A COMPREHENSIVE STUDY OF THREE SELECTED AREAS OF FARM MECHANICS AS A BASIS FOR CURRICULUM CONSTRUCTION AND COURSE PLANNING

By

RICHARD ALBERT BAKER

Bachelor of Science
Auburn University
Auburn, Alabama
1954

Master of Agricultural Education
Auburn University
Auburn, Alabama
1956

Submitted to the Faculty of the Graduate School
of the Oklahoma State University
in partial fulfillment of the requirements
for the degree of
DOCTOR OF EDUCATION
May, 1964

A COMPREHENSIVE STUDY OF THREE SELECTED AREAS
OF FARM MECHANICS AS A BASIS FOR CURRICULUM
CONSTRUCTION AND COURSE PLANNING

Thesis Approved:

Robert R. Price
Thesis Adviser

Everett D. Edington

Odell L. Walker

John E. Susky

Dean of the Graduate School

ACKNOWLEDGMENTS

Indebtedness is acknowledged to many persons whose cooperation helped make the successful completion of this study possible.

Appreciation is expressed to Dr. Robert R. Price, the writer's major advisor, and Dr. Everett D. Edington for their guidance and aid in this research effort; and to Professor Erwin W. Schroeder; Dr. John E. Susky; and Dr. Odell L. Walker for their advice while serving as members of the doctoral committee.

Appreciation is also expressed to the teacher educators, supervisors of vocational agriculture, commercial educational representatives, teachers of vocational agriculture and farmers of Alabama who supplied the basic data necessary for this study.

Indebtedness is also acknowledged to Dr. Carl E. Marshall and Gene Pulley of the Oklahoma State University Computer Center for their valuable assistance in organizing the data for computator program computation.

The writer is especially grateful to his wife, Shirley, for her encouragement, sacrifices and assistance during his advanced graduate program.

TABLE OF CONTENTS

Chapter Page

LIST OF TABLES

CHAPTER I

INTRODUCTION

The farm operator of today and of the future must be educated for farm-wide responsibilities. It will not only be necessary that these farmers be able to make wise production and managerial decisions, but they must also be able to perform the demanding operative skills and managerial abilities needed to keep abreast the ever-increasing trend in farm mechanization.

With the ever-changing complexion of the modern farmer's needs in mechanical training, it is imperative that teachers of vocational agriculture and teacher educators constantly evaluate their instructional programs in farm mechanics. The functional approach to curriculum construction and course planning implies the need for constant development and revision of an educational program to meet the ever-changing needs and interest of the student in an ever-changing environment. Farm mechanics, like any other educational program, can be justified only to the extent to which it meets the needs of each individual student in his existing environment. It was to promote this end that this study was undertaken.

Statement of the Problem

In view of the rapid expansion in farm mechanization and the profound changes in the educational systems both at the secondary school

and college level, it is generally agreed among agricultural educators and school administrators that the time has arrived for the reassessment and evaluation of farm mechanics instruction.

The central problem of this study was to provide descriptive evidence for an appraisal of farm mechanics instruction in the curriculum areas of farm power and machinery, farm buildings and other structures and farm electrification for secondary school departments of vocational agriculture and undergraduate teacher education programs in institutions of higher education.

Definitions of Terms Used in the Study

The term "farm mechanics" refers to all the unspecialized mechanical and managerial activities associated with farm mechanics performed on the farm.

The term "farmer" or "farm operator" refers to a person who operates a farm, either doing the work himself or directly supervising the work being done.

The term "teacher educators" refers to staff members in institutions of higher education that participate in teacher education programs in farm mechanics.

The term "commercial educational representatives" refers to selected persons employed by commercial concerns to advise farmers and others in the agriculture sector in one of the three selected areas under study.

The term "mechanical or operative activities or skills" refers to activities or skills requiring a knowledge of mechanical theory and the ability of the operator to successfully perform the ability or skill.

The term "managerial activities or abilities" refers to activities requiring purposeful thinking, planning and the use of evaluative factors in the successful performance.

The term "recent trend activities or skills" refers to those activities or skills considered to be relatively new for farmer acquisition and use.

The term "farmer acquisition and use", as related to the mechanical and managerial activities, is the knowledge, skills, abilities and appreciations needed to deal with the mechanical problems encountered by the present day farm operator.

The term "out-of-school instruction" refers to instruction offered by secondary school departments of vocational agriculture for students beyond the secondary school level.

The term "instructional period" is that portion of a clock hour normally used for instructional purposes. This excludes time used by students for developing operative or mechanical skills and abilities.

The term "time series classes" refers to systemative instruction provided during instructional sessions over a period of specified time with five or more out-of-school students in attendance.

The term "on-the-farm instruction" is that instruction provided on farms to teach skills and in other ways assist individuals with problems that arise in their farming program or rural living. These individuals may or may not be enrolled in a time series class. This definition also includes instructional services rendered to groups of people in the community.

Basic Assumptions

This study recognized and accepted the following assumptions:

1. The farm mechanics problems and needs of farm people constitute a valid basis for curriculum construction both at the secondary school and college level.

2. There is no ultimate authority on what should be included in farm mechanics curriculums, but the most unbiased estimate would be represented by adequate samples of personnel associated with all the aspects and levels of instruction.

3. It would be desirable to have the instructional emphasis directed toward the most important needs of those served by the curriculums.

Scope of the Study

In order to resolve the thesis problem, this study involved the collection and analysis of data and the development of conclusions based on: (1) selected mechanical and managerial activities being performed in farm power and machinery, farm buildings and other structures and farm electrification on selected Alabama farms; (2) the status of instructional programs in the three selected curriculum areas of farm mechanics in secondary school departments of vocational agriculture and undergraduate teacher education programs in the institutions of higher education in Alabama that train prospective teachers of vocational agriculture and (3) the opinions of selected farm operators, teachers of vocational agriculture, teacher educators and commercial educational representatives as to the relative value for the farmer acquisition and use of selected mechanical and managerial

activities in the three selected areas to farm operation and rural living.

The criteria used included seventy instructional units in the three selected areas with distribution as follows: (1) twenty-nine in farm power and machinery, (2) twenty-four in farm buildings and other structures and (3) seventeen in farm electrification. The units selected were adduced from the Alabama guide for teaching vocational agriculture.[1] The units are adjudged by Alabama educators in vocational agriculture as being the recipients of the basic instruction given in farm mechanics.

Need for the Study

The central problem facing agricultural educators in providing instruction in farm mechanics is determining curriculum content for each of the instructional areas. The intensity of this problem is being advanced by the present trend of allowing less time for secondary school study in vocational agriculture, curriculum re-orientation at the higher education level and the ever-increasing trend toward farm mechanization. With the continuing development of these conditions, it is becoming increasingly more difficult to effectively provide the basic instruction needed by students in the secondary school program as well as in institutions of higher education.

The problem of providing the necessary instruction in farm mechanics must be faced realistically. Agricultural educators must

---

[1] Alabama State Department of Education, "Guide for Developing the Local Program of Instruction in Vocational Agriculture" (Montgomery: Division of Vocational Agriculture, 1960), pp. 19-50. (Mimeographed.)

promote and conduct more worthwhile research in each of the instructional areas. The findings from such research are needed along with the pooled and refined judgments of farmers, agricultural educators, agricultural engineers and commercial educational representatives to insure wise decisions in planning programs for the present as well as the future.

The information provided by this study may be useful to: (1) teachers of vocational agriculture in the construction of farm mechanics curriculums, (2) supervisors of vocational agriculture in directing teachers in developing instructional programs in farm mechanics and (3) teacher educators in planning and implementing pre-service and in-service courses for teachers of vocational agriculture.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this chapter is to review some of the recent research related to curriculum construction in farm mechanics. In order to present a practical review, only studies involving a scope larger than a local school district will be reviewed, and from these, detail statements will be adduced to present significant findings and implications for vocational agriculture.

Related Studies and Investigations

There have been several farm mechanics studies conducted during the past few years relative to curriculum construction in vocational agriculture. These studies of both a statistical and non-statistical nature have revealed the significant values and strengths of the current programs, and provided direct implications for determining the present and future needs which should be met by both the secondary school curriculum and teacher education courses in institutions of higher education.

A study by Hobbs[1] in 1960 revealed some interesting findings worthy of review by educators planning and implementing instructional

---

[1]Walter Wesley Hobbs, "Factors Associated With The Occurrence of Effective Local Farm Mechanics Programs in Vocational Agriculture In Oklahoma" (unpublished Doctoral thesis, Oklahoma State University, 1960), pp. 87-92.

programs in farm mechanics. The study dealt with selected factors associated with the above-average and below-average programs of farm mechanics in departments of vocational agriculture in Oklahoma.

The central problem of the study was to substantiate or refute the common assumption among agricultural educators and school administrators that there are certain factors associated with the probability of developing successful programs of instruction in farm mechanics.

A statistical analysis of the data obtained revealed that significant differences did not exist between the adjudged above and below average programs in regard to: (1) age of the teacher, (2) years of teaching experience in vocational agriculture, (3) tenure of teacher in present department, (4) number of college credit hours in farm mechanics, (5) teachers having college training in a number of different farm mechanics courses, (6) teachers having received civilian instruction below college level, (7) teachers having mechanical training in the armed forces, and (8) teachers receiving farm mechanics training in high school.

The study did reveal, however, that significant differences did exist in favor of the below-average programs with respect to the number of teachers receiving other types of shop training while enrolled in high school.

The findings of the investigation further revealed that significant differences did not exist between the programs in regard to: (1) average enrollment in the high school and vocational agriculture program, (2) average hours of instruction per week in vocational agriculture, (3) departments with out-of-school programs, (4) departments sharing shop facilities with other school departments, (5) departments with

budgets provided by local school administrators for the financing of farm mechanics instruction, (6) available shop floor space per student enrolled in the largest class and (7) a number of economic characteristics prevalent in the service area of the school districts.

It was found that significant differences did exist in favor of the adjudged above-average programs in regard to: (1) total number of hours in the 4-year program allotted to farm mechanics instruction, (2) departments in which the "station method" was used in teaching farm mechanics and (3) the percentage of farms having farm mechanics facilities in use. It is questionable if the generalizations that one might draw in regard to these existing differences would be of any value in developing farm mechanics programs. The differences, however, do provide a basis for developing hypotheses toward further research.

A majority of the farm mechanics research as reported by the Summaries of Studies in Agricultural Education has been in the instructional area of farm shop. A thorough search of the summaries revealed that a total of twenty-seven studies have been conducted relative to curriculum development since 1945. Of this twenty-seven, eighteen were in the instructional area of farm shop.

One of the most recent studies of any significant value beyond the territorial boundaries of a given community was conducted by Harris[2] in 1960. This study consisted of interviewing 408 farmers in Georgia to determine what farm shop abilities are needed on the present day mechanized farm.

---

[2]Roland R. Harris, "A Study of Selected Farm Shop Abilities Needed By In-School Boy, Young-Adult and Older-Adult Farmers in Georgia" (unpublished Doctor's dissertation, Michigan State University, 1960), pp. 240-252.

Of the 408 farmers participating in the study, 156 were high school students of vocational agriculture, 123 were young farmers and 129 were adult farmers. Each respondent was asked if he had encountered a problem involving selected farm shop abilities, and how important he thought it was for him personally to possess the ability. A relative value was determined for each selected ability by relating the percentage of farmers needing the ability to the relative importance of the ability as expressed by the farmers. These relative values were used in determining a ranking of the various instructional sub-areas in farm shop. The rankings in descending order of importance were as follows: (1) woodworking and carpentry, (2) cold metal work, (3) home-farm shop, (4) farm fencing, (5) tool fitting, (6) planning shop projects, (7) farm plumbing, (8) rope and leather work, (9) painting and glazing, (10) hot metal work, (11) concrete and masonry, (12) electric arc and oxyacetylene welding and (13) soldering metals. Similar investigations conducted in other areas of the United States have found very little difference in the total ranking of these same instructional sub-areas by farmers and teachers of vocational agriculture.

A study conducted by Howell[3] using a farmer population reported only a slight variation in the total rankings of the same sub-areas. The sub-areas of painting and glazing and arc welding ranked higher than in the Harris study.

---

[3]Ezra L. Howell, "Farm Mechanics Jobs Performed on Farms in North Carolina, Including Those Jobs Which Should Be Performed" (unpublished M.S. thesis, North Carolina State College, 1952) as abstracted in Summaries of Studies in Agricultural Education, U. S. Office of Education, Vocational Division, Bul. No. 251 (Washington, 1953), pp. 40-41.

In other studies conducted by Dougan,[4] Miller[5] and Odell,[6] in which teacher of vocational agriculture populations were used, the sub-areas of arc welding and plumbing were ranked considerably higher by the teachers than in the similar studies with farmer populations.

It is understandable that a ranking order of sub-areas would be of some value in curriculum construction; however, the ranking without regard for or to the educational objectives to be attained is questionable.

In reviewing research literature two studies were found that attempted to determine educational objectives to be attained under each of the farm shop sub-areas. Both of the studies have been previously mentioned in this review as conducted by Miller[7] and Harris.[8] The study by Harris has greater merit for curriculum construction in vocational agriculture because the design was based on skills in farm

---

[4]Riley S. Dougan, "Farm Shop Skills and Abilities Needed and Acquired by Beginning Teachers of Vocational Agriculture in Ohio" (unpublished M.S. thesis, Ohio State University, 1951) as abstracted in Summaries of Studies in Agricultural Education, U.S. Office of Education, Vocational Division Bul. No. 248 (Washington, 1952), pp. 16-17.

[5]Harry T. Miller, "Technical Skills in Farm Mechanics Requiring A Planned Demonstration for Effective Teaching, Needed by Teacher of Vocational Agriculture in the North Atlantic Region" (unpublished M.S. thesis, University of Maryland, 1952) as summarized in The Agricultural Education Magazine, XXVII (1955), pp. 160-164.

[6]Finley Odell, "The Farm Mechanics Skills Used by Vocational Agriculture Teachers in Forty Vocational Agriculture Departments in West Virginia" (unpublished Master's study, University of West Virginia, 1955), as abstracted in Summaries of Studies in Agricultural Education, U.S. Office of Education, Vocational Division Bul. No. 263 (Washington, 1953), p. 56.

[7]Miller, op. cit.

[8]Harris, op. cit.

shop without regard for the sub-areas. Of the selected abilities listed in the study, forty-one were considered to be extremely valuable for farmers of all age groups. The forty-one listed in descending order were: (1) using wrenches and other metal working tools correctly; (2) selecting suitable nails, screws and bolts for a given job; (3) protecting a water system from freezing; (4) squaring the end of a piece of lumber; (5) sawing a board with a crosscut handsaw; (6) sharpening axes or hatchets; (7) replacing handles in various farm tools; (8) repairing farm equipment constructed of wood; (9) cleaning, maintaining and caring for hand tools; (10) laying out and cutting an angle on a board; (11) deciding what kind of fence to build; (12) drilling holes in wood; (13) cutting metal with files, hacksaws, cold chisels and tinner's snips; (14) identifying materials commonly used in farm buildings and equipment; (15) selecting suitable hinges, locks, glues and catches for a given job; (16) installing hinges and locking devices on doors; (17) removing broken bolts and screws from holes; (18) determining the kind and grades of lumber and plywood to use for a given job; (19) applying paint with a brush; (20) repairing small buildings; (21) sharpening hoes, shovels or spades; (22) calculating pre-construction cost for projects; (23) repairing a barbed wire fence; (24) building a barbed wire fence; (25) installing glass in a frame window or door; (26) deciding what kind and size of gates, cattle guards or stiles to use in fences; (27) whetting sharp edge tools; (28) fastening pieces of metal together with rivets, metal screws or bolts; (29) deciding what kind and amount of tools to have for farm shop work; (30) shaping and smoothing wood to a specific size; (31) repairing a leaky faucet; (32) figuring a bill of material for a given job;

(33) sharpening cold chisels; (34) laying out and cutting braces; (35) building a small farm building; (36) planning a storage arrangement for the farm shop; (37) making good concrete; (38) replacing a piece of damaged pipe in a water system; (39) straightening a piece of bent metal; (40) building or repairing gates, cattle guards, stiles, walk throughs or flood gates in fences and; (41) making labor saving equipment for the farm.

The study by Miller[9] involving a population of teachers of vocational agriculture was somewhat similar in design to the study by Harris.[10] The respondents were asked to rate a selected group of farm shop skills in term of use in their instructional programs. It was interesting to note that the skills most frequently used by the teacher of vocational agriculture in each sub-area of farm shop were almost identical to the skills listed by Harris as being extremely valuable to his population of farmers. It was further interesting to note that these two studies of similar findings were conducted in two different areas of the United States.

Another study involving farmer respondents was recently conducted by Weston[11] to determine what mechanical jobs Missouri farmers perform. This study involved all of the instructional areas of farm mechanics. The data for the study were procured by questionnaires from 423 farmers distributed throughout Missouri.

---

[9]Miller, op. cit.

[10]Harris, op. cit.

[11]Curtis R. Weston, "A Study Of Mechanical Jobs Performed By Selected Farmers in Missouri" (unpublished Doctoral thesis, University of Missouri, 1959), pp. 168.

After statistical treatment of the data the following conclusions were drawn: (1) farmers in Missouri perform the same mechanical jobs and desire the same mechanical training regardless of where they live and tenure status and (2) farmers desire farm mechanical training in jobs in which they are not properly trained.

In regard to the latter conclusion the study revealed that of the jobs which the farmers performed to a lesser degree over forty per cent wanted additional training in the maintenance, repair and adjustment of farm machinery, including tractors. The study has merit in that it provides descriptive evidences that farmers are not interested in becoming experts in the various semi-skilled or skilled areas, such as plumbing, electrical work, hot metal work, engine mechanics and the construction of large buildings. Rather, they are interested in the abilities required to operate, repair, adjust and maintain equipment and farm machinery.

It appears that more descriptive studies are needed to determine the mechanical and managerial activities being performed by farmers in all of the instructional areas of farm mechanics. Such information would provide a partial basis for determining revisions for the secondary school program, as well as being helpful in the professional training of prospective teachers of vocational agriculture.

A non-statistical study conducted by Duggar[12] dealing with mechanical competencies needed by teachers of vocational agriculture in Oklahoma certainly has some implications for the organization and

---

[12]Roy W. Duggar, "Mechanical Competencies Needed By Vocational Agriculture Teachers In Oklahoma" (unpublished Doctoral thesis, Oklahoma State University, 1956), pp. 101-103.

implementation of farm mechanics programs at both the secondary school and college level. This study revealed that of 115 competencies considered, vocational agriculture teachers should possess sufficient understanding in 112 to be able to provide and implement educational programs in farm mechanics. The respondents, consisting of teachers of vocational agriculture and farmers, were asked to express opinions concerning the degree of understanding needed by farmers in selected mechanical competencies covering all of the instructional areas of farm mechanics. The opinion expressed were grouped under headings of extensive and personal, when and how to get assistance, little or none and no comment.

Of the selected competencies in the areas of farm power and machinery, farm buildings and other structures and farm electification, all of the respondents expressed that farmers need an extensive and personal understanding in thirteen of the selected sixty-five competencies used in the study design. Listed in no order or ranking of importance they were: (1) selecting farm tractors, (2) lubricating engines and farm machinery, (3) selecting farm machinery, (4) servicing and repairing farm machinery, (5) building with concrete, (6) building with lumber, (7) building with metal, (8) repairing farm buildings, (9) planning livestock and poultry equipment, (10) building livestock and poultry equipment, (11) repairing livestock and poultry equipment, (12) planning fence arrangements and (13) repairing fences.

Of the remaining fifty-two competencies, a majority of the respondents expressed the opinion that farmers need an extensive and personal understanding of: (1) selecting farm trucks; (2) selecting stationary engines; (3) servicing engine fuel systems; (4) servicing

engine ignition and cooling systems; (5) replacing and adjusting clutches; (6) repairing and adjusting brakes; (7) servicing transmissions and final drives; (8) making sketches to scale; (9) planning farm buildings; (10) estimating building costs; (11) building with prefabricated materials; (12) building fences; (13) planning, installing, servicing and repairing farm water systems; (14) servicing and repairing heating systems; (15) estimating cost of electrical wiring; (16) installing electrical wiring; (17) maintaining electrical wiring; (18) estimating electrical power demands; (19) estimating electrical power cost; (20) servicing electrical motors; (21) servicing electrical overload protectors; (22) selecting and servicing electrical appliances; (23) selecting electrical lighting equipment; (24) servicing and repairing lighting equipment and; (25) servicing and repairing electrical heating systems.

It should be noted that many of the competencies listed by Duggar[13] are managerial in nature. Better selection of equipment, more effective use of mechanical and electrical labor-saving devices, building design and labor efficiency factors related to mechanical devices are but a few of the managerial aspects common to the present day mechanized farm.

A study to identify the management training needed in farm mechanics by Virginia farmers was recently conducted by Thompson.[14] This comprehensive study used an opinion-gathering device to procure data

---

[13]Ibid.

[14]Evans G. Thompson, "The Identification Of Management Decisions In Farm Mechanics Needed By Farm Operators In Virginia" (unpublished Doctoral thesis, Cornell University, 1960), pp. 165-168.

from teachers of vocational agriculture, secondary school students of vocational agriculture, farmers and farm machinery dealers in Virginia. The study sample also included the opinions of thirty-seven farm mechanics specialists from throughout the United States.

Of the total respondents, seventy-five per cent highly recommended managerial instruction in the areas of farm power and machinery, farm buildings and other structures and farm electrification. The instructional units recommended were: (1) determining method to use in harvesting and storing crops; (2) determining whether to custom hire or buy own machinery; (3) determining the type and size of farm machinery and equipment to buy; (4) determining the type of fence construction to use; (5) selecting fencing materials; (6) determining housing needs for farm shop facilities; (7) determining housing needs for machinery, livestock and crop storage; (8) selecting feed handling equipment; (9) planning the farm and home wiring system; (10) planning the farm and home lighting system and (11) selecting electric motors for specific farm jobs.

Conclusions Based Upon Review

An exhaustive review of research literature relative to the area of curriculum construction in farm mechanics revealed only a small number of studies with sufficient scope to portray a specific approach to curriculum construction in the instructional areas of farm power and machinery, farm buildings and other structures and farm electrification. Some of the most significiant of these studies were reviewed in this chapter.

To the extent that the samplings were representative and the facts and opinions were accurate in the studies reviewed the following conclusions are justified: (1) a teacher's personality and his philosophy of what constitutes a good farm mechanics program are probably the most important factors in the establishment of a successful program of instruction in farm mechanics; (2) although the scope of college training in farm mechanics for a teacher of vocational agriculture is an important factor in the establishment of a successful program of instruction in farm mechanics, there seems to be no best combination of courses; (3) college courses taken in farm mechanics by prospective teachers of vocational agriculture and secondary school curriculums of vocational agriculture should be evaluated in the light of the mechanical jobs farmers are actually performing; (4) since farmers in general are performing the same types of farm mechanics activities, a standardized course with standardized instructional materials could be developed to teach the basic essential subject-matter and skills; (5) more instructional emphasis should be placed upon farm power and machinery, farm building and other structures and farm electrification by secondary schools and colleges; (6) more instructional emphasis should be placed on the planning, equipping and using farm shops by teacher educators and teachers of vocational agriculture; (7) increased attention should be given to the aspects of managerial instruction in vocational agriculture and teacher education courses in farm mechanics and (8) either teachers of vocational agriculture and teacher educators are more advanced in their thinking concerning the farm mechanics needs of farmers than commercial people or they are not fully cognizant of the farm mechanics activities that farmers are doing or have need of doing.

CHAPTER III

DESIGN OF THE STUDY

The purpose of this chapter is to describe the procedure used in conducting this study. The description will include the statement of problems and hypotheses under investigation, a description of the samples involved, procedures and methods used in obtaining data and the statistical techniques used in the analysis of the data.

The Null Hypotheses

For the purposes of statistical inference a hypothesis may be defined as a tentative assumption, stated as a generalization. The hypothesis to be tested by the researcher must be rigorous and exact; it must have testability. In other words, its content must be capable of being refuted if it is to have a scientific meaning. This type of hypothesis is known in research as the "null hypothesis" and is a useful tool in testing the significance of differences.

In the language of the researcher the hypothesis may be expressed in several ways, but in its usual null form asserts that there is no true difference between two population means under comparison except those arising from chance factors. This type of statement constitutes

a challenge; and the function of the research is to give the facts a chance to refute this challenge.[1]

Problems Investigated and Hypotheses Tested

The major problem of this study was to provide a comparative appraisal of farm mechanics instruction in farm power and machinery, farm buildings and other structures and farm electrification for secondary school departments of vocational agriculture and undergraduate teacher education programs in institutions of higher education.

The following problems were investigated and null hypotheses tested in an attempt to resolve the central problem of this study:

A. To what extent are selected mechanical and managerial activities being performed on farms by selected farm operators in:
   1. farm power and machinery,
   2. farm buildings and other structures and
   3. farm electrification?

B. There is no significant difference in the following characteristics for those farm operators who perform selected mechanical and managerial activities and those who do not:
   1. age,
   2. formal education,
   3. degree of participation in secondary school vocational agriculture,
   4. degree of farming experience,
   5. degree of on-the-farm employment,

---

[1] Henry E. Garrett. Statistics in Psychology and Education, (New York, 1958), pp. 213.

6. size of farm operation in total acres,
7. investment in farm power and machinery and
8. investment in farm buildings and other structures.

C. To what extent do farm operators recognize themselves as qualified and not qualified to perform certain selected mechanical and managerial activities in:
   1. farm power and machinery,
   2. farm buildings and other structures and
   3. farm electrification?

D. There is no significant difference in the following characteristics for those farm operators recognizing themselves as qualified and those recognizing themselves as not qualified to perform selected mechanical and managerial activities:
   1. age,
   2. formal education,
   3. degree of participation in secondary school vocational agriculture and
   4. degree of farming experience..

E. There is no significant difference in the following characteristics among those farm operators who expressed a high and those who expressed a medium to low relative value for farmer acquisition and use of selected mechanical and managerial activities:
   1. age,
   2. formal education,
   3. degree of participation in secondary school vocational agriculture,
   4. degree of farming experience,

5. degree of on-the-farm employment,
6. size of farm operation in total acres,
7. investment in farm power and machinery and
8. investment in farm buildings and other structures.

F. No significant differences exist between the nature and extent of instructional programs of vocational agriculture departments that offer three and four year secondary school programs with regard to:

1. number of instructional periods allotted to farm mechanics in the secondary school program,
2. number of clock hours of out-of-school instruction allotted to all agricultural problem areas during time series classes,
3. number of clock hours of out-of-school instruction allotted to farm mechanics during time series classes,
4. number of total instructional periods allotted to instruction in the three selected curriculum areas in the secondary school program,
5. number of instructional periods allotted to farm power and machinery in the secondary school program,
6. number of instructional periods allotted to farm building and other structures in the secondary school programs,
7. number of instructional periods allotted to farm electrification in the secondary school program,
8. number of total clock hours spent by the teacher of vocational agriculture in providing out-of-school instruction in the three selected curriculum areas during time series classes and on-the-farm instruction,

9. number of clock hours spent by the teacher of vocational agriculture in providing out-of-school instruction in farm power and machinery during time series classes and on-the-farm instruction,
10. number of clock hours spent by the teacher of vocational agriculture in providing out-of-school instruction in farm buildings and other structures during time series classes and on-the-farm instruction,
11. number of clock hours spent by the teacher of vocational agriculture in providing out-of-school instruction in farm electrification during time series classes and on-the-farm instruction,
12. number of instructional periods allotted to selected units in the areas of farm power and machinery, farm buildings and other structures and farm electrification in the secondary school program and
13. number of clock hours spent by the teacher of vocational agriculture in providing out-of-school instruction in selected units or activities in the areas of farm power and machinery, farm buildings and other structures and farm electrification during time series classes and on-the-farm instruction.

G. To what extent are institutions of higher education providing instruction in undergraduate teacher education programs in the areas of:
   1. farm power and machinery,
   2. farm buildings and other structures and
   3. farm electrification?

H. To what extent do differences exist between the expressions of farm operators, teachers of vocational agriculture, teacher educators and commercial educational representatives as to the relative value for farmer acquisition and use of selected mechanical and managerial activities in the areas of:

1. farm power and machinery,
2. farm buildings and other structures and
3. farm electrification?

The Sample

This study recognized and accepted the assumption that there is no ultimate authority on what should be included in the farm mechanics curriculum; therefore several different samples were involved in the study. It was felt that such a design would provide the most unbiased estimate of possible curriculum content in the three areas under study. The samples involved in this study were teachers of vocational agriculture, farm operators, teacher educators and commercial educational representatives.[2]

A total of one hundred teachers were selected from the mailing list of Alabama Teachers of Vocational Agriculture. To assure a geographical distribution throughout the state twenty teachers were chosen at random from each of the five supervisory districts. These were simple random samples drawn through the use of random sampling table numbers.[3]

---

[2]See definitions Page 2.

[3]Herbert Arkin and Raymond Colton. Tables for Statisticians, (New York, 1950), pp. 142.

The farm operators participating in this study were selected by the teachers of vocational agriculture participating in the study. Each teacher was requested to interview two full-time and one part-time operator living within his respective school service area. It was further requested that the teachers interview only those operators that they considered progressive and dependent upon the farm for a substantial proportion of their livelihood. It was felt that the sample should include only progressive operators if data obtained were to be of value in determining possible directions to be taken in planning the secondary school curriculum of vocational agriculture and teacher education courses in institutions of higher education.

All teacher educators involved were staff members of either Auburn University, Alabama Agricultural and Mechanical College or Tuskegee Institute, and included only those directly participating in the farm mechanics training of teachers of vocational agriculture.

The sample of commercial educational representatives consisted of forty-two persons employed by twenty-four commercial companies or agencies operating in Alabama. The representatives were employed by the: Allis-Chalmers Manufacturing Company, John Deere and Company, Ford Tractor Company, International Harvester Company, J. I. Case Company, Massey-Ferguson Company, New Holland Machine Company, New Idea Equipment Company and Oliver Corporation in farm power and machinery; American Wood Preservers Institute, American Zinc Institute, Butler Manufacturing Company, Douglas Fir Plywood Association, F. E. Meyers and Brothers Company, Goulds Pumps Incorporation, Portland Cement Association, Republic Steel Corporation, Reynolds Farm Institute, Southern Pine Association, Stran-Steel Corporation and United States

Steel Corporation in farm buildings and other structures and Alabama Rural Electrification Association, Alabama Power Company and Tennessee Valley Authority in farm electrification.

Collection and Analysis of Data

Data for this study were collected by questionnaire, checklist, and interview techniques. These techniques were used for the following reasons:

1. Data to be secured were from varied and widely scattered sources.
2. Investigator could not readily see personally all of the people from whom responses were desired.
3. Questionnaire, checklist and interview schedules would tend to standardize and objectify responses.
4. Farm operators were interviewed by teachers to clear up any ambiguous questions in the schedule and to safe guard against fragmentary returns.

Tentative instruments for collecting the data were formulated and distributed to selected farmers, teachers of vocational agriculture and teacher educators in Oklahoma and Alabama for the purposes of (1) identifying strengths and weaknesses; (2) checking the time required to respond; (3) studying the procedure for completing questionnaires, checklists and administering interviews with the schedule and (4) checking clarity and communications.

After the questionnaires and checklist were brought to the final form, they were mailed out to the teachers of vocational agriculture,

and commercial educational representatives.[4] Upon receipt of the returned questionnaire from a teacher of vocational agriculture, he was then sent three copies of the final schedule to be used in interviewing farmers.[5]

After data were obtained and tabulated, they were then subjected to both statistical and non-statistical techniques. The "t" test and analysis of variance statistical techniques were used in the testing of the formulated null hypotheses. The level of significance required for the rejection of a null hypotheses was set at the five per cent level.

Relationship of the "t" Test to Analysis of Variance

The use of analysis of variance for the comparison of two groups, which was the case in this study, is mathematically identical with the variance in arriving at a t-value. The reason for using the analysis of variance rather than the t test in part of the analysis of data was so that a test of significance differences could be provided between two groups and eight sets of means simultaneously with a digital computator. If desired, the value of t can be obtained from the analysis by extracting the square root of the resulting F-value.

---

[4]See Appendixes A, B-1, B-2, B-3, C-1, C-2 and C-3.

[5]See Appendix D.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

Data presented in this chapter were obtained from 228 selected farm operators, ninety-two randomly selected teachers of vocational agriculture, seven teacher educators, and twenty-four commercial educational representatives throughout the state of Alabama.

After data were secured through the previously outlined procedures and techniques, data were tabulated and analyzed by appropriate non-statistical and statistical techniques in order to determine the nature and extent of findings.

In the tabular presentation of data, two asterisks (**) immediately after statistical values indicate a statistical difference which is highly significant, or significant at the one per cent level. One asterisk (*) appearing after statistical values is indicative of a significant difference at the five per cent level. When no asterisk appears, this indicates that the difference, if any, was possibly due to chance.

