AN ASSESSMENT OF AGRICULTURAL MECHANICS COURSE REQUIREMENTS IN AGRICULTURE TEACHER EDUCATION PROGRAMS IN THE UNITED STATES

By

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AN ASSESSMENT OF AGRICULTURAL MECHANICS

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IN THE UNITED STATES

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CHAPTER I

INTRODUCTION

As the twenty-first century approaches, questions continue to arise in agricultural education discussions in regards to whether the types of curricula in use today have been sufficient in enabling graduating students to become a productive part of society. It is admirable to be concerned about the educational well-being of the students. A preemptive concern to the students, however, should be whether or not what is being taught future teachers is adequate for their success as agricultural educators.

Agriculture teachers preparing to teach into the twenty-first century must have exposure to and knowledge of the technology which await those individuals entering an ever-changing agricultural industry. Not only will their students experience work in furrowed fields, but also in biological laboratories investigating gene-splicing or machine shops with hi-tech equipment utilized to assist in daily decision-making. Additionally, they may encounter computer laboratories or aqua-farms utilizing specially-designed, aerated production tanks. Agricultural education has always adapted to the ever-changing nature of the agricultural industry, but has agricultural education previously had to deal with the preparedness of its teachers on such a large scope?

Pre-service education experienced by future agricultural educators must be more than adequate to allow them to be professionally self-sufficient when they enter their first jobs as agriculture teachers. Requiring additional courses to supplement needed knowledge in the evolving technological areas will obviously be beneficial to their success. Miller (1991) stated that it was critical to remember that agricultural mechanics reaches across the entire agricultural education curriculum to all of the present and emerging areas. Kotrlik and Drueckhammer (1987), in a national study, concluded that agricultural mechanics will be one of the two most important components in insuring quality agricultural education programs in the future. Because of the evolving nature of agricultural practices and systems, one can assume safely that the agricultural mechanics components of programs will continue to evolve also. Osborne (1992) and others pondered how agricultural mechanics instruction should change as we head into a new era of agricultural education.

Harper (1989) stated that the most serious problems facing agricultural education are not the changes occurring, but rather the strategies, or more clearly the lack of strategies, agricultural educators are pursuing to facilitate change. Miller (1991) recognized that agricultural mechanics played a major role in bringing agriculture to the level of efficiency enjoyed today; however, few were visionary enough to see the future role or the need to bring appropriate competencies in agricultural mechanics to the students of tomorrow. The question to be answered then: "Is the pre-service education our future teachers are receiving in agricultural education, specifically in agricultural mechanics, of the scope and quality needed for success?"

Agricultural education and agricultural mechanization programs have a long tradition of cooperation and integration. Cooperation and integration of new agricultural skills and knowledge must continue in order to supply competent teachers of agriculture for the students of tomorrow.

Statement of the Problem

The vastly changing structure of agriculture over the last quarter century has demanded that secondary agricultural education programs change curricula. Based on the review of literature, it was evident that agricultural mechanics curriculum in secondary education programs has not changed significantly during this same time period. The literature further suggested that teacher preparation in agricultural mechanics has failed to recognize the changes which have taken place in agriculture. It has been questioned whether the current collegiate course offerings in agricultural mechanics reflect this change and thus provide the appropriate experiences needed for agriculture teacher success in this dynamic content area. As a result, there exists a need to assess the nature of pre-service agricultural mechanics coursework required for agriculture teacher certification across the United States.

Purpose

The purpose of this study was to assess the agricultural mechanics course requirements for agriculture teacher certification at selected colleges and universities in the United States.

Objectives

Seven objectives were established to achieve the purpose of this study. The objectives were to:

1) Ascertain the number of newly certified agricultural teachers for the 1994-95 academic year in the study population.
2) Determine the total number of courses required in agricultural mechanics or related courses by those students studying to become agriculture teachers
3) Ascertain the number of semester credit hours required in agricultural mechanics or related courses for those students studying to become agriculture teachers.
4) Ascertain the number of required semester credit hours in agricultural mechanics teaching methods courses for those students studying to become agriculture teachers.
5) Develop an inventory of titles of the administrative unit offering the agricultural mechanics courses required of students studying to become agriculture teachers.

6) Determine required/preferred minimum qualifications of the instructors of required agricultural mechanics courses in agricultural teacher certification programs.

7) Identify the major topics of required agricultural mechanics or related courses for agriculture teacher certification.

Definitions

Agricultural Education Teacher - teacher who teaches agricultural education at the secondary school level. Formerly known as Vocational Agriculture teachers or Vo-ag instructors (Garr, 1990)

Agricultural Mechanics - secondary agricultural mechanics programs designed to:

1) Develop understandings of basic principles of power and machinery, structures and electrification, agricultural construction, and soil and water conservation management so principles are used in making decisions in students' careers for economic, sociological, and environmental advantages.
2) Foster positive workmanship, work habits, time-on-tasks, and decisions about the quality of one's work.
3) Instill desirable work habits in students using a variety of "hands-on" activities.
4) Acquaint students with principles and competencies related to the application of physical sciences to the problems and opportunities of agriculture.

5) Use agriculture, food and biological systems technologies as a context to teach and/or reinforce physical and biological science principles, mathematics and communications skills.

6) Develop an understanding of the role technology plays in agriculture and the ability to apply those basic principles and concepts.

7) Promote experiences in using technology in agriculture.

8) Complement a comprehensive curriculum in agricultural education.

9) Develop an understanding that agriculture is broader than production agriculture.

10) Develop attention to and consciousness in safety while using technology in agriculture.

11) Develop skills in a variety of mechanical experiences that the student can use throughout life in either vocational or avocational settings.

(Shinn, 1995)

Professional Education - "Professional education refers to that component of teacher education which is designed primarily to orient college students to the purposes, principles, policies, and procedures in education, as well as to develop in students the abilities essential for teaching in agricultural education programs" (Crunkilton and Hemp, 1982).

Pre-service education - structured educational programs in which prospective teachers or other professionals participate to better familiarize and prepare themselves for positions within their professions.

Assumptions

It was assumed by the researcher that the respondents at each university who completed and returned the surveys were knowledgeable of both the program requirements for agriculture teacher certification at their institutions and for agriculture teacher certification in their states, respectively.

Scope

The scope of the study included those agricultural education teacher preparation programs in the United States which certified five or more agriculture teachers during the 1992-93 and 1993-94 school years, respectively, as reported in A National Study of the Supply and Demand For Teachers of Agricultural Education (Camp, 1994 and 1995). A total of fifty-nine individual programs met this criterion for these two years.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this chapter is to provide an overview of the available literature in agricultural education and agricultural mechanization as it relates to teacher education in agriculture. A compilation of books, professional journals, proceedings of agricultural education research meetings, and magazines has been utilized to give a broad representation of the review of literature for this study. Chapter II has been divided into the following sections: 1) Introduction, 2) Agricultural Education and Change, 3) Agricultural Mechanics Curriculum, 4) Agricultural Mechanics Instruction and Teacher Pre-service Preparation, and 5) Summary

Introduction

Agricultural education is unique in that its educational scope must adjust as agricultural technology advancements place new constraints upon students completing agriculture programs. There will always be a need for traditional agricultural skills jobs in welding, tractor or heavy machinery operation, and animal and plant husbandry. However, the agricultural education profession must strive to meet the technology-oriented society directly by expanding away from the traditional areas in agricultural mechanics.

Many states have taken the initiative to more fully integrate agricultural education programs in secondary schools with the core programs in the biological sciences. Fully integrated agriscience programs, however, can and do reach beyond the biological sciences. The agricultural mechanics shop can be a home for physical science instruction. Agricultural mechanics is a scientific based curriculum which provides the ideal setting to apply selected principles of physics, chemistry, and mathematics (Miller, 1991). From the properties of metals and materials to the laws of physics, the objectives of the physical science curricula could be met using innovative lessons by high school agriculture instructors. Osborne (1992) stated, "compared to the other segments of the curriculum, agricultural mechanics may hold the greatest potential for addressing a blend of literacy, vocational, applied science, and basic study objectives. A new emphasis on physical science application in agriculture will diversify agricultural mechanics instruction and appropriately maintain agricultural mechanics as an important component of secondary agricultural education" (p.4).

A result of the rapid advance of farm mechanization and parallel developments in other fields is a growing need for better education of those entering agriculture (Report V, 1975). Crawford (1987) found that the future success of secondary agricultural education programs will depend on the ability to focus on the true changes that have occurred in the agricultural industry. According to Bear and Darcey (1986), the historic applications of agricultural mechanization curricula should be discarded and changes implemented which concentrate on the application of current and future

technology. The continued implementation of new automated processes in agriculture will add a new dimension to agricultural mechanization curricula (Slocombe, 1987).

Agricultural Education and Change

History has demonstrated that humankind resists complacency in the agricultural industry. Utilizing skills and knowledge to make jobs for people easier or land more productive characterizes the ideals of research and education in their most basic forms. Land-grant institutions were established in part to aid in the research and advancement of agricultural techniques to better supply food and fiber products for the armies fighting during the Civil War. During that turbulent period of American history, a need grew to improve the current practices of both production agriculture and education in agriculture (Williams, Current, and Freidel, 1963). The improvements in production agriculture have been out of necessity to keep pace with an increasing population. However, Dillard (1991) commented that change has had to take place in agricultural education not only for its improvement, but more importantly for its survival.

