominantly, only situations where the null hypotheses were rejected at the .05 level of significance were presented in the findings. Tests at other significance levels were also conducted to ascertain the direction in which marginal differences could be identified. Consult the appendices for more complete data.

## Adult Farmer and Educator Perceptions Hypothesis One

The first hypothesis of the study suggested that we should expect differences between the perceptions by adult farmers and by professionals about occupational competency needs of young people who will enter farming occupations in the next five years. The null form of the hypothesis was tested by analysis of contingency tables using the chi-square test statistic for each of two groups of farming occupations: (1) farm entrepreneurship and (2) technician/mid-management level farm employment.

Young Farm Entrepreneur. There were fifteen competency statements about which the null hypothesis was rejected. Table 4.10 illustrates the distribution according to perceived competency needs of (a) all young farmers, (b) young livestock farmers and (c) young crop farmers. Thirteen of the items were rated 'necessary' by 60 percent or more of the adult farmers. These were:

9. "Maintain...drainage systems." Educators were more concerned that this competency be acquired by young farmers, in general. Considerably more of them emphasized (77.8 percent) the need for all young farmers to have this competency than did adult farmers (63.5 percent).

24. "Forward contract sales..." Educators placed considerably more often indicated performance needed on this competency by all young farmers (73.8 percent) than did adult farmers (51.8 percent).

## Table 4.10

Young Farmer Competencies About Which There Were Significant Differences Between Adult Farmer and Educator Responses

| | Competency | Farmers | | | | Educators | | | | $X^{2e}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | | N[a] (84.8) | % All[b] | % LVSTK[c] | % CPS[d] | N[a] (44.8) | % All[b] | % LVSTK[c] | % CPS[d] | |
| 9. | "Maintain...drainage systems." | 85 | 63.5 | 3.5 | 15.3 | 45 | 77.8 | 0.0 | 20.0 | 8.53 |
| 10. | "...maintain farm...irrigation systems." | 79 | 25.3 | 1.3 | 17.7 | 43 | 20.9 | 2.3 | 55.8 | 21.14 |
| 24. | "Forward contract sales..." | 83 | 51.8 | 2.4 | 13.3 | 42 | 73.8 | 2.4 | 14.3 | 8.25 |
| 34. | "Merchandise...farm products..." | 78 | 37.2 | 0.0 | 19.2 | 45 | 48.9 | 0.0 | 42.2 | 21.07 |
| 37. | "Minimize waste..." | 85 | 68.2 | 8.2 | 15.3 | 44 | 90.9 | 2.3 | 2.3 | 8.72 |
| 41. | "Perform routine...livestock related activities..." | 69 | 44.9 | 50.7 | 0.0 | 44 | 18.2 | 77.3 | 4.6 | 13.72 |
| 42. | "Feed and care for livestock...to maximize farm profits." | 67 | 41.8 | 53.7 | 0.0 | 44 | 15.9 | 79.6 | 4.6 | 13.43 |
| 43. | "Select...feeds..." | 68 | 38.2 | 54.4 | 0.0 | 44 | 15.9 | 79.6 | 4.6 | 13.47 |
| 44. | "...conduct animal health programs..." | 67 | 40.3 | 55.2 | 0.0 | 44 | 18.2 | 77.3 | 4.6 | 11.15 |
| 45. | "Perform...herd health tasks..." | 67 | 34.3 | 55.2 | 0.0 | 44 | 11.4 | 72.7 | 4.6 | 11.48 |

Table 4.10 (continued)

| Competency | Farmers | | | | Educators | | | | $X^{2e}$ |
|---|---|---|---|---|---|---|---|---|---|
| | N[a] (84.8) | % All[b] | % LVSTK[c] | % CPS[d] | N[a] (44.8) | % All[b] | % LVSTK[c] | % CPS[d] | |
| 46. "Select...disinfectants and etc....for... disease prevention." | 68 | 42.7 | 50.0 | 1.5 | 44 | 20.5 | 72.7 | 4.6 | 7.94 |
| 47. "Design and conduct a breeding program..." | 68 | 29.4 | 52.9 | 0.0 | 44 | 11.3 | 84.1 | 4.6 | 18.73 |
| 48. "...select animals...that meet the specifications of the market." | 68 | 33.8 | 48.5 | 0.0 | 44 | 11.4 | 81.8 | 4.6 | 18.73 |
| 50. "Maintain...production records..." | 67 | 32.8 | 52.2 | 0.0 | 41 | 14.6 | 78.1 | 4.9 | 13.14 |
| 53. "Speak in public meetings..." | 87 | 64.4 | 3.5 | 5.8 | 44 | 86.4 | 0.0 | 0.0 | 8.18 |

[a]N is the total number responding

[b]All young farmers will need this competency.

[c]All young livestock farmers will need this competency.

[d]All young crops farmers will need this competency.

[e]All significant at the .05 level.

37. "Minimize waste...." Educators considerably more often indicated this competency will be needed by all young farmers (90.9 percent) than did adult farmers (68.2 percent).

53. "Speak in public meeting..." Professionals agreed most often (86.4 percent) that this would be needed by all young farmers. Only 73.7 percent of the adult farmers responded affirmatively in all response categories combined.

Nine of the ten livestock production competencies were also included. Professionals were in much more agreement that it will be necessary that livestock competencies be performed specifically by young livestock farmers (72.7 to 84.1 percent) than were the adult farmer group (48.5 to 55.2 percent). Crops farmers often neglected to make any judgements on the livestock competencies. In general adult farmer respondents discriminated much less between the specialized needs of the young livestock farmer and the needs of all young farmers in general, than did professionals.

Farm Workers. We would expect from the first hypothesis that adult farmers would have, as a group, agreed with professional educators about the entry level competency needs of technician/mid-management farm employees in the next five years. These positions have been traditionally called "herdsmen" or "crops foremen", depending on the size and type of farm. Table 4.4 showed the percentage affirmative responses about competency ascribed by adult farmers and professional educators, as entry level farm employment competency needs.

To determine significance of any differences between the judgements of professionals and adult farmers about farm worker competencies,

a special t test[1] was calculated on each of the fifty-four competencies. This variation was necessary because farmers were asked to assess such competencies they felt would be needed by an employee on their particular type of farms. Educators were required to ascribe the competencies to (1) all farm workers, (2) workers on livestock farms, or (3) workers on crops farms. The null hypothesis (no differences) was rejected at the .05 level on a two-tailed t test of significance on six competencies. Only the following had been perceived necessary to 60 percent or more of the adult farmers.

2. "...[minor] repair...on farm equipment."
19. "Determine personal role in the farm business..."
31. "Identify common economic pests..."

In all cases a larger proportion of professionals indicated need for farm workers to be able to perform a given competency than were adult farmers (adult farmers: low of 32.0 percent to a high of 92.9 percent, educators: low of 56.8 percent to a high of 100.0 percent).

Educator Perceptions of Competency Needs of Both Young Farm Operators and Farm Workers. Figure 4.1 shows the extent to which educators perceived that persons entering farm entreprenuerships and those entering farm employment should be equipped with essentially the same competencies. Modal affirmative response proportions (percentages) show a maximum of 71.2 percent of the educator responses projected the need for competence

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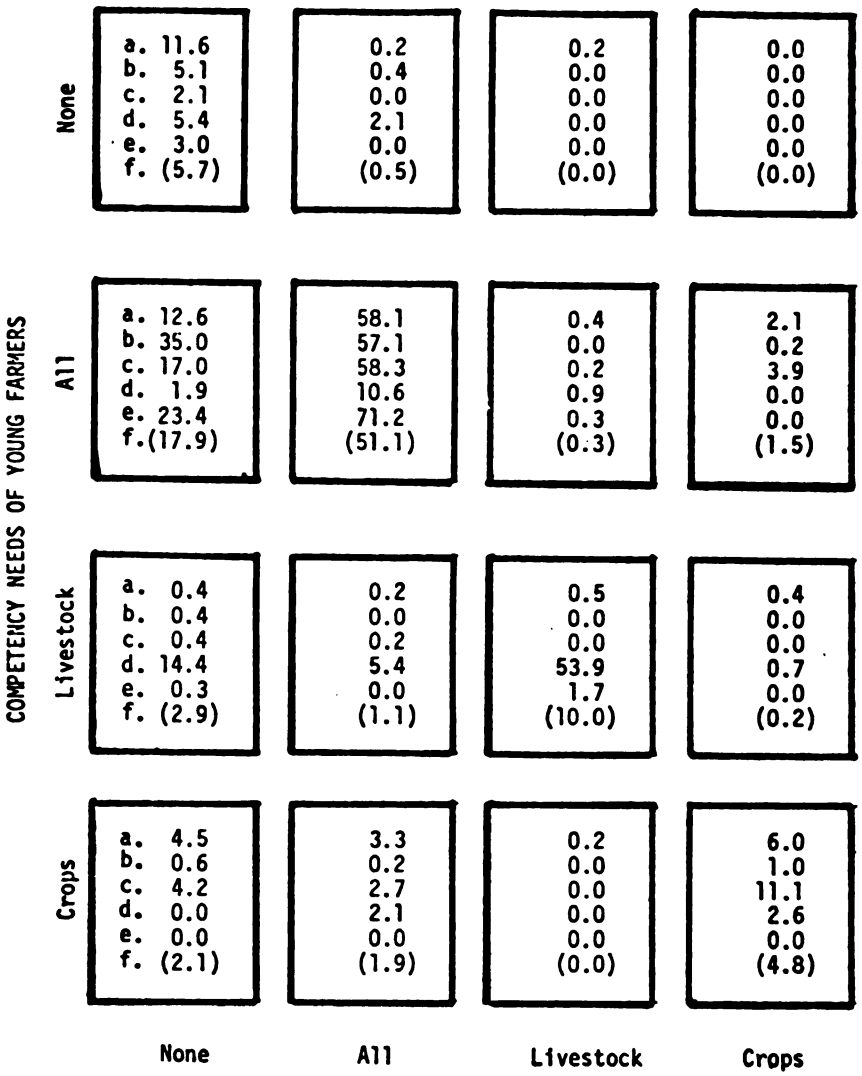
[1] Robert R. Sokol and F. James Rohlf, Biometry, (San Francisco: W. F. Freeman and Co., 1969), p. 607.

$$t_s = \frac{\arcsin \sqrt{p_1} - \arcsin \sqrt{p_2}}{\sqrt{820.8 \left(1/n_1 + 1/n_2\right)}}$$




Competencies Needed by Both Farm Workers and Farm Entrepreneurs Perceived by Agricultural Educators*

Figure 4.1

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*Percent of Total Responses According to Competency group.

Note: Data in Figure should be read as follows: (example) 11.6 percent of the educator responses regarding agricultural mechanics competencies indicated that neither young farm operators nor young farm workers would need to perform in at least some portion of the competencies listed in this functional area.

Key:

| | |
|---|---|
| a. | Agricultural Mechanics |
| b. | Farm Management |
| c. | Crop Production |
| d. | Livestock Production |
| e. | General |
| f. | (All-54 Competencies) |

by all young farmers and young farm workers in any given functional competency grouping (in this case general competencies).

The greatest variation in the pattern existed in both the livestock and crop production competencies. More educators indicated that livestock production competencies will be needed by livestock farmers and farm workers, and not by all farmers. While this was an expected outcome, it does provide additional proof that respondents were providing differentiated data.

The composite distribution of responses shows that no value was placed on the competencies as they related to farm worker requirements in 28.6 percent of the cases. A similar relationship occurred in only 6.2 percent of the cases in which the competencies were related to needs of young farm entrepreneurs. The figure also shows that 70.8 percent of the responses indicated need by all entrepreneurs; 14.2 percent by just livestock farmers; and 8.8 percent solely by crop farmers.

## Competency Needs...Next Five Years and Experience of Young Farmers...Last Five Years Hypothesis Two

The second null research hypothesis of the study was stated in such a way so that we should expect no differences between what adult farmers expect will be the occupational needs of young people entering farming in the next five years, and the experience of persons who had entered farming in the past five years. The t test of population proportions showed that, at the .05 level of significance, the null hypothesis was rejected on thirty-five of the fifty-four competencies. On all but three of the competencies, a higher proportion of adult farmers indicated that performance will be needed in the future than young farmers had experienced. Those items showed that a higher proportion of young farmers

(49.4 percent vs. 35.7 percent) indicated that they had performed, "... major overhaul...of farm power units...," (92.8 percent vs. 53.2 percent) said they had determined, "...personal role in the farm business...," and considerably more (90.9 percent vs. 58.0 percent) said they had had experience in, "minimizing waste." Appendix Table 5 lists related information.

All nineteen competencies about which there were no significant differences between adult farmer projections and young farmer experience, were rated important by 60 percent or more of the adult farmers responding to the given items.

Table 4.11

Spearman Rho Rank Order Correlation of Agreement Between Adult Farmer Perceived Young Farmer Competency Needs and Young Farmer Competency Performance Experience By Functional Area

| Functional Area | $r_s$ |
|---|---|
| Agricultural Mechanics | .96[a] |
| Farm Management | .85[a] |
| Crop Production | .71[a] |
| Livestock Production | .82[a] |
| General | .99[a] |

[a]Significant at .05 level.

Rank order correlations of the cumulative affirmative response on the "performance necessary" dimension of the study by adult farmers compared with "have performed" dimension marked affirmatively by young

farmers are illustrated in Table 4.11. These correlations indicate that relative importance of given competencies within the adult farmer group and within the young farmer group very nearly the same even though there were differences in the numbers of affirmative responses.

## Competency Perceptions as Function of Farm Size Hypothesis Three

One of the major objectives of the study was to determine the effect of farm size on young farmer competency needs. To test the related hypotheses, chi-square statistics were calculated from fifty-four, 2x4 contingency tables. Adult farmers were dichotomously grouped according to self-reported tillable acreage based on type of farm (see Chapter III). Their responses on the "performance necessary" dimensions were then compared.

Young Farm Entrepreneurs. The null hypothesis was rejected on only one item at the .05 level of significance:

> 16. "Prepare...income taxes." Small farm operators ascribed this competency most often (80.8 percent) to all young farmers, whereas only 52.8 percent of the large farm operators did so.

However, it is interesting to note the nature of the competencies that could be listed had the .10 significance level had been chosen as a basis for rejecting the null hypothesis. Large farm operators were consistently more discriminating between the expected performance needs of persons entering specialized livestock or crops farm operations. Six items were significant at this level: "Calibrate...sprayers...;" "Keep financial records for...tax...and business analysis;" "Procure farm supplies...;" "Forward contract sales...;" "Evaluate public...policies...

as they affect the costs...[of] production...;" and "...conduct a soil management program..."

Large farm operators were in most agreement (24.2 percent) that "forward contracting" will be necessary by young crops farmers. Only 6.0 percent of the small farm operators perceived this need specifically to crops farmers. (See Appendix Table 6)

Farm Workers. An alternate null hypothesis was tested to determine the effect of farm size on perceptions of performance needs of persons entering farming occupations. Adult farmers were asked to state their perceptions of the competency needs of persons entering employment on their own types of farms.

The null hypothesis that size makes no difference in competency needs perceptions, was rejected at the .05 level of significance in only three cases: "Calibrate...sprayers...;" "...construct...housing... storage;" and "Read...to enable...updating...technical competency." In each case there exceeded a twenty percent difference in affirmative response rate by large over small farm operator perceptions of farm employee needs. (See Appendix Table 7) These competencies were perceived necessary by more than 60 percent of all adult farmers responding.

## Competency Perceptions as Function of Farm Type Hypothesis Four

Another major objective of the study, was to determine the extent to which young farmer occupational competency needs are influenced by type of major enterprise, within the farm business. A dichotomy of livestock vs. crops farm needs was written into the survey instrument to encourage discriminate responses. Additional analysis was possible by examining response patterns by various sub-groups of the respondent

population. The null hypothesis stated that we should expect no differences between the occupational competencies needed by persons who enter farming occupations as perceived by adult farmers who operate livestock farms and adult farmers who operate crops farms. Chi-square statistics were calculated from 2x4 contingency tables of each of the fifty-four competency statements.

Young Farm Entrepreneurs. The null hypothesis was rejected at the .05 significance level on thirty-two of the items. Appendix Table 8, shows the nature of the affirmative response pattern. Competencies needed by young farmers which were perceived significantly differently by livestock and crops farmers in the agricultural mechanics group included all except five items. Three of these had been considered necessary by sixty percent of the adult farmers as illustrated in Table 4.4. They were:

> 3. "Calibrate farm application equipment (sprayers, fertilizer spreaders, etc.)." (98.8 percent)
>
> 8. "Utilize topographical maps for purposes of planning systems of drainage and erosion control." (66.7 percent)
>
> 9. "Maintain surface and subsurface drainage systems." (82.3 percent)

In most instances, relatively fewer adult farmers who operated crops farms perceived that these competencies would be needed by all young farmers (crop farmer range: 48.3 percent - 83.3 percent); livestock farmer range: 63.2 percent - 94.7 percent). These were statements about irrigation and electrification were exceptions. Twelve percent of the livestock farmers and 48.3 percent of the crops farmers felt irrigation competency will be needed by all farmers. Items where significant differences occured, were most commonly attributable to the higher rate at

which adult crops farmers ascribed the particular item to young crops farmers rather than to the all or livestock farmer categories.

Eleven of the thirteen competencies within the functional grouping, farm management and economics, were also among the statements rejected under the null hypothesis. Essentially the same phenomena occurred as noted in the previous discussion. A higher percentage of crops farmers perceived that competencies will be needed by young specialized crops farmers than perceived by adult livestock producers. The competencies within which no significant differences of opinion were observed were:

20. "Supervise the work of farm employees."

22. "Determine the extent to which formal insurance may be used to protect farm equity, personal property and family."

The null hypothesis was rejected at the .05 level on the crop production competency, "Merchandise...farm products." Far fewer livestock farmers felt that all young farmers would need the competency (27.5 percent vs. 55.6 percent).

The null hypothesis was rejected at the .05 level on half of the livestock production competencies. (See Appendix Table 8). Livestock farmers affirmatively responded at higher rates throughout. It is interesting to note, however, that as in a previous discussion neither subgroups of adult farmers discriminated to a very high degree between the competency needs of all young farmers and the needs of young farmers relative to specialized livestock production farm businesses.

The entire set of seven general competencies was rejected under the null hypothesis for the same reasons as presented earlier: crop farmers more often ascribed needs to specifically young crops farmers.

Only a few livestock farmers ascribed the needs specifically to young livestock farmers. Consult the Appendix Table 8 for the details.

Farm Workers. The second alternate null hypothesis suggested that no differences exist between the farm employee competency needs perceptions held by adult farmers on the basis of type of farm operated. The null hypothesis was rejected at the .05 level of significance on five items. They included:

10. "...maintain farm...irrigation systems." Crop farmers showed much more agreement on the need for employee competency in this area then did livestock farmers (80.0 percent vs. 14.3 percent).

13. "...operate and maintain materials handling systems." Livestock farmers said this competency would be needed by their farm employees more often than crops farmers (75.5 percent vs. 45.5 percent).

19. "Determine personal role in the farm business..." Livestock farmers perceived this competency to be necessary more often than did crops farmers (78.0 percent vs. 41.7 percent).

Two remaining items were livestock competencies. Because only six of thirty crops farmers responded to any item in this functional group. Actual significance of differences may not determined accurately by the chi-square. Low response rate was indicative that the null hypothesis was rejected. (See Appendix Table 9)

## Performance, Expectations and Training Needs Perceived by Young Farmers Hypothesis Five

Up until now, the findings of this study have been primarily devoted to the consideration of the judgements of adult farmers, county agents and vocational agricultural teachers. Hypothesis two, which dealt with a comparison of past young farmer performance and adult farmer expectations for the future was an attempt to establish linkage from the past with possible needs of the future. This section deals with the findings from analysis of young farmer responses regarding their expectations of the future. These data are not comparable with the previously presented adult farmer expectations of young farmer needs primarily because the latter were asked to consider "entry level" needs. Young farmers in the study had already entered their occupation and were asked to reflect their future competency performance expectations.

The final hypothesis of the study was concerned about the relative expectations of young farmers as might be affected by their employment status, size of farm and farm type. The null hypothesis, if accepted, would lead us to conclude that no significant differences exist within the group of young farmer graduates at the .05 level based upon the given variables.

Farm Type. Young farmer competency experience, expectations for future performance and perceptions of their own training needs were examined for differences which might be attributed to type of farm which were operated by or with, which young farmers were associated. At the .05 level significant differences were observed in the perceived need for training in the following: "...major overhaul...of farm power units."

Livestock farmers were in greater accord than were crops farmers (86.4 percent vs. 63.0 percent). Livestock farmers reported more experience in maintenance of "electrical...[conveniences]," (86.4 percent vs. 64.3 percent), more experience with construction of "...livestock...housing... and...crop storage," and similarly, more experience with "...materials handling systems." Livestock farmers expect more work in construction and maintenance of housing and storage than do crops farmers (96.6 percent vs. 77.8 percent).

Unexpected differences were also revealed about the expectations and training perceived necessary by young farmers on the competency: "Supervise...farm employees." Young crops farmers expressed greater needs in this area than did young livestock farmers (70.7 percent vs. 85.3 percent and 25.9 percent vs. 50.0 percent respectively). Young crops farmers also expressed significantly higher needs for training in "forward contracting" (63.2 percent vs. 77.8 percent).

Young crops farmers showed significantly greater expectations for performance of the competency "merchandise...farm products..." (34.0 percent vs. 58.6 percent).

Young livestock farmers, as we would have anticipated, showed significant differences in performance and expectations for performance of nine of ten livestock production competencies.

The fact that no differences were observed in the judgements about "show animals in competition..." is very likely due to the small percentage of crop farmers who do have same livestock and the relatively low affirmative response by either group. Training needs were not significantly different for those responding on any competency.