As previously stated, the five per cent level of significance was selected for the study. When statistical treatments confirmed that differences did not exist at the five per cent level of significance, the null hypotheses relative to the selected activities were accepted.

Selected Mechanical and Managerial Activities Performed on Farms in Farm Power and Machinery, Farm Buildings and Other Structures and Farm Electrification

One of the many pertinent factors to be considered in determining what training should be given to present and prospective farmers is to determine what farm mechanics activities are now being performed by farmers. It was believed that this data would be of value in developing farm mechanics programs for the secondary school as well as being useful in planning courses for preparing teachers of vocational agriculture. It was believed that a study of certain phases of activities performed by successful farmers would constitute one valid approach.

This section is devoted to an analysis of two groups of data secured from 228 successful farm operators selected by ninety-two teachers of vocational agriculture. These data include: (1) selected farm mechanics activities performed on farms and (2) whether or not these activities were performed by the farmer operators.

The data shown in Table I indicate that twenty-one of the twenty-nine selected activities in farm power and machinery were reported as performed on over fifty per cent of the 228 farms. Only four of the activities were performed on less than forty per cent of the farms.

Of the twenty-nine activities performed on the farms, twenty-eight were performed by fifty per cent or more of the operators. Nine of the activities performed were not performed by thirty per cent or more of the operators.

TABLE I

SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES PERFORMED IN FARM POWER AND MACHINERY

Activities	Farms included in survey reporting performance		Farms reporting performance			
			By operator		Not by operators	
	Number	Per cent	Number	Per cent	Number	Per cent
Determining the cost involved in owning and operating farm machinery	119	52.19	88	73.94	31	26.06
Determining the power, labor and machinery requirement for a farm enterprise	106	46.49	82	77.35	24	22.65
Determining the capacity of farm machinery	110	48.24	93	84.54	17	15.46
Planning a machinery replacement program	95	41.66	84	88.42	11	23.16
Selection of tractor fuels and lubricants	208	91.23	199	95.67	9	4.33
Tractor preventative maintenance	225	98.68	222	98.66	3	1.34
Servicing an ignition system	186	81.57	145	77.95	41	22.05
Servicing a fuel system	199	87.28	167	83.91	32	16.09
Servicing a cooling system	198	86.84	182	91.91	16	8.09

TABLE I (continued)

Activities	Farms included in survey reporting performance		Farms reporting performance			
			By operator		Not by operators	
	Number	Per cent	Number	Per cent	Number	Per cent
Adjusting a tractor clutch	181	79.38	138	76.24	43	23.76
Replacing a tractor clutch	151	66.22	92	60.92	59	39.08
Adjusting tractor brakes	197	86.40	176	89.34	21	10.66
Replacing tractor brakes	167	73.24	113	67.66	54	32.34
Adjusting engine valve tappets	124	54.38	66	53.22	58	46.78
Diagnosing and making minor machinery and equipment repairs	203	89.03	181	89.16	22	10.84
Diagnosing the needs for major machinery and equipment repair	156	68.42	124	79.49	32	20.51
Complete tractor or power unit engine overhaul	92	40.35	45	48.91	47	51.09
Complete one cylinder engine overhaul	68	29.82	37	54.41	31	45.59
Complete overhaul of farm machinery	152	66.66	128	84.21	24	15.79
Using the arc welder	148	64.91	87	58.78	61	41.22
Using the oxyacetylene welder	128	56.14	67	52.34	61	47.66

TABLE I (continued)

Activities	Farms included in survey reporting performance		Farms reporting performance			
			By operator		Not by operators	
	Number	Per cent	Number	Per cent	Number	Per cent
Painting farm machinery	161	70.61	153	95.03	8	4.97
Setting up farm machinery	212	92.99	208	98.11	4	1.89
Adjusting farm machinery under field conditions	214	93.86	210	98.13	4	1.87
Calculating pulley speeds	79	34.64	59	74.68	20	25.32
Constructing labor-saving equipment	127	55.70	122	96.06	5	3.94
Calibrating power sprayers	86	37.71	59	68.60	27	31.40
Calibrating planters and seeding drills	173	75.87	166	95.95	7	4.05
Hardsurfacing plow-shares and cultivator sweeps	90	39.47	53	58.88	37	41.12

TABLE II

SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES PERFORMED IN FARM BUILDINGS AND OTHER STRUCTURES

Activities	Farms included in survey reporting performance		Farms reporting performance			
			By operator		Not by operators	
	Number	Per cent	Number	Per cent	Number	Per cent
Sketching and drawing	123	53.94	86	69.91	37	30.09
Reading blue prints and detail drawings	102	44.73	73	71.56	29	28.44
Determining building requirements for animals and crops	154	67.54	137	88.96	17	11.04
Maintaining and improving farm buildings	183	80.26	165	90.16	18	9.84
Figuring bill of materials and other building cost	157	68.85	144	91.71	13	8.29
Selecting lumber and other building materials	174	76.31	160	91.95	14	8.05
Constructing farm buildings	165	72.36	145	87.88	20	12.12
Treating lumber and other wood materials	118	51.75	97	82.20	21	17.80
Paints and painting	145	63.59	132	91.03	13	8.97
Constructing pole type buildings	120	52.63	99	82.50	21	17.50

TABLE II (continued)

Activities	Farms included in survey reporting performance		Farms reporting performance			
			By operator		Not by operators	
	Number	Per cent	Number	Per cent	Number	Per cent
Constructing concrete forms	139	60.96	118	84.89	21	15.11
Determining concrete mixtures	128	56.14	99	77.34	29	22.66
Determining amounts of concrete needed	130	57.01	103	79.23	27	20.77
Mixing concrete on the farm	141	61.84	125	84.65	16	11.35
Using concrete blocks and other masonry materials	140	61.40	105	75.00	35	25.00
Planning a water system	183	80.26	152	83.06	31	16.94
Selecting a farm water pump	180	78.94	131	72.78	49	27.22
Installing a water pump	189	82.89	117	61.90	72	38.10
Installing a farm home plumbing system	175	76.75	79	45.14	96	54.86
Installing other farm plumbing	168	73.68	124	73.80	44	26.20
Maintaining and repairing farm plumbing	194	85.09	168	86.60	26	13.40

TABLE II (continued)

Activities	Farms included in survey reporting performance		Farms reporting performance			
			By operator		Not by operators	
	Number	Per cent	Number	Per cent	Number	Per cent
Constructing and maintaining farm fences and gates	228	100.00	228	100.00	0	.00
Planning a farm home sewage system	175	76.75	78	44.57	97	55.43
Installing a farm home sewage system	174	76.31	66	37.93	108	62.07

It should be noted that the activities of a managerial nature and the mechanical activities requiring specialized skills were performed to a lesser degree on the farms and to a lesser degree by the farm operators.

As indicated in Table II, eighteen of the twenty-four activities included in farm building and other structures were performed on sixty per cent or more of the farms. Only one activity was performed on less than fifty per cent of the 228 farms reporting.

Of the activities performed, only three were performed by less than fifty per cent of the farm operators. Twenty of the twenty-one were performed by sixty per cent or more of the operators. Four activities performed were not performed by thirty per cent or more of the operators.

A study of Table III reveals that twelve of the seventeen selected activities in farm electrification were performed on fifty per cent or more of the 228 reporting farms. Only two of the activities were performed on less than thirty per cent of the farms.

Of the seventeen activities performed on the farms, twelve were performed by fifty per cent or more of the operators. It should be noted that these twelve activities, in general, are the same twelve activities performed on a majority of the farms. Eleven of the activities performed were not performed by thirty per cent or more of the operators.

TABLE III

SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES PERFORMED IN FARM ELECTRIFICATION

Activities	Farms included in survey reporting performance		Farms reporting performance			
			By operator		Not by operators	
	Number	Per cent	Number	Per cent	Number	Per cent
Planning an electrical wiring system	154	67.54	66	42.85	88	57.15
Figuring an electrical system load	129	56.57	52	40.31	77	59.69
Selecting electrical wiring materials	145	63.59	75	51.72	70	48.28
Planning an exterior distribution system	104	45.61	45	43.27	59	56.73
Selecting lighting equipment	156	68.42	131	83.97	25	16.03
Installing a wiring system for the farm home	136	59.64	45	33.08	91	66.92
Maintaining a farm home wiring system	177	77.63	138	77.96	39	22.04
Installing and maintaining other farm wiring systems	144	63.15	109	75.69	35	24.31
Selecting electrical motors	129	56.57	90	69.76	39	30.24

TABLE III (continued)

Activities	Farms included in survey reporting performance		Farms reporting performance			
			By operator		Not by operators	
	Number	Per cent	Number	Per cent	Number	Per cent
Servicing electric motors	107	46.92	74	69.15	33	30.85
Reconditioning electric motors	61	26.75	4	6.55	57	93.45
Selecting electrical home appliances	185	81.14	149	80.54	36	19.46
Selecting electrical heating systems	79	34.64	50	63.29	29	36.71
Servicing electrical home appliances	134	58.77	90	67.16	44	32.84
Servicing and repairing electrical heating systems	53	23.24	26	49.05	27	50.95
Selecting electrical equipment for a specific farm enterprise	127	55.70	102	80.31	25	19.69
Diagnosing electrical system failures and safety hazards	169	74.12	134	79.28	35	20.72

Personal Characteristics and Economic Conditions of Farm Operators Performing and Not Performing Selected Mechanical and Managerial Activities in Farm Power and Machinery

There is a common assumption among agricultural educators that certain personal characteristics and economic conditions are associated with whether or not farm operators perform the mechanical and managerial farm mechanics activities conducted on their farms. Data analyzed in this section regarding personal characteristics and economic conditions of farm operators performing and not performing selected activities in farm power and machinery include: (1) age of operators, (2) level of formal education, (3) years of vocational agriculture instruction received while attending secondary school, (4) years of farming experience, (5) days of annual on-the-farm employment, (6) total acres in the farm operation and (7) current investment in farm power and machinery.

Data presented in Table IV indicate, in general, that no apparent pattern existed with regard to age and the selected activities performed and not performed by the selected farm operators in farm power and machinery. In referring to the table it is found that highly significant differences exist between the mean ages of those operators performing and not performing four of the sixteen selected activities. Therefore, the null hypothesis relative to the four activities was rejected.

It is observed in Table V that highly significant differences exist between the mean levels of education for those operators performing and not performing three of the sixteen selected activities in farm power and machinery. Of the three significant activities, two reflect higher mean levels in favor of the non-performing group. The null hypothesis relative to the three activities was rejected.

TABLE IV

MEAN AGES OF FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM POWER AND MACHINERY

Activities	Operators Performing Number	Operators Performing Mean years	Operators Not performing Number	Operators Not performing Mean years	F-value of difference between means
Determining cost involved in owning and operating machinery	88	41.40	31	42.19	.94
Determining power, labor and machinery requirement for a farm enterprise	82	41.98	24	43.58	.27
Determining capacity of farm machinery	93	43.03	17	43.12	.00
Planning a machinery replacement program	84	43.87	11	47.36	7.24**
Servicing an ignition system	145	41.61	41	39.51	.85
Servicing a fuel system	167	41.05	32	40.63	.03
Replacing a tractor clutch	92	41.66	59	37.95	3.33**
Replacing a tractor brakes	113	42.25	54	38.33	3.72**
Adjusting engine tappets	66	43.56	58	40.90	.15
Complete tractor or power unit overhaul	45	43.58	47	42.09	.03
One cylinder engine overhaul	37	42.05	31	41.90	.00
Arc welding	87	37.80	61	41.89	.36
Oxyacetylene welding	67	36.24	61	41.84	5.87**
Calculating pulley speeds	59	41.59	20	41.90	.09
Calibrating power sprayers	59	41.92	27	41.59	.01
Hardsurfacing plow-shares	53	37.13	37	39.92	1.24

**Significant at the one per cent level

TABLE V

MEAN YEARS OF FORMAL EDUCATION ATTAINED BY FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM POWER AND MACHINERY

Activities	Operators: Performing Number	Operators: Performing Mean years	Operators: Not performing Number	Operators: Not performing Mean years	F-value of difference between means
Determining cost involved in owning and operating machinery	88	11.85	31	11.35	.10
Determining power, labor and machinery requirement for a farm enterprise	82	11.77	24	9.83	1.27
Determining capacity of farm machinery	93	11.70	17	10.76	.24
Planning a machinery replacement program	84	10.57	11	9.36	1.59
Servicing an ignition system	145	11.32	41	10.68	.38
Servicing a fuel system	167	11.33	32	11.06	.06
Replacing a tractor clutch	92	11.34	59	11.27	.03
Replacing tractor brakes	113	11.04	54	11.39	.12
Adjusting engine tappets	66	11.30	58	11.09	.29
Complete tractor or power unit overhaul	45	10.07	47	11.02	2.28**
One cylinder engine overhaul	37	10.41	31	11.71	4.63**
Arc welding	87	12.36	61	10.89	.20
Oxyacetylene welding	67	12.60	61	11.03	1.83**
Calculating pulley speeds	59	12.19	20	10.75	.42
Calibrating power sprayers	59	11.14	27	11.56	.33
Hardsurfacing plow-shares	53	11.25	37	11.86	1.04

**Significant at one per cent level

TABLE VI

MEAN YEARS OF SECONDARY SCHOOL VOCATIONAL AGRICULTURE INSTRUCTION RECEIVED BY FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM POWER AND MACHINERY

Activities	Operators Performing Number	Operators Performing Mean years	Operators Not performing Number	Operators Not performing Mean years	F-value of difference between means
Determining cost involved in owning and operating machinery	88	1.74	31	.74	9.69**
Determining power, labor and machinery requirement for a farm enterprise	82	1.55	24	1.04	.19
Determining capacity of farm machinery	93	1.37	17	1.53	.17
Planning a machinery replacement program	84	1.51	11	.45	5.01**
Servicing an ignition system	145	1.48	41	1.34	.25
Servicing a fuel system	167	1.52	32	1.53	.00
Replacing a tractor clutch	92	1.37	59	1.56	.53
Replacing tractor brakes	113	1.34	54	1.57	.87
Adjusting engine tappets	66	1.47	58	1.31	.34
Complete tractor or power unit overhaul	45	1.24	47	1.49	.55
One cylinder engine overhual	37	1.38	31	1.58	.30
Arc welding	87	1.76	61	1.36	2.33**
Oxyacetylene welding	67	1.78	61	1.44	1.41*
Calcuating pulley speeds	59	1.58	20	1.20	.83
Calibrating power sprayers	59	1.69	27	1.48	.33
Hardsurfacing plow-shares	53	1.55	37	2.00	1.82**

*Significant at five per cent level
**Significant at one per cent level

Table VI indicates higher mean years of vocational agriculture instruction received in secondary school for the operator performed group in nine of the sixteen selected activities in farm power and machinery. In general, these activities were either managerial in nature or require a high degree of mechanical competency. Of the nine activities, five show a significant difference between the means of the two groups. Four of the significant activities reflect a high mean in favor of the operator performed group. The null hypothesis relative to the five significant activities was rejected.

The data in Table VII indicate that the less experienced farm operators were performing managerial activities whereas the more experienced operators were using the services of others to perform the activities in the area of farm power and machinery. However, of the sixteen selected activities a significant difference existed between the means of the two groups for only two activities; consequently, the null hypothesis relative to the two activities was rejected.

Data presented in Table VIII show with one exception, that the farm operators with the largest number days of annual on-the-farm employment performed the farm mechanics activities in farm power and machinery conducted on their farms. Of the sixteen selected activities, ten show a highly significant difference between the means of the two groups. In each case the larger mean is in favor of the operator performed group. Therefore, the null hypothesis relative to the ten activities was rejected.

TABLE VII

MEAN YEARS OF FARMING EXPERIENCE COMPLETED BY FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM POWER AND MACHINERY

Activities	Operators: Performing Number	Operators: Performing Mean years	Operators: Not performing Number	Operators: Not performing Mean years	F-value of difference between means
Determining cost involved in owning and operating machinery	88	23.69	31	24.87	.01
Determining power, labor and machinery requirement for a farm enterprise	82	23.72	24	26.21	1.27
Determining capacity of farm machinery	93	24.31	17	26.59	.39
Planning a machinery replacement program	84	25.82	11	33.91	.33
Servicing an ignition system	145	23.19	41	21.71	.40
Servicing a fuel system	167	22.41	32	23.16	.90
Replacing a tractor clutch	92	24.35	59	19.44	5.78**
Replacing tractor brakes	113	24.38	54	20.37	.38
Adjusting engine tappets	66	24.74	58	22.81	.78
Complete tractor or power unit overhaul	45	26.36	47	23.57	.13
One cylinder engine overhaul	37	24.59	31	23.52	.14
Arc welding	87	19.62	61	23.80	.38
Oxyacetylene welding	67	18.01	61	23.77	6.28**
Calculating pulley speeds	59	22.81	20	22.50	.06
Calibrating power sprayers	59	23.32	27	22.44	.97
Hardsurfacing plow-shares	53	19.02	37	19.97	.04

**Significant at one per cent level

TABLE VIII

MEAN DAYS OF ANNUAL ON-THE-FARM EMPLOYMENT FOR FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM POWER AND MACHINERY

Activities	Operators Performing Number	Operators Performing Mean days	Operators Not performing Number	Operators Not performing Mean days	F-value of difference between means
Determining cost involved in owning and operating machinery	88	223.05	21	118.87	2.04**
Determining power, labor and machinery requirement for a farm enterprise	82	223.76	24	176.25	3.18**
Determining capacity of farm machinery	93	227.56	17	220.59	.00
Planning a machinery replacement program	84	251.61	11	197.27	3.29**
Servicing an ignition system	145	223.14	41	166.71	8.12**
Servicing a fuel system	167	216.26	32	165.31	6.55**
Replacing a tractor clutch	92	223.48	59	186.69	3.50**
Replacing tractor brakes	113	226.88	54	176.20	7.38**
Adjusting engine tappets	66	237.95	58	186.95	6.18**
Complete tractor or power unit overhaul	45	208.78	47	217.13	.02
One cylinder engine overhaul	37	216.08	31	199.35	.32
Arc welding	87	217.59	61	192.05	.17
Oxyacetylene welding	67	220.52	61	190.25	2.14**
Calculating pulley speeds	59	226.61	20	213.00	.23
Calibrating power sprayers	59	249.71	27	196.22	5.54**
Hardsurfacing plow-shares	53	221.17	37	207.03	.33

**Significant at one per cent level

It is shown in Table IX that the larger farm operators performed the selected activities in farm power and machinery conducted on their farms. Of the sixteen selected activities, eight reflect a highly significant difference between the means of the two groups; thus, the null hypothesis relative to the eight activities was rejected.

The data presented in Table X reflect that the farm operators with the larger investments in farm power and machinery performed the activities conducted on their farms. Of the sixteen selected activities, six show a highly significant difference between the means of the two groups with a high mean in favor of the operator performed group; consequently, the null hypothesis relative to six activities was rejected.

TABLE IX

MEAN TOTAL ACRES IN FARM OPERATION OF THOSE FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM POWER AND MACHINERY

Activities	Operators				F-value of difference between means
	Performing		Not performing		
	Number	Mean acres	Number	Mean acres	
Determining cost involved in owning and operating machinery	88	270.67	31	158.65	7.60**
Determining power, labor and machinery requirement for a farm enterprise	82	282.78	24	204.42	2.81**
Determining capacity of farm machinery	93	270.04	17	209.29	1.54**
Planning a machinery replacement program	84	233.27	11	196.36	.54
Servicing an ignition system	145	232.46	41	194.39	1.44
Servicing a fuel system	167	229.02	32	204.22	.50
Replacing a tractor clutch	92	262.88	59	202.59	4.45
Replacing tractor brakes	113	258.22	54	201.76	3.61**
Adjusting engine tappets	66	276.39	58	184.59	5.79**
Complete tractor or power unit overhaul	45	262.67	47	199.36	.38
One cylinder engine overhaul	37	200.84	31	224.06	.56
Arc welding	87	243.33	61	182.23	5.34**
Oxyacetylene welding	67	252.25	61	170.84	9.74**
Calculating pulley speeds	59	220.56	20	199.30	.22
Calibrating power sprayers	59	262.88	27	179.26	4.38**
Hardsurfacing plow-shares	53	236.11	37	228.05	.50

**Significant at one per cent level

TABLE X

MEAN HUNDRED DOLLARS OF CURRENT INVESTMENT IN FARM POWER AND MACHINERY OF THOSE FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM POWER AND MACHINERY

Activities	Performing		Not performing		F-value of difference between means
	Number	Mean dollars	Number	Mean dollars	
Determining cost involved in owning and operating machinery	88	8,900	31	6,900	2.84**
Determining power, labor and machinery requirement for a farm enterprise	82	9,100	24	7,600	1.24
Determining capacity of farm machinery	93	8,900	17	8,400	.55
Planning a machinery replacement program	84	9,400	11	7,800	7.76**
Servicing an ignition system	145	8,100	41	7,000	1.06
Servicing a fuel system	167	8,100	32	7,300	.48
Replacing a tractor clutch	92	9,000	59	7,200	.36
Replacing tractor brakes	113	8,300	54	7,300	1.17
Adjusting engine tappets	66	9,700	58	7,000	6.94**
Complete tractor or power unit overhaul	45	9,500	47	7,400	.30
One cylinder engine overhaul	37	7,700	31	8,500	.32
Arc welding	87	9,200	61	6,200	1.16
Oxyacetylene welding	67	9,200	61	6,300	9.00**
Calculating pulley speeds	59	8,800	20	7,300	.83
Calibrating power sprayers	59	10,400	27	6,300	9.53**
Hardsurfacing plow-shares	53	9,000	37	7,500	1.69*

* Significant at five per cent level
**Significant at one per cent level

Personal Characteristics and Economic Conditions of Farm Operators Performing and Not Performing Selected Mechanical and Managerial Activities in Farm Buildings and Other Structures

Data analyzed in this section regarding personal characteristics and economic conditions of farm operators performing and not performing selected activities in farm buildings and other structures include: (1) age of operators, (2) level of formal education, (3) years of vocational agriculture instruction received while attending secondary school, (4) years of farming experience, (5) days of annual on-the-farm employment, (6) total acres in the farm operation and (7) current investment in farm buildings and other structures.

The data in Table XI indicate that no pattern existed with regard to age and the performance and non-performance of the activities by the selected farm operators in farm buildings and other structures. It is observed that highly significant differences exist between the means of the groups for three of the eleven activities; thus, the null hypothesis relative to the three activities was rejected.

In referring to Table XII it is found that significant differences exist between the mean levels of education for those operators performing and not performing three of the eleven selected activities in farm buildings and other structures. All three of the activities reflect higher means in favor of the operator performed group. Therefore, the null hypothesis relative to the three activities was rejected.

It is shown in Table XIII that higher mean years of vocational agriculture instruction received in secondary school exist in favor of the operator performed group for nine of the eleven selected activities in farm buildings and other structures. Of these nine activities,

TABLE XI

MEAN AGES OF FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM BUILDINGS AND OTHER STRUCTURES

Activities	Operators Performing Number	Operators Performing Mean years	Operators Not performing Number	Operators Not performing Mean years	F-value of difference between means
Sketching and drawing	86	38.09	37	39.70	.43
Reading blue prints and detail drawings	73	39.90	29	41.38	.02
Figuring bill of materials and other building cost	144	41.86	13	40.31	.20
Determining concrete mixtures	99	42.47	29	39.24	.15
Determining amounts of concrete needed	103	41.90	27	41.52	.00
Using concrete blocks and other masonry materials	105	42.01	35	43.26	.25
Planning a water system	152	39.40	31	44.55	4.39**
Installing a farm home plumbing system	79	39.71	96	39.42	.00
Installing other farm plumbing	124	39.60	44	41.09	.05
Planning a farm home sewage system	78	41.65	97	37.98	3.68**
Installing a farm home sewage system	66	41.65	108	38.60	2.38**

**Significant at one per cent level

TABLE XII

MEAN YEARS OF FORMAL EDUCATION ATTAINED BY FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM BUILDINGS AND OTHER STRUCTURES

Activities	Operators: Performing Number	Operators: Performing Mean years	Operators: Not performing Number	Operators: Not performing Mean years	F-value of difference between means
Sketching and drawing	86	11.26	37	11.35	.30
Reading blue prints and detail drawings	73	11.30	29	10.52	.16
Figuring bill of materials and other building cost	144	11.07	13	11.15	.08
Determining concrete mixtures	99	11.08	29	11.10	.00
Determining amounts of concrete needed	103	11.24	27	10.44	1.27*
Using concrete blocks and other masonry materials	105	11.44	35	10.29	3.63**
Planning a water system	152	11.29	31	9.68	7.63**
Installing a farm home plumbing system	79	11.35	96	10.97	.75
Installing other farm plumbing	124	11.56	44	10.34	.60
Planning a farm home sewage system	78	11.08	97	11.08	.00
Installing a farm home sewage system	66	11.17	108	11.09	.00

* Significant at five per cent level
**Significant at one per cent level

TABLE XIII

MEAN YEARS OF SECONDARY SCHOOL VOCATIONAL AGRICULTURE INSTRUCTION RECEIVED BY FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM BUILDINGS AND OTHER STRUCTURES

Activities	Operators Performing Number	Operators Performing Mean years	Operators Not performing Number	Operators Not performing Mean years	F-value of difference between means
Sketching and drawing	86	1.88	37	1.35	3.09**
Reading blue prints and detail drawings	73	1.75	29	1.31	.02
Figuring bill of materials and other building cost	144	1.56	13	1.38	.15
Determining concrete mixtures	99	1.59	29	1.41	.90
Determining amounts of concrete needed	103	1.56	27	1.11	1.83*
Using concrete blocks and other masonry materials	105	1.59	35	1.06	3.22**
Planning a water system	152	1.60	31	1.13	2.10**
Installing a farm home plumbing system	79	1.53	96	1.54	.00
Installing other farm plumbing	124	1.67	44	1.11	4.31**
Planning a farm home sewage system	78	1.40	97	1.59	.65
Installing a farm home sewage system	66	1.29	108	1.65	2.24**

* Significant at five per cent level
**Significant at one per cent level

five show a highly significant difference between the group means. Of the five activities, four reflect a higher mean in favor of the operator performed group. Therefore, the null hypothesis relative to the five significant activities was rejected.

Table XIV shows that no apparent pattern existed with regard to the factor of farming experience and the performance and non-performance of selected activities in farm buildings and other structures by the farm operators. Of the eleven selected activities, three show a highly significant difference between the means of the groups. Two of the significant activities reflect a higher mean in favor of the operator performed group. Therefore, the null hypothesis relative to the three significant activities was rejected.

Table XV shows that a significant difference exists between the mean number days of on-the-farm employment for those operators performing and not performing two of the eleven selected activities in farm buildings and other structures. Therefore, the null hypothesis relative to the two activities was rejected.

The data in Table XVI indicate, in general, that the larger farm operators performed the activities in farm building and other structure conducted on their farms. Of the eleven selected activities, nine reflect a high mean in favor of the operator performed group. However, only three of the eleven activities show a significant difference between the means. Therefore, the null hypothesis relative to the three activities was rejected.

TABLE XIV

MEAN YEARS OF FARMING EXPERIENCE COMPLETED BY FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM BUILDINGS AND OTHER STRUCTURES

Activities	Operators: Performing Number	Operators: Performing Mean years	Operators: Not performing Number	Operators: Not performing Mean years	F-value of difference between means
Sketching and drawing	86	21.08	37	21.92	.11
Reading blue prints and detail drawings	73	22.56	29	24.45	.04
Figuring bill of materials and other building cost	144	23.85	13	23.08	.04
Determining concrete mixtures	99	23.56	29	23.10	.00
Determining amounts of concrete needed	103	23.02	27	24.70	.37
Using concrete blocks and other masonry materials	105	22.87	35	25.14	.07
Planning a water system	152	21.05	31	26.52	4.71**
Installing a farm home plumbing system	79	21.63	96	21.00	.00
Istalling other farm plumbing	124	21.48	44	21.86	.03
Planning a farm home sewage system	78	23.18	97	20.01	2.69**
Installing a farm home sewage system	66	23.00	108	20.45	1.64**

**Significant at one per cent level

TABLE XV

MEAN DAYS OF ANNUAL ON-THE-FARM EMPLOYMENT FOR FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM BUILDINGS AND OTHER STRUCTURES

Activities	Operators				F-value of difference between means
	Performing		Not performing		
	Number	Mean days	Number	Mean days	
Sketching and drawing	86	185.67	37	182.70	.00
Reading blue prints and detail drawings	73	189.11	29	218.62	.13
Figuring bill of materials and other building cost	144	211.10	13	188.46	.46
Determining concrete mixtures	99	213.24	29	211.38	.00
Determining amounts of concrete needed	103	214.17	27	214.44	.00
Using concrete blocks and other masonry materials	105	214.19	35	227.71	.00
Planning a water system	152	195.93	31	235.48	2.96**
Installing a farm home plumbing system	79	213.42	96	197.86	.78
Installing other farm plumbing	124	197.74	44	207.98	.24
Planning a farm home sewage system	78	216.99	97	200.19	.88
Installing a farm home sewage system	66	220.08	108	195.77	1.73**

**Significant at one per cent level

TABLE XVI

MEAN TOTAL ACRES IN FARM OPERATION OF THOSE FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM BUILDINGS AND OTHER STRUCTURES

Activities	Operators: Performing Number	Operators: Performing Mean acres	Operators: Not performing Number	Operators: Not performing Mean acres	F-value of difference between means
Sketching and drawing	86	219.21	37	210.41	.69
Reading blue prints and detail drawings	73	218.22	29	240.17	.03
Figuring bill of materials and other building cost	144	230.42	13	271.38	.53
Determining concrete mixtures	99	272.76	29	197.10	3.92*
Determining amounts of concrete needed	103	239.69	27	212.22	.51
Using concrete blocks and other masonry materials	105	253.82	35	224.94	.56
Planning a water system	152	225.50	31	221.42	.00
Installing a farm home plumbing system	79	272.27	96	194.80	.77
Installing other farm plumbing	124	246.69	44	207.89	1.33
Planning a farm home sewage system	78	268.09	97	207.25	4.62**
Installing a farm home sewage system	66	272.80	108	213.95	4.09**

* Significant at five per cent level
**Significant at one per cent level

It is observed in Table XVII that, in general, those farm operators with higher investments in farm buildings and other structures performed the activities conducted on their farms in the area of farm buildings and other structures. The table shows that of the eleven activities, only two reflect a higher mean in favor of the non-performing group. Four of the eleven activities reflect a significant difference between the means of the two groups; thus, the null hypothesis relative to the four activities was rejected.

TABLE XVII

MEAN HUNDRED DOLLARS OF CURRENT INVESTMENT IN FARM BUILDINGS AND OTHER STRUCTURES OF THOSE FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM BUILDINGS AND OTHER STRUCTURES

Activities	Operators: Performing Number	Operators: Performing Mean dollars	Operators: Not performing Number	Operators: Not performing Mean dollars	F-value of difference between means
Sketching and drawing	86	7,100	37	5,600	3.13**
Reading blue prints and detail drawings	73	6,500	29	5,200	.19
Figuring bill of materials and other building cost	144	6,000	13	8,800	.42
Determining concrete mixtures	99	6,600	29	6,500	.01
Determining amoungs of concrete needed	103	6,300	27	5,300	1.35
Using concrete blocks and other masonry materials	105	6,700	35	5,400	1.98**
Planning a water system	152	6,197	31	5,694	.36
Installing a farm home plumbing system	79	6,500	96	6,000	.74
Installing other farm plumbing	124	6,000	44	6,700	.87
Planning a farm home sewage system	78	6,800	97	6,000	1.34*
Installing a farm home sewage system	66	6,700	108	6,300	4.78**

* Significant at five per cent level
**Significant at one per cent level

Personal Characteristics and Economic Conditions of Farm Operators Performing and Not Performing Selected Mechanical and Managerial Activities in Farm Electrification

Data analyzed in this section regarding personal characteristics and economic conditions of farm operators performing and not performing selected activities in farm electrification include: (1) age of operators, (2) level of formal education, (3) years of vocational agriculture instruction received while attending secondary school, (4) years of farming experience, (5) days of annual on-the-farm employment, (6) total acres in the farm operation and (7) current investment in farm buildings and other structures.

The data in Table XVIII indicate that the older farm operators performed those activities in farm electrification conducted on their farms. All of the selected activities reflect a higher mean in favor of the operator performed group. However, only three of the ten activities show a significant difference between the means; consequently, the null hypothesis relative to the three activities was rejected.

In referring to Table XIX one finds no definite existing pattern between the level of formal education and the performance and non-performance of the activities in farm electrification by the operator interviewed. Of the ten selected activities, three show a highly significant difference between the means; therefore, the null hypothesis relative to the three activities was rejected.

The data in Table XX indicate no established pattern between those operators performing and not performing activities in farm electrification with regard to the years of vocational agriculture instruction received while attending secondary school. Of the ten selected activities, only one reflects a significant difference between the means.

