DOCUMENT RESUME

ED 116 043 CE 005 962

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TITLE Competency Commonalities and Accompanying Job Titles Derived from the Six Montana Agricultural Manpower Studies.
INSTITUTION Montana State Univ., Bozeman. Montana Agricultural Experiment Station.
SPONS AGENCY Montana State Dept. of Public Instruction, Helena. Div. of Vocational and Occupational Skills.
PUB DATE Jun 75
NOTE 187p.; For the Manpower Project Manuals and Reports, see ED 069 872-875; For the Competency Studies, see ED 086 809-810, ED 090 422-423, and ED 103 654-655

EDRS PRICE MF-$0.76 HC-$9.51 Plus Postage
DESCRIPTORS Agribusiness; *Agricultural Occupations; Agricultural Production; *Agricultural Skills; Curriculum Development; Data Analysis; *Job Analysis; Job Skills; *Occupational Surveys; Research Projects; *Tables (Data)
IDENTIFIERS *Competency Identification; Montana

ABSTRACT

The report provides essential information for curriculum development relevant to manpower demands for agricultural production and agribusiness in Montana. It focuses on an analysis of 3,500 competency statements to determine the existence of duplication, commonalities, and uniqueness among 76 identified job titles derived from six Agricultural Manpower Project Competency Studies. The study was conducted by developing a manipulative method for handling the competency statements, establishment of common cores and sub-cores, a review and revision of competency groupings, and documentation of the taxonomy. The eight subject matter cores include animal science, plant science, mechanics, clerical, leadership, business management and marketing, merchandising, and miscellaneous. The data are analyzed in two sets of tables: the first series of six tables documents the unique competencies appearing for the job titles covered in the six studies, and the second series of eight tables documents the competencies according to the eight major cores and corresponding sub-cores to relate commonalities. Conclusions and recommendations based on the data are presented. A bibliography is included. Competency numbers and related job titles listed by study are appended. (Author/EC)

Competency Commonalities and Accompanying Job Titles

Derived from the Six Montana Agricultural Manpower Studies

PUBLISHED BY DOLORES COLBURG
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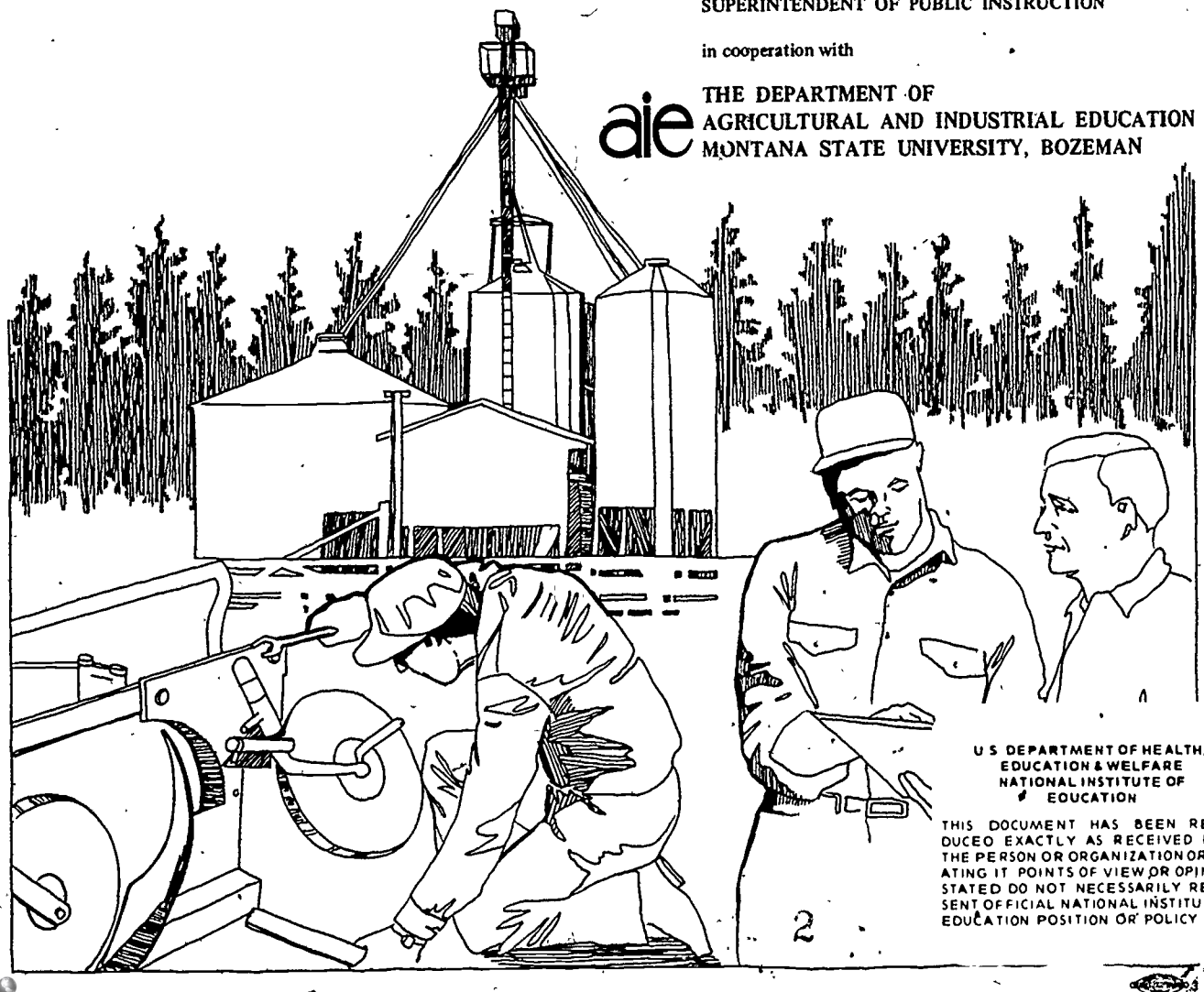
in cooperation with

aie THE DEPARTMENT OF
AGRICULTURAL AND INDUSTRIAL EDUCATION
MONTANA STATE UNIVERSITY, BOZEMAN



COMPETENCY COMMONALITIES AND ACCOMPANYING JOB TITLES DERIVED FROM THE SIX MONTANA AGRICULTURAL MANPOWER STUDIES

by

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The work presented herein was performed by the Montana Agricultural Experiment Station and Supported by the Office of the Superintendent of Public Instruction, Vocational and Occupational Skills Component

The Montana State University
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Room 126, Creative Arts Complex, Building 2
Bozeman, Montana
June, 1975

PREFACE

In the spring of 1970, a statewide study to determine the nature and extent of rural youth and adult education and employment opportunities in agri-business and agricultural production was undertaken by the Department of Agricultural and Industrial Education.

Two of the five phases of the study have been completed. The results of these studies appear in the following ten reports available from the Office of the Superintendent of Public Instruction, Helena, Montana, 59601 and on microfiche in the library reference source, Educational Resource Information Center (ERIC):

PHASE I - 1970-1971 (To assess current and projected manpower needs in agri-business and agricultural production).

(ED 069 874) - Ag-Business Manpower Project Manual
(ED 069 872) - Ag-Business Manpower Project Report
(ED 069 875) - Agricultural Producers' Manpower Project Manual
(ED 069 873) - Agricultural Production Manpower Report

PHASE II - 1972-1973 (To determine the knowledge, skills and attitudes needed by potential employees in order to qualify for available jobs in agriculture).

(ED 086 809) - A Study to Determine Competencies Needed by Employees Entering Agricultural Supplies and Services Occupations
(ED 086 810) - A Study to Determine Competencies Needed by Employees Entering the Grain, Feed and Seed Business
(ED 090 422) - A Study to Determine Competencies Needed by Employees Entering Agricultural Production Occupations
(ED 090 423) - A Study to Determine Competencies Needed by Employees Entering Agricultural Mechanics Occupations

[The above reports are also available on interlibrary loan from the Creative Arts Library of Montana State University.]

PHASE II - EXTENDED 1973-1974

*(CE 003 258) - A Study to Determine Competencies Needed in Selected Job Titles in Agricultural Products Occupations

*(CE 003 259) - A Study to Determine Competencies Needed in Selected Job Titles in Agricultural Resources Occupations

In the fall of 1974, an agreement was reached between the Department of Agricultural and Industrial Education and the project supervisors from the Office of the Superintendent of Public Instruction to continue the research into Phase III. The continuation would be to analyze the previously identified competencies to determine if competency commonalities exist across the various studies. This investigation would then produce documentation of competency commonalities and uniqueness which would enhance the work of curriculum planners - the next phase in the completion of the five phases of the Agricultural Manpower Project.

This report is a compilation of common and unique competencies and a taxonomy of cores and sub-cores. A section on research methodology is also included. Such documentation is in keeping with the major objective of the overall study - to provide essential information for curriculum development relevant to manpower demands for agricultural production and agri-business in Montana.

* ED numbers will be assigned in the August, 1975 ERIC Reference Index.

ACKNOWLEDGEMENTS

The research of the Montana Agricultural Manpower Project has been assisted and encouraged by many persons over the past four years. We have expressed our appreciation to these individuals and agencies in each of the six competency studies and the initial surveys.

The present study's progress and results were enhanced by the efforts of Mr. Ben Ulmer, Director of Vocational and Occupational Skills; Dr. Vernon Luft, Supervisor of Agricultural Education; Mesrs. Joe Gipe of Eddys Bakery, Frank Youngheim of Sweetheart Bakery, Dick Schillinger of Darigold Creamery, Clarence Petaja of Sweetgrass Creamery, Kendall Pfeiffer and Mel Sinclair of the Soil Conservation Service, Bernard Lea of the Peavey Company and Dr. B. R. "Pete" Moss, Dairy Specialist of the Animal and Range Science Department who kindly responded to our request to determine unique competencies.

Others serving as consultants were Dr. Ray Gould of the University of Montana and Dr. Ed Morison of the Center for Vocational Education of Ohio State University.

Dr. Ervin Smith, Dr. Ken Tiahrt, Mr. Chuck Shaffer, Dr. Paul Willis and staff members of the Montana State University Library and Computing Center also participated in this effort.

To all of these people who served in various capacities, we are indeed grateful.

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SUMMARY

Purpose and Objectives

The primary purpose of the study was to arrange 3,500 competency statements derived from the six Agricultural Manpower Project Competency Studies into groups to determine duplications, commonalities and uniqueness among the 76 job titles identified. This phase of the research process is a continuation of the Montana Agricultural Manpower Project, a five-year, five-phased manpower research effort which commenced in 1970.

The major objective was to prepare and publish this information to facilitate its use by curriculum planners.

Methods and Procedure

Competency statements were placed on cards for sorting. Those competencies considered unique to a job title were removed. Those competencies remaining were then sorted into eight subject matter cores: Animal Science, Plant Science, Mechanics, Clerical, Leadership, Business Management and Marketing, Merchandising and Miscellaneous. The competencies were further divided into sub-cores under the above adopted taxonomy.

Major Findings

A series of competency-based core courses can be developed which will enable vocational educators to prepare future employees for a cluster of agribusiness occupations. Increased emphasis should be placed on the use of cooperative vocational education to prepare employees for unique competencies important to a very limited number of job titles. Additional emphasis should be placed on developing within students an understanding of basic economic

principles as they apply to the management of agri-business firms. The competencies required of employees in the several areas of agri-business depend, to a degree, upon the size of the business. All students should be informed about the various forms of business organization. Adequately trained employees for agricultural job titles will need an articulated training program which includes high school, post-high school and university training. These programs will vary in length.

Affective behaviors in leadership and human relation skills should be emphasized and be included as an integral part of all agri-business training programs.

An understanding of the principles of agricultural production would be beneficial to employees entering agri-business educational programs. This knowledge could be acquired through practical agricultural experience or through an agricultural production core program. An educational core program in selling and salesmanship (merchandising) could also be developed which would be appropriate for agri-business job titles requiring such competencies.

RECOMMENDATIONS FOR FUTURE CURRICULUM DEVELOPMENT

1. Future curriculum development activities should evolve around the core concept with the development instructional units based on identified competencies. These units should be developed so they may be used singly or as a part of an extensive course.

2. Performance objectives for curriculum material should be based upon competencies identified.

3. Curriculum conferences should be held which involve high school, post-secondary and university personnel to develop an articulated agricultural educational training program for Montana.

CHAPTER I

INTRODUCTION

The changes in the social and economic fabric of rural America and Montana are irreversible. The same changes giving us greatly increased production and improved levels of living have created very difficult adjustment problems for many rural families and rural communities.[15] The tremendous and incredible social changes occurring in this country have an impact on our schools far beyond that affecting any other institution.[18]

The U.S. educational system is perhaps history's greatest social achievement.[19] The facts supporting this statement are: the growth of all levels of education to the point where nearly one third of the entire population is now involved in education full time; dramatically enhanced opportunities in higher education existing for the poor; and steadily rising academic standards at all levels of instruction. From September to June, five days a week, 45 million American youngsters from every conceivable set of environmental circumstances, with varying abilities and ambitions, with all the problems and potential of humanity itself, march to the open doors of public elementary and secondary schools of the U.S. An overwhelming majority leave those buildings with minds and spirits enriched, social and cultural appetites stimulated and the capacity for further knowledge and human service greatly increased.[19]

In spite of these achievements, we have made it difficult for our youth to prepare themselves for jobs and careers and have hampered their ability to enter the job market. The problem in the youth labor market is not in the

number of jobs available but the fact that in the world of work, we have stacked the cards against our young people by not teaching them the necessary skills to be employable. The comment has been made with considerable accuracy that we have academically prepared our youth to go to college but not to go to work.

Agriculture is Montana's number one income producing industry.[20] Obviously, employment in agriculture and related industries is where the majority of job opportunities exist. In rural areas, employment in agriculture, forests, mines and fisheries is declining faster than new jobs are being created by construction, manufacturing and service industries. The seasonal nature of farmwork intensifies the problem. Not only is unemployment in agriculture about twice the national average of non-agricultural industries, but the monthly employment rate fluctuates sharply. In the entire agricultural employment picture we find a pattern of irregular employment, low wages and poor working conditions.[15] The present national economic situation and low marketing prices for agricultural products augments the plight of the rural resident, be he owner/operator or hired hand. The dilemma of many rural persons in Montana is characterized by their lack of access to respected positions and the lack of power to do anything about their situation. The need for advanced training in many areas is critical in qualifying a person for entry into the present day world of work in a highly technical society.