## Table 4.12

Performance, Expectations and Training Needs Perceived by Livestock and Crop Farmers

| | Competency | Performance | | | Expectations | | | Training Needed | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | LVSTK % | CPS % | $X^2$ | LVSTK % | CPS % | $X^2$ | LVSTK % | CPS % | $X^2$ |
| 1. | "...maintain farm shop..." | 82.8 | 82.1 | .01 | 96.5 | 96.4 | 2.72 | 67.9 | 67.9 | .69 |
| 2. | "...[minor] repair...on farm equipment" | 96.6 | 100.0 | .97 | 96.6 | 100.0 | 3.06 | 71.2 | 57.1 | 1.69[a] |
| 3. | "Calibrate...sprayers..." | 93.2 | 96.2 | .32 | 96.5 | 92.6 | .99 | 40.7 | 40.7 | .00 |
| 4. | "Plan...mechanization of...[farm] operations." | 65.5 | 73.1 | .47 | 86.2 | 92.3 | 1.49 | 63.6 | 64.0 | .00 |
| 5. | "Operate and...[maintain]...farm power units." | 93.2 | 96.3 | .32 | 94.9 | 92.6 | 2.66 | 55.9 | 48.2 | .45 |
| 6. | "Operate and...[maintain]...farm machinery..." | 96.6 | 100.0 | .94 | 98.2 | 100.0 | 5.32 | 52.5 | 37.0 | 1.79[a] |
| 7. | "Perform major overhaul...power... and...machinery." | 44.1 | 63.0 | 2.65[a] | 70.7 | 37.0 | 1.79 | 86.4 | 63.0 | 6.17[c] |
| 8. | "[Use]...maps for...planning... drainage..." | 30.5 | 37.0 | .36 | 66.1 | 76.9 | 3.46 | 62.1 | 73.1 | .96 |
| 9. | "Maintain...drainage systems." | 75.9 | 81.5 | .34 | 84.4 | 92.6 | 3.22 | 45.6 | 46.2 | .00 |
| 10. | "...maintain farm...irrigation systems." | 5.2 | 7.4 | .17 | 25.9 | 25.9 | 2.58 | 33.3 | 30.8 | .05 |

Table 4.12 (continued)

| Competency | Performance | | | Expectations | | | Training Needed | | |
|---|---|---|---|---|---|---|---|---|---|
| | LVSTK % | CPS % | $X^2$ | LVSTK % | CPS % | $X^2$ | LVSTK % | CPS % | $X^2$ |
| 11. "...maintain electrical [conveniences]..." | 86.4 | 64.3 | 5.68[c] | 88.1 | 78.6 | 6.81[a] | 75.9 | 78.6 | .08 |
| 12. "...construct...maintain...livestock housing...or crop storage." | 88.1 | 70.4 | 4.06[c] | 96.6 | 77.8 | 9.60[c] | 72.9 | 77.8 | .23 |
| 13. "...operate and maintain... materials handling systems." | 75.9 | 44.0 | 7.93[c] | 91.4 | 80.0 | 4.99 | 63.8 | 72.0 | .53 |
| 14. Other (Please state) | open ended - not tested | | | | | | | | |
| 15. "Keep financial records for... tax...and business analysis." | 81.4 | 85.7 | .25 | 81.9 | 96.4 | 4.17 | 59.3 | 67.9 | .59 |
| 16. "Prepare...income taxes." | 54.2 | 57.1 | .07 | 66.1 | 64.3 | 3.30 | 70.2 | 78.6 | .67 |
| 17. "Participate in day-to-day decision-making..." | 100.0 | 96.6 | 2.06[a] | 100.0 | 96.4 | 2.46 | 50.9 | 67.9 | 2.20[a] |
| 18. "Participate in long-term planning..." | 94.9 | 85.7 | 2.17[a] | 96.6 | 100.0 | 2.65 | 65.5 | 67.9 | .05 |
| 19. "Determine personal role in the farm business..." | 91.2 | 96.2 | .65 | 98.2 | 100.0 | 1.50 | 46.3 | 47.7 | 2.74[b] |
| 20. "Supervise...farm employees." | 72.9 | 71.4 | .02 | 70.7 | 85.3 | 10.70[c] | 25.9 | 50.0 | 4.92[c] |
| 21. "Establish...operating and... sales agreements..." | 74.6 | 72.4 | .05 | 87.9 | 89.6 | .45 | 69.5 | 69.0 | .00 |
| 22. "Determine...formal insurance... to protect farm...family." | 67.8 | 55.2 | 1.34 | 89.7 | 89.7 | .86 | 69.0 | 65.5 | .11 |

Table 4.12 (continued)

| Competency | Performance | | | Expectations | | | Training Needed | | |
|---|---|---|---|---|---|---|---|---|---|
| | LVSTK % | CPS % | $X^2$ | LVSTK % | CPS % | $X^2$ | LVSTK % | CPS % | $X^2$ |
| 23. "Procure farm supplies..." | 98.2 | 89.3 | 3.28[b] | 100.0 | 96.4 | 2.54 | 37.5 | 39.3 | .03 |
| 24. "Forward contract sales..." | 49.2 | 51.9 | .05 | 75.9 | 85.2 | 5.63[a] | 63.2 | 77.8 | 4.68[c] |
| 25. "...marketing of farm products..." | 59.3 | 58.6 | .00 | 86.2 | 93.1 | 3.40 | 61.0 | 79.3 | 2.95[b] |
| 26. "Select credit sources..." | 62.7 | 58.6 | .14 | 82.8 | 79.3 | 1.95 | 56.9 | 69.0 | .32 |
| 27. "Evaluate public...policies...as they affect the costs...[of] production..." | 62.7 | 65.5 | .07 | 81.4 | 83.8 | 2.82 | 74.1 | 71.4 | .07 |
| 28. Other (Please state) | open ended - not tested | | | | | | | | |
| 29. "Conduct crop production programs..." | 86.4 | 93.1 | .86 | 96.5 | 100.0 | 2.12 | 58.6 | 55.2 | .09 |
| 30. "Determine fertilizer requirements..." | 84.8 | 89.3 | .33 | 89.8 | 96.4 | 3.41 | 59.3 | 50.0 | .67 |
| 31. "Identify common economic pests" | 77.2 | 89.3 | 1.80[a] | 92.8 | 89.3 | 1.36 | 77.2 | 64.3 | 1.59[a] |
| 32. "...conduct...[pest] control programs..." | 84.8 | 82.1 | .10 | 84.5 | 89.3 | 3.02 | 69.5 | 69.3 | .24 |
| 33. "Harvest...farm crops..." | 98.3 | 100.0 | .50 | 98.3 | 100.0 | 1.55 | 54.2 | 62.1 | .49 |
| 34. "Merchandise...farm products..." | 24.5 | 37.9 | 1.63[a] | 34.0 | 58.6 | 14.16[c] | 33.3 | 48.2 | 1.64[a] |

Table 4.12 (continued)

| Competency | Performance | | | Expectations | | | Training Needed | | |
|---|---|---|---|---|---|---|---|---|---|
| | LVSTK % | CPS % | $X^2$ | LVSTK % | CPS % | $X^2$ | LVSTK % | CPS % | $X^2$ |
| 35. "...conduct a soil management program..." | 77.6 | 82.1 | .24 | 96.5 | 92.9 | 6.43[a] | 56.9 | 57.1 | .00 |
| 36. "Conduct soil...practices...responsive to bacteriological activity..." | 74.1 | 81.5 | .55 | 89.5 | 100.0 | 7.08[a] | 63.2 | 63.0 | .00 |
| 37. "Minimize waste..." | 93.2 | 86.2 | 1.16 | 94.8 | 89.6 | 1.10 | 38.6 | 48.3 | .74 |
| 38. "Identify...natural resources of the farm..." | 47.4 | 38.5 | .57 | 64.9 | 57.4 | 1.90 | 62.5 | 61.5 | .01 |
| 39. "[Use] weather information..." | 91.1 | 100.0 | 2.66[a] | 90.1 | 100.0 | 2.89 | 38.2 | 50.0 | 1.68[a] |
| 40. Other (Please state) | open ended - not tested | | | | | | | | |
| 41. "Perform routine...livestock related activities..." | 100.0 | 81.0 | 11.83[c] | 100.0 | 76.2 | 26.06[c] | 25.9 | 40.0 | 1.43[a] |
| 42. "Feed and care for livestock...to maximize farm profits." | 98.3 | 70.0 | 14.82[c] | 94.9 | 80.0 | 24.61[c] | 50.0 | 45.0 | .15 |
| 43. "Select...feeds..." | 89.8 | 61.9 | 8.37[c] | 98.3 | 71.4 | 17.85[c] | 52.5 | 55.0 | .04 |
| 44. "...conduct animal health programs..." | 89.8 | 60.0 | 9.12[c] | 98.3 | 80.0 | 16.62[c] | 72.9 | 57.9 | 1.52[a] |
| 45. "Perform...herd health tasks..." | 94.9 | 80.0 | 4.12[c] | 98.3 | 80.0 | 15.83[c] | 65.5 | 68.4 | .05 |
| 46. "Select...disinfectants and etc... for...disease prevention." | 86.4 | 45.0 | 14.04[c] | 91.5 | 60.0 | 20.38[c] | 44.8 | 47.4 | .04 |

Table 4.12 (continued)

| Competency | Performance | | | Expectations | | | Training Needed | | |
|---|---|---|---|---|---|---|---|---|---|
| | LVSTK % | CPS % | $X^2$ | LVSTK % | CPS % | $X^2$ | LVSTK % | CPS % | $X^2$ |
| 47. "Design and conduct a breeding program..." | 74.1 | 25.0 | 15.17[c] | 89.7 | 55.0 | 18.75[c] | 49.1 | 52.6 | .07 |
| 48. "...select animals...that meet the specifications of the market." | 84.5 | 40.0 | 14.96[c] | 87.9 | 70.0 | 10.94[c] | 49.1 | 57.9 | .44 |
| 49. "...show animals in competition" | 39.7 | 35.0 | .14 | 39.7 | 30.0 | 8.09[b] | 28.6 | 27.8 | .00 |
| 50. "Maintain...production records..." | 77.6 | 31.6 | 13.55[c] | 86.2 | 57.9 | 17.86[c] | 38.6 | 44.4 | .20 |
| 51. Other (Please state) | open ended - not tested | | | | | | | | |
| 52. "Read...to enable...updating... technical competence." | 93.2 | 92.9 | .00 | 100.0 | 100.0 | 7.29[c] | 25.9 | 44.4 | 2.94[b] |
| 53. "Speak in public meetings..." | 40.7 | 44.4 | .11 | 60.7 | 84.6 | 7.95[b] | 58.5 | 69.2 | .85 |
| 54. "Write business letters..." | 69.5 | 89.3 | 4.06[c] | 86.0 | 100.0 | 4.86 | 24.6 | 48.2 | 4.67[c] |
| 55. "Perform...computations needed..." | 88.1 | 85.2 | .15 | 93.1 | 100.0 | 2.47 | 48.3 | 50.0 | .02 |
| 56. "Identify key opinion leaders..." | 73.2 | 69.2 | .14 | 81.5 | 92.0 | 1.57 | 38.9 | 60.0 | 3.03[b] |
| 57. "Participate in local... organizations." | 62.1 | 57.7 | .14 | 82.8 | 96.1 | 5.84 | 38.2 | 38.0 | .68 |
| 58. "Develop...[appreciation of others]..." | 98.3 | 100.0 | .49 | 100.0 | 100.0 | .49 | 16.4 | 15.8 | .01 |

[a]Significant at .25 level

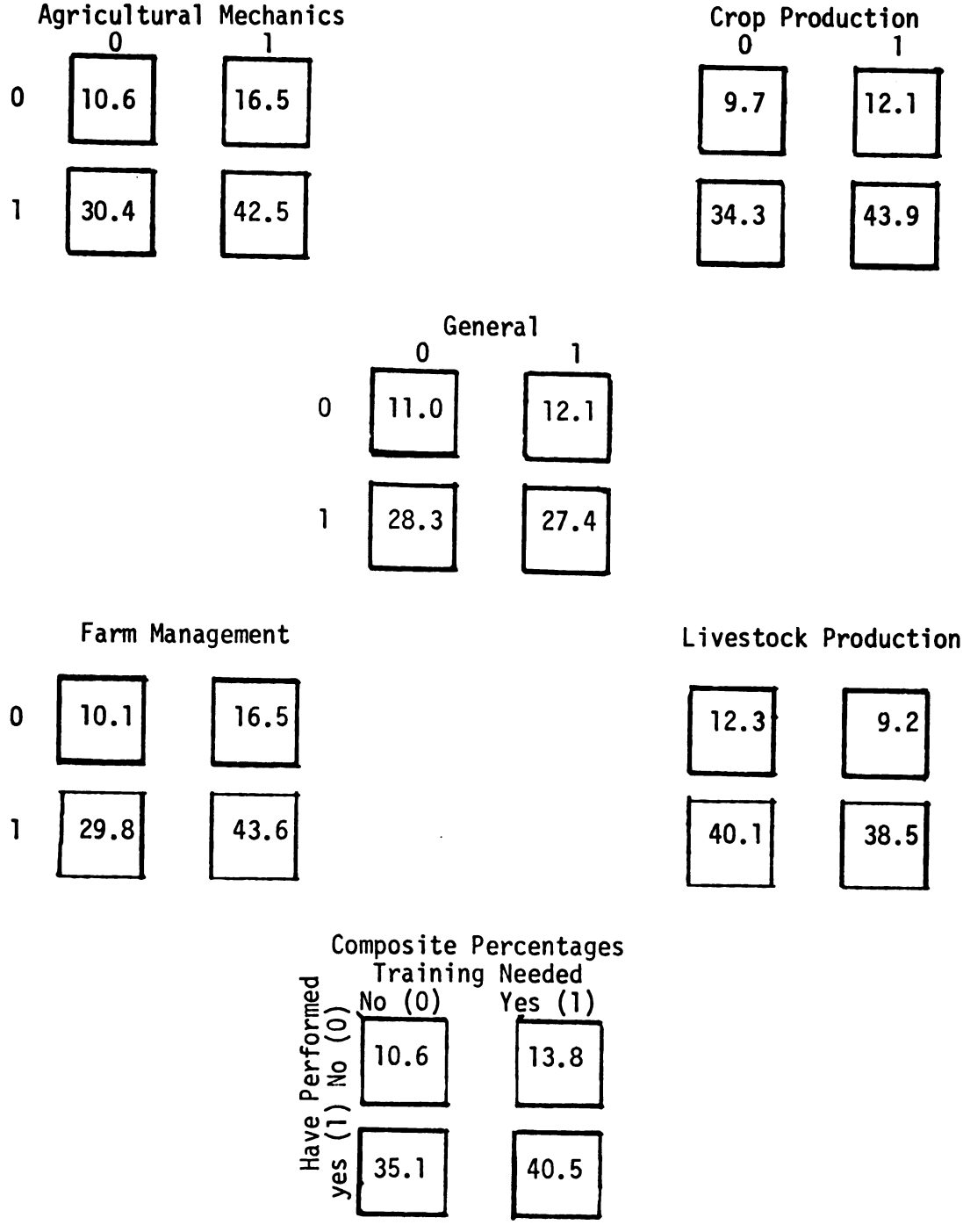
[b]Significant at .10 level

[c]Significant at .05 level

Performance expectations differences were greatest between the two sub-groups of young farmers on the competency: "read to enable... updating...technical competence." Both groups responded 100 percent affirmatively but the differences showed up in when such would be performed. Crops farmers reported performance of the competency "write business letter..." more than livestock farmers (69.5 percent vs. 89.3 percent) and significantly more interest in additional training (24.6 percent vs. 48.2 percent). (See Table 4.12)

Farm Size. Size of farm upon which young farmers were working provided little help in analyzing young farmer performance or training differences. Significance testing by use of the chi-square revealed that the null hypothesis (no differences due to farm type) would have been rejected at the .05 level in only two cases of the 162 cases generated for this analysis. (See Appendix Table 10 for more details.)

Joint Performance and Training Needs. Young farmer experience and currently perceived training needs was cross tabulated for each of the five functional competency areas. Figure 4.2 shows that 24.4 percent of the response had been in the no experience category regarding performance to date. Of the 3985 individual responses distributed by 91 young farmers over the two dimensions, "have performed" and "training needed," and across the 54 competency statements, 54.3 percent were in the "training needed" category.




Young Farmer Experience vs. His Perceived Training Needs by Percent of Total Responses by Functional Area

FIGURE 4.2

## SUMMARY

This study was conducted to provide a basis for decision-making on the part of institutions of higher education in Michigan in providing occupational training for persons who will enter farming occupations in the next five years. Eight-eight adult farm operators, ninety-one young farmers, sixteen county agents, and twenty-nine high school vocational agriculture instructors composed the study sample. This represented 75.0 percent of the eligible population given that 13 of the persons who were located to represent the graduates of the Agricultural Production Program as the young farmers of the study of the five classes 1969-1973 were not farming at the time of the study.

Sixty-five and nine tenths percent of the adult farmers were defined as livestock farmers, while 34.1 percent were crops farmers. Of the young farmers 63.9 percent were defined as livestock farmers and 36.1 percent were involved in crops farms. Large farm businesses were operated by 40.9 percent of the adult farmers. Forty-five and one tenth percent of the young farmers were involved in large farming operations.

Over sixty percent of the adult farmers affirmed the need for young farmers as a group to perform 48 of the 54 competencies. Over 95 percent of adult farmers responding to given items affirmed that performance will be needed in 24 of the 54 competency areas by young farmers in the study. Only 28 of the 54 competencies were rated necessary as they related to the full-time farm employees by sixty percent or more of the adult farmers. Two competencies about which sixty percent or fewer of the responses provided by both adult farmers and educators were made on behalf of both farm entrepreneurs and farm employees: (1) "perform major overhaul...power...and machinery", and (2) "...show animals in competition."

Adult farmers and agricultural educators response patterns over the assignment of performance necessary by: (1) all, (2) livestock, or (3) crops farmers were significantly different at the .05 level on fifteen young farm entrepreneur competencies and six technician/mid-management level farm employee competencies. This disagreement arose jointly between young farmer and farm worker needs on three com-

"maintain...drainage systems", "...maintain...irrigation systems", and "merchandise...farm products...". The tendency was for professionals to explicitly assign the performance need to specific type of farm operation rather than to "all" young farmers. This pattern was not true, however, on the five cases having to do with "maintaining drainage systems", "forward contracting", "soil management", "minimizing waste", and "public speaking".

Farm type of the adult farmer respondents accounted for 32 of 33 statistically significant (.05 level) differences among response patterns within the adult farmer population on the young farm entrepreneur "performance needed" dimensions. Adult crop farmers more often designated given competencies needed specifically by young crops farm operators. Livestock farmers generalized many of the same competencies to prospective needs of all young farmers. Farm type of the adult farmer respondent also accounted for 5 of 8 statistically significant differences (.05 level) within performance needs ascribed to employees.

Type of farm upon which the young farmer respondents were employed accounted for all significant differences in their reported com-

experience. With the exception of "business letter writing," a significantly higher proportion of young crops farmers expect in the

future to supervise farm employees and merchandise farm products, than young livestock farmers. Significantly more livestock farmers expect to be involved in construction and "maintenance of livestock housing and/or crop storage." They also expect, as anticipated, to perform livestock - oriented competencies in the future.

Young farmers on small farms and those on livestock farms indicated significantly greater interest in additional training in "...major overhaul...of farm power units...". Young farmers on crops farms indicated significantly greater interest in additional training in the competencies, "supervise (ing)...farm employees", "forward contracting", and "...business letter writing".

Table 4.13 shows a summary of the hypotheses tested.

Table 4.13

Summary of Hypotheses Tested and Direction of Significant Differences

| Agricultural Mechanics Competencies | IMPT.[1] | | Hypotheses[2,3,4] $H_1$ | | $H_2$ | $H_3$ | | $H_4$ | | $H_5$ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | YF | FW | YF | FW | YF | YF | FW | YF | FW | PERF. | EXP. | TR. |
| 1. Establish and/or maintain a farm shop (or farm service center) | X | Y | | | A | | | C-c | | | | |
| 2. Perform shop skills at least to the extent necessary to repair minor breakage and wear on farm equipment. | X | Y | | E | A | | | C-c | | | | |
| 3. Calibrate farm application equipment (sprayers, fertilizer spreaders, etc.) | X | Y | | | | | L | | | | | |
| 4. Plan and conduct a coordinated program of mechanization of field and farmstead operations. | X | | | | A | | | C-c | | | | |
| 5. Operate and perform routine maintenance of both gasoline and diesel farm power units to obtain maximum efficiency and machine life. | X | Y | | | | | | C-c | | | | |
| 6. Operate and perform routine maintenance on farm machinery to obtain maximum efficiency and machine life. | X | Y | | | A | | | C-c | | | | |
| 7. Perform major overhaul and/or structural repair of farm power units and/or farm machinery. | | | | | Y | | | | | | | ls |
| 8. Utilize topographical farm maps for purposes of planning systems of drainage and/or erosion control. | Y | | E-a | E | A | | | | | | | |
| 9. Maintain surface and subsurface farm drainage systems. | Y | | E-c | E | | | | | | | | |
| 10. Select, install, operate, and maintain farm crop irrigation systems. | | | | | A | | | C-a | C | | | |
| 11. Select, install, and maintain electrical motors, wiring, controls, outlets and lighting required in the farmstead. | Y | Y | | | A | | | C-c | | 1 | | |
| 12. Plan, construct, (and/or renovate) and maintain livestock housing and/or crop storage facilities. | Y | Y | | | A | | L | C-c | | 1 | 1 | |
| 13. Plan, operate, and maintain grain drying, waste and/or other farm materials handling systems. | Y | Y | | | A | | | C-c | Li | 1 | | |
| 14. Other (Please state) _____ | | | | | | open ended - not tested | | | | | | |

Table 4.13 (continued)

| Farm Management & Economics Competencies | IMPT.[1] YF | IMPT.[1] FW | $H_1$ YF | $H_1$ FW | $H_2$ YF | $H_3$ YF | $H_3$ FW | $H_4$ YF | $H_4$ FW | $H_5$ PERF. | $H_5$ EXP. | $H_5$ TR. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Hypotheses[2,3,4] | | | | | | | |
| 15. Keep financial records for purposes of income tax reporting and business analysis. | X | | | | A | | | C-c | | | | |
| 16. Prepare farm and/or personal income taxes. | Y | | | | A | S-a | | Li-a | | | | |
| 17. Participate in day-to-day decision-making and management of the farm. | X | Y | | | | | | C-c | | | | |
| 18. Participate in long term planning of growth and development of the farm business. | X | | | | | | | C-c | | | | |
| 19. Determine personal role in the farm business and evaluate opportunities for realization of occupational and personal goals. | X | Y | | E | Y | | | C-c | Li | | | |
| 20. Supervise the work of farm employees. | Y | | | | A | | | | | | c | c |
| 21. Establish farm operating and/or sales agreements (partnerships, loans, land purchases, etc.) with minimum of unnecessary professional legal assistance. | Y | | | | | | | C-c | | | | |
| 22. Determine the extent to which formal insurance may be used to protect farm equity, personal property, and family. | Y | | | | A | | | C-c | | | | |
| 23. Procure farm supplies and services. | X | Y | | | | | | C-c | | | | |
| 24. Forward contract sales of farm products. | Y | | E-a | | | | | C-c | | | c | |
| 25. Develop a system of orderly marketing of farm products that will maximize profits. | Y | | | | A | | | C-c | | | | |
| 26. Select credit sources that will provide greatest long term security and flexibility at minimum cost. | X | | | | A | | | C-c | | | | |
| 27. Evaluate public economic and social policies and/or issues as they affect the costs and returns of farm production and participate in their solution. | Y | | | | A | | | C-c | | | | |
| 28. Other (Please state) _____ | | | | | | open ended - not tested | | | | | | |

Table 4.13 (continued)

| Crop Production Competencies | IMPT.[1] | | Hypotheses[2,3,4] $H_1$ | | $H_2$ | $H_3$ | | $H_4$ | | $H_5$ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | YF | FW | YF | FW | YF | YF | FW | YF | FW | PERF. | EXP. | TR. |
| 29. Conduct crop production program (including fruits and vegetables, if) applicable) that maximizes production profits. | X | | | | A | | | | | | | |
| 30. Determine fertilizer requirements for crop production. | Y | | | | | | | | | | | |
| 31. Identify common economic pests such as crop insects. | X | Y | | E | A | | | | | | | |
| 32. Select and conduct insect, weed, and disease control programs that will minimize losses and help maximize production profits. | X | | | | A | | | | | | | |
| 33. Harvest, handle and store farm crops and/or produce to retain maximum crop quality and yield. | X | Y | | | | | | | | | | |
| 34. Merchandise specialized farm products (i.e. certified seed, truck crops, fruit, etc., where applicable). | | | E-c | | A | | | C-a | | | c | |
| 35. Plan and conduct a soil management program to conserve topsoil and preserve or enhance its productivity. | Y | | | | A | | | | | | | |
| 36. Conduct soil management practices that are responsive to bacteriological activity and organic matter constituents of the soil. | Y | | E-a | | | | | | | | | |
| 37. Minimize waste of all recycleable farm products and supplies (manure, straw, etc.) | Y | Y | E-a | | Y | | | | | | | |
| 38. Identify and develop natural resources of the farm that may be used to benefit the farm and community. | Y | | | | A | | | | | | | |
| 39. Utilize weather information to plan daily and seasonal farming activities. | X | Y | | | | | | | | | | |
| 40. Other (Please state)_____ | | | | | | open ended - not tested | | | | | | |

Table 4.13 (continued)

| Livestock and/or Dairy Production Competencies | Hypotheses[2,3,4] IMPT.[1] YF | IMPT. FW | $H_1$ YF | $H_1$ FW | $H_2$ YF | $H_3$ YF | $H_3$ FW | $H_4$ YF | $H_4$ FW | $H_5$ PERF. | $H_5$ EXP. | $H_5$ TR. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41. Perform routine dairy and/or livestock (including poultry) related activities (milking, feeding, manure removal, egg gathering, etc.) | X | X | E-1 | | | | | Li-1 | Li | 1 | 1 | |
| 42. Feed and care for livestock (dairy and/or beef) in such a way as to maximize farm profits. | X | Y | E-1 | | | | | Li-1 | Li | 1 | 1 | |
| 43. Select homegrown and/or purchased feeds which meet nutritional requirements of animals (for whatever purpose that applies: milk production, eggs, maintenance, fattening, etc.) | Y | Y | E-1 | | | | | Li-1 | | 1 | 1 | |
| 44. Identify common animal insects and diseases; Conduct animal health programs that will maximize utilization of genetic production capacity. | X | Y | E-1 | | A | | | | | 1 | 1 | |
| 45. Perform certain veterinary-type herd health tasks ( such as calf pulling, intravascular injections, palpation for pregnancy, etc.) | Y | Y | E-1 | | | | | Li-1 | | 1 | 1 | |
| 46. Select and use detergents, disinfectants and etc. necessary for sanitation and disease prevention. | Y | Y | E-1 | | A | | | | | 1 | 1 | |
| 47. Design and conduct a breeding program that will lead to improved genetic capability for meat, and/or milk production. | Y | | E-1 | | A | | | | | 1 | 1 | |
| 48. Evaluate and select animals to join the herd or flock that meet the specifications of the market for the products of such animals. | Y | | E-1 | | | | | | | 1 | 1 | |
| 49. Prepare and show animals in competition with other producers. | | | | | A | | | | | | | |
| 50. Maintain animal related production records for purposes of selection and/or sales of animals and/or animal products. | Y | | E-1 | | A | | | | | 1 | 1 | |
| 51. Other (Please state) _____ | | | | | | open ended - not tested | | | | | | |

Table 4.13 (continued)

| General Competencies | IMPT.[1] YF | IMPT.[1] FW | Hypotheses[2,3,4] $H_1$ YF | $H_1$ FW | $H_2$ YF | $H_3$ YF | $H_3$ FW | $H_4$ YF | $H_4$ FW | $H_5$ PERF. | $H_5$ EXP. | $H_5$ TR. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 52. Read sufficiently well to enable continued updating of technical competence. | X | Y | | | A | | L | C-c | | | | |
| 53. Speak in public meetings and lead group discussions on topics related to welfare of farm people. | Y | | E-a | | A | | | C-c | | | | |
| 54. Write business letters and other communications necessary for the normal conduct of farm business. | Y | | | | A | | | C-c | | c | | c |
| 55. Perform mathematic computations needed in determining measures of efficiency, farm accounts, etc. (with the aid of calculators and computers where necessary). | X | Y | | | A | | | C-c | | | | |
| 56. Identify key opinion leaders and decision-makers in farm related professions. | Y | | | | | | | C-c | | | | |
| 57. Participate in local government farm, and community organizations. | X | Y | | | A | | | C-c | | | | |
| 58. Develop the ability to enjoy and appreciate family, friends, non-farm people and other personal interests. | X | Y | | | | | | C-c | | | | |

[1] X - Judged necessary of persons entering specified farming occupation by 95.0 percent or more of respondent adult farmers.
Y - Judged necessary of persons entering specified farming occupation by 60.0 to 94.9 percent of respondent adult farmers.