TABLE XVIII

MEAN AGES OF FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM ELECTRIFICATION

Activities	Operators Performing Number	Operators Performing Mean years	Operators Not performing Number	Operators Not performing Mean years	F-value of difference between means
Planning an electrical wiring system	66	41.89	88	38.22	.29
Figuring an electricial system load	52	40.00	77	37.90	.87
Selecting electrical wiring materials	75	40.92	70	39.17	.06
Installing a wiring system for the farm home	45	41.82	91	40.62	.26
Installing and maintaining other farm wiring systems	109	39.50	35	39.26	.00
Selecting electrical motors	90	41.19	39	39.85	.35
Selecting electrical home appliances	149	42.13	36	38.42	2.31**
Selecting electrical heating systems	50	44.52	29	34.03	3.15**
Selecting electrical equipment for a specific farm enterprise	102	39.64	25	37.08	.80
Diagnosing electrical system failures and safety hazards	134	40.29	35	37.40	1.34*

* Significant at five per cent level
**Significant at one per cent level

TABLE XIX

MEAN YEARS OF FORMAL EDUCATION ATTAINED BY FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM ELECTRIFICATION

Activities	Operators Performing Number	Operators Performing Mean years	Operators Not performing Number	Operators Not performing Mean years	F-value of difference between means
Planning an electrical wiring system	66	11.70	88	10.73	3.83**
Figuring an electrical system load	52	11.33	77	11.32	.00
Selecting electrical wiring materials	75	11.32	70	10.90	.86
Installing a wiring system for the farm home	45	10.73	91	11.11	.48
Installing and maintaining other farm wiring systems	109	11.18	35	11.29	.00
Selecting electrical motors	90	10.90	39	11.03	.00
Selecting electrical home appliances	149	10.58	36	11.36	2.17**
Selecting electrical heating systems	50	10.80	29	11.76	2.05**
Selecting electrical equipment for a specific farm enterprise	102	11.11	25	10.72	.38
Diagnosing electrical system failures and safety hazards	134	10.87	35	11.49	1.22

**Signficant at one per cent level

It should be noted that this activity shows a higher mean in favor of the non-performing group. Therefore, the null hypothesis relative to this activity was rejected.

It is shown in Table XXI that the more experienced farm operators performed the activities conducted on their farms in farm electrification. This is reflected by higher means for the performed group in all of the selected activities. Five of the activities indicate highly significant differences between the means. Therefore, the null hypothesis relative to the significant activities was rejected.

As indicated by data in Table XXII, the farm operators with the largest number days of on-the-farm employment performed the farm electrification activities conducted on their farm. In only two of the ten activities is the higher mean in favor of the non-performing group; however, both are insignificant. Of the ten activities, three show a highly significant difference between the group means; thus, the null hypothesis relative to the three activities was rejected.

In comparing the two groups of data presented in Table XXIII one finds that the farm operators with larger acreages in their operation performed the farm electrification activities conducted on their farms. No activity reflects a higher mean in favor of the non-performing group. However, of the ten selected activities only four show a significant difference between the group means. Therefore, the null hypothesis relative to significant activities was rejected.

The data presented in Table XXIV indicate that the farm operators with larger investments in farm buildings and other structures performed the farm electrification activities conducted on their farm. All of the selected activities reflect a higher mean in favor of operator

performed group. It should be noted however, that only three activities show a significant difference between the group means; consequently, the null hypothesis relative to the three activities was rejected.

TABLE XX

MEAN YEARS OF SECONDARY SCHOOL VOCATIONAL AGRICULTURE INSTRUCTION RECEIVED BY FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM ELECTRIFICATION

Activities	Operators: Performing Number	Operators: Performing Mean years	Operators: Not performing Number	Operators: Not performing Mean years	F-value of difference between means
Planning an electrical wiring system	66	1.52	88	1.51	.00
Figuring an electrical system load	52	1.58	77	1.79	.57
Selecting electrical wiring materials	75	1.53	70	1.64	.18
Installing a wiring system for the farm home	45	1.44	91	1.44	.00
Installing and maintaining other farm wiring systems	109	1.49	35	1.66	.33
Selecting electrical motors	90	1.40	39	1.49	.08
Selecting electrical home appliances	149	1.44	36	1.42	.00
Selecting electrical heating systems	50	1.28	29	2.21	6.49**
Selecting electrical equipment for a specific farm enterprise	102	1.51	25	1.28	.43
Diagnosing electrical system failures and safety hazards	134	1.46	35	1.83	1.66

**Significant at one per cent level

TABLE XXI

MEAN YEARS OF FARMING EXPERIENCE COMPLETED BY FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM ELECTRIFICATION

Activities	Operators Performing Number	Operators Performing Mean years	Operators Not performing Number	Operators Not performing Mean years	F-value of difference between means
Planning an electrical wiring system	66	23.97	88	19.89	4.56**
Figuring an electrical system load	52	23.02	77	19.25	2.87**
Selecting electrical wiring materials	75	22.60	70	20.51	.96
Installing a wiring system for the farm home	45	23.38	91	22.18	.02
Installing and maintaining other farm wiring systems	109	21.42	35	20.57	1.16
Selecting electrical motors	90	22.66	39	20.18	1.09
Selecting electrical home appliances	149	23.96	36	20.89	1.55**
Selecting electrical heating systems	50	24.62	29	16.07	8.92**
Selecting electrical equipment for a specific farm enterprise	102	21.31	25	17.96	1.57
Diagnosing electrical system failures and safety hazards	134	22.07	35	17.74	3.16**

**Significant at one per cent level

TABLE XXII

MEAN DAYS OF ANNUAL ON-THE-FARM EMPLOYMENT FOR FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM ELECTRIFICATION

Activities	Operators Performing Number	Operators Performing Mean days	Operators Not performing Number	Operators Not performing Mean days	F-value of difference between means
Planning an electrical wiring system	66	217.30	88	194.94	.13
Figuring an electrical system load	52	196.19	77	199.94	.00
Selecting electrical wiring materials	75	215.51	70	194.03	1.20
Installing a wiring system for the farm home	45	202.33	91	214.64	.33
Installing and maintaining other farm wiring systems	109	202.94	35	181.71	.80
Selecting electrical motors	90	208.23	39	195.18	.35
Selecting electrical home appliances	149	215.62	36	177.64	3.02**
Selecting electrical heating systems	50	222.84	29	160.79	5.35**
Selecting electrical equipment for a specific farm enterprise	102	218.99	25	111.00	.18
Diagnosing electrical system failures and safety hazards	134	210.86	35	173.71	2.75**

**Significant at one per cent level

TABLE XXIII

MEAN TOTAL ACRES IN FARM OPERATION OF THOSE FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM ELECTRIFICATION

Activities	Operators: Performing Number	Operators: Performing Mean acres	Operators: Not performing Number	Operators: Not performing Mean acres	F-value of difference between means
Planning an electrical wiring system	66	270.36	88	190.73	7.58**
Figuring an electrical system load	52	271.79	77	202.82	4.97**
Selecting electrical wiring materials	75	257.45	70	204.11	3.10**
Installing a wiring system for the farm home	45	243.27	91	211.63	.96
Installing and maintaining other farm wiring systems	109	228.04	35	194.89	.91
Selecting electrical motors	90	250.78	39	218.15	.82
Selecting electrical home appliances	149	241.71	36	167.97	4.66**
Selecting electrical heating systems	50	255.38	29	233.72	.24
Selecting electrical equipment for a specific farm enterprise	102	249.12	25	172.76	.35
Diagnosing electrical system failures and safety hazards	134	220.85	35	194.66	.59

**Signficant at one per cent level

TABLE XXIV

MEAN HUNDRED DOLLARS OF CURRENT INVESTMENT IN FARM BUILDINGS AND OTHER STRUCTURES OF THOSE FARM OPERATORS PERFORMING AND NOT PERFORMING SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM ELECTRIFICATION

Activities	Operators Performing Number	Operators Performing Mean dollars	Operators Not performing Number	Operators Not performing Mean dollars	F-value of difference between means
Planning an electrical wiring system	66	6,200	88	5,500	1.29*
Figuring an electrical system load	52	6,300	77	5,900	.35
Selecting electrical wiring materials	75	6,800	70	5,000	7.57**
Installing a wiring system for the farm home	45	6,700	91	5,800	1.61**
Installing and maintaining other farm wiring systems	109	6,800	35	5,400	.35
Selecting electrical motors	90	6,900	39	5,885	1.43
Selecting electrical home appliances	149	6,400	36	5,700	.66
Selecting electrical heating systems	50	6,200	29	5,800	.18
Selecting electrical equipment for a specific farm enterprise	102	6,500	25	5,300	1.64
Diagnosing electrical system failures and safety hazards	134	6,300	35	5,300	.14

* Signficant at five per cent level
**Signficant at one per cent level

The Nature and Extent of the Qualifications of Farm Operators To Perform Mechanical and Managerial Activities in Farm Power and Machinery, Farm Buildings and Other Structures and Farm Electrification

Another pertinent favor which should be considered by agricultural educators in the planning of farm mechanics instruction would be to determine what farm mechanics activities farmers are qualified to perform. This data would certainly be of value in planning and implementing instruction for out-of-school groups.

Data analyzed in this section were secured from 228 selected successful farmers. The data include: (1) selected farm mechanics activities performed on farms and (2) whether or not the farm operators were qualified to perform the selected activities. No attempt was made during the collection of data to determine the competency level of the farm operator to perform the activity. It was assumed that if the operator performed the activities he was qualified.

A study of Table XXV shows that of twenty-nine selected activities in farm power and machinery performed on the reporting farms, seventy per cent or more of the operators felt that they were qualified to perform at least twenty-three of the activities. Sixty per cent or more of the operators felt that they were qualified to perform at least twenty-five of the activities. Fifty per cent or more of the operators felt that they could perform all of the twenty-nine activities.

Of the twenty-nine activities performed on the farm, thirty per cent or more of the operators felt that they were not qualified to perform seven of the activities. It should be noted that these activities are managerial in nature, major overhauls, recent trend activities and mechanical skills requiring a knowledge of mechanical theory.

TABLE XXV

SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES PERFORMED IN FARM POWER AND MACHINERY AND THE RECOGNITION BY FARM OPERATORS AS BEING EITHER QUALIFIED OR NOT QUALIFIED TO PERFORM THE SELECTED ACTIVITIES

Activities	Farms included in survey reporting performance		Farms reporting operator			
			Qualified to perform		Not qualified to perform	
	Number	Per cent	Number	Per cent	Number	Per cent
Determining the cost involved in owning and operating farm machinery	119	52.19	89	74.78	30	25.22
Determining the power, labor and machinery requirement for a farm enterprise	106	46.49	85	80.18	21	19.82
Determining the capacity of farm machinery	110	48.24	97	88.18	13	11.82
Planning a machinery replacement program	95	41.66	84	88.42	11	11.58
Selection of tractor fuels and lubricants	208	91.23	199	95.67	9	4.33
Tractor preventative maintenance	225	98.68	223	99.11	2	.89
Servicing an ignition system	186	81.57	150	80.64	36	19.36
Servicing a fuel system	199	87.28	172	86.43	27	13.57
Servicing a cooling system	198	86.84	183	92.42	15	7.58

TABLE XXV (continued)

Activities	Farms included in survey reporting performance		Farms reporting operator			
			Qualified to perform		Not qualified to perform	
	Number	Per cent	Number	Per cent	Number	Per cent
Adjusting a tractor clutch	181	79.38	152	83.98	29	16.02
Replacing a tractor clutch	151	66.22	107	70.86	44	29.14
Adjusting tractor brakes	197	86.40	176	89.34	21	10.66
Replacing tractor brakes	167	73.24	120	71.85	47	28.15
Adjusting engine valve tappets	124	54.38	72	58.06	52	41.94
Diagnosing and making minor machinery and equipment repair	203	89.03	184	90.64	19	9.36
Diagnosing the needs for major machinery and equipment repair	156	68.42	124	79.49	32	20.51
Complete tractor or power unit engine overhaul	92	40.35	47	51.08	45	48.92
Complete one cylinder engine overhaul	68	29.82	37	54.41	31	45.59
Complete overhaul of farm machinery	152	66.66	128	84.21	24	15.79
Using the arc welder	148	64.91	92	62.16	56	37.84
Using the oxyacetylene welder	128	56.14	74	57.81	54	42.19

TABLE XXV (continued)

Activities	Farms included in survey reporting performance		Farms reporting operator			
			Qualified to perform		Not qualified to perform	
	Number	Per cent	Number	Per cent	Number	Per cent
Painting farm machinery	161	70.61	158	98.13	3	1.87
Setting up farm machinery	212	92.99	208	98.11	4	1.89
Adjusting farm machinery under field conditions	214	93.86	210	98.13	4	1.87
Calculating pulley speeds	79	34.64	59	74.68	20	25.32
Constructing labor-saving equipment	127	55.70	122	96.06	5	3.94
Calibrating power sprayers	86	37.71	59	68.60	27	31.40
Calibrating planters and seeding drills	173	75.87	166	95.95	7	4.05
Hardsurfacing plow-shares and cultivator sweeps	90	39.47	57	63.33	33	36.67

The data in Table XXVI indicate that of the twenty-four selected activities in farm buildings and other structures reported performed, seventy per cent or more of the operators felt that they were qualified to perform twenty-one of the activities. Fifty-five per cent or more of the operators felt that they were qualified to perform all twenty-four activities.

Of the twenty-four activities performed on the farms, thirty per cent or more of the operators felt that they were not qualified to perform three of the activities. These activities, in general, were activities associated with the installation of farm home conveniences.

It is shown in Table XXVII that of the seventeen selected activities in farm electrification reported performed, seventy per cent or more of the farm operators felt that they were qualified to perform nine of the activities. Forty-five per cent or more felt that they were qualified to perform at least fourteen of the seventeen activities.

Of the seventeen activities reported as performed, thirty per cent or more of the operators felt that they were not qualified to perform seven of the activities. These seven activities were associated with the planning and installing of electrical equipment and wiring systems.

In referring to Tables XXV, XXVI and XXVII it is noted that percentage-wise the farm operators interviewed were less qualified to perform the activities in farm electrification and farm power and machinery.

It is also interesting to note the small difference in the percentages of each activity when the "not qualified to perform" column of Table XXV is compared with the "not performed by operator" column of Table I on pages 30 through 70, Table XXVI with Table II on pages

33 through 75 and Table XXVII with Table III on pages 37 through 78.

Since these were the same reporting operators the data indicate, in general, that if the operator was qualified he performed the activity himself. This seems to refute the assumption held by many educators and commercial people that farm operators will or do rely on others to perform many mechanical activities even though they are qualified to perform the activity themselves.

TABLE XXVI

SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES PERFORMED IN FARM BUILDINGS AND OTHER STRUCTURES AND THE RECOGNITION BY FARM OPERATORS AS BEING EITHER QUALIFIED OR NOT QUALIFIED TO PERFORM THE SELECTED ACTIVITIES

Activities	Farms included in survey reporting performance		Farms reporting operator			
			Qualified to perform		Not qualified to perform	
	Number	Per cent	Number	Per cent	Number	Per cent
Sketching and drawing	123	53.94	87	70.74	36	29.26
Reading blue prints and detail drawings	102	44.73	73	71.56	29	28.44
Determining building requirements for animals and crops	154	67.54	141	91.55	13	8.45
Maintaining and improving farm buildings	183	80.54	170	92.89	13	7.11
Figuring bill of materials and other building cost	157	68.85	144	91.71	13	8.29
Selecting lumber and other building materials	174	76.31	162	93.10	12	6.90
Constructing farm buildings	165	72.36	149	90.30	11	9.70
Treating lumber and other wood materials	118	51.75	108	91.52	10	8.84
Paints and painting	145	63.59	139	95.86	6	4.14

TABLE XXVI (continued)

Activities	Farms included in survey reporting performance		Farms reporting operator			
			Qualified to perform		Not qualified to perform	
	Number	Per cent	Number	Per cent	Number	Per cent
Constructing pole type buildings	120	52.62	102	85.00	18	15.00
Constructing concrete forms	139	60.96	125	89.92	14	10.08
Determining concrete mixtures	128	56.14	101	78.90	27	21.10
Determining amounts of concrete needed	130	57.01	103	79.23	27	20.77
Mixing concrete on the farm	144	63.15	127	88.19	14	11.81
Using concrete blocks and other masonry materials	140	61.40	113	80.71	27	19.29
Planning a water system	183	80.26	162	88.52	21	11.48
Selecting a farm water pump	180	78.94	144	80.00	36	20.00
Installing a water pump	189	82.89	141	74.67	48	25.40
Installing a farm home plumbing system	175	76.75	99	56.54	76	43.46
Installing other farm plumbing	168	73.68	132	78.57	36	21.43
Maintaining and repairing farm plumbing	194	85.09	169	87.11	25	12.89

TABLE XXVI (continued)

Activities	Farms included in survey reporting performance		Farms reporting operator			
			Qualified to perform		Not qualified to perform	
	Number	Per cent	Number	Per cent	Number	Per cent
Constructing and maintaining farm fences and gates	228	100.00	228	100.00	0	.00
Planning a farm home sewage system	175	76.75	108	61.71	68	38.29
Installing a farm home sewage system	174	76.31	98	56.32	76	43.68

TABLE XXVII

SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES PERFORMED IN FARM ELECTRIFICATION AND THE RECOGNITION BY FARM OPERATORS AS BEING EITHER QUALIFIED OR NOT QUALIFIED TO PERFORM THE SELECTED ACTIVITIES

Activities	Farms included in survey reporting performance		Farms reporting operator			
			Qualified to perform		Not qualified to perform	
	Number	Per cent	Number	Per cent	Number	Per cent
Planning an electrical wiring system	154	67.54	74	48.06	80	51.94
Figuring an electrical system load	129	56.57	59	45.73	70	54.27
Selecting electrical wiring materials	145	63.59	85	58.62	60	41.38
Planning an exterior distribution system	104	45.61	78	75.00	26	25.00
Selecting lighting equipment	156	68.42	134	85.89	22	14.11
Installing a wiring system for the farm home	136	59.64	54	39.70	82	60.30
Maintaining a farm home wiring system	177	77.63	144	81.35	33	18.65
Installing and maintaining other farm wiring systems	144	63.15	109	75.69	35	24.31
Selecting electrical motors	129	56.57	99	76.74	30	23.26

TABLE XXVII (continued)

Activities	Farms included in survey reporting performance		Farms reporting operator			
			Qualified to perform		Not qualified to perform	
	Number	Per cent	Number	Per cent	Number	Per cent
Servicing electric motors	107	46.92	74	69.16	33	30.84
Reconditioning electric motors	61	26.75	4	6.55	57	93.45
Selecting electrical home appliances	185	81.14	152	82.16	33	17.84
Selecting electrical heating systems	79	34.64	57	72.15	22	27.88
Servicing electrical home appliances	134	58.77	90	67.16	44	32.84
Servicing and repairing electrical heating systems	53	23.24	26	49.06	27	50.94
Selecting electrical equipment for a specific farm enterprise	127	55.70	104	81.88	23	18.12
Diagnosing electrical system failures and safety hazards	169	74.12	143	84.61	26	15.39

Personal Characteristics of Farm Operators Recognizing Themselves as Qualified and Not Qualified to Perform Selected Mechanical and Managerial Activities in Farm Power and Machinery

Another of the common assumptions among agricultural educators is that certain personal characteristics are associated with whether or not farm operators are qualified to perform the mechanical and managerial farm mechanics activities conducted on their farms. Data analyzed in this section regarding personal characteristics of farm operators recognizing themselves as qualified and not qualified to perform selected activities in farm power and machinery include: (1) age of operators, (2) level of formal education, (3) years of vocational agriculture instruction received while attending secondary school and (4) years of farming experience.

The data in Table XXVIII indicate that, in general, the younger farm operators interviewed were qualified to perform the managerial and recent trend mechanical activities in farm power and machinery. Of these activities, eight reflect higher means in favor of the not qualified group. However, the data indicate that the older farm operators were more qualified to perform five mechanical activities. All five activities show a highly significant difference between the group means. The null hypothesis relative to the eight significant activities was rejected.

The data in Table XXIX reveal that the farm operators with the higher level of formal education felt that they were qualified to perform the managerial activities in farm power and machinery. The table shows that four of the six significant activities reflecting a higher mean in favor of the qualified group were managerial activities.

TABLE XXVIII

MEAN AGES OF FARM OPERATORS RECOGNIZING THEMSELVES AS QUALIFIED AND THOSE RECOGNIZING THEMSELVES AS NOT QUALIFIED TO PERFORM SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM POWER AND MACHINERY

Activities	Operators: Qualified Number	Qualified Mean years	Not qualified Number	Not qualified Mean years	F-value of difference between means
Determining the cost involved in owning and operating farm machinery	89	40.99	30	43.43	.87
Determining power, labor and machinery requirement for a farm enterprise	85	41.99	21	43.50	2.47**
Determining capacity of farm machinery	97	42.91	13	44.08	.97
Planning a machinery replacement program	84	44.17	11	45.09	.05
Servicing an ignition system	150	41.98	36	37.69	2.64**
Servicing a fuel system	172	41.58	27	37.15	2.89**
Replacing a tractor clutch	107	41.72	44	36.55	5.69**
Replacing tractor brakes	120	42.49	47	37.13	6.57**
Adjusting engine tappets	72	44.17	52	39.75	4.12**
Complete tractor or power unit overhaul	47	42.26	45	42.36	.01
One cylinder engine overhaul	37	42.41	31	42.68	.18
Arc welding	92	38.62	56	40.91	1.10
Oxacetylene welding	74	37.41	54	40.96	2.25**
Calculating pulley speeds	59	42.10	20	40.40	.29
Calibrating power sprayers	59	41.27	27	43.00	.40
Hardsurfacing plow-shares	57	36.47	23	41.39	3.82**

**Significant at one per cent level

TABLE XXIX

MEAN AGES OF FARM OPERATORS RECOGNIZING THEMSELVES AS QUALIFIED AND THOSE RECOGNIZING THEMSELVES AS NOT QUALIFIED TO PERFORM SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM POWER AND MACHINERY

Activities	Operators: Qualified Number	Qualified Mean years	Not qualified Number	Not qualified Mean years	F-value of difference between means
Determining the cost involved in owning and operating farm machinery	89	12.60	30	11.09	2.59**
Determining the power, labor and machinery requirement for a farm enterprise	85	12.79	21	10.89	1.96*
Determining capacity of farm machinery	97	12.85	13	9.60	2.32*
Planning a machinery replacement program	84	11.55	11	9.65	2.49*
Servicing an ignition system	150	11.29	36	10.75	.20
Servicing a fuel system	172	11.27	27	11.37	.02
Replacing a tractor clutch	107	11.11	44	11.80	.03
Replacing tractor brakes	120	11.00	47	11.53	.26
Adjusting engine tappets	72	11.39	52	10.94	.12
Complete tractor or power unit overhaul	47	9.89	45	11.24	.47
One cylinder engine overhaul	37	10.46	31	11.65	.38
Arc welding	92	12.25	56	10.93	1.58**
Oxacetylene welding	74	12.51	54	10.94	1.80**
Calculating pulley speeds	59	12.22	20	10.65	.51
Calibrating power sprayers	59	11.24	27	11.33	.00
Hardsurfacing plow-shares	57	11.37	23	11.73	.33

*Significant at five per cent level
**Significant at one per cent level

The other two activities were recent trend activities and also reflect high means in favor of the qualified group. Therefore, the null hypothesis relative to the six activities was rejected.

It is shown in Table XXX that ten of the selected activities in farm power and machinery reflect higher mean years of vocational agriculture instruction received in favor of the operator qualified group. In general, these activities were managerial in nature and activities requiring a knowledge of mechanical theory. However, only four of the ten show a significant difference between the group means; thus, the null hypothesis realtive to the four activities was rejected.

It is observed in Table XXXI that the less experienced operators were qualified to perform the managerial and recent trend activities but not as qualified to perform the mechanical activities in farm power and machinery as the more experienced operators. Of the sixteen selected activities, seven reflect a significant difference between the group means; therefore, the null hypothesis relative to the seven activities was rejected.

TABLE XXX

MEAN YEARS OF SECONDARY SCHOOL VOCATIONAL AGRICULTURE INSTRUCTION RECEIVED BY FARM OPERATORS RECOGNIZING THEMSELVES AS QUALIFIED AND THOSE RECOGNIZING THEMSELVES AS NOT QUALIFIED TO PERFORM SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM POWER AND MACHINERY

Activities	Operators: Qualified Number	Qualified Mean years	Not qualified Number	Not qualified Mean years	F-value of difference between means
Determining the cost involved in owning and operating farm machinery	89	1.79	30	.57	1.47*
Determining power, labor and machinery requirement for a farm enterprise	85	1.53	21	1.04	1.75**
Determining the capacity of farm machinery	97	1.42	13	1.15	.36
Planning a machinery replacement program	84	1.46	11	.82	1.81
Servicing an ignition system	150	1.47	36	1.36	.11
Servicing a fuel system	172	1.51	27	1.59	.63
Replacing tractor clutch	107	1.40	44	1.55	.26
Replacing tractor brakes	120	1.36	47	1.55	.53
Adjusting engine tappets	72	1.54	52	1.19	1.61*
Complete tractor or power unit overhaul	47	1.19	45	1.56	.12
One cylinder engine overhaul	37	1.41	31	1.55	.15
Arc welding	92	1.65	56	1.50	.33
Oxyacetylene welding	74	1.70	54	1.50	.50
Calculating pulley speeds	59	1.63	20	1.05	1.90*
Calibrating power sprayers	59	1.78	27	1.30	1.73*
Hardsurfacing plow-shares	57	1.65	23	1.88	.44

*Significant at five per cent level
**Significant at one per cent level

TABLE XXXI

MEAN YEARS OF FARMING EXPERIENCE COMPLETED BY FARM OPERATORS RECOGNIZING THEMSELVES AS QUALIFIED AND THOSE RECOGNIZING THEMSELVES AS NOT QUALIFIED TO PERFORM SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM POWER AND MACHINERY

Activities	Operators: Qualified Number	Qualified Mean years	Not qualified Number	Not qualified Mean years	F-value of difference between means
Determining the cost involved in owning the operating farm machinery	89	23.47	30	25.57	.55
Determining power, labor and machinery requirement for a farm enterprise	85	23.86	21	25.79	.36
Determining the capacity of farm machinery	97	24.31	13	27.31	.54
Planning a machinery replacement program	84	26.06	11	32.09	1.80**
Servicing an ignition system	150	23.57	36	19.94	2.89**
Servicing a fuel system	172	23.01	27	19.44	1.79**
Replacing a tractor clutch	107	24.39	44	17.66	9.68**
Replacing tractor brakes	120	24.54	47	19.36	.59
Adjusting engine tappets	72	24.94	52	22.31	1.42*
Complete tractor or power unit overhaul	47	25.91	45	23.91	.00
One cylinder engine overhaul	37	23.94	31	24.29	.01
Arc welding	92	20.15	56	23.30	2.08**
Oxyacetylene welding	74	18.93	54	23.26	3.39**
Calculating pulley speeds	59	23.20	20	24.35	.11
Calibrating power sprayers	59	22.42	27	24.41	.50
Hardsurfacing plow-shares	57	18.02	23	21.82	.22

*Significant at five per cent level
**Significant at one per cent level

Personal Characteristics of Farm Operators Recognizing Themselves As Qualified and Not Qualified to Perform Selected Mechanical and Managerial Activities in Farm Buildings and Other Structures

Data analyzed in this section regarding personal characteristics of farm operators recognizing themselves as qualified and not qualified to perform selected activities in farm buildings and other structures include: (1) age of operators, (2) level of formal education, (3) years of vocational agriculture instruction received while attending secondary school and (4) years of farming experience.

Data in Table XXXII indicate that, in general, no apparent pattern existed in regard to age and being qualified and not qualified to perform the selected activities in farm buildings and other structures for those operators interviewed. It is interesting to note that the three activities reflecting significant differences between the group means are associated with farm conveniences. The null hypothesis relative to the three activities was rejected.

In referring to Table XXXIII one will find that the farm operators with the higher levels of formal education were qualified to perform the selected activities in farm buildings and other structures. All activities reflect a higher mean in favor of the operator qualified group. Of the eleven selected activities, six reflect a highly significant difference between the group means. Therefore, the null hypothesis relative to the six activities was rejected.

It is shown in Table XXXIV that with one exception, the farm operators receiving the largest number years of vocational agriculture instruction while attending secondary school were qualified to perform the selected activities in farm buildings and other structures.

Of the eleven activities, five reflect a significant difference between the group means; consequently, the null hypothesis relative to five activities was rejected.

As indicated in Table XXXV no pattern existed for selected group of farm operators with regard to farming experience and being qualified and not qualified to perform the selected activities in farm buildings and other structures. Of the eleven activities, only three show a significant difference between the means of the groups; thus, the null hypothesis relative to the three activities was rejected.

TABLE XXXII

MEAN AGES OF FARM OPERATORS RECOGNIZING THEMSELVES AS QUALIFIED AND THOSE RECOGNIZING THEMSELVES AS NOT QUALIFIED TO PERFORM SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM BUILDINGS AND OTHER STRUCTURES

Activities	Operators: Qualified Number	Qualified Mean ages	Not qualified Number	Not qualified Mean ages	F-value of difference between means
Sketching and drawing	87	39.01	36	37.53	.36
Reading blue prints and detail drawings	73	40.79	29	39.14	.32
Figuring bill of materials and other building cost	144	41.61	13	42.76	.13
Determining concrete mixtures	101	42.19	27	40.07	.62
Determining amounts of concrete needed	103	41.81	27	41.89	.00
Using concrete blocks and other masonry materials	113	42.19	27	42.85	.05
Planning a water system	162	39.54	21	45.95	4.94**
Installing a farm home plumbing system	99	40.76	76	37.97	2.08**
Installing other farm plumbing	132	40.04	36	39.81	.01
Planning a farm home sewage system	108	39.98	68	39.03	.00
Installing a farm home sewage system	98	41.70	76	37.25	5.40**

**Significant at one per cent level

TABLE XXXIII

MEAN YEARS OF FORMAL EDUCATION ATTAINED BY FARM OPERATORS RECOGNIZING THEMSELVES AS QUALIFIED AND THOSE RECOGNIZING THEMSELVES AS NOT QUALIFIED TO PERFORM SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM BUILDINGS AND OTHER STRUCTURES

Activities	Operators: Qualified Number	Qualified Mean years	Not qualified Number	Not qualified Mean years	F-value of difference between means
Sketching and drawing	87	11.84	36	11.64	.81
Reading blue prints and detail drawings	73	11.23	29	10.69	.76
Figuring bill of materials and other building cost	144	11.14	13	10.59	.48
Determining concrete mixtures	101	11.11	27	11.00	.00
Determining amounts of concrete needed	103	11.29	27	10.26	2.13**
Using concrete blocks and other masonry materials	113	11.39	27	10.15	3.49**
Planning a water system	162	11.22	21	9.43	6.79**
Installing a farm home plumbing system	99	11.41	76	10.79	1.96**
Installing other farm plumbing	132	11.44	36	10.50	2.93**
Planning a farm home sewage system	108	11.15	68	10.97	.14
Installing a farm home sewage system	98	11.39	76	10.78	1.76**

**Significant at one per cent level

TABLE XXXIV

MEAN YEARS OF SECONDARY SCHOOL VOCATIONAL AGRICULTURE INSTRUCTION RECEIVED BY FARM OPERATORS RECOGNIZING THEMSELVES AS QUALIFIED AND THOSE RECOGNIZING THEMSELVES AS NOT QUALIFIED TO PERFORM SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM BUILDINGS AND OTHER STRUCTURES

Activities	Operators: Qualified Number	Qualified Mean years	Not Qualified Number	Not Qualified Mean years	F-value of difference between means
Sketching and drawing	87	1.84	36	1.44	1.65
Reading blue prints and detail drawings	73	1.70	29	1.45	.48
Figuring bill of materials and other building cost	144	1.58	13	1.29	.49
Determining concrete mixtures	101	1.57	27	1.44	.15
Determining amounts of concrete needed	103	1.56	27	1.11	1.83*
Using concrete blocks and other masonry materials	112	1.65	27	.67	9.43**
Planning a water system	162	1.60	21	.86	4.55**
Installing a farm home plumbing system	99	1.60	76	1.46	.33
Installing other farm plumbing	132	1.65	36	1.06	4.32**
Planning a farm home sewage system	108	1.60	68	1.34	1.15**
Installing a farm home sewage system	98	1.45	76	1.59	.36

*Significant at five per cent level
**Significant at one per cent level

TABLE XXXV

MEAN YEARS OF FARMING EXPERIENCE COMPLETED BY FARM OPERATORS RECOGNIZING THEMSELVES AS QUALIFIED AND THOSE RECOGNIZING THEMSELVES AS NOT QUALIFIED TO PERFORM SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM BUILDINGS AND OTHER STRUCTURES

Activities	Operators: Qualified Number	Qualified Mean years	Not qualified Number	Not qualified Mean years	F-value of difference between means
Sketching and drawing	87	21.98	36	19.78	.78
Reading blue prints and detail drawings	73	23.52	29	22.03	.26
Figuring bill of materials and other building cost	144	23.62	13	25.12	.02
Determining concrete mixtures	101	23.53	27	23.15	.00
Determining amounts of concrete needed	103	22.95	27	24.96	.53
Using concrete blocks and other masonry materials	113	23.18	27	24.52	.21
Planning a water system	162	21.23	21	27.71	4.78**
Installing a farm home plumbing system	99	22.34	76	19.91	1.56**
Installing other farm plumbing	132	21.39	36	22.28	.01
Planning a farm home sewage system	108	21.21	68	21.76	.75
Installing a farm home sewage system	98	22.93	76	19.47	3.20**

**Significant at one per cent level

Personal Characteristics of Farm Operators Recognizing Themselves As Qualified and Not Qualified to Perform Selected Mechanical and Managerial Activities in Farm Electrification

Data analyzed in this section regarding personal characteristics of farm operators recognizing themselves as qualified and not qualified to perform selected activities in farm electrification include: (1) age of operators; (2) level of formal education, (3) years of vocational agriculture instruction received while attending secondary school and (4) years of farming experience.