The findings of the Montana Agricultural Manpower Project in the six areas, substantiate these employment facts and support the need for adequate training programs. A primary objective of the Agricultural Manpower Project has been to obtain the data necessary for the creation of relevant educational programs in vocational education indigenous to the state of Montana and its job opportunities. This objective has been accomplished. We now have the

information to enhance teacher accountability and to serve those being educated for the unique job market in Montana. This will require the implementation of the research data into programs and the eventual institution of these programs in the vocational education departments of Montana's secondary schools.

RATIONALE FOR THE STUDY

In the summer of 1974, a symposium of vocational agriculture teachers was organized to use the data of existing manpower studies in an effort to revise the present state curriculum guide for vocational agriculture. The participants found that the material as published was not comprehensive enough to facilitate a comparison of various job titles and related competencies. In reality, there was more information than could be assimilated. It was suggested that the next step in the research process be accomplished to arrange the identified competencies from all of the studies into common cores and sub-cores. This would direct attention to the feasibility of establishing programs in which there is overlap or commonality between identified job titles.

Thus the objective for this phase of the study was to analyze the previously identified competencies to determine if competency commonalities exist between identified job titles across the various Montana Agricultural Manpower Project Studies. The areas covered in these studies were: agricultural production, agricultural mechanics, the grain, feed and seed business, agricultural supplies and services, agricultural products and agricultural resources. All competencies were considered with the exception of those for Federal Food Inspector (Ag. Resources). These were omitted because of their relative uniqueness and the extreme detail in which competencies were defined.

This study was conducted by the Department of Agricultural and Industrial Education as part of an overall research effort to obtain a comprehensive analysis of agricultural occupations in Montana and to provide the documen-

tation necessary to assist curriculum planners in designing relevant and realistic programs of vocational education. In addition, a specific extension of the study objective was the development of a relevant agricultural manpower research model.

ASSUMPTIONS

The following assumptions were generally accepted by the researchers at the beginning of the study: (1) that there were common areas of knowledge, skills and attitudes across the various job titles included in the Montana Agricultural Manpower Project Studies; (2) these common areas could be identified; (3) competencies could be analyzed as to their uniqueness to a particular job title; (4) competencies could be analyzed as to their similarity; (5) a heirarchy of necessary knowledge and skills, and teaching levels could be revealed; (6) there would evolve a series of cores of competencies with accompanying sub-cores; (7) there would evolve a cluster of job titles accompanying the identified competency cores; (8) this research could be accomplished by a computer retrieval system or subjective analysis and judgement; (9) such analysis would yield a summary of competencies that could be documented to assist curriculum planners.

DEFINITION OF TERMS

A Unique Competency - a competency considered unique to an identified job title having the following characteristics:

a. The task is not done by any other person in the same context or with the same device or instrument.

b. It comprises knowledge or skills solely related to a particular job title.

c. It is generally a highly specialized skill or knowledge that may require experience or advanced training.

A Common Competency - is one that is similar to or shared by two or more job titles. (In some instances - i.e., management positions - the skill or knowledge can be implied.)

Core - a grouping of competencies by broadly designated subject matter area consisting of subject matter content in the following areas: Animal Science, Plant Science, Mechanics, Clerical, Leadership, Business Management and Marketing, Merchandising and Miscellaneous.

Sub-core - a further break-out of competencies by subject matter area within the core. Example: the core, Animal Science, was broken out into the following sub-cores; breeding, nutrition, animal care and handling, identification and disease control.

Animal Science - skills in and knowledge of the production of animals and animal products.[14]

Plant Science - skills in and knowledge of the production of plants and the products derived from plants.[14]

Agricultural Mechanics - knowledge of the power, machinery, tools, equipment, structures and conveniences utilized in the production of animals, plants and their products and skills in soil and water management for agricultural production or conservation.[14]

Agricultural Business Management - decision making skills in and knowledge of production efficiency and resource analysis, accounting, financing, labor and other business management factors applied to agricultural production and agricultural industries' operations.[14]

Merchandising - knowledge of and skills in the production, processing, distribution and use of consumable supplies used in the production of animals, plants and their products; and the provision of services associated with the selling and distribution of such supplies; additional skills are in the inspection, sorting, grading and storing of and knowledge of agricultural products in their original state of production and primary by-products; also skills in the marketing of agricultural products in their original state of production and primary by-products; also skills in the marketing of agricultural products and primary by-products when combined with other agricultural competencies for operations such as purchasing and marketing.[14]

Clerical - knowledge of and skills in the running of an office such as filing, typing and the use of office machines; the writing of reports, letters and record keeping of various types.

Leadership - affective concepts of relationships with co-workers, customers and management, personal attributes, abilities and experiences.

No Significant Training Required - rudimentary tasks requiring limited training or experience, generally characterized by short on-the-job training.

REVIEW OF LITERATURE

Because a review of literature appears in each of the Agricultural Manpower Competency Studies the literature reviewed herein is concerned with grouping commonalities. Dr. Max L. Amberson, a Project Director traveled to Ohio State University to consult with personnel there experienced in creating taxonomies and analyzing human task behavior. At the National Center for Vocational Technical Education he located a collection of studies on microfiche in which taxonomies had been developed and attempts to analyze human tasks were documented. These AD prefexes appearing in the Bibliography are a private collection belonging to the National Center Library at the Ohio State University.

Additional literature reviewed but not cited in the following narrative appears at the end of the Bibliography.

Review of Literature Related to Taxonomies and Task Analysis

Fleishman and Stephenson (1970) conducted a study to enhance personnel decisions in which some basic points about how to develop a taxonomy were included. They suggested that the following considerations be made:

1). Careful thinking about one's purpose in developing a taxonomy before starting. a) Who is going to use it? b) What outcome are you trying to predict? c) In which predictions are you interested? d) What is the size of the human performance unit you are trying to describe?

2). Confining attention to specific subject matter areas in which one has expertise.

3). Begin by thinking about user-oriented evaluative systems.

4). Not concerning one's self with relationship to extraneous taxonomic systems at the outset.

5). Using existing data to revise and improve the capability of the taxonomy to perform the function for which it was intended.

6). Being alert to theoretical development as well as to procedure. a) Need is not for a thesaurus of terms but for a way of organizing information in terms of theoretically-based languages of descriptors. b) Standardization of procedures is important.

7). Orienting one's long-range plans toward computerized retrieval of information.

8). Giving one's work on taxonomies a high priority.[11]

Farina's study (1969) was examined in which he reviewed tasks analysis approaches used by R.B. Miller, Gagne', Foley, Berliner and McCormick. Farina pointed out the factors which hampered available schemes for analyzing human task behavior. He cited the following factors: (1) imprecise terms; (2) little measurement of capability; (3) lack of development of the scheme to a point where it may be applied readily to real world tasks. Farina continued by commenting that "tasks per se are more appropriately described in terms of non-behavioral task characteristics."[10] He suggested that the five basic steps identifying the elements of the scheme are: Stimuli, Response, Feedback, Indicators and Controls.

R.B. Miller declared, "Tasks analysis in its loosest form is a generic label referring to a group of analytic activities which take place in a systems development context. Items are generally linked to one or more of the following topics: Human Behavior, Performance, Equipment and Work Place (environment)."[10] Miller continued by explaining that "task analysis is a data handling system for human factors and should be concerned with utility and validity; it is a process, not a product."[10] Miller adequately stated

the difference between task description and task analysis as follows: "Task description process produces a detailed picture of what physically occurs. Task analysis attempts to abstract behavioral implications from this physical description."[10]

"The conceptualization of human functions basic to sensing, identification and interpretation is the practice of task analysis"[10] as stated by Gagne'. "This (conceptualization) was done to assess man's and machine functions in relation to system goals", he further commented. Gagne' continued by defining functions "as being transformations which the human being performs upon inputs to produce outputs."[10]

Continuing in the Farina (1969) study, Foley analyzes tasks as being concerned with: (1) procedure following; (2) continuous perceptual activity; (3) monitoring; (4) communicating and (5) decision making and problem solving.[10]

Berliner's research presented a process that could have been adapted to the needs of the present research effort if the researcher had been interested in <u>how</u> employees were processing or performing behaviors. Berliner analyzed task description as, "approaching a focus on the efficient production or construction of jobs, while job analysis and classifications' approaches emphasize their maintenance and upkeep."[10] McCormick established dimensions of job performance. McCormick stated, "There is structure and order within the domain of human work - that dimensions of that structure can be identified; individual jobs can be characterized in terms of such dimensions - for each dimension there are underlying requirements of human attributes that would be required for successful performance on the job dimensions."[10]

McCormick continued by articulating that jobs are described in terms of human behavior involved rather than describing them by reference to technological activities (drilling, welding, cutting, etc.). To these human

behaviors McCormick has added the categories of situational and environmental variables. The informational processing model used by McCormick in structuring his approach contained the following categories: (1) information receiving; (2) information processing; (3) decision making and (4) actions (physical or communicative).[10]

A concluding definition of task in Farina's research described a task as being a construct - an arbitrary way of conceptualizing a complex man-machine action. Our ultimate concern in classifying tasks is that knowledge of them will allow us to be more efficient in preparing human beings to perform them.[10] This was a point relative to our present objective since competencies identified were to contribute towards developing curriculum.

All of the theories reviewed in the Farina study were qualitative approaches. There is now a trend to quantitative approaches or descriptions based on such measurable factors as percent of task time involved, degree of attention required of the operator, errors, importance, amount of specific ability required by task and possessed by the operator and difficulty level.

Review of Literature Related to Constructing A Controlled Vocabulary

A search of related literature was conducted to explore the feasibility of developing a controlled vocabulary. Theologus, Romanshko and Fleishman (1970) prepared a report about constructing instruments and their philosophy about developing a taxonomy of human performance. They indicated that the major problem confronting behavioral scientists is the lack of a unifying dimension for describing human task performance.[16] There is a need for a well-defined task descriptive language for use by those who must apply the results of research to operational tasks. Theologus, Romanshko and Fleishman

(1970) suggested a well defined task descriptive language. They felt that broad categories were ineffective.[16] For example: Spatial visualization is a performance and function of aerial navigation, blueprint reading and dentistry but in entirely different contexts. The three researchers used a method of quantitative analysis in which they established a set of abilities in task classification. A sub-area of human performance was studied where tasks were specifically designed to tap certain hypothesized ability categories. These tasks were administered to samples of subjects and correlations among them were obtained through factor analysis. Based on this information, additional studies were conducted by Theologus, Romanshko and Fleishman to sharpen the definitions of the categories. The result of this experimental process was a set of abilities which vary in scope and specificity. Theologus et al resolved that abilities provide a natural basis for describing and hence classifying tasks in terms of human performance.[16] It was felt that the 37 abilities identified by the Theologus research team might serve as a starting point in the creation of a controlled vocabulary for classifying the competencies from the six Montana Agricultural Manpower studies through use of the computer.

Fleishman and Teichner (1970) implied that the unique feature of the controlled vocabulary is that it is based on the specific needs of the user rather than on the content.[12] All of the studies reviewed regarding taxonomies were concerned with <u>how</u> people were processing information rather than <u>what</u> they were processing. Since the focus of the present research effort is to prepare information for curriculum planners, it was obvious that <u>what</u> was being processed was important and that a devised vocabulary might be the long way around providing the documentation that would have immediate utility.

A Review of Literature Related to Clustering Occupations and Competencies

The researcher investigated materials contained in ERIC and discovered that Cunningham (1972) was involved in clustering occupations and job tasks.[7] An "ergometric" approach was used which is the application of psychometric principles and procedures to the study of human work. This approach draws from the theories and principles of human behavior as well as from established procedures in psychological measurement and job analysis.[7] After reading the methodology of Cunningham's research it was determined that we did not have data essential for extensive quantitative analysis.

In an approach by Vestal and Baker (1973) their research was analyzed in terms of the 15 occupational clusters identified by the U.S. Office of Education. They found that the six digit codes of the Dictionary of Occupational Titles have inherent in them some classifications of activities. The first three digits of the code describe the general occupational area. The last three digits are of particular interest to a counselor or curriculum planner as they identify the worker's function in relation to data, the extent to which he works with people and the manipulative and operational skills required in working.[17]

It was felt that the controlled vocabulary using the above descriptors as analyzed in the DOT could be applied to the competencies and the codes used on a comparison basis across industry lines. This was experimented with, but the results were not sufficiently definitive or applicable to the present research charge to encourage further exploration.

Hamilton's Arizona study (1971) dealt with competency commonalities collected from a common instrument administered to a population of workers employed in production agriculture and agriculturally related businesses.[13]

reactions from respondents were then tabulated and competency clusters were constructed.[13] The general taxonomy of agricultural competency areas was used as the basis for the initial taxonomy for the present study. The Arizona taxonomy was adapted and additional areas were added to cover the span of the research studies included in the six agricultural areas in Montana.

In the total review of literature, attention was given to compatible computer programs.

METHODOLOGY

The analysis of competencies to determine if competency commonalities exist across the various Montana Agricultural Manpower Studies took the following form:

1. Exploration of a feasible approach to the problem through a review of literature (previously reported) and contacting consultants.
2. Development of a method to sort identified competency statements for grouping.
3. Establishment of common cores and sub-cores.
4. Review and revision of competency groupings.
5. Documentation of the taxonomy.
6. Experimentation with appropriate methods of documentation for curriculum planners.

Exploration of a Feasible Approach

Contacts were made with knowledgeable consultants to determine alternatives to the research problem. Their opinions were in agreement that the problem was essentially one of classifying competencies. Empirical decisions would have to be made. It was suggested that this was a job for an "ethnographer", a social anthropologist, skilled in making qualitative or content analyses.