[2] Any entry in hypotheses columns signifies significant difference (.05 level) between responses of groups being compared. The letter designation indicates source of greater value within the comparison: (E) educator (A) adult farmer (Y) young farmer
(a) all young farmers (l) young livestock farmers (c) young crops farmers
(S) small farm operators (L) large farm operators
(Li) livestock farm operators (C) crops farm operators

[3] Hypotheses: ($H_1$) adult farmer vs. educator, ($H_2$) adult farmer vs. young farmer, ($H_3$) small farmer vs. large farmer, ($H_4$) livestock vs. crops farmer, ($H_5$) young farmer by farm type and size.

[4] (YF) Young Farmer, (FW) Farm Worker, (AF) Adult Farmer, (PERF.) Performance, (EXP.) Expectations, (TR.) Training Needs

# CHAPTER V

## SUMMARY AND CONCLUSIONS

The purpose of this study was to provide one basis for institutions of public higher education in Michigan, concerned with agricultural education, for defining the task of providing career preparation for persons seeking to enter and become established in farming occupations. This study focused on entrepreneurial and technician/mid-management level farming occupations.

## BACKGROUND FOR STUDY

Agricultural education has been a function performed by public higher education in this country for over a hundred years. Michigan pioneered the movement by establishing a college of agriculture at an institution, now known as Michigan State University, which was separated both geographically and philosophically from the states only major university at the time, less than twenty years after achieving statehood in 1837.

The purpose of the college of agriculture in Michigan was to upgrade the proficiency and the dignity of the work of the common man. Popularity of the agriculture school in Michigan was greatly enhanced when, in the late 1890's, it began offering less-than-degree level education in specialized phases of agriculture. In many states, land-grant institutions like Michigan State University also joined the "short course" movement.

Post-secondary, less-than-baccalaureate-degree level programs in agriculture have increased rapidly in numbers since passage of the Vocational Education Act of 1963 and the Vocational Education Amendments of 1968. Such programs are now offered around the county in over four hundred institutions. These institutions are predominantly separate two-year institutions such as community colleges and area vocational-technical schools. The role of land-grant institutions as primary sources of technical training in agricultural occupations at less-than-baccalaureate level has been a source of much debate.

Recently, a special admissions commission did reaffirm the role of the Michigan State University in providing "short course" training, "...because of tradition and the existence of unique resources."[1] The days of unquestioned public loyalty and tradition alone are passing. Economic affluence has been interrupted by inflation and high unemployment. Colleges and universities are having to make choices concerning their internal priorities and those of the societal framework within which they are fostered. While it is difficult for such institutions to delete services to traditional clientele groups, state-wide planning of post-secondary education being mandated across the country may take the decisions out of the hands of institutional administrators.

Sound investment of tax dollars in public higher education demands relevent educational programs and sufficient number of students. To be relevent, educational programs, for the work of the farm, must adapt to needs of the farms. Farms that will continue to offer opportunity for full-time employment and acceptable incomes for family living

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[1] Admissions and Student Body Composition (East Lansing: Michigan State University, 1971), p. 14.

are increasing in size. Such growth is expected to be accompanied by demand for specialization of labor and management within the farm, and subsequent demand for supplies of capable labor and management within the family or available from outside the farm family. The demand will compound the educational needs for young people who will enter farming occupations.

## OBJECTIVES

The objectives of the study were to determine occupational competencies that will be needed by persons who will enter farming occupations in the next five years. More specifically, the objectives were:

1. To determine occupational competencies needed by persons,
   (a) becoming established in farm businesses as entrepreneurs and those
   (b) entering technician/mid-management level farm employment.
2. To determine occupational competencies needed by persons becoming established in,
   (a) small farm businesses and
   (b) large farm businesses.
3. To determine occupational competencies needed by persons becoming established in,
   (a) livestock (including dairy) farming occupations and
   (b) crops (cash crop, grain, vegetable, or fruit) farming occupations.

# METHODOLOGY

Data for the study were collected by use of a mailed survey instrument in April and May, 1974.

## Survey Instrument

Fifty-four statements which had been developed specifically for the study were included in the questionnaire to obtain judgements about young farmer competency needs. These statements were divided into five functional groups: (1) agricultural mechanics, (2) farm management and economics, (3) crop production (including soil management), (4) livestock production, and (5) general (social-personal). The evaluative dimensions upon which adult farmers and professional agricultural educator judgements were used as the basis for the findings were: "Will performance in this competency area be necessary for persons becoming established in farming in the next five years?" and "Will performance in this competency area be needed by technician/mid-management level farm employees?". Young farmer responses were tabulated on their answers to the questions: "Have you performed in this competency area?" "Do you expect to in the future?" and "Do you feel you need additional training ...in this area?"

## Analysis

Values of chi-square were calculated by the CISSR (the Michigan State University Computer Institute for Social Science Research) library computer program designated as ACT on the MSU 6500 CDC computer. Significance testing at the .05 level provided the basis for accepting or rejecting the research hypotheses which were stated in the null form. The

special t test of population proportions and the Spearman Rank Order Correlations were also used to identify associations within the data.

The respondents were provided opportunities in the competency portion of the questionnaire to suggest additional competency areas or to write comments. The number of such responses was so small and diverse in type, that they were excluded from the findings of the study.

## Respondents

The respondents of the study included 88 adult farmers who averaged 47.6 years in age and of whom 70.2 percent were sole proprietors and 29.8 percent were in farm business partnerships. They operated farms that averaged 388 tillable acres in size and 38.5 percent had received some formal post-high school education. According to the dichotomies established for analysis of responses 59.1 percent of the adult farmers operated small farms; 40.9 percent operated large farms; 65.9 percent operated livestock farms; and 34.1 percent operated crops farms.

The 91 young farmers in the study represented the 77.8 percent of the graduates of the five years 1969-73, of the educational program for young farmers in the Institute of Agricultural Technology of Michigan State University, who were employed in farming occupations at the time of the study. Of these, 78.0 percent reported that their farming occupation was their primary source of employment. Of the total young farmers responding, 62.6 percent were in farm partnerships with their fathers and 15.8 percent were sole proprietors. According to the same definitions of size and type as used with adult farmers, 45.1 percent of the young farmers were involved in large farms, 54.9 percent in small farms, 64.8 percent in livestock farms and 35.2 percent in crops farms.

There were 45 professional agricultural educator respondents in the study. Of these, 16 were county directors of the Cooperative Extension Service and 29 were high school teachers of vocational agriculture. The average reported number of years of professional experience among this group was 17.3 years.

## SUMMARY OF THE FINDINGS

### Occupational Competencies

Young Farm Entrepreneurs. Twenty-four of the 54 competencies in the survey instrument were considered necessary for persons entering farm entrepreneurship by 95.0 percent or more of the adult farmers responding. Of these six were in agricultural mechanics, six were in farm management and economics, five were in crop production, three were in livestock production, and four were general competencies.

Twenty-seven competencies were rated necessary for all young farmers irregardless of farm type by at least sixty percent of the adult farmers. Nine competencies were specified for young livestock farmers by more than forty percent of each of the sub-groups of adult farmers (large, small, crops, livestock) and 23 competencies were identified as especially necessary for young crops farmers by twenty percent or more of at least one adult farmer sub-group.

In addition to to the 24 high need competencies there were 26 considered necessary by 60.0 to 94.9 percent of the adult farmers responding. Of these five were in agricultural mechanics, seven were in farm management, five were in crop production, six were in livestock production and three were general competencies. Two of the least needed (fewer than 50.0 percent affirmative) competencies were in agricultural

mechanics, one was in crop production and one was in livestock production.

Farm Workers. Seventeen of the competencies found very necessary (by 95.0 percent of adult farmers) for young farm entrepreneurs were also identified by more than 60.0 percent of the adult farmers as necessary for full-time technician/mid-management level farm workers. Only five competencies were considered necessary for all farm workers by more than 80.0 percent of the adult farmers responding. Of the seventeen competencies, six were in agricultural mechanics, three were in farm management, three were in crop production, two were in livestock production, and three were general competencies. Eight additional competencies identified by 60.0 percent of the adult farmers responding were among the less necessary (60.0 - 94.9 percent) young farm entrepreneur competencies.

## Hypotheses Tested

Five general hypotheses were posed about expected differences between, (1) adult farmers and educators in their perceptions of young farmer and farm worker competency needs, (2) adult farmer perceptions of young farmer competencies needed and young farmer recollection of experiences to date, (3) adult farmers who operate livestock and crops farms in their perceptions of young farmer competency needs, (4) adult farmers who operate small farms and large farms in their perceptions of young farmer competency needs, and (5) large, and small; livestock and crops farm influences on the experience, expectations and training needs of young farmers perceived by themselves. Research hypotheses, written in the null form, were derived from the general hypotheses that were posed. The purpose of testing the first four hypotheses was to deter-

mine the extent of agreement between the adult farmer opinions as a group and the various other sub-groups of respondents. The final hypothesis test was conducted to determine size and type of farm in which young farmers were involved was related to any differences in perceptions of competency needs of persons in positions similar to those being studied.

Adult Farmers vs. Agricultural Educators

Young Farm Entrepreneur. Significant differences between adult farmers and agricultural educators were found in their perceptions of young farm entrepreneur competency needs on fifteen competency areas. Thirteen of these had been perceived necessary by the adults. One of the thirteen was in agricultural mechanics, one was in farm management, one was in crop production, nine were in livestock production and one was a general competency. Only two of the competencies in which significant differences of opinion occurred had been judged necessary by more than 95.0 percent of the adult farmers. Educator responses were more frequently differentiated between the needs of all persons entering farming and those associated with farm type than were the responses of adult farmers.

The percentages of affirmative adult farmer responses about young farmer competency needs in each functional group were compared with similar figures from educator responses. Correlation coefficients of .93 on agricultural mechanics, .85 on farm management, .73 on crop production, .62 on livestock production and .77 on general competencies indicated considerable agreement.

Farm Worker. The number of affirmative responses by educators about farm worker competencies differed significantly with adult farmer responses on only three competencies about which at least 60.0 percent or

more of the adult farmers had indicated performance will be needed. One of the competencies was in agricultural mechanics; one was in farm management and; one was in crop production. Only 51.7 percent of the responses provided by educators indicated the need for all young farm operators and all farm workers to be able to perform the same competencies.

Adult Farmers vs. Young Farmers

In the comparison of adult farmer expectations about the competency needs of young farmers in the next five years and the recollections by young farmers becoming established in the last five years, there were significant differences on 30 of the 54 competencies. Only three of the thirty competencies had not been identified as necessary for young farmers by more than 60.0 percent of the adult farmers. Eleven of the competencies identified most often as important by adults (95.0 percent plus) were the 30.

Rank order coefficients of correlation of competencies according to percentage of adult farmer affirmative responses and the percentages of young farmers having performed them were: .96 on agricultural mechanics, .85 on farm management, .71 on crop production, .82 on livestock production, and .99 on general competencies. This indicates a high level of agreement in relative numbers of responses to items in each grouping. The high number of significant differences were accounted for in that more adult farmers felt the competencies would be needed in the future than were indicated by the reported experiences of young farmers to date.

Small vs. Large Farm Operators

Size of farms operated accounted for only one statistically significant difference within the adult farmer respondents as concerned

with young farmer competency needs. Size made a significant difference on only three farm worker competencies

Livestock vs. Crops Farm Operators

Young Farm Entrepreneurs. Farm type within the adult farmer group accounted for 32 out of the 33 competencies about which there were significantly different numbers of affirmative responses about young farmer competency needs. Fifteen of the 32 were considered necessary by 95.0 percent or more of all adult farmers. Eight of the 32 were competencies in agricultural mechanics, eleven were in farm management, one in crop production, five in livestock production and included all seven general competencies. Only two of the competencies had been evaluated affirmatively by fewer than 60.0 percent of all adult farmers. In general, crops farm operators as a group discriminated more often between the needs of all young farmers and the specific needs of persons entering crops farms than was true of the livestock farmers.

Farm Workers. Type of farm operated by the adult farmer was related to rejection of the null hypothesis, that there were no differences about farm worker competency needs, in 5 of 8 cases. Four of the five had been identified as necessary for farm workers by over sixty percent of the adult farmers as a group.

Young Farmer Performance, Expectations and Training Needs

Significant differences between the experience, the expectations of competency performance and training needs as perceived by young farmers themselves were accounted for 26 of the 27 times over the entire field of competencies on the basis of type of farm in which the respondents were involved. Only one significant difference was based on size of farm.

## CONCLUSIONS

The findings of this study have provided evidence that there will be a broad range of competence required of persons who enter farming occupations in the forseeable future. Persons who become entrepreneurs will require a considerably wider range of competencies, at the outset of their careers, than will persons entering technician/mid-management farm employment. Persons who enter farming occupations in the future are also likely to be required to perform in some competency areas not experienced by persons entering similar occupations in the recent past.

The findings show that agricultural educators tend to differentiate more often than adult farmers in their estimations of young farmer competency needs. Farm type, as defined by major enterprise, is much more important than farm size as a means for differentiating perceptions of competency needs of young farmers and farm workers.

While there may be differences in the level of experience of young farmers in performance of farming occupational competencies, as a group young farmers agree more closely with adult farmers on the relative merit of competencies than do educators. If it is assumed that educators are somewhat more oriented to the future than adult farmers, the direction of these differences is an important consideration in planning educational programs to accommodate these needs.

## IMPLICATIONS

This study was intended for use in policy-making and program development by institutions of public higher education in Michigan concerned with agricultural education. The study was focused toward the

study has identified many competencies that are perceived to be necessary for young farm entrepreneurs and technician level farm workers. To implement the competency-based educational concept it will become necessary to establish standards of achievement other than the "normal curve" traditionally used for assigning passing grades.

Higher education institutions need to provide effective pre-admission counseling to vocational programs. Potential students should be aware of the educational programs available, type of experiences that accompany successful completion of formal schooling and minimum job entry requirements. No institution can be all things to all people. All farming occupations require social-personal abilities, skill in mechanics and in farm management; most farming occupations also require competence in plant science and some require competence in animal science. It is essential that persons interested in these occupations become aware of these requirements and assess their ability to gain necessary competence.

Achievement of most of the competencies identified in this study means that the individual must gain practical experience as well as technical knowledge. The implication is that the institution providing occupational training must be able to simulate practical situations where competencies can be learned or provide opportunities for on-the-job experience. Such experience will need to be structured in such a way as to supplement the classroom experience and compliment previous training and background.

Advisory councils for vocational or technical education programs are mandated by law. Programs for farming occupations would normally involve persons in those occupations. In this study, county agents, high school vocational agriculture instructors, and young farmers

occupational competencies that will be needed by persons at the time they embark upon their careers in farming occupations. The findings of the study illustrate the expansive nature of those competencies.

It should not be presumed that all of the occupational competencies needed by young farmers can, or should, be provided for in a single educational institution. Any person who chooses a farming occupation, though, should be able to participate in an educational program that will lead him to a career in which he can be gainfully employed and find fulfillment. This may include career preparation at both high school and post-high school levels.

The need for articulation of educational programs provided by high schools and colleges for farming occupations is an important implication of this study. A person leaving the educational institution at any point should find himself equipped with at least a minimum level of competence in those areas necessary for gainful work. He should also recognize that additional education could increase his level of competence in these areas.

At the post-high school level, provision should be made for the persons whose occupational preparation is missing or inadequate compared with others who have had backgrounds which may have included vocational agriculture at the high school level. Some persons make delayed decisions about careers and will not have taken advantage of existing programs. This implies the need for pretesting and provision of alternative educational models for persons entering with varying levels of competency.

Competency-based educational programming is dependent upon satisfactory achievement of specified competencies by the learner. This

were in agreement much more often than not. Advisory councils for post-secondary programs could be composed of representatives of any of these four groups without much danger of being inadequately staffed. A better solution would be to include representatives of all these groups.

Farming occupations have diverse competency requirements. Opportunities should be provided for individuals to obtain the competencies, through courses of instruction or other experiences, needed to satisfy their specific needs. Type of farm and level of employment (entrepreneurship vs. technician-mid-management level farm employment) are the most important factors which differentiate competency needs. While educational programs may be designed to include some courses in agricultural mechanics, farm management, crop production, and communications to be required of all, there should be provision for specialized livestock and crop production courses that attend to the specific needs of persons entering these types of farms.

Young farmers recognize that they still have things to be learned, even after completion of technical programs like the one at Michigan State University. Young farmers in this study may have been saying that those needs were not currently being met by existing public service programs of the university or elsewhere. The final implication is that new programs should be developed to meet needs of persons who are fully employed and unable to participate in formal schooling at great distances which would require much time away from home.

## RECOMMENDATIONS FOR ADDITIONAL RESEARCH

From the discussion above, it becomes obvious that this research study, only scratched the surface. Additional investigation in the area educational needs of persons entering farming occupations could profitably focused on these tasks:

1. Additional analysis of the data collected in this study, refinement of the instrument on the dimensions "age or stage competency needed," "frequency of performance," and "proficiency required."

2. More intensive investigation of the differential needs of persons employed full-time on large farms of different farm types in positions commensurate with technician or mid-management positions in agri-business.

3. Identification of specific behaviors needed within each of the competency areas identified in this study.

4. Determination of which behaviors should best be included as the focus of courses within the formal-post-secondary technical training program setting and what provisions should be made to meet the continuing educational needs of persons in farming occupations during their early years of becoming established.

5. A study should be conducted to determine the impact that various types of formal post-secondary education institutions providing training for farming occupations are most profitable for persons concerned and most socially beneficial.

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# APPENDICES

# APPENDIX A

# AGRICULTURAL TECHNOLOGY ALUMNI ASSOCIATION BOARD OF DIRECTORS

# Agricultural Technology Alumni Association

## Board of Directors

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Kent City, Mich. 49330

# APPENDIX B

# INSTRUMENTATION: COVER LETTERS AND SURVEY INSTRUMENTS

COOPERATIVE EXTENSION SERVICE
MICHIGAN STATE UNIVERSITY and
U.S. DEPARTMENT OF AGRICULTURE COOPERATING

APPENDIX B

AGRICULTURAL ECONOMICS
AGRICULTURE HALL

EAST LANSING • MICHIGAN • 48824

April 1, 1974 Adult Farmer Cover Letter

Dear Telfarmer:

This is a request for your help in evaluating occupational competency areas within which young people should be able to perform if they plan to become established in farming in the next five years. The study is being conducted by Jim Gibson, faculty member in the Institute of Agricultural Technology. It will become the basis for updating the young farmer program offered by the Institute.

You are being asked to participate in this study because of your outstanding farming record. The accompanying questionnaire will take approximately thirty minutes of your time. Your assistance in this study is urgently needed.

Please return the completed questionnaire in the enclosed self-addressed envelope by April 12th. Thanking you in advance for your assistance.

Sincerely,

Leonard R. Kyle
Project Leader
Farm Management Extension

# APPENDIX B

## ADULT FARMER QUESTIONNAIRE

**Y O U N G  F A R M E R  R E S E A R C H  S T U D Y**

The Institute of Agricultural Technology is conducting a study to determine the competencies needed by persons who hope to get started in farming in the next five years.

You have been selected to participate in the study. Your help will be a valuable aid in providing a basis for improving the training program for young farmers at Michigan State University.

All personal information will be kept confidential.

Institute of Agricultural Technology
Michigan State University
East Lansing, Michigan

1974

A.

YOUNG FARMER RESEARCH STUDY

There are two parts to this questionnaire. Please answer all questions in terms of your particular type of farm operation. Please write in any additional comments you feel would be useful in this study.

PART I

Background Information

1. Name and address
   (please correct if in error
   on label)

2. Major Farm Enterprise _____

3. Scope: Total Tillable Acres# _____
   Head (in major enterprise _____

4. You age _____

5. Present County of Residence _____

6. Are you in a farming partnership? Yes _____ No _____

7. If yes, with whom?
   a. Relationship _____
   b. Name _____

8. If a father-son partnership, please describe the way you have worked out the division of responsibilities.

   _____

   _____

9. Do you employ full time farm workers? Yes _____ No _____

10. If yes, please describe the work assigned. _____

    _____

11. What is your educational background? (optional)

    _____ Less than high school diploma
    _____ High school diploma
    _____ Ag Tech (Short Course) at Michigan State
    _____ Other college (please describe) _____

A.

## PART II

## YOUNG FARMER COMPETENCIES

*INSTRUCTIONS*

The following pages contain statements which describe areas of performance about which your judgements are needed. Please evaluate these statements in terms of the performance required of young people who will be involved in the process of becoming established in the type of farming in which you, personally, are engaged, in the next five years.

Please write in the numbers identifying your response in the column and space following each competency statement.