It is observed in Table XXXVI that the older operators were qualified to perform the selected activities in farm electrification. All of the activities reflect a high mean in favor of the qualified group. Of the ten activities, five reveal a highly significant difference between the group means. Therefore, the null hypothesis relative to the five activities was rejected.

The data in Table XXXVII indicate that no apparent pattern existed with regard to years of formal education completed and being qualified and not qualified to perform the selected activities in farm electrification for the farm operators interviewed. Of the ten activities, four reflect a highly significant difference between the group means; consequently, the null hypothesis relative to four activities was rejected.

It is shown in Table XXXVIII that, in general, those farm operators receiving the largest number years of vocational agriculture instruction while attending secondary school were qualified to perform the selected activities in farm electrification. However, it should be noted that none of the activities reflecting a high mean in favor of the qualified

group indicate a significant difference between the group means. Of the ten activities, only one indicates a significant difference between the means. Therefore, the null hypothesis relative to the significant activity was rejected.

Data in Table XXXIX indicate that the more experienced operators were qualified to perform the selected activities in farm electrification. All of the activities reflect a high mean in favor of the qualified group. Of the ten activities, six were highly significant; thus, the null hypothesis relative to activities was rejected.

TABLE XXXVI

MEAN AGES OF FARM OPERATORS RECOGNIZING THEMSELVES AS QUALIFIED AND THOSE RECOGNIZING THEMSELVES AS NOT QUALIFIED TO PERFORM SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM ELECTRIFICATION

Activities	Operators: Qualified Number	Qualified Mean ages	Not qualified Number	Not qualified Mean ages	F-value of difference between means
Planning an electrical wiring system	74	42.18	80	37.59	4.62**
Figuring an electrical system load	59	39.49	70	38.11	.38
Selecting electrical wiring materials	85	41.11	60	38.62	1.30
Installing a wiring system for the farm home	54	41.52	82	40.68	.13
Installing and maintaining other farm wiring systems	109	40.20	35	37.14	1.59**
Selecting electrical motors	99	40.97	30	40.17	.01
Selecting electrical home appliances	152	42.98	33	34.15	2.32**
Selecting electrical heating systems	57	43.95	22	32.18	7.03**
Selecting electrical equipment for a specific farm enterprise	104	39.74	23	36.39	2.99**
Diagnosing electrical system failures and safety hazards	143	40.23	26	36.73	.15

**Significant at one per cent level

TABLE XXXVII

MEAN YEARS OF FORMAL EDUCATION ATTAINED BY FARM OPERATORS RECOGNIZING THEMSELVES AS QUALIFIED AND THOSE RECOGNIZING THEMSELVES AS NOT QUALIFIED TO PERFORM SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM ELECTRIFICATION

Activities	Operators: Qualified Number	Operators: Qualified Mean years	Operators: Not qualified Number	Operators: Not qualified Mean years	F-value of difference between means
Planning an electrical wiring system	74	10.81	80	11.73	2.62**
Figuring an electrical system load	59	11.49	70	11.19	.37
Selecting electrical wiring materials	85	11.40	60	10.72	2.24**
Installing a wiring system for the farm home	54	10.83	82	11.09	.23
Installing and maintaining other farm wiring systems	109	11.18	35	11.31	.05
Selecting electrical motors	99	11.08	30	10.47	.95
Selecting electrical home appliances	152	10.60	33	11.36	2.17**
Selecting electrical heating systems	57	11.05	22	11.41	.24
Selecting electrical equipment for a specific farm enterprise	104	11.19	23	10.30	1.91**
Diagnosing electrical system failures and safety hazards	143	10.99	26	11.08	.02

**Significant at one per cent level

TABLE XXXVIII

MEAN YEARS OF SECONDARY SCHOOL VOCATIONAL AGRICULTURE INSTRUCTION RECEIVED BY FARM OPERATORS RECOGNIZING THEMSELVES AS QUALIFIED AND THOSE RECOGNIZING THEMSELVES AS NOT QUALIFIED TO PERFORM SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM ELECTRIFICATION

Activities	Operators: Qualified Number	Qualified Mean years	Not qualified Number	Not qualified Mean years	F-value of difference between means
Planning an electrical wiring system	74	1.58	80	1.45	.28
Figuring an electrical system load	59	1.73	70	1.69	.02
Selecting electrical wiring materials	85	1.67	60	1.47	.61
Installing a wiring system for the farm home	54	1.59	82	1.34	.87
Installing and maintaining other farm wiring systems	109	1.77	35	1.69	.57
Selecting electrical motors	99	1.47	30	1.27	.42
Selecting electrical home appliances	152	1.88	33	1.70	.89
Selecting electrical heating systems	57	1.35	22	2.32	6.09**
Selecting electrical equipment for a specific farm enterprise	104	1.55	23	1.52	.36
Diagnosing electrical system failures and safety hazards	143	1.59	26	1.58	.02

**Significant at one per cent level

TABLE XXXIX

MEAN YEARS OF FARMING EXPERIENCE COMPLETED BY FARM OPERATORS RECOGNIZING THEMSELVES AS QUALIFIED AND THOSE RECOGNIZING THEMSELVES AS NOT QUALIFIED TO PERFORM SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM ELECTRIFICATION

Activities	Operators: Qualified Number	Qualified Mean years	Not qualified Number	Not qualified Mean years	F-value of difference between means
Planning an electrical wiring system	74	24.09	80	19.36	5.10**
Figuring an electrical system load	59	21.95	70	19.77	.97
Selecting electrical wiring materials	85	22.46	60	20.37	.93
Installing a wiring system for the farm home	54	23.31	82	22.09	.30
Installing and maintaining other farm wiring systems	109	22.09	35	18.58	2.05**
Selecting electrical motors	99	22.03	30	21.50	2.31**
Selecting electrical home appliances	152	24.51	33	18.06	3.80**
Selecting electrical heating systems	57	24.09	22	14.73	9.39**
Selecting electrical equipment for a specific farm enterprise	104	21.25	23	17.91	1.47
Diagnosing electrical system failures and safety hazards	143	21.95	26	16.88	3.91**

**Significant at one per cent level

Personal Characteristics and Economic Conditions of Farm Operators and Their Expressions of the Relative Value of Farmer Acquisition and Use of Selected Mechanical and Managerial Activities in Farm Power and Machinery

One of the issues most prevalent among agricultural educators in farm mechanics is whether or not the personal characteristics and economic conditions of farm operators are factors associated with their expressions of the relative values for farmer acquisition and use of selected mechanical and managerial activities in farm mechanics. Data analyzed in this section regarding personal characteristics and economics condition of operators expressing "high" and "medium to low" values for the farmer acquisition and use of selected mechanical and managerial activities in farm power and machinery include: (1) age of operators, (2) level of formal education, (3) years of vocational agriculture instruction received while attending secondary school, (4) years of farming experience, (5) days of annual on-the-farm employment, (6) total acres in the farm operation and (7) current investment in farm power and machinery.

The data in Table XL indicate that, in general, the younger farm operators expressed higher relative values for the farmer acquisition and use of the selected activities in farm power and machinery than the older operators. This was true for all activities except those activities dealing with the complete overhaul of internal combustion engines. Of the sixteen activities, ten reveal a significant difference between the group means. Two of the significant activities show a higher mean in favor of the high expression group; while six show a higher mean in favor of the medium to low expression group. Therefore, the null hypothesis relative to the ten activities was rejected.

TABLE XL

MEAN AGES OF FARM OPERATORS AND THEIR EXPRESSIONS OF THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM POWER AND MACHINERY

Activities	Operators expressing High: Number	Operators expressing High: Mean years	Operators expressing Medium to low: Number	Operators expressing Medium to low: Mean years	F-value of difference between means
Determining the cost involved in owning and operating farm machinery	176	40.34	52	43.94	3.32**
Determining power, labor and machinery requirement for a farm enterprise	143	39.23	85	44.41	9.10**
Determining the capacity of farm machinery	147	40.01	81	42.70	2.23**
Planning a machinery replacement program	125	39.46	103	43.23	5.01**
Servicing an ignition system	150	40.85	78	41.78	.27
Servicing a fuel system	154	41.15	74	41.20	.08
Replacing a tractor clutch	120	40.23	108	42.20	1.35*
Replacing tractor brakes	127	40.27	101	42.30	1.42**
Adjusting engine tappets	96	40.73	132	41.48	.19
Complete tractor or power unit overhaul	82	41.74	146	40.84	.26
One cylinder engine overhaul	62	42.85	166	40.54	1.49**
Arc welding	144	40.11	84	42.98	2.69**
Oxyacetylene welding	124	39.33	104	43.36	5.74**
Calculating pulley speeds	74	40.15	154	41.66	.69
Calibrating power sprayers	59	40.65	27	41.61	.32
Hardsurfacing plow-shares	57	40.04	33	42.29	1.77**

*Significant at five per cent level
**Significant at one per cent level

It is shown in Table XLI that the selected operators with higher levels of formal education expressed higher relative values for the farmer acquisition and use of the selected managerial activities and lower values for the mechanical activities in farm power and machinery than the operators with lower levels of education. Of the sixteen activities, ten reflect a significant difference between the group means; consequently, the null hypothesis relative to the ten activities was rejected.

Table XLII indicates that, in general, the selected operators receiving the largest number years of vocational agriculture instruction while attending secondary school expressed higher relative values for the farmer acquisition and use of the selected activities in farm power and machinery than those receiving a smaller number years of instruction. This was true with the exception of being able to overhaul internal combustion engines. Of the sixteen activities, seven reveal a significant difference between the group means. Therefore, the null hypothesis relative to the seven activities was rejected.

It is observed in Table XLIII that the less experienced farm operators expressed higher relative values for the farmer acquisition and use of the selected activities in farm power and machinery than the operators with more farming experience. This is indicated by the fact that all activities reflect a high mean in favor of the medium to low expression group. However, only seven of the sixteen activities show a significant difference between the group means. It should also be noted that, in general, the significant ones are managerial and recent trend activities. Therefore, the null hypothesis relative to the seven activities was rejected.

TABLE XLI

MEAN YEARS OF FORMAL EDUCATION ATTAINED BY FARM OPERATORS AND THEIR EXPRESSIONS OF THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM POWER AND MACHINERY

Activities	Operators expressing High: Number	High: Mean years	Medium to low: Number	Medium to low: Mean years	F-value of difference between means
Determining the cost involved in owning and operating farm machinery	176	11.62	52	10.21	2.46**
Determining the power, labor and machinery requirement for a farm enterprise	143	11.52	85	10.58	1.59**
Determining the capacity of farm machinery	147	11.40	81	10.73	.80
Planning a machinery replacement program	125	11.46	103	10.82	.78
Servicing an ignition system	150	10.69	78	12.08	3.34**
Servicing a fuel system	154	10.71	74	12.11	3.30**
Replacing a tractor clutch	120	11.03	108	11.31	1.52**
Replacing tractor brakes	127	10.73	101	11.71	1.83**
Adjusting engine tappets	96	10.49	132	11.66	3.42**
Complete tractor or power unit overhaul	82	10.49	146	11.55	1.99**
One cylinder engine overhaul	62	10.55	166	11.40	1.09**
Arc welding	144	10.90	84	11.63	9.66**
Oxyacetylene welding	124	10.89	104	11.50	.71
Calculating pulley speeds	74	10.66	154	11.42	.95
Calibrating power sprayers	59	10.95	27	10.77	.21
Hardsurfacing plow-shares	57	10.88	33	10.83	.01

**Significant at one per cent level

TABLE XLII

MEAN YEARS OF SECONDARY SCHOOL VOCATIONAL AGRICULTURE INSTRUCTION RECEIVED BY FARM OPERATORS AND THEIR EXPRESSIONS OF THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM POWER AND MACHINERY

Activities	Operators expressing High: Number	High: Mean years	Medium to low: Number	Medium to low: Mean years	F-value of difference between means
Determining the cost involved in owning and operating farm machinery	176	1.45	52	1.31	.35
Determining the power, labor and machinery requirement for a farm enterprise	143	1.57	85	1.16	3.81**
Determining the capacity of farm machinery	147	1.49	81	1.27	1.06
Planning a machinery replacement program	125	1.57	103	1.23	2.80**
Servicing an ignition system	150	1.49	78	1.28	.94
Servicing a fuel system	154	1.50	74	1.24	1.45**
Replacing a tractor clutch	120	1.58	108	1.24	2.80**
Replacing tractor brakes	127	1.51	101	1.30	1.13
Adjusting engine tappets	96	1.42	132	1.40	.00
Complete tractor or power unit overhaul	82	1.32	146	1.47	.56
One cylinder engine overhaul	62	1.29	166	1.48	.73
Arc welding	144	1.47	84	1.32	5.29**
Oxyacetylene welding	124	1.55	104	1.26	2.08**
Calculating pulley speeds	74	1.65	154	1.31	2.61**
Calibrating power sprayers	59	1.52	27	1.33	.90
Hardsurfacing plow-shares	57	1.64	33	1.49	.56

**Significant at one per cent level

TABLE XLIII

MEAN YEARS OF FARMING EXPERIENCE COMPLETED BY FARM OPERATORS AND THEIR EXPRESSIONS OF THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM POWER AND MACHINERY

Activities	Operators expressing High: Number	High: Mean years	Medium to low: Number	Medium to low: Mean years	F-value of difference between means
Determining the cost involved in owning and operating farm machinery	176	21.95	52	24.81	1.98**
Determining the power, labor and machinery requirement for a farm enterprise	143	21.16	85	25.02	4.86**
Determining the capacity of farm machinery	147	21.29	81	25.05	4.48**
Planning a machinery replacement program	125	20.67	103	24.94	6.33**
Servicing an ignition system	150	22.77	78	22.28	.72
Servicing a fuel system	154	22.82	74	22.15	.13
Replacing a tractor clutch	120	22.33	108	22.90	.11
Replacing tractor brakes	127	22.50	101	22.73	.19
Adjusting engine tappets	96	22.88	132	22.40	.74
Complete tractor or power unit overhaul	82	23.66	146	22.01	.85
One cylinder engine overhaul	62	24.35	166	21.95	1.57**
Arc welding	144	21.89	84	23.82	1.19*
Oxyacetylene welding	124	21.22	104	24.25	3.15**
Calculating pulley speeds	74	21.86	154	22.95	.35
Calibrating power sprayers	59	22.03	27	23.10	.38
Hardsurfacing plow-shares	57	21.68	33	23.57	1.15

*Significant at five per cent level
**Significant at one per cent level

The data in Table XLIV indicate that the farm operators employed on the farm the largest number of days per year expressed lower relative values for the farmer acquisition and use of the managerial activities and higher values for the mechanical activities in farm power and machinery than the operators employed a smaller number of days per year. Of the nine activities reflecting significant differences, two were managerial and seven mechanical in nature. The null hypothesis relative to the nine activities was rejected.

Table XLV shows that, in general, the farm operators with the larger farmers in total acres expressed higher relative values for the farmer acquisition and use of the selected activities in farm power and machinery than the operators with smaller acreages. This was true except for determining the cost involving with machinery; however, the difference between the means was insignificant. Of the sixteen activities, seven reflect a significant difference between the group means; consequently, the null hypothesis relative to the seven activities was rejected.

Table XLVI reveals no evident pattern between the expressed relative values by the operators for the farmer acquisition and use of the selected activities in farm power and machinery and their current investment in farm power and machinery. Of the sixteen activities, five show a highly significant difference between the group means. Therefore, the null hypothesis relative to the five activities was rejected.

TABLE XLIV

MEAN DAYS OF ANNUAL ON-THE-FARM EMPLOYMENT OF FARM OPERATORS AND THEIR EXPRESSIONS OF THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM POWER AND MACHINERY

Activities	Operators Expressing High: Number	High: Mean days	Medium to low: Number	Medium to low: Mean days	F-value of difference between means
Determining the cost involved in owning and operating farm machinery	176	205.16	52	215.73	.33
Determining the power, labor and machinery requirement for a farm enterprise	143	200.34	85	219.74	1.48**
Determining the capacity of farm machinery	147	203.57	81	213.64	.49
Planning a machinery replacement program	125	203.88	103	212.05	2.76**
Servicing an ignition system	150	219.64	78	218.97	.13
Servicing a fuel system	154	207.28	74	208.18	.29
Replacing a tractor clutch	120	216.84	108	197.27	1.60*
Replacing tractor brakes	127	219.34	101	192.77	2.94**
Adjusting engine valve tappets	96	230.55	132	190.86	6.60**
Complete tractor or power unit overhaul	82	229.55	146	195.23	4.62**
One cylinder engine overhaul	62	239.50	166	195.64	6.54**
Arc welding	144	212.35	84	199.38	.65
Oxyacetylene welding	124	216.05	104	197.46	1.44**
Calculating pulley speeds	74	231.39	154	196.12	4.64**
Calibrating power sprayers	59	214.41	27	201.63	.68
Hardsurfacing plow-shares	57	214.52	33	200.62	.80

*Significant at five per cent level
**Significant at one per cent level

TABLE XLV

MEAN TOTAL ACRES IN FARM OPERATION AND THE EXPRESSIONS OF OPERATORS AS TO THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM POWER AND MACHINERY

Activities	Operators expressing High: Number	High: Mean acres	Medium to low: Number	Medium to low: Mean acres	F-value of difference between means
Determining the cost involved in owning and operating farm machinery	176	214.65	52	239.40	.75
Determining the power, labor and machinery requirement for a farm enterprise	143	227.03	85	225.79	.16
Determining the capacity of farm machinery	147	229.34	81	222.75	.18
Planning a machinery replacement program	125	228.43	103	207.83	.72
Servicing an ignition system	150	226.75	78	223.69	.75
Servicing a fuel system	154	219.41	74	218.53	.12
Replacing a tractor clutch	120	228.51	108	208.69	.68
Replacing tractor brakes	127	237.30	101	196.27	2.91**
Adjusting engine valve tappets	96	261.35	132	188.41	2.74**
Complete tractor or power unit overhaul	82	253.52	146	199.80	4.69**
One cylinder engine overhaul	62	259.45	166	204.06	4.28**
Arc welding	144	229.13	84	201.96	1.94**
Oxyacetylene welding	124	233.06	104	202.50	1.61**
Calculating pulley speeds	74	207.69	154	224.62	4.35**
Calibrating power sprayers	59	214.04	27	223.57	.15
Hardsurfacing plow-shares	57	210.89	33	227.35	.47

**Significant at one per cent level

TABLE XLVI

MEAN HUNDRED DOLLARS OF CURRENT INVESTMENT IN FARM POWER AND MACHINERY OF FARM OPERATORS AND THEIR EXPRESSIONS OF THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM POWER AND MACHINERY

Activities	Operators expressing High: Number	High: Mean dollars	Medium to low: Number	Medium to low: Mean dollars	F-value of difference between means
Determining the cost involved in owning and operating farm machinery	176	7,600	52	7,800	.47
Determining the power, labor and machinery requirement for a farm enterprise	143	7,800	85	7,500	.23
Determining the capacity of farm machinery	147	7,900	81	7,200	.93
Planning a machinery replacement program	125	8,400	103	6,800	4.68**
Servicing an ignition system	150	7,500	78	8,100	.57
Servicing a fuel system	154	7,600	74	8,000	.25
Replacing a tractor clutch	120	7,600	108	7,800	.16
Replacing tractor brakes	127	7,800	101	7,600	.94
Adjusting engine valve tappets	96	8,300	132	7,300	1.77**
Complete tractor or power unit overhaul	82	7,900	146	7,600	.13
One cylinder engine overhaul	62	8,100	166	7,600	3.78**
Arc welding	144	7,400	84	8,200	1.16
Oxyacetylene welding	124	7,200	104	8,300	2.26**
Calculating pulley speeds	74	8,200	154	7,400	.99
Calibrating power sprayers	59	7,900	27	7,500	.34
Hardsurfacing plow-shares	57	7,100	33	8,300	2.96**

**Significant at one per cent level

Personal Characteristics and Economic Conditions of Farm Operators and Their Expressions of the Relative Values of Farmer Acquisition and Use of Selected Mechanical and Managerial Activities in Farm Buildings and Other Structures

Data analyzed in this section regarding personal characteristics and economic conditions of operators expressing "high" and "medium to low" values for the farmer acquisition and use of the selected mechanical and managerial activities in farm buildings and other structures include: (1) age of operators, (2) level of formal education, (3) years of vocational agriculture received while attending secondary school, (4) years of farming experience, (5) days of annual on-the-farm employment, (6) total acres in the farm operation and (7) current investment in farm buildings and other structures.

Data in Table XLVII indicate that the older farm operators expressed higher values for the farmer acquisition and use of the selected activities in farm buildings and other structures than the younger operators interviewed. The activity sketching and drawing was the only exception. Of the eleven activities, six reflect a significant difference between the group means; consequently, the null hypothesis relative to the six activities was rejected.

It is evident from the data shown in Table XLVIII that, in general, the operators with less formal education expressed higher values for the farmer acquisition and use of the selected managerial activities in farm buildings and other structures than the operators with higher levels of formal education. Of the eleven activities, six show a significant difference between the group means; thus, the null hypothesis relative to six activities was rejected.

TABLE XLVII

MEAN AGES OF FARM OPERATORS AND THEIR EXPRESSIONS OF THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM BUILDINGS AND OTHER STRUCTURES

Activities	Operators expressing High: Number	High: Mean years	Medium to low: Number	Medium to low: Mean years	F-value difference between means
Sketching and drawing	74	39.88	154	42.00	1.38**
Reading blueprints and drawings	70	41.94	158	40.95	.29
Figuring bill of materials and other building costs	113	43.19	115	39.33	.53
Determining concrete mixtures	86	42.15	142	40.71	.69
Determining amounts of concrete needed	90	43.28	138	39.93	3.81**
Using concrete blocks and other masonry materials	73	42.26	155	40.77	.67
Planning a water system	99	41.74	129	40.61	.43
Installing a farm home plumbing system	107	43.56	121	39.23	6.72**
Installing other farm plumbing	104	44.29	124	38.73	11.30**
Planning a farm sewage system	108	45.17	68	38.22	1.80**
Installing a farm home sewage system	98	44.16	76	39.12	9.09**

**Significant at one per cent level

TABLE XLVIII

MEAN YEARS OF FORMAL EDUCATION ATTAINED BY FARM OPERATORS AND THEIR EXPRESSIONS OF THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM BUILDINGS AND OTHER STRUCTURES

Activities	Operators expressing High: Number	High: Mean years	Medium to low: Number	Medium to low: Mean years	F-value of difference between means
Sketching and drawing	74	10.28	154	11.09	3.77*
Reading blue prints and detail drawings	70	10.39	158	11.04	2.32**
Figuring bill of materials and other building cost	113	10.65	115	11.04	.99
Determining concrete mixtures	86	10.48	142	11.06	2.09**
Determining amounts of concrete needed	90	10.66	138	10.94	.48
Using concrete blocks and other masonry materials	73	10.86	155	10.83	.05
Planning a water system	99	10.93	129	10.72	.26
Installing a farm home plumbing system	107	10.41	121	11.22	4.39**
Installing other farm plumbing	104	10.70	124	10.96	.43
Planning farm home sewage system	108	10.65	68	10.99	.76
Installing a farm home sewage system	98	10.57	76	11.05	1.48**

**Significant at one per cent level

The data in Table XLIX indicate that no pattern existed with regard to number of years of vocational agriculture received in secondary school and the relative values expressed by the operators as to the value for farmer acquisition and use of the selected activities in farm building and other structures. Of the eleven activities, only one activity shows a significant difference between the group means; therefore, the null hypothesis relative to the activity was rejected.

It is shown in Table L that, in general, the more experienced farm operators expressed high relative values for the farmer acquisition and use of the selected activities in farm buildings and other structures than the less experienced operators interviewed. The activity sketching and drawing was the only exception. Of the eleven activities, five show a significant difference between the means of the groups. All of the significant activities reflect a higher mean in favor of the high expression group. Therefore, the null hypothesis relative to the five significant activities was rejected.

It is observed in Table LI that those farm operators employed the larger number of days per year on the farm expressed higher relative value for the farmer acquisition and use of the selected activities in farm buildings and other structures than those operators employed a smaller number of days. Of the eleven activities, nine reflect a highly significant difference between the group means; thus, the null hypothesis relative to the nine activities was rejected.

The data in Table LII indicate that those farm operators with the larger farms in total acres expressed higher relative values for the farmer acquisition and use of the selected activities in farm buildings and other structures than those farm operators with smaller acreages.

TABLE XLIX

MEAN YEARS OF SECONDARY SCHOOL VOCATIONAL AGRICULTURE INSTRUCTION RECEIVED BY FARM OPERATORS AND THEIR EXPRESSIONS OF THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM BUILDINGS AND OTHER STRUCTURES

Activities	Operators expressing High: Number	High: Mean years	Medium to low: Number	Medium to low: Mean years	F-value of difference between means
Sketching and drawing	74	1.49	154	1.35	.39
Reading blue prints and detail drawings	70	1.58	158	1.34	1.27**
Figuring bill of materials and other building cost	113	1.24	115	1.48	.53
Determining concrete mixtures	86	1.52	142	1.35	.69
Determining amounts of concrete needed	90	1.46	138	1.38	.16
Using concrete blocks and other masonry materials	73	1.27	155	1.38	.15
Planning a water system	99	1.44	129	1.41	.00
Installing a farm home plumbing system	107	1.32	121	1.29	.69
Installing other farm plumbing	104	1.28	124	1.52	.14
Planning farm home sewage system	108	1.30	68	1.49	.88
Installing a farm home sewage system	98	1.41	76	1.40	.00

**Significant at one per cent level

TABLE L

MEAN YEARS OF FARMING EXPERIENCE COMPLETED BY FARM OPERATORS AND THEIR EXPRESSIONS OF THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM BUILDINGS AND OTHER STRUCTURES

Activities	Operators expressing High: Number	High: Mean years	Medium to low: Number	Medium to low: Mean years	F-value of difference between means
Sketching and drawing	74	21.54	154	23.26	.87
Reading blue prints and detail drawings	70	23.39	158	22.35	.31
Figuring bill of materials and other building cost	113	24.11	115	21.25	.28
Determining concrete mixtures	86	23.67	142	22.07	.82
Determining amounts of concrete needed	90	24.64	138	21.40	3.47**
Using concrete blocks and other masonry materials	73	23.16	155	22.44	.16
Planning a water system	99	22.71	129	22.61	.03
Installing a farm home plumbing system	107	23.95	121	21.55	1.99**
Installing other farm plumbing	104	24.81	124	20.90	5.30**
Planning farm home sewage system	108	26.02	68	20.08	12.51**
Installing a farm home sewage system	98	25.49	76	20.62	8.25**

**Significant at one per cent level

TABLE LI

MEAN DAYS OF ANNUAL ON-THE-FARM EMPLOYMENT OF FARM OPERATORS AND THEIR EXPRESSIONS OF THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM BUILDINGS AND OTHER STRUCTURES

	Operators expressing				F-value of difference between means
	High		Medium to low		
	Number	Mean days	Number	Mean days	
Sketching and drawing	74	218.19	154	200.86	1.57**
Reading blue prints and detail drawings	70	225.07	158	199.34	2.36**
Figuring bill of materials and other building cost	113	226.24	115	188.25	6.17**
Determining concrete mixtures	86	232.94	142	191.73	6.83**
Determining amounts of concrete needed	90	225.09	138	195.67	3.50**
Using concrete blocks and other masonry materials	73	223.15	155	199.58	2.04**
Planning a water system	99	208.43	129	205.49	.35
Installing a farm home plumbing system	107	231.41	121	185.93	8.92**
Installing other farm plumbing	104	216.66	124	199.27	1.25
Planning farm home sewage system	108	218.62	68	198.30	1.70**
Installing a farm home sewage system	98	218.34	76	196.98	1.86**

**Significant at one per cent level

TABLE LII

MEAN TOTAL ACRES IN FARM OPERATIONS AND THE EXPRESSIONS OF OPERATORS AS TO THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM BUILDINGS AND OTHER STRUCTURES

Activities	Operators expressing High: Number	High: Mean acres	Medium to low: Number	Medium to low: Mean acres	F-value of difference between means
Sketching and drawing	74	232.28	154	214.49	.64
Reading blue prints and detail drawings	70	273.00	158	196.41	8.90**
Figuring bill of materials and other building cost	113	254.81	115	184.88	8.77**
Determining concrete mixtures	86	265.94	142	193.91	8.74**
Determining amounts of concrete needed	90	264.94	138	192.04	9.11**
Using concrete blocks and other masonry materials	73	235.84	155	213.79	.74
Planning a water system	99	231.44	129	206.98	1.02
Installing a farm home plumbing system	107	260.84	121	185.88	1.01
Installing other farm plumbing	104	257.93	124	190.10	8.19**
Planning farm home sewage system	108	250.84	68	197.71	4.91**
Installing a farm home sewage system	98	255.82	76	194.29	6.65**

**Significant at one per cent level

Of the eleven activities, seven reflect a highly significant difference between the group means; consequently, the null hypothesis relative to seven activities was rejected.

Data in Table LIII indicate that those farm operators with the larger investments in farm buildings and other structures expressed higher relative values for the farmer acquisition and use of the selected activities in farm buildings and other structures than those operators with smaller investments. Of the eleven activities, six reflect a highly significant difference between the group means. It should be noted that five of the six significant activities are managerial in nature. The null hypothesis relative to the six significant activities was rejected.

Personal Characteristics and Economic Conditions of Farm Operators and Their Expressions of the Relative Value of Farmer Acquisition and Use of Selected Mechanical and Managerial Activities in Farm Electrification

Data analyzed in this section regarding personal characteristics and economic conditions of operators expressing "high" and "medium to low" values for the farmer acquisition and use of the selected mechanical and managerial activities in farm electrification include: (1) age of operators, (2) level of formal education, (3) years of vocational agriculture instruction received while attending secondary school, (4) years of farming experience, (5) days of annual on-the-farm employment, (6) total acres in the farm operation and (7) current investment in farm buildings and other structures.

TABLE LIII

MEAN HUNDRED DOLLARS OF CURRENT INVESTMENT IN FARM BUILDINGS AND OTHER STRUCTURES OF FARM OPERATORS AND THEIR EXPRESSIONS OF THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM BUILDINGS AND OTHER STRUCTURES

Activities	Operators expressing High: Number	High: Mean dollars	Medium to low: Number	Medium to low: Mean dollars	F-value of difference between means
Sketching and drawing	74	6,600	154	5,800	2.06**
Reading blue prints and detail drawings	70	6,700	158	5,800	2.10**
Figuring bill of materials and other building cost	113	6,700	115	5,500	3.83**
Determining concrete mixtures	86	6,900	142	5,676	4.68**
Determining amounts of concrete needed	90	7,000	138	5,500	6.82**
Using concrete blocks and other masonry materials	73	6,400	155	6,000	.59
Planning a water system	99	6,200	129	6,100	.02
Installing farm home plumbing	107	6,200	121	6,000	.19
Installing other farm plumbing	104	6,300	124	6,000	.23
Planning farm home sewage system	108	6,400	68	5,900	.82
Installing a farm home sewage system	98	6,200	76	6,000	1.88**

**Significant at one per cent level

The data in Table LIV indicate that, in general, the older farm operators expressed higher relative values for the farmer acquisition and use of the selected activities in farm electrification than the younger operators. The activities selecting electrical equipment for a farm enterprise and diagnosing electrical systems failures and safety hazards, were the only exceptions. It should be noted, however, that the differences between the group means for both activities were insignificant. Of the ten selected activities, five reflect a highly significant difference between the group means; thus, the null hypothesis relative to the five activities was rejected.

It is observed in Table LV that those farm operators with less formal education expressed higher relative values for the farmer acquisition and use of the selected activities in farm electrification than those operators with higher levels of formal education. Of the ten activities, eight reflect a highly significant difference between the group means. Therefore, the null hypothesis relative to eight activities was rejected.