Agricultural education has been very traditional in its ideas and concepts. The areas of leadership development, experiential learning or "learning by doing", and technical knowledge and skills in agriculture will continue to exist in agricultural education programs. Curricula content in the latter of these areas has brought about much discussion. Addressing the curricula of vocational agriculture programs, the National Research Council (1988) found that much of the focus and content of many

vocational agriculture programs is outdated. The emphasis on the curricula was still in the area of production agriculture even though fewer and fewer people were living on farms. This emphasis still followed the traditional purpose of vocational agriculture programs.

The National Summit on Agricultural Education (1989) developed seven goals "to set overall priorities for agricultural education and serve to focus and guide decisions throughout the [agricultural education] community." Three of the goals were directed to curriculum and instruction in agricultural education.

> Goal 1: To update instruction in agriculture and expand programs about agriculture; As the world changes and advances, agricultural education will respond and advance with it...the prevailing accent on production agriculture must give way to a much broader agenda...
>
> Goal 4: To develop educational programs that continually and systematically respond to the trends and demands of the marketplace.
>
> Goal 7: To elevate and extend our standards of excellence in classroom and laboratory instruction...; Currently, the shortage of qualified teachers and inadequate tools and facilities hamper the development of quality programs... (pp. 4-5)

Adapting our curricula to reflect advancements in technological knowledge and skills is necessary to adequately prepare agriculture students for the variety of jobs which await them. Not to go unnoticed, however, has been the need to prepare our future teachers in the same manner. Kellogg and Knapp (1966) recognized the need for accepting change in agriculture and adjusting educational programs to it.

> Each college of agriculture has a basic responsibility to appraise continually the changing needs of agricultural education. This takes study and discussion with informed individuals and groups throughout the state. As needs

> arise, they can be detected, and the college can plan ways for meeting them, either with its own staff and facilities or elsewhere. This time to give help and leadership is before educational gaps become critical and people have already taken public position on alternative. (p. 134)

Agricultural education and agricultural teacher education programs must continue to recognize when change is needed and when goals of programs must be revised or redeveloped. Stevens (1967) recognized that objectives are not static and they evolve as general personal and social goals change.

> Scientific and technological advances including automation are powerful factors. Population changes, shifts in food preferences, national defense needs, and world markets influence persons to prepare for careers in particular fields in agriculture. Continuous appraisal of objectives and course content are required if agricultural programs are to educate competent, versatile, adaptable individuals equipped to succeed in occupational fields using some proportion of knowledge and skills in agriculture. (p. 17)

Zurbrick (1991) noted that many agricultural education programs have grown or been modified to meet new occupational demands in agriculture. These occupational demands will continue to influence the direction of agricultural education programs into the next century.

Agricultural Mechanics Curriculum

Agricultural mechanics has been an important part of the total agricultural education program (Phipps, 1983). There has been a great deal of discussion in the last few years as to what should be taught in the changing secondary agricultural mechanics programs (Harper, 1990; Dillard, 1991; Slocombe, 1987; Buriak, 1992; Osborne,

1992). Many critics perceive agricultural mechanics to be a non-essential area with the move to science-based curricula in secondary agriculture programs (Buriak, 1992). Biology-based, science curricula is abundant in our animal and plant production programs. However, agricultural education programs naturally encounter physical science curricula. In particular, a proven vehicle to provide experiential learning in applied physical science is agricultural mechanics (Krueger and Johnson, 1992). Agricultural mechanics and technology curriculum can be defined as principle driven instruction. The curriculum was based on building upon the most basic physical fundamentals and expanded into the interrelationships of applied sciences and physical laws (Harper and Buriak, 1995). This aspect of agricultural mechanics was not always the most recognizable aspect of the curricula, however. Initially, agricultural mechanics was just one of seven to nine basic instructional areas within agricultural education. While some areas of instruction have remained consistent in some regards, others have undertaken vast redirection. Certain areas are also more directly influenced or impacted by technological advancements. In particular, the successes of new and innovative integrated equipment in the field of agricultural mechanics has led to formation of national committees which have refined the goals and objectives of secondary agricultural mechanics programs in areas of instructional methods and content. The formation of new goals and objectives can be much easier than implementing them however. Slocombe (1987) suggested that agricultural mechanization curricula should contain a balance of courses in agricultural science, business and economics, mathematics and science, and mechanization technology which

will emphasize problem solving and developing individual and logical thought processes. With the numerous technological changes to occur before and after the beginning of the 21st century, agricultural mechanization curricula needs to be reevaluated so graduates are properly skilled for careers in the year 2000 and beyond.

The processes which are utilized to move and transform agricultural products from the field to the supermarkets have improved dramatically over time. Most of the harvesting and processing equipment integrates many different electrical and mechanical components. The individuals who operate and maintain this equipment must have adequate educational backgrounds in order to interpret the intricate functions of this equipment. Although many companies are willing to invest training time into these individuals, it is the agricultural educator's job to provide much of the same underlying knowledge these individuals require before seeking employment. Adaptations must continue as the job skills and knowledge continue to change at a more rapid pace compared to changes encountered during the first half of the 20th century.

Agricultural Mechanics Instruction and Pre-service Preparation

The National Research Council (1988) found that much of the focus and content of many vocational agriculture programs were outdated and not meeting the broader needs for agricultural education generated by changes in the food and fiber industries and society as a whole. Progress must continue in preparing agriculture teachers with knowledge which reflects the current food and fiber industry. The teachers must not

only be competent in these areas in order to be successful, but they must also have the opportunity and desire to improve their teaching skills and technological backgrounds.

The ultimate goal in all schools is the achievement of sound educational programs. This should be no different in agricultural education programs. Where strong agricultural education programs exist, good teaching is responsible; where weak programs exist, poor teaching is responsible (Crunkilton and Krebs, 1982). Preparing teachers to use educationally sound methods and procedures pays dividends in both positive student performance and program success. Preparing teachers in agricultural mechanics should be taken with the same positive approach.

In many secondary agricultural education programs, the time allocated for instruction in agricultural mechanics historically comprised twenty-five to forty percent of the total instructional time (Phipps, 1980). Shinn (1987) found that as much as two-thirds of the total instructional time in agriculture courses may be devoted to laboratory instruction. Much of the agricultural mechanics instruction commonly takes place in the laboratory or shop. It follows that prospective teachers need to have competence in the area of shop management (Johnson and Schumacher, 1989). Garr (1990) noted that teacher competency determines the teacher's success and the success of the agricultural education program. Leforce (1966) found that there were competencies which a student teacher or a new teacher of agricultural mechanics needed in order to be successful. The knowledge of these traditional skills from 1966, while still valuable, may not necessarily be needed in the same depth by agriculture teachers today. Many of these skills do not emphasize the technological advancements which have been

steadily integrated into most facets of production agriculture over the last decade or so. Report V of the ASAE Committee (1975) identified areas of pre-service education and specific areas of training in agricultural mechanics. These identified areas were currently under revision as of March 1996 in an attempt to reflect the most current needs of agricultural mechanics teacher education. Gliem (1988) concluded that the traditional areas of construction, welding, and small engines were overemphasized in the present Ohio agricultural mechanics curriculum and that the instructional areas of electricity, agricultural machinery, soil and water, and multicylinder power units needed increased emphasis.

It has been noted by many that the agricultural mechanics shop or laboratory holds an unlimited resource of opportunity for hands-on, physical science instruction. From a scientific standpoint, the teachers of agricultural mechanics sometimes choose to ignore that it is, in fact, a laboratory. Accepting that the shop is a laboratory where experimentation and research can occur will facilitate the reorganization needed to address the different types of workers reflective in the current agricultural industry.

Steps must also be taken to develop confident and qualified teachers of agricultural mechanics to face the emphasis of high technology incorporation within agricultural jobs. New teachers must be comfortable with this area of agricultural education. However, Foster (1986) found that "teaching agricultural mechanics ranked in the top ten teaching activities with the highest anxiety scores in both a) a priori to student teaching and b) during student teaching."

Coupled with increasing mechanization and reliance on technology of all areas of agriculture, the background diversity of college students appears to be presenting new problems for agriculture teacher educators in identifying the skills actually needed by teachers entering the classroom (Polson, 1985). New agriculture teachers completing current mechanics preparation courses need to have exposure to the current agricultural practices regardless of the technological advancement. In 1967, Stevens recognized that the quality agricultural mechanics teachers for the future will need to be more than:

> ...farm-reared high school graduates which have had high school instruction in agriculture and employment in agricultural positions in the summers between college terms. Agriculture teachers are primarily occupationally experienced and need the agricultural science and professional education courses to qualify as beginning teachers (p.100)

Agricultural mechanics instruction will be more demanding than ever with the approach of the new century. Students preparing for jobs in production agriculture and supporting businesses will need to be well-versed in many areas of the physical sciences. Many have determined that traditional skills and knowledge, while still important, must be supplemented and upgraded to better prepare students for the new agriculture which awaits them. Harris and Nardozzi (1987) determined emerging knowledge and skills that individuals engaged in part-time farming would need by 1995 and identified three new knowledge and skill areas in the area of agricultural machines and equipment: 1) operation of machines and equipment with electronic devices, 2) trouble-shooting electronic switches, sensors, and circuitry, and 3) operation and

maintenance of hydraulic equipment. In conducting a national survey to assess the status of agricultural mechanics curriculum as perceived by secondary school agricultural education instructors, Laird and Kahler (1995) found the greatest positive change in ranks from "current depth" to "future importance" included the instructional areas of computer usage in agricultural mechanics, TIG welding, CPR and first aid, applied physics, waste handling, electric controls and automation devices, environment control, problem solving strategies, applied math, energy conservation, robotics, and electric power. These findings agree with Shinn (1995) in his study of the purposes of ideal secondary curriculum that includes agricultural mechanics.