Use the following key:

Column 1

Do you feel that performance in this area will be necessary of most young people who become established in farming in the next five years?

| | |
|---|---|
| 0 No | 2 Yes, livestock or dairy farms |
| 1 Yes | 3 Yes, crops farms (including speciality crops where applicable) |

Column 2

If yes, what will be the earliest stage of development that a young farmer normally will need to be able to perform this competency well?

1 By age 18. (by end of high school)
2 By age 20-22. ( by end of college age years)
3 By age 24-26. (middle of years of becoming established as full time farmer)
4 After age 26. (later stages of becoming established as fulltime farmer)

Column 3

How often will performance in this area be needed?

0 None
1 Occasionally (at irregular times during year)
2 Regularly (daily-weekly)
3 Seasonally (or annually)
4 Periodically (less often than annually)

Column 4

How proficient should the young farmer be in this competency area?

0 None
1 Minimal Proficiency (able to determine when to seek help)
2 Average Proficiency (able to perform with occasional supervision)
3 Very Proficient (able to perform very well, self-directed)

A.

Column 5

Should a person hired into a mid-management position (herdsman, field foreman, etc.) on your type of farm be able to perform well in this competency area?

0 No
1 Yes

Additional competency areas not listed you feel important may be written in at the end of each grouping.

SAMPLE RESPONSE

| | Col.1 Performance Necessary? key: 0 No, 1 Yes (all), 2 Yes (livestock - dairy), 3 Yes (crops) | Col.2 Earliest Age Prof. Needed key: 1 Age 18, 2 Age 20-22, 3 Age 24-26, 4 26 + | Col.3 How Often Performed key: 0 None, 1 Occasionally, 2 Regularly, 3 Seasonally, 4 Periodically | Col.4 How Proficient key: 0 No, 1 Minimal, 2 Average, 3 Very | Col 5 Needed by Employees -your type farm key: 0 No, 1 Yes |
|---|---|---|---|---|---|
| 1. Establish and/or maintain a farm shop or farm service center. | 1 | 1 | 2 | 3 | 1 |
| ... | | | | | |
| 16 Prepare farm and/or personal income taxes. | 1 | 2 | 3 | 2 | 1 |

(1) If you had marked the above as noted on the right, you would have indicated that all young farmers should be able to at least maintain a farm shop by the end of their high school years on a regular basis. They should be able to do it by themselves. Employees hired on to the farm should also be able to maintain a farm shop.

(16) If you had marked this answer as noted you would have been indicating that young farmers will need some proficiency in the area of income tax preparation by the ages of 20 to 22. This task will be performed seasonally (or annually) with occasional assistance. Employees should also be able to perform in this competency area.

YOUNG FARMER RESEARCH STUDY
PART II.
YOUNG FARMER COMPETENCIES

Agricultural Mechanics Competencies

| | Col.1 Performance Necessary? key: 0 No, 1 Yes (all), 2 Yes (livestock - dairy), 3 Yes (crops) | Col.2 Earliest Age Prof. Needed key: 1 Age 18, 2 Age 20-22, 3 Age 24-26, 4 26 + | Col.3 How Often Performed key: 0 None, 1 Occasionally, 2 Regularly, 3 Seasonally, 4 Periodically | Col.4 How Proficient key: 0 No, 1 Minimal, 2 Average, 3 Very | Col.5 Needed by Employees -your type farm key: 0 No, 1 Yes |
|---|---|---|---|---|---|
| 1. Establish and/or maintain a farm shop (or farm service center) | | | | | |
| 2. Perform shop skills at least to the extent necessary to repair minor breakage and wear on farm equipment. | | | | | |
| 3. Calibrate farm application equipment (sprayers, fertilizer spreaders, etc.) | | | | | |
| 4. Plan and conduct a coordinated program of mechanization of field and farmstead operations. | | | | | |
| 5. Operate and perform routine maintenance of both gasoline and diesel farm power units to obtain maximum efficiency and machine life. | | | | | |
| 6. Operate and perform routine maintenance on farm machinery to obtain maximum efficiency and machine life. | | | | | |
| 7. Perform major overhaul and/or structural repair of farm power units and/or farm machinery. | | | | | |
| 8. Utilize topographical farm maps for purposes of planning systems of drainage and/or erosion control. | | | | | |
| 9. Maintain surface and subsurface farm drainage systems. | | | | | |
| 10. Select, install, operate, and maintain farm crop irrigation systems. | | | | | |
| 11. Select, install, and maintain electrical motors, wiring, controls, outlets and lighting required in the farmstead. | | | | | |
| 12. Plan, construct, (and/or renovate) and maintain livestock housing and/or crop storage facilities. | | | | | |
| 13. Plan, operate, and maintain grain drying, waste and/or other farm materials handling systems. | | | | | |
| 14. Other (Please state) _____ | | | | | |

## Farm Management & Economics Competencies

15. Keep financial records for purposes of income tax reporting and business analysis.
16. Prepare farm and/or personal income taxes.
17. Participate in day-to-day decision-making and management of the farm.
18. Participate in long term planning of growth and development of the farm business.
19. Determine personal role in the farm business and evaluate opportunities for realization of occupational and personal goals.
20. Supervise the work of farm employees.
21. Establish farm operating and/or sales agreements (partnerships, loans, land purchases, etc.) with minimum of unnecessary professional legal assistance.
22. Determine the extent to which formal insurance may be used to protect farm equity, personal property, and family.
23. Procure farm supplies and services.
24. Forward contract sales of farm products.
25. Develop a system of orderly marketing of farm products that will maximize profits.
26. Select credit sources that will provide greatest long term security and flexibility at minimum cost.
27. Evaluate public economic and social policies and/or issues as they affect the costs and returns of farm production and participate in their solution.
28. Other (Please state) _____

| Col.1 | Col.2 | Col.3 | Col.4 | Col.5 |
|---|---|---|---|---|
| Performance Necessary?<br>key:<br>0 No<br>1 Yes (all)<br>2 Yes (livestock - dairy)<br>3 Yes (crops) | Earliest Age Prof. Needed<br>key:<br>1 Age 18<br>2 Age 20-22<br>3 Age 24-26<br>4 26 + | How Often Performed<br>key:<br>0 None<br>1 Occasionally<br>2 Regularly<br>3 Seasonally<br>4 Periodically | How Proficient<br>key:<br>0 No<br>1 Minimal<br>2 Average<br>3 Very | Needed by Employees -your type farm<br>key:<br>0 No<br>1 Yes |
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## Crop Production Competencies

29. Conduct crop production program (including fruits and vegetables, if applicable) that maximizes production profits.

30. Determine fertilizer requirements for crop production.

31. Identify common economic pests such as crop insects.

32. Select and conduct insect, weed, and disease control programs that will minimize losses and help maximize production profits.

33. Harvest, handle and store farm crops and/or produce to retain maximum crop quality and yield.

34. Merchandise specialized farm products (i.e. certified seed, truck crops, fruit, etc., where applicable).

35. Plan and conduct a soil management program to conserve topsoil and preserve or enhance its productivity.

36. Conduct soil management practices that are responsive to bacteriological activity and organic matter constituents of the soil.

37. Minimize waste of all recycleable farm products and supplies (manure, straw, etc.)

38. Identify and develop natural resources of the farm that may be used to benefit the farm and community.

39. Utilize weather information to plan daily and seasonal farming activities.

40. Other (Please state) _____

_____

| Col.1 | Col.2 | Col.3 | Col.4 | Col.5 |
|---|---|---|---|---|
| Performance Necessary?<br>key:<br>0 No<br>1 Yes (all)<br>2 Yes (livestock - dairy)<br>3 Yes (crops) | Earliest Age Prof. Needed<br>key:<br>1 Age 18<br>2 Age 20-22<br>3 Age 24-26<br>4 26 + | How Often Performed<br>key:<br>0 None<br>1 Occasionally<br>2 Regularly<br>3 Seasonally<br>4 Periodically | How Proficient<br>key:<br>0 No<br>1 Minimal<br>2 Average<br>3 Very | Needed by Employees -your type farm<br>key:<br>0 No<br>1 Yes |
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## Livestock and/or Dairy Production Competencies

| | Col.1 Performance Necessary? Key: 0 No, 1 Yes (all), 2 Yes (livestock - dairy), 3 Yes (crops) | Col.2 Earliest Age Prof. Needed Key: 1 Age 18, 2 Age 20-22, 3 Age 24-26, 4 26 + | Col.3 How Often Performed Key: 0 None, 1 Occasionally, 2 Regularly, 3 Seasonally, 4 Periodically | Col.4 How Proficient Key: 0 No, 1 Minimal, 2 Average, 3 Very | Col.5 Needed by Employees -your type farm Key: 0 No, 1 Yes |
|---|---|---|---|---|---|
| 41. Perform routine dairy and/or livestock (including poultry) related activities (milking, feeding, manure removal, egg gathering, etc.) | | | | | |
| 42. Feed and care for livestock (dairy and/or beef) in such a way as to maximize farm profits. | | | | | |
| 43. Select homegrown and/or purchased feeds which meet nutritional requirements of animals (for whatever purpose that applies: milk production, eggs, maintenance, fattening, etc.) | | | | | |
| 44. Identify common animal insects and diseases; Conduct animal health programs that will maximize utilization of genetic production capacity. | | | | | |
| 45. Perform certain veterinary-type herd health tasks ( such as calf pulling, intravascular injections, palpation for pregnancy, etc.) | | | | | |
| 46. Select and use detergents, disinfectants and etc. necessary for sanitation and disease prevention. | | | | | |
| 47. Design and conduct a breeding program that will lead to improved genetic capability for meat, and/or milk production. | | | | | |
| 48. Evaluate and select animals to join the herd or flock that meet the specifications of the market for the products of such animals. | | | | | |
| 49. Prepare and show animals in competition with other producers. | | | | | |
| 50. Maintain animal related production records for purposes of selection and/or sales of animals and/or animal products. | | | | | |
| 51. Other (Please state) _____ | | | | | |

_____

## General Competencies

52. Read sufficiently well to enable continued updating of technical competence.

53. Speak in public meetings and lead group discussions on topics related to welfare of farm people.

54. Write business letters and other communications necessary for the normal conduct of farm business.

55. Perform mathematic computations needed in determining measures of efficiency, farm accounts, etc. (with the aid of calculators and computers where necessary).

56. Identify key opinion leaders and decision-makers in farm related professions.

57. Participate in local government farm, and community organizations.

58. Develop the ability to enjoy and appreciate family, friends, non-farm people and other personal interests.

59. Other (please state) _____

_____

60. Other (please state) _____

_____

This questionnaire was filled out by:

[ ] farmer [ ] both
[ ] wife [ ] other; specify _____

*This is the end of the questionnaire. Please return in the accompanying envelope today.*

*Thanks again for your generous cooperation.*

| Col.1 | Col.2 | Col.3 | Col.4 | Col.5 |
|---|---|---|---|---|
| Performance Necessary?<br>key:<br>0 No<br>1 Yes (all)<br>2 Yes (livestock - dairy)<br>3 Yes (crops) | Earliest Age Prof. Needed<br>key:<br>1 Age 18<br>2 Age 20-22<br>3 Age 24-26<br>4 26 + | How Often Performed<br>key:<br>0 None<br>1 Occasionally<br>2 Regularly<br>3 Seasonally<br>4 Periodically | How Proficient<br>key:<br>0 No<br>1 Minimal<br>2 Average<br>3 Very | Needed by Employees -your type farm<br>key:<br>0 No<br>1 Yes |
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APPENDIX B

MICHIGAN STATE UNIVERSITY EAST LANSING • MICHIGAN 48823

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

INSTITUTE OF AGRICULTURAL TECHNOLOGY • AGRICULTURE HALL

March 29, 1974

Alumni Cover Letter

Dear Alumnus:

We are conducting a follow-up study of selected graduates of the Agricultural Production Program. This is part of a larger project to determine the areas of competency that will be needed by young farmers as they become established in farming or farm employment in the next five years.

Your help is needed to make this study valid. Please complete the enclosed questionnaire to the best of your ability and return it in the accompanying self-addressed envelope.

The questionnaire will probably take you no longer than 30 minutes to complete. Please return it before the crush of spring work begins and no later than April 19.

Thanking you in advance for your cooperation. I am looking forward to your response.

Sincerely,

James L. Gibson

James L Gibson
Secretary-Treasurer
Ag Tech Alumni Association

# APPENDIX B

## AGRICULTURAL TECHNOLOGY GRADUATE QUESTIONNAIRE

## Y O U N G  F A R M E R  R E S E A R C H  S T U D Y

The Institute of Agricultural Technology is conducting a study to determine the competencies needed by persons who hope to get started in farming in the next five years.

You have been selected to participate in the study. Your help will be a valuable aid in providing a basis for improving the training program for young farmers at Michigan State University.

All personal information will be kept confidential.

Institute of Agricultural Technology
Michigan State University
East Lansing, Michigan

1974

B.

YOUNG FARMER RESEARCH STUDY

There are two parts to this questionnaire. Please carefully consider and complete all items. Your response is essential to complete the study.

PART I

Background Information

1. Name and Address
   (please correct any errors on label)

2. Present county of residence _____

3. Year of graduation from "Ag Tech" _____

4. Marital status _____

5. Present employment (check and complete description)
   a. [ ] Farming part-time; Tillable acres# _____ Major Enterprise_____
      Head (major enterprise) _____
   b. [ ] Farming full-time; Tillable acres# _____ Major Enterprise_____
      Head (major enterprise) _____
   c. Farming Status:
      [ ] On own [ ] Partnership
      With. Whom? _____ Your share _____
   d. [ ] In school Name _____
   e. [ ] Military Branch_____Your title _____
   f. [ ] Employed by _____Your title _____

6. Net income level this past year: (optional)
   [ ] $0 - $5,000
   [ ] $5,001 - $10,000
   [ ] $10,001 - $15,000
   [ ] $15,001 - $20,000
   [ ] $ over $20,000

7. If not presently farming, would you say that your work is related to agriculture? [ ] yes [ ] no If yes, how? _____
   _____

8. Since completion of your "Ag Tech" program, what additional formal education have you had?
   a. [ ] none
   b. 1) school _____ dates of attendance(from)_____(to)_____
      major _____
      2) other _____

B.

9. What are your immediate educational and/or career plans? (please state)

_____

_____

10. How do you evaluate your Ag Tech experience in terms of your present occupation? (check one in each column)

[ ] Valuable asset
[ ] Useful
[ ] No value

[ ] Correct balance between technical and general courses
[ ] Should have had more technical courses

11. Are you generally satisfied with the direction your life has taken since graduation from Ag Tech?

[ ] Yes
[ ] No

Why? _____

_____

_____

NOTE: *If you are currently farming or performing farm work please continue with Part II. If not, stop here and return the entire questionnaire in the self-addressed postage paid envelope enclosed. Thank you again for your time.*

B.

## PART II

## YOUNG FARMER COMPETENCIES

*INSTRUCTIONS*

Please respond in this part of the study only if you are currently farming. Respond in terms of the areas of competence in which it is necessary for you or others in the same stage of becoming established in the same type of farming or farm work as you.

Write in the numbers identifying your response in the column and space following each competency statement. Use the following key.

Column 1.

Is this a competency area in which you have had to perform?

0 No
1 Yes

Column 2

Do you see the need to be able to perform in this area in the future?

0 No
1 Yes, regularly
2 Yes, in next 2 years
3 Yes, in next 5 years
4 Yes, in next 10 years

Column 3

How often do you perform or expect to perform in this competency area?

0 None
1 Occasionally (at irregular times during year)
2 Regularly (daily-weekly)
3 Seasonally (or annually)
4 Periodically (less often than annually)

Column 4

How well do you feel you are able to perform in this area?

0 Not at all
1 Minimal proficiency (able to determine when to seek help)
2 Somewhat proficient (able to perform with occasional help)
3 Very proficient (able to perform well, self-directed).

Column 5

Do you feel that you need additional training or experience in this area?

0 No
1 Yes

B.

SAMPLE RESPONSE

| | Col.1 Have Done? key: 0 No 1 Yes | Col.2 Do in Future key: 0 No 1 Yes, regularly 2 Yes, within 2 yrs 3 Yes, within 5 yrs 4 Yes, within 10 yrs | Col.3 How Often Performed key: 0 None 1 Occasionally 2 Regularly 3 Seasonally 4 Periodically | Col.4 How Proficient key: 0 No 1 Minimal 2 Somewhat 3 Very | Col.5 Need Training? key: 0 No 1 Yes |
|---|---|---|---|---|---|
| 1. Establish and/or maintain a farm shop or service center. | 1 | 2 | 2 | 2 | 1 |
| .... | | | | | |
| 16. Prepare farm and/or personal income taxes | 1 | 1 | 3 | 2 | 1 |

(1) If you had marked the above as noted to the right of the competency statement, you would have indicated that you have had to at least maintain a farm shop. You expect that you will need to perform this task regularly in the future but with occasional assistance from someone else in areas not yet familiar to you and that you do need some additional training or experience.

(16) If you had marked the responses in this example, you would have indicated that you have had at least some experience in income tax preparation and that you expect to do this regularly in the future, at least seasonally (or annually). Furthermore, you are able to perform this competency with just occasional assistance but do expect that additional training would be helpful.

YOUNG FARMER RESEARCH STUDY
PART II.
YOUNG FARMER COMPETENCIES

Agricultural Mechanics Competencies

| | Col.1<br>Have Done?<br>key:<br>0 No<br>1 Yes | Col.2<br>Do in Future<br>key:<br>0 No<br>1 Yes, regularly<br>2 Yes, within 2 yrs<br>3 Yes, within 5 yrs<br>4 Yes, within 10 yrs | Col.3<br>How Often Performed<br>key:<br>0 None<br>1 Occasionally<br>2 Regularly<br>3 Seasonally<br>4 Periodically | Col.4<br>How Proficient<br>key:<br>0 No<br>1 Minimal<br>2 Somewhat<br>3 Very | Col.5<br>Need Training?<br>key:<br>0 No<br>1 Yes |
|---|---|---|---|---|---|
| 1. Establish and/or maintain a farm shop (or farm service center) | | | | | |
| 2. Perform shop skills at least to the extent necessary to repair minor breakage and wear on farm equipment. | | | | | |
| 3. Calibrate farm application equipment (sprayers, fertilizer spreaders, etc.) | | | | | |
| 4. Plan and conduct a coordinated program of mechanization of field and farmstead operations. | | | | | |
| 5. Operate and perform routine maintenance of both gasoline and diesel farm power units to obtain maximum efficiency and machine life. | | | | | |
| 6. Operate and perform routine maintenance on farm machinery to obtain maximum efficiency and machine life. | | | | | |
| 7. Perform major overhaul and/or structural repair of farm power units and/or farm machinery. | | | | | |
| 8. Utilize topographical farm maps for purposes of planning systems of drainage and/or erosion control. | | | | | |
| 9. Maintain surface and subsurface farm drainage systems. | | | | | |
| 10. Select, install, operate, and maintain farm crop irrigation systems. | | | | | |
| 11. Select, install, and maintain electrical motors, wiring, controls, outlets and lighting required in the farmstead. | | | | | |
| 12. Plan, construct, (and/or renovate) and maintain livestock housing and/or crop storage facilities. | | | | | |
| 13. Plan, operate, and maintain grain drying, waste and/or other farm materials handling systems. | | | | | |
| 14. Other (Please state) _____ | | | | | |

## Farm Management & Economics Competencies

15. Keep financial records for purposes of income tax reporting and business analysis.
16. Prepare farm and/or personal income taxes.
17. Participate in day-to-day decision-making and management of the farm.
18. Participate in long term planning of growth and development of the farm business.
19. Determine personal role in the farm business and evaluate opportunities for realization of occupational and personal goals.
20. Supervise the work of farm employees.
21. Establish farm operating and/or sales agreements (partnerships, loans, land purchases, etc.) with minimum of unnecessary professional legal assistance.
22. Determine the extent to which formal insurance may be used to protect farm equity, personal property, and family.
23. Procure farm supplies and services.
24. Forward contract sales of farm products.
25. Develop a system of orderly marketing of farm products that will maximize profits.
26. Select credit sources that will provide greatest long term security and flexibility at minimum cost.
27. Evaluate public economic and social policies and/or issues as they affect the costs and returns of farm production and participate in their solution.
28. Other (Please state) _____

_____

| Col.1 Have Done? key: 0 No 1 Yes | Col.2 Do in Future key: 0 No 1 Yes, regularly 2 Yes, within 2 yrs 3 Yes, within 5 yrs 4 Yes, within 10 yrs | Col.3 How Often Performed key: 0 None 1 Occasionally 2 Regularly 3 Seasonally 4 Periodically | Col.4 How Proficient key: 0 No 1 Minimal 2 Somewhat 3 Very | Col.5 Need Training? key: 0 No 1 Yes |
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## Crop Production Competencies

29. Conduct crop production program (including fruits and vegetables, if) applicable) that maximizes production profits.

30. Determine fertilizer requirements for crop production.

31. Identify common economic pests such as crop insects.

32. Select and conduct insect, weed, and disease control programs that will minimize losses and help maximize production profits.

33. Harvest, handle and store farm crops and/or produce to retain maximum crop quality and yield.

34. Merchandise specialized farm products (i.e. certified seed, truck crops, fruit, etc., where applicable).

35. Plan and conduct a soil management program to conserve topsoil and preserve or enhance its productivity.

36. Conduct soil management practices that are responsive to bacteriological activity and organic matter constituents of the soil.

37. Minimize waste of all recycleable farm products and supplies (manure, straw, etc.)

38. Identify and develop natural resources of the farm that may be used to benefit the farm and community.

39. Utilize weather information to plan daily and seasonal farming activities.

40. Other (Please state) _____

_____

| Col.1 | Col.2 | Col.3 | Col.4 | Col.5 |
|---|---|---|---|---|
| Have Done?<br>key:<br>0 No<br>1 Yes | Do in Future<br>key:<br>0 No<br>1 Yes, regularly<br>2 Yes, within 2 yrs<br>3 Yes, within 5 yrs<br>4 Yes, within 10 yrs | How Often Performed<br>key:<br>0 None<br>1 Occasionally<br>2 Regularly<br>3 Seasonally<br>4 Periodically | How Proficient<br>key:<br>0 No<br>1 Minimal<br>2 Somewhat<br>3 Very | Need Training?<br>key:<br>0 No<br>1 Yes |
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## Livestock and/or Dairy Production Competencies

| | Col.1 Have Done? key: 0 No 1 Yes | Col.2 Do in Future key: 0 No 1 Yes, regularly 2 Yes, within 2 yrs 3 Yes, within 5 yrs 4 Yes, within 10 yrs | Col.3 How Often Performed key: 0 None 1 Occasionally 2 Regularly 3 Seasonally 4 Periodically | Col.4 How Proficient key: 0 No 1 Minimal 2 Somewhat 3 Very | Col.5 Need Training? key: 0 No 1 Yes |
|---|---|---|---|---|---|
| 41. Perform routine dairy and/or livestock (including poultry) related activities (milking, feeding, manure removal, egg gathering, etc.) | | | | | |
| 42. Feed and care for livestock (dairy and/or beef) in such a way as to maximize farm profits. | | | | | |
| 43. Select homegrown and/or purchased feeds which meet nutritional requirements of animals (for whatever purpose that applies: milk production, eggs, maintenance, fattening, etc.) | | | | | |
| 44. Identify common animal insects and diseases; Conduct animal health programs that will maximize utilization of genetic production capacity. | | | | | |
| 45. Perform certain veterinary-type herd health tasks ( such as calf pulling, intravascular injections, palpation for pregnancy, etc.) | | | | | |
| 46. Select and use detergents, disinfectants and etc. necessary for sanitation and disease prevention. | | | | | |
| 47. Design and conduct a breeding program that will lead to improved genetic capability for meat, and/or milk production. | | | | | |
| 48. Evaluate and select animals to join the herd or flock that meet the specifications of the market for the products of such animals. | | | | | |
| 49. Prepare and show animals in competition with other producers. | | | | | |
| 50. Maintain animal related production records for purposes of selection and/or sales of animals and/or animal products. | | | | | |
| 51. Other (Please state) _____ | | | | | |

## General Competencies

52. Read sufficiently well to enable continued updating of technical competence.

53. Speak in public meetings and lead group discussions on topics related to welfare of farm people.

54. Write business letters and other communications necessary for the normal conduct of farm business.

55. Perform mathematic computations needed in determining measures of efficiency, farm accounts, etc. (with the aid of calculators and computers where necessary).