It is shown in Table LVI that, in general, those selected farm operators receiving the largest number years of vocational agriculture instruction while attending secondary school expressed higher relative values for the farmer acquisition and use of the selected activities in farm electrification than those operators receiving less vocational agriculture instruction. The activity installing a wiring system for the farm home, was the only exception. Of the ten activities, only one activity reflects a significant difference between the group means; therefore, the null hypothesis relative to the activity was rejected.

TABLE LIV

MEAN AGES OF FARM OPERATORS AND THEIR EXPRESSIONS OF THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM ELECTRIFICATION

Activities	Operators expressing High		Operators expressing Medium to low		F-value of difference between means
	Number	Mean years	Number	Mean years	
Planning an electrical wiring system	113	42.63	115	39.91	2.61**
Figuring an electrical system load	103	43.53	125	39.41	.60
Selecting electrical wiring materials	105	43.92	123	38.97	8.85**
Installing a wiring system for the farm home	99	43.41	129	39.60	5.09**
Installing and maintaining other farm wiring system	99	41.81	129	40.66	.46**
Selecting electrical motors	102	42.38	106	40.31	1.59**
Selecting electrical home appliances	86	43.76	142	39.81	5.18**
Selecting electrical heating systems	50	41.22	178	40.93	.02
Selecting eletrical equipment for a farm enterprise	106	40.46	122	41.73	.56
Diagnosing electrical system failures and safety hazards	174	40.85	54	42.56	.74

**Significant at one per cent level

TABLE LV

MEAN YEARS OF FORMAL EDUCATION ATTAINED BY FARM OPERATORS AND THEIR EXPRESSIONS OF THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM ELECTRIFICATION

Activities	Operators expressing High: Number	High: Mean years	Medium to low: Number	Medium to low: Mean years	F-value of difference between means
Planning an electrical wiring system	113	10.84	115	11.10	.29
Figuring an electrical system load	103	10.56	125	11.06	1.65**
Selecting electrical wiring materials	105	10.39	123	11.21	4.39**
Installing a wiring system for the farm home	99	10.41	129	11.17	3.79**
Installing and maintaining other farm wiring systems	99	10.54	129	11.15	2.44**
Selecting electrical motors	102	10.51	106	11.11	2.32**
Selecting electrical home appliances	86	10.24	142	11.15	5.05**
Selecting electrical heating systems	50	10.58	178	10.98	.73
Selecting electrical equipment for a specific farm enterprise	106	10.59	122	11.09	1.57**
Diagnosing electrical system failures and safety hazards	174	10.63	54	11.46	3.34**

**Significant at one per cent level

TABLE LVI

MEAN YEARS OF SECONDARY SCHOOL VOCATIONAL AGRICULTURE INSTRUCTION RECEIVED BY FARM OPERATORS AND THEIR EXPRESSIONS OF THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM ELECTRIFICATION

Activities	Operators expressing High: Number	High: Mean years	Medium to low: Number	Medium to low: Mean years	F-value of difference between means
Planning an electrical wiring system	113	1.57	115	1.25	2.56**
Figuring an electrical system load	103	1.49	125	1.35	.45
Selecting electrical wiring materials	105	1.47	123	1.43	.11
Installing a wiring system for the farm home	99	1.30	129	1.50	.98
Installing and maintaining other farm wiring systems	99	1.45	129	1.37	.15
Selecting electrical motors	102	1.45	106	1.38	.11
Selecting electrical home appliances	86	1.38	142	1.28	.35
Selecting electrical heating systems	50	1.60	178	1.38	.85
Selecting electrical equipment for a specific farm enterprise	106	1.44	122	1.37	.01
Diagnosing electrical system failures and safety hazards	174	1.47	54	1.24	.96

**Significant at one per cent level

The data in Table LVII indicate that the more experienced farm operators expressed higher relative values for the farmer acquisition and use of the selected activities in farm electrification than the less experienced operators. Of the ten activities, five reflect a highly significant difference between the group means; therefore, the null hypothesis relative to the five activities was rejected.

Data in Table LVIII indicate that, in general, the farm operators employed the largest number of days on the farm per year expressed higher relative values for the farmer acquisition and use of the selected activities in farm electrification than the group of operators employed the smallest number of days. The activities selecting electrical heating systems, selecting electrical equipment for a specific farm enterprise and diagnosing electrical system failures and hazards, were the only exceptions. It should be noted that only one of these activities reflect a significant difference between the group means. Of the ten activities, six reflect a significant difference between the group means; consequently, the null hypothesis relative to the activities was rejected.

It is shown in Table LIX that, in general, the farm operators with the larger farms in total acres expressed higher relative values for the farmer acquisition and use of the selected activities in farm electrification than the group operators with smaller acreages. Of the ten activities, only three reflect a higher mean in favor of the medium to low group; however, the differences between the group means for the three activities was insignificant. Of the ten activities, only four show a significant difference between the group means. Therefore, the null hypothesis relative to the four activities was rejected.

TABLE LVII

MEAN YEARS OF FARM EXPERIENCE COMPLETED BY FARM OPERATORS AND THEIR EXPRESSIONS OF THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM ELECTRIFICATION

Activities	Operators expressing High: Number	High: Mean years	Medium to low: Number	Medium to low: Mean years	F-value of difference between means
Planning an electrical wiring system	113	23.40	115	21.96	.71
Figuring an electrical system load	103	24.26	125	21.35	2.89**
Selecting electrical wiring materials	105	25.05	123	20.73	6.50**
Installing a wiring system for the farm home	99	24.72	129	21.11	4.47**
Installing and maintaining other farm wiring systems	99	23.33	129	21.98	.62
Selecting electrical motors	102	23.84	106	21.69	1.58**
Selecting electrical home appliances	86	25.24	142	20.85	6.28**
Selecting electrical heating systems	50	22.96	178	22.40	.76
Selecting electrical equipment for a specific farm enterprise	106	23.09	122	23.02	.29
Diagnosing electrical system failures and safety hazards	174	22.64	54	22.43	.00

**Significant at one per cent level

TABLE LVIII

MEAN DAYS OF ANNUAL ON-THE-FARM EMPLOYMENT OF FARM OPERATORS AND THEIR EXPRESSIONS OF THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM ELECTRIFICATION

Activities	Operators expressing High: Number	High: Mean days	Medium to low: Number	Medium to low: Mean days	F-value of difference between means
Planning an electrical wiring system	113	223.05	115	191.69	4.17**
Figuring an electrical system load	103	223.29	125	193.15	3.81**
Selecting electrical wiring materials	105	226.05	123	190.30	5.41**
Installing a wiring system for the farm home	99	227.03	129	192.07	5.11**
Installing and maintaining other farm wiring systems	99	207.62	129	206.68	.00
Selecting electrical motors	102	209.62	106	205.12	.08
Selecting electrical home appliances	86	223.45	142	194.69	3.39**
Selecting electrical heating systems	50	206.96	178	207.84	.03
Selecting electrical equipment for a specific farm enterprise	106	195.72	122	220.24	2.55**
Diagnosing electrical system failures and safety hazards	174	200.72	54	225.98	.01

**Significant at one per cent level

TABLE LIX

MEAN TOTAL ACRES IN FARM OPERATIONS AND THE EXPRESSIONS OF OPERATORS AS TO THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM ELECTRIFICATION

Activities	Operators expressing High: Number	High: Mean acres	Medium to low: Number	Medium to low: Mean acres	F-value of difference between means
Planning an electrical wiring system	113	249.74	115	192.77	5.76**
Figuring an electrical system load	103	255.48	125	192.53	6.98**
Selecting electrical wiring materials	105	250.19	123	196.35	5.08**
Installing a wiring system for the farm home	99	250.79	129	198.16	4.80**
Installing and maintaining other farm wiring systems	99	277.58	129	213.88	.32
Selecting electrical motors	102	229.82	106	213.46	.46
Selecting electrical home appliances	86	221.40	142	215.47	.59
Selecting electrical heating systems	50	200.60	178	225.33	.73
Selecting electrical equipment for a specific farm enterprise	106	209.17	122	234.84	1.14
Diagnosing electrical system failures and safety hazards	174	209.95	54	256.46	.27

**Significant at one per cent level

It is observed in Table LX that, in general, the farm operators with larger investments in farm buildings and other structures expressed higher values for the farmer acquisition and use of the selected activities in farm electrification than the operators with smaller investments. The activity diagnosing electrical system failures and hazards was the only exception. Of the ten activities, only two reflect a significant difference between the group means. Therefore, the null hypothesis relative to the two activities was rejected.

Expressions of Farm Operators, Teachers of Vocational Agriculture, Teacher-educators and, Commercial Educational Representatives As to the Value of Farmer Acquisition and Use of Selected Mechanical and Mangerial Activities in Farm Power and Machinery, Farm Buildings and Other Structures Farm Electrification

Data analyzed in this section include the opinions of 228 selected farm operators, ninety-two teachers of vocational agriculture, seven teacher-educators and twenty-four commercial educational representatives as to the economical value of farmer acquisition and use of selected activities in: (1) farm power and machinery, (2) farm buildings and other structures and (3) farm electrification. Teacher educators and commercial educational representatives expressed value opinions only in their respective instructional areas.

Economy-wise, values expressed by the respondents were categorized as "no value", "low", "medium" and "high". In the tabular presentation of data, the arithmetical values, reported to the nearest hundredth, are 0.00 to 1.00, low; 1.01 to 2.00, medium and 2.01 to 3.00 high.

TABLE LX

MEAN HUNDRED DOLLARS OF CURRENT INVESTMENT IN FARMING BUILDINGS AND OTHER STRUCTURES OF FARM OPERATORS AND THEIR EXPRESSIONS OF THE RELATIVE VALUE FOR FARMER ACQUISITION AND USE OF SELECTED ACTIVITIES IN FARM ELECTRIFICATION

Activities	Operators expressing High: Number	High: Mean dollars	Medium to low: Number	Medium to low: Mean dollars	F-value of difference between means
Planning an electrical wiring system	113	6,400	115	5,800	1.17
Figuring an electrical system load	103	6,200	125	6,000	.53
Selecting electrical wiring materials	105	6,500	123	5,800	1.25
Installing a wiring system for the farm home	99	6,400	129	5,900	1.01
Installing and maintaining other farm wiring systems	99	6,300	129	5,900	2.54**
Selecting electrical motors	102	6,600	106	5,700	2.59**
Selecting electrical home appliances	86	6,320	142	5,700	1.08
Selecting electrical heating systems	50	5,900	178	6,200	.09
Selecting electrical equipment for a specific farm enterprise	106	6,116	122	6,194	.00
Diagnosing electrical system failures and safety hazards	174	6,000	54	6,000	.00

**Significant at one per cent level

The data in Table LXI indicate the relative mean values and ordinal rankings for the farmer acquisition and use of selected activities in farm power and machinery as expressed by farm operators, teachers of vocational agriculture, teacher educators and commercial educational representatives.

The relative means values of the activities as determined from farm operator responses show that twenty-five, or eighty-six per cent, of the activities received a high farmer acquisition and use value while four, or fourteen per cent, received a medium value. The teacher responses show that twenty-one, or seventy-two per cent, of the activities received a high value while eight, or twenty-eight per cent, received a medium value. Teacher educator responses show that eighteen, or sixty-two per cent, of the activities received a high value; nine, or thirty-one per cent, received a medium value; while two, or seven per cent, received a low value. The values of activities as determined from commercial educational representative responses show that thirteen, or forty-four per cent, received a high value; twelve, or forty-one per cent, received a medium value; while four, or fifteen per cent, received a low value.

It is also observed in Table LXI that when a mean of the combined respondent groups was calculated, nineteen or sixty-two per cent of the activities in farm power and machinery received a high value; while ten, or thirty-eight per cent, received a medium value.

Table LXII shows the relative mean values and ordinal rankings for the farmer acquisition and use of selected activities in farm buildings and other structures as expressed by farm operators, teachers of vocational agriculture, teacher educators and commercial educational representatives.

TABLE LXI

MEAN VALUES AND RANKS OF SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM POWER AND MACHINERY AS INDICATED BY FARM OPERATORS, TEACHERS OF VOCATIONAL AGRICULTURE, TEACHER EDUCATORS AND COMMERCIAL EDUCATIONAL REPRESENTATIVES

Activities	Farm operators		Vo-ag teachers		Teacher educators		Commercial educ. rep.		Combined	
	Value[a]	Rank	Value[1]	Rank	Value	Rank	Value	Rank	Value	Rank
Adjusting farm machinery under field conditions	2.88	1	2.53	4	2.71	1	2.54	4	2.66	1
Tractor preventative maintenance	2.79	4	2.62	3	2.71	1	2.27	8	2.60	2
Setting up farm machinery	2.85	3	2.35	9	2.43	7	2.36	6	2.50	3
Diagnosing and making minor machinery and equipment repair	2.60	9	2.63	2	2.57	4	2.09	12	2.47	4
Adjusting a tractor clutch	2.62	7	2.10	18	1.57	22	1.10	24	2.45	5
Calibrating planters and seeding drills	2.48	16	2.16	16	2.43	7	2.64	2	2.43	6
Determining the power, labor and machinery requirement for a farm enterprise	2.50	14	2.28	13	2.28	10	2.63	3	2.42	8
Servicing a cooling system	2.86	2	2.35	9	2.28	10	2.18	10	2.42	8
Servicing a fuel system	2.68	2	2.35	9	2.71	1	1.91	15	2.41	10
Determining the capacity of farm machinery	2.60	9	2.10	18	2.14	14	2.82	1	2.41	10

TABLE LXI (continued)

	Farm operators		Vo-ag teachers		Teacher educators		Commercial educ. rep.		Combined	
	Value[a]	Rank[b]	Value	Rank	Value	Rank	Value	Rank	Value	Rank
Servicing an ignition system	2.54	11	2.36	8	2.57	4	1.73	16	2.30	12
Determining the cost involved in owning and operating farm machinery	1.94	27	2.23	14	2.57	4	2.45	5	2.30	12
Calibrating power sprayers	2.30	22	2.10	18	2.42	9	2.18	10	2.25	14
Using the arc welder	2.53	12	2.85	1	2.28	10	1.27	21	2.23	15
Planning a machinery replacement program	2.43	19	1.99	22	2.14	14	2.27	8	2.21	16
Diagnosing the needs for major machinery and equipment repair	2.46	13	2.23	14	2.00	18	2.01	12	2.19	17
Adjusting tractor brakes	2.49	15	2.14	17	2.00	18	2.00	14	2.16	18
Hardsurfacing plow-shares and cultivator sweeps	2.35	21	2.33	12	2.14	14	1.27	21	2.02	19
Painting farm machinery	2.19	24	2.49	5	1.71	20	1.45	18	1.96	20
Using the oxyacetylene welder	2.39	23	1.60	29	2.14	14	1.36	20	1.87	21
Replacing tractor brakes	2.44	17	1.85	24	1.57	22	1.45	18	1.82	22
Constructing labor-saving equipment	2.42	20	2.47	6	1.71	20	0.64	29	1.81	23

TABLE LXI (continued)

	Farm operators		Vo-ag teachers		Teacher educators		Commercial educ. rep.		Combined	
	Value[a]	Rank[b]	Value	Rank	Value	Rank	Value	Rank	Value	Rank
Adjusting engine valve tappets	2.61	8	1.78	25	1.43	24	1.18	23	1.75	24
Replacing a tractor clutch	2.44	17	1.97	23	1.43	24	1.09	25	1.73	25
Calculating pulley speeds	1.96	26	1.64	27	0.85	29	1.54	17	1.50	26
Complete one cylinder engine overhaul	1.84	28	2.04	21	1.43	24	0.91	26	1.55	27
Complete overhaul of farm machinery	2.05	25	1.72	26	1.14	28	0.82	27	1.43	28
Complete tractor or power unit overhaul	1.74	29	1.62	28	1.28	27	0.73	28	1.34	29

[a]Description of arithmetical values: 0.00 to 1.00 low, 1.01 to 2.00 medium, and 2.01 to 3.00 high

[b]Ordinal based on expressed mean value

TABLE LXII

MEAN VALUES AND RANKS OF SELECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM BUILDINGS AND OTHER STRUCTURES AS INDICATED BY FARM OPERATORS, TEACHERS OF VOCATIONAL AGRICULTURE, TEACHER EDUCATIONS AND COMMERCIAL EDUCATIONAL REPRESENTATIVES

Activities	Farm operators		Vo-Ag teachers		Teacher educators		Commercial educ. rep.		Combined	
	Value[a]	Rank[b]	Value	Rank	Value	Rank	Value	Rank	Value	Rank
Planning a water system	2.53	1	2.43	8	2.75	1	2.33	4	2.51	1
Maintaining and improving farm buildings	2.51	4	2.53	3	2.25	8	2.53	1	2.45	2
Figuring bill of materials and other building costs	2.34	9	2.71	1	2.75	1	1.82	13	2.41	3
Determining building requirements for animals and crops	2.34	9	2.23	17	2.75	1	2.29	5	2.40	4
Selecting a farm water pump	2.53	1	2.33	11	2.75	1	1.91	10	2.38	5
Selecting lumber and other building materials	2.46	5	2.54	2	2.25	8	2.18	7	2.36	6
Constructing and maintaining farm fences and gates	2.41	6	2.47	5	2.00	13	2.47	2	2.34	7
Maintaining and repairing farm plumbing	2.52	3	2.27	15	2.00	13	2.41	3	2.30	8
Determining amounts of concrete needed	2.21	13	2.44	6	2.00	13	2.24	6	2.22	9

TABLE LXII (continued)

Activities	Farm operators		Vo-Ag teachers		Teacher educators		Commercial educ. rep.		Combined	
	Value[a]	Rank[b]	Value	Rank	Value	Rank	Value	Rank	Value	Rank
Paints and Painting	2.32	12	2.51	4	2.00	13	2.00	5	2.21	10
Planning a farm home sewage system	2.34	9	2.30	12	2.50	5	1.58	23	2.18	11
Installing a water pump	2.19	15	2.22	19	2.50	5	1.76	17	2.17	12
Installing other farm plumbing	2.36	8	2.28	14	2.00	13	2.00	8	2.16	13
Reading blue prints and detail drawings	2.18	16	2.22	19	2.50	5	1.76	17	2.15	14
Sketching and drawing	2.11	20	2.66	16	2.25	8	1.47	21	2.12	15
Installing a farm home plumbing system	2.18	16	2.35	10	2.25	8	1.65	20	2.10	16
Determining concrete mixtures	2.14	18	2.37	9	2.00	13	1.83	12	2.08	17
Constructing pole type buildings	2.13	19	1.98	24	2.25	8	1.88	11	2.06	18
Constructing farm buildings	2.39	7	2.22	19	1.75	19	1.82	13	2.04	19
Constructing concrete forms	2.10	21	2.21	22	2.00	13	1.82	13	2.03	20
Mixing conrete on the farm	2.10	21	2.29	13	1.50	24	1.70	19	1.90	21
Using concrete blocks and other masonry materials	2.20	14	2.23	17	1.75	19	1.77	16	1.99	22

Table LXII (continued)

Activities	Farm operators		Vo-Ag teachers		Teacher educators		Commercial educ. rep.		Combined	
	Value[a]	Rank[b]	Value	Rank	Value	Rank	Value	Rank	Value	Rank
Treating lumber and other materials	2.09	22	2.44	6	1.75	19	1.23	24	1.88	23
Installing a farm home sewage system	1.96	24	2.19	23	1.75	19	1.59	22	1.87	24

[a]Description of Arithmetical values: 0.00 to 1.00 "low", 101 to 200 "medium", and 2.01 to 3.00 "high"
[b]Ordinal based on the expressed mean value

The relative mean values of the activities as determined from the farm operator and teacher responses show that twenty-three, or ninety-five per cent, of the activities received a high farmer acquisition and use value; while one, or five per cent received a medium value. Teacher educator responses show that twelve, or fifty per cent, of the activities received a medium value. The values as determined from responses given by the commercial educational representatives show that seven, or twenty-nine per cent of the activities received a high value; while seventeen, or seventy-one per cent received a medium value.

Table LXII also indicates that when a mean of the combined respondent groups was determined, twenty, or eighty-three per cent, of the activities in farm buildings and other structures received a high value; while four, or seventeen per cent received a medium value.

Table LXIII shows the relative mean values and ordinal rankings for the farmer acquisition and use of selected activities in farm electrification as expressed by farm operators, teachers of vocational agriculture, teacher educators and commercial educational representatives.

The relative mean values of the activities as determined from farm operator responses show that thirteen, or seventy-six per cent, of the activities received a high farmer acquisition and use value; while four, or twenty-four per cent, received a medium value. Teacher responses show that twelve, or seventy per cent of the activities received a high value; while five, or thirty per cent, received a medium value. The teacher educator responses show ten, or fifty-eight per cent, of the activities as receiving a high value; while seven,

TABLE LXIII

MEAN VALUES AND RANKS OF SEEECTED MECHANICAL AND MANAGERIAL ACTIVITIES IN FARM ELECTRIFICATION AS INDICATED BY FARM OPERATORS, TEACHERS OF VOCATIONAL AGRICULTURE, TEACHER EDUCATORS AND COMMERCIAL EDUCATIONAL REPRESENTATIVES

Activities	Farm operators		Vo-Ag teachers		Teacher educators		Commercial educ. rep.		Combined	
	Value[2]	Rank[5]	Value	Rank	Value	Rank	Value	Rank	Value	Rank
Diagnosing electrical system failures and safety hazards	2.71	1	2.69	1	2.75	1	2.04	4	2.53	1
Installing and maintaining other farm wiring systems	2.47	2	2.44	7	2.50	4	2.04	4	2.36	2
Selecting electrical motors	2.22	9	2.60	2	2.50	4	2.07	2	2.35	3
Maintaining a farm home wiring system	2.34	3	2.54	5	2.25	8	2.07	2	2.31	4
Planning an electrical wiring system	2.29	7	2.56	4	2.50	4	1.93	6	2.30	5
Selecting electrical wiring materials	2.33	4	2.58	3	2.00	11	1.93	6	2.21	6
Selecting electrical equipment for a specific farm enterprise	2.30	6	1.98	13	2.75	1	1.64	11	2.17	7
Selecting lighting equipment	2.32	5	2.14	10	2.50	4	1.68	8	2.16	8
Figuring an electrical system load	2.29	7	2.53	6	2.25	8	1.36	15	2.11	9

TABLE LXIII (continued)

Activities	Farm operators		Vo-Ag teachers		Teacher educators		Commercial educ. rep.		Combined	
	Value[a]	Rank[b]	Value	Rank	Value	Rank	Value	Rank	Value	Rank
Servicing electrical motors	2.07	12	2.27	9	2.25	8	1.71	9	2.07	10
Selecting electrical home appliances	1.96	14	1.07	17	2.75	1	2.36	1	2.03	11
Installing a wiring system for the farm home	2.17	10	2.42	8	1.75	14	1.71	9	2.01	12
Servicing electrical home appliances	2.01	13	2.05	11	2.00	11	1.57	12	1.91	13
Planning an exterior distribution system	2.10	11	2.02	12	2.00	11	1.36	15	1.87	14
Selecting electrical heating systems	1.83	15	1.73	14	1.75	14	1.57	12	1.72	15
Servicing and repairing electrical heating systems	1.88	16	1.43	16	1.50	16	1.43	14	1.56	16
Reconditioning electrical motors	1.78	17	1.46	15	1.50	16	0.78	17	1.38	17

[a]Description of Arithmetical values: 0.00 to 1.00 "low", 1.01 to 2.00 "medium" and 2.01 to 3.00 "high"
[b]Ordinal based on the expressed mean value

or forty-two per cent, received a medium value. The values as determined from the responses of the commercial educational representatives indicate that three, or seventeen per cent, of the activities received a high value; thirteen or seventy-six per cent received a medium value; while one, or seven per cent received a low value.

It is also observed in Table LXIII that when a mean of the combined respondents was determined, twelve, or seventy per cent, of the farm electrification activities received a high value; while five, or thirty per cent received a medium value.

It is observed in Table LXI, LXII and LXIII that a majority of the activities received either a high or medium value for farmer acquisition and use. A considerable amount of agreement existed among the respondents for the activities receiving a high value. It will be noted that a high level of agreement also existed for the least valuable activities. The agreement among the respondents for many of the activities between the highest and lowest values varied.

Since the agreement among the respondents varied considerably for many of the activities, educators attempting to use the data for program planning would need to supplement the data with subjective factors to determine a priority classification for the activities. This supplement of subjectivity would make the findings more applicable for course planning than the mere objective data. The priority classification could be accomplished by setting up priority groups with a range from the highest level of importance for farmer acquisition and use to the lowest level with the amount of instructional time available being a limiting factor. After the priorities were established a set of subjective factors could be applied to the mean values and ordinal ranks.

First, the differences between the relative value means of an activity among the respondent groups should be considered. If there was a high agreement among respondents as to the value of an activity, then the combined groups could be used to classify the activity into a priority. If one group of respondents differed greatly from other closely agreeing groups, the more consideration should be given to importance of the activities by those groups agreeing. If all groups disagreed greatly, then this subjective factor should be disregarded.

Second, the ordinal rank of the activity within and among the group should be considered. In general, an activity with a higher rank should take precedence over a lower rank.

Third, recent trend activities should receive special consideration. If an activity was considered to be relatively new for farmer acquisition and use, then more weight should be given to the responses of the educators in classifying the activity.

Fourth, activities requiring non-specialized and low cost equipment or supplies should receive a higher priority classification than activities requiring specialized and costly equipment.

Fifth, the availability of dependable commercial services within the area served by the instructional program should also be used to determine priority classifications.

Nature and Extent of Instruction in Undergraduate Teacher Education Courses in Institutions of Higher Education

In previous sections of this chapter, data have been presented with regards to the nature, extent, and relative values of selected activities being performed on farms in farm power and machinery, farm buildings and other structures, and farm electrification. The remainder of this chapter will be devoted to the presentation of data associated with the assessment of present instructional programs within the three selected curriculum areas.

It is the thinking among agricultural educators in vocational agriculture that the instructional program in farm mechanics for training present and prospective farmers should center largely around those activities being performed by farmers. This thinking has the same implication for the training of teachers of vocational agriculture since the teachers who are to teach for competence should be able to perform with a reasonable degree of competence the same activities.

The data presented in this section were obtained from the instructors of the required undergraduate course in farm power and machinery, farm buildings and other structures and farm electrification offered by the institutions training teachers of vocational agriculture in Alabama. The tabular presentation includes combined data from the institutions. Due to differences in the length of academic terms, the instructional time was converted to a per cent of the total instructional time available.

The data in Table LXIV indicate that in the instructional area of farm power and machinery, the largest mean percentage of available time was allotted to instruction in tractor preventative maintenance

followed closely by arc welding, adjusting farm machinery, setting up farm machinery and oxyacetylene welding. The activity receiving the smallest percentage of time was adjusting tractor brakes. This is understandable since this activity would probably require less time to teach than most of the activities included in the instructional area. The other activities, in general, were allotted time within the same percentage ranges. It should be noted that there was a wide variation in the instructional hours reported by the institutions for the activities. This is particularly true with the hours reported for those activities receiving the highest percentages of total available time. At least one institution offered no instruction in one of the six instructional units included.

It should also be noted that those activities previously mentioned as receiving the highest percentages of total available time were those activities that rank the highest in value for farmer acquisition and use as shown in the combined rank column in Table LXI on page 129. The activity, oxyacetylene welding was the only exception. However, this activity would normally require more instructional time than many of the activities included.

It is shown in Table LXV that the greatest mean percentage of total instructional time in farm buildings and other structures was allotted to the single unit of constructing farm buildings. Other units of instruction allotted large percentages of instructional time were those units associated with the planning of farm buildings. The instructional units associated with planning and installing farm and farm home conveniences received the smallest per cent of total time available. At least one institution offered no instruction in maintaining and repairing farm plumbing.

TABLE LXIV

INSTRUCTIONAL TIME ALLOTTED TO SELECTED UNITS OF INSTRUCTION IN FARM POWER AND MACHINERY IN UNDERGRADUATE TEACHER EDUCATION COURSES

Units of instruction	Hours reported	
	Range	Mean per cent of total
Determining the cost involved in owning and operating farm machinery	2-6	3.53
Determining the power, labor and machinery requirement for a farm enterprise	2-6	3.16
Determining the capacity of farm machinery	1-2	1.63
Planning a machinery replacement program	1-2	1.43
Selection of tractor fuels and lubricants	1-6	3.33
Tractor preventative maintenance	6-20	8.16
Servicing an ignition system	2-10	3.60
Servicing a fuel system	2-8	3.20
Servicing a cooling system	2-3	2.20
Adjusting a tractor clutch	0-2	1.23
Replacing a tractor clutch	0-3	2.43
Adjusting tractor brakes	0-1	.80
Replacing tractor brakes	0-2	1.23
Adjusting engine valve tappets	2-8	3.56
Diagnosing an making minor machinery and equipment repairs	2-6	4.60
Diagnosing the needs for major machinery and equipment repair	1-4	3.06
Complete tractor or power unit overhaul	0-6	2.20
Complete one cylinder engine overhaul	3-4	3.67
Complete overhaul of farm machinery	0-6	2.20

TABLE LXIV (continued)

Units of instruction	Hours reporting	
	Range	Mean per cent of total
Using the arc welder	4-20	7.26
Using the oxyacetylene welder	4-10	5.23
Painting farm machinery	0-2	1.60
Setting up farm machinery	2-25	6.63
Adjusting farm machinery under field conditions	4-25	6.96
Calculating pulley speeds	1-4	2.33
Constructing labor-saving equipment	2-4	3.26
Calibrating power sprayers	1-4	2.70
Calibrating planter and other seeding drills	1-4	3.43
Hardsurfacing plow-shares and cultivator sweeps	1-3	2.13

TABLE LXV

INSTRUCTIONAL TIME ALLOTTED TO SELECTED UNITS OF INSTRUCTION IN FARM BUILDINGS AND OTHER STRUCTURES IN UNDERGRADUATE TEACHER EDUCATION COURSES

Units of instruction	Hours reported	
	Range	Mean per cent of total
Sketching and drawing	2-7	4.53
Reading blue prints and detail drawings	2-3	3.20
Determining building requirements for animals and crops	2-6	5.53
Maintaining and improving farm buildings	2-8	5.40
Figuring bill of materials and other building cost	2-6	5.20
Selecting lumber and other building cost	4-6	6.43
Constructing farm buildings	8-12	12.90
Treating lumber and other wood materials	2-4	3.63
Paints and painting	2-10	5.53
Constructing pole type buildings	2-6	4.63
Constructing concrete forms	2	2.40
Determining concrete mixtures	1-2	1.96
Determining amounts of concrete needed	1-2	1.96
Mixing concrete on the farm	1-4	3.20
Using concrete blocks and other masonry materials	1-6	4.20
Planning a water system	3-4	4.10
Selecting a farm water pump	1-3	2.30

TABLE LXV (continued)

Units of instruction	Hours reported	
	Range	Mean percent of total
Installing a water pump	1-4	3.43
Installing a farm home plumbing system	1-3	2.30
Installing other farm plumbing	1-4	2.86
Maintaining and repairing farm plumbing	1-4	2.20
Constructing and maintaining farm fences and gates	2-3	2.86
Planning farm home sewage system	1-3	2.30
Installing a farm home sewage system	1-3	2.30

In general, the single units of instruction receiving the largest percentages of instructional time, correspond to those activities receiving the higher value ranks for farmer acquisition and use as shown in the combined rank column in Table LXII on page 132.

The data in Table LXVI indicate that the units of instruction receiving the largest allotments of instructional time are those associated with planning electrical systems. Units associated with the installation and maintenance of electrical systems received the next largest allotments followed by the units associated with selecting electrical equipment. In general, those units associated with electrical motors and heating systems received the smallest per cent of the available instructional time. At least one institution provided no instruction in one of the three units included.

TABLE LXVI

INSTRUCTIONAL TIME ALLOTTED TO SELECTED UNITS OF INSTRUCTION IN FARM ELECTRIFICATION IN UNDER-GRADUATE TEACHER EDUCATION COURSES

Units of instruction	Hours reported	
	Range	Mean per cent of total
Planning an electrical wiring system	3-4	6.93
Figuring an electrical system load	4-5	8.43
Selecting electrical wiring materials	3-4	6.00
Planning an exterior distribution system	2-4	5.60
Selecting lighting equipment	2-4	5.60
Installing a wiring system for the farm home	4-8	4.80
Maintaining a farm home wiring system	3-4	6.93
Installing and maintaining other farm wiring systems	4	7.77
Selecting electrical motors	2-4	6.10
Servicing electrical motors	1-3	3.70
Reconditioning electrical motors	0-3	2.00
Selecting electrical home appliances	0-6	4.33
Selecting electrical heating systems	1-6	4.83
Servicing electrical home appliances	0-6	2.66
Servicing an repairing electrical heatingsystems	0-2	1.70
Selecting electrical equipment for a specific farm enterprise	1-4	4.10
Diagnozing electrical system failures and safety hazards	4-5	8.43

It should be noted that those units receiving the largest percentages of instructional time correspond closely in agreement to the value ranks for farmer acquisition and use as shown in the combined rank column in Table LXIII on page 136.