If the agriculture teachers' jobs are to prepare their students for tomorrow's positions in agriculture, then new teachers entering the profession must have proper training, experience or abilities to attain these skills. Polson (1985) noted that "teacher preparation in the area of agricultural mechanics has largely remained structured as it was when vocational agriculture was production agriculture." As the emphasis of programs continue to move away from predominantly production agriculture and more towards agriscience, agricultural mechanics needs do the same. Schlautman and Foster (1991) found that secondary agricultural mechanics instruction played an important role in developing competent individuals to respond to the changing needs of the agricultural industry, and thus, must be responsive to current and future agricultural mechanization changes.

Summary

The tasks of the employment opportunities in vocational and technical education in agriculture for the millions of workers in off-farm agricultural occupations is expanding readily. Complex occupational requirements of positions in many businesses demand flexibility and adaptability. The development of agricultural mechanics curricula must reflect this flexibility and adaptability.

Agricultural education programs will continue to prepare intelligent and well-rounded students of agriculture if the agricultural education profession as a whole continues to adapt to changes within the agricultural industry. While this review of literature found no national studies which investigated agricultural mechanics course requirements, material was found which ascertained those agricultural mechanics competencies teachers should possess. It can be inferred that in order for teachers to attain appropriate competency levels in specific subject matter, appropriate background courses and practical experience would facilitate the attainment of the skills.

CHAPTER III

DESIGN AND METHODOLOGY

Purpose

The purpose of this study was to assess the agricultural mechanics course requirements for agriculture teacher certification at selected colleges and universities in the United States.

Objectives

Seven objectives were established for this study. They were to:

1) Ascertain the number of newly certified agricultural teachers for the 1994-95 academic year in the study population.
2) Determine the total number of courses required in agricultural mechanics or related courses by those students studying to become agriculture teachers
3) Ascertain the number of credit hours required in agricultural mechanics or related courses by those students studying to become agriculture teachers.
4) Ascertain the number of required credit hours in agricultural mechanics teaching methods courses by those students studying to become agriculture teachers.
5) Develop an inventory of titles of the administrative unit offering the agricultural mechanics courses required of students studying to become agriculture teachers.

6) Determine required/preferred minimum qualifications of the instructors of required agricultural mechanics courses in agricultural teacher certification programs.

7) Identify the major topics of required agricultural mechanics or related courses for agriculture teacher certification.

Institutional Review Board

Federal regulations and Oklahoma State University policy require review and approval of all research studies that involve human subjects before investigators can initiate their research. The Office of University Research at Oklahoma State University and the Institutional Review Board conducts the aforementioned review to protect the rights and welfare of human subjects involved in biomedical and behavioral research. In compliance with this policy, this study received the proper surveillance and was granted permission to continue. Refer to Appendix B for IRB approval.

Population

The population of the study consisted of agricultural education teacher certification programs that certified five or more agriculture teachers during the 1992-93 and 1993-94 school years respectively as reported in A National Study of the Supply and Demand For Teachers of Agricultural Education (Camp, 1994 and 1995). Fifty-nine individual agricultural education teacher certification programs which met this criterion were identified. For this two-year period, forty-eight of the fifty-nine identified programs certified five or more new agriculture teachers during both years.

The remaining eleven universities certified five or more new agriculture teacher in only one of the two years. Therefore, a total of fifty-nine programs met the criterion for this study during this two-year period. Tables I, II, and III are presented as means of providing details about the scope and nature of the population of programs for this study.

TABLE I

A SUMMARY OF UNIVERSITY PROGRAMS CERTIFYING FIVE OR MORE AGRICULTURE TEACHERS DURING 1992-94

DISTRIBUTION BY AAAE REGION AND YEARS

	1992-93		1993-94	
Region	N	% of Region	N	% of Region
Central	13	76.5	14	73.7
Eastern	2	22.2	3	30.0
Southern	25	65.8	23	60.5
Western	14	93.3	13	86.7
TOTAL	54	68.4	53	64.6

Table I provides an analysis of the qualifying programs. The programs included in the census certified five or more new agriculture teachers in one or both years. Only those programs that met this criterion were included in the census for each year. Of the fifty-nine programs, forty-eight met the criterion for both years. The difference from the total for each year and forty-eight accounted for the eleven

programs meeting the criterion for the study in only one of the two years (54 - 48 = 6, and 53 - 48 = 5, respectively).

Table II was constructed to illustrate that the total number of newly certified agricultural teachers from these identified programs accounted for nearly ninety-one percent of all new agriculture teachers certified in the country during the two year period. For programs in the Western, Southern, and Central Regions, those certifying five or more teachers accounted for 96.1, 91.8, and 90.1 percent respectively of the total number of agriculture teachers certified in the region.

TABLE II

A COMPARISON OF NEWLY CERTIFIED AGRICULTURAL TEACHERS FROM PROGRAMS CERTIFYING FIVE OR MORE FOR 1992-1994

DISTRIBUTION BY AAAE REGION

AAAE Region	Total	Certified From Programs of Five or More	
		Number	% of region total
Central	284	256	90.1
Eastern	83	57	68.7
Southern	711	653	91.8
Western	207	199	96.1
TOTAL	1285	1165	90.7

Table III was constructed to describe the national distribution of newly certified agricultural teachers from programs certifying five or more during 1992-1994 by the number of teachers certified. For 1992-93, it should be noted that 31, or 57.4 percent,

of the total came from programs having the smallest number, 5-10, of newly certified teachers. This was true to an even greater extent for 1993-94 when it was found that 37, or 71.2 percent of the total, came from this size category. In both years, the next largest populations came from programs that certified 11-20 new teachers. The respective proportions for 1992-93 and 1993-94 were 19, or 35.3 percent; and 10, or 19.2 percent.

TABLE III

DISTRIBUTION OF PROGRAMS CERTIFYING FIVE OR MORE AGRICULTURE TEACHERS DURING 1992-93 AND 1993-94 BY NUMBERS CERTIFIED

DISTRIBUTION BY YEARS				
	1992-93		1993-94	
No. of Teachers	N	%	N	%
5 to 10	31	57.4	37	71.2
11 to 20	19	35.2	10	19.2
21 to 30	3	5.6	2	3.8
31 to 40	1	1.8	3	5.8
TOTAL	54	100.0	52	100.0

Development of the Instrument

The researcher developed a survey instrument to specifically determine agriculture teacher certification requirements in the area of agricultural mechanics. The survey instrument developed is included in Appendix A. Content validity and

reliability was insured using the following procedures. After gathering input from a panel of experts in agricultural mechanics identified from a number of universities, the instrument was distributed to several groups of individuals and reviewed at Oklahoma State University in the Spring of 1996. These individuals included agricultural education teacher educators, agricultural education graduate students, agricultural mechanics instructors and students of a research design course. They were asked to evaluate the instrument for content reliability. It was decided that the style of the instrument did not address a need for a formal test of reliability. Following the review, the instrument was revised and distributed to accomplish the objectives of this study.

The components of the survey related to the number of credit hours in required agricultural mechanics technical background courses, the number of credit hours required in agricultural mechanics teaching methods courses, a listing of individual required agricultural mechanics courses, the instructor qualification for teaching the listed agricultural mechanics courses, the number of credit hours of the listed courses, the department in which the courses were offered, total number of new teachers certified in the 1994-95 academic school year, and a request that the syllabi of all required courses in agricultural mechanics be returned with the survey.

Collection of Data

Data collection from the universities in the population was completed over an eight-week period. Initial questionnaires to determine departmental consent to participate in the study were distributed to the department heads of the selected

agricultural education programs between February 16 and March 23, 1996 (see appendix). The methods of distribution were by electronic mail (e-mail), facsimile (FAX), and conventional mail. E-mail addresses, FAX numbers, and conventional mailing addresses for the survey were accessed using the 1995-1996 AAAE Directory of Teacher Educators in Agriculture. Respondents were requested to reply to a consent survey by utilizing any of the three means. The respondents commonly chose the method which was used to reach them.

A second contact was attempted approximately two weeks later to gather consent responses from those in the population who, for whatever reason, were not initially contacted by means of the first distribution of consent surveys. Further investigation revealed incorrectly published e-mail addresses and FAX numbers. The remaining non-respondents were contacted by telephone to determine their consent and/or willingness to participate to this study.

On March 25, 1996 all universities consenting to participate in the study to date were mailed the Agricultural Mechanics Course Requirements for Agriculture Teacher Certification Survey and a cover letter detailing the expectations of this study (Appendix A). A self-addressed, 9-inch by 12-inch envelope was included for return of both the survey instrument and the requested syllabi of all required agricultural mechanics courses needed for teacher certification at each respective university. The survey was a one-page, table-style formatted instrument containing five items (see appendix). The respondents were asked to return the surveys and syllabi to Oklahoma State University by April 19, 1996. Beginning April 22, follow-up contacts were

initiated using electronic mail or telephone to those departments which had failed to respond by the April 19 deadline. The programs were given until May 10 to reply to the previous contact. All final nonrespondents were contacted by telephone and email on May 8 in an attempt to gather their completed survey and syllabi. Two universities which were inadvertently omitted from the previous mailings and contact were notified by phone and thus included in the study.