56. Identify key opinion leaders and decision-makers in farm related professions.

57. Participate in local government farm, and community organizations.

58. Develop the ability to enjoy and appreciate family, friends, non-farm people and other personal interests.

59. Other (please state) _____

_____

60. Other (please state) _____

_____

This questionnaire was filled out by:

[ ] farmer [ ] both
[ ] wife [ ] other; specify _____

*This is the end of the questionnaire. Please return in the accompanying envelope today.*

*Thanks again for your generous cooperation.*

| Col.1<br>Have Done?<br>key:<br>0 No<br>1 Yes | Col.2<br>Do in Future<br>key:<br>0 No<br>1 Yes, regularly<br>2 Yes, within 2 yrs<br>3 Yes, within 5 yrs<br>4 Yes, within 10 yrs | Col.3<br>How Often Performed<br>key:<br>0 None<br>1 Occasionally<br>2 Regularly<br>3 Seasonally<br>4 Periodically | Col.4<br>How Proficient<br>key:<br>0 No<br>1 Minimal<br>2 Somewhat<br>3 Very | Col.5<br>Need Training?<br>key:<br>0 No<br>1 Yes |
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APPENDIX B

MICHIGAN STATE UNIVERSITY EAST LANSING • MICHIGAN 48823

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

INSTITUTE OF AGRICULTURAL TECHNOLOGY • AGRICULTURE HALL

April 1, 1974

Ag. Educator Cover Letter

Dear Vo Ag Instructor:

The Institute of Agricultural Technology is conducting a study to determine the occupational competency areas within which young people will have to perform when they become established in farming or technician or mid-management level farm employment. As a teacher of high school students, many of whom have become established in farming occupations over the years, you are in a unique position to evaluate these types of competency needs.

Selected Vo-Ag Teachers, County Agents, adult farmers and former students of the Agricultural Production Program from nineteen counties are being asked to assess the competencies listed in the enclosed questionnaire. From the data gathered, we hope to be in a better position to plan curriculum for those young people who come to Michigan State University for the eighteen month technical training program in Agricultural Production.

Please give us the help on this project that we need to develop a benchmark for programming in the future. Return the questionnaire in the pre-paid self-addressed envelope accompanying this material by April 12th.

Thanking you in advance for your most generous help.

Sincerely,

James L Gibson, Coordinator
Agricultural Production Program

# APPENDIX B

## AGRICULTURAL EDUCATOR QUESTIONNAIRE

Y O U N G  F A R M E R  R E S E A R C H  S T U D Y

The Institute of Agricultural Technology is conducting a study to determine the competencies needed by persons who hope to get started in farming in the next five years.

You have been selected to participate in the study. Your help will be a valuable aid in providing a basis for improving the training program for young farmers at Michigan State University.

All personal information will be kept confidential.

Institute of Agricultural Technology
Michigan State University
East Lansing, Michigan

1974

C.

YOUNG FARMER RESEARCH STUDY

The Institute of Agricultural Technology is conducting a study to determine the areas within which performance by young farmers will be necessary as they become established in farming or farm employment in the next five years. You are being asked to participate in this study because of your close association with young farmers.

There are two parts to this questionnaire. Please evaluate each item carefully and completely.

PART I

BACKGROUND INFORMATION

1. Name and address

2. County _____

3. Years of professional experience _____

4. Please indicate your perception of the performance of young farmers who have had some form of formal education beyond high school in comparison to those who had none.

(Please check box)

| | 3 Above Average | 2 Average | 1 Below Average | 0 No Opinion |
|---|---|---|---|---|
| a. Technical ability | | | | |
| b. Leadership in community affairs | | | | |
| c. Management ability | | | | |
| d. Interest in extension activities | | | | |
| e. Independent objective thinking | | | | |
| f. Knowledge of farm business procedures | | | | |

Please go on to PART II.

C.

## PART II

## YOUNG FARMER COMPETENCIES

*INSTRUCTIONS*

The following pages contain a list of statements describing areas of competence about which your judgement is needed. Please evaluate these statements in terms of the performance you perceive will be necessary for young people who enter farming and/or farm employment in your county in the next five years.

Please write in the numbers identifying your response in the column and space following each competency statement.

Use the following Key:

Column 1

Do you feel that performance in this area will be necessary of most young people who become established in farming in the next five years?

0 No
1 Yes-all
2 Yes, livestock or dairy farms
3 Yes, crops farms (including speciality crops where applicable)

Column 2

If yes, at what age or stage of development are young people most likely to be required to first perform this competency well?

1 By age 18 (end of high school)
2 By age 20-22 (end of college age years)
3 By age 24-26 (middle years of years of becoming established as fulltime farmer)
4 After age 26 (later stages of becoming established as fulltime farmer)

Column 3

How often will performance in this area be needed?

0 None
1 Occasionally (at irregular times during year)
2 Regularly (daily-weekly)
3 Seasonally (or annually)
4 Periodically (less often than annually)

Column 4

How proficient should young farmers be in these areas?

0 None
1 Minimal proficiency (able to determine when to seek help)
2 Average proficiency (able to perform with occasional assistance)
3 Very proficient (able to perform very well, self-directed)

C.

Column 5

Should persons hired into mid-management positions (herdsmen, field foreman, etc.) be able to perform well in this competency area?

0 No
1 Yes, all types of farms
2 Yes, livestock or dairy farms
3 Yes, crops farms (including specialty crops farms where applicable)

Additional competency areas not listed you feel important may be written in at the end of each grouping.

SAMPLE RESPONSE

| | Col.1 Performance Necessary? key: 0 No 1 Yes (all) 2 Yes (livestock - dairy) 3 Yes (crops) | Col.2 Earliest Age Prof. Needed key: 0 No age 1 Age 18 2 Age 20-22 3 Age 24-26 4 26 + | Col.3 How Often Performed key: 0 None 1 Occasionally 2 Regularly 3 Seasonally 4 Periodically | Col.4 How Proficient key: 0 No 1 Minimal 2 Average 3 Very | Col.5 Needed By Employee key: 0 No 1 Yes 2 Yes (livestock - dairy) 3 Yes (crops) |
|---|---|---|---|---|---|
| 1. Establish and/or maintain a farm shop or farm service center. | 1 | 1 | 2 | 3 | 1 |
| ... | | | | | |
| 16 Prepare farm and/or personal income taxes. | 1 | 2 | 3 | 2 | 1 |

(1) If you had marked the above as noted on the right, you would have indicated that all young farmers should be able to at least maintain a farm shop by the end of their high school years on a regular basis. They should be able to do it by themselves. Employees hired on to the farm should also be able to maintain a farm shop.

(16) If you had marked this answer as noted you would have been indicating that young farmers will need some proficiency in the area of income tax preparation by the ages of 20 to 22. This task will be performed seasonally (or annually) with occasional assistance. Employees should also be able to perform in this competency area.

YOUNG FARMER RESEARCH STUDY
PART II.
YOUNG FARMER COMPETENCIES

Agricultural Mechanics Competencies

| | Col.1 | Col.2 | Col.3 | Col.4 | Col.5 |
|---|---|---|---|---|---|
| | Performance Necessary?<br>key:<br>0 No<br>1 Yes (all)<br>2 Yes (livestock - dairy)<br>3 Yes (crops) | Earliest Age Prof. Needed<br>key:<br>0 No age<br>1 Age 18<br>2 Age 20-22<br>3 Age 24-26<br>4 26 + | How Often Performed<br>key:<br>0 None<br>1 Occasionally<br>2 Regularly<br>3 Seasonally<br>4 Periodically | How Proficient<br>key:<br>0 No<br>1 Minimal<br>2 Average<br>3 Very | Needed By Employee<br>key:<br>0 No<br>1 Yes<br>2 Yes (livestock - dairy)<br>3 Yes (crops) |
| 1. Establish and/or maintain a farm shop (or farm service center) | | | | | |
| 2. Perform shop skills at least to the extent necessary to repair minor breakage and wear on farm equipment. | | | | | |
| 3. Calibrate farm application equipment (sprayers, fertilizer spreaders, etc.) | | | | | |
| 4. Plan and conduct a coordinated program of mechanization of field and farmstead operations. | | | | | |
| 5. Operate and perform routine maintenance of both gasoline and diesel farm power units to obtain maximum efficiency and machine life. | | | | | |
| 6. Operate and perform routine maintenance on farm machinery to obtain maximum efficiency and machine life. | | | | | |
| 7. Perform major overhaul and/or structural repair of farm power units and/or farm machinery. | | | | | |
| 8. Utilize topographical farm maps for purposes of planning systems of drainage and/or erosion control. | | | | | |
| 9. Maintain surface and subsurface farm drainage systems. | | | | | |
| 10. Select, install, operate, and maintain farm crop irrigation systems. | | | | | |
| 11. Select, install, and maintain electrical motors, wiring, controls, outlets and lighting required in the farmstead. | | | | | |
| 12. Plan, construct, (and/or renovate) and maintain livestock housing and/or crop storage facilities. | | | | | |
| 13. Plan, operate, and maintain grain drying, waste and/or other farm materials handling systems. | | | | | |
| 14. Other (Please state) _____ | | | | | |

## Farm Management & Economics Competencies

| | Col.1 | Col.2 | Col.3 | Col.4 | Col.5 |
|---|---|---|---|---|---|
| | Performance Necessary? key: 0 No; 1 Yes (all); 2 Yes (livestock - dairy); 3 Yes (crops) | Earliest Age Prof. Needed key: 0 No age; 1 Age 18; 2 Age 20-22; 3 Age 24-26; 4 26 + | How Often Performed key: 0 None; 1 Occasionally; 2 Regularly; 3 Seasonally; 4 Periodically | How Proficient key: 0 No; 1 Minimal; 2 Average; 3 Very | Needed By Employee key: 0 No; 1 Yes; 2 Yes (livestock - dairy); 3 Yes (crops) |
| 15. Keep financial records for purposes of income tax reporting and business analysis. | | | | | |
| 16. Prepare farm and/or personal income taxes. | | | | | |
| 17. Participate in day-to-day decision-making and management of the farm. | | | | | |
| 18. Participate in long term planning of growth and development of the farm business. | | | | | |
| 19. Determine personal role in the farm business and evaluate opportunities for realization of occupational and personal goals. | | | | | |
| 20. Supervise the work of farm employees. | | | | | |
| 21. Establish farm operating and/or sales agreements (partnerships, loans, land purchases, etc.) with minimum of unnecessary professional legal assistance. | | | | | |
| 22. Determine the extent to which formal insurance may be used to protect farm equity, personal property, and family. | | | | | |
| 23. Procure farm supplies and services. | | | | | |
| 24. Forward contract sales of farm products. | | | | | |
| 25. Develop a system of orderly marketing of farm products that will maximize profits. | | | | | |
| 26. Select credit sources that will provide greatest long term security and flexibility at minimum cost. | | | | | |
| 27. Evaluate public economic and social policies and/or issues as they affect the costs and returns of farm production and participate in their solution. | | | | | |
| 28. Other (Please state) _____ | | | | | |

## Crop Production Competencies

| | Col.1 | Col.2 | Col.3 | Col.4 | Col.5 |
|---|---|---|---|---|---|
| | Performance Necessary? | Earliest Age Prof. Needed | How Often Performed | How Proficient | Needed By Employee |
| | key: | key: | key: | key: | key: |
| | 0 No<br>1 Yes (all)<br>2 Yes (livestock - dairy)<br>3 Yes (crops) | 0 No age<br>1 Age 18<br>2 Age 20-22<br>3 Age 24-26<br>4 26 + | 0 None<br>1 Occasionally<br>2 Regularly<br>3 Seasonally<br>4 Periodically | 0 No<br>1 Minimal<br>2 Average<br>3 Very | 0 No<br>1 Yes<br>2 Yes (livestock - dairy)<br>3 Yes (crops) |
| 29. Conduct crop production program (including fruits and vegetables, if) applicable) that maximizes production profits. | | | | | |
| 30. Determine fertilizer requirements for crop production. | | | | | |
| 31. Identify common economic pests such as crop insects. | | | | | |
| 32. Select and conduct insect, weed, and disease control programs that will minimize losses and help maximize production profits. | | | | | |
| 33. Harvest, handle and store farm crops and/or produce to retain maximum crop quality and yield. | | | | | |
| 34. Merchandise specialized farm products (i.e. certified seed, truck crops, fruit, etc., where applicable). | | | | | |
| 35. Plan and conduct a soil management program to conserve topsoil and preserve or enhance its productivity. | | | | | |
| 36. Conduct soil management practices that are responsive to bacteriological activity and organic matter constituents of the soil. | | | | | |
| 37. Minimize waste of all recycleable farm products and supplies (manure, straw, etc.) | | | | | |
| 38. Identify and develop natural resources of the farm that may be used to benefit the farm and community. | | | | | |
| 39. Utilize weather information to plan daily and seasonal farming activities. | | | | | |
| 40. Other (Please state) _____ | | | | | |

## Livestock and/or Dairy Production Competencies

| | Col.1 Performance Necessary? key: 0 No; 1 Yes (all); 2 Yes (livestock - dairy); 3 Yes (crops) | Col.2 Earliest Age Prof. Needed key: 0 No age; 1 Age 18; 2 Age 20-22; 3 Age 24-26; 4 26 + | Col.3 How Often Performed key: 0 None; 1 Occasionally; 2 Regularly; 3 Seasonally; 4 Periodically | Col.4 How Proficient key: 0 No; 1 Minimal; 2 Average; 3 Very | Col.5 Needed By Employee key: 0 No; 1 Yes; 2 Yes (livestock - dairy); 3 Yes (crops) |
|---|---|---|---|---|---|
| 41. Perform routine dairy and/or livestock (including poultry) related activities (milking, feeding, manure removal, egg gathering, etc.) | | | | | |
| 42. Feed and care for livestock (dairy and/or beef) in such a way as to maximize farm profits. | | | | | |
| 43. Select homegrown and/or purchased feeds which meet nutritional requirements of animals (for whatever purpose that applies: milk production, eggs, maintenance, fattening, etc.) | | | | | |
| 44. Identify common animal insects and diseases; Conduct animal health programs that will maximize utilization of genetic production capacity. | | | | | |
| 45. Perform certain veterinary-type herd health tasks ( such as calf pulling, intravascular injections, palpation for pregnancy, etc.) | | | | | |
| 46. Select and use detergents, disinfectants and etc. necessary for sanitation and disease prevention. | | | | | |
| 47. Design and conduct a breeding program that will lead to improved genetic capability for meat, and/or milk production. | | | | | |
| 48. Evaluate and select animals to join the herd or flock that meet the specifications of the market for the products of such animals. | | | | | |
| 49. Prepare and show animals in competition with other producers. | | | | | |
| 50. Maintain animal related production records for purposes of selection and/or sales of animals and/or animal products. | | | | | |
| 51. Other (Please state) _____ | | | | | |

_____

## General Competencies

52. Read sufficiently well to enable continued updating of technical competence.

53. Speak in public meetings and lead group discussions on topics related to welfare of farm people.

54. Write business letters and other communications necessary for the normal conduct of farm business.

55. Perform mathematic computations needed in determining measures of efficiency, farm accounts, etc. (with the aid of calculators and computers where necessary).

56. Identify key opinion leaders and decision-makers in farm related professions.

57. Participate in local government farm, and community organizations.

58. Develop the ability to enjoy and appreciate family, friends, non-farm people and other personal interests.

59. Other (please state) _____

_____

60. Other (please state) _____

_____

This questionnaire was filled out by:

[ ] farmer [ ] both
[ ] wife [ ] other; specify _____

*This is the end of the questionnaire. Please return in the accompanying envelope today.*

*Thanks again for your generous cooperation.*

| Col.1 | Col.2 | Col.3 | Col.4 | Col.5 |
|---|---|---|---|---|
| Performance Necessary?<br>key:<br>0 No<br>1 Yes (all)<br>2 Yes (livestock - dairy)<br>3 Yes (crops) | Earliest Age Prof. Needed<br>key:<br>0 No age<br>1 Age 18<br>2 Age 20-22<br>3 Age 24-26<br>4 26 + | How Often Performed<br>key:<br>0 None<br>1 Occasionally<br>2 Regularly<br>3 Seasonally<br>4 Periodically | How Proficient<br>key:<br>0 No<br>1 Minimal<br>2 Average<br>3 Very | Needed By Employee<br>key:<br>0 No<br>1 Yes<br>2 Yes (livestock - dairy)<br>3 Yes (crops) |
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APPENDIX B

MICHIGAN STATE UNIVERSITY EAST LANSING • MICHIGAN 48823

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

INSTITUTE OF AGRICULTURAL TECHNOLOGY • AGRICULTURE HALL

May 24, 1974 Alumni Association Board Follow-up Letter

To Board of Directors:

My data for the Young Farmer Research Study is about ready for analysis. At our April meeting the members of the board indicated a willingness to help test the reliability of the questionnaire I am using by filling out a second form and mailing it back at a later time.

Enclosed is a prepaid envelope and another questionnaire (if you didn't pick it up at the meeting). Please fill it out and return it as soon as possible.

Thank you very much.

Sincerely,

James L Gibson, Coordinator
Agricultural Production Program
Secretary/Treasurer Ag Tech Alumni Club

APPENDIX B

MICHIGAN STATE UNIVERSITY EAST LANSING • MICHIGAN 48823

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

INSTITUTE OF AGRICULTURAL TECHNOLOGY • AGRICULTURE HALL

Reminder

Mr. Richard Gilna
5160 Serr Road
Corunna, MI 48817

Dear Richard:

The Institute of Agricultural Technology is conducting a study to determine the occupational competency areas within which young farmers will be required to perform in the future as they become established. You are being asked to participate in this study as a member of a small but select group of farmers, educators, and "Ag Tech" graduates.

You may already have received an initial request for help with the study. If not, a copy of the questionnaire being used to gather information for the study is enclosed. We recognize that the rush of spring activity will increase from now on, so we ask that you spend the first available thirty minutes to record your evaluation of the items in the questionnaire.

Response to the study so far has been good. But, your judgements are needed and will be used. Please complete the questionnaire and mail it back in the post-paid envelope today!

Thank you in advance for your time and for sharing your expectations for the needs of future young farmers. If you did receive the earlier mailing and if you have already put the questionnaire in the mail, your help has been most appreciated.

Sincerely,

James L. Gibson, Coordinator
Agricultural Production Program

APPENDIX B

MICHIGAN STATE UNIVERSITY EAST LANSING • MICHIGAN 48823

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

INSTITUTE OF AGRICULTURAL TECHNOLOGY • AGRICULTURE HALL

Thank You Letter

Dear :

We have received the completed Young Farmer Research Study Questionnaire. The findings of this study are going to be very useful in providing new directions for the post-high school educational programs available to young farmers at Michigan State University. Thank you very much for taking time out of your busy schedule to respond.

Sincerely,

James L Gibson, Coordinator
Agricultural Production Program

# APPENDIX C

# NUMBERS OF AGRICULTURAL TECHNOLOGY GRADUATES FARMING AND NUMBERS OF RESPONDENTS IN STUDY BY COUNTY OF HOME RESIDENCE

Appendix Table 1

Respondent Population in Study by
County of Home Residence

| County | Adult Farmers | Young Farmers | Professional Educators | Total | Percent of Total |
|---|---|---|---|---|---|
| Allegan | 16 | 5 | 1 | 22 | 9.7 |
| Branch | 4 | 7 | 2 | 13 | 6.3 |
| Calhoun | 4 | 3 | 3 | 10 | 4.5 |
| Clinton | 5 | 2 | 1 | 8 | 3.6 |
| Eaton | 2 | 5 | 3 | 10 | 4.5 |
| Gratiot | 0 | 3 | 0 | 3 | 1.3 |
| Hillsdale | 5 | 10 | 4 | 19 | 8.5 |
| Huron | 6 | 9 | 5 | 20 | 8.8 |
| Ingham | 1 | 5 | 3 | 9 | 4.0 |
| Kent | 9 | 5 | 2 | 16 | 7.0 |
| Lenawee | 4 | 5 | 5 | 14 | 6.3 |
| Muskegon | 2 | 4 | 3 | 9 | 4.0 |
| Newaygo | 1 | 1 | 2 | 4 | 1.8 |
| Oakland | 2 | 3 | 2 | 7 | 3.1 |
| Oceana | 4 | 2 | 1 | 7 | 3.1 |
| Saginaw | 15 | 3 | 2 | 20 | 8.8 |
| Shiawasee | 2 | 8 | 3 | 13 | 5.8 |
| Washtenaw | 5 | 9 | 2 | 16 | 7.1 |
| Wayne | 1 | 2 | 1 | 4 | 1.8 |
| Total | 88 | 91 | 45 | 224 | 100.0 |

Appendix Table 2

Graduates of the Agricultural Production Program Engaged in Farming at the Time of the Study

| County | Total Graduates | Total Farming | Total in Study | Percent of Total Respondents |
|---|---|---|---|---|
| Allegan | 8 | 7 | 5 | 5.5 |
| Branch | 10 | 7 | 7 | 7.7 |
| Calhoun | 8 | 7 | 3 | 3.3 |
| Clinton | 3 | 3 | 2 | 2.2 |
| Eaton | 8 | 6 | 5 | 5.5 |
| Gratiot | 4 | 4 | 3 | 3.3 |
| Hillsdale | 13 | 13 | 10 | 10.9 |
| Huron | 9 | 9 | 9 | 9.9 |
| Ingham | 8 | 7 | 5 | 5.5 |
| Kent | 9 | 8 | 6 | 5.5 |
| Lenawee | 7 | 6 | 5 | 5.5 |
| Muskegon | 4 | 4 | 4 | 4.4 |
| Newaygo | 1 | 1 | 1 | 1.1 |
| Oakland | 4 | 3 | 3 | 3.3 |
| Oceana | 3 | 2 | 2 | 2.2 |
| Saginaw | 8 | 8 | 3 | 3.3 |
| Shiawassee | 10 | 9 | 8 | 8.8 |
| Washtenaw | 10 | 9 | 9 | 9.9 |
| Wayne | 3 | 3 | 2 | 2.2 |
| | 130 | 117 | 91* | 100.0 |
| Percent | 100.0 | 90.0 | 68.4 | |

[*Percent Farming In Study.....77.8]