Nature and Extent of the Instructional Program in Farm Power and Machinery, Farm Buildings and Other Structures and Farm Electrification in Secondary School Departments Offering Three and Four Year Programs of Vocational Agriculture

One of the most pressing problems confronting agricultural educators in vocational agriculture is the present trend of allowing less time for secondary school study of vocational agriculture in the comprehensive secondary school curriculum. Many schools previously offering four year programs of vocational agriculture have reduced their program to three years. The data analyzed in this section reflect some of the instructional program differences between the sixty-eight three year and twenty-four four year departments included in the sample. The characteristics concerning the instruction offered by the two group of departments were categorized into the following: (1) total instructional time allocations in farm mechanics, (2) instruction offered for secondary school students in farm power and machinery, (3) instruction offered for secondary school students in farming building and other structures, (4) instruction offered for secondary school students in farm electrification, (5) out-of-school instruction offered in farm power and machinery, (6) out-of-school instruction offered in farm buildings and other structures and (7) out-of-school instruction offered in farm electrification.

It is shown in Table LXVII that, in general, the instructional time allotted to the various areas and phases of farm mechanics by the vocational agriculture departments offering three and four year programs differ very little even though the four year program has more instructional time available. Of the eleven time allocations, only one reflects a significant difference between the group means.

The significant allocation of period to farm mechanics includes all instructional areas except soil and water conservation. It is apparent from the data presented that the existing difference was in the instructional area of farm shop and skills development through supervision since little differences existed between the instructional areas of farm power and machinery, farm buildings and other structures and farm electrification. Therefore, the null hypothesis was rejected.

Based on the per cent of total instructional time available, it was determined that the three year program group was spending forty-eight per cent of the available time in farm mechanics, while the four year program group was spending forty-four per cent. Of the total clock hours of out-of-school instruction provided during time series classes in all areas of agricultural and mechanical instruction, it was determined that the three year department group offered fifty-one per cent in mechanics instruction; while the four year group offered fifty-six per cent.

An analysis of the allocation data seem to reflect little evidence to substantiate the common generalizations that: (1) the amount of instructional time available in the secondary school program influences the allocation of instructional time in all phases of the farm mechanics program and (2) number of years of secondary school

TABLE LXVII

INSTRUCTIONAL TIME ALLOCATED TO FARM MECHANICS BY DEPARTMENTS OF VOCATIONAL AGRICULTURE REPORTING THREE AND FOUR YEAR SECONDARY SCHOOL PROGRAMS

Time allocations[a]	Departments reporting		t-value of difference between means
	Three year program	Four year program	
Mean number of instructional periods allotted to farm mechanics instruction in the secondary school program	234.39	287.00	2.66**
Mean number of clock hours of out-of-school instruction provided during time series classes in all areas of agricultural and mechanical instruction	47.56	43.37	.93
Mean number of clock hours of out-of-school instruction allotted to farm mechanics during time series classes	24.70	24.50	.05
Mean number of instructional periods allotted to instruction in the three areas of farm power and machinery, farm buildings and other structures and farm electrification in the secondary school program	169.97	197.13	1.66
Mean number of instructional periods allotted to instruction in farm power and machinery in the secondary school program	76.40	93.41	1.65
Mean number of instructional periods allotted to instruction in farm buildings and other structures in the secondary school program	64.44	65.08	.11

TABLE LXVII (continued)

Time allocations	Departments reporting: Three year program	Departments reporting: Four year program	t-value of difference between means
Mean number of instructional periods allotted to instruction in farm electrification in the secondary school program	29.13	33.38	.92
Mean number of clock hours spent by the teacher of vocational agriculture in providing out-of-school instruction in the three areas of farm power and machinery, farm buildings and other structures and farm electrification during time series classes and on-the-farm instruction	46.66	43.91	.21
Mean number of clock hours spent by the teacher of vocational agriculture in providing out-of-school instruction in farm power and machinery during time series classes and on-the-farm instruction	22.50	24.04	.91
Mean number of clock hours spent by the teacher of vocational agriculture in providing out-of-school instruction in farm buildings and other structures during time series classes and on-the-farm instruction	15.65	10.21	1.17
Mean number of clock hours spent by the teacher of vocational agriculture in providing out-of-school instruction in farm electrification during time series classes and on-the-farm instruction	8.51	6.54	1.38

**Significant at one per cent level

[a]Secondary school allocations based on one-hundred sixty fifty-six minute period per year

vocational agriculture offered influences teacher time spent in providing out-of-school instruction.

Table LXVIII shows the mean number period of instruction provided in selected units of farm power and machinery by three and four year program departments in the secondary school program. It is observed, in general, that a wider variation existed between the per cent of departments teaching the units than in the number periods of instruction offered.

Of the twenty-nine instructional units, thirteen were taught by fifty per cent or more of the three year group; while fourteen were taught by more than fifty per cent of the four year group.

Seven units were taught by less than thirty per cent of the three year group; while five were taught by less than thirty per cent of the four year group.

Of the twenty-nine instructional units, only two reflect a significant difference between the mean number periods of instruction offered by the groups; therefore, the null hypothesis relative to the activities was rejected.

Table LXIX shows the mean number of instructional period allotted to selected units in farm buildings and other structures by three and four year departments in the secondary school program. It is noted, in general, that very little variation existed between the groups with regard to the per cent of departments teaching and the number of mean periods of instruction offered.

Of the twenty-four instructional units, nineteen were taught by fifty per cent or more of the three year group; while twenty-one were taught by fifty per cent or more of the four year group.

TABLE LXVIII

MEAN NUMBER OF PERIODS ALLOCATED BY DEPARTMENTS THAT OFFERED INSTRUCTION FOR SECONDARY SCHOOL STUDENTS IN SELECTED UNITS IN THE AREA OF FARM POWER AND MACHINERY

Instructional units	Departments reporting				t-value of difference between means
	Three year program		Four year program		
	Per cent teaching	Mean periods	Per cent teaching	Mean periods	
Determining the cost involved in owning and operating farm machinery	75.00	4.72	75.00	4.22	.77
Determining the power, labor and machinery requirement for a farm enterprise	67.65	4.17	62.50	4.40	.20
Determining the capacity of farm machinery	44.12	2.80	54.16	3.00	.30
Planning a machinery replacement program	27.94	2.94	45.83	2.36	.83
Selection of tractor fuels and lubricants	80.88	2.63	87.50	2.95	.39
Tractor preventative maintenance	89.70	5.14	91.67	6.18	1.37
Servicing an ignition system	54.41	2.02	79.16	2.00	.09
Servicing a fuel system	63.23	1.72	83.33	1.95	.56
Servicing a cooling system	66.17	1.77	70.83	1.59	1.28

TABLE LXVIII (continued)

Instructional units	Departments reporting: Three year program, Per cent teaching	Three year program, Mean periods	Four year program, Per cent teaching	Four year program, Mean periods	t-value of difference between means
Adjusting a tractor clutch	27.94	1.89	29.17	1.71	.25
Replacing a tractor clutch	19.11	2.23	16.66	2.00	.41
Adjusting tractor brakes	7.35	1.80	33.33	2.00	.55
Replacing tractor brakes	7.35	2.00	25.00	2.50	.43
Adjusting engine valve tappets	33.82	2.08	33.33	1.87	.44
Diagnosing and making minor machinery and equipment repairs	76.47	4.52	79.16	4.73	.25
Diagnosing the needs for major machinery and equipment repairs	52.94	2.47	41.67	3.40	1.18
Complete tractor or power unit engine overhaul	13.23	6.33	25.00	6.00	.11
Complete one cylinder engine overhaul	33.82	7.71	62.50	5.06	1.76
Complete overhaul of farm machinery	22.06	5.73	33.33	5.75	.01
Using the arc welder	89.70	26.17	87.50	42.27	2.30*
Using the oxyacetylene welder	41.18	10.45	41.67	11.10	.12
Painting farm machinery	85.29	4.73	83.33	6.50	1.22

TABLE LXVIII (continued)

Instructional units	Departments reporting: Three year program, Per cent teaching	Departments reporting: Three year program, Mean periods	Departments reporting: Four year program, Per cent teaching	Departments reporting: Four year program, Mean periods	t-value of difference between means
Setting up farm machinery	47.06	4.42	37.50	3.00	.65
Adjusting farm machinery under field conditions	42.65	3.41	33.33	2.87	.57
Calculating pulley speeds	36.76	1.52	66.67	1.87	1.13
Constructing labor-saving equipment	73.52	7.50	45.83	4.18	2.25*
Calibrating power sprayers	27.94	2.36	16.67	2.75	.34
Calibrating planters and seeding drills	30.88	2.52	29.17	2.28	.48
Hardsurfacing plow-shares and cultivator sweeps	66.17	3.06	91.67	2.90	.30

*Significant at five per cent level

TABLE LXIX

MEAN NUMBER OF PERIODS ALLOCATED BY DEPARTMENTS THAT OFFERED INSTRUCTION FOR SECONDARY SCHOOL STUDENTS IN SELECTED UNITS IN THE AREA OF FARM BUILDINGS AND OTHER STRUCTURES

Instructional units	Departments reporting				t-value of difference between means
	Three year program		Four year program		
	Per cent teaching	Mean periods	Per cent teaching	Mean periods	
Sketching and drawing	80.88	3.69	83.33	4.80	.80
Reading blue prints and detail drawings	69.12	3.59	70.83	3.47	.13
Determining building requirements for animals and crops	63.23	4.00	66.67	4.68	.77
Maintaining and improving farm buildings	76.47	5.90	83.33	4.85	.24
Figuring bill of materials and other building cost	95.59	7.10	100.00	6.16	.99
Selecting lumber and other building materials	97.06	4.22	100.00	4.08	.16
Constructing farm buildings	66.17	5.08	75.00	4.61	.53
Treating lumber and other wood materials	66.17	2.73	62.50	2.46	.64
Paints and painting	86.76	4.52	100.00	4.45	.09

TABLE LXIX (continued)

Instructional units	Departments reporting: Three year programs, Per cent teaching	Three year programs, Mean periods	Four year program, Per cent teaching	Four year program, Mean periods	t-value of difference between means
Constructing pole type buildings	36.76	3.64	20.58	3.92	.25
Constructing concrete forms	76.46	3.80	75.00	2.88	.01
Determining concrete mixtures	80.88	3.80	91.67	3.72	.01
Determining amounts of concrete needed	86.76	2.49	87.50	2.85	.90
Mixing concrete on the farm	80.88	3.29	66.67	2.43	2.00*
Using concrete blocks and other masonry materials	55.88	4.07	50.00	3.66	.40
Planning a water system	69.12	4.23	79.16	3.10	2.26*
Selecting a farm water pump	51.47	2.14	66.67	2.25	.29
Installing a water pump	33.82	3.21	20.58	2.07	2.19*
Installing a farm home plumbing system	48.53	5.93	83.33	4.75	1.12
Installing other farm plumbing	41.18	3.17	41.67	3.40	.37
Maintaining and repairing farm plumbing	61.76	3.14	50.00	2.83	.54

TABLE LXIX (continued)

Instructional units	Departments reporting: Three year program, Per cent teaching	Three year program, Mean periods	Four year program, Per cent teaching	Four year program, Mean periods	t-value of difference between means
Constructing and maintaining farm fences and gates	75.00	4.07	91.67	3.36	1.22
Planning a farm home sewage system	55.88	3.55	62.50	2.40	2.21*
Installing a farm home sewage system	26.47	4.27	50.00	2.41	2.44*

*Significant at five per cent level

Of the twenty-four instructional units, only one was taught by less than thirty per cent of the three year group; while two were taught by less than thirty per cent of the four year group.

Five of the twenty-four units reflect a significant difference between the mean number periods of instruction offered by the groups. All units reflect a higher mean in favor of the three year group. The null hypothesis relative to the five significant activities was rejected.

Table LXX shows the mean number of instructional periods allotted to selected units in farm electrification by three and four year departments in the secondary school program.

Of the seventeen instructional units, ten were taught by fifty per cent or more of the three year group; while twelve were taught by fifty per cent or more of the four year group.

Three of the seventeen units were taught by less than thirty per cent of both groups.

Only one of the instructional units reflects a significant difference between the mean number periods of instruction offered by the groups; thus, the null hypothesis relative to the activity was rejected.

Table LXI shows the mean clock hours of out-of-school instruction offered by three and four year departments of vocational agriculture in farm power and machinery during time series classes and on-the-farm instruction.

It is observed that twenty-five per cent or more of the three year group offered instruction in fourteen of the twenty-nine units; while twenty-five per cent or more of the four year group offered instruction in only five of the units.

TABLE LXX

MEAN NUMBER OF PERIODS ALLOCATED BY DEPARTMENTS THAT OFFERED INSTRUCTION FOR SECONDARY SCHOOL STUDENTS IN SELECTED UNITS IN THE AREA OF FARM ELECTRIFICATION

Instructional units	Departments reporting				t-value of difference between means
	Three year program		Four year program		
	Per cent teaching	Mean periods	Per cent teaching	Mean periods	
Planning an electrical wiring system	83.82	4.71	100.00	6.00	1.24
Figuring an electrical system load	75.00	2.60	100.00	3.08	.69
Selecting electrical wiring materials	83.82	2.77	95.83	2.60	.47
Planning an exterior distribution system	41.81	1.96	70.83	2.35	.61
Selecting lighting equipment	70.59	2.45	87.50	1.80	1.96
Installing a wiring system for the farm home	75.00	6.74	70.83	6.88	.09
Maintaining a farm home wiring system	67.65	2.81	87.50	2.19	1.44
Installing and maintaining other farm wiring systems	42.65	2.96	62.50	2.40	1.00
Selecting electrical motors	66.17	2.58	87.50	2.19	1.26
Servicing electric motors	51.47	2.51	66.67	1.93	1.70
Reconditioning electric motors	14.70	5.10	16.66	5.25	.08

TABLE LXX (continued)

Instructional units	Departments reporting: Three year program, Per cent teaching	Departments reporting: Three year program, Mean periods	Departments reporting: Four year program, Per cent teaching	Departments reporting: Four year program, Mean periods	t-value of difference between means
Selecting electrical home appliances	39.70	2.33	41.67	1.60	1.04
Selecting electrical heating systems	14.70	3.40	29.17	1.14	4.03**
Servicing electrical home appliances	41.18	2.60	50.00	2.25	.46
Servicing and repairing electrical heating systems	13.23	2.89	16.66	2.75	.17
Selecting electrical equipment for a specific farm enterprise	36.76	3.28	41.67	2.60	.90
Diagnosing electrical system failures and safety hazards	79.41	2.79	100.00	2.70	.04

**Significant at one per cent level

TABLE LXXI

MEAN CLOCK HOURS OF OUT-OF-SCHOOL INSTRUCTION OFFERED BY DEPARTMENTS IN SELECTED UNITS IN THE AREA OF FARM POWER AND MACHINERY DURING TIME SERIES CLASSES AND ON-THE-FARM INSTRUCTION

Instructional units	Departments reporting				t-value of difference between means
	Three year program		Four year program		
	Per cent teaching	Mean hours	Per cent teaching	Mean hours	
Determining the cost involved in owning and operating farm machinery	36.76	2.32	20.58	2.35	.05
Determining the power, labor and machinery requirement for a farm enterprise	30.88	2.52	16.66	2.00	.94
Determining the capacity of farm machinery	20.58	1.93	12.50	1.66	.09
Planning a machinery replacement program	13.23	2.11	20.83	1.80	.35
Selection of tractor fuels and lubricants	36.76	1.56	20.83	1.40	.00
Tractor preventative maintenance	36.76	2.68	29.17	1.71	1.76
Servicing an ignition system	29.41	2.00	16.66	1.75	1.03
Servicing a fuel system	29.41	1.60	25.00	2.00	.80
Servicing a cooling system	29.41	1.40	20.83	1.00	.00

TABLE LXXI (continued)

Instructional units	Departments reporting: Three year program, Per cent teaching	Departments reporting: Three year program, Mean hours	Departments reporting: Four year program, Per cent teaching	Departments reporting: Four year program, Mean hours	t-value of difference between means
Adjusting a tractor clutch	13.23	1.00	12.50	1.00	.00
Replacing a tractor clutch	7.35	2.00	12.50	1.00	.00
Adjusting tractor brakes	10.29	1.00	4.41	1.00	.00
Replacing tractor brakes	7.35	2.00	.00	--	--
Adjusting engine valve tappets	16.17	1.81	8.33	1.00	.00
Diagnosing and making minor machinery and equipment repair	39.70	3.85	11.76	4.62	.50
Diagnosing the needs for major machinery and equipment repair	19.11	1.84	12.50	4.00	2.04
Complete tractor or power unit engine overhaul	0.00	--	8.33	11.50	--
Complete one cylinder engine overhaul	14.70	4.20	12.50	2.66	2.02
Complete overhaul of farm machinery	4.41	12.33	12.50	11.00	.13
Using the arc welder	70.59	10.97	66.66	18.37	2.06
Using the oxyacetylene welder	27.94	3.78	20.83	2.00	1.39

TABLE LXXI (continued)

Instructional units	Departments reporting: Three year program, Per cent teaching	Three year program, Mean hours	Four year program, Per cent teaching	Four year program, Mean hours	t-value of difference between means
Painting farm machinery	27.94	2.00	25.00	2.50	1.03
Setting up farm machinery	14.70	1.50	12.50	2.66	1.31
Adjusting farm machinery under field conditions	19.11	3.07	20.83	2.80	.54
Calculating pulley speeds	29.41	1.00	12.50	1.33	.00
Constructing labor-saving equipment	32.35	4.50	20.83	4.40	.58
Calibrating power sprayers	4.41	2.66	20.83	1.60	.63
Calibrating planters and seeding drills	13.23	2.88	16.66	1.75	1.04
Hardsurfacing plow-shares and cultivator sweeps	39.70	2.25	45.83	3.36	2.22*

*Significant at five per cent level

Of the three year group, less than ten per cent offered instruction in five of the units; while less than ten per cent of the four year group offered instruction in four of the units.

Of the twenty-nine instructional units, only one reflects a significant difference between the clock hour means of groups; thus the null hypothesis relative to the unit was rejected.

Table LXII indicates the mean clock hours of out-of-school instruction offered by three and four year departments in farm buildings and other structures during time series classes and on-the-farm instruction.

It is observed that twenty-five per cent or more of the three year group offered instruction in fourteen of the twenty-four units; while twenty-five per cent or more of the four year group offered instruction in only five of the units. Less than ten per cent of the three year group offered instruction in only one unit; while less than ten per cent of the four year group offered instruction in five of the units.

Five of the twenty-four units reflect a significant difference between the clock hour means of the groups. Therefore, the null hypothesis relative to the five units was rejected.

Table LXIII shows the mean clock hours of out-of-school instruction offered by three and four year departments of vocational agriculture in farm electrification during time series meeting and on-the-farm instruction.

The table indicates that twenty-five per cent or more of both groups offered instruction in only four of the seventeen instructional units.

TABLE LXXII

MEAN CLOCK HOURS OF OUT-OF-SCHOOL INSTRUCTION OFFERED BY DEPARTMENTS IN SELECTED UNITS IN THE AREA OF FARM BUILDINGS AND OTHER STRUCTURES DURING TIME SERIES CLASSES AND ON-THE-FARM INSTRUCTION

Instructional units	Departments reporting				t-value of difference between means
	Three year program		Four year program		
	Per cent teaching	Mean hours	Per cent teaching	Mean hours	
Sketching and drawing	5.88	1.75	8.33	2.00	.00
Reading blue prints and detail drawings	11.76	2.00	8.33	1.00	2.70*
Determining building requirements for animals and crops	30.88	2.76	16.66	3.25	.34
Maintaining and improving farm buildings	39.70	3.03	25.00	2.33	.84
Figuring bill of materials and other building cost	32.35	2.81	20.83	4.00	1.27
Selecting lumber and other buildings materials	29.41	2.40	25.00	2.50	.07
Constructing farm buildings	25.00	3.70	25.00	2.50	1.14
Treating lumber and other wood materials	27.94	2.15	12.50	2.00	.00
Paints and painting	27.94	3.15	20.83	1.80	1.62
Constructing pole type buildings	25.00	1.88	25.00	3.16	.87

TABLE LXXII (continued)

Instructional units	Departments reporting: Three year program, Per cent teaching	Departments reporting: Three year program, Mean hours	Departments reporting: Four year program, Per cent teaching	Departments reporting: Four year program, Mean hours	t-value of difference between means
Constructing concrete forms	22.06	2.45	12.50	3.00	1.12
Determining concrete mixtures	19.11	1.69	20.83	1.00	.00
Determining amounts of concrete needed	20.59	2.28	20.83	5.00	6.18**
Mixing concrete on the farm	22.06	2.53	12.50	1.60	2.51*
Using concrete blocks and other masonry materials	25.00	2.70	12.50	1.33	4.56**
Planning a water system	32.35	2.68	12.50	1.33	4.56**
Selecting a farm water pump	25.00	1.52	8.33	2.50	.66
Installing a water pump	19.11	2.92	12.50	3.00	.01
Installing a farm home plumbing system	23.53	3.87	12.50	4.66	.59
Installing other farm plumbing	26.47	2.50	8.33	6.00	11.29**
Maintaining and repairing farm plumbing	30.88	2.27	12.50	2.66	.33
Constructing and maintaining farm fences and gates	32.35	3.19	33.33	2.87	.32
Planning a farm sewage system	16.17	3.45	12.50	2.00	1.73
Installing a farm home sewage system	10.29	4.14	8.33	4.00	.10

*Significant at five per cent level
**Significant at one per cent level

TABLE LXXIII

MEAN CLOCK HOURS OF OUT-OF-SCHOOL INSTRUCTION OFFERED BY DEPARTMENTS IN SELECTED UNITS IN THE AREA OF FARM ELECTRIFICATION DURING TIME SERIES CLASSES AND ON-THE-FARM INSTRUCTION

Instructional units	Departments reporting				t-value of difference between means
	Three year program		Four year program		
	Per cent teaching	Mean hours	Per cent teaching	Mean hours	
Planning an electrical wiring system	41.18	2.43	29.17	4.28	.84
Figuring an electrical system load	20.59	2.50	25.00	2.16	.48
Selecting electrical wiring materials	30.88	1.71	20.83	2.00	.40
Planning an exterior distribution system	16.17	2.27	12.50	1.33	1.88
Selecting lighting equipment	23.53	1.56	12.50	2.33	.59
Installing a wiring system for the farm home	25.00	5.11	16.66	2.50	1.86
Maintaining a farm home wiring system	16.17	2.72	8.33	1.50	.55
Installing and maintaining other farm wiring systems	16.17	3.54	20.83	2.60	1.16
Selecting electrical motors	20.59	1.78	16.66	1.25	.00
Servicing electric motors	17.65	1.83	12.50	1.33	1.51
Reconditioning electric motors	7.35	3.00	2.50	4.00	.00
Selecting electrical home appliances	16.17	2.00	12.50	2.00	.00

TABLE LXXIV (continued)

	Departments reporting				t-value of difference between means
	Three year program		Four year program		
	Per cent teaching	Mean hours	Per cent teaching	Mean hours	
Selecting electrical heating systems	7.35	2.60	16.66	2.00	.88
Servicing electrical home appliances	17.65	2.80	12.50	2.00	.00
Servicing and repairing electrical heating	11.76	1.62	8.33	2.00	.00
Selecting electrical equipment for enterprise	14.70	3.30	29.17	2.14	1.70
Diagnosing electrical failures and hazards	33.82	2.60	33.33	1.50	3.23**

**Significant at one per cent level

Of the three year group, less than ten per cent offered instruction in two units; while less than ten per cent of the four year group offered instruction in three of the seventeen units.

Only one of the seventeen instructional units reflects a significant difference between the clock hour means of the two groups; consequently the null hypothesis relative to the unit was rejected.

CHAPTER V

SUMMARIES AND CONCLUSIONS

Problem of the Study

The central problem of this study was to provide descriptive evidence for an appraisal of farm mechanics instruction in the curriculum areas of farm power and machinery, farm buildings and other structures and farm electrification for secondary school departments of vocational agriculture and undergraduate teacher education programs in institutions of higher education.

The study involved the collection and analysis of data regarding: (1) selected mechanical and managerial activities being performed in the three curriculum areas on selected Alabama farms, (2) the status of Alabama instructional programs in the three curriculum areas in secondary school departments of vocational agriculture and undergraduate teacher education programs in the institutions of higher education training prospective teachers of vocational agriculture and (3) the opinions of selected farm operators, teachers of vocational agriculture, teacher educators and commercial educational representatives as to the relative value for farmer acquisition and use of selected mechanical and managerial activities in the three curriculum areas to farm operation and rural living.

Methods and Procedure of the Study

The study was designed to investigate a number of problems and to test a number of null hypotheses pertaining to the: (1) nature and extent of instructional programs, (2) existence of significant differences between a group of farm operators who participate and a group who did not participate in the performance of selected mechanical and managerial activities with regard to their personal and economic characteristics, (3) existence of significant differences between farm operators expressing different relative values for selected mechanical and managerial activities with regard to their personal and economic characteristics and (4) extent of differences existing between the expression of farm operators, teachers of vocational agriculture, teacher educators, and commercial educational representatives as to the relative value of selected mechanical and managerial activities.

The data were collected by the questionnaire, checklist and interview techniques from 228 selected farm operators, ninety-two randomly selected teachers of vocational agriculture, seven teacher educators and twenty-four commercial educational representatives throughout the state of Alabama.

The statistical techniques used in the testing of null hypotheses were the "t" test and analysis of variance. The level of significance required for the rejection of a null hypotheses was set at the five per cent level.

Summary of Findings in Regard to Problems Investigated and Hypotheses Tested in Farm Power and Machinery

The data obtained were tabulated and subjected to both non-statistical and statistical techniques. The following is a summary of the most important findings.

Nature and extent of mechanical and managerial activities performed on selected farms in farm power and machinery. The data indicated that twenty-one of the twenty-nine selected activities were being performed on a majority of the farms. No activities was being performed on less than thirty per cent of the farms.

Twenty-eight of the activities performed on farms were being performed by a majority of the operators. Activities being performed by other persons on thirty per cent or more of the farms were: (1) replacing a tractor clutch, (2) replacing tractor brakes, (3) adjusting engine valve tappets, (4) complete tractor or power unit overhaul, (5) complete one cylinder engine overhaul, (6) using the arc welder, (7) using the oxyacetylene welder, (8) calibrating power sprayers and (9) hardsurfacing plow-shares and cultivator sweeps.

Hypothesis regarding age and operator performance of mechanical and managerial activities in farm power and machinery. Twelve of the sixteen selected activities relative to the hypothesis were not significant. It was found that significant differences did exist between those operators performing and those not performing the activities: (1) planning a machinery replacement program, (2) using the oxyacetylene welder, (3) replacing a tractor clutch and (4) replacing tractor brakes.

The data indicated that the younger farm operators were performing activities one and two; while the older operators were performing three and four.

Hypothesis regarding level of formal education and operator performance of mechanical and managerial activities in farm power and machinery. Thirteen of sixteen selected activities relative to the hypothesis were not significant. It was found that significant differences did exist between those operators performing and those not performing the activities: (1) complete tractor or power unit overhaul, (2) complete one cylinder engine overhaul and (3) using the oxyacetylene welder.

The data revealed that the less educated operators were performing activities one and two; while the more educated operators were performing activity three.

Hypothesis regarding years of vocational agriculture received while attending secondary school and farm operator performance of mechanical and managerial activities in farm power and machinery. Eleven of sixteen selected activities relative to the hypothesis were found to be significant. Significant differences did exist between those operators performing and those not performing the activities: (1) determining the cost involved in owning and operating farm machinery, (2) planning a machinery replacement program, (3) using the arc welder, (4) using the oxyacetylene welder and (5) hardsurfacing plow-shares and cultivator sweeps.

The data indicated that the operators receiving the largest number years of vocational agriculture instruction were performing activities one through four, while operators that received the smallest number years of instruction were performing activity five.

Hypothesis regarding farming experience and farm operator performance of mechanical and managerial activities in farm power and machinery. Fourteen of the sixteen selected activities relative to the hypothesis were not significant. It was found that significant differences did exist between those operators performing and those not performing the activities: (1) replacing a tractor clutch and (2) using the oxyacetylene welder.

The data reflected that the more experienced operators were performing activity one; while the less experienced were performing activity two.

Hypothesis regarding days of annual on-the-farm employment and operators performance of mechanical and managerial activities in farm power and machinery. Six of the sixteen selected activities relative to the hypothesis were insignificant. Significant differences did exist between those operators performing and those not performing the activities: (1) determining the cost involved in owning and operating farm machinery; (2) determining the power, labor and machinery requirement for a farm enterprise; (3) planning a machinery replacement program; (4) servicing an engine ignition system; (5) servicing an engine fuel system; (6) replacing a tractor clutch, (7) replacing tractor brakes; (8) adjusting engine value tappets; (9) using the oxyacetylene welder and (10) calibrating power sprayers.

The data revealed that the operators employed the largest number of days annually were performing to a greater extent the forementioned ten activities than those operators employed on the farm to a lesser degree.

Hypothesis regarding size of farm in total acres and operator performance of mechanical and managerial activities in farm power and machinery. Eight of the sixteen selected activities relative to the hypothesis were not significant. It was found that significant differences did exist between those operators performing and those not performing the activities: (1) determining the cost involved in owning and operating farm machinery; (2) determining the power, labor and machinery requirements for a farm enterprise; (3) determining the capacity of farm machinery; (4) replacing tractor brakes; (5) adjusting engine valve tappets; (6) using the arc welder; (7) using the oxyacetylene welder and (8) calibrating power sprayers.

The data indicated that those operators with large acreages in the farm operation were performing to a greater extent the eight forementioned activities than those operators with small acreages.

Hypothesis regarding current investment in farm power and machinery and operator performance of mechanical and managerial activities in farm power and machinery. Ten of the sixteen selected activities relative to the hypothesis were insignificant. Significant differences did exist between those operators performing and those not performing the activities: (1) determining the cost involved in owning and operating farm machinery, (2) planning a machinery replacement program, (3) adjusting engine valve tappets, (4) using the oxyacetylene welder, (5) calibrating power sprayers and (6) hardsurfacing plow-shares and cultivator sweeps.

The data indicated that those operators with large investments were performing to a greater extent the six forementioned activites than those operators with small investments.

Nature and extent of the qualifications of farm operators to perform mechanical and managerial activities in farm power and machinery. The data indicated that seventy per cent or more of the farmers felt that they were qualified to perform twenty-three of the twenty-nine selected activities. Thirty per cent or more of the operators felt that they were not qualified to perform the activities: (1) adjusting engine valve tappets, (2) complete tractor or power unit engine overhaul, (3) complete one cylinder engine overhaul, (4) using the arc welder, (5) using the oxyacetylene welder, (6) calibrating power sprayers, and (7) hard-surfacing plow-shares and cultivator sweeps.

Hypothesis regarding age and farm operator qualifications to perform mechanical and managerial activities in farm power and machinery. Eight of the sixteen selected activities relative to the hypothesis were not significant. It was found that significant differences did exist between the operators recognizing themselves as qualified and those not qualified to perform the activities: (1) servicing an engine ignition system; (2) servicing a fuel system; (3) replacing a tractor clutch; (4) replacing tractor brakes; (5) adjusting engine valve tappets; (6) determining the power, labor and machinery requirements for a farm enterprise; (7) using the oxyacetylene welder and (8) hardsurfacing plow-shares and cultivator sweeps.

The data indicated that the ability to perform activities, one through five, was in favor of the older farmers; while the ability to perform activities, six through eight, was in favor of the younger group.

Hypothesis regarding level of education and farm operator qualifications to perform mechanical and managerial activities in farm power and machinery. Ten of the sixteen selected activities relative to the hypothesis were insignificant. Significant differences did exist between those operators recognizing themselves as qualified and those not qualified to perform the activities: (1) determining the cost involved in owning and operating farm machinery; (2) determining the power, labor, and machinery requirements for a farm enterprise; (3) determining capacity of farm machinery; (4) planning a machinery replacement program; (5) using the arc welder and (6) using the oxyacetylene welder.

The data indicated that the ability to perform the six forementioned activities was in favor of the more educated group.

Hypothesis regarding years of vocational agriculture instruction received and farm operator qualification to perform mechanical and managerial activities in farm power and machinery. Twelve of the sixteen selected activities relative to the hypothesis were not significant. It was found that significant differences did exist between those operators recognizing themselves as qualified and those not qualified to perform the activities: (1) determining the power, labor and machinery requirements for a farm enterprise; (2) adjusting engine valve tappets; (3) calculating pulley speeds and (4) calibrating power sprayers.

The data indicated that the ability to perform the four forementioned activities was in favor of the group of operators receiving the most vocational agriculture instruction while attending secondary school.