Analysis of Data

The data from the survey were both qualitative and quantitative. Data were analyzed using descriptive statistics including means, frequency distributions, and percentages. All findings were reported in the aggregate with no institutions being represented singly.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

The purpose of this study was to assess the agricultural mechanics course requirements for agriculture teacher certification at selected colleges and universities in the United States. Seven objectives were established for this study. The objectives were to:

1) Ascertain the number of newly certified agricultural teachers for the 1994-95 academic year in the study population.
2) Determine the total number of courses required in agricultural mechanics or related courses by those students studying to become agriculture teachers
3) Ascertain the number of credit hours required in agricultural mechanics or related courses by those students studying to become agriculture teachers.
4) Ascertain the number of required credit hours in agricultural mechanics teaching methods courses by those students studying to become agriculture teachers.
5) Develop an inventory of titles of the administrative unit offering the agricultural mechanics courses required of students studying to become agriculture teachers.

6) Determine required/preferred minimum qualifications of the instructors of required agricultural mechanics courses in agricultural teacher certification programs.

7) Identify the major topics of required agricultural mechanics or related courses for agriculture teacher certification.

A five-item questionnaire to specifically determine agriculture teacher certification requirements in the area of agricultural mechanics was distributed to fifty-nine university agriculture teacher certification programs. The questionnaire was originally distributed to fifty-eight programs but it was determined through responses that one university issues two different types of credentials and the decision was made to count each as a separate program. Therefore, the total number of programs participating in the study was determined to be fifty-nine (N=59).

Response rate

Table IV was constructed to illustrate the response rate for the study. As shown in the table, the highest proportion of responding programs came from the Western Region with 92.9 percent. Essentially three quarters of the programs contacted in the Southern and Central Regions returned questionnaires, while two-thirds of those in the Eastern region participated. Overall, a total of 46 responses were received from the 59 programs selected to participate, resulting in a 78 percent return rate.

TABLE IV

A SUMMARY OF RESPONSE RATE OF PROGRAMS BY AAAE REGIONS

AAAE Region	DISTRIBUTION N	%
Central	13	76.5
Eastern	2	66.7
Southern	18	72.0
Western	13	92.9
TOTAL	46	78.0

1994-95 Newly Certified Teachers

Table III was provided in Chapter III to illustrate the national distribution of newly certified agriculture teachers in programs certifying five or more agriculture teachers from 1992-94. Table V was developed for this chapter to provide a comparison of the number of newly-certified agriculture teachers for 1994-95 by regions from programs responding to the survey instrument. Responses were received from a total of 46 programs with the largest number, 18, coming from the Southern Region. From both the Central and Western Regions, 13 institutions responded and 2 reported from the Eastern Region. Almost one-third of the programs responding, 15, or 32.6 percent, credentialed from 6-10 new teachers that year. Nearly another third, 14, or 30.4 percent, reported certifying 11-15 new teachers. Only 6 programs, 13.0 percent, indicated that they produced 16 or more teachers in that time frame. One of these, from the Central Region, reported certifying 11-15 new teachers. The remaining

five in this group were programs located in the Southern Region. The mean number of newly certified teachers was 9.5.

TABLE V

A SUMMARY OF NEWLY CERTIFIED AGRICULTURE TEACHERS PRODUCED BY PARTICIPATING PROGRAMS BY REGION DURING 1994-1995

	DISTRIBUTION BY AAAE REGION									
No. of	Central		Eastern		Southern		Western		Total	
New Teachers	N	%	N	%	N	%	N	%	N	%
0 to 5	5	10.9	0	0.0	4	8.7	2	15.4	11	24.0
6 to 10	3	6.5	2	100.0	4	8.7	6	46.1	15	32.6
11 to 15	4	8.7	0	0.0	5	10.9	5	10.9	14	30.4
16 to 20	1	7.7	0	0.0	2	11.1	0	0.0	3	6.5
21 to 25	0	0.0	0	0.0	2	11.1	0	0.0	2	4.3
26 to 30	0	0.0	0	0.0	1	5.6	0	0.0	1	2.2
TOTAL	13	28.3	2	4.3	18	39.1	13	28.3	46	100.0

*Mean = 9.5 new teachers per program

Number of Courses Required in Agricultural Mechanics

Inspection of data in Table VI reveals that a total of 3 programs, 6.5 percent, required no courses in agricultural mechanics or related content, while 12, 26.1 percent, required 2 courses. Ten programs, 21.7 percent, required 3 courses; another 8, 17.4 percent, required 4 courses; and 6, 13.0 percent, required 6 or more such courses. The reporting programs from the Eastern Region required no methods

courses. Requiring three or more courses were 10 programs from the Southern Region, 9 from the Western Region, and 6 from the Central Region. In four Western Region and two Central Region programs, six or more courses in the area of agricultural mechanics were required.

TABLE VI

NUMBER OF REQUIRED COURSES IN AGRICULTURAL MECHANICS FOR TEACHER CERTIFICATION

	DISTRIBUTION BY AAAE REGION									
No. of required	Central		Eastern		Southern		Western		Total	
Courses	N	%	N	%	N	%	N	%	N	%
0	1	2.2	2	4.3	0	0.0	0	0.0	3	6.5
1	1	2.2	0	0.0	4	8.7	1	2.2	6	13.0
2	5	10.9	0	0.0	4	8.7	3	6.5	12	26.1
3	3	6.5	0	0.0	6	13.0	1	2.2	10	21.7
4	1	2.2	0	0.0	4	8.7	3	6.5	8	17.4
5	0	0.0	0	0.0	0	0.0	1	2.2	1	2.2
6+	2	4.3	0	0.0	0	0.0	4	8.7	6	13.0
TOTAL	13	28.3	2	4.3	18	39.1	13	28.3	46	100.0

*Mean = 2.8 courses per program

Number of Semester Credit Hours in Agricultural Mechanics

Analyzing data in Table VII revealed that 22, or 47.8 percent of the respondents, required at least 5.6 but less than 11.5 semester credit hours in

agricultural mechanics courses. Another 16, or 34.7 percent of those responding programs, required at least 2.5 but less than 5.5 semester hours in agricultural mechanics courses. Four programs required at least 11.6 but less than 14.5 hours and two programs each required zero to 2.5 hours and 14.6 to 17.5 hours, respectively. Twelve, or 92.3 percent of the programs in the Central Region, required at least 2.6 but less than 11.5 semester credit hours in agricultural mechanics. Eight, 44.4 percent, of the 18 Southern Region programs reported needing 2.6 to 5.5 semester credit hours. In the Western Region, more than three quarters of the programs required at least 5.6 semester credit hours in agricultural mechanics. The mean number of semester credit hours was 6.7 per program.

TABLE VII

SEMESTER CREDIT HOURS IN AGRICULTURAL MECHANICS REQUIRED FOR TEACHER CERTIFICATION

	DISTRIBUTION BY AAAE REGION									
	Central		Eastern		Southern		Western		Total	
Credit Hours	N	%	N	%	N	%	N	%	N	%
0 to 2.5	1	2.2	1	2.2	0	0.0	0	0.0	2	4.3
2.6 to 5.5	6	13.0	0	0.0	8	17.4	2	4.3	16	34.7
5.6 to 8.5	2	4.3	1	2.2	3	6.5	5	10.9	11	23.9
8.6 to 11.5	4	8.7	0	0.0	4	8.7	3	6.5	11	23.9
11.6 to 14.5	0	0.0	0	0.0	2	4.3	2	4.3	4	8.7
14.6 to 17.5	0	0.0	0	0.0	1	2.2	1	2.2	2	4.3
TOTAL	13	28.3	2	4.3	18	39.1	13	28.3	46	100.0

*Mean = 6.7 semester credit hours

Number of Semester Credit Hours in Teaching Methods of Agricultural Mechanics

Data reported in Table VIII provide the basis for comparisons of the number of semester credit hours in agricultural mechanics teaching methods required for teacher certification by AAAE Regions. Many programs reported their credit hours in quarter hours. A conversion to semester credit hours was accomplished using 0.667 semester hours per quarter hour as the conversion factor. Due to these conversions the reported semester hours are displayed in decimal form.

It is noteworthy that exactly one-half of the programs responding required zero hours of this type of coursework. The next largest group, a total of nine programs, 19.5 percent, indicated at least two, but less than three hours of such credit are required. Just six programs, four of these being from the Western Region, reported they required at least three, but less than four semester hours of methods of teaching agricultural mechanics. In three programs, or 6.6 percent, from 1 to 1.9 credits of this type and another three responded in the 4 to 4.9 hour category. At the top extreme, two programs, one each in the Southern and Western Regions, reported requiring six or more hours in this area. Overall, responding programs averaged 1.3 semester credit hours and those programs located in the Southern and Western Regions had the highest credit hour requirements in agricultural mechanics teaching methods.