Advice was sought on a quantitative approach and it was realized that this would not be realistic since it is almost impossible to have effective results when analyzing a number of items or statements in factor analysis when the number of items or statements is larger than the "N". This is the case in almost all of the job titles studied. A program called "Famulus"

devised for the Forest Service has the capability of accomodating non-numerical data and requires the writing of a controlled vocabulary of identifiers for each item (competency statement). This computer program was given considerable thought, but it was realized that in the time a controlled vocabulary could be devised, the information coded and key punched, this process could be accomplished by hand less expensively when considering the time involved.

Development of a Manipulative Method

After a computer retrieval system was ruled out, the researchers devised a method of handling the competency statements. Each statement was then placed on a card with the mean, importance rating given the competency, the job title to which it was related and any identifying sub-classifications.

Establishment of Common Cores and Sub-Cores

On the first sort of competencies, those considered unique to each job title were pulled out. In the case of industry specialists, primarily in the agricultural products study, the competencies were sent to consultants who marked those competencies they felt were unique. Upon their return, these decisions were compared and reviewed by the project directors and final placement was made as to their uniqueness. The remaining competencies were then sorted into eight main cores (see Figure 7) - Animal Science, Plant Science, Mechanics, Clerical, Leadership, Business Management and Marketing, Merchandising and Miscellaneous. They were then sub-divided into sub-cores according to the taxonomy (see Figure 7 for the complete taxonomy).

Review and Revision of Competency Groupings

Numerous revisions of competency groupings by a team of researchers occurred before placing competencies in common cores (groups). Researchers

attempted to be as general as possible in placing competencies in their respective cores since precise tasks and their importance are reported in the individual studies according to each particular job title. Should curriculum developers be concerned at any time with specific competencies performed by persons in particular job titles, they may return to the appropriate studies for such information. It is intended that this report be used in companion with the six individual studies, available as detailed in the preface.

Documentation of the Taxonomy

After the groupings of competencies was finalized, the taxonomy was revised to accomodate the various areas of tasks. The final form of this taxonomy including the eight major cores and corresponding sub-cores appears in Figure 7 below and on subsequent pages.

I. Animal Science

- A. Breeding
- B. Nutrition
- C. Animal Care and Handling
- D. Identification and Disease Control

II. Plant Science

- A. General Knowledge
- B. Plant Growth
- C. Seed Propogation
- D. Fertilization
- E. Hazards (Insects, Disease, Weeds, Damage and Contamination)
- F. Agricultural Chemicals

Fig. 7. —A taxonomy of common competency cores and sub-cores for the six Montana Agricultural Manpower Project Studies.

III. Agricultural Mechanics

A. Agricultural Power and Machinery Repair and Maintenance

1. General Knowledge and Skills
2. Engine Overhaul
3. Steering Systems
4. Charging Circuit
5. Gasoline Fuel System
6. Diesel Fuel System
7. Final Drive
8. Lubrication System
9. Storage Battery
10. Hydraulic System
11. Power Train
12. Governing Systems
13. Exhaust Systems
14. Power Take-off
15. Cooling System
16. Ignition System
17. Starting Circuit
18. Differentials
19. Belts, Chains, Gears and Clutches
20. Braking System
21. Tires

B. Special Equipment Maintenance

C. Basic Agricultural Shop Skills

1. Welding
   a) General Skills-Arc and Acetylene
   b) Brazing
   c) Positions, Joints and Processes
   d) Special Welding Applications
2. Woodwork and Farm Carpentry
3. Leather Work
4. Pipe Work and Simple Plumbing
5. Soldering and Sheet Metal Work
6. Electrical Work and Electric Motors

Fig. 7.--Continued

7. Farm Blacksmithing
8. Concrete Work
9. Rope Work
10. Cold Metal Work

D. Equipment, Supplies and Materials Recommendations and Selections

E. Equipment Operation

1. Various Specialized
2. Testing and Analysis Devices
3. Major Equipment
4. Welding & Related Activities
5. Office Machines
6. Starting, Stopping, Adjusting Regulating
7. Manuals, Parts Lists, Journals, Tables, etc.
8. Machinery Set-up & Assembly

F. Agricultural Buildings and Conveniences

1. Construction
2. Maintenance and Repair
3. Housekeeping

G. Soil and Water Management

1. General
2. Soils
3. Irrigation Systems and Practices
4. Watershed
5. Conservation Practices
6. Engineering Practices

IV. Agricultural Business Management & Marketing

A. General Management

B. Financial Management

1. Analysis and Assessment
2. Purchasing and Budgeting
3. Credit
4. Marketing
5. Pricing
6. Insurance
7. Profits

Fig. 7.--Continued

C. Personnel Management

1. General Knowledge
2. Selection, Training and Supervision
3. Labor Management

V. Merchandising

A. Salesmanship and Selling
B. Promotion
C. Advertising
D. Stock Control and Inventory
E. Collections and Handling Cash
F. Processing
G. Quality Control
H. Receiving, Packaging, Labeling
I. Shipping

VI Clerical

A. General
B. Bookkeeping
C. Record Keeping
D. Writing Letters and Reports
E. Business Forms

VII. Leadership

A. Personal Qualities and Qualifications
B. Job Attitudes
C. Human Relations

VIII. Miscellaneous

A. Sanitation
B. Safety
C. Storage
D. Mathematics
E. No Significant Training Required

Fig. 7.--Continued

Experimentation with Appropriate Methods of

Documentation for Curriculum Planners

Numerous formats were tried in an effort to present the material in a way which would facilitate planning for curriculum development. The competencies were placed in tables and arranged by their mean competency rating within sub-classifications. When a competency had more than one mean because of its similarity or duplication, an average of the means was used for its placement. Since the Grain, Feed and Seed study did not have the means reported, it was necessary to devise a computer program to figure the means.

CHAPTER II

ANALYSIS OF THE DATA

The data (competency statements) were analyzed to determine the uniqueness and commonality among the competencies appearing in the six Agricultural Manpower Competency Studies. The tables appearing in this chapter are in two series. The first series of six tables documents the unique competencies appearing for the job titles covered in each of the six studies. Since the six studies were not all inclusive of job titles in that particular agricultural sector, it would appear that some of these unique competencies might be similar or common to other job situations. This is especially true of the unique competencies in the Grain, Feed and Seed and Supplies and Services Studies. Further, the same competencies for like job titles but present in one or more industry in the Agricultural Products Study, are repeated for each industry. In essence, the competencies are unique for the job title but common across one or more industry.

The second series of eight tables documents the competencies according to the eight major cores and corresponding sub-cores to relate commonalities.

Since there is no duplication of competency numbers in each particular study (with the exception of the Grain, Feed and Seed Study) the competencies are readily identifiable by the competency number which is provided. (Competency numbers used in this study are the same as those used in the specific manpower studies.) The table title for unique competencies' tables and the study code for common core competency tables reveal the study in which the competency is found. Appendix A lists the job titles and the numbers of the

competencies falling under that title for Agricultural Production, Mechanics, Products and Resources. Numbers are listed by tables for the Grain, Feed and Seed and Supplies and Services Studies. This was provided to afford access to the job titles table in the individual reports. The researchers did not write an extensive discussion of each table since the results of this study exist in the tables themselves. Because each individual will use the data in somewhat different ways, each table will need to be interpreted by each consumer to meet his particular educational needs.

Unique Competencies

Data presented in the first series of six tables lists the competencies found to be unique in certain job titles. There is a table for each of the six separate studies with accompanying competencies listed by job title. Unique competencies were defined as expressing tasks which are not done by any other person in the same context or with the same device or instrument and comprising knowledge or skills solely related to a particular job title. Unique competencies are generally highly specialized skills or knowledge that require a degree of experience on the job or advanced training. The in-school or on-the-job tasks could be provided at high school or post-secondary situations such as vocational-technical centers and community or junior colleges.

Data in Table 1 describes those unique competencies and their related job titles identified in the Agricultural Production Study.

The tasks displayed in Table 1 are representative of competencies unique to workers engaged in production agriculture. There appears to be little competency similarity among all job titles. However, a careful examination will reveal common characteristics between selected job titles.

For example, the unique competencies for the Farm and Ranch Foreman and Feedlot Managers are closely associated with economics and business management. On the other hand, all types of general farm workers are expected to be able to perform specialized skills that would be considered as technical within their respective areas. Since there are relatively few unique competencies for each job title, curriculum developers should include training for these competencies within existing programs.

TABLE 1

UNIQUE COMPETENCIES AND THEIR RELATED JOB TITLES IN THE AGRICULTURAL PRODUCTION STUDY

Competency Number and Competency		Job Title
804.	Realize the importance of the timeliness of operations in crop and livestock production.	Farm and Ranch Foreman
800.	Plan short and long term goals for the farm.	
855.	Assign appropriate priorities to the farm work to be done.	
813.	Arrange labor, buildings and other facilities as well as land and field layout to save labor and increase profits.	
826.	Figure the cost of gain on feeding livestock.	
802.	Set up a farm record system and center in the home.	
810.	Plan the cropping and livestock programs to distribute labor throughout the year.	
871.	Provide for the housing needs of workers and their families.	
819.	Determine the net farm income on a cash or accrual basis.	
818.	Keep farm accounts and using these records, determine the position of the business by farm enterprise.	
847.	Establish the size or volume of farm business necessary to employ full-time year-round labor on the farm.	
806.	Gather and use agricultural outlook information.	
846.	Figure the relative amount and the seasonal distribution of the labor required in each farm enterprise.	
825.	Figure the costs and the returns from using chemicals, herbicides and insecticides.	
816.	Appraise farm and ranch properties to determine their total value.	

TABLE 1 - Continued

Competency Number and Competency	Job Title
837. Negotiate land purchases and transactions such as leasing land. 814. Recognize the services offered by farm business organizations. 833. Determine the per acre crop expense. 803. Estimate the potential value of family labor to the farming operation. 807. Know about educational programs of extension services and vocational education programs that would benefit the farm enterprise. 835. Analyze the farm accounts on the basis of individual production enterprises. 834. Figure the power and machinery costs per acre.	Farm and Ranch Foreman
939. Guard flock against predatory animals. 935. Tend flock of sheep grazing on range or pasture. 936. Move sheep to and about area assigned for grazing.	General Farm Worker - Sheep
971. Clean teats and udder of cow with disinfectant. 975. Identify mucus, curds or blood in milk sample. 974. Strip cow's teat to collect sample of milk in strainer cup. 972. Guide cow into milking station.	Milker
1005. Properly clean fertilizer equipment upon completion of operation. 1008. Seed crops using grain drill. 1009. Adjust grain drill for seeding the recommended quantity of grain to desirable depth. 1000. Properly clean planting equipment upon completion of operation.	General Farm Worker - Crop Production

TABLE 1 - Continued

Competency Number and Competency	Job Title
1007. Prepare seed bed using appropriate farm implements. 1006. Conduct secondary tillage operation prior to seed bed preparation. 1001. Follow management directions for removal of crop residue. 1003. Adjust fertilizer spreader for application of the recommended type and quantity of fertilizer. 1012. Operate and adjust farm sprayer and duster for the control of weeds and insects. 1002. Execute the initial tillage operation using appropriate equipment for local conditions. 1011. Interpret the directions for the proper application of agri-chemicals. 1010. Know stages and growth development of crop maturation. 1013. Determine when soil moisture conditions warrant irrigation. 999. Select sprays and dusts for the appropriate cropping practice.	General Farm Worker - Crop Production
1030. Determine the desirable moisture level of hay for bailing, cropping, stacking or ensilage. 1031. Stack bales or loose hay by hand or using farm machinery. 1028. Determine the stage of maturity of the hay for cutting. 1029. Determine the level of moisture in the hay after cutting. 1033. Buck bales onto a wagon or a truck using a hand hook. 1032. Pack ensilage for storage using appropriate equipment. 1035. Measure quantity of hay and/or silage in piles, bunkers or trucks.	General Farm Worker - Hay

TABLE 1 - Continued

Competency Number and Competency	Job Title
1034. Cover stack or hay pile to protect from spoilage.	General Farm Worker - Hay
1176. Construct machinery and equipment.	
1416. Maintain semen under desirable conditions.	Artificial Inseminator
1412. Demonstrate skill involved in using approved artificial insemination methods such as: -clean cows genital area with soap, water and antiseptic -draw semen into breeding pipet -inject prepared bull semen into cows for breeding -insert and depress syringe to inject semen.	
1418. Maintain log of semen specimens used and cows bred.	
1415. Hold, confine and restrain the animal in the appropriate position for insemination.	
1417. Select semen from bulls according to sire characteristics published by breeder services.	
1410. Name the parts of the reproductive organs.	
1450. Ride horses to drive cattle in desired direction.	Cowboy
1449. Ride horses to round up stray cattle.	
1457. Break wild horses and train them for saddle.	
1465. Keep accurate log or records of livestock inventory.	Feedlot Manager
1466. Do business in compliance with state and federal laws regulating operation of feedlots.	

TABLE 1 - Continued

Competency Number and Competency		Job Title
1474.	Keep current with feedlot technology by reading and attending professional meetings.	Feedlot Manager
1467.	Plan and arrange financing for the feedlot.	
1471.	Determine the feeding and marketing point at which livestock should be marketed.	
1549.	Determine the length of the feeding period.	
1550.	Provide fattening rations.	
1481.	Determine the net return for each lot of cattle fed.	
1565.	Maintain mechanical and automatic feedlot equipment.	
1564.	Operate mechanical and automatic feedlot equipment.	
1470.	Hedge livestock purchases and sales using the futures market.	
1546.	Adjust thermostats to insure proper temperature and humidity for livestock confined in housing.	
1698.	Evaluate the performance records, daily gain, adjusted weight, I.P.R. of dams and sires.	Herdsman
1695.	Fill out registration papers.	
1703.	Make arrangements at livestock shows for livestock housing, inspections, certificates and releases.	
1706.	Make necessary arrangements for interstate livestock transportation.	
1697.	Enter animals in shows, fairs in appropriate age and sex classes.	
1702.	Plan show or fair travel schedule.	
1718.	Remove obstructions from ditches and rows.	Irrigator
1715.	Channel water to flow evenly over fields.	