Hypothesis regarding years of farming experience and farm operator qualifications to perform mechanical and managerial activities in farm power and machinery. Nine of the sixteen selected activities relative to the hypothesis were insignificant. Significant differences existed between those operators recognizing themselves as qualified and those not qualified to perform the activities: (1) planning a machinery replacement program, (2) using the arc welder, (3) using the oxyacetylene welder, (4) servicing an engine ignition system, (5) servicing an engine fuel, (6) replacing a tractor clutch and (7) adjusting engine valve tappets.

The data indicated that the ability to perform activities, one through three, was in favor of the less experience group; while the ability to perform activities, four through seven, was in favor of the more experienced group.

Hypothesis regarding age and farm operator expressions of the value for farmer acquisition and use of mechanical and managerial activities in farm power and machinery. Six of the sixteen selected activities relative to the hypothesis were insignificant. Significant differences did exist between those operators expressing a high and those a medium to low value for the activities; (1) determining the cost involved in owning and operating farm machinery; (2) determining the power, labor and machinery requirements for a farm enterprise; (3) determining the capacity of farm machinery; (4) planning a machinery replacement program; (5) replacing a tractor clutch; (6) replacing tractor brakes; (7) using the arc welder; (8) using the oxyacetylene welder; (9) hard-surfacing plow-shares and cultivator sweeps and (10) complete one cylinder engine overhaul.

The data revealed that the younger group of operators expressed a high value for activities, one through nine; while the older group expressed a high value for activity ten.

Hypothesis regarding level of formal education and farm operator expression of the value for farmer acquisition and use of mechanical and managerial activities in farm power and machinery. Six of the sixteen selected activities relative to the hypothesis were not significant. It was found that significant differences did exist between those operators expressing a high and those a medium to low value for the activities: (1) determining the cost involved in owning and operating farm machinery; (2) determining the power, labor and machinery requirements for a farm enterprise; (3) servicing an engine ignition system; (4) servicing an engine fuel system; (5) replacing a tractor clutch; (6) replacing tractor brakes; (7) adjusting engine valve tappets; (8) complete tractor or power unit overhaul; (9) complete one cylinder engine overhaul and (10) using the arc welder.

The data indicated that the more educated group expressed a high value for activities one and two; while the less educated group expressed a high value for the remaining eight activities.

Hypothesis regarding years of vocational agriculture instruction received and farm operator expression of the value for farmer acquisition and use of mechanical and managerial activities in farm power and machinery. Nine of the sixteen selected activities relative to the hypothesis were insignificant. Significant differences did exist between those operators expressing a high and those a medium to low value for the activities: (1) determining the power, labor and machinery requirements for a farm enterprise; (2) planning a machinery replacement

program; (3) servicing an engine fuel system; (4) replacing a tractor clutch; (5) using the arc welder; (6) using the oxyacetylene welder and (7) calculating pulley speeds.

The data revealed that the group of operators receiving the most vocational agriculture instruction while attending secondary school expressed a higher value for seven forementioned activities than those operators that received fewer years of instruction.

Hypothesis regarding years of farming experience and farm operator expressions of the value for farmer acquisition and use of mechanical and managerial activities in farm power and machinery. Nine of the sixteen selected activities relative to the hypothesis were not significant. It was found that significant differences did exist between those operators expressing a high and those a medium to low value for the activities: (1) determining the cost involved in owning and operating farm machinery; (2) determining the power, labor and machinery requirement for a farm enterprise; (3) determining the capacity of farm machinery; (4) planning a machinery replacement program; (5) using the arc welder; (6) using the oxyacetylene welder and (7) complete overhaul of a one cylinder engine.

The data reflected that the less experienced operators expressed a high value for activities, one through six; while the more experienced operators express a high value for overhauling one cylinder engines.

Hypothesis regarding annual on-the-farm employment and farm operator expressions of the value for farmer acquisition and use of mechanical and managerial activities in farm power and machinery. Seven of the sixteen selected activities relative to the hypothesis were insignificant. It was found that significant differences did exist

between those operators expressing a high and those a medium to low value for the activities: (1) determining the power, labor and machinery requirement; (2) planning a machinery replacement program; (3) replacing a tractor clutch; (4) replacing tractor brakes; (5) adjusting engine valve tappets; (6) complete tractor or power unit overhaul; (7) complete one cylinder engine overhaul; (8) using the oxyacetylene welder and (9) calculating pulley speeds.

The data indicated that those operators employed on-the-farm a smaller number of days annually expressed a high value for activities one and two; while those operators employed a larger number of days expressed a high value for the reamining seven activities.

Hypothesis regarding size of farm in acres and operator expressions of the value for farmer acquisition and use of mechanical and managerial activities in farm power and machinery. Nine of the sixteen selected activities relative to the hypothesis were not significant. Significant differences did exist between those operators expressing a high and those a medium to low value for the activities: (1) replacing tractor brakes; (2) adjusting engine valve tappets; (3) complete tractor or power unit overhaul; (4) complete one cylinder engine overhaul; (5) using the arc welder; (6) using the oxyacetylene welder and (7) calculating pulley speeds.

The data revealed that those operators with larger acreages expressed a high value for activities, one through six; while those with smaller acreage expressed a high value for calculating pulley speeds.

Hypothesis regarding current investment in farm power and machinery and farm operator expressions of the value for farmer acquisition and use of mechanical and managerial activities in farm power and machinery. Eleven of the sixteen activities relative to the hypothesis were not significant. Signficant differences did exist between those operators expressing a high and those a medium to low value for the activities: (1) planning a machinery replacement program, (2) adjusting engine valve tappets; (3) complete one cylinder engine overhaul; (4) using the oxyacetylene welder and (5) hardsurfacing plow-shares and cultivator sweeps.

The data indicated that those operators with larger investments expressed a high value for activities one, two and three; while the operators with smaller investments expressed a high value for activities four and five.

Combined expressions of farm operators, teachers of vocational agriculture, teacher-educators and commercial educational representatives as to the relative value for farmer acquisition and use of selected mechanical and managerial activities in farm power and machinery. After the data were tabulated and analyzed, it was found that a high agreement existed between the respondents with regard to those activities receiving a high and low acquisition and use value. The agreement among the respondents for those activities between the highs and lows varied.

The activities receiving a high value rating by all groups of respondents were: (1) adjusting farm machinery under field conditions; (2) tractor preventative maintenance; (3) servicing an engine cooling system; (4) setting up farm machinery; (5) selection of tractor fuels

TABLE LXXIV

TABULAR SUMMARY OF ACCEPTED AND REJECTED HYPOTHESES IN FARM POWER AND MACHINERY RELATIVE TO SELECTED FARM OPERATOR CHARACTERISTICS

Activities	Operator Characteristics: Age of operator			Level of education			Years in Vo-Ag			Farming experience			Annual on-the-farm employment		Farm size in acres		Current investment	
	Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis		Null Hypothesis		Null Hypothesis	
	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed
Determining the cost involved in owning and operating farm machinery	A[a]	A	R[b]	A	R	R	R	R	A	A	A	R	R	A	R	A	R	A
Determining power, labor and machinery replacement for a farm enterprise	A	R	R	A	R	R	A	R	R	A	A	R	R	R	R	A	A	A
Determining the capacity of farm machinery	A	A	R	A	R	A	A	A	A	A	A	R	A	A	R	A	A	A

TABLE LXXIV (continued)

Activities	Operator Characteristics: Age of operator			Level of education			Years of Vo-ag			Farming experience			Annual on-the-farm employment		Farm size in acres		Current investment	
	Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis		Null Hypothesis		Null Hypothesis	
	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed
Planning a machinery replacement program	R	A	R	A	R	A	R	A	R	A	R	R	R	R	A	A	R	R
Servicing ignition system	A	R	A	A	A	R	A	A	A	A	R	A	R	A	A	A	A	A
Servicing a fuel system	A	R	A	A	A	R	A	A	A	A	R	A	R	A	A	A	A	A
Replacing a tractor clutch	R	R	R	A	A	R	A	A	R	R	R	A	R	R	A	A	A	A
Replacing tractor brakes	R	R	R	A	A	R	A	A	A	A	A	A	R	R	R	R	A	A
Adjusting engine tappets	A	R	A	A	A	R	A	R	A	A	R	A	R	R	R	R	R	R

TABLE LXXIV (continued)

Activities	Operator Characteristics																	
	Age of operator			Level of education			Years of Vo-Ag			Farming experience			Annual on-the-farm employment		Farm size in acres		Current investment	
	Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis		Null Hypothesis		Null Hypothesis	
	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed
Complete tractor or power unit overhaul	A	A	A	R	A	R	A	A	A	A	A	A	A	R	A	R	A	A
One cylinder engine overhaul	A	A	R	R	A	R	A	A	A	A	A	R	A	R	A	R	A	R
Using the arc welder	A	A	R	A	R	R	R	A	R	A	R	R	A	A	R	R	A	A
Using the oxyacetylene welder	R	R	R	R	R	A	R	A	R	R	R	R	R	R	R	R	R	R

TABLE LXXIV (continued)

Activities	Operators Characteristics																	
	Age of operator			Level of education			Years of Vo-Ag			Farming experience			Annual on-the-farm employment		Farm size in acres		Current investment	
	Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis		Null Hypothesis		Null Hypothesis	
	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed
Calculating pulley speeds	A	A	A	A	A	A	A	R	R	A	A	A	A	R	A	R	A	A
Calibrating power sprayers	A	A	A	A	A	A	A	R	A	A	A	A	R	A	R	A	R	A
Hardsurfacing plow-shares	A	R	R	A	A	A	R	A	A	A	A	A	A	A	A	A	R	R

[a]Activity accepted
[b]Activity rejected

and lubricants; (6) diagnosing and making minor machinery and equipment repairs; (7) determining the power, labor and machinery requirements for a farm enterprise; (8) determining the capacity of farm machinery and (9) calibrating planters and seeding drills.

The activities receiving a medium to low value rating by all groups of respondents were: (1) calculating pulley speeds and (2) complete tractor or power unit engine overhaul.

Nature and extent of instruction offered by teacher training institutions in undergraduate courses in farm power and machinery. An analysis of the data revealed that the institutions were allocating larger segments of the available instructional time to the instructional units: (1) tractor preventative maintenance, (2) using the arc welder, (3) adjusting machinery under field conditions, (4) setting up farm machinery, (5) using the oxyacetylene welder, (6) managerial activities associated with farm machinery and (7) diagnosing and making minor machinery and equipment repairs.

The smaller segments of instruction time were allotted to units associated with minor mechanical activities and major overhauls.

Hypothesis regarding periods of secondary school instruction allocated to selected units in farm power and machinery by vocational agriculture departments reporting three and four year secondary programs. Twenty-seven of the twenty-nine instructional units relative to the hypothesis were not significant. It was found that significant differences did exist between the three and the four year departments for the instructional units: (1) using the arc welder and (2) constructing labor saving equipment.

The data indicated that the four year departments allocated more time to arc welding; while the three year departments allocated more time to constructing labor saving equipment.

Hypothesis regarding clock hours of out-of-school instruction offered in selected units in farm power and machinery by vocational agriculture departments reporting three and four year secondary school programs. Twenty-eight of the twenty-nine instructional units relative to the hypothesis were not significant. A significant difference did exist between the three and four year departments in the number of clock hours spent in hardsurfacing plow-shares and cultivator sweeps.

The data revealed that the four year departments were spending more time hardsurfacing than the three year departments.

Summary of Findings in Regard to Problems Investigated and Hypothesis Tested in Farm Buildings and Other Structures

The data obtained were tabulated and subjected to both non-statistical and statistical techniques. The following is a summary of the most important findings.

Nature and extent of mechanical and managerial activities performed on selected farms in farm buildings and other structures. The only activity being performed on less than fifty per cent of the farms was reading blue prints and drawings. The farm operators were performing a majority of those activities being performed. Activities being performed by other persons on thirty per cent of the farms were: (1) installing a water pump, (2) installing a farm home plumbing system, (3) planning a farm home sewage system and (4) installing a farm home sewage system.

The data reflected that the younger operators were performing activity one; while the older operators were performing activities two and three.

Hypothesis regarding level of formal education and farm operator performance of mechanical and managerial activities in farm buildings and other structures. Eight of the eleven selected activities relative to the hypothesis were insignificant. Significant differences did exist between those operators performing and those not performing the activities: (1) determining amounts of concrete needed, (2) using concrete blocks and other masonry materials and (3) planning a water system.

The data indicated that the more educated operators were performing the three forementioned activities.

Hypothesis regarding years of vocational agriculture received while attending secondary school and farm operator performance of mechanical and managerial activities in farm buildings and other structures. Six of the eleven selected activities relative to the hypothesis were not significant. It was found that significant differences did exist between those operators performing and those not performing the activites: (1) sketching and drawing, (2) using concrete blocks and other masonry materials, (3) planning a water system, (4) installing farmstead plumbing and (5) installing a farm home sewage system.

The data revealed that the operators receiving the most vocational agriculture instruction were performing activities one through four; while the operators receiving fewer years of instruction were performing activity five.

Hypothesis regarding farming experience and farm operator performance of mechanical and managerial activities in farm buildings and other structures. Eight of the eleven selected activities relative to the hypothesis were insignificant. Significant differences did exist between those operators performing and those not performing the activities: (1) planning a water system, (2) planning a farm home sewage system and (3) installing a farm home sewage system.

The data indicated that the less experienced operators were performing activity one; while the more experienced were performing activities two and three.

Hypothesis regarding days of annual on-the-farm employment and operator performance of mechanical and managerial activities in farm buildings and other structures. Nine of the eleven selected activites relative to the hypothesis were not significant. It was found that significant differences did exist between those operators performing and those not performing the activities: (1) planning a water system and (2) installing a farm home sewage system.

The data indicated that the operators employed the smallest number of days annually were performing activity one; while those employed the largest number of days were performing activity two.

Hypothesis regarding size of farm in total acres and operator performance of mechanical and managerial activities in farm buildings and other structures. Eight of the eleven selected activities relative to the hypothesis were insignificant. Significant differences did exist between those operators performing and those not performing the activities: (1) determining concrete mixtures, (2) planning a farm home sewage system and (3) installing a farm home sewage system.

Hypothesis regarding current investment in farm buildings and other structures and operator performances of mechanical and managerial activities in farm buildings and other structures. Seven of the eleven selected activities relative to the hypothesis were not significant. It was found that significant differences did exist between those operators performing and those not performing the activities: (1) sketching and drawing, (2) using concrete blocks and other masonry materials, (3) planning a farm home sewage system and (4) installing a farm home sewage system.

The data reflected that the operators with large investments were performing to a greater extent the four forementioned activities than the operators with small investments.

Nature and extent of the qualifications of farm operators to perform mechanical and managerial activities in farm buildings and other structures. Seventy per cent or more of the operators felt that they were qualified to perform twenty-one of the twenty-four selected activities. Thirty per cent or more of the operators felt that they were not qualified to perform the activities: (1) installing a farm home plumbing system, (2) planning a farm home sewage system and (3) installing a farm home sewage system.

Hypothesis regarding age and farm operators qualifications to perform mechanical and managerial activities in farm buildings and other structures. Eight of the eleven activities relative to the hypothesis were insignificant. Significant differences did exist between those operators recognizing themselves as qualified and those not qualified to perform the activities: (1) planning a water system, (2) installing a farm home plumbing system and (3) installing a farm home sewage system.

The data revealed that the ability to plan a water system was in favor of the younger operators; while the installation of a home plumbing and sewage system was in favor of the older group.

Hypothesis regarding level of education and farm operators qualifications to perform mechanical and managerial activities in farm buildings and other structures. Five of the eleven selected activities relative to the hypothesis were not significant. It was found that significant differences did exist between those operators recognizing themselves as qualified and those not qualified to perform the activities: (1) determining amount of concrete needed, (2) using concrete blocks and other masonry materials, (3) planning a water system, (4) installing a farm home plumbing system, (5) installing farmstead plumbing and (6) installing a farm home sewage system.

The data revealed that the ability to perform all of the foregoing activities was in favor of the more educated group of farm operators.

Hypothesis regarding years of vocational agriculture instruction received and farm operators qualifications to perform mechanical and managerial activities in farm buildings and other structures. Six of the eleven selected activities relative to the hypothesis were insignificant. Significant differences did exist between those operators recognizing themselves as qualified and those not qualified to perform the activities: (1) determining amounts of concrete needed, (2) using concrete blocks and other masonry materials, (3) planning a water system, (4) installing farmstead plumbing and (5) planning a farm home sewage system.

The data reflected that the ability to perform the forementioned activities was in favor of the group of operators receiving the most vocational agriculture instruction while attending secondary school.

Hypothesis regarding years of farming experience and farm operators qualifications to perform mechanical and managerial activities in farm buildings and other structures. Eight of the eleven selected activities relative to hypothesis were not significant. It was found that significant differences did exist between those operators recognizing themselves as qualified and those not qualified to perform the activities: (1) planning a water system, (2) installing a farm home plumbing system and (3) installing a farm home sewage system.

The data revealed that the ability to plan a water system was in favor of the less experienced group; while the ability to install a farm home plumbing and sewage system was in favor of the more experienced group.

Hypothesis regarding age and farm operators expressions of the value for farmer acquisition and use of mechanical and managerial activities in farm buildings and other structures. Five of the eleven selected activities relative to the hypothesis were insignificant. It was found that significant differences did exist between those operators expressing a high and those a medium to low value for the activities: (1) sketching and drawing, (2) determining amounts of concrete needed, (3) installing a farm home plumbing system, (4) installing farmstead plumbing, (5) planning a farm home sewage system and (6) installing a farm home sewage system.

The data revealed that the younger operators expressed a high value for sketching and drawing; while the older group expressed a high value for the remaining five activities.

Hypothesis regarding level of formal education and farm operators expressions of the value for farmer acquisition and use of mechanical and managerial activities in farm buildings and other structures. Six of the eleven selected activities relative to the hypothesis were not significant. Significant differences did exist between those operators expressing a high and those a medium to low value for the activities: (1) sketching and drawing, (2) reading blue prints and detail drawings, (3) determining concrete mixtures, (4) installing a farm home plumbing system and (5) installing a farm home sewage system.

The data reflected that the less educated group of operators expressed a higher value for the five forementioned activities than the more education group.

Hypothesis regarding years of vocational agriculture instruction received and farm operators expressions of the value for farmer acquisition and use of mechanical and managerial activities in farm buildings and other structures. Ten of the eleven selected activities relative to the hypothesis were insignificant. It was found that a significant difference did exist between those operators expressing a high and those a medium to low value for being able to read blue prints and detail drawings.

The data indicated that those operators receiving the largest number years of vocational agriculture instruction while attending secondary school expressed a higher value for the activity.

Hypothesis regarding years of farming experience and farm operators expressions of the value for farmer acquisition and use of mechanical and managerial activities in farm buildings and other structures. Six of the eleven selected activities relative to the hypothesis were not significant. Significant differences did exist between those operators expressing a high and those a medium to low value for the activities: (1) determining amounts of concrete needed, (2) installing a farm home plumbing system, (3) installing farmstead plumbing, (4) planning a farm home sewage system and (5) installing a farm home sewage system.

The data revealed that the more experienced operators expressed a higher value for the forementioned activities than the less experienced operators.

Hypothesis regarding annual on-the-farm employment and farm operators expressions of the value for farmer acquisition and use of mechanical and managerial activities in farm buildings and other structures. Two of the eleven selected activities relative to the hypothesis were not significant. Significant differences did exist between those operators expressing a high and those a medium to low value for the activities: (1) sketching and drawing, (2) reading blue prints and detail drawings, (3) figuring bill of materials and other buildings costs, (4) determining concrete mixtures, (5) determining amounts of concrete needed, (6) using concrete blocks and other masonry materials, (7) installing a farm home plumbing system, (8) planning a farm home sewage system and (9) installing a farm home sewage system.

The data indicated that those operators employed on-the-farm the largest number days annually expressed higher values for the nine fore-mentioned activities than those operators employed to a lesser degree.

Hypothesis regarding size of farm in acres and operators expressions of the value for farmer acquisition and use of mechanical and managerial activities in farm buildings and other structures. Four of the eleven selected activities relative to the hypothesis were insignificant. It was found that significant differences did exist between those operators expressing a high and those a medium to low value for the activities: (1) reading blue prints and detail drawings, (2) figuring bill of materials and other building cost, (3) determining concrete mixtures, (4) determining amounts of concrete needed, (5) planning a farm home sewage system and (6) installing a farm home sewage system.

The data reflected that those operators with large acreages expressed higher values for the seven forementioned activities than operators with small acreages.

Hypothesis regarding current investment in farm buildings and other structures and farm operators expressions of the value for farmer acquisition and use of mechanical and managerial activities in farm buildings and other structures. Five of the eleven selected activities relative to the hypothesis were not significant. It was found that significant differences did exist between those operators expressing a high and those a medium to low value for activities: (1) sketching and drawing, (2) reading blue prints and detail drawings, (3) figuring bill of materials and other building cost, (4) determining concrete mixtures, (5) determining amounts of concrete needed and (6) installing a farm home sewage system.

The data indicated that those operators with large investments expressed a higher value for the six forementioned activities than those operators with small investments.

TABLE LXXV

TABULAR SUMMARY OF ACCEPTED AND REJECTED HYPOTHESES IN FARM BUILDINGS AND OTHER STRUCTURES RELATIVE TO SELECTED FARM OPERATOR CHARACTERISTICS

Activities	Operator Characteristics: Age of operator			Level of education			Years in Vo-Ag			Farming experience			Annual on-the farm employment		Farm size in acres		Current investment	
	Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis		Null Hypothesis		Null Hypothesis	
	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed
Sketching and drawing	A[a]	A	R[b]	A	A	R	R	A	A	A	A	A	A	R	A	A	R	R
Reading blue prints and detail drawings	A	A	A	A	A	R	A	A	R	A	A	A	A	R	A	R	A	R
Figuring bill of materials and other building costs	A	A	A	A	A	A	A	A	A	A	A	A	A	R	A	R	A	R
Determining concrete mixture	A	A	A	A	A	R	A	A	A	A	A	A	A	R	R	R	A	R

TABLE LXXV (continued)

Activities	Operators Characteristics																	
	Age of operator			Level of education			Years in Vo-Ag			Farming experience			Annual on-the farm employment		Farm size in acres		Current investment	
	Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis		Null Hypothesis		Null Hypothesis	
	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed
Determining amounts of concrete needed	A	A	R	R	R	A	R	R	A	A	A	R	A	R	A	R	A	R
Using concrete blocks and other masonry materials	A	A	A	R	R	A	R	R	A	A	A	A	A	R	A	A	R	A
Planning a water system	R	R	A	R	R	A	R	R	A	R	R	A	R	A	A	A	A	A
Installing a farm home plumbing system	A	R	R	A	R	R	A	A	A	A	R	R	A	R	A	A	A	A
Installing other farm plumbing	A	A	R	A	R	A	R	A	A	A	A	R	A	R	A	R	A	A

TABLE LXXV (continued)

Activities	Operator Characteristics																	
	Age of operator			Level of education			Years of Vo-Ag			Farming experience			Annual on-the-farm employment		Farm size in acres		Current investment	
	Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis		Null Hypothesis		Null Hypothesis	
	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Values expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed
Planning a farm home sewage system	R	A	R	A	A	A	A	R	A	R	A	R	A	R	R	R	R	A
Installing a farm home sewage system	R	R	R	A	R	R	R	A	A	R	R	R	R	R	R	R	R	R

[a]Activity accepted
[b]Activity rejected

Combined expressions of farm operators, teachers of vocational agriculture, teacher educators and commercial educational representatives as to the relative value for farmer acquisition and use of selected mechanical and managerial activities in farm buildings and other structures. It was found that a high agreement existed between the respondents with regard to those activities receiving high and low acquisition and use values. The agreement among the respondents for those activities between the highs and the lows varied.

The activities receiving a high value rating by all groups of respondents were: (1) maintaining and improving farm buildings, (2) planning a water system, (3) selecting lumber and other building materials and (4) determining building requirements for animals and crops.

No activity included in the study received a medium to low rating by all groups of respondents.

Nature and extent of instruction offered by teacher training institutions in undergraduate courses in farm buildings and other structures. It was found that institutions were offering instruction in all of the units of instruction included in this study.

The units receiving the largest allocations of instructional time were: (1) construction of farm buildings, (2) maintaining and improving farm buildings, (3) paints and painting, (4) construction of pole type buildings, (5) determining building requirements for animals and crops, (6) sketching and drawing and (7) planning a water system.

The data revealed that a very small portion of the total available instructional time was allotted to units in concrete and masonry construction.

Hypothesis regarding periods of secondary school instruction allocated to selected units in farm buildings and other structures by vocational agriculture departments reporting three and four year secondary programs. Nineteen of the twenty-four instructional units relative to the hypothesis were insignificant. Significant differences did exist between the three year and the four year departments for the instructional units: (1) mixing concrete on the farm, (2) planning a water system, (3) installing a water pump, (4) planning a farm home sewage system and (5) installing a farm home sewage system.

The data revealed that the three year departments allotted more time for the five forementioned units than the four year departments.

Hypothesis regarding clock hours of out-of-school instruction offered in selected units in farm buildings and other structures by vocational agriculture departments reporting three and four year secondary school programs. Nineteen of the twenty-four instructional units relative to the hypothesis were not significant. It was found that significant differences did exist between the three year and the four year departments for the units: (1) reading blue prints and detail drawings, (2) using concrete blocks and other masonry materials, (3) determining amounts of concrete needed and (4) installing farmstead plumbing.

The data indicated that the three year departments were providing more hours in units, one through three; while the four year departments were providing more hours in units four and five.

Summary of Findings in Regard to Problem Investigated and Hypothesis Tested in Farm Electrification

The data obtained were tabulated and subjected to both non-statistical and statistical techniques. The following is a summary of the most important findings.

Nature and extent of mechanical and managerial activities performed on selected farms in farm electrification. Twelve of the seventeen selected activities were performed on a majority of the farms. The same twelve activities were performed by a majority of the operators. Activities being performed by other persons on thirty per cent or more of the farms were: (1) planning an electrical wiring system, (2) figuring an electrical system load, (3) selecting electrical wiring materials, (4) planning an exterior distribution system, (5) installing a wiring system for the farm home, (6) selecting electrical motors, (7) servicing electrical motors, (8) reconditioning electrical motors, (9) selecting electrical heating systems, (10) servicing electrical home appliances and (11) servicing and repairing electrical heating systems.

Hypothesis regarding age and operators performance of mechanical and managerial activities in farm electrification. Three of the ten selected activities relative to the hypothesis were insignificant. It was found that significant differences did exist between those operators performing and those not performing the activities: (1) selecting electrical home appliances, (2) selecting electrical heating systems and (3) diagnosing electrical systems failures and safety hazards.

The data indicated that the older operators were performing the three forementioned activities to a greater extent than the younger operators.

Hypothesis regarding level of formal education and farm operators performances of mechanical and managerial activities in farm electrification. Seven of the ten selected activities relative to the hypothesis were not significant. It was found that significant differences did exist between those operators performing and those not performing the activities: (1) planning an electrical wiring system, (2) selecting electrical home appliances, and (3) selecting electrical heating systems.

The data revealed that the more educated operators were performing activity one; while the less educated were performing activities two and three.

Hypothesis regarding years of vocational agriculture received while attending secondary school and farm operators performance of mechanical and managerial activities in farm electrification. Nine of the ten selected activities relative to the hypothesis were insignificant. A significant difference did exist between those operators selecting and those not selecting electrical heating systems.

The data revealed that the activity was being performed to a greater extent by operators receiving the smallest number years of vocational agriculture.

Hypothesis regarding farming experience and farm operators performances of mechanical and managerial activities in farm electrification. Five of the ten selected activities relative to the hypothesis were not significant. It was found that significant differences did exist between those operators performing and those not performing the activities: (1) planning an electrical wiring system, (2) figuring an electrical system load, (3) selecting electrical home appliances,

(4) selecting electrical heating systems and (5) diagnosing electrical system failures and safety hazards.

The data revealed that the more experienced operators were performing all five of the forementioned activities.

Hypothesis regarding days of annual on-the-farm employment and operators performance of mechanical and managerial activities in farm electrification. Seven of the ten selected activities relative to the hypothesis were insignificant. Significant differences did exist between those operators performing and those not performing the activities: (1) selecting electrical home appliances, (2) selecting electrical heating systems, and (3) diagnosing electrical system failures and safety hazards.

The data revealed that the farm operators employed the largest number of days annually were performing to a greater extent the three forementioned activities than those operators employed to a lesser degree.

Hypothesis regarding size of farm in total acres and operators performance of mechanical and managerial activities in farm electrification. Six of the ten activities relative to the hypothesis were not significant. It was found that significant differences did exist between those operators performing and those not performing the activities: (1) planning an electrical wiring system, (2) figuring an electrical system load, (3) selecting electrical wiring materials and (4) selecting electrical home appliances.

The data revealed that no operators with large acreages in the farm operation were performing to a greater extent the three forementioned activities than the operators with small acreages.

Hypothesis regarding current investment in farm buildings and other structures and operators performances of mechanical and managerial activities in farm electrification. Seven of the ten selected activities relative to the hypothesis were insignificant. Significant differences did exist between those operators performing and those not performing the activities: (1) planning an electrical wiring system, (2) selecting electrical wiring materials and (3) installing a wiring system for the farm home.

The data revealed that the operators with large investments were performing to a greater extent the three forementioned activities than the operators with small investments.

Nature and extent of the qualifications of farm operators to perform mechanical and managerial activities in farm electrifications. Seventy per cent or more of the operators felt that they were qualified to perform nine of the seventeen selected activities. Thirty per cent or more of the operators felt that they were not qualified to perform the activities: (1) planning an electrical wiring system, (2) figuring an electrical system load, (3) selecting electrical wiring materials, (4) installing a wiring system for the farm home, (5) reconditioning electric motors, (6) servicing electrical home appliances and (7) servicing and repairing electrical heating systems.

Hypothesis regarding age and farm operators qualifications to perform mechanical and managerial activities in farm electrification. Five of the ten selected activities relative to the hypothesis were not significant. It was found that significant differences did exist between those operators recognizing themselves as qualified and those not qualified to perform the activities: (1) planning an electrical

wiring system, (2) installing and maintaining farmstead wiring systems, (3) selecting electrical home appliances, (4) selecting electrical heating systems and (5) selecting electrical equipment for a specific farm enterprise.

The data reflected that the ability to perform the five forementioned activities was in favor of the older group of operators.

Hypothesis regarding level of education and farm operators qualifications to perform mechanical and managerial activities in farm electrification. Six of the ten selected activities relative to the hypothesis were insignificant. Significant differences did exist between those operators recognizing themselves as qualified and those not qualified to perform the activities: (1) planning an electrical wiring system, (2) selecting electrical home appliances, (3) selecting electrical wiring materials and (4) selecting electrical equipment for a specific farm enterprise.

The data reflected that the ability to perform activities one and two was in favor of the less educated group; while the ability to perform three and four was in favor of the more educated group.

Hypothesis regarding years of vocational agriculture received and farm operators qualifications to perform mechanical and managerial activities in farm electrification. Nine of the ten selected activities relative to the hypothesis were not significant. It was found that a significant difference did exist between those operators recognizing themselves as qualified and those not qualified to select electrical heating systems. The ability to perform the activity was in favor of the group of operators receiving the least number years of vocational agriculture instruction while attending secondary school.

Hypothesis regarding years of farming experience and farm operators qualification to perform mechanical and managerial activities in farm electrification. Four of the ten selected activities relative to the hypothesis were insignificant. Significant differences did exist between those operators recognizing themselves as qualified and those not qualified to perform the activities: (1) planning an electrical wiring system, (2) installing and maintaining farmstead wiring systems, (3) selecting electrical motors, (4) selecting electrical heating systems and (5) diagnosing electrical system failures and safety hazards.

The data reflected that the ability to perform the six forementioned activities was in favor of the more experienced group of operators.

Hypothesis regarding age and farm operators expressions of the value for farmer acquisition and use of mechanical and managerial activities in farm electrification. Five of the ten selected activities relative to the hypothesis were not significant. It was found that significant differences did exist between those operators expressing a high and those a medium to low value for the activities: (1) planning an electrical wiring system, (2) selecting electrical wiring materials, (3) installing a wiring system for the farm home, (4) selecting electrical motors and (5) selecting electrical heating systems.

The data revealed that the older operators expressed a higher value for the five forementioned activities than the younger operators.

Hypothesis regarding level of formal education and farm operators expressions of the value for farmer acquisition and use of mechanical and managerial activities in farm electrification. Two of the ten selected activities relative to the hypothesis were insignificant. Significant differences did exist between those operators expressing a

high and those a medium to low value for the activities: (1) figuring an electrical system load, (2) selecting electrical wiring materials, (3) installing a wiring system for the farm home, (4) installing and maintaining other farm wiring systems, (5) selecting electrical motors, (6) selecting electrical home appliances, (7) selecting electrical equipment for a specific farm enterprise and (8) diagnosing electrical system failures and safety hazards.