TABLE VIII

SEMESTER CREDIT HOURS IN AGRICULTURAL MECHANICS TEACHING METHODS REQUIRED FOR TEACHER CERTIFICATION

	DISTRIBUTION BY AAAE REGION									
	Central		Eastern		Southern		Western		Total	
Credit Hours	N	%	N	%	N	%	N	%	N	%
Zero	7	15.2	2	4.3	10	21.7	4	8.7	23	50.0
1 to 1.9	2	4.3	0	0.0	0	0.0	1	2.2	3	6.5
2 to 2.9	2	4.3	0	0.0	4	8.7	3	6.5	9	19.5
3 to 3.9	0	0.0	0	0.0	2	4.3	4	8.7	6	13.0
4 to 4.9	2	4.3	0	0.0	1	2.2	0	0.0	3	6.5
5 to 5.9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
6 to 6.9	0	0.0	0	0.0	1	2.2	1	2.2	2	4.3
TOTAL	13	28.3	2	4.3	18	39.1	13	28.3	46	100.0

*Mean = 1.3 semester credit hours per program

Administrative Units Offering Required Agricultural Mechanics Courses

As summarized in Table IX, fifty-seven individual administrative units were identified by respondents as those which offer the courses required in the area of Agricultural Mechanics or courses related thereto. Respondents may have identified more than one department as offering courses which would satisfy the agricultural mechanics requirements for their certification program. The largest number of department titles was in the area of Agricultural Engineering and like-names with 26

programs, or 45.6 percent, classified in this category. A total of 18, or 31.6 percent of the departments, having "education" as a part of the departmental title were listed as the source of required agricultural mechanics courses. Four each, or 7.0 percent, of Agriculture and Agricultural and Life Sciences departments were reported as being responsible for providing such coursework. Industrial Technology/Services were identified by two responses, and one each were classified in the areas of Agricultural Services and Development, Natural Resources and Environmental Design, and Plant Science and Mechanized Agriculture.

TABLE IX

TITLES OF ADMINISTRATIVE UNITS OFFERING REQUIRED COURSES IN AGRICULTURAL MECHANICS NEEDED FOR CERTIFICATION

	DISTRIBUTION BY DEPARTMENT OFFERING REQUIRED COURSES	
	N	%
Agricultural Engineering and like-named Departments[1]	26	45.6
Education[2]	18	31.5
Agriculture	4	7.0
Agricultural and Life Sciences	4	7.0
Industrial Technology/Industrial Sciences	2	3.5
Agricultural Services and Development	1	1.8
Natural Resources and Environmental Design	1	1.8
Plant Science and Mechanized Agriculture	1	1.8
TOTAL	57	100.0

1-Education refers to offerings in departments having "education" in their departmental title.
2-Agricultural Engineering and like-named departments reflect those departments whose main emphasis included agricultural engineering and integration of food and fiber systems technology.

Required/Preferred Instructor Qualifications

Table X provides a summary of responses to the minimum criteria required or preferred by agriculture teacher certification programs for instructors of required courses in Agricultural Mechanics or related courses. Seventy-five responses were

garnered in this category. Many programs indicated that they would accept various levels of education for instructors of the required courses, hence the number of indicated responses were more numerous than the identified population of forty-six programs. Respondents were instructed to choose from six listed criteria or identify minimum criteria if not indicated by the list. Almost one-third (32.0%) of the respondents indicated that they preferred or required a terminal degree in Agricultural Education of the instructors of required agricultural mechanics courses. One-fifth required/preferred individuals identified as Agricultural Engineers to teach required agricultural mechanics courses. Instructors with a terminal degree in Agricultural Mechanization were identified by 11 (14.7%) of the respondents. Masters degrees in Agricultural Education and Agricultural Mechanization were preferred or required by eight (10.7%) and five (6.7%), respectively. Four identified the qualifications of the instructor must be at least a Professional Engineer. Finally, there were eight responses identified in the "other" category. They were: Technology Education Doctorate, Senior Instructor, Ph.D. Industrial Technology, Graduate student, Experienced teacher, Engineering College instructor, B.S. in Industrial Technology, and "plus 3 years teaching experience". The Eastern Region did not report any required courses in Agricultural Mechanics hence there is no column representing their total

TABLE X

REQUIRED/ PREFERRED INSTRUCTOR QUALIFICATIONS TO TEACH AGRICULTURAL MECHANICS REQUIRED COURSES

	DISTRIBUTION BY AAAE REGION							
	Central		Southern		Western		Total	
Qualification	N	%	N	%	N	%	N	%
Doctorate-Ag.Ed.	5	6.7	11	14.7	8	10.7	24	32.0
Ag Engineer	6	8.0	4	5.3	5	6.7	15	20.0
Doctorate-Ag.Mech.	3	4.0	6	8.0	2	2.7	11	14.6
Masters.-Ag.Ed.	2	2.7	2	2.7	4	5.3	8	10.7
Masters-Ag.Mech.	2	2.7	1	1.3	2	2.7	5	6.7
Professional Engineer	3	4.0	1	1.3	0	0.0	4	5.3
Other	1	1.3	1	1.3	6	8.0	8	10.7
* TOTAL	22	29.3	26	34.7	27	36.0	75	100.0

Central Topics of Required Agricultural Mechanics Courses.

An area of interest to the researcher was the content covered in required courses in Agricultural Mechanics. In an effort to determine this, each program was requested to send syllabi of their required courses. Such materials were received from 39 of the programs participating in the study. Syllabi from 108 courses were forwarded, obviously indicating that several programs required more than one course. Not surprisingly, the range of topics was quite varied, so much so that the researcher felt presentation of each would result in a rather bulky and less meaningful set of findings.

Therefore, the investigator identified headings under which similar or related topics could be categorized and then sorted the responses. Table XI was developed to present a distribution of central topics contained in the syllabi by AAAE region. As can be seen, the most common topic was General Agricultural Mechanics Skills and was contained in 21 (19.4 %) of the syllabi. Agricultural Mechanics Teaching Methods was the topic appearing in another 18 (16.7 %) of the course outlines provided, while Metals and Welding was a topic included in 15 (13.9%) syllabi. The topics of Agricultural Building and Construction and Agricultural Power and Machinery were each a part of 14 (13.0%) of the courses syllabi. Small Engines, Electricity, Shop Safety, and Introduction to Agricultural Systems were topics contained in 7 (6.5%), 6 (5.6%), 3 (2.7%) and 3 (2.7%) course syllabi respectively. Under a category of Other, some special topics, not applicable to any of the foregoing categories were placed. These included Fundamentals of Agricultural Mechanization, Facilities for Agricultural and Greenhouse Production, Woodworking, Agricultural Computer Applications, Irrigation Water Management, Applications in Urban Agromechanization, and Turf and Landscape Technology. Combined, these topics were a part of seven (6.5%) of the syllabi received.

TABLE XI

CENTRAL TOPICS OF REQUIRED COURSES IN AGRICULTURAL MECHANICS COURSES AS DETERMINED FROM COLLECTED SYLLABI

	DISTRIBUTION BY AAAE REGION							
	Central		Southern		Western		Total	
Central Topic	N	%	N	%	N	%	N	%
General Agricultural Mechanics Skills	5	4.6	7	6.5	9	8.3	21	19.4
Agricultural Mechanics Teaching Methods	5	4.6	6	5.6	7	6.5	18	16.7
Metals and Welding	4	3.7	6	5.6	5	4.6	15	13.9
Agricultural Building and Construction	4	3.7	6	5.6	4	3.7	14	13.0
Agricultural Power and Machinery	3	2.8	5	4.6	6	5.6	14	13.0
Small Engines	3	2.8	2	1.9	2	1.9	7	6.5
Electricity	4	3.7	1	0.9	1	0.9	6	5.6
Shop Safety	1	0.9	1	0.9	1	0.9	3	2.8
Introduction to Agricultural Systems	1	0.9	1	0.9	1	0.9	3	2.8
Other	2	2.8	2	2.8	3	3.7	7	6.5
TOTAL	32	29.6	37	34.3	39	36.1	108	100.0

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The intent of this chapter is to present concise summaries of the following topics: purpose of the study, objectives of the study, design of the study, and major findings of the research. In addition, conclusions and recommendations were formulated based on the analysis of data.

Purpose of the Study

The purpose of this study was to assess the agricultural mechanics course requirements for agriculture teacher certification at selected colleges and universities in the United States.

Objectives of the Study

In order to accomplish the purpose of the study, the following seven objectives were established. The objectives were to:

1) Ascertain the number of newly certified agricultural teachers for the 1994-95 academic year in the study population.
2) Determine the total number of courses required in agricultural mechanics or related courses by those students studying to become agriculture teachers

3) Ascertain the number of credit hours required in agricultural mechanics or related courses by those students studying to become agriculture teachers.

4) Ascertain the number of required credit hours in agricultural mechanics teaching methods courses by those students studying to become agriculture teachers.

5) Develop an inventory of titles of the administrative units offering the agricultural mechanics courses required of students studying to become agriculture teachers.

6) Determine required/preferred minimum qualifications of the instructors of required agricultural mechanics courses in agricultural teacher certification programs.

7) Identify the major topics of required agricultural mechanics or related courses for agriculture teacher certification.

Population

The population for this study consisted of colleges and universities that graduated five or more new agriculture teachers from 1992-94. The colleges and universities were identified according to the report, A National Study of the Supply and Demand For Teachers of Agricultural Education (Camp, 1994 and 1995). A total of fifty-nine individual programs met this criterion for these two years.

Design of the Study

Following a review of literature and research indirectly and/or directly related to the study, procedures were established to satisfy the purpose of the study.

Development of the Instrument

The instrument used for this study contained a total of five items. Respondents were asked to answer three questions and fill in one table on agricultural mechanics course specifications. Question one asked for the number of credit hours in agricultural mechanics which were needed for agriculture teacher certification in the respondent's respective state. The second question asked for the number of credit hours in the area of agricultural mechanics teaching methods which were needed for agriculture teacher certification in the respondent's respective state. The third item was a table which asked for agricultural mechanics course title name, department in which the course was offered, instructor qualification, and credit hours. Courses were separated into two areas identified as required courses and optional courses.
Item four was a question which asked how many new agriculture teachers were certified by their program during the 1994-95 academic year. Item five requested that respondents submit to the researcher the syllabi of all required agricultural mechanics courses.