# APPENDIX D

# SUPPORTING TABLES

Appendix Table 3

Young Farmer Competency Needs Perceived by Adult Farmers and Professional Agricultural Educators

| Competency | Farmers | | | | Professionals | | | | $X^2$ |
|---|---|---|---|---|---|---|---|---|---|
| | N | % ALL | % LVSTK | % CPS | N | % ALL | % LVSTK | % CPS | |
| 1. | 87 | 82.8 | 5.8 | 6.9 | 45 | 97.8 | 0.0 | 0.0 | 6.89[b] |
| 2. | 87 | 89.7 | 5.8 | 4.6 | 45 | 100.0 | 0.0 | 0.0 | 4.99[b] |
| 3. | 87 | 80.5 | 4.6 | 13.8 | 45 | 77.8 | 0.0 | 22.2 | 3.88 |
| 4. | 82 | 78.1 | 7.3 | 11.0 | 45 | 95.6 | 0.0 | 4.4 | 7.43[b] |
| 5. | 87 | 88.5 | 3.5 | 5.8 | 45 | 93.3 | 2.2 | 4.4 | 1.35 |
| 6. | 87 | 88.5 | 4.6 | 6.9 | 45 | 95.6 | 0.0 | 4.4 | 2.53 |
| 7. | 84 | 29.8 | 2.4 | 3.6 | 45 | 26.7 | 0.0 | 6.7 | 1.80 |
| 8. | 84 | 44.1 | 4.8 | 17.9 | 45 | 44.4 | 0.0 | 26.7 | 3.41 |
| 9. | 85 | 63.5 | 3.5 | 15.3 | 45 | 77.8 | 0.0 | 20.0 | 8.53[c] |
| 10. | 79 | 25.3 | 1.3 | 17.7 | 43 | 20.9 | 2.3 | 55.8 | 21.14[c] |
| 11. | 87 | 64.4 | 6.9 | 4.6 | 45 | 75.6 | 2.2 | 0.0 | 3.88 |
| 12. | 84 | 66.7 | 8.3 | 8.3 | 45 | 73.3 | 11.1 | 4.4 | 1.68 |
| 13. | 83 | 69.9 | 4.8 | 9.6 | 44 | 77.3 | 2.3 | 13.6 | 2.89 |
| 14. | open ended - not tested | | | | | | | | |
| 15. | 88 | 87.5 | 3.4 | 6.8 | 45 | 100.0 | 0.0 | 0.0 | 6.13[a] |
| 16. | 88 | 69.3 | 2.3 | 4.6 | 44 | 79.6 | 0.0 | 0.0 | 3.57 |
| 17. | 87 | 90.8 | 3.5 | 5.7 | 45 | 100.0 | 0.0 | 0.0 | 4.41[a] |
| 18. | 88 | 85.2 | 3.4 | 6.8 | 45 | 100.0 | 0.0 | 0.0 | 7.37[b] |
| 19. | 81 | 85.2 | 4.9 | 6.2 | 43 | 97.7 | 0.0 | 0.0 | 5.43[a] |
| 20. | 86 | 76.7 | 3.5 | 2.3 | 45 | 93.3 | 0.0 | 0.0 | 6.10[a] |
| 21. | 85 | 76.5 | 2.4 | 4.7 | 44 | 93.2 | 0.0 | 0.0 | 6.14[a] |
| 22. | 84 | 83.3 | 3.6 | 3.6 | 45 | 93.3 | 2.2 | 0.0 | 3.09 |
| 23. | 87 | 88.5 | 2.3 | 5.8 | 45 | 97.8 | 2.2 | 0.0 | 4.42[a] |
| 24. | 83 | 51.8 | 2.4 | 13.3 | 42 | 73.8 | 2.4 | 14.3 | 8.25[c] |
| 25. | 85 | 77.7 | 2.4 | 8.2 | 45 | 97.8 | 0.0 | 2.2 | 9.49[c] |
| 26. | 85 | 85.9 | 3.5 | 4.7 | 45 | 100.0 | 0.0 | 0.0 | 6.99[b] |
| 27. | 82 | 76.8 | 4.9 | 4.9 | 45 | 93.3 | 4.4 | 2.3 | 6.55[b] |
| 28. | open ended - not tested | | | | | | | | |
| 29. | 87 | 60.9 | 4.6 | 32.2 | 45 | 71.1 | 0.0 | 28.9 | 3.69 |

Appendix Table 3 (continued)

| Competency | Farmers | | | | Professionals | | | | $X^2$ |
|---|---|---|---|---|---|---|---|---|---|
| | N | % ALL | % LVSTK | % CPS | N | % ALL | % LVSTK | % CPS | |
| 30. | 88 | 64.8 | 4.6 | 23.9 | 45 | 73.3 | 0.0 | 26.7 | 5.53[a] |
| 31. | 86 | 65.1 | 4.7 | 26.7 | 44 | 77.3 | 0.0 | 22.7 | 4.39[a] |
| 32. | 88 | 67.1 | 4.6 | 25.0 | 45 | 80.0 | 0.0 | 20.0 | 4.60[a] |
| 33. | 88 | 68.2 | 4.6 | 27.3 | 45 | 71.1 | 0.0 | 26.7 | 4.04 |
| 34. | 78 | 37.2 | 0.0 | 19.2 | 45 | 48.9 | 0.0 | 42.2 | 21.07[c] |
| 35. | 87 | 60.9 | 6.9 | 25.3 | 45 | 80.0 | 0.0 | 17.8 | 6.66[b] |
| 36. | 84 | 54.8 | 6.0 | 25.0 | 44 | 75.0 | 0.0 | 20.5 | 7.30[c] |
| 37. | 85 | 68.2 | 8.2 | 15.3 | 44 | 90.9 | 2.3 | 2.3 | 8.72[c] |
| 38. | 82 | 70.7 | 3.7 | 13.4 | 44 | 86.4 | 2.3 | 2.3 | 5.07[a] |
| 39. | 86 | 74.4 | 5.8 | 18.6 | 43 | 90.7 | 0.0 | 9.3 | 5.55[a] |
| 40. | open ended - not tested | | | | | | | | |
| 41. | 69 | 44.9 | 50.7 | 0.0 | 44 | 18.2 | 77.3 | 4.6 | 13.72[c] |
| 42. | 67 | 41.8 | 53.7 | 0.0 | 44 | 15.9 | 79.6 | 4.6 | 13.43[c] |
| 43. | 68 | 38.2 | 54.4 | 0.0 | 44 | 15.9 | 79.6 | 4.6 | 13.47[c] |
| 44. | 67 | 40.3 | 55.2 | 0.0 | 44 | 18.2 | 77.3 | 4.6 | 11.15[c] |
| 45. | 67 | 34.3 | 55.2 | 0.0 | 44 | 11.4 | 72.7 | 4.6 | 11.48[c] |
| 46. | 68 | 42.7 | 50.0 | 1.5 | 44 | 20.5 | 72.7 | 4.6 | 7.94[c] |
| 47. | 68 | 29.4 | 52.9 | 0.0 | 44 | 11.3 | 84.1 | 4.6 | 18.73[c] |
| 48. | 68 | 33.8 | 48.5 | 0.0 | 44 | 11.4 | 81.8 | 4.6 | 18.73[c] |
| 49. | 67 | 16.4 | 29.9 | 0.0 | 43 | 4.7 | 41.9 | 0.0 | 4.16[a] |
| 50. | 67 | 32.8 | 52.2 | 0.0 | 41 | 14.6 | 78.1 | 4.9 | 13.14[c] |
| 51. | open ended - not tested | | | | | | | | |
| 52. | 87 | 88.5 | 4.6 | 5.8 | 44 | 100.0 | 0.0 | 0.0 | 5.48[a] |
| 53. | 87 | 64.4 | 3.5 | 5.8 | 44 | 86.4 | 0.0 | 0.0 | 8.18[c] |
| 54. | 87 | 83.9 | 3.5 | 4.6 | 44 | 97.7 | 0.0 | 0.0 | 5.77[a] |
| 55. | 87 | 86.2 | 3.5 | 5.8 | 44 | 100.0 | 0.0 | 0.0 | 6.68[b] |
| 56. | 82 | 72.0 | 3.7 | 7.3 | 44 | 90.9 | 0.0 | 0.0 | 7.42[b] |
| 57. | 87 | 85.1 | 3.5 | 5.8 | 44 | 90.9 | 0.0 | 0.0 | 4.64[a] |
| 58. | 87 | 90.8 | 3.5 | 5.8 | 43 | 97.7 | 0.0 | 0.0 | 6.12[a] |

[a]Significant at .25 level

[b]Significant at .10 level

[c]Significant at .05 level

Appendix Table 4

Performance Needed by Technician/Mid-management Level Farm Employees as Perceived by Adult Farmers and Professional Agricultural Educators

| | Adult Farmer | | Professional | | |
|---|---|---|---|---|---|
| Competency | N | %-Yes | N | %-Yes | t |
| 1. | 86 | 81.4 | 45 | 86.6 | .77 |
| 2. | 85 | 92.9 | 45 | 100.0 | 2.93[c] |
| 3. | 83 | 86.8 | 45 | 95.6 | 1.69[b] |
| 4. | 79 | 57.0 | 44 | 59.1 | .23 |
| 5. | 83 | 89.2 | 45 | 95.6 | 1.30[a] |
| 6. | 83 | 92.7 | 45 | 97.8 | 1.32[a] |
| 7. | 59 | 28.8 | 37 | 29.7 | .15 |
| 8. | 67 | 35.8 | 42 | 26.2 | 1.17 |
| 9. | 75 | 58.7 | 45 | 80.0 | 2.49[c] |
| 10. | 55 | 38.2 | 42 | 57.2 | 1.78[c] |
| 11. | 70 | 67.1 | 43 | 72.1 | .56 |
| 12. | 72 | 65.3 | 44 | 56.8 | .91 |
| 13. | 71 | 66.2 | 43 | 72.1 | .72 |
| 14. | | open ended - not tested | | | |
| 15. | 82 | 53.7 | 45 | 48.9 | .52 |
| 16. | 68 | 51.5 | 43 | 46.5 | .51 |
| 17. | 84 | 75.0 | 45 | 84.4 | 1.27 |
| 18. | 79 | 53.2 | 45 | 53.3 | .01 |
| 19. | 74 | 66.2 | 42 | 85.7 | 2.48[c] |
| 20. | 71 | 53.5 | 43 | 51.2 | .24 |
| 21. | 70 | 32.9 | 43 | 30.2 | .30 |
| 22. | 75 | 44.0 | 44 | 61.4 | 1.85[b] |
| 23. | 82 | 68.3 | 44 | 79.6 | 1.37[a] |
| 24. | 64 | 26.6 | 41 | 45.2 | 1.94[b] |
| 25. | 74 | 43.2 | 45 | 42.2 | .11 |
| 26. | 78 | 36.5 | 45 | 35.6 | .10 |
| 27. | 72 | 47.2 | 45 | 57.8 | 1.10 |
| 28. | | open ended - not tested | | | |
| 29. | 82 | 57.3 | 45 | 66.7 | 1.01 |

Appendix Table 4 (continued)

| Competency | Adult Farmer N | Adult Farmer %-Yes | Professional N | Professional %-Yes | t |
|---|---|---|---|---|---|
| 30. | 80 | 56.3 | 45 | 73.4 | 1.93[b] |
| 31. | 79 | 72.2 | 44 | 93.2 | 3.10[c] |
| 32. | 82 | 58.5 | 44 | 72.8 | 1.73[b] |
| 33. | 84 | 81.0 | 45 | 91.1 | 1.59[a] |
| 34. | 50 | 32.0 | 44 | 56.8 | 2.44[c] |
| 35. | 78 | 59.0 | 45 | 66.6 | .84 |
| 36. | 72 | 55.6 | 44 | 65.9 | .82 |
| 37. | 77 | 75.3 | 44 | 79.5 | .53 |
| 38. | 69 | 55.1 | 42 | 61.9 | .70 |
| 39. | 80 | 80.0 | 43 | 81.4 | .19 |
| 40. | | open ended - not tested | | | |
| 41. | 62 | 95.2 | 44 | 97.8 | .73 |
| 42. | 60 | 93.3 | 44 | 97.7 | 1.10 |
| 43. | 61 | 70.5 | 44 | 75.0 | .51 |
| 44. | 61 | 83.6 | 44 | 90.9 | 1.12 |
| 45. | 57 | 82.5 | 43 | 75.0 | .91 |
| 46. | 62 | 82.3 | 44 | 84.1 | .24[a] |
| 47. | 55 | 56.3 | 44 | 69.1 | 1.30[a] |
| 48. | 56 | 55.3 | 43 | 55.8 | .05 |
| 49. | 39 | 53.9 | 37 | 42.2 | 1.02[a] |
| 50. | 56 | 57.1 | 41 | 72.0 | 1.52[a] |
| 51. | | open ended - not tested | | | |
| 52. | 82 | 84.2 | 44 | 94.5 | 1.84[b] |
| 53. | 67 | 44.8 | 41 | 53.7 | .90 |
| 54. | 77 | 52.0 | 43 | 60.5 | .91[b] |
| 55. | 79 | 60.8 | 44 | 77.3 | 1.91[b] |
| 56. | 66 | 50.0 | 41 | 58.5 | .86 |
| 57. | 78 | 64.1 | 43 | 65.1 | .11[b] |
| 58. | 80 | 90.0 | 43 | 97.7 | 1.79[b] |

[a]Significant at .20 level

[b]Significant at .10 level

[c]Significant at .05 level

Appendix Table 5

Adult Farmer Perception of Performance Needed-Next Five Years v.s. Young Farmer Performance To Date

| | Adult Farmer | | Young Farmer | | |
|---|---|---|---|---|---|
| Competency | N | % | N | % | t |
| 1. | 87 | 95.4 | 87 | 86.7 | 2.07[c] |
| 2. | 87 | 100.0 | 88 | 97.7 | 2.01[c] |
| 3. | 87 | 96.3 | 87 | 94.2 | 1.76[b] |
| 4. | 82 | 98.9 | 85 | 67.1 | 9.89[c] |
| 5. | 87 | 97.7 | 87 | 94.3 | 1.17 |
| 6. | 87 | 100.0 | 87 | 97.7 | 2.00[c] |
| 7. | 84 | 35.8 | 87 | 49.4 | 18.15[c] |
| 8. | 84 | 66.8 | 87 | 32.2 | 4.71[c] |
| 9. | 85 | 82.3 | 87 | 76.7 | 1.08 |
| 10. | 79 | 44.3 | 86 | 6.9 | 5.96[c] |
| 11. | 87 | 75.9 | 88 | 79.5 | .83 |
| 12. | 84 | 83.3 | 87 | 81.6 | .29 |
| 13. | 83 | 84.3 | 84 | 66.7 | 2.69[c] |
| 14. | | open ended - not tested | | | |
| 15. | 88 | 97.7 | 87 | 82.8 | 3.64[c] |
| 16. | 88 | 76.2 | 87 | 55.2 | 3.34[c] |
| 17. | 87 | 100.0 | 88 | 98.9 | 1.39[a] |
| 18. | 88 | 95.5 | 87 | 92.0 | .97 |
| 19. | 79 | 96.3 | 83 | 92.8 | .99 |
| 20. | 81 | 82.6 | 88 | 72.7 | 1.85[b] |
| 21. | 85 | 83.5 | 88 | 73.9 | 1.55[a] |
| 22. | 84 | 92.0 | 88 | 63.6 | 4.73[c] |
| 23. | 87 | 96.5 | 84 | 95.2 | .40 |
| 24. | 83 | 67.5 | 86 | 50.0 | 2.32[c] |
| 25. | 85 | 88.2 | 88 | 59.1 | 4.51[c] |
| 26. | 85 | 95.0 | 88 | 61.4 | 5.85[c] |
| 27. | 82 | 86.6 | 88 | 63.6 | 3.56[c] |
| 28. | | open ended - not tested | | | |
| 29. | 87 | 97.7 | 88 | 88.6 | 2.53[c] |

Appendix Table 5 (continued)

| Competency | Adult Farmer N | Adult Farmer % | Young Farmer N | Young Farmer % | t |
|---|---|---|---|---|---|
| 30. | 88 | 93.3 | 87 | 86.2 | 1.54 |
| 31. | 86 | 96.5 | 85 | 81.2 | 3.41[c] |
| 32. | 88 | 96.7 | 87 | 83.9 | 2.99[c] |
| 33. | 88 | 100.0 | 89 | 98.9 | 1.40[a] |
| 34. | 78 | 56.4 | 82 | 29.3 | 3.51[c] |
| 35. | 87 | 93.1 | 86 | 79.1 | 2.75[c] |
| 36. | 84 | 85.8 | 85 | 76.5 | 1.54[a] |
| 37. | 85 | 91.7 | 88 | 90.9 | 1.17 |
| 38. | 82 | 87.8 | 83 | 44.6 | 6.10[c] |
| 39. | 86 | 98.8 | 84 | 94.1 | 1.76[b] |
| 40. | | open ended - not tested | | | |
| 41. | 69 | 95.6 | 81 | 95.1 | .14 |
| 42. | 67 | 95.5 | 80 | 91.3 | 1.03 |
| 43. | 68 | 92.6 | 81 | 81.5 | 1.81[b] |
| 44. | 67 | 95.5 | 80 | 82.5 | 2.63[c] |
| 45. | 67 | 89.5 | 80 | 92.3 | 1.29[a] |
| 46. | 68 | 94.1 | 80 | 76.3 | 3.19[c] |
| 47. | 68 | 82.3 | 79 | 60.8 | 2.90[c] |
| 48. | 68 | 82.3 | 79 | 72.2 | 1.46[a] |
| 49. | 67 | 46.3 | 79 | 38.0 | 1.00 |
| 50. | 67 | 85.1 | 78 | 66.7 | 2.63[c] |
| 51. | | open ended - not tested | | | |
| 52. | 87 | 98.9 | 88 | 93.2 | 2.04[c] |
| 53. | 87 | 73.9 | 87 | 41.4 | 4.36[c] |
| 54. | 87 | 91.7 | 88 | 76.1 | 2.94[c] |
| 55. | 87 | 95.4 | 87 | 86.2 | 2.17[c] |
| 56. | 82 | 83.0 | 83 | 72.3 | 1.65[b] |
| 57. | 87 | 97.4 | 85 | 61.2 | 4.27[c] |
| 58. | 87 | 100.0 | 87 | 98.2 | 1.77[b] |

[a]Significant at .20 level

[b]Significant at .10 level

[c]Significant at .05 level

Appendix Table 6

Young Farmer Competency Needs Perceived by
Adult Farmers Who Operate
Small and Large Farms

| Competency | Small Farm | | | | Large Farm | | | | $X^2$ |
|---|---|---|---|---|---|---|---|---|---|
| | N | % ALL | % LVSTK | % CPS | N | % ALL | % LVSTK | % CPS | |
| 1. | 51 | 86.3 | 3.9 | 3.9 | 36 | 77.8 | 8.3 | 11.1 | 2.92 |
| 2. | 51 | 94.1 | 3.9 | 2.0 | 36 | 83.3 | 8.3 | 8.4 | 2.85[a] |
| 3. | 51 | 86.3 | 0.0 | 13.7 | 36 | 72.2 | 11.1 | 13.9 | 7.60[b] |
| 4. | 49 | 83.7 | 4.1 | 8.2 | 33 | 69.7 | 12.1 | 15.2 | 3.17 |
| 5. | 51 | 94.1 | 2.0 | 3.9 | 36 | 80.6 | 5.6 | 8.3 | 4.78[a] |
| 6. | 51 | 92.1 | 2.0 | 5.9 | 36 | 83.3 | 8.3 | 8.4 | 2.23 |
| 7. | 49 | 30.6 | 0.0 | 2.0 | 35 | 28.6 | 5.7 | 5.7 | 3.77 |
| 8. | 50 | 46.0 | 4.0 | 20.0 | 34 | 41.2 | 5.9 | 14.7 | .99 |
| 9. | 50 | 68.0 | 2.0 | 14.0 | 35 | 57.1 | 5.7 | 17.1 | 1.51 |
| 10. | 48 | 22.9 | 2.1 | 12.5 | 31 | 29.0 | 0.0 | 25.8 | 3.82 |
| 11. | 51 | 72.6 | 3.9 | 2.0 | 36 | 52.8 | 11.1 | 8.3 | 5.06[a] |
| 12. | 50 | 72.0 | 4.0 | 6.0 | 34 | 58.8 | 14.7 | 11.7 | 4.25[a] |
| 13. | 48 | 77.1 | 2.1 | 6.3 | 35 | 60.0 | 8.6 | 14.3 | 4.05 |
| 14. | open ended - not tested | | | | | | | | |
| 15. | 52 | 94.2 | 0.0 | 3.9 | 36 | 78.8 | 8.3 | 11.1 | 6.71[b] |
| 16. | 52 | 80.8 | 0.0 | 1.9 | 36 | 52.8 | 5.6 | 8.3 | 9.51[c] |
| 17. | 52 | 94.2 | 1.9 | 3.9 | 35 | 85.7 | 5.7 | 8.6 | 1.85 |
| 18. | 52 | 86.5 | 1.9 | 5.8 | 36 | 83.3 | 5.6 | 8.3 | 1.47 |
| 19. | 48 | 91.7 | 4.2 | 2.1 | 33 | 75.8 | 6.1 | 12.1 | 4.75[a] |
| 20. | 52 | 76.9 | 1.9 | 0.0 | 34 | 76.5 | 5.9 | 5.9 | 5.02[a] |
| 21. | 51 | 80.4 | 0.0 | 3.9 | 34 | 70.6 | 5.9 | 5.9 | 3.47 |
| 22. | 50 | 86.0 | 2.0 | 0.0 | 34 | 79.4 | 5.9 | 8.8 | 6.17[a] |
| 23. | 51 | 94.1 | 0.0 | 2.0 | 36 | 80.6 | 5.6 | 11.1 | 6.43[b] |
| 24. | 50 | 54.0 | 2.0 | 6.0 | 33 | 48.5 | 3.0 | 24.2 | 6.35[b] |
| 25. | 51 | 82.4 | 2.0 | 3.9 | 34 | 70.6 | 2.9 | 14.7 | 3.33 |
| 26. | 51 | 92.2 | 2.0 | 2.0 | 34 | 76.5 | 5.9 | 8.8 | 4.35[a] |
| 27. | 49 | 83.7 | 4.1 | 0.0 | 33 | 66.7 | 6.1 | 12.1 | 6.96[b] |
| 28. | open ended - not tested | | | | | | | | |
| 29. | 52 | 69.2 | 1.9 | 26.9 | 35 | 48.6 | 8.6 | 40.0 | 4.67[a] |

Appendix Table 6 (continued)

| Competency | Small Farm N | Small Farm % ALL | Small Farm % LVSTK | Small Farm % CPS | Large Farm N | Large Farm % ALL | Large Farm % LVSTK | Large Farm % CPS | $X^2$ |
|---|---|---|---|---|---|---|---|---|---|
| 30. | 52 | 69.2 | 1.9 | 21.2 | 36 | 58.3 | 8.3 | 27.8 | 2.85 |
| 31. | 50 | 70.0 | 2.0 | 24.0 | 36 | 58.3 | 8.3 | 30.6 | 2.67 |
| 32. | 52 | 73.1 | 1.9 | 23.1 | 36 | 58.3 | 8.3 | 27.8 | 3.62 |
| 33. | 52 | 75.0 | 1.9 | 23.1 | 36 | 58.3 | 8.3 | 33.3 | 3.61 |
| 34. | 48 | 37.5 | 0.0 | 20.8 | 30 | 36.7 | 0.0 | 16.7 | .28 |
| 35. | 51 | 68.6 | 2.0 | 21.6 | 36 | 50.0 | 13.9 | 30.6 | 6.39[b] |
| 36. | 50 | 58.0 | 2.0 | 24.0 | 34 | 50.0 | 11.8 | 26.5 | 3.78 |
| 37. | 51 | 74.5 | 3.9 | 13.7 | 34 | 58.8 | 14.7 | 17.7 | 3.85 |
| 38. | 50 | 78.0 | 2.0 | 10.0 | 32 | 59.4 | 6.3 | 18.8 | 3.54 |
| 39. | 50 | 80.0 | 2.0 | 18.0 | 36 | 66.7 | 11.1 | 19.4 | 4.90[a] |
| 40. | | | open ended - not tested | | | | | | |
| 41. | 42 | 45.2 | 52.4 | 0.0 | 27 | 44.4 | 48.2 | 0.0 | 1.02 |
| 42. | 41 | 41.5 | 56.1 | 0.0 | 26 | 42.3 | 50.0 | 0.0 | 1.09 |
| 43. | 42 | 38.1 | 57.1 | 0.0 | 26 | 38.5 | 50.0 | 0.0 | 1.15 |
| 44. | 42 | 42.9 | 54.8 | 0.0 | 25 | 36.0 | 56.0 | 0.0 | 1.29 |
| 45. | 42 | 38.1 | 54.8 | 0.0 | 25 | 28.0 | 56.0 | 0.0 | 1.65 |
| 46. | 42 | 45.3 | 47.6 | 2.4 | 26 | 38.5 | 53.9 | 0.0 | 1.15 |
| 47. | 42 | 28.6 | 57.1 | 0.0 | 26 | 30.8 | 46.2 | 0.0 | 1.10 |
| 48. | 42 | 33.3 | 50.0 | 0.0 | 26 | 34.6 | 46.2 | 0.0 | .12 |
| 49. | 42 | 14.3 | 35.7 | 0.0 | 25 | 20.0 | 20.0 | 0.0 | 1.90 |
| 50. | 42 | 30.9 | 57.1 | 0.0 | 25 | 36.0 | 44.0 | 0.0 | 1.33 |
| 51. | | | open ended - not tested | | | | | | |
| 52. | 51 | 92.2 | 2.0 | 3.9 | 36 | 83.3 | 8.3 | 8.3 | 3.47 |
| 53. | 51 | 60.8 | 2.0 | 5.9 | 36 | 69.4 | 5.6 | 5.6 | 2.18 |
| 54. | 51 | 88.2 | 2.0 | 3.9 | 36 | 77.8 | 5.6 | 5.6 | 1.91 |
| 55. | 51 | 88.2 | 2.0 | 3.9 | 36 | 83.3 | 5.6 | 8.3 | 2.01 |
| 56. | 49 | 79.6 | 2.0 | 4.1 | 33 | 60.6 | 6.1 | 12.1 | 4.16[a] |
| 57. | 51 | 90.2 | 2.0 | 3.9 | 36 | 77.8 | 5.6 | 8.3 | 2.60 |
| 58. | 51 | 94.1 | 2.0 | 3.9 | 36 | 86.1 | 5.6 | 8.3 | 1.66 |