TABLE 1 - Continued

Competency Number and Competency	Job Title
1729. Use canvas, plastic, etc., dams to direct water flow from ditch to field.	Irrigator
1719. Remove plugs and gates from portholes in pipes or wooden tunnels.	
1720. Build up edges of ditches with rows of dirt.	
1721. Plug portholes as rows are flooded.	
1717. Close off bordered dyke inlet gates when dyke section is flooded.	
1716. Cut trenches in high areas of fields to direct water flow.	
1725. Start electrical motor to drive water pump.	
1722. Siphon water from ditch into furrows.	
1724. Remove siphon when water in furrows reaches desired levels.	
1726. Regulate water flow from main line to lateral sprinkler lines.	
1723. Use tubes or hoses to siphon water into rows or fields.	
1727. Move pipes and sprinklers.	
1734. Consult with government agencies for assistance in designing an irrigation system.	
1728. Assemble pipes and sprinklers.	
1731. Measure and compute water flow.	
1732. Divide water into desired quantities using various measuring devices.	
1730. Use instruments to identify stress conditions of crops.	

Unique competencies appearing in Table 2 are easily identified as being related to the Agricultural Mechanics job titles. The knowledge and skills required to perform the respective job tasks vary from simple manipulative operations to tasks requiring considerable prerequisite knowledge and skill. For example, the mechanic's duties could range from the simple task of changing a spark plug to a more complicated task of diagnosing an engine with an oscilloscope and analyzer.

There appears to be considerable overlap among competencies performed by the Mechanic and the Mechanical Technician. This was probably due to the fact that the researchers sought information from very large, as well as very small establishments and the fact that more specialization exists in the larger businesses.

Within the mechanics area, there would be little need to develop special programs to train for the job titles Machinery Salesman, Supervisor and Manager, because of the similarity of these job titles to like job titles in other occupational areas and due to the small number of unique competencies. For example, sales competencies required by a feed salesman and a machinery salesman are quite similar; therefore, the training program designed for agriculture salesman would meet the needs of both occupational areas.

TABLE 2

UNIQUE COMPETENCIES AND THEIR RELATED JOB TITLES IN THE AGRICULTURAL MECHANICS STUDY

Competency Number and Competency	Job Title
746. Assemble farm machinery.	Maintenance Man
744. Crate parts for shipment.	
712. Determine the physical properties of iron and steel.	Welder
689. Seam weld.	
654. Braze weld cast.	
713. Determine the nature (identification) of iron and steel by the spark test.	
684. Spot weld.	
697. Weld low carbon alloy metal.	
714. Understand the nature and use of iron and steel alloys.	
650. Braze with silver alloys.	
651. Braze on stainless steel.	
655. Braze ferrous (iron) metal.	
686. Shot weld.	
687. Upset weld.	
688. Flash weld.	
690. Projection weld.	
691. Spike weld.	
692. Stud weld.	
709. Do pipe and tube welding.	
710. Perform sheet metal fabrication.	
715. Classify ferrous or non-ferrous metals.	
718. Temper steel.	

TABLE 2 - Continued

Competency Number and Competency	Job Title
722. Operate an abrasive cutoff machine.	Welder
711. Perform heavy steel fabrication.	
652. Low temperature weld aluminum.	
685. Gun weld.	
708. Weld Tool and Die Steel.	
717. Harden steel.	
653. Low temperature weld magnesium.	
679. Perform gas Tungsten-arc welding (TIG).	
680. Perform gas Metal-arc welding (MIG).	
698. Weld Chromium Steel.	
720. Stress relieve steel.	
681. Maintain inert gas welding equipment.	
683. Operate a consumable wire electrode unit (MIG and/or cored wire).	
693. Metal Foil weld.	
694. Metal Fiber weld.	
695. Percussion weld.	
706. Arc weld cast aluminum.	
716. Anneal and/or normalize steel.	
719. Caseharden steel.	
721. Operate a power shear.	
701. Weld low Carbon Molybdenum Steel.	
682. Repair inert gas welding equipment.	
696. High Frequency Resistance weld.	
699. Weld Nickel-Chromium Stainless Steel.	
700. Weld Chrome-Nickel Molybdenum Steel.	
702. Weld Chrome-Moly Steel.	
625. Maintain spraying equipment.	Painter
612. Operate spray gun equipment.	

TABLE 2 - Continued

Competency Number and Competency	Job Title
601. Follow directions when mixing paint.	Painter
616. Use enamel paints.	
602. Operate a power sander and grinder.	
615. Thin paint.	
620. Prepare metal surfaces for priming.	
626. Repair spraying equipment.	
617. Use lacquer paints.	
619. Use masking materials.	
621. Select and use thinners properly.	
627. Do touch-up painting.	
618. Use acrylic paints.	
614. Match paints.	
622. Select and use reducers properly.	
603. Use chemicals to remove paint.	
607. Use body fillers.	
623. Use metal conditioners.	
613. Operate a sand blasting machine.	
435. Remove carbon from ring grooves.	Mechanic
462. Adjust clutch free play.	
423. Grind valves.	
436. Measure piston ring land clearance.	
437. Check piston ring end gap.	
425. Reface valve seats.	
411. Time fuel injector to engine.	
433. De-glaze cylinder.	
446. Install a crankshaft.	
514. Correct adjustment of ring gear and pinion.	
432. Remove piston assembly.	
453. Install piston assembly.	

TABLE 2 - Continued

Competency Number and Competency	Job Title
463. Service and adjust a dry clutch.	Mechanic
516. Preload bearings.	
415. Install the diesel injection pump.	
431. Remove cylinder ridge.	
434. Measure cylinder taper.	
520. Preload and install bearings in final drive.	
420. Determine valve stem guide clearance.	
426. Install cylinder heads.	
427. Check cylinder head for block warpage.	
458. Check and adjust engine oil pressure.	
470. Service and adjust an engine governor.	
494. Preload bearing in gear train.	
438. Clean oil passages.	
476. Analyze malfunctions of hydraulic pumps.	
487. Analyze a hydraulic system.	
492. Determine backlash and clearance in gear train.	
517. Service and adjust final drives.	
457. Service and repair oil pumps.	
416. Remove. clean and replace injector nozzle.	
464. Service and adjust a wet clutch.	
513. Repair differentials.	
522. Adjust end play in final drive.	
524. Repair and adjust power take-off drive.	
421. Replace valve guides.	
493. Determine endplay movement in gear shaft.	
422. Test valve springs.	
442. Replace wet sleeves.	
443. Replace dry sleeves.	
469. Trouble shoot clutches.	

TABLE 2 - Continued

Competency Number and Competency	Job Title
477. Service and repair hydraulic pumps.	Mechanic
511. Adjust and service differential locks (mechanical, hydraulic).	
519. Repair final drives.	
527. Trouble shoot power take-off drive.	
471. Repair an engine governor.	
475. Service and repair internal hydraulic pumps.	
478. Service and repair hydraulic valves.	
518. Service and repair inboard and outboard mounted planetary drives.	
382. Check armature and fields.	
474. Service external hydraulic pumps.	
479. Analyze malfunctions of hydraulic valves.	
486. Operate and analyze a hydraulic tester.	
496. Repair or rebuild sliding gear transmissions.	
515. Trouble shoot differentials.	
417. Analyze the operation of the diesel injector nozzle.	
473. Identify governor malfunctions.	
495. Service and adjust sliding gear transmissions.	
497. Repair or rebuild constant mesh transmissions.	
409. Analyze a diesel fuel injector.	
424. Replace rocker arms.	
488. Service and adjust hydraulic assist transmissions.	
498. Repair and rebuild power shift transmissions.	
532. Service and repair variable speed belt drives.	
326. Recondition machinery trade-ins.	
394. Check solenoid.	
480. Repair hydraulic cylinders.	
521. Trouble shoot final drives.	
523. Adjust chain drive in final drive.	
534. Service and repair gear drives.	

TABLE 2 - Continued

Competency Number and Competency	Job Title
483. Repair hydraulic motors.	Mechanic
503. Trouble shoot a hydrostatic drive.	
401. Test a fuel pump.	
378. Polarize a tractor generator and test on bench.	
361. Set breaker point dwell using a dwell meter.	
531. Service and repair belt drives.	
533. Service and repair chain drives.	
468. Repair a wet clutch.	
502. Repair a hydrostatic drive.	
504. Check for overheating, noise level and leaks on a torque converter.	
490. Trouble shoot a hydraulic assist transmission.	
499. Service and adjust hydraulic pump.	
500. Service and adjust hydraulic motor.	
501. Service and adjust a hydrostatic drive.	
358. Test an ignition distributor.	
362. Test distributor advance mechanism.	
482. Service hydraulic motors.	
489. Repair hydraulic assist transmissions.	
467. Repair an overrunning clutch.	
509. Inspect a torque converter and seals for internal damage.	
383. Test alternator diodes and replace heat sink.	
505. Service a torque converter.	
508. Remove a torque converter.	
506. Check torque converter with test equipment.	
507. Repair a torque converter.	
510. Do a stall test on a torque converter.	
342. Use the dynamometer.	
419. Service and maintain turbochargers.	
472. Repair and adjust hydraulic governor.	

TABLE 2 - Continued

Competency Number and Competency	Job Title
375. Test charging circuit using a voltmeter, ammeter, and/or carbonpile.	Mechanic
386. Test stator windings in alternator.	
384. Replace diodes.	
410. Repair a diesel transfer pump.	
366. Repair and trouble shoot magneto.	
465. Repair a magnetic clutch.	
380. Turn armature.	
391. Turn armature.	
466. Repair an expanding shoe clutch.	
413. Test the diesel injection pump.	
407. Use an exhaust analyzer.	
341. Diagnose an engine with an oscilloscope analyzer.	
441. Rebuild a piston and install and knurl spacers.	
414. Repair the diesel injection pump.	
445. Knurl a piston.	
317. Rebuild an engine and install spacers.	Mechanical Technician
288. Grind valve seats.	
293. Hone cylinders.	
303. Rebuild hydraulic pumps.	
300. Rebuild hydraulic systems.	
301. Rebuild control valves.	
306. Fit pistons.	
291. Replace wet sleeves.	
289. Knurl valve guides.	
307. Size and align connecting rods.	

TABLE 2 - Continued

Competency Number and Competency	Job Title
309. Rebuild rocker arms and shafts.	Mechanical Technician
290. Replace valve seats.	
298. Rebuild diesel fuel injectors.	
292. Replace dry sleeves.	
302. Rebuild accumulators.	
304. Rebuild hydraulic motors.	
314. Repair supercharger, turbocharger and blower.	
312. Replace diodes in alternator.	
311. Rebuild a magneto.	
305. Rebuild flow dividers.	
297. Rebuild diesel fuel injection pump.	
299. Calibrate diesel injection pumps.	
286. Rebore an engine block.	
315. Repair and adjust hydraulic governor.	
313. Rebuild and adjust voltage regulator.	
285. Plane a cylinder head.	
295. Balance a crankshaft.	
294. Knurl a piston.	
310. Wind a generator and starter armature.	
287. Turn a crankshaft.	
296. Rebuild a crankshaft.	
308. Line bore an engine, camshaft and main bearings.	
105. Thoroughly understand the advantages of the company's machinery.	Machinery Salesman
106. Demonstrate to customers the characteristics and advantages of the machinery and equipment merchandised by the company.	
130. Complete financial arrangements for customers who purchase machinery.	

TABLE 2 - Continued

Competency Number and Competency	Job Title
139. Create new promotional techniques for increasing machinery sales.	Machinery Salesman
119. Help customers to determine their machinery needs.	
140. Use current promotional techniques for increasing machinery sales.	
77. Demonstrate a complete and thorough knowledge of the tasks performed by employees under his supervision.	Supervisor
44. Explain equipment warranty and guarantee provisions.	Manager
12. Assist customers in planning machinery and equipment replacement programs.	
11. Help customers compute costs and returns on the use of machinery and equipment.	

Competencies unique to persons employed within the grain, feed and seed business appear in Table 3. Those persons employed as Managers and Technical Specialists must possess knowledge and skills that are quite specific to the grain, feed and seed business. These competencies deal primarily with the economic considerations unique to the grain, feed and seed business and evolve around assisting the farmer and rancher with management decisions. Although the number of competencies required of persons in the Manager and Technical Specialist job titles is not extensive, there is a wide variation in the nature of the competencies. For example, the Manager must be able to perform competencies that range from developing objectives for the business that can be used by management to promoting business growth, interpreting soil tests, writing advertising and preparing radio and TV scripts.

TABLE 3

UNIQUE COMPETENCIES AND THEIR RELATED JOB TITLES IN GRAIN, FEED AND SEED STUDY

Competency Number and Competency	Job Title
21. Draw a representative sample of grain from truck or car.	Manager
40. Weigh grain as it arrives at the elevator.	
10. Develop objectives for the business that can be used by management to promote business growth.	
11. Use business goals for preparing a total business budget.	
15. Interpret soil tests.	
18. Estimate customer wants and needs from past records.	
1. Compute costs and returns in determining the use of agricultural chemicals.	
38. Prepare an advertising budget.	
20. Recognize potential customers identified from market studies.	
31. Assist farmers and ranchers in determining the most economical weights to market livestock.	
40. Write advertising.	
17. Analyze feeds for fats, nitrogen, nitrogen-free extract, fiber and ash.	
31. Prepare news releases.	
1. Determine from county crop reports potential volume of grain produced in elevator trade territory.	
30. Prepare radio and TV scripts.	
18. Develop a hedging program appropriate for a country elevator.	Technical Specialists
33. Suggest how livestock producers can use the futures market as a market tool.	

TABLE 3 - Continued

Competency Number and Competency	Job Title
13. Diagram an efficient facility layout for a modern grain, feed, seed and fertilizer operation.	Technical Specialists
47. Conduct field inspection for producing certified seed.	

Table 4 contains unique competencies associated with the job titles normally found in the agricultural supplies and services businesses. The Manager must be able to develop, promote, control and manage the agricultural business, with the one exception of gathering and using agricultural outlook information as a tool in assisting farmers in planning their livestock production, marketing and management programs.