Data Collection

The data for this study were collected using a questionnaire. Initial questionnaires to determine departmental consent to participate in the study were

distributed to the department heads of the selected agricultural education programs between February 16 and March 23, 1996. These were distributed via electronic mail or facsimile. On March 25, 1996 the survey questionnaires were mailed to the selected agricultural education programs consenting to participate in the study. Included in the mailing were the Agricultural Mechanics Course Requirements for Agriculture Teacher Certification Survey and a cover letter detailing the expectations of this study. The respondents were asked to return the surveys and syllabi to the researcher at Oklahoma State University by April 19, 1996. Forty-six of the 59 programs, or 78.0 percent, responded to the survey. Attempts were made to contact the final non-respondents, but no additional response was forthcoming from this group. Figure 1 was developed to provide a summary, by AAAE region, of the number of programs responding to the survey as compared to the number of total number of programs which were mailed the survey. The majority of the participants in the study were from three of the four AAAE regions. The Southern region was the most represented of the four regions (40 percent), while the Eastern region had the least number of representatives (4 percent). The balance of the participants were evenly distributed between the Central and Western regions (28 percent and 28 percent). A graphical portrayal of this distribution is offered as Figure 2.

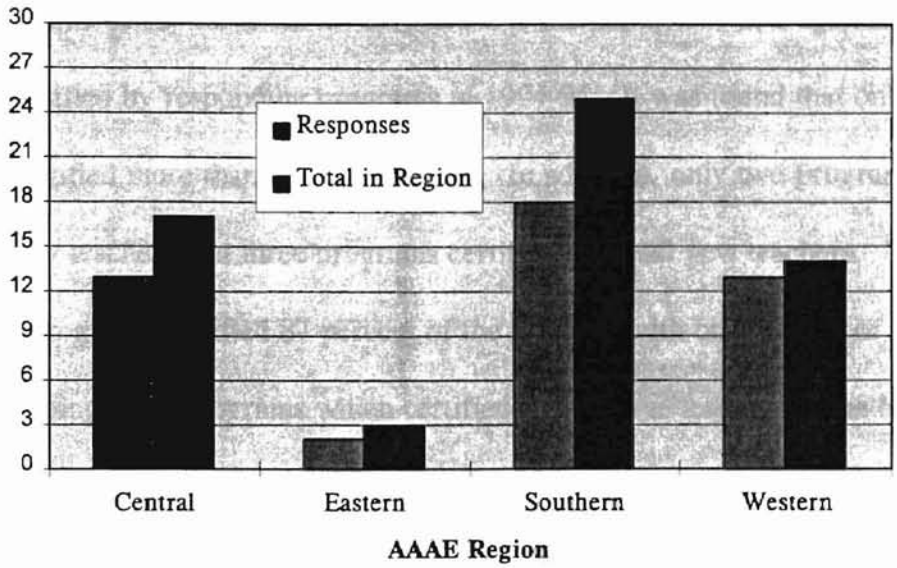

Figure 1. Comparison of Responding Programs to AAAE Region Totals.

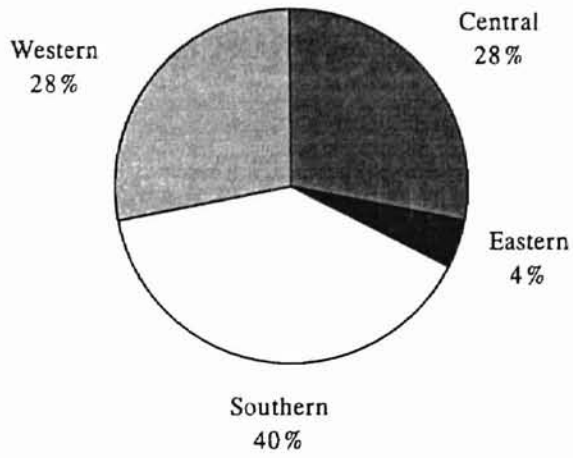

Figure 2. Programs Participating in the Study by AAAE Region

Major Findings of the Study

Figure 3 was developed to summarize selected demographics of the participating programs. One of the variables investigated was the number of new agriculture teachers certified by responding programs in 1994-95. It was found that only one program certified more than 26 new teachers. In addition, only two programs certified 21 to 25 new teachers and three programs certified 16 to 20 new teachers. The remaining programs certified 87 percent of the teachers with one-quarter of these teachers coming from programs which certified zero to five teachers. The balance of the new teachers came from programs which certified from six to 15 new teachers. The mean number of new teachers certified per responding program was 9.5.

The number of courses required in agricultural mechanics was also studied. This number ranged from no required courses in three programs to as many as six or more courses in six programs, with a mean of 2.8 courses per program. Almost two-thirds of the programs surveyed (65.2%) required between two and four separate courses.

Similarly, the number of semester credit hours required in agricultural mechanics was determined. These ranged from two programs which required between zero to 2.5 credit hours, to two programs which required between 14.6 to 17.5 credit hours. Almost 35 percent (34.7) of the programs surveyed reported requiring 2.6 to 5.5 credit hours, while the final 47.8 percent required 5.6 to 11.5 semester credit hours

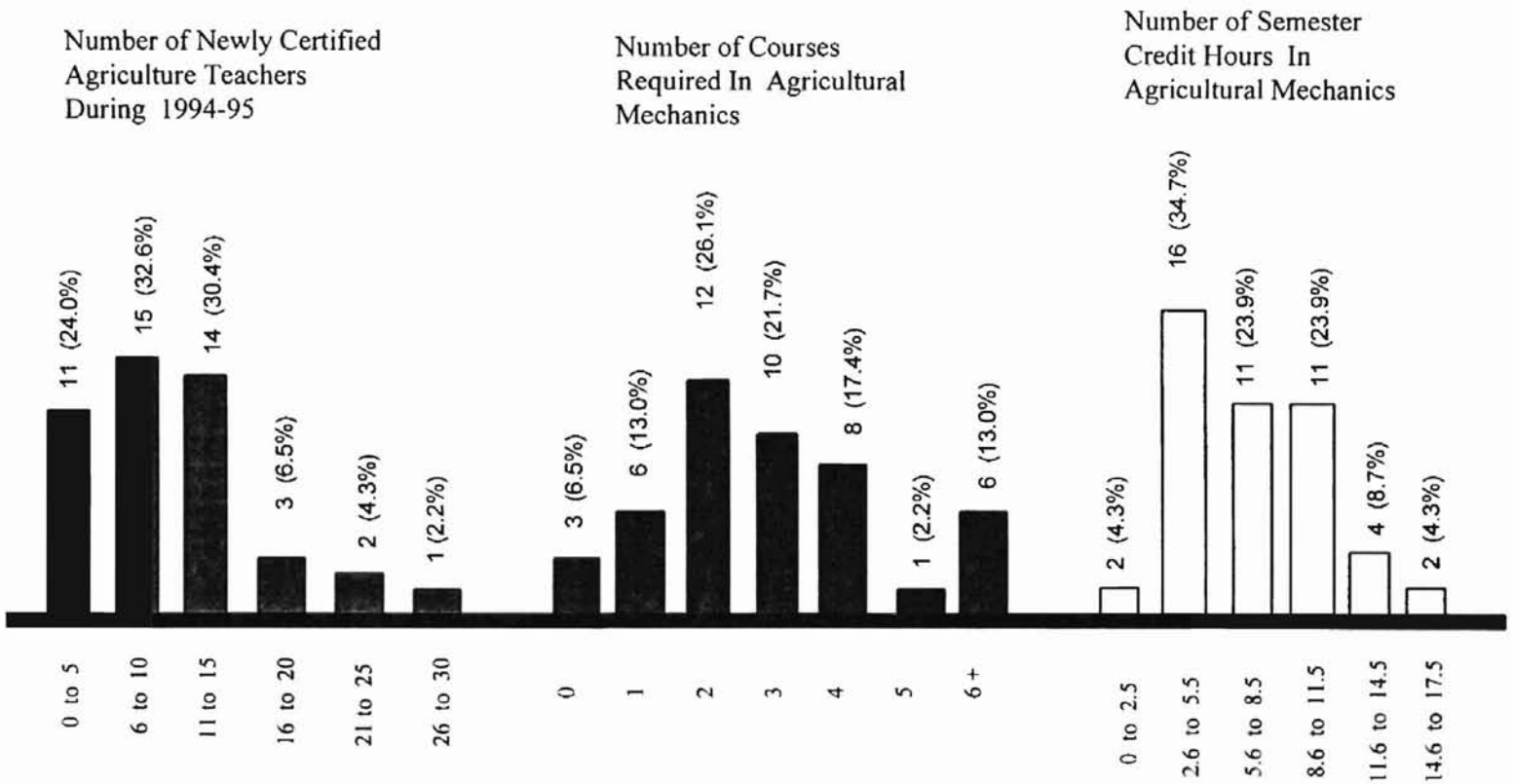

Figure 3. A Summary of Selected Agricultural Teacher Education Program Demographics

in the subject matter of this kind. The mean number of required credit hours per program was 6.7.

Figure 4 was constructed to graphically demonstrate the semester credit hours required in methods of teaching agricultural mechanics and the required/preferred instructor qualifications to teach agricultural mechanics required courses. It was learned that one-half (50%) of the surveyed programs required no credit hours in agricultural mechanics teaching methods courses. Nearly 20 percent (19.4) required from 2 to 2.9 credit hours. Three programs each required from 1 to 1.9 and 4 to 4.9 respectively. Six programs required 3 to 3.9 while the remaining required greater than six credits. The average number per program was determined to be 1.3 credit hours.