The data indicated that the less educated operators expressed a higher value for the eight forementioned activities than the more educated operators.

Hypothesis regarding years of vocational agriculture instruction received and farm operators expressions of the value for farmer acquisition and use of mechanical and managerial activities in farm electrification. Nine of the ten activities relative to the hypothesis were not significant. It was found that a significant difference did exist between those operators expressing a medium to low value for planning an electrical wiring system.

The data revealed that those operators receiving the largest number years of instruction expressed a higher value for the activities than those operators receiving a smaller number years of instruction while attending secondary school.

Hypothesis regarding years of farming experience and farm operators expressions of the value for farmer acquisition and use of mechanical and managerial activities in farm electrification. Five of the ten selected activities relative to the hypothesis were insignificant. Significant differences did exist between those operators expressing a high and those a medium to low value for the activities: (1) figuring

an electrical system load, (2) selecting electrical wiring materials, (3) installing a wiring system for the farm home, (4) selecting electrical motors and (5) selecting electrical home appliances.

The data reflected that the more experienced operators expressed a high value for the five forementioned activities than those operators with less experience.

Hypothesis regarding annual on-the-farm employment and farm operators expressions of the value for farmer acquisition and use of mechanical and managerial activities in farm electrification. Four of the ten selected activities relative to the hypothesis were insignficant. It was found that significant differences did exist between those operators expressing a high and those a medium to low value for the activities: (1) planning an electrical wiring system, (2) figuring an electrical system load, (3) selecting electrical wiring materials, (4) installing a wiring system for the farm home, (5) selecting electrical home appliances and (6) selecting electrical equipment for a specific farm enterprise.

The data indicated that those operators employed the largest number of days annually expressed a higher value for activities one through five; while those operators employed to a lesser degree expressed a higher value for selecting electrical equipment for a specific farm enterprise.

Hypothesis regarding size of farm in acres and farm operators expressions of the value for farmer acquisition and use of mechanical and managerial activities in farm electrification. Six of the ten selected activities relative to the hypothesis were not significant. It was found that significant differences did exist between those operators expressing a high and those a medium to low value for the activities:

TABLE LXXVI

TABULAR SUMMARY OF ACCEPTED AND REJECTED HYPOTHESES IN FARM ELECTRIFICATION RELATIVE TO SELECTED FARM OPERATOR CHARACTERISTICS

Activities	Operators Characteristics																			
	Age of operator			Level of education			Years of Vo-Ag			Farming experience			Annual on-the-farm employment		Farm size in acres		Current investment	
	Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis		Null Hypothesis		Null Hypothesis	
	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed
Planning an electrical wiring system	A[a]	R[b]	R	R	R	A	A	A	R	R	R	A	A	R	R	R	R	A
Figuring an electrical system load	A	A	A	A	A	R	A	A	A	R	A	R	A	R	R	R	A	A
Selecting electrical wiring materials	A	A	R	A	R	R	A	A	A	A	A	R	A	R	R	R	R	A
Installing a wiring system for a farm home	A	A	R	A	A	R	A	A	A	A	A	R	A	R	A	R	R	A

TABLE LXXVI (continued)

Activities	Operators Characteristics: Age of operator			Level of education			Years of Vc-Ag			Farming experience			Annual on-the-farm employment		Farm size in acres		Current investment	
	Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis		Null Hypothesis		Null Hypothesis	
	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed
Installing and maintaining other farm wiring systems	A	R	A	A	A	R	A	A	A	A	R	A	A	A	A	A	A	R
Selecting electrical motors	A	A	R	A	A	R	A	A	A	A	R	R	A	A	A	A	A	R
Selecting electrical home appliances	R	R	R	R	R	R	A	A	A	R	R	R	R	R	R	A	A	A
Selecting electrical heating systems	R	R	A	R	A	A	R	R	A	R	R	A	R	A	A	A	A	A

TABLE LXXVI (continued)

Activities	Operator Characteristics																	
	Age of operator			Level of education			Years of Vo-Ag			Farming experience			Annual on-the-farm employment		Farm size in acres		Current investment	
	Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis			Null Hypothesis		Null Hypothesis		Null Hypothesis	
	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Qualified-Not qualified	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed	Performed-Not performed	Value expressed
Selecting electrical equipment for a specific farm enterprise	A	R	A	A	R	R	A	A	A	A	A	A	A	R	A	A	A	A
Diagnosing electrical system failures and safety hazards	R	A	A	A	A	R	A	A	A	R	R	A	R	A	A	A	A	A

[a]Activity accepted
[b]Activity rejected

[a]Activity accepted
bActivity rejected

(1) planning an electrical wiring system, (2) figuring an electrical system load, (3) selecting electrical wiring materials and (4) installing a wiring system for the farm home.

The data indicated that those operators with large acreages expressed a higher value for the four forementioned activities than those operators with small acreages.

Hypothesis regarding current investment in farm buildings and other structures and farm operators expressions as to the value for farmer acquisition and use of mechanical and managerial activities in farm electrification. Eight of the ten selected activities relative to the hypothesis were insignificant. Significant differences did exist between those operators expressing a high and those a medium to low value for the activities: (1) installing and maintaining farmstead wiring systems and (2) selecting electrical motors.

The data reflected that those operators with large investments expressed a higher value for the two forementioned activites than those with small investments.

Combined expressions of farm operators, teachers of vocational agriculture, teacher educators, and commercial educational representatives as to the relative value for farmer acquisition and use of selected mechanical and managerial activities in farm electrification. A high agreement existed between the respondents with regard to those activities receiving a high and low acquisition and use values. The agreement among the respondents for those activities between the highs and lows varied.

The activities receiving a high value rating by all groups of respondents were: (1) diagnosing electrical system failures and safety hazards, (2) installing and maintaining farmstead wiring systems, (3) maintaining a farm home wiring system and (4) selecting electrical motors.

The activities receiving a medium to low value rating by all groups of respondents were: (1) selecting electrical heating systems, (2) servicing and repairing electrical heating systems and (3) reconditioning electrical motors.

Nature and extent of instruction offered by teacher training institutions in undergraduate courses in farm electrification. An analysis of the data revealed that, in general, the institutions were allocating instructional time on nearly an equal basis to the units of instruction included in this study.

It was noted that those units associated with planning and maintaining electrical wiring systems received slightly more time than the other units. The units receiving the smallest allocation of time were: (1) reconditioning electrical motors and (2) servicing and repairing electrical heating systems.

Hypothesis regarding periods of secondary school instruction allocated to selected units in farm electrification by vocational agriculture departments reporting three and four secondary programs. Sixteen of the seventeen instructional units were not significant. A significant difference did exist between the three year and four year departments in the number of clock-hours devoted to instruction in diagnosing electrical system failures and safety hazards.

The data reflected that the three year departments were providing more hours of instruction in the unit than four year departments.

Summary of Findings in Regard to Hypotheses Tested Relative to Total Instructional Time Allocated to Farm Mechanics by Vocational Agriculture Departments Offering Three and Four Year Secondary School Programs

Of the eleven hypotheses tested relative to total time allocated to the different instructional phases of farm mechanics by three and four year departments of vocational agriculture, ten were insignificant. It was found that a significant difference did exist between the three and four year departments in the total number of instructional periods allotted to farm mechanics instruction in the secondary school program. All of the hypothesis relative to the out-of-school program allocations were sustained.

The sample of vocational agriculture teachers were asked to exclude the instructional time allotted to the farm mechanics area of soil and water conservation. Since all of the hypotheses relative to secondary school instructional time in farm power and machinery, farm buildings and other structures and farm electrification were sustained; it was concluded that the time difference in the statistical significant allocation of time to the total farm mechanics by the four year departments would be in the area of farm shop instruction and student skills development.

Conclusions

This study was not undertaken to establish a cause and effect relationship, but to obtain descriptive evidence relative to curriculum construction and course planning in the farm mechanics area of farm power and machinery, farm buildings and other structures and farm electrification.

To the extent that the samplings were representative and the data collected and opinions expressed were accurate, the following conclusions seem justifiable:

1. Teachers should consider farmer opinions in their school service area pertaining to the importance and appropriateness of farm mechanics activities to be included in the curriculum. This is particularly true for those activities beyond the essential basic subject-matter and skills.

2. Teachers of vocational agriculture should consider the personal characteristics and economic conditions of the farmer population in the school service area when planning educational programs in farm mechanics.

3. Curriculums and courses in farm mechanics should be planned, revised and evaluated in terms of the mechanical activities being performed on farms.

4. Curriculums and courses should be revised frequently to keep abreast of new mechanical developments such as economic advantages of larger and better machinery and equipment, prefabricated construction, building designs, multiple use buildings, materials handling systems and

equipment and automation in the farm home.

5. Considerable emphasis should be placed on developing abilities and understanding in farm farm power and machinery with emphasis on maintenance, service and adjustments.

6. Considerable emphasis should be placed on developing abilities and understandings in the area of farm and home conveniences with emphasis on the planning of facilities and selection of equipment.

7. Considerable emphasis should be placed on the managerial aspects of farm mechanics.

8. Considerable emphasis should be placed on the teaching of mechanical theory along with the perfection of manupulative skills.

9. The mechanical and managerial activities being performed by farmers along with the opinions of teachers of vocational agriculture, commercial people and specialists should be used by teachers of vocational agriculture to establish a priority classification for the farm mechanics instruction to be included in the curriculum.

10. Standardized resource materials and units should be developed for the teaching of basic subject-matter and skills.

A SELECTED BIBLIOGRAPHY

Ahalt, Arthur M. and Harry T. Miller. "Technical Skills Needed in Farm Mechanics." Agricultural Education Magazine, XXVII, No. 7 (1955).

Alabama State Department of Education. "Guide for Developing the Local Programs of Instruction in Vocational Agriculture." Montgomery: Vocational Agriculture Division, 1960. (Mimeographed.)

Arkins, Herbert and Raymond R. Colton. Tables for Statisticians. New York: Barnes and Noble, Inc., 1950.

Bureau of the Census. Manual of Tabular Presentations. Washington: U. S. Government Printing Office, 1949.

Campbell, William Giles. Form and Style in Thesis Writing. Cambridge, Mass.: Houghton Mifflin Company, 1954.

Committee on Agricultural Teacher Training. "Agricultural Engineering Phases of Teacher Training for Vocational Agriculture." St. Joseph, Michigan: Committee Report of the American Society of Agricultural Engineers, 1959. (Mimeographed.)

Cook, Glen, Clyde Walker and Obed L. Snowden. Practical Methods of Teaching Farm Mechanics. Danville, Illinois: Interstate Printers and Publishers, Inc., 1952.

Duggar, Roy W. "Mechanical Competencies Needed by Vocational Agriculture Teachers in Oklahoma." Unpublished Doctoral thesis, Oklahoma State University, 1956.

Garrett, Henry E. Statistics in Psychology and Education. New York: Longmans, Green and Company, 1958.

Good, C. A. and D. E. Scates. The Methodology of Educational Research. New York: D. Appleton-Century, 1953.

Harris, Roland R. "A Study of Selected Farm Shop Abilities Needed by In-School Boy, Young Adult and Older Adult Farmers in Georgia." Unpublished Doctor's dissertation, Michigan State University, 1960.

Hobbs, Walter Wesley. "Factors Associated With The Occurrence of Effective Local Farm Mechanics Programs in Vocational Agriculture," Unpublished Doctoral thesis, Oklahoma State University, 1960.

Research Committee, Agricultural Education Section, American Vocational Association. Summaries of Studies in Agricultural Education. U. S. Office of Education, Vocational Education Bulletin No. 248. Washington: U. S. Government Printing Office, 1952.

_____. Summaries of Studies in Agricultural Education. U. S. Office of Education, Vocational Education Bulletin No. 263. Washington: U. S. Government Printing Office, 1953.

Thompson, Evans G. "The Identification of Management Decisions in Farm Mechanics Needed by Farm Operators in Virginia." unpublished Doctoral thesis, Cornell University, 1960.

Weston, Curtis R. "A Study of Mechanical Jobs Performed by Selected Farmers in Missouri." unpublished Doctoral thesis, University of Missouri, 1959.

Yuker, Harold E. A Guide to Statistical Calculations. New York: C. P. Putnam's Sons, 1958.

APPENDIXES

Appendix A - Questionnaire

Appendix B-1, B-2 and B-3 - Questionnaires

Appendix C-1, C-2 and C-3 - Checklists

Appendix D - Interview Schedule

APPENDIX A

QUESTIONNAIRE REGARDING SELECTED AREAS OF FARM MECHANICS INSTRUCTION IN DEPARTMENTS OF VOCATIONAL AGRICULTURE

The purpose of this questionnaire is to secure information regarding the present status of instructional programs in farm power and machinery, farm buildings and other structures and farm electrification.

School Data:

Name:_____
Vo-Ag Supervisory District_____

PROGRAM DATA:

Circle the years of agriculture offered in the school: 1 2 3 4
Indicate length of period in minutes for each class per day: Ag I __ Ag II __ Ag III __ Ag IV __ Circle those considered double periods. Is there an adult program in the school? ____ Is there a young farmer program in the school? ___ If there are out-of-school programs in progress enter from the final E I reports the total number of clock hours of instruction for young farmers ___ and adult farmers ___

FARM MECHAINCS INSTRUCTIONAL PROGRAM:

Indicate the total number of periods spent in farm mechanics during the year for all classes in the high school program in the areas of farm shop, farm power and machinery, farm buildings and farm electrification: Total periods ____ Indicate the number of hours reported on the E I that was spent providing instruction in farm shop, farm power and machinery, farm buildings and other structures and farm electrification: Total hours ____

From the department course calendar please indicate the total number of periods of instruction spent during the present school year for each of the units listed below for the high school program in Col. 1. Consider all double period classes as two periods.

Also list in Col. 2 the number of hours spent in the out-of-school program, include on-the-farm instruction (Use your Form 10)

In column 3 we are interested in obtaining your expression as to the value you would place on the unit in regard to how economical it would be for the present day and future farmer to be able to perform the activity himself. Please rate the unit whether taught or not. Express the value in terms of "H" for high, "M" for medium, "L" for low or "N" for no value.

We would like to stress that the number of instructional periods spent on the unit indicates in no way the value a teacher will please on the units since teaching objectives and time will vary. If the unit is not taught this does not necessarily indicate a no value rating. In other words, the entries made in columns 1 & 2 should not influence the value expressed in column 3.

AREA AND SELECTED UNITS	1 H. S. Class Periods	2 Out-of-school hours	3 Value
Farm Power and Machinery			
1. Determining the cost involved in owning and operating farm machinery			
2. Determining the actual power, labor and machinery requirement for a farm enterprise			
3. Determining the capacity of farm machinery			
4. Planning a machinery replacement program			
5. Selecting tractor fuels and lubricants			
6. Tractor operation and daily care			
7. Servicing an ignition system			
8. Servicing a fuel system			
9. Servicing a cooling system			
10. Adjusting a tractor clutch			
11. Replacing a tractor clutch			
12. Adjusting tractor brakes			
13. Replacing tractor brakes			
14. Adjusting engine valve tappets			
15. Diagnosing and making minor machinery and equipment repairs			
16. Diagnosing the need for major machinery and equipment repairs			
17. Complete tractor or power unit overhaul			
18. Complete one cylinder engine engine overhaul			
19. Complete overhaul of farm machinery			
20. Using the arc welder			
21. Using the oxyacetylene welder			
22. Painting farm machinery			
23. Setting farm machinery			
24. Adjusting farm machinery under field conditions			
25. Calculating pulley speeds			
26. Constructing labor-saving equipment			
27. Calibrating power sprayers			
28. Calibrating planters and seeding drills			
29. Hardsurfacing plow-shares and cultivator sweeps, etc.			
30. Others			
Farm Buildings and Other Structures	XXXXXXX	XXXXXXX	XXXXX
1. Sketching and drawing			
2. Reading blue prints and detail drawings			
3. Determining building requirements for animals and crops			
4. Maintaining and improving farm buildings			
5. Figuring bills of materials and other building cost			
6. Selecting lumber and other building materials			
7. Constructing farm buildings			

AREA AND SELECTED UNITS CONT.	1 H. S. Class Periods	2 Out-of-School Hours	3 Value
8. Treating lumber and other wood materials			
9. Paints and painting			
10. Constructing pole type buildings			
11. Determining concrete mixtures			
12. Determining amounts of concrete needed			
13. Mixing concrete on the farm			
14. Constructing concrete forms			
15. Using concrete blocks and other masonry materials			
16. Planning a water system			
17. Selecting a farm water pump			
18. Installing a water pump			
19. Installing a farm home plumbing system			
20. Installing other farm plumbing			
21. Maintaining and repairing farm plumbing			
22. Constructing and maintaining farm fences and gates			
23. Planning a farm home sewage system			
24. Installing a farm home sewage system			
25. Others			
Farm Electrification	XXXXXXX	XXXXXXX	XXXXX
1. Planning an electrical wiring system			
2. Figuring an electrical system load			
3. Selecting electrical wiring materials			
4. Planning an exterior distribution system			
5. Selecting lighting equipment			
6. Installing a wiring system for the farm home			
7. Maintain a farm home wiring system			
8. Installing and maintaining other farm wiring systems			
9. Selecting electrical motors			
10. Servicing electrical motors			
11. Reconditioning electrical motors			
12. Selecting electrical home appliances			
13. Selecting electrical heating systems			
14. Servicing electrical home appliances			
15. Servicing and repairing electrical heating systems			
16. Selecting electrical equipment for a specific farm enterprise			
17. Diagnosing electrical system failures and safety hazards			
18. Others			

APPENDIX B-1

AN ANALYSIS OF FARM MECHANICS INSTRUCTION
IN INSTITUTIONS OF HIGHER EDUCATION

Questionnaire

Course Title:_____
Length of course in weeks _____
Theory length in hours _____ days _____ each week
Laboratory length in hours _____ days _____ each week

Directions: Indicate hours spent in units in the forementioned course only.

Units of Instruction	Hours spent
1. Determining the cost involved in owning and operating farm machinery	
2. Determining the actual power, labor and machinery requirement for a farm enterprise	
3. Determining the capacity of farm machinery	
4. Planning a machinery replacement program	
5. Selecting tractor fuels and lubricants	
6. Tractor preventative maintenance	
7. Servicing an ignition system	
8. Servicing a fuel system	
9. Servicing a cooling system	
10. Adjusting a tractor clutch	
11. Replacing a tractor clutch	
12. Adjusting tractor brakes	
13. Replacing tractor brakes	
14. Adjusting engine valve tappets	
15. Diagnosing and making minor machinery and equipment repairs	
16. Diagnosing the needs for major machinery and equipment repairs	
17. Complete tractor or power unit engine overhaul	
18. Complete one cylinder engine overhaul	
19. Complete overhaul of farm machinery	
20. Using the arc welder	
21. Using the oxyacetylene welder	
22. Painting farm machinery	
23. Setting farm machinery	
24. Adjusting farm machinery under field conditions	
25. Calculating pulley speeds	
26. Constructing labor-saving equipment	
27. Calibrating power sprayers	
28. Calibrating planters and seeding drills	
29. Hardsurfacing plow-shares and cultivator sweeps, etc.	

APPENDIX B-2

AN ANALYSIS OF FARM MECHANICS INSTRUCTION
IN INSTITUTIONS OF HIGHER EDUCATION

Questionnaire

Course Title:_____
Length of course in weeks _____
Theory length in hours _____ days _____ each week
Laboratory length in hours _____ days _____ each week

Directions: Indicate hours spent in units in the forementioned course only.

Units of Instruction	Hours Spent
1. Sketching and drawing	
2. Reading blue prints and detail drawings	
3. Determining building requirements for animals and crops	
4. Maintaining and improving farm buildings	
5. Figuring bill of materials and other building cost	
6. Selecting lumber and other building materials	
7. Constructing farm buildings	
8. Treating lumber and other wood materials	
9. Paints and painting	
10. Constructing pole type buildings	
11. Constructing concrete forms	
12. Determining concrete mixtures	
13. Determining amounts of concrete needed	
14. Mixing concrete on the farm	
15. Using concrete blocks and other masonry materials	
16. Planning a water system	
17. Selecting a farm water pump	
18. Installing a water pump	
19. Installing a farm home plumbing system	
20. Installing other farm plumbing	
21. Maintaining and repairing farm plumbing	
22. Constructing and maintaining farm fences and gates	
23. Planning a farm home sewage system	
24. Installing a farm home sewage system	

APPENDIX B-3

AN ANALYSIS OF FARM MECHANICS INSTRUCTION
IN INSTITUTIONS OF HIGHER EDUCATION

Questionnaire

Course title:_____
Length of course in weeks_____
Theory length in hours _____ days _____ each week
Laboratory length in hours _____ days _____ each week

Directions: Indicate hours spent in units in the forementioned course only.

Unit of Instruction	Hours Spent
1. Planning an electrical wiring system	
2. Figuring an electrical system load	
3. Selecting electrical wiring materials	
4. Planning an exterior distribution system	
5. Selecting lighting equipment	
6. Installing a wiring system for the farm home	
7. Maintaining a farm home wiring system	
8. Installing and maintaining other farm wiring systems	
9. Selecting electric motors	
10. Servicing electric motors	
11. Reconditioning electric motors	
12. Selecting electrical home appliances	
13. Selecting electrical heating systems	
14. Servicing electrical home appliances	
15. Servicing and repairing electrical heating systems	
16. Selecting electric equipment for a specific farm enterprise	
17. Diagnosing electrical system failures and safety hazards	

APPENDIX C-1

RATING CHECKLIST FOR TEACHER EDUCATORS AND COMMERCIAL EDUCATIONAL REPRESENTATIVES REGARDING SELECTED SKILLS, FUNCTIONS OR ACTIVITIES IN FARM POWER AND MACHINERY

Directions:

Please check the relative value, as indicated in the columns, that you would place on the present day and future farmer being able to perform the skill, function, or activity as listed:

0 Teacher-Trainer

0 Commercial Rep.

Skill, Function or Activity	High	Medium	Low	No value
1. Determining the cost involved in owning and operating farm machinery				
2. Determining the actual power, labor and machinery requirement for a farm enterprise				
3. Determining the capacity of farm machinery				
4. Planning a machinery replacement program				
5. Selecting tractor fuels and lubricants				
6. Tractor preventative maintenance				
7. Servicing an ignition system				
8. Servicing a fuel system				
9. Servicing a cooling system				
10. Adjusting a tractor clutch				
11. Replacing a tractor clutch				
12. Adjusting tractor brakes				
13. Replacing tractor brakes				
14. Adjusting engine valve tappets				
15. Diagnosing and making minor machinery and equipment repairs				
16. Diagnosing the needs for major machinery and equipment repairs				
17. Complete tractor or power unit engine overhaul				
18. Complete one cylinder engine overhaul				
19. Complete overhaul of farm machinery				
20. Using the arc welder				
21. Using the oxyacetylene welder				
22. Painting farm machinery				
23. Setting up farm machinery				
24. Adjusting farm machinery under field conditions				
25. Calculating pulley speeds				
26. Constructing labor-saving equipment				
27. Calibrating power sprayers				
28. Calibrating planters and seeding drills				
29. Hardsurfacing plow-shares and cultivator sweeps, etc.				

APPENDIX C-2

RATING CHECKLIST FOR TEACHER EDUCATORS AND COMMERCIAL REPRESENTATIVES REGARDING SELECTED SKILLS, FUNCTIONS OR ACTIVITIES IN FARM BUILDING AND OTHER STRUCTURES

Directions:

Please check the relative value, as indicated in the columns, that you would place on the present day and future farmer being able to perform the skill, function or activity as listed:

O Teacher-Trainer

O Commercial Rep.

Skill, Function or Activity	High	Medium	Low	No value
1. Sketching and drawing				
2. Reading blue prints and detail drawing				
3. Determining buildings requirements for animals and crops				
4. Maintaining and improving farm buildings				
5. Figuring bill of materials and other building costs				
6. Selecting lumber and other building materials				
7. Constructing farm buildings				
8. Treating lumber and other wood materials				
9. Paints and painting				
10. Constructing pole type buildings				
11. Constructing concrete forms				
12. Determining amounts of concrete needed				
13. Determining concrete mixtures				
14. Mixing concrete on the farm				
15. Using concrete blocks and other masonry materials				
16. Planning a water system				
17. Selecting a farm water pump				
18. Installing a water pump				
19. Installing a farm home plumbing system				
20. Installing other farm plumbing				
21. Maintaining and repairing farm plumbing				
22. Constructing and maintaining farm fences and gates				
23. Planning a farm home sewage system				
24. Installing a farm home sewage system				

APPENDIX C-3

RATING CHECKLIST FOR TEACHER EDUCATORS AND COMMERCIAL EDUCATIONAL REPRESENTATIVES REGARDING SELECTED SKILLS, FUNCTIONS OR ACTIVITIES IN FARM ELECTRIFICATION

Directions:

Please check the relative value, as indicated in the columns, that you would place on the present day and future farmer being able to perform the skill, function or activity as listed:

0	Teacher-Trainer
0	Commercial Rep.

Skill, Function or Activity	High	Medium	Low	No value
1. Planning an electrical wiring system				
2. Figuring an electrical system load				
3. Selecting electrical wiring materials				
4. Planning an exterior distribution system				
5. Selecting lighting equipment				
6. Installing a wiring system for the farm home				
7. Maintaining a farm home wiring system				
8. Installing and maintaining other farm wiring systems				
9. Selecting electric motors				
10. Servicing electric motors				
11. Reconditioning electric motors				
12. Selecting electrical home appliances				
13. Selecting electrical heating systems				
14. Servicing electrical home appliances				
15. Servicing and repairing electrical heating system				
16. Selecting electrical equipment for a specific farm enterprise				
17. Diagnosing electrical system failures and safety hazards				

APPENDIX D

AN ANALYSIS OF SELECTED FARM MECHANICS ACTIVITIES CONDUCTED ON ALABAMA FARMS

Interview Schedule

School_____

Vo-Ag Supervisory District_____

The purpose of this interview schedule is to secure information regarding skills, jobs, functions or activities being performed by farmers relative to farm power and machinery, farm buildings and other structures, and farm electrification.

PERSONAL DATA:

Age of the farmer___ Years of formal education___ Did he take Vo-Ag in High School?___ If so, how many years?___ Was he ever enrolled in the Veteran's Farm Program?___ If so, how many years?___ Does he have any other formal education in agriculture?___ If so, what kind?_____ _____ How many years of farming experience does he have?___ How many days was he employed off of his own farm during the past twelve months? ___

FARM DATA:

Size of farming operation in acres___ No. acres owned_____ No. acres rented_____

Value of present dollar investment in farm power and machinery (Check only one) (Take from the annual income tax depreciation schedule)

Ranges:

( ) Less than 2,000
( ) 2,001 - 3,000
( ) 3,001 - 4,000
( ) 4,001 - 5,000
( ) 5,001 - 6,000
( ) 6,001 - 8,000
( ) 8,001 - 10,000
( ) 10,001 - 12,000
( ) 12,001 - 14,000
( ) 14,001 - 16,000
( ) 16,000 - 18,000
( ) 18,001 - 20,000
( ) More than 20,000

Value of present dollar investment in farm buildings and structures not including farm home (Take from the annual income tax depreciation schedule (Check only one)

Ranges:

( ) Less than 2,000
( ) 2,001 - 3,000
( ) 3,001 - 4,000
( ) 4,001 - 5,000
( ) 5,001 - 6,000
( ) 6,001 - 8,000
( ) 8,001 - 10,000
( ) 10,001 - 12,000
( ) 12,001 - 14,000
( ) 14,001 - 16,000
( ) 16,001 - 18,000
( ) 18,001 - 20,000
( ) More than 20,000

Note to the interviewer:

We are interested in determining the factors as in columns 1, 2, 3, and 4, in regard to the following farm mechanics activities and subject matter.

In order to make this survey uniform throughout the state we would like to make the following suggestions about your recording under each column:

Column 1. Check only if the answer is yes.

Column 2. Check only if performed by the farmer.

Column 3. This column should be checked only if the activity was not performed by the farmer but he feels that he could have performed the activity satisfactory without seeking assistance.

Column 4. Always record either a "H", "M", "L", "N". The term economy-wise as related here means monetary values - time spent in performing could be used to best advantage elsewhere in operation - cheaper to hire it done - less risk to have it performed by others, etc.

	COLUMN			
	1	2	3	4
	Have the following skills, jobs, functions or activities been performed on or for your farm or farming operation during the past?	Did you perform the skill, job, or supervise the function or activity either on your farm or elsewhere?	Do you feel that you could have performed the skill, job, or supervised the function or activity without seeking assistance?	Economy-wise would you value being able to perform this skill, job, function or activity as "high", "medium", "low", or "no value" to present and future farm operation and rural living?
Activities by Areas	XXX	XX	XXX	XXXX
Farm Power and Machinery				
1. Determined actual cost involved in owning and operating farm machinery				
2. Determined actual capacity of farm machinery in performing various operations				
3. Determined the actual power, labor and machinery requirement for a farm enterprise				
4. Planned a machinery replacement program				
5. Selected proper tractor fuels and lubricants				
6. Conducted preventative maintenance activities				
7. Serviced an ignition system				
8. Serviced a fuel system				
9. Serviced a cooling system				
10. Made a tractor clutch adjustment				
11. Replaced and adjusted a tractor clutch				
12. Made a tractor brake adjustment				
13. Replaced and adjusted tractor brakes				

Activity by Areas Cont.	COLUMN 1 Was performed	2 Performed by farmer	3 Could have performed	4 Economy-wise value
14. Adjusted engine valve tappets				
15. Diagnosed and made minor machinery and equipment repairs				
16. Diagnosed needs for major machinery and equipment repairs				
17. Completely overhauled tractor or power unit engine				
18. Completely overhauled one cylinder power unit				
19. Completely overhauled machinery and other equipment				
20. Welded broken machinery part with arc welder				
21. Brazed broken machinery part with oxyactylene welder				
22. Painted farm machinery				
23. Setting farm implements				
24. Adjusting farm machinery under field conditions				
25. Calculated speed of pulleys				
26. Constructed a piece of labor saving equipment				
27. Calibrated power sprayers				
28. Calibrated planters and other seeding drills				
29. Hardsurfaced plow-shares and cultivator sweeps				
Farm Buildings and Other Structures				
1. Made working drawings				
2. Reading of blueprints or detail drawings				
3. Planned a building of facilities for a specific animal or crop enterprise				
4. Planned for buildings maintenance and improvements				
5. Estimated the cost of constructing buildings				
6. Selected lumber and other building materials				
7. Constructed or supervised the construction of a farm building				
8. Treated lumber or other wood materials with a preservative				
9. Painted farm buildings				
10. Constructed or supervised the construction of a pole farm building				
11. Constructed concrete forms				
12. Determined concrete mixtures				
13. Determined amount of concrete needed				
14. Mixed concrete on the farm				
15. Used concrete blocks or other masonry				
16. Planned a farm water system				
17. Selected a farm water pump				

Activity by Areas Cont.	COLUMN 1 Was performed	2 Performed by farmer	3 Could have performed	4 Economy-wise value
18. Installed a farm water pump				
19. Installed a farm home plumbing system				
20. Installed other farm water systems				
21. Maintained and repaired farm plumbing				
22. Constructed and maintained farm fences and gates				
23. Planned a farm home sewage system				
24. Installed a farm home sewage system				
Farm Electrification				
1. Planned an electrical wiring system				
2. Figured an electrical system load				
3. Selected electrical wiring materials				
4. Planned an exterior distribution system				
5. Selected lighting equipment				
6. Installed wiring system for a farm home				
7. Maintaining farm home wiring system				
8. Installed and maintaining other farm wiring systems				
9. Selected an electric motor				
10. Servicing electric motors				
11. Reconditioning an electric motor				
12. Selected an electric home appliance				
13. Selected an electric heating system				
14. Serviced an electric home appliance				
15. Serviced and repaired an electrical heating system				
16. Selected electric equipment for a specific farm enterprise				
17. Diagnosed electrical system failures and safety hazards.				

VITA

Richard Albert Baker

Candidate for the Degree of

Doctor of Education

Thesis: A COMPREHENSIVE STUDY OF THREE SELECTED AREAS OF FARM MECHANICS AS A BASIS FOR CURRICULUM CONSTRUCTION AND COURSE PLANNING

Major Field: Agricultural Education

Biographical:

Personal Data: Born near Opelika, Alabama, June 20, 1932, the son of J. A. and Lois Marie Baker.

Education: Attended grade school at Beauregard and Auburn, Alabama, graduates from Auburn High School in 1950; received the Bachelor of Science Degree with a major in Agricultural Education in March, 1954, and a Master of Agricultural Education in December, 1956, from the Auburn University.

Professional Experience: Entered the United States Air Force as a commissioned officer in June, 1954; taught Vocational Agriculture, Warrior, Alabama, 1957-1959 and at Tuskegee, Alabama, 1959-1961; served as graduate assistant in the Department of Agricultural Education at the Auburn University in 1956 and as graduate assistant in the Department of Agricultural Education at the Oklahoma State University during the 1961-1962 and 1962-1963 school terms.