The Technical Specialist in the supplies and services businesses, on the other hand, needed very technical competencies in a broad range of subject matter areas. These areas included economics and business management, soils, irrigation, dairy equipment, electricity, animal waste handling programs and competencies about agriculture chemicals.

TABLE 4

UNIQUE COMPETENCIES AND THEIR RELATED JOB TITLES IN THE SUPPLIES AND SERVICES STUDY

Competency Number and Competency	Job Title
11. Determine whether yearly sales volume from a new service is sufficient for additional dollars to be invested. 133. Develop and file a complete "farm plan" for each farm customer. 6. Analyze available modes of transportation to determine the most economical service. 10. Analyze an enterprise to determine profitability of adding a new service. 9. Conduct a study to determine the nature of competition in the business area. 17. Develop a sales map of the service trade area. 8. Conduct and utilize a business survey to determine potential volume of business in the trade area and to determine product mix. 118. Gather and use agricultural outlook information as a tool in assisting farmers in planning their livestock production, marketing and management programs. 20. Plan and develop direct-mail advertising from current list of prospective customers.	Manager
132. Recommend cropping programs to agricultural producers based on soil testing services. 128. Assist producers in planning alternative cropping programs by determining rates of returns per dollar invested.	Technical Specialists

TABLE L - Continued

Competency Number and Competency	Job Title
147. Determine costs and returns from irrigation. 111. Recommend appropriate type and size of milking equipment for a dairy. 149. Recommend the type and size of terminal irrigation delivery heads. 139. Recommend types and sizes of switches, fuses and wiring to meet electrical codes. 142. Assist customers in planning or altering farmstead watering systems. 141. Determine the cause of water hardness and recommend corrective measures. 115. Assist producers in developing programs for handling animal wastes. 140. Assist in planning or altering farmstead wiring system. 114. Recommend vaccines, sprays, dips and other medications for animal health problems.	Technical Specialists

Unique competencies associated with job titles in the agricultural products industries are presented in Table 5. Competencies in the bakery industry are for the job titles Machine Bagger, Warehouseman, Shipping Clerk, Mixer, Divider Operator, Rounder, Overhead Proofer, Molder Operator, Baker-Retail. Though the competencies are unique, generally they are simple, manipulative operations for which training could be given on the job without prerequisite information (learning) about the bakery industry.

The job title, Baker-Retail, would appear to be an exception since the competencies require both simple and complex knowledge and, for some competencies, prerequisite knowledge would appear to be important.

Competencies associated with the dairy industry were distributed between nine different job titles. The knowledge and skills required range from simple, single skilled operations to those requiring complex knowledge and skills. The Plant Worker, Machine Operator, Cooler Man and Pasteurizer would perhaps be able to receive on-the-job taining whereas the skills and knowledge required of the Butter-Maker, Cheese-Maker, Ice Cream Maker and Laboratory Technician would benefit from having prerequisite knowledge and skills prior to or concurrently with entering these job titles.

Unique competencies in the meat industry were distributed among five job titles. Though the competencies required both simple and complex knowledge and skills, the competencies required a high degree of skill in order to perform the required task. This was especially true of the Butcher, Render Operator, Shipping Clerk, Meat Cutter-Retail job titles. The Sausage Maker required a blend of both skill and knowledge, with emphasis on knowing what was needed to produce a product.

Management personnel in the meat industry indicated that a person of average intelligence, willing to work and learn, could be taught the knowledge and skills they needed while performing on the job.

The unique competencies in the milling industry were for six job titles. The Flour Packer, Warehouseman, Miller, Smutter and Buhr Miller needed a general understanding of electrically powered conveyors and milling equipment of several types. It would appear that employees should have a cursory knowledge of the flour milling operation, yet it would not be essential for employees to have extensive prior knowledge about the operation. On-the-job training under supervision of an experienced employee would, no doubt, be all the training necessary to enter these job titles.

The job of the Miller and Chemist, on the other hand, is specialized; and even though it involves some simple, single skilled operations, the knowledge and skills required tend to be very complex and require considerable prerequisite learning and supervised on-the-job experience. Though the Miller job title is a technical level job, the job of the Chemist is very complex and the range of skills is quite broad. Persons working in this job title had educational backgrounds ranging from high school education with extensive on-job-training to persons with a doctor's degree who have extensive research backgrounds. Specialized educational programs, both technical and professional, are available for persons desiring to acquire the competencies essential to perform these job titles.

TABLE 5

UNIQUE COMPETENCIES AND THEIR RELATED JOB TITLES IN THE AGRICULTURAL PRODUCTS STUDY

Competency Number and Competency	Job Title
	Bakery Industry
88. Set guides.	Machine Bagger
93. Replenish packaging supplies (wrapping paper, plastic sheeting, boxes, cartons, bags, etc.).	
72. Tend machine that performs one or more packaging functions (filling, marking, weighing, wrapping, closing, etc.).	
87. Change forming and cutting dies.	
139. Determine methods of storage and identification; location considering temperature, humidity and height and weight limits.	Warehouseman
152. Put up salesman's orders.	Shipping Clerk
184. Make finished dough.	Mixer
185. Dump dough into trough.	
172. Estimate size of doughs needed to meet production requirements at start of shift.	
186. Keep shop schedule or dough sheet.	
190. Tend machines that automatically divide, round, proof, and shape dough.	Divider Operator Rounder
198. Adjust rheostats to control speed of proofing and molding machine conveyors.	Overhead Proofer
199. Inspect shape units of dough as they are ejected into pans from molding.	

TABLE 5 - Continued

Competency Number and Competency	Job Title
211. Observe molder during operation. 217. Adjust machine tension for proper shaping. 218. Inspect shape units of dough as they are ejected into pans from molding machine. 215. Observe sheeter operation of the molding machine. 216. Adjust sheeting rollers.	Molder Operator
276. Mix according to specifications by hand or using electric mixer. 270. Read and follow recipe or formula. 272. Weigh and measure ingredients. 277. Bake products. 271. Mix and bake ingredients according to recipes. 274. Use scale and graduated containers. 282. Observe color of product being baked. 273. Prepare batters, doughs, fillings, and icings. 280. Bake in oven. 278. Roll out and shape dough. 275. Dump ingredients into mixing machine, bowl or steam kettle. 279. Place dough on pans, molds, or sheets. 283. Regulate oven temperatures. 284. Apply glaze, icings or other topping to baked goods using spatula or brush. 285. Decorate cakes. 286. Develop new recipes for cakes and icings. 281. Bake on a grill.	Baker-Retail

TABLE 5 - Continued

Competency Number and Competency	Job Title
	Dairy Industry
88. Set guides. 93. Replenish packaging supplies (wrapping paper, plastic sheeting, boxes, cartons, bags, etc.). 72. Tend machine that performs one or more packaging functions (filling, marking, weighing, wrapping, closing, etc.). 87. Change forming and cutting dies.	Plant Worker Machine Operator
139. Determine methods of storage and identification; location considering temperature, humidity and height and weight limits.	Cooler Man
364. Test butter for moisture. 351. Operate a butter churn. 366. Test butter for consistency. 378. Test sample by smell, taste and feel to grade butter. 365. Test butter for salt content. 357. Observe separation of buttermilk from butter. 354. Test cream for butterfat. 363. Add coloring to meet specifications. 368. Grade butter according to prescribed standards. 350. Control equipment to make grades of butter.	Buttermaker

TABLE 5 - Continued

Competency Number and Competency	Job Title
369. Make butter by the butter chilling method.	Buttermaker
387. Cook milk and specified ingredients to make cheese according to formula.	Cheesemaker
400. Cook curd at prescribed temperature.	
401. Determine desired firmness and texture.	
391. Heat milk to specified temperature.	
395. Determine amount of rennet to be added.	
394. Determine acidity by testing milk sample.	
392. Determine proper quantity and type of dye and starter to be added to milk.	
396. Determine when to stop agitator to allow milk to coagulate into curd.	
404. Taste, smell, feel and observe sample for quality.	
402. Determine the finished acidity of product.	
461. Have a knowledge of proper temperatures for pasteurizing.	Pasteurizer
462. Pasteurize by holding method.	
463. Regulate the bacterial count by controlling temperatures.	
464. Regulate temperatures to lower viscosity of mix (less fat clumping).	
465. Regulate temperature for tester freezing in batch freezer.	
430. Reject impure samples.	Laboratory Technician

TABLE 5 - Continued

Competency Number and Competency	Job Title
425. Test samples of manufactured products for quality control.	Laboratory Technician
423. Propogate starters and cultures.	
426. Execute several tests for butter fats and solids.	
424. Test samples of milk from bulk transports.	
427. Test for bacterial counts.	
412. Determine chemical and physical characteristics of products.	
429. Test for WMT (Wisconsin Mastitis Test).	
428. Test for penicillin.	
413. Determine the composition of solid, liquid or gaseous materials.	
473. Have knowledge of flavoring and ingredients.	Ice Cream Maker
481. Regulate and inject air into mix.	
480. Determine the amount of refrigerant to be used in freezer coils to maintain proper temperature.	
483. Observe and adjust ammeter and pressure gauge.	
478. Regulate rippling pump.	
	Meat Industry
556. Sever jugular vein to drain blood.	Butcher
557. Skin animals.	
582. Be familiar with standard meat cuts.	
558. Eviscerate animal.	

TABLE 5 - Continued

Competency Number and Competency	Job Title
564. Trim, skin and separate edible portions from offal. 581. Bone and trim cuts of meat. 555. Stun animals prior to slaughtering using a stunning gun. 561. Split open carcass. 580. Reduce carcass to primal pieces. 560. Trim out carcass. 565. Trim head meat and other parts of animals' heads or skulls. 563. Shroud carcass. 559. Shakle hind legs.	Butcher
622. Combine ingredients to make jerky, salami, sausage, etc. 631. Fill casings. 616. Determine proper time periods for curing fresh meat. 617. Smoke and cure meat. 630. Be able to determine meat textures for making salami and weiners.	Sausage Maker
643. Operate cooker.	Render Operator
152. Put up salesman's orders.	Shipping Clerk
608. Wrap meats for freezer. 607. Package meats for display purposes. 605. Clean and cut fish and poultry.	Meat Cutter-Retail

TABLE 5 - Continued

Competency Number and Competency	Job Title
	Flour Milling Industry
88. Set guides	Flour Packer
93. Replenish packaging supplies (wrapping paper, plastic sheeting, boxes, cartons, bags, etc.).	
72. Tend machine that performs one or more packaging functions (filling, marking, weighing, wrapping, closing, etc.).	
87. Change forming and cutting dies.	
139. Determine methods of storage and identification; location considering temperature, humidity and height and weight limits.	Warehouseman
715. Conduct tests and experiments with wheat and flour.	Chemist
717. Conduct tests and experiments with cereal by-products.	
724. Provide a flour analysis statement for customers.	
727. Have the ability and knowledge to operate a muffle oven to determine ash content.	
728. Have the ability and knowledge to operate an amylograph to determine malt content.	
729. Have the ability and knowledge to operate a farinagraph to determine dough quality.	
731. Have the ability and knowledge to operate a roto-top for testing granulation of whole wheat flour.	
732. Have the ability and knowledge to operate a moisture tester to determine moisture of material.	

TABLE 5 - Continued

Competency Number and Competency	Job Title
734. Have the ability and knowledge to operate distillation units.	Chemist
735. Have the ability and knowledge to operate an electro-photometer to test for color and additives.	
741. Tend machines that mix, grind, or pulverize materials used in making flour.	Miller
742. Know the system by which the product flows through the mill.	
750. Operate a bank of roll grinders to grind grain into flour.	
751. Turn wheels to adjust pressure of grinding rollers for each break (passage of grain between rollers) according to grain size and hardness.	
752. Adjust rollers to maintain maximum yield from grain being ground.	
753. Adjust grinding rollers and other equipment to mill product to specifications.	
758. Detect by feel, the quality of flour being produced.	
740. Have a basic knowledge of the milling process.	
795. Tend separating equipment.	Smutter
780. Clean and temper grain prior to grinding.	
798. Regulate the supply of wheat in keeping with the various component demands of the mill.	

TABLE 5 - Continued

Competency Number and Competency	Job Title
781. Tend grain separating, washing and scouring machines to remove dirt, smut and rust from grain before milling.	Smutter
765. Operate buhr mills, reels and sifters to grind grain into flour. 767. Determine when grinding stones need to be replaced. 768. Operate milling machines to produce grain flakes.	Buhr-Miller*

* No table appears for this job title in the Agricultural Products Report, as only one person rated these competencies.

The tasks presented in Table 6 are considered competencies unique to persons employed in the area of agricultural resources.

There is a degree of similarity between competencies required of persons with the Soil Conservation Technician and Civil Engineering Technician job titles. Both groups deal with land leveling, drainage, layout and design of irrigation structures. The reason such competencies were unique is that the Soil Conservation and Civil Engineering Technician deal with somewhat different structures. The Civil Engineering Technician works with roads, bridges or city and county development projects, while the Soil Conservation Technician tends to work with agricultural production.

One might surmise, from studying the competencies for the two jobs, that the educational requirements are nearly the same with the differences being primarily in course emphasis and on-the-job experience in the particular area.

The Dairy Herd Improvement Supervisor job competencies, identified as being unique, were broadly dispersed. In the main, competencies were associated with conducting tests and interpreting the results analyzed by computer.

TABLE 6

UNIQUE COMPETENCIES AND THEIR RELATED JOB TITLES IN THE AGRICULTURAL RESOURCES STUDY*

Competency Number and Competency	Job Title
377. Run a profile.	Soil Conservation Technician
390. Make preliminary site surveys.	
412. Run bench level circuits.	
393. Gather basic information for planning conservation activities.	
396. Explain conservation plans to cooperating operators.	
417. Make computations from aerial photographs.	
413. Map contour lines	
410. Design and draft conservation practices.	
370. Make rough tracings of form maps.	
391. Supervise construction of conservation structures.	
395. Execute agreements for the district with operators to implement conservation plans.	
436. Recommend grassed waterways.	
437. Recommend stockwater ponds.	
326. Suggest alternative land treatments within established proper land use.	
389. Inspect conservation sites.	
371. Prepare finished farm conservation maps.	
327. Develop alternative land treatment plans within established proper land use.	
438. Recommend diversion dams.	
467. Identify soil problems that may be due to a lack of drainage or lack of water.	
380. Determine the need for contour strip cropping.	
382. Determine the need for wind strip cropping.	