Almost one-quarter of the programs indicated that they required/preferred an instructor to have a terminal degree in agricultural education in order to teach required agricultural mechanics courses. A total of 75 responses were received indicating more than one response from some programs. One-fifth of the responses received suggested the required/preferred qualification was that instructors be agricultural engineers. A little over 10 percent of the responses identified a masters degree in agricultural education as a requirement/preference, while almost 15 percent indicated a doctorate in agricultural mechanics as the minimum. A masters degree in agricultural mechanics was identified in 6.7 percent of the responses, and professional engineers were acceptable according to 5.3 percent. The remaining 10.7 percent of the responses were for singularly different instructor qualifications ranging from graduate student status to doctorates in similar technological fields.

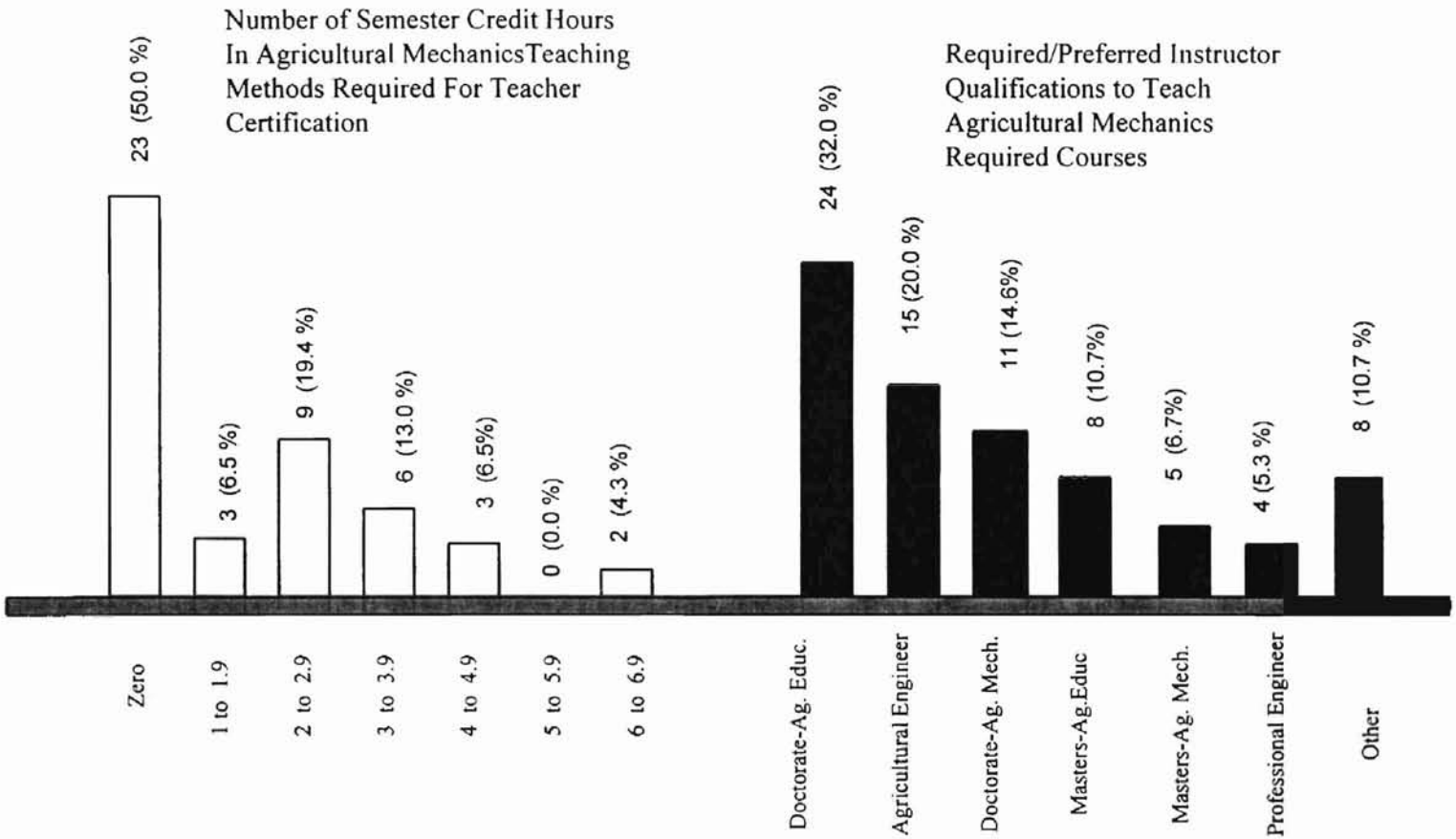

Figure 4. A Summary of Semester Hours of Required Agricultural Mechanics Methods Courses and Required/Preferred Instructor Qualifications

Figure 5 was developed to provide a diagrammatic summarization of the titles of administrative units offering required courses in agricultural mechanics needed for certification. Nearly 32 percent of the administrative units identified by the responding programs contained "education" in the title. Almost 37 percent (36.8) of the titles were identified by "agricultural engineering" either in part or wholly in the title.

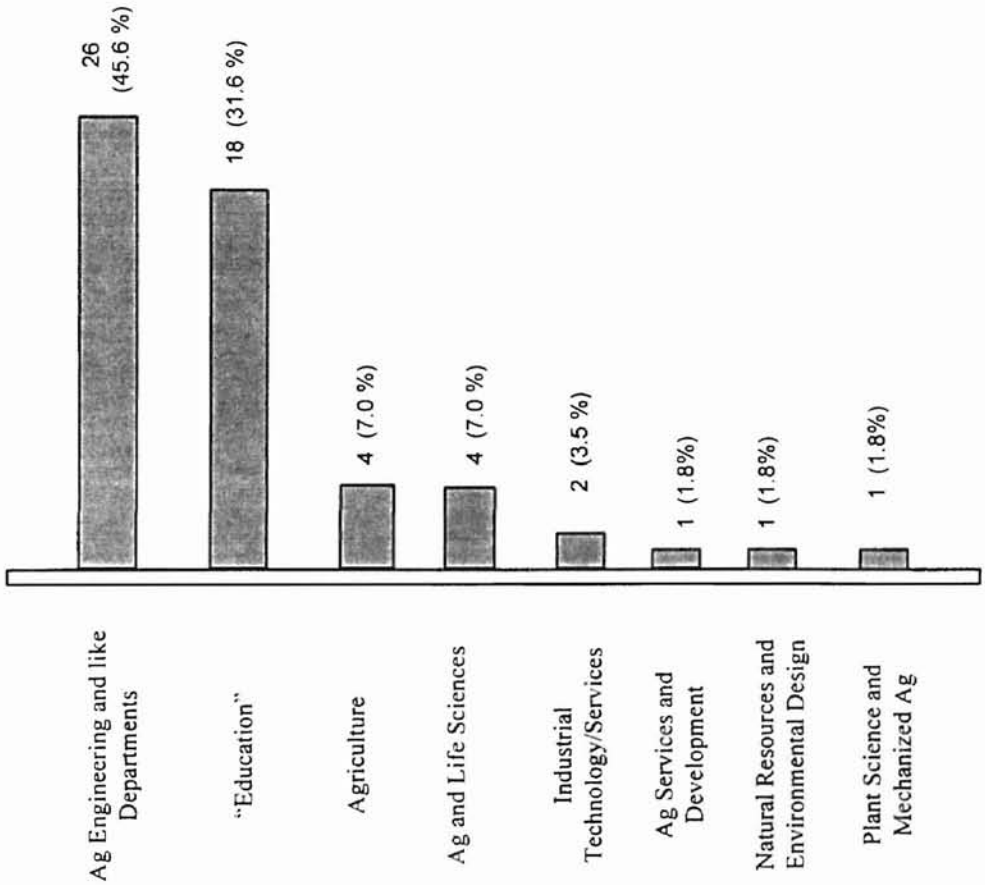

Figure 5. A Summary of Titles of Administrative Units Offering Required Courses in Agricultural Mechanics Needed for Certification

Figure 6 was fabricated to provide a summary of central topics of required courses in agricultural mechanics courses as determined from collected syllabi. Almost

one-fifth of the central topics were in the conglomerate field of General Agricultural Mechanics Skills. There was no singular topic covered in the course, but rather a broad overview of general skills in agricultural mechanics. From the remainder of the syllabi, 16.7 percent of the topics were identified with the area of Agricultural Mechanics Teaching Methods and another 13.9 percent were in the category of Metals and Welding. The topic categories of Agricultural Building and Construction and Agricultural Power and Machinery each were contained in 13.0 percent of the syllabi. Small Engines and Electricity were relatively evenly split appearing in 12.1 percent of the collected syllabi, while Shop Safety and Introduction to Agricultural Systems were equally divided 5.6 percent. The category "other" was made up of six topics. These included Computer Applications, Facilities for Agricultural and Greenhouse Production and Woodworking to Fundamentals of Agricultural Mechanization, Irrigation Water Management, and Applications in Urban Agromechanization.