[a]Significant at .25 level

[b]Significant at .10 level

[c]Significant at .05 level

Appendix Table 7

Farm Worker Competency Needs Perceived by
Adult Farmers Who Operate
Small and Large Farms

| | Small | | Large | | |
|---|---|---|---|---|---|
| Competency | N | % | N | % | $X^2$ |
| 1. | 50 | 78.0 | 36 | 86.1 | .91 |
| 2. | 51 | 90.2 | 34 | 97.1 | 1.46[a] |
| 3. | 49 | 79.6 | 34 | 97.1 | 5.33[c] |
| 4. | 47 | 53.2 | 32 | 62.5 | .67 |
| 5. | 50 | 86.0 | 33 | 93.9 | 1.30 |
| 6. | 49 | 89.8 | 34 | 97.1 | 1.58[a] |
| 7. | 37 | 27.0 | 22 | 31.8 | .15 |
| 8. | 42 | 28.7 | 25 | 48.0 | 2.57[a] |
| 9. | 47 | 46.8 | 28 | 78.6 | 7.30[b] |
| 10. | 34 | 32.4 | 21 | 47.6 | 1.28 |
| 11. | 44 | 65.9 | 26 | 69.2 | .08 |
| 12. | 44 | 54.6 | 28 | 82.1 | 5.75[c] |
| 13. | 42 | 59.5 | 29 | 75.9 | 2.05[a] |
| 14. | | open ended - not tested | | | |
| 15. | 49 | 59.2 | 33 | 45.5 | 1.50[a] |
| 16. | 44 | 52.3 | 24 | 50.0 | .03 |
| 17. | 50 | 70.0 | 34 | 82.4 | 1.65[a] |
| 18. | 46 | 52.2 | 33 | 54.6 | .04 |
| 19. | 45 | 62.2 | 29 | 72.4 | .82 |
| 20. | 42 | 50.0 | 29 | 28.6 | .51 |
| 21. | 44 | 36.4 | 26 | 26.9 | .66 |
| 22. | 44 | 47.7 | 31 | 38.7 | .60 |
| 23. | 49 | 69.4 | 33 | 66.7 | .07 |
| 24. | 35 | 28.6 | 29 | 24.1 | .16 |
| 25. | 44 | 50.0 | 30 | 33.3 | 2.02[a] |
| 26. | 48 | 39.6 | 30 | 36.7 | .07 |
| 27. | 45 | 40.0 | 27 | 59.3 | 2.51[a] |
| 28. | | open ended - not tested | | | |
| 29. | 49 | 55.1 | 33 | 60.6 | .24 |

Appendix Table 7 (continued)

| Competency | Small N | Small % | Large N | Large % | $X^2$ |
|---|---|---|---|---|---|
| 30. | 47 | 53.2 | 33 | 60.6 | .43 |
| 31. | 46 | 67.4 | 33 | 78.8 | 1.24 |
| 32. | 49 | 55.1 | 33 | 63.6 | .59 |
| 33. | 50 | 78.0 | 34 | 85.3 | .70 |
| 34. | 30 | 33.0 | 20 | 30.0 | .06 |
| 35. | 46 | 56.5 | 32 | 62.5 | .28 |
| 36. | 41 | 51.2 | 31 | 61.3 | .73 |
| 37. | 46 | 71.7 | 31 | 80.7 | .79 |
| 38. | 43 | 48.8 | 26 | 65.4 | 1.79[a] |
| 39. | 47 | 78.7 | 33 | 81.8 | .12 |
| 40. | open ended - not tested | | | | |
| 41. | 39 | 94.9 | 23 | 95.6 | .02 |
| 42. | 38 | 94.7 | 22 | 90.9 | .33 |
| 43. | 38 | 71.1 | 23 | 69.6 | .02 |
| 44. | 39 | 82.1 | 22 | 86.4 | .19 |
| 45. | 36 | 77.8 | 21 | 90.5 | 1.48[a] |
| 46. | 39 | 76.9 | 23 | 91.3 | 2.05[a] |
| 47. | 36 | 47.2 | 19 | 68.4 | 2.52[a] |
| 48. | 35 | 48.6 | 21 | 61.9 | 3.07[b] |
| 49. | 26 | 61.5 | 13 | 38.5 | 1.86[a] |
| 50. | 37 | 54.1 | 19 | 63.2 | .43 |
| 51. | open ended - not tested | | | | |
| 52. | 48 | 77.1 | 34 | 94.1 | 4.33[c] |
| 53. | 40 | 42.5 | 27 | 48.2 | .21 |
| 54. | 47 | 55.3 | 30 | 46.7 | .55 |
| 55. | 47 | 61.7 | 32 | 59.4 | .04 |
| 56. | 41 | 51.2 | 25 | 48.0 | .06 |
| 57. | 47 | 59.6 | 31 | 71.0 | 1.05 |
| 58. | 48 | 85.4 | 32 | 96.9 | 2.80[b] |

[a]Significant at .25 level

[b]Significant at .10 level

[c]Significant at .05 level

## Appendix Table 8

Young Farmer Competency Needs Perceived by Adult Livestock and Crop Farmers

| Competency | Livestock Farmers | | | | Crop Farmers | | | | $X^2$ |
|---|---|---|---|---|---|---|---|---|---|
| | N | % ALL | % LVSTK | % CPS | N | % ALL | % LVSTK | % CPS | |
| 1. | 57 | 84.2 | 7.0 | 1.8 | 30 | 80.0 | 3.3 | 16.7 | 8.95[c] |
| 2. | 57 | 93.0 | 7.0 | 0.0 | 30 | 83.3 | 3.3 | 13.4 | 8.27[c] |
| 3. | 57 | 86.0 | 3.5 | 8.8 | 30 | 70.0 | 6.7 | 23.3 | 4.60[a] |
| 4. | 54 | 81.5 | 9.3 | 3.7 | 28 | 71.4 | 3.6 | 25.0 | 10.23[c] |
| 5. | 57 | 93.0 | 5.3 | 0.0 | 30 | 80.0 | 0.0 | 16.7 | 11.67[c] |
| 6. | 57 | 94.7 | 5.3 | 0.0 | 30 | 76.7 | 3.3 | 20.0 | 12.28[c] |
| 7. | 56 | 28.7 | 3.6 | 1.8 | 28 | 32.1 | 0.0 | 7.1 | 2.66 |
| 8. | 55 | 41.8 | 7.3 | 20.0 | 29 | 48.3 | 0.0 | 13.8 | 2.98 |
| 9. | 56 | 66.1 | 5.4 | 16.1 | 29 | 58.6 | 0.0 | 13.8 | 4.25[a] |
| 10. | 50 | 12.0 | 2.0 | 16.0 | 29 | 48.3 | 0.0 | 20.7 | 15.35[c] |
| 11. | 57 | 63.2 | 10.5 | 0.0 | 30 | 66.7 | 0.0 | 13.3 | 11.12[c] |
| 12. | 57 | 73.7 | 12.3 | 1.8 | 27 | 51.4 | 0.0 | 22.2 | 15.88[c] |
| 13. | 56 | 75.0 | 7.1 | 3.6 | 27 | 59.3 | 0.0 | 22.2 | 9.36[c] |
| 14. | open ended - not tested | | | | | | | | |
| 15. | 58 | 93.1 | 5.2 | 0.0 | 30 | 76.7 | 0.0 | 20.0 | 13.99[c] |
| 16. | 58 | 75.9 | 3.5 | 0.0 | 30 | 56.7 | 0.0 | 13.3 | 10.54[c] |
| 17. | 58 | 94.8 | 5.2 | 0.0 | 29 | 82.8 | 0.0 | 17.2 | 11.81[c] |
| 18. | 58 | 89.7 | 5.2 | 0.0 | 30 | 76.7 | 0.0 | 20.0 | 13.69[c] |
| 19. | 55 | 89.1 | 7.3 | 0.0 | 26 | 76.9 | 0.0 | 19.2 | 12.78[c] |
| 20. | 56 | 75.0 | 3.6 | 0.0 | 30 | 80.0 | 3.3 | 6.7 | 5.26[a] |
| 21. | 56 | 80.4 | 3.6 | 0.0 | 29 | 69.0 | 0.0 | 13.8 | 9.10[c] |
| 22. | 55 | 85.5 | 5.5 | 0.0 | 29 | 79.3 | 0.0 | 10.3 | 7.39[b] |
| 23. | 57 | 91.2 | 3.5 | 0.0 | 30 | 83.3 | 0.0 | 16.7 | 12.27[c] |
| 24. | 56 | 51.8 | 3.6 | 5.4 | 27 | 51.9 | 0.0 | 29.6 | 11.48[c] |
| 25. | 56 | 80.4 | 3.6 | 1.8 | 29 | 72.4 | 0.0 | 20.7 | 10.37[c] |
| 26. | 56 | 91.1 | 5.4 | 0.0 | 29 | 75.9 | 0.0 | 13.8 | 11.28[c] |
| 27. | 54 | 75.9 | 7.4 | 0.0 | 28 | 78.6 | 0.0 | 14.3 | 11.05[c] |
| 28. | open ended - not tested | | | | | | | | |
| 29. | 58 | 62.1 | 6.9 | 29.3 | 29 | 58.6 | 0.0 | 37.9 | 2.73 |

Appendix Table 8 (continued)

| Competency | Livestock Farmers | | | | Crop Farmers | | | | $X^2$ |
|---|---|---|---|---|---|---|---|---|---|
| | N | % ALL | % LVSTK | % CPS | N | % ALL | % LVSTK | % CPS | |
| 30. | 58 | 62.1 | 6.9 | 22.4 | 30 | 70.0 | 0.0 | 26.7 | 3.22 |
| 31. | 56 | 62.5 | 7.1 | 26.8 | 30 | 70.0 | 0.0 | 26.7 | 2.32 |
| 32. | 58 | 67.2 | 6.9 | 22.4 | 30 | 66.7 | 0.0 | 30.0 | 2.53 |
| 33. | 58 | 69.0 | 6.9 | 24.1 | 30 | 66.7 | 0.0 | 33.3 | 2.70 |
| 34. | 51 | 27.5 | 0.0 | 17.7 | 27 | 55.6 | 0.0 | 22.2 | 8.27[c] |
| 35. | 57 | 59.7 | 8.8 | 22.8 | 30 | 63.3 | 3.3 | 30.0 | 2.13 |
| 36. | 55 | 54.6 | 7.3 | 21.8 | 29 | 55.2 | 3.5 | 31.0 | 1.60 |
| 37. | 56 | 71.4 | 12.5 | 10.7 | 29 | 62.1 | 0.0 | 24.1 | 7.77[b] |
| 38. | 54 | 72.2 | 5.6 | 9.3 | 28 | 67.9 | 0.0 | 21.4 | 3.72 |
| 39. | 56 | 76.8 | 8.9 | 14.3 | 30 | 70.0 | 0.0 | 26.7 | 6.28[b] |
| 40. | open ended - not tested | | | | | | | | |
| 41. | 58 | 46.6 | 53.5 | 0.0 | 11 | 36.4 | 36.4 | 0.0 | 16.56[c] |
| 42. | 56 | 42.9 | 57.1 | 0.0 | 11 | 36.4 | 36.4 | 0.0 | 16.10[c] |
| 43. | 58 | 39.7 | 56.9 | 0.0 | 10 | 30.0 | 40.0 | 0.0 | 8.83[c] |
| 44. | 57 | 42.1 | 57.9 | 0.0 | 10 | 30.0 | 40.0 | 0.0 | 17.90[c] |
| 45. | 57 | 36.8 | 57.9 | 0.0 | 10 | 20.0 | 40.0 | 0.0 | 11.02[c] |
| 46. | 58 | 44.8 | 51.7 | 1.7 | 10 | 30.0 | 40.0 | 0.0 | 12.44[b] |
| 47. | 57 | 29.8 | 56.1 | 0.0 | 11 | 27.3 | 36.4 | 0.0 | 3.31[a] |
| 48. | 57 | 35.1 | 50.9 | 0.0 | 11 | 27.3 | 36.4 | 0.0 | 3.17[a] |
| 49. | 56 | 16.1 | 28.6 | 0.0 | 11 | 18.2 | 36.4 | 0.0 | .38 |
| 50. | 57 | 35.1 | 54.4 | 0.0 | 10 | 20.0 | 40.0 | 0.0 | 5.88[b] |
| 51. | open ended - not tested | | | | | | | | |
| 52. | 57 | 91.2 | 7.0 | 0.0 | 30 | 83.3 | 0.0 | 16.7 | 12.27[c] |
| 53. | 57 | 64.9 | 5.3 | 0.0 | 30 | 63.3 | 0.0 | 16.7 | 11.80[c] |
| 54. | 57 | 86.0 | 5.3 | 0.0 | 30 | 80.0 | 0.0 | 13.3 | 9.37[c] |
| 55. | 57 | 91.2 | 5.3 | 0.0 | 30 | 76.7 | 0.0 | 16.7 | 11.99[c] |
| 56. | 54 | 72.2 | 5.6 | 0.0 | 28 | 71.4 | 0.0 | 21.4 | 15.58[c] |
| 57. | 57 | 87.7 | 5.3 | 0.0 | 30 | 80.0 | 0.0 | 16.7 | 11.68[c] |
| 58. | 57 | 94.7 | 5.3 | 0.0 | 30 | 83.3 | 0.0 | 16.7 | 11.36[c] |

[a]Significant at .25 level

[b]Significant at .10 level

[c]Significant at .05 level

## Appendix Table 9

### Farm Worker Competency Needs Perceived by Adult Livestock and Crop Farmers

| Competency | Livestock | | Crops | | $X^2$ |
|---|---|---|---|---|---|
| | N | % | N | % | |
| 1. | 56 | 82.1 | 30 | 80.0 | .07 |
| 2. | 56 | 94.6 | 29 | 89.7 | .72 |
| 3. | 56 | 83.9 | 27 | 92.6 | 1.19 |
| 4. | 52 | 57.7 | 27 | 55.6 | .03 |
| 5. | 56 | 87.5 | 27 | 92.6 | .49 |
| 6. | 55 | 92.7 | 28 | 92.9 | .00 |
| 7. | 40 | 27.5 | 19 | 31.6 | .10 |
| 8. | 48 | 33.3 | 19 | 42.1 | .46 |
| 9. | 52 | 57.7 | 23 | 60.9 | .07 |
| 10. | 35 | 14.3 | 20 | 80.0 | 23.30[c] |
| 11. | 44 | 70.5 | 26 | 61.5 | .59 |
| 12. | 51 | 64.7 | 21 | 66.7 | .03 |
| 13. | 49 | 75.5 | 22 | 45.5 | 6.13[c] |
| 14. | | open ended - not tested | | | |
| 15. | 55 | 60.0 | 27 | 40.7 | 2.70[a] |
| 16. | 46 | 58.7 | 22 | 36.4 | 2.97[b] |
| 17. | 56 | 76.8 | 28 | 71.4 | .29 |
| 18. | 53 | 56.6 | 26 | 46.2 | .77 |
| 19. | 50 | 78.0 | 24 | 41.7 | 9.57[c] |
| 20. | 46 | 52.2 | 25 | 56.0 | .10 |
| 21. | 47 | 36.2 | 23 | 26.1 | .71 |
| 22. | 51 | 49.0 | 24 | 33.3 | 1.63[a] |
| 23. | 54 | 70.4 | 28 | 64.3 | .32 |
| 24. | 42 | 31.0 | 22 | 18.2 | 1.21 |
| 25. | 47 | 46.8 | 27 | 37.0 | .67 |
| 26. | 53 | 39.6 | 25 | 36.0 | .09 |
| 27. | 47 | 48.9 | 25 | 44.0 | .16 |
| 28. | | open ended - not tested | | | |
| 29. | 55 | 63.6 | 27 | 44.4 | 2.73[b] |

Appendix Table 9 (continued)

| Competency | Livestock N | Livestock % | Crops N | Crops % | $X^2$ |
|---|---|---|---|---|---|
| 30. | 53 | 54.7 | 27 | 59.3 | .15 |
| 31. | 52 | 71.2 | 27 | 74.1 | .08 |
| 32. | 55 | 58.2 | 27 | 59.3 | .01 |
| 33. | 56 | 82.1 | 28 | 78.6 | .15 |
| 34. | 29 | 24.1 | 21 | 42.9 | 1.96[a] |
| 35. | 51 | 58.8 | 27 | 59.3 | .00 |
| 36. | 46 | 54.4 | 26 | 57.7 | .08 |
| 37. | 53 | 79.3 | 24 | 66.7 | 1.41[a] |
| 38. | 46 | 52.2 | 23 | 60.9 | .47 |
| 39. | 54 | 79.6 | 26 | 80.8 | .01 |
| 40. | open ended - not tested | | | | |
| 41. | 56 | 98.2 | 6 | 66.7 | 11.71[c] |
| 42. | 54 | 96.3 | 6 | 66.7 | 7.62[c] |
| 43. | 55 | 72.7 | 6 | 50.0 | 1.34[a] |
| 44. | 55 | 85.5 | 6 | 66.7 | 1.39[a] |
| 45. | 52 | 84.6 | 5 | 60.0 | 1.91[a] |
| 46. | 56 | 83.9 | 6 | 66.7 | 1.11 |
| 47. | 50 | 56.0 | 5 | 40.0 | .65 |
| 48. | 51 | 56.9 | 5 | 20.0 | 2.79[b] |
| 49. | 34 | 58.9 | 5 | 20.0 | 2.64[b] |
| 50. | 51 | 60.8 | 5 | 20.0 | 3.09[b] |
| 51. | open ended - not tested | | | | |
| 52. | 54 | 85.2 | 28 | 82.1 | .13 |
| 53. | 43 | 44.2 | 24 | 45.8 | .02 |
| 54. | 51 | 54.9 | 26 | 46.2 | .53 |
| 55. | 52 | 65.4 | 27 | 51.9 | 1.37[a] |
| 56. | 42 | 50.0 | 24 | 50.0 | .00 |
| 57. | 51 | 68.6 | 27 | 55.6 | 1.31 |
| 58. | 52 | 90.4 | 28 | 89.3 | .02 |

[a]Significant at .25 level

[b]Significant at .10 level

[c]Significant at .05 level

## Appendix Table 10

Performance, Expectations and Training Needs Perceived by Young Farmers by Size of Farm Entered

| | Have Performed | | | | | Expectations | | | | | Training Needed | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Small | | Large | | | Small | | Large | | | Small | | Large | | |
| Competency | N | %-Yes | N | %-Yes | $X^2$ | N | %-Yes | N | %-Yes | $X^2$ | N | %-Yes | N | %-Yes | $X^2$ |
| 1. | 48 | 83.3 | 39 | 79.5 | .21 | 47 | 97.9 | 39 | 92.3 | 4.36[a] | 47 | 76.6 | 37 | 67.6 | .85 |
| 2. | 48 | 100.0 | 40 | 95.0 | 2.46[a] | 48 | 100.0 | 40 | 100.0 | 3.25[a] | 48 | 62.5 | 40 | 72.5 | .99 |
| 3. | 48 | 93.8 | 39 | 94.9 | .05 | 47 | 97.9 | 39 | 92.3 | 1.94 | 48 | 41.7 | 39 | 41.0 | .00 |
| 4. | 46 | 65.2 | 39 | 69.2 | .15 | 46 | 91.3 | 39 | 82.0 | 4.68 | 42 | 59.5 | 39 | 66.7 | .44 |
| 5. | 48 | 97.9 | 39 | 89.7 | 2.65[a] | 48 | 95.8 | 39 | 94.9 | 3.94 | 48 | 45.8 | 39 | 64.1 | 2.89 |
| 6. | 48 | 100.0 | 39 | 94.9 | 2.52[a] | 48 | 100.0 | 39 | 97.4 | 2.07 | 48 | 45.8 | 39 | 51.3 | .26 |
| 7. | 48 | 54.2 | 39 | 43.6 | .94 | 48 | 87.2 | 38 | 60.5 | 9.60[c] | 48 | 81.3 | 39 | 76.9 | .25 |
| 8. | 48 | 31.3 | 39 | 33.3 | .04 | 48 | 72.9 | 38 | 65.2 | 2.78[b] | 47 | 70.2 | 38 | 60.5 | .88 |
| 9. | 48 | 75.0 | 38 | 79.0 | .19 | 48 | 85.4 | 38 | 86.8 | 3.67[b] | 47 | 48.9 | 37 | 43.2 | .27 |
| 10. | 47 | 4.3 | 39 | 10.3 | 1.18 | 47 | 21.3 | 39 | 33.3 | 5.07 | 46 | 32.6 | 38 | 34.2 | .02 |
| 11. | 48 | 72.9 | 40 | 87.5 | 2.85[b] | 48 | 81.2 | 40 | 90.0 | 5.17 | 48 | 79.2 | 39 | 74.4 | .28 |
| 12. | 48 | 77.1 | 39 | 87.2 | 1.46 | 48 | 89.6 | 39 | 92.3 | 1.85 | 48 | 75.0 | 39 | 74.4 | .01 |
| 13. | 45 | 62.2 | 39 | 71.8 | .86 | 45 | 86.7 | 39 | 89.7 | 4.39 | 45 | 66.7 | 39 | 66.7 | .00 |
| 14. | | | | | | open ended - not tested | | | | | | | | | |
| 15. | 49 | 85.7 | 38 | 79.0 | .69 | 48 | 91.7 | 38 | 89.5 | 7.94[b] | 49 | 61.2 | 38 | 63.2 | .03 |
| 16. | 49 | 49.0 | 38 | 63.2 | 1.74[a] | 49 | 65.3 | 38 | 65.8 | 3.06[a] | 48 | 79.2 | 37 | 64.9 | 2.17[a] |