* Competencies for Federal Food Inspector have not been considered in the present study. (See Rationale for the Study)

Table 6 - Continued

Competency Number and Competency	Job Title
420. Make recommendations for grass plantings from information provided.	Soil Conservation Technician
428. Use water runoff tables.	
381. Determine the need for field strip cropping.	
405. Provide basic data for land inventory and evaluation.	
384. Layout plan for contour strip cropping.	
419. Layout conservation shelterbelts.	
441. Advise in the construction of grassed waterways.	
340. Recommend strip cropping practices.	
450. Design shelterbelts.	
334. Classify land according to its capability to produce.	
335. Determine appropriate crop rotations.	
339. Recommend crop rotation practices.	
383. Determine the need for buffer strip cropping.	
409, Recommend land use conversion.	
440. Plan water drainage outlet.	
336. Determine soil tilth.	
439. Develop a detailed water drainage map.	
386. Plan a terrace system.	
350. Shoot levels in wells.	
449. Develop a plan to stabilize sandblows.	
347. Assist boring machine operator.	
182. Determine if engineering practices meet specifications.	Civil Engineering Technician
169. Prepare maps.	
170. Prepare field sheets.	
203. Design open drains.	
204. Layout open drains.	
208. Prepare land for leveling.	
177. Recommend proper maintenance of conservation structures.	

Table 6 - Continued

Competency Number and Competency	Job Title
206. Layout closed drains.	Civil Engineering Technician
207. Layout and design irrigation structure.	
205. Design closed drains..	
176. Maintain a follow-up of engineering practices.	
209. Plan leveling practices.	
110. Appear before groups to explain engineering plans.	
194. Conduct hydrologic investigations.	
178. Recommend changes in engineering practices in farm plans.	
20. Weigh or measure daily milk production.	Dairy Herd Improvement Supervisor
21. Take a representative milk sample.	
22. Properly clean milk testing equipment.	
6. Follow established rules and regulations for testing.	
8. Be aware of fraudulent practices in DHI testing.	
47. Enter breeding records into computer.	
3. Make minor repairs to testing or weighing equipment.	
17. Be familiar with computer input procedures.	
24. Run Babcock butterfat test.	
36. Interpret butterfat tests.	
45. Be aware of input changes for computer analysis.	
49. Correct computer print-out of herd or cow information.	
25. Conduct mastitis tests.	
35. Interpret mastitis test results.	
29. Maintain milk samples for later testing.	
26. Test solids (non-fat) by the Golding bead test.	
27. Know the physical properties of milk.	
23. Run TeSa butterfat test.	
28. Know the chemical properties of milk.	

Common Competencies

The second series of eight tables list the competencies under sub-cores within the eight major categories. Each table represents those competencies listed under the major cores of Animal Science, Plant Science, Mechanics, Business Management and Marketing, Merchandising, Clerical, Leadership and Miscellaneous (including Sanitation, Safety, Storage and Mathematics). Competencies in these tables were listed by mean from highest to lowest within sub-classifications.

In one instance the same competency appears in two places; "Explain equipment guarantee and warranty provisions". This was done since the competency was in a management context in one instance and in a selling context in another. Competencies in which a specific tool, instrument or piece of equipment were mentioned, regardless of their simplicity, were put into the Equipment Operation sub-core in the Mechanics Core.

It is suggested that the various codes, figures and appendix be used in the following manner: If the numbers (2-52) (1-801) appear after the competency, the reader would know from the study code, footnoted at the bottom of each table, that "2" referred to the Mechanics Study and "1" referred to the Production Study. The reader could then look in the appendix to locate the number range into which 52 falls and find the associated job title. He could then turn to the index of the Mechanics Study and find the table for that job title. It should also be noted that tables for the job titles "General Farm Worker - Beef", "General Farm Worker - Hogs", "General Farm Worker - Combination" (Livestock and Crops) do not appear in the Production Report as these job titles were referrals to competencies under "General Farm Worker - Livestock" and "General Farm Worker - Crop Production" (for General Farm Worker - Combination).

It will be almost imperative that the reader refer to Figure 5 to learn the proper job title according to industry when looking for job titles in the Agricultural Products Study.

Figures 1 - 6

The numbers in parentheses appearing in Tables 7 - 14 correspond to the study code and also to the figures. There is a figure for each study outlining the main job titles and other job title possibilities. It is suggested that the figures be referred to in order to ascertain the proper job titles for particular industries and studies. For example: A "Plant Worker" is a "Machine Bagger" in the bakery industry and a "Flour Packer" in the milling industry. In addition, there is a "Supervisor" in the Mechanics Study as well as the Products Study. It should also be noted that the job titles for the Grain, Feed and Seed Study are the same as those for the Supplies and Services study and depend upon the size of the center or elevator. We admit a weakness in these studies (Grain, Feed and Seed and Supplies and Services) that specific job titles were not identified.

MAIN AND SYNONYMOUS JOB TITLES	MAIN AND SYNONYMOUS JOB TITLES
Farm and Ranch Foreman (F&RF) F&RF General F&RF Crops F&RF Combination (Livestock and Crops) F&RF Livestock F&RF Unspecified General Farm Worker (GFW) GFW Livestock GFW Beef GFW Sheep GFW Diary - Milker GFW Combination (Livestock and Crops) GFW Crop Production (Field Crops & Grain) GFW Hay GFW Unspecified (Construction and Maintenance)	Agricultural Mechanic Artificial Inseminator Cook Cowboy Feedlot Manager Herdsman (Beef, Sheep, Swine) Irrigator Maid Machinery and Equipment Operator Truck Driver

Fig. 1.--Agricultural Production job title array.

MAIN AND SYNONYMOUS JOB TITLES	MAIN AND SYNONYMOUS JOB TITLES
Manager Supervisor Assistant Manager Shop Foreman Parts Manager Service Manager Mechanical Technician* Machinist Diesel Repair Man Salesman Parts Man Mechanic Service Technician	Welder Mechanic's Helper Clerical Worker Office Worker Bookkeeper Clerk Maintenance Man Delivery Man Yard Man Set-up Man Painter

* This job title is not listed in the competency core tables since in most shops this work goes outside to specialists.

Fig. 2.--Agricultural Mechanics job title array.

MAIN JOB TITLES	MAIN JOB TITLES
Small Elevator or Farm Center	Large Elevator or Center
Manager Second Man Helper Driver	Manager Assistant Manager Bookkeeper Dept. Manager - Feed Dept. Manager - Grain & Seed Dept. Manager - Fertilizers & Chem. Dept. Manager - Petroleum Products Dept. Manager - Parts and Services Retail Counterman Outside Retail Salesman - Feed, Fert. & Chem. Helper Driver
Medium-sized Elevator or Farm Center	
Manager Bookkeeper Counterman Sales and Service Representative Helper Driver	
Technical Specialists Veterinarian Elevator and Center Managers	

Fig. 3.--Grain, Feed and Seed job title array.

MAIN JOB TITLES	MAIN JOB TITLES
Small Elevator or Farm Center	Large Elevator or Center
Manager	Manager
Second Man	Assistant Manager
Helper	Bookkeeper
Driver	Dept. Manager - Feed
	Dept. Manager - Grain & Seed
	Dept. Manager - Fertilizers & Chem.
	Dept. Manager - Petroleum Products
Medium-sized Elevator or Farm Center	Dept. Manager - Parts and Services
	Retail Counterman
Manager	Outside Retail Salesman - Feed, Fert. & Chem.
Bookkeeper	Helper
Counterman	Driver
Sales and Service Representative	
Helper	
Driver	
Technical Specialists	
Veterinarian	
Elevator and Center Managers	

Fig. 4.--Agricultural Supplies and Services job title array.

MAIN AND SYNONYMOUS JOB TITLES	BAKERY	DAIRY	MEAT	MILL
*Supervisor	X	X	X	X
Plant Supervisor	X	X	X	
Production Superintendent	X	X	X	
Production Supervisor	X	X	X	
Milling Superintendent				X
*Plant Worker	X	X	X	X
Machinery Operator	X	X		
Machine Bagger	X			
Flour Packer				X
*Salesman-Driver	X	X		
Routeman	X	X		
Driver	X	X		
*Warehouseman	X	X		X
Receiving Clerk	X			
Cooler Man		X		
Dock Man		X		
*Shipping Clerk	X		X	
Mixer	X			
Divider Operator	X			
Molder Operator	X			
Bench Hand	X			
Baker-Retail	X			
Ovenman	X			
Handbagger	X			
Buttermaker		X		
Cheesemaker		X		
Lab Technician		X		
Pasteurizer		X		
Ice Cream Maker		X		
Butcher			X	
Meat Cutter			X	
Sausage Maker			X	
Render Operator			X	
Chemist				X
Miller				X
Assistant Miller				X
Grinder Operator				X
Buhr-Mill Operator				X
Whole Wheat Miller				X
Smutter				X
Grain Cleaner				X

* Common instrument for each job title administered across industries.

Fig. 5.--Agricultural Products job title array and the industries in which they are present.

MAIN JOB TITLES
Soil Conservation Technician
Civil Engineering Technician
Dairy Herd Improvement Supervisor
Federal Food Inspector*

* Competencies identified for job title not included in this study.

Fig. 6.--Agricultural Resources job title array.

Table 7 displays the animal science competencies by sub-cores and by certain job titles in accordance with the Arizona taxonomy.

Competencies in breeding, as would be expected, are the competencies associated with agricultural production job titles. An exception is the Dairy Herd Improvement Supervisor whose job title was included in the resources study.

Competencies in animal nutrition, though needed primarily by persons in agricultural production job titles, were quite important to persons employed in jobs in the grain, feed and seed industry and, to a lesser degree, in the supplies and services industries, and persons employed in job titles in the resources area.

Generally, animal care and handling competencies were essential to persons employed in agricultural production job titles. Competencies such as interpreting individual cow records, demonstrating cow sense and determining animal weights by using heart girth measurements, were important to job titles in the resources area.

Competencies concerned with identification and disease control were a major concern to persons employed in job titles in agricultural production. These same competencies were also necessary to persons employed in certain job titles in the grain, feed and seed and supplies and services businesses and, to a lesser degree, with persons employed in the resources area.

TABLE 7

ANIMAL SCIENCE COMPETENCIES
BY
SUB-CORES AND JOB TITLES

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles #
Breeding -Visually detect the various stages of the estrous cycle. (1-1413) -Assist in the delivery of new born livestock. (1-884, 883) -Detect livestock ready to lamb, calve or farrow. (1-882) -Evaluate potential genetic combinations from livestock records in planning breeding programs. (1-1699) -Know the functions of male and female reproductive organs. (1-1411) -Evaluate progeny from various breeding systems. (1-1701) -Initiate various livestock breeding systems. (1-1700) -Determine when animals should be bred. (1-900) -Pregnancy test livestock. (1-891, 1421) -Determine breeding cycles in dairy cattle. (6-58)	Artificial Inseminator (1) GFW-Livestock (1) Combination (1) Beef (1) Hay (1) Herdsman (1) Dairy Herd Impr. Sup. (6)
Nutrition -Use feed additives wisely. (1-1540) -Recommend feeding programs which will eliminate problems of chemical residues in meat, milk and eggs. (3-25) -Provide an adequate supply of uncontaminated water to livestock. (1-1535) -Recommend the use of additives and medications in compliance with FDA standards. (3-24) -Formulate feeds so as to balance economically grains grown on the farm. (3-6)	[See next page]

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 7 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Nutrition continued -Explain the purpose of feed additives and medications. (3-23) -Interpret worth of various feed ingredients. (1-1533) -Determine least cost rations for maximum growth, production and reproduction. (1-1530) -Determine needed feed additives to supplement rations. (1-1531) -Recommend feed additives and medication in relation to cost and suitability. (3-22) -Mix feed additives to insure proper nutrition. (1-906, 1538) -Read and explain the meaning of ingredients listed on a feed tag. (3-19) (1-913) -Evaluate livestock quality and recommend compatible feeding programs. (3-2) -Determine suitability of feeds for ruminants, nonruminants. (3-11) -Plan alternative feeding programs for different types of livestock using feeds available in the area. (3-5) -Substitute various feed ingredients in balancing rations. (3-20) -Compute feed required for pound of gain for each major livestock group. (3-21) -Determine the amount of water needed for livestock. (1-908) -Determine feed needs in terms of nutrients for growth, production and reproduction. (3-13) (1-905, 1529) -Classify feeds in terms of nutrients and energy value. (3-15) -Determine the quality of hay and silage in terms of feeding value (judgement, lab analysis, etc.). (3-7) -Fill feed troughs with grain and roughage. (1-907) -Balance rations for different types of livestock and poultry of various ages. (3-14) (1-910, 1532, 1704)	Artificial Inseminator (1) GFW - Livestock (1) Combination (1) Beef (1) Sheep (1) Hogs (1) Herdsman (1) Feedlot Manager (1) Dept. Mgrs.-G,F&S (3) (4) Lvst. & Crop. Prod. Counterman (3) (4) Helper (3) (4) Technical Experts (3) Dairy Herd Impr. Sup. (6)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 7 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Nutrition continued -Compute weight losses and gains of livestock. (1-912, 1539) -Determine when pastures should be rotated. (1-901) -Determine the form (pelleted, rolled, ground, etc.) in which feeds should be prepared for livestock and poultry. (3-12) (1-914, 1534) -Feed animals supplementary rations. (1-942) -Classify feeds according to mineral content. (3-16) -Modify feeding practices to increase livestock value. (1-911) -Compute the conversion of nitrogen from non-protein sources to protein. (3-18) -Trace the passage of feed through digestive processes of various animals. (3-10) -Set up appropriate creep feeders. (1-899) -Handle liquid feed additives. (1-1552) -Compute rations for dairy cows. (6-37) -Measure feed consumption. (6-38) -Analyze feeding practices in dairy production. (6-39) -Limit feed intake of animals through the use of feed additives. (1-1554)	Artificial Inseminator (1) GFW - Livestock (1) Combination (1) Beef (1) Sheep (1) Hogs (1) Herdsman (1) Feedlot Manager (1) Dept. Mgrs.-G,F&S (3) (4) Lvst. & Crop. Prod. Counterman (3) (4) Helper (3) (4) Technical Experts (3) Dairy Herd Impr. Sup. (6)
Animal Care and Handling -Feed cattle during cold weather. (1-1456) -Handle livestock in a quiet, easy manner. (1-1422) -Receive livestock into feedlot arriving in truck and by rail noting any problems for future claims. (1-1571) -Tend beef cattle on stock ranch. (1-1445) -Assist in lambing, docking and shearing animals. (1-941) -Weigh newly arrived livestock into feedlot. (1-1572)	[See next page]