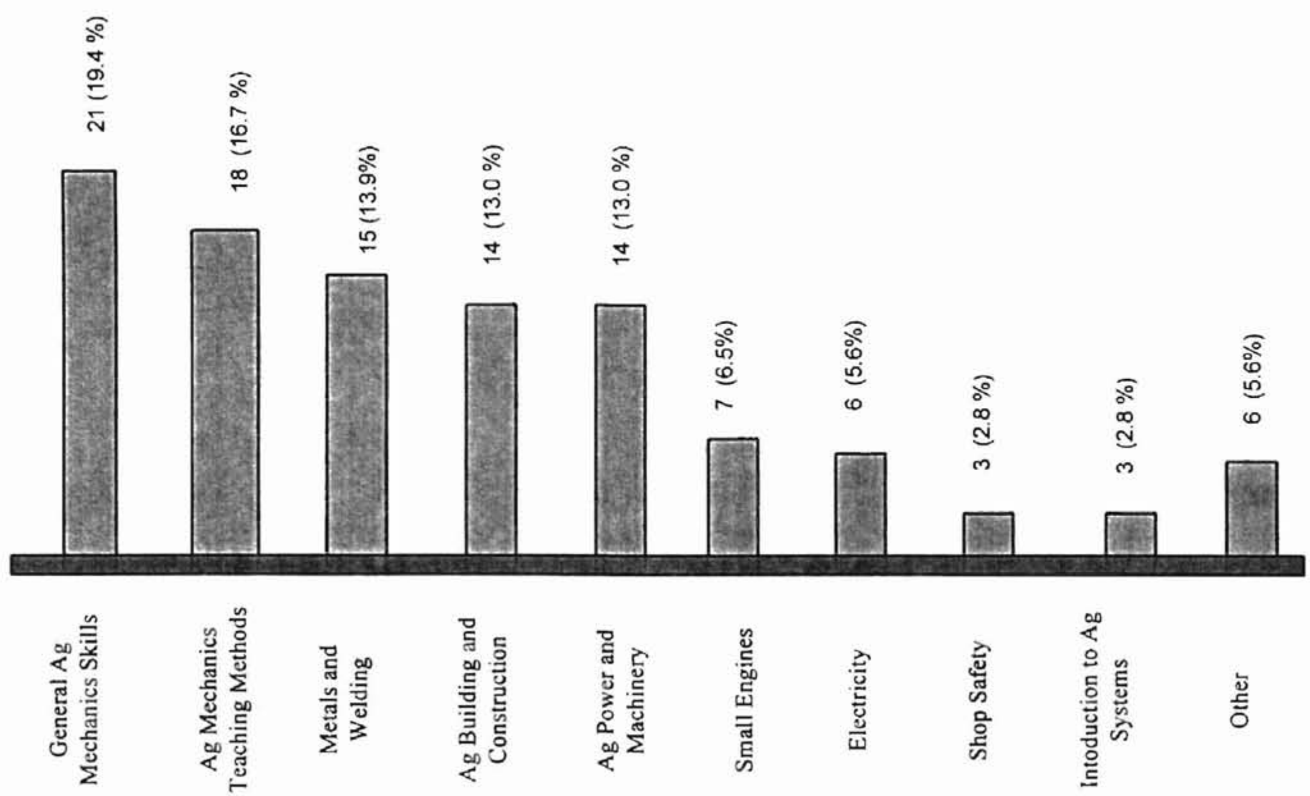

Figure 6. A Summary of Central Topics of Required Courses in Agricultural Mechanics as Determined From Collected Syllabi.

When the variables studied were consolidated to form what might be called a "typical" responding agriculture teacher education program, several characteristics can be highlighted. Overall, it was found that in the area of agricultural mechanics 2.8 classes were required on average. A mean of 6.7 semester credit hours in agricultural mechanics were required with 1.3 semester credit hours being required in teaching methods of agricultural mechanics. One-half of the programs required no teaching methods coursework. The majority of programs required/preferred instructors of agricultural mechanics courses to possess either a doctorate in agricultural education or to be an agricultural engineer. It was also found that most of the central topics covered in these required courses were of traditional agricultural mechanics subject matter, did not reflect progressive agricultural advancements, and there was no identifiable core of knowledge being taught in agricultural mechanics. Finally, it appears that most required agricultural mechanics courses were being taught by departments which have an agricultural engineering or like emphasis, in conjunction with agricultural education departments.

Conclusions

The analysis of data and the subsequent findings were the basis of the following conclusions.

1. The number of newly certified agriculture teachers from the participating programs did not change substantially from 1992-94 to 1994-95. The vast majority of

the newly certified teachers are being prepared by relatively small teacher education programs (those having 15 or fewer graduates each year).

2. Agricultural mechanics preparation continues to be an integral component of agriculture teacher education programs. The emphasis appears, however, to be in establishing within these prospective teachers a technical base of traditional agricultural mechanics skills. There appears to be a less than adequate emphasis on the methods used to teach the subject matter as compared to background knowledge even though agricultural education departments provide the instruction in this subject matter.

3. The material presented in the agricultural mechanics courses required for teacher certification still reflect traditional agricultural mechanics subject matter with a minimal number of instances of expanding beyond these realms.

4. Not surprisingly, most typical agriculture teacher education programs utilize instructors who have substantial knowledge in the areas of agricultural education and agricultural mechanics to teach required agricultural mechanics courses. The departments in which these instructors teach reflect the changes in agriculture as evidenced by the integrated titles of these departments.

Recommendations

As a result of the conclusions drawn from the analysis and interpretation of data, the following recommendations are made.

1. Agricultural mechanics will continue as an integral component in secondary agricultural education programs. Teacher education programs should increase the emphasis on teaching methods of agricultural mechanics to better prepare its students for their impending employment as agriculture teachers.

2. The technical knowledge and skills learned in other required agricultural mechanics courses should reflect the current status of the agricultural industry. Traditional skills and technical knowledge courses should remain a segment of the agricultural mechanics requirements, but not the emphasis.

3. Required preparatory courses in agricultural mechanics need to address current technology and skill areas as reflected by the changing agricultural industry.

4. Administrative units should continue to integrate and update the content of their curricula as is currently reflected by department titles throughout universities.

5. It is recommended to develop curriculum to serve as a basis for effecting improvements in current agricultural mechanics courses.

6. It is recommended that further study be done to determine if agriculture teacher education programs are addressing the major findings of this study and whether change is occurring.

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APPENDICES

APPENDIX A

SURVEY INSTRUMENT

Agricultural Mechanization Course Requirements for Agriculture Teacher Certification Survey

For Oklahoma State University---Confidential

University Name_____ Name of Respondent_____

1. How many total hours of agricultural mechanization courses are required for teacher certification in your state? Semester [ ] Quarter [ ]

2. How many total hours of agricultural mechanization teaching methods courses are required for teacher certification in your state? Semester [ ] Quarter [ ]

3. Please list all courses offered to students which enable completion of the agricultural mechanization requirements for teacher certification in your program.

Course Title Required Courses	Department Offering Course	Instructor Qualification (See key below)	Credit Hours Semester	 Quarter
Example: Teaching Methods in Agricultural Mechanics	*Biosystems & Agr Engineering*	*3*	*3*	
Optional Courses (use back of survey form if additional lines or spaces are needed)	XXXXXXXXXXX	XXXXX	XXXXX	XXXXX

(1= Agricultural Engineer, 2=Professional Engineer, 3=Doctorate-Ag Education, 4=Doctorate-Ag Mechanization, 5=Masters-Ag Education, 6=Masters-Ag Mechanization, 7=other, please specify _____)

4. Please indicate the number of new agriculture teachers which were certified through your program in the 1994-1995 academic year. [ ]

5. Using the enclosed, self-addressed envelope please send a copy of the course syllabi for all **required** agricultural mechanization courses listed above to:

Dan Hubert
Department of Ag Education,
Communications, and 4-H
448 Ag Hall
Oklahoma State University
Stillwater, OK 74078-6031

If you have any questions, feel free to call at 405-744-7093, (message 405-744-5129) or email me at hubert@agen.okstate.edu

APPENDIX B

INSTITUTIONAL REVIEW BOARD APPROVAL

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
HUMAN SUBJECTS REVIEW

Date: 03-11-96 **IRB#:** AG-96-020

Proposal Title: AN ASSESSMENT OF AGRICULTURAL MECHANICS COURSE REQUIREMENTS IN AGRICULTURE TEACHER EDUCATION PROGRAMS IN THE UNITED STATES

Principal Investigator(s): Daniel J. Hubert, Robert Terry

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

ALL APPROVALS MAY BE SUBJECT TO REVIEW BY FULL INSTITUTIONAL REVIEW BOARD AT NEXT MEETING.
APPROVAL STATUS PERIOD VALID FOR ONE CALENDAR YEAR AFTER WHICH A CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE SUBMITTED FOR BOARD APPROVAL.
ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO BE SUBMITTED FOR APPROVAL.

Comments, Modifications/Conditions for Approval or Reasons for Deferral or Disapproval are as follows:

Signature: John H. Wyatt

Chair of Institutional Review Board

Date: March 18, 1996

VITA

Daniel James Hubert

Candidate for the Degree of

Master of Science

Thesis: AN ASSESSMENT OF AGRICULTURAL MECHANICS COURSE REQUIREMENTS IN AGRICULTURE TEACHER EDUCATION PROGRAMS IN THE UNITED STATES

Major Field: Agricultural Education

Biographical:

Personal Data: Born in Neenah, Wisconsin, December 5, 1963

Education: Graduated from Grace M. Davis High School, Modesto, California, in June, 1982; attended Modesto Junior College two years; received Bachelor of Science degree from the University of California at Davis, March, 1988; completed requirements for the Master of Science degree from Oklahoma State University in July, 1996.

Professional Experience: Graduate Research Assistant, Univerisity of California at Davis, 1991-92; Agriculture Teacher, Galt, California, 1993; Agriculture Teacher, Atwater, California, 1993-94; Science, Math, and Computer Teacher, San Andreas, California, 1994-95; Graduate Teaching Assistant, Oklahoma State University, 1995-96.