Appendix Table 10 (continued)

| Competency | Have Performed | | | | | Expectations | | | | | Training Needed | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Small | | Large | | | Small | | Large | | | Small | | Large | | |
| | N | %-Yes | N | %-Yes | $X^2$ | N | %-Yes | N | %-Yes | $X^2$ | N | %-Yes | N | %-Yes | $X^2$ |
| 17. | 49 | 98.0 | 39 | 100.0 | .81 | 48 | 97.9 | 39 | 100.0 | .84 | 47 | 55.3 | 38 | 57.9 | .06 |
| 18. | 49 | 89.8 | 38 | 94.7 | .71 | 49 | 100.0 | 38 | 94.7 | 4.20 | 48 | 62.5 | 38 | 71.1 | .69 |
| 19. | 44 | 97.7 | 39 | 87.2 | 3.43[b] | 45 | 100.0 | 38 | 97.4 | 1.22 | 43 | 53.5 | 37 | 46.0 | 1.20 |
| 20. | 49 | 65.3 | 39 | 82.1 | 3.07[b] | 48 | 70.8 | 39 | 82.0 | 8.43[c] | 48 | 29.2 | 39 | 38.5 | .84 |
| 21. | 49 | 69.4 | 39 | 79.5 | 1.15 | 49 | 89.8 | 38 | 86.8 | 4.10 | 49 | 73.5 | 39 | 64.1 | .90 |
| 22. | 49 | 63.3 | 39 | 64.1 | .01 | 49 | 93.9 | 38 | 84.2 | 2.52 | 48 | 70.8 | 39 | 64.1 | .45 |
| 23. | 46 | 95.7 | 38 | 94.7 | .04 | 46 | 97.8 | 37 | 100.0 | 4.90 | 46 | 45.7 | 38 | 29.0 | 2.46[a] |
| 24. | 48 | 43.8 | 38 | 57.9 | 1.70[a] | 48 | 79.2 | 37 | 78.4 | 7.05[a] | 48 | 70.8 | 36 | 66.7 | .88 |
| 25. | 49 | 63.3 | 39 | 53.9 | .80 | 49 | 87.8 | 38 | 89.5 | 4.92 | 49 | 65.3 | 39 | 69.2 | .15 |
| 26. | 49 | 61.2 | 39 | 61.5 | .00 | 48 | 79.2 | 39 | 84.6 | 2.30 | 48 | 62.5 | 39 | 59.0 | .11 |
| 27. | 49 | 59.2 | 39 | 69.2 | .95 | 49 | 79.6 | 39 | 84.6 | .91 | 47 | 70.2 | 39 | 76.9 | .49 |
| 28. | open ended - not tested | | | | | | | | | | | | | | |
| 29. | 49 | 87.8 | 39 | 89.7 | .09 | 48 | 100.0 | 39 | 94.9 | 3.43 | 48 | 56.3 | 39 | 59.0 | .07 |
| 30. | 49 | 85.7 | 38 | 86.8 | .02 | 49 | 91.8 | 38 | 92.1 | 1.99 | 49 | 55.1 | 38 | 57.9 | .07 |
| 31. | 48 | 85.4 | 37 | 75.7 | 1.30 | 47 | 93.6 | 37 | 89.2 | 3.26 | 48 | 70.8 | 37 | 75.7 | .25 |
| 32. | 49 | 85.7 | 38 | 81.6 | .27 | 48 | 95.8 | 38 | 94.7 | 3.16 | 49 | 63.3 | 38 | 73.7 | 1.06 |
| 33. | 49 | 100.0 | 40 | 97.5 | 1.24 | 48 | 100.0 | 40 | 97.5 | 3.73[a] | 49 | 55.1 | 40 | 57.5 | .05 |
| 34. | 45 | 26.7 | 37 | 32.4 | .33 | 45 | 46.7 | 37 | 37.8 | 8.03[b] | 43 | 44.2 | 35 | 31.4 | 1.33 |
| 35. | 48 | 81.3 | 38 | 76.3 | .31 | 48 | 95.8 | 38 | 94.7 | 3.52 | 48 | 52.1 | 38 | 63.2 | 1.06 |
| 36. | 49 | 73.5 | 36 | 80.6 | .58 | 47 | 95.7 | 36 | 88.9 | 3.74 | 48 | 60.4 | 36 | 66.7 | .35 |
| 37. | 49 | 91.8 | 39 | 89.7 | .12 | 48 | 93.7 | 39 | 92.3 | .10 | 47 | 38.3 | 39 | 46.2 | .54 |
| 38. | 47 | 44.7 | 36 | 44.4 | .00 | 47 | 61.7 | 36 | 63.9 | 2.30 | 46 | 65.2 | 36 | 58.3 | .41 |
| 39. | 49 | 98.0 | 35 | 88.6 | 3.21 | 48 | 97.9 | 35 | 88.6 | 4.45 | 47 | 36.2 | 35 | 45.7 | .76 |
| 40. | open ended - not tested | | | | | | | | | | | | | | |

Appendix Table 10 (continued)

| Competency | Have Performed | | | | | Expectations | | | | | Training Needed | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Small | | Large | | | Small | | Large | | | Small | | Large | | |
| | N | %-Yes | N | %-Yes | $X^2$ | N | %-Yes | N | %-Yes | $X^2$ | N | %-Yes | N | %-Yes | $X^2$ |
| 41. | 43 | 90.7 | 38 | 100.0 | 3.72[b] | 43 | 88.4 | 38 | 100.0 | 7.85[b] | 41 | 29.3 | 38 | 29.0 | .00 |
| 42. | 42 | 90.5 | 38 | 92.1 | .07 | 42 | 90.5 | 38 | 97.4 | 1.62 | 42 | 47.6 | 37 | 48.7 | .01 |
| 43. | 43 | 79.1 | 38 | 84.2 | .35 | 43 | 83.7 | 38 | 100.0 | 6.88[b] | 42 | 47.6 | 38 | 57.9 | .85 |
| 44. | 42 | 76.2 | 38 | 89.5 | 2.44 | 41 | 87.8 | 38 | 100.0 | 6.29[b] | 41 | 63.4 | 38 | 73.7 | .96 |
| 45. | 42 | 88.1 | 38 | 94.7 | 1.10 | 41 | 90.2 | 38 | 97.4 | 2.67 | 41 | 58.5 | 37 | 73.0 | 1.79[a] |
| 46. | 42 | 71.4 | 38 | 81.6 | 1.14 | 42 | 80.9 | 38 | 86.8 | 3.70 | 40 | 50.0 | 38 | 39.5 | .87 |
| 47. | 41 | 56.1 | 38 | 65.8 | .78 | 41 | 78.0 | 38 | 71.5 | 7.05[a] | 40 | 40.0 | 37 | 59.5 | 2.91[b] |
| 48. | 41 | 70.7 | 38 | 73.7 | .09 | 41 | 80.5 | 38 | 84.2 | 3.32 | 40 | 52.5 | 37 | 48.7 | .11 |
| 49. | 41 | 31.7 | 38 | 44.7 | 1.42[a] | 41 | 36.6 | 38 | 36.8 | 1.99 | 38 | 29.0 | 37 | 27.0 | .03 |
| 50. | 40 | 57.5 | 38 | 76.3 | 3.11[b] | 40 | 72.5 | 38 | 86.8 | 9.46[b] | 39 | 38.5 | 37 | 40.5 | .03 |
| 51. | open ended - not tested | | | | | | | | | | | | | | |
| 52. | 48 | 97.9 | 40 | 87.5 | 3.73[b] | 47 | 100.0 | 40 | 100.0 | 2.57 | 46 | 30.4 | 40 | 32.5 | .04 |
| 53. | 48 | 41.7 | 39 | 41.0 | .00[a] | 47 | 68.1 | 38 | 65.8 | 1.73 | 45 | 60.0 | 35 | 62.9 | .07 |
| 54. | 48 | 81.3 | 40 | 70.0 | 1.52[a] | 47 | 91.5 | 39 | 90.4 | 4.34 | 45 | 28.9 | 40 | 35.0 | .37 |
| 55. | 47 | 85.1 | 40 | 87.5 | .10 | 46 | 95.6 | 40 | 92.5 | 3.93[b] | 45 | 48.9 | 40 | 50.0 | .01 |
| 56. | 44 | 72.7 | 39 | 71.8 | .01[a] | 42 | 88.1 | 38 | 81.6 | 7.00[b] | 42 | 45.2 | 38 | 44.7 | .00 |
| 57. | 46 | 50.0 | 39 | 74.4 | 5.27[a] | 46 | 82.6 | 36 | 92.3 | 1.84 | 43 | 37.2 | 38 | 44.7 | .47[a] |
| 58. | 48 | 100.0 | 39 | 97.4 | 1.25 | 48 | 100.0 | 39 | 100.0 | 3.70 | 45 | 11.1 | 37 | 21.6 | 1.68[a] |

[a]Significant at .25 level

[b]Significant at .10 level

[c]Significant at .05 level

# APPENDIX E

# UNUSED DATA

Appendix Table 11

Mean Age and Proficiency Level of Young Farmer Competency Performance That Will be Needed as Estimated by Adult Farmers Professional Agricultural Educators

| Competency | Mean Age (years) | | Proficiency Level* | |
|---|---|---|---|---|
| | Adult Farmer | Professional | Adult Farmer | Professional |
| 1. | 20.6 | 19.9 | 2.17 | 2.22 |
| 2. | 19.6 | 19.1 | 2.10 | 2.47 |
| 3. | 20.6 | 19.9 | 2.42 | 2.58 |
| 4. | 22.8 | 23.2 | 2.31 | 2.33 |
| 5. | 20.1 | 19.6 | 2.42 | 2.38 |
| 6. | 19.7 | 19.6 | 2.39 | 2.44 |
| 7. | 24.4 | 22.8 | 2.11 | 1.07 |
| 8. | 25.0 | 22.7 | 1.95 | 1.37 |
| 9. | 24.2 | 21.3 | 2.06 | 2.09 |
| 10. | 23.8 | 22.8 | 2.09 | 1.71 |
| 11. | 23.4 | 21.2 | 2.08 | 1.80 |
| 12. | 23.2 | 23.2 | 2.04 | 1.78 |
| 13. | 22.6 | 22.8 | 2.09 | 2.05 |
| 14. | open ended - not tested | | | |
| 15. | 21.0 | 19.7 | 2.52 | 2.76 |
| 16. | 21.6 | 20.0 | 2.36 | 2.31 |
| 17. | 20.5 | 19.6 | 2.34 | 2.71 |
| 18. | 22.2 | 21.2 | 2.34 | 2.64 |
| 19. | 22.6 | 20.4 | 2.30 | 2.47 |
| 20. | 22.8 | 22.1 | 2.40 | 2.50 |
| 21. | 23.2 | 22.0 | 2.25 | 2.31 |
| 22. | 22.7 | 20.3 | 2.20 | 2.13 |
| 23. | 20.1 | 18.6 | 2.36 | 2.47 |
| 24. | 23.5 | 21.7 | 2.32 | 2.54 |
| 25. | 22.8 | 21.4 | 2.41 | 2.62 |
| 26. | 22.6 | 21.4 | 2.28 | 2.58 |
| 27. | 23.8 | 23.0 | 2.15 | 2.19 |
| 28. | open ended - not tested | | | |
| 29. | 21.7 | 20.0 | 2.28 | 2.67 |
| 30. | 21.1 | 19.4 | 2.38 | 2.64 |
| 31. | 21.1 | 19.4 | 2.23 | 2.43 |
| 32. | 21.4 | 19.9 | 2.29 | 2.60 |
| 33. | 20.8 | 19.8 | 2.43 | 2.59 |
| 34. | 23.1 | 22.2 | 2.33 | 2.49 |
| 35. | 21.4 | 19.2 | 2.38 | 2.31 |

Appendix Table 11 (continued)

| Competency | Mean Age (years) | | Proficiency Level* | |
|---|---|---|---|---|
| | Adult Farmer | Professional | Adult Farmer | Professional |
| 36. | 22.0 | 19.8 | 2.17 | 2.19 |
| 37. | 20.0 | 18.8 | 2.19 | 2.29 |
| 38. | 22.0 | 20.6 | 1.99 | 2.05 |
| 39. | 20.3 | 19.2 | 2.31 | 2.28 |
| 40. | open ended - not tested | | | |
| 41. | 18.7 | 18.4 | 2.48 | 2.48 |
| 42. | 19.3 | 18.7 | 2.58 | 2.77 |
| 43. | 20.8 | 19.6 | 2.40 | 2.66 |
| 44. | 21.1 | 20.1 | 2.30 | 2.48 |
| 45. | 21.1 | 20.5 | 2.27 | 2.40 |
| 46. | 19.8 | 18.5 | 2.23 | 2.42 |
| 47. | 22.2 | 21.4 | 2.37 | 2.68 |
| 48. | 21.8 | 21.0 | 2.36 | 2.60 |
| 49. | 19.3 | 19.3 | 2.15 | 1.57 |
| 50. | 20.5 | 19.4 | 2.40 | 2.63 |
| 51. | open ended - not tested | | | |
| 52. | 20.5 | 19.4 | 2.42 | 2.61 |
| 53. | 18.9 | 18.4 | 2.09 | 2.26 |
| 54. | 22.0 | 21.0 | 2.20 | 2.21 |
| 55. | 21.0 | 19.0 | 2.23 | 2.50 |
| 56. | 20.7 | 18.8 | 1.99 | 2.03 |
| 57. | 22.2 | 21.5 | 2.04 | 2.21 |
| 58. | 19.6 | 18.4 | 2.36 | 2.45 |

*(1) minimal, (2) average and (3) very proficient

## Appendix Table 12

Frequency of Performance in Occupational Competency Areas by Young Farmers as perceived by Adult Farmers, Young Farmers and Professional Agricultural Educators

| | Adult Farmers | | | | | Young Farmers | | | | | Professionals | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Competency | None 0 | Occas. 1 | Reg. 2 | Seas. 3 | Period 4 | None 0 | Occas. 1 | Reg. 2 | Seas. 3 | Period 4 | None 0 | Occas. 1 | Reg. 2 | Seas. 3 | Period 4 | H[d] |
| 1. | 3 | 14 | 64 | 1 | 5 | 5 | 14 | 62 | 2 | 2 | 1 | 5 | 36 | 1 | 2 | 1.10 |
| 2. | 0 | 17 | 66 | 3 | 1 | 1 | 15 | 65 | 5 | 1 | 0 | 1 | 39 | 1 | 3 | 7.61[c] |
| 3. | 0 | 8 | 34 | 44 | 1 | 3 | 14 | 15 | 53 | 2 | 0 | 5 | 12 | 27 | 1 | 5.51[b] |
| 4. | 3 | 10 | 41 | 17 | 10 | 23 | 10 | 33 | 9 | 9 | 1 | 4 | 20 | 6 | 14 | 7.98[c] |
| 5. | 2 | 9 | 72 | 2 | 2 | 3 | 14 | 56 | 8 | 6 | 0 | 3 | 56 | 8 | 6 | 3.27[a] |
| 6. | 1 | 2 | 79 | 5 | 0 | 1 | 8 | 57 | 15 | 5 | 0 | 2 | 37 | 4 | 2 | 6.91[c] |
| 7. | 45 | 21 | 6 | 7 | 5 | 37 | 28 | 6 | 5 | 11 | 24 | 15 | 2 | 2 | 1 | 2.07 |
| 8. | 23 | 26 | 7 | 12 | 16 | 41 | 18 | 2 | 4 | 21 | 12 | 15 | 1 | 3 | 12 | 7.95[c] |
| 9. | 15 | 18 | 22 | 17 | 13 | 17 | 23 | 14 | 17 | 15 | 1 | 16 | 9 | 11 | 8 | 6.29[c] |
| 10. | 40 | 8 | 8 | 19 | 3 | 76 | 0 | 2 | 6 | 1 | 7 | 7 | 3 | 22 | 2 | 5.70[b] |
| 11. | 18 | 26 | 29 | 1 | 13 | 13 | 48 | 15 | 1 | 11 | 8 | 18 | 15 | 0 | 4 | 4.18[a] |
| 12. | 12 | 25 | 24 | 2 | 21 | 9 | 42 | 14 | 6 | 15 | 4 | 17 | 7 | 1 | 15 | 5.97[b] |
| 13. | 13 | 12 | 28 | 17 | 13 | 21 | 20 | 25 | 11 | 7 | 2 | 13 | 9 | 12 | 7 | 5.81[b] |
| 14. | | | | | | open ended - not tested | | | | | | | | | | |
| 15. | 2 | 1 | 75 | 7 | 3 | 11 | 9 | 54 | 7 | 6 | 0 | 0 | 41 | 4 | 0 | .95 |
| 16. | 18 | 1 | 21 | 40 | 8 | 33 | 5 | 14 | 31 | 4 | 9 | 4 | 10 | 15 | 6 | 6.70[c] |
| 17. | 0 | 5 | 78 | 2 | 1 | 1 | 5 | 79 | 0 | 1 | 0 | 1 | 44 | 0 | 0 | 3.57[a] |
| 18. | 4 | 14 | 50 | 6 | 13 | 6 | 22 | 43 | 6 | 9 | 0 | 2 | 29 | 2 | 12 | 2.58 |
| 19. | 3 | 12 | 46 | 5 | 14 | 2 | 30 | 38 | 2 | 8 | 0 | 9 | 23 | 0 | 10 | 7.21[c] |
| 20. | 12 | 8 | 56 | 6 | 3 | 21 | 16 | 38 | 10 | 2 | 3 | 3 | 35 | 4 | 0 | 1.93 |
| 21. | 14 | 23 | 28 | 5 | 13 | 17 | 37 | 12 | 7 | 15 | 2 | 17 | 14 | 6 | 4 | 6.43[c] |
| 22. | 7 | 20 | 25 | 7 | 23 | 24 | 31 | 9 | 6 | 18 | 1 | 17 | 11 | 1 | 14 | 5.79[b] |

Appendix Table 12(continued)

| Competency | Adult Farmers None 0 | Occas. 1 | Reg. 2 | Seas. 3 | Period 4 | Young Farmers None 0 | Occas. 1 | Reg. 2 | Seas. 3 | Period 4 | Professional None 0 | Occas. 1 | Reg. 2 | Seas. 3 | Period 4 | Hd |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23. | 2 | 11 | 65 | 3 | 3 | 3 | 13 | 65 | 3 | 0 | 0 | 2 | 40 | 1 | 1 | 2.63 |
| 24. | 21 | 19 | 17 | 17 | 6 | 33 | 19 | 14 | 15 | 4 | 2 | 10 | 13 | 10 | 6 | 2.89[a] |
| 25. | 11 | 8 | 43 | 16 | 6 | 26 | 19 | 30 | 10 | 3 | 0 | 2 | 28 | 13 | 2 | 1.67 |
| 26. | 5 | 21 | 34 | 10 | 14 | 24 | 36 | 14 | 3 | 10 | 0 | 9 | 24 | 1 | 11 | 6.25[c] |
| 27. | 10 | 22 | 34 | 5 | 11 | 24 | 31 | 25 | 3 | 4 | 2 | 14 | 18 | 1 | 10 | 2.35 |
| 28. | open ended - not tested | | | | | | | | | | | | | | | |
| 29. | 2 | 5 | 45 | 31 | 4 | 5 | 11 | 41 | 30 | 0 | 0 | 4 | 29 | 12 | 0 | 6.91[c] |
| 30. | 5 | 6 | 35 | 4 | 0 | 5 | 6 | 24 | 48 | 3 | 0 | 2 | 15 | 27 | 1 | 5.27[b] |
| 31. | 3 | 10 | 41 | 29 | 2 | 10 | 26 | 16 | 29 | 3 | 0 | 5 | 19 | 9 | 1 | 3.13[a] |
| 32. | 3 | 5 | 47 | 32 | 1 | 7 | 12 | 27 | 40 | 0 | 0 | 1 | 17 | 27 | 0 | 8.18[c] |
| 33. | 0 | 3 | 48 | 37 | 0 | 1 | 8 | 33 | 45 | 1 | 1 | 1 | 17 | 26 | 0 | 6.37[c] |
| 34. | 33 | 11 | 9 | 23 | 1 | 50 | 8 | 5 | 16 | 1 | 1 | 4 | 13 | 23 | 3 | 14.56[c] |
| 35. | 6 | 8 | 50 | 14 | 9 | 14 | 20 | 30 | 14 | 8 | 0 | 3 | 32 | 8 | 2 | 1.39 |
| 36. | 12 | 10 | 38 | 18 | 6 | 15 | 29 | 19 | 19 | 1 | 2 | 3 | 24 | 13 | 2 | 3.15[a] |
| 37. | 7 | 6 | 68 | 2 | 2 | 7 | 15 | 54 | 7 | 4 | 2 | 6 | 33 | 1 | 2 | 3.75[a] |
| 38. | 9 | 21 | 35 | 4 | 11 | 39 | 19 | 8 | 5 | 12 | 3 | 10 | 17 | 1 | 13 | 6.84[c] |
| 39. | 1 | 3 | 74 | 7 | 1 | 5 | 12 | 64 | 1 | 1 | 0 | 2 | 32 | 8 | 1 | 3.14[a] |
| 40. | open ended - not tested | | | | | | | | | | | | | | | |
| 41. | 3 | 3 | 62 | 0 | 1 | 6 | 2 | 72 | 0 | 1 | 0 | 1 | 43 | 0 | 0 | 1.56 |
| 42. | 3 | 3 | 60 | 0 | 1 | 6 | 5 | 68 | 0 | 1 | 0 | 0 | 44 | 0 | 0 | 2.02 |
| 43. | 5 | 6 | 50 | 3 | 3 | 15 | 5 | 55 | 1 | 2 | 0 | 2 | 39 | 1 | 2 | 2.33 |
| 44. | 3 | 3 | 59 | 0 | 1 | 12 | 9 | 52 | 2 | 2 | 0 | 2 | 38 | 1 | 3 | 2.53[a] |
| 45. | 8 | 16 | 38 | 0 | 3 | 5 | 16 | 49 | 6 | 2 | 3 | 8 | 26 | 1 | 6 | 5.30[b] |
| 46. | 5 | 8 | 53 | 0 | 1 | 16 | 11 | 49 | 1 | 2 | 1 | 0 | 42 | 0 | 1 | 3.23[a] |
| 47. | 12 | 6 | 40 | 0 | 9 | 26 | 6 | 40 | 3 | 3 | 0 | 3 | 34 | 2 | 5 | 5.83[b] |

Appendix Table 12 (continued)

| Competency | Adult Farmers None 0 | Occas. 1 | Reg. 2 | Seas. 3 | Period 4 | Young Farmers None 0 | Occas. 1 | Reg. 2 | Seas. 3 | Period 4 | Professional None 0 | Occas. 1 | Reg. 2 | Seas. 3 | Period 4 | H[d] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 48. | 11 | 14 | 31 | 2 | 9 | 18 | 19 | 32 | 3 | 6 | 1 | 4 | 31 | 4 | 4 | 7.80[c] |
| 49. | 32 | 15 | 6 | 6 | 6 | 47 | 12 | 8 | 6 | 5 | 20 | 12 | 3 | 4 | 3 | .40 |
| 50. | 10 | 5 | 48 | 1 | 2 | 22 | 9 | 40 | 3 | 3 | 1 | 2 | 36 | 0 | 2 | 1.23 |
| 51. | | | | | | open ended - not tested | | | | | | | | | | |
| 52. | 1 | 4 | 80 | 1 | 1 | 1 | 16 | 71 | 0 | 0 | 0 | 0 | 43 | 0 | 1 | 1.70[b] |
| 53. | 19 | 42 | 10 | 2 | 13 | 39 | 33 | 5 | 0 | 7 | 3 | 20 | 13 | 1 | 5 | 4.84[b] |
| 54. | 7 | 36 | 36 | 1 | 7 | 17 | 41 | 25 | 1 | 2 | 1 | 13 | 27 | 0 | 3 | 2.16 |
| 55. | 4 | 18 | 56 | 3 | 9 | 7 | 24 | 53 | 2 | 0 | 0 | 7 | 35 | 2 | 0 | 8.35[c] |
| 56. | 15 | 30 | 33 | 1 | 3 | 19 | 34 | 19 | 3 | 6 | 3 | 14 | 21 | 0 | 5 | 3.55[a] |
| 57. | 5 | 22 | 50 | 0 | 8 | 20 | 26 | 32 | 1 | 5 | 3 | 11 | 27 | 0 | 2 | 2.82[a] |
| 58. | 0 | 10 | 73 | 0 | 2 | 0 | 13 | 69 | 2 | 1 | 1 | 2 | 39 | 0 | 1 | 2.99[a] |

[a]Significant at .25 level

[b]Significant at .10 level

[c]Significant at .05 level

[d]Kruskall-Wallis Independent H, a test of significance, approximates the chi-square distribution with two degrees of freedom.