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 7 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Animal Care and Handling continued -Make newly arrived livestock comfortable. (1-1573) -Sort livestock into pens on basis of size, sex and condition. (1-1574) -Ride over range to inspect cattle. (1-1455) -Read brands and animal identification systems. (1-902) -Mark animals by branding or tagging. (1-1575, 890, 1452) -Move herd or flock about areas assigned for grazing. (1-889, 1446) -Dispose of dead livestock in accordance with present health standards. (1-903, 1576) -Prevent animals from wandering or becoming lost. (1-937) -Alter animals by castration. (1-885, 1451) -Schedule fitting and feeding programs in advance of shows, fairs and sales so livestock are in condition. (1-1705) -Secure cow in stanchions. (1-973) -Assist with planning alternative systems of livestock management. (3-3) -Interpret individual cow records. (6-34) -Control herd or flock on range or pasture by tending them with trained dogs, horses or herders. (1-888, 938) -Manage livestock in stalls, pens or houses for confinement. (1-880) -Demonstrate cow-sense. (6-1) -Adjust thermostats to insure proper temperature and humidity for livestock confined in housing. (1-922) -Be familiar with animal anatomy. (5-551, 586)	Cowboy (1) GFW Sheep (1) Livestock (1) Beef (1) Combination (1) Hogs (1) Milker (1) Feedlot Manager (1) Dairy Herd Impr. Sup. (6) Butcher (5) Meat Cutter (5) Artificial Inseminator (1)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 7 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Animal Care and Handling continued -Shear without nicking or cutting skin of sheep. (1-950) -Understand proper care and maintenance of dairy herd. (6-57) -Secure animal in position for shearing. (1-946) -Remove needle teeth of pigs. (1-887) -Block animals by docking or clipping. (1-893, 895) -Determine animal weights by using heart girth measurement. (6-33) -Clamp metal rings into nostrils of animals for ease of handling. (1-892) -Wash animals. (1-894)	[See previous page]
Identification and Disease Control -Recognize stress demonstrated by behavior of animals. (1-1447) -Administer simple medication to animals by mouth or by use of a syringe or hypodermic needle. (1-918, 1542) -Follow directions of a veterinarian in treating livestock. (1-1551) -Determine the general condition of livestock. (1-916) -Identify symptoms in animal suffering injury, common diseases or other problems. (1-925, 1527, 1548) (3-27) (6-59) -Isolate stressed animals. (1-1448) -Apply medication to cuts and bruises. (1-919, 1543, 951) -Precondition animals for feedlot. (1-1553) -Prevent various venereal diseases through an immunization program. (1-1420) -Advise agricultural producers of standards governing the use of livestock health products. (4-106) -Set up hospital quarters for weak, injured or ill livestock. (1-924, 1528, 1547)	Cowboy (1) GFW Livestock (1) Beef (1) Combination (1) Milker (1) Hogs (1) Dairy Herd Impr. Sup. (6) Artificial Inseminator (1) Dept. Mgrs.-G,F&S (3) (4) Lvst. & Crop Prod. Counterman (3) (4) Helper (3) (4) Salesman (3) (4) Technical Experts (3)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 7 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Identification and Disease Control continued -Recommend appropriate animal health products. (4-105) -Identify symptoms in animals and birds suffering from deficiencies of essential nutritive elements in feeding rations. (3-26) (1-915) -Spray livestock with insecticide repellents. (1-920, 1544) -Administer medicine through feeds. (1-917, 1541) -Administer necessary shots, medicine, dips or spray. (1-1526, 976, 921, 1545, 1454 -Work with producers in developing animal health programs. (4-113) -Recommend treatment for animals and poultry suffering from parasites. (3-28) -Keep records on livestock to assist a veterinarian in injury, sicknesses and/or other problems. (1-926) -Recommend appropriate type and size of pet food health products and other equipment. (4-117) -Post animals or birds to determine internal parasites. (3-27) -Recognize symptoms of external parasites in dairy cattle. (6-60) -Recognize symptoms of internal parasites in dairy cattle. (6-61)	Cowboy (1) GFW Livestock (1) Beef (1) Combination (1) Milker (1) Hogs (1) Dairy Herd Impr. Sup. (6) Artificial Inseminator (1) Dept. Mgrs.-G,F&S (3) (4) Lvst. & Crop Prod. Counterman (3) (4) Helper (3) (4) Salesman (3) (4) Technical Experts (3)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

Table 8 presents a categorization of plant science competencies needed by persons employed in certain job titles.

The largest number of persons who need knowledge and skills in plant science are in production agriculture. The balance of the competencies are distributed among persons employed in job titles in Grain, Feed and Seed, Supplies and Services, Resources, Products and Mechanics. It would appear that any program training employees for these job titles should include instruction in plant science to include plant growth, seed propagation, fertilization and safety and use of agricultural chemicals.

TABLE 8

PLANT SCIENCE COMPETENCIES
BY
SUB-CORES AND JOB TITLES

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles #
General Knowledge -Understand the agricultural production practices of the community. (2-141) -Determine the desirable moisture level of hay for bailing, cropping, stacking or ensilage. (1-1030) -Compute weight loss incurred in drying grain. (3-28) -Stack bales or loose hay by hand or using farm machinery. (1-1031) -Compute cost of drying grain. (3-27) -Apply knowledge of all farm practices and products. (2-23) -Recognize poisonous plants. (1-940) -Determine the level of moisture in hay after cutting. (1-1029) -Recommend accepted crop management practices to improve volume of grain produced. (3-2) -Discuss crop harvesting practices. (2-158) -Determine the timeliness of crop harvest for optimum yields. (4-131) -Recommend appropriate garden and lawn cultural practices. (4-126) -Determine when crops are ready to harvest. (5-707) (1-1016) -Measure quantity of hay and/or silage in piles, bunkers or trucks. (1-1035) -Explain crop adaptation in terms of factor related to soil, climate and economics. (3-8) -Assist in planning alternative cropping systems. (3-5)	Salesman (2) Department Manager (3) (4) Retail Counterman (3) (4) Helper (3) (4) Manager (2) GFW Sheep (1) GFW Hay (1) All Mill (5) GFW Crop Production (1) Combination (1) Technical Experts (3)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 8 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
General Knowledge continued -Know where and how to obtain advanced information about improved crop production techniques. (5-706) (1-1015)	[See previous page]
Plant Growth -Determine the stage of maturity of the hay for cutting. (1-1028) -Discuss propagation, planting and transplanting of plants. (2-152) -Discuss plant breeding, selection and reproduction. (2-157) -Discuss pruning, thinning and training. (2-155) -Prepare seedbeds. (6-127, 332) -Recommend tillage operations. (6-130) (2-151) -Recommend planting operations. (6-131, 338) -Carry out tillage operations. (6-337) -Know the acceptable crop production techniques essential to the production of quality crops. (5-700) -Know stages and growth development of crop maturation. (5-703)	GFW Hay (1) Salesman (2) Civil Eng. Tech. (6) Soil Cons. Tech. (6) All Mill (5)
Seed Propagation -Analyze seed samples and properly label for sale. (3-55) -Test seed for germination. (3-50)	Dept. Mgr.-G,F&S (3) Retail Counterman (3) Helper (3)
Fertilization -Recommend a fertilizer program (timing, placement, etc.). (3-3) -Determine relative amounts of different kinds and types of fertilizers to be applied per acre. (3-6) -Formulate fertilizers to specification. (3-9) -Assist with planning alternative methods of fertilizer applications. (3-7)	Dept. Mgr.-G,S&F; Ag. Chem. & Fert. (3) Retail Counterman (3) Helper (3) Salesman (2) Technical Experts (3)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 8 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Fertilization continued -Substitute fertilizer ingredients according to economic and agronomic conditions. (3-11) -Formulate herbicide-fertilizer mixtures. (3-10) -Recondition fertilizers after lengthy storage. (6-25) -Discuss soil fertilization and plant nutrition. (2-156) -Explain the processes of manufacturing fertilizers. (3-8)	Dept. Mgr.-G,S&F; Ag. Chem. & Fert. (3) Retail Counterman (3) Helper (3) Salesman (2) Technical Experts (3)
Hazards - (Insects, Weeds, Damage and Contamination) -Identify various types of grain damage. (3-22) -Identify materials that might contaminate grain because of odors. (3-30) -Treat grain properly and safely for insect control. (3-37) -Identify sources of grain contamination and recommend complete programs of grain sanitation. (3-29) -Recommend programs for controlling stored grain insects. (4-136) -Identify various insects and crop diseases common to the trade area. (4-119) (1-1014) -Identify weeds and weed seeds commonly found in crops grown locally. (3-11) -Identify and classify insect damage. (3-29) -Identify seed-borne diseases. (3-52) -Understand weed control measures. (6-129, 331) (3-12) -Discuss weed, pest and disease prevention, control and eradication. (2-154) -Recognize and identify actual and potential crop hazards such as disease, weeds and insects. (5-705) -Understand weed growth habits. (6-128, 333)	Dept. Mgr.-G,S&F; Chem. & Fert. (3) Retail Counterman (3) Helper (3) All Mill (6) GFW Crop Production (1) Combination (1) Civil Eng. Tech. (6) Salesman (2) (3) Soil Cons. Tech. (6)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 8 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Agricultural Chemicals -Recommend proper time to use chemicals (weeds, crops, insects, etc.). (3-4) -Time chemical applications to avoid residue problems. (3-5) -Interpret chemical labels. (3-21) -Compute amounts of active ingredients of chemicals to be used. (3-22) -Recommend cultural and chemical control methods for insects and crop diseases. (4-120) (3-30) -Discuss with the customer, the residual effect of using farm chemicals. (4-123) -Name sources of information regarding laws and regulations governing the use of agricultural chemicals. (3-2) -Explain the function of various chemical elements in plant growth. (3-19) -Weigh and measure relatively small quantities of chemicals. (3-23) -Interpret the directions for the proper application of agri-chemicals. (5-704) -Advise customers as to fertilizers and chemicals. (5-710)	Dept. Mgrs. G,F&S (3) Ag. Chem. & Fert. (3) Lvst. & Crop Prod. (4) Retail Counterman (3) (4) Outside Salesman (3) Helper (3) (4) All Mill (6)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

Table 9 presents the common agricultural mechanics competencies according to selected sub-cores. Presented with each sub-core are those competencies performed by workers engaged in agricultural mechanics occupations as well as workers in other areas. Included in the right column of Table 9 are job titles used to describe workers who perform the competencies included under the respective sub-cores.

A review of the sub-cores presented in Table 9 show that the specificity of the sub-core is a strong indicator of the complexity of the competencies. The more general the sub-core, the more general the competencies. A further review of the table will show a much larger number of job titles outside the mechanical area are associated with the more general sub-cores as compared with the more specialized sub-cores.

For example, the "general knowledge" and "special equipment maintenance" sub-cores contain a large number of rather general mechanical competencies that might be included as a part of a variety of job titles while the sub-core "engine overhaul" contain more technical competencies performed by fewer workers employed in fewer agri-businesses.

A review of the entire table will show a very strong relationship between the competencies required by employees in the agri-mechanics business and employees doing mechanical work in the area of production agriculture.

TABLE 9

AGRICULTURAL MECHANICS COMPETENCIES
BY
SUB-CORES AND JOB TITLES

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles #
Agricultural Power and Machinery Repair and Maintenance - General Knowledge -Carry out pre-delivery service. (2-781) -Carry out delivery service. (2-782) -Recognize the need for keeping lubricants and fuels clean. (1-1201) -Service machinery and equipment according to operators manual. (1-1761) -Trouble shoot and identify operational problems. (2-345) (1-1199) -Identify component problems after disassembly. (2-346) (1-1200) -Maintain truck safety equipment. (2-766) (1-1384) -Advise on service problems. (2-79) -Demonstrate a basic understanding of parts. (2-336) -Recognize faulty truck operation. (2-770) -Demonstrate a working knowledge of adjustment, maintenance of crop harvesting equipment. (2-794) -Make preliminary equipment checks to determine need for repair. (2-327) (1-1178, 1378) -Repair equipment under field conditions. (2-325, 783) (1-1027, 1175) -Perform emergency roadside repairs (changing tires, installing bulbs, fuses and spark plugs). (1-1790) (2-743) -Inspect machinery for needed repair. (1-1379) -Winterize a truck (1-1390)	Set-up Man (2) Agricultural Mechanic (1) Mach. and Equip. Op. (1) Maintenance Man (2) Supervisor (2) GFW Hay (1) Truck Driver (1) Mechanic's Helper (2) Partsman (2) Dept. Mgr.-Pet. Prod.; Parts and Serv. (4) Retail Counterman (4) Delivery Driver (4) Painter (2) Welder (2) Salesman (2) Soil Cons. Tech. (6) Civil Eng. Tech. (6)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Agricultural Power and Machinery Repair and Maintenance - General Knowledge continued -Clean machinery prior to disassembly or clean component parts. (2-331, 559) (1-1182) -Inspect and service light duty trucks. (2-742) -Perform minor adjustments of farm machinery. (2-761) -Repair farm machinery. (2-760) -Recondition worn equipment. (1-1177) -Replace worn machinery parts. (2-762) -Maintain shop equipment. (2-97, 328, 558) (1-1179) -Repair brake assemblies. (2-343) (1-1198) -Disassemble, pack and replace wheel bearings. (1-1202, 1386)(2-550) -Diagnose problems in hydraulic power transfer systems. (2-88) -Diagnose problems relating to diesel engine tune-up. (2-91) -Diagnose problems in mechanical power transfer systems. (2-89) -Perform minor tune-up of vehicles and tractors. (2-759) -Diagnose problems relating to gasoline engine tune-up. (2-90) -Install wheel bearings. (2-347, 551) -Demonstrate a working knowledge of agricultural machinery service department operating procedures. (2-232) -Demonstrate a working knowledge of hydraulic power transfer systems. (2-792) -Recommend vehicle service based on manufacturer's recommendations. (4-99) -Bleed brake lines. (2-573) (1-1392) -Clean and sharpen hand tools. (2-755) -Use grease removers. (2-624) -Perform minor maintenance on lights. (4-98c)	Set-up Man (2) Agricultural Mechanic (1) Mach. and Equip. Op. (1) Maintenance Man (2) Supervisor (2) GFW Hay (1) Truck Driver (1) Mechanic's Helper (2) Partsman (2) Dept. Mgr.-Pet. Prod.; Parts and Serv. (4) Retail Counterman (4) Delivery Driver (4) Painter (2) Welder (2) Salesman (2) Soil Cons. Tech. (6) Civil Eng. Tech. (6)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources

#Numbers after job titles correspond to Study Codes and Figure numbers.

PREFACE

In the spring of 1970, a statewide study to determine the nature and extent of rural youth and adult education and employment opportunities in agri-business and agricultural production was undertaken by the Department of Agricultural and Industrial Education.

Two of the five phases of the study have been completed. The results of these studies appear in the following ten reports available from the Office of the Superintendent of Public Instruction, Helena, Montana, 59601 and on microfiche in the library reference source, Educational Resource Information Center (ERIC):

PHASE I - 1970-1971 (To assess current and projected manpower needs in agri-business and agricultural production).

(ED 069 874) - Ag-Business Manpower Project Manual
(ED 069 872) - Ag-Business Manpower Project Report
(ED 069 875) - Agricultural Producers' Manpower Project Manual
(ED 069 873) - Agricultural Production Manpower Report

PHASE II - 1972-1973 (To determine the knowledge, skills and attitudes needed by potential employees in order to qualify for available jobs in agriculture).

(ED 086 809) - A Study to Determine Competencies Needed by Employees Entering Agricultural Supplies and Services Occupations
(ED 086 810) - A Study to Determine Competencies Needed by Employees Entering the Grain, Feed and Seed Business
(ED 090 422) - A Study to Determine Competencies Needed by Employees Entering Agricultural Production Occupations
(ED 090 423) - A Study to Determine Competencies Needed by Employees Entering Agricultural Mechanics Occupations

[The above reports are also available on interlibrary loan from the Creative Arts Library of Montana State University.]

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Agricultural Power and Machinery Repair and Maintenance - General Knowledge continued -Perform minor maintenance on coolants. (4-98d) -Clean disassembled components for inspection. (2-332, 560) (1-1186) -Sharpen hand metal working tools. (2-730) -Demonstrate a working knowledge of hydraulic power transfer systems. (2-231) -Demonstrate the use of the water paste test. (4-73) -Demonstrate a working knowledge of adjustment, maintenance and repair of tillage, planting, spraying and fertilizing machinery. (2-233, 793) -Demonstrate a working knowledge of mechanical power transfer systems. (2-230, 791) -Identify broken and badly worn parts. (2-606) -Perform minor maintenance on shock absorbers. (4-98f) -Demonstrate a working knowledge of tractor tune-up and maintenance. (2-235) -Demonstrate a working knowledge of diesel engine systems. (2-237) -Reline brakes. (1-1391) -Perform minor maintenance on mufflers. (4-98g) -Demonstrate a working knowledge of gasoline tractor engine systems. (2-236) -Demonstrate a working knowledge of adjustment, maintenance and repair of crop harvesting machinery. (2-234) -Maintain diesel engines. (2-150) -Make minor repairs to vehicles. (6-318) (1-1788) -Maintain large gas engines. (2-149) -Carry out minor maintenance on vehicles. (6-122, 319) (2-758)	Set-up Man (2) Agricultural Mechanic (1) Mach. and Equip. Op. (1) Maintenance Man (2) Supervisor (2) GFW Hay (1) Truck Driver (1) Mechanic's Helper (2) Partsman (2) Dept. Mgr.-Pet. Prod.; Parts and Serv. (4) Retail Counterman (4) Delivery Driver (4) Painter (2) Welder (2) Salesman (2) Soil Cons. Tech. (6) Civil Eng. Tech. (6)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Agricultural Power and Machinery Repair and Maintenance - General Knowledge continued -Maintain small gas engines. (2-148) -Explain the theory of using liquified petroleum gas as fuel. (4-57) -Explain the principles of a 4-stroke cycle engine. (4-55) -Explain the principles of a 2-stroke cycle engine. (4-56) -Make minor repairs to truck. (6-119, 314)	[See previous page]
Agricultural Power and Machinery Repair and Maintenance - Engine Overhaul -Check bearing clearance during installation. (2-452) -Check and measure crankshaft main and rod journals. (2-440) -Replace rear engine oil seal. (2-430) -Install rod bearings. (2-450, 447) (1-1291) -Adjust valve clearance. (2-444) (1-1277) -Install and torque connecting rod caps. (1-1292) (2-451) -Replace oil seals. (1-1196, 1289) (2-448) -Install timing chain or gears. (2-456) (1-1296) -Replace oil pan gasket assembly. (2-429) (1-1274) -Start an engine after storage. (1-1183) -Install and torque main bearings and caps. (1-1288, 1290) (2-449) -Replace piston rings. (2-439) (1-1285, 1293) -Remove, inspect and replace intake manifold. (2-428) (1-1273) -Test engine compression. (2-348) (1-1276) -Measure camshaft for wear. (2-454) (1-1294) -Replace camshaft bearings. (2-455) (1-1295) -Remove carbon from ring grooves. (2-555) (1-1281) -Clean pistons. (2-566)	Mechanic (2) Agricultural Mechanic (1) Mechanic's Helper (2)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Agricultural Power and Machinery Repair and Maintenance - Engine Overhaul continued -Torque cylinder heads. (1-1271) -Disassemble and inspect a cylinder head. (1-1263) -Clean oil passages. (2-556) (1-1284) -Ream cylinder ridge. (1-1275) -Clean cylinder blocks. (2-564) -Check piston ring end gap. (1-1283) -Determine the valve stem guide clearance. (1-1264) -Install a crankshaft. (1-1287) -Replace rocker arms. (1-1268) -Check condition of lifter and push rod. (1-1269) -Hone cylinder. (1-1279) -Measure ring land clearance. (1-1282) -Remove piston rings. (2-565) (1-1278) -Measure cylinder taper and roundness. (1-1280) -Reface valves and valve seats. (1-1270) -Replace valve guides. (1-1265) -Grind valves. (1-1267) -Test valve springs. (1-1266) -Measure cylinder head and block warpage. (1-1272)	Mechanic (2) Agricultural Mechanic (1) Mechanic's Helper (2)
Agricultural Power and Machinery Repair and Maintenance - Steering Systems -Service power steering. (1-1350) -Adjust power steering linkage. (1-1351)	Agricultural Mechanic (1)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Agricultural Power and Machinery Repair and Maintenance - Charging Circuit -Test, replace and adjust the generator or alternator regulator. (2-376) -Replace bearing. (2-381) -Trouble shoot and identify problems in a charging circuit. (2-377) (1-1233) -Replace generator brushes. (2-379) (1-1235) -Replace generator bushings. (1-1236) -Replace bearing brushes and turn slip rings. (2-385) -Replace and adjust voltage regulator. (1-1234) (2-387) -Check armature and fields. (1-1237) -Turn down comutator. (1-1239) -Undercut mica on generator armature. (1-1238)	Mechanic (2) Agricultural Mechanic (1)
Agricultural Power and Machinery Repair and Maintenance - Gasoline Fuel System -Clean and replace oil in oilbath air cleaners. (2-397, 547) (1-1246) -Adjust carburetor float. (2-406) -Clean carburetor. (2-404) -Replace fuel filters. (2-399, 549) (1-1250) -Service a dry element air cleaner. (2-398, 548) (1-1248) -Check gas lines, fittings and repair leaks. (1-1256) -Replace fuel pump. (2-400) (1-1251) -Adjust engine idle. (2-403) (1-1254) -Adjust carburetor idle air/fuel mixture. (2-402) (1-1253) -Install carburetor kit. (2-405) (1-1255)	Mechanic (2) Mechanic's Helper (2) Agricultural Mechanic (1)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Agricultural Power and Machinery Repair and Maintenance - Gasoline Fuel System continued -Replace carburetor jets. (2-408) -Test a fuel pump. (1-1252) -Clean fuel lines. (2-569) -Clean and flush fuel tanks. (2-568)	Mechanic (2) Mechanic's Helper (2) Agricultural Mechanic (1)
Agricultural Power and Machinery Repair and Maintenance - Diesel Fuel System -Bleed a diesel fuel system. (2-418, 557) (1-1260) -Replace diesel fuel filters. (2-412) (1-1257) -Service diesel fuel filters. (2-579) -Remove, clean and replace injector nozzle. (1-1258) -Service and maintain turbochargers. (1-1261) -Analyze the operation of the diesel injector nozzle. (1-1259) -Repair turbochargers. (1-1262)	Mechanic (2) Mechanic's Helper (2) Agricultural Mechanic (1)
Agricultural Power and Machinery Repair and Maintenance - Final Drive -Service and adjust final drives. (1-1357) -Trouble shoot final drives. (1-1359) -Repair final drives. (1-1358)	Agricultural Mechanic (1)
Agricultural Power and Machinery Repair and Maintenance - Lubrication System -Change oil filters. (2-460, 553, 572) (1-1301) -Drain and refill engine oil. (2-461, 552, 571, 754) (4-96, 97) (1-1197)	[See next page]

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Agricultural Power and Machinery Repair and Maintenance - Lubrication System continued	
-Lubricate machinery and equipment. (2-335, 562, 763) (1-1189, 1789, 1382) (4-61) -Perform minor maintenance with lubrication, oil and grease changes. (4-98e) -Service and repair oil coolers. (2-459) (1-1300) -Perform minor maintenance on filters. (4-98h) -Service and replace oil pumps. (1-1298) -Check and adjust engine oil pressure. (1-1299)	Mechanic (2) Mechanic's Helper (2) Agricultural Mechanic (1) Dept. Mgr.-Pet. Prod. (4) Retail Counterman (4) Delivery Driver (4) Maintenance Man (2) Truck Driver (1)
Agricultural Power and Machinery Repair and Maintenance - Storage Battery	
-Check specific gravity of electrolyte. (2-585) -Clean battery, cables, terminals and battery box. (2-582) -Add battery water. (2-586) -Charge or recharge a wet cell battery. (2-353, 543, 753) (1-1207) -Determine correct electrolyte level of a battery. (1-1206) (2-349, 540) -Tighten battery cables and battery hold-down. (2-583) -Treat battery terminals to prevent corrosion. (2-584) -Activate dry-charged batteries. (2-587) -Clean and maintain a wet cell battery. (1-1208) -Demonstrate a fundamental knowledge of tires and batteries. (4-84) -Perform minor maintenance on a battery. (4-98b) -Run a load test on a battery to determine serviceability. (2-352)	Mechanic's Helper (2) Mechanic (2) Maintenance Man (2) Agricultural Mechanic (1) Dept. Mgr.-Pet. Prod. (4) Retail Counterman (4) Delivery Driver (4)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Areas and Competencies - Study Code* and Competency Number	Job Titles#
Agricultural Power and Machinery Repair and Maintenance - Hydraulic System -Maintain oil level in hydraulic system. (1-1328) -Drain, clean, flush and refill hydraulic system. (1-1334) (2-590, 485) -Change hydraulic filters. (2-491, 591) -Clean hydraulic system breather cap or air vent. (1-1331) -Replace hydraulic fittings. (2-484) (1-1332) -Stop leaks in hydraulic system. (1-1335) -Replace hydraulic "0" rings. (1-1333) -Make hydraulic hose connections. (1-1337) -Clean and replace hydraulic lines. (1-1339) -Bleed hydraulic system. (1-1343) -Clean hydraulic relief valves. (1-1321) -Clean hydraulic systems orafices. (1-1340) -Service and repair external hydraulic pumps. (1-1318) -Service and repair hydraulic valves. (1-1322) -Analyze malfunction of hydraulic valves. (1-1323) -Service hydraulic motors. (1-1329) -Maintain hydraulic cylinders. (2-481) (1-1327) -Repair hydraulic cylinders. (1-1326) -Analyze malfunctions of hydraulic pumps. (1-1320) -Determine hydraulic cylinder displacement. (1-1324) -Repair hydraulic motors. (1-1330) -Service and repair internal hydraulic pumps. (1-1319) -Determine hydraulic cylinder lift force. (1-1325) -Service and adjust hydraulic assist transmission. (1-1338) -Explain the theory of hydraulics. (4-60)	Agricultural Mechanic (1) Mechanic's Helper (2) Mechanic (2) Dept. Mgr.-Pet. Prod. (4) Retail Counterman (4) Delivery Driver (4)

*1-Production 2-Mechanical 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Agricultural Power and Machinery Repair and Maintenance - Power-Train -Service and repair drive shafts. (2-526) -Service and repair U-joints. (2-525) -Check for external oil leaks. (1-1344) -Adjust clutch free travel. (1-1313) -Adjust wheel brakes. (1-1347) -Check rear wheel brakes. (1-1346) -Drain and refill transmissions. (2-588) (1-1348) -Check wear in axle bearings. (1-1345) -Determine cause of backlash, clearance or "play" in gear train. (1-1354) -Adjust power take off clutch. (1-1349) -Repair hydraulic assist transmissions. (1-1341) -Trouble shoot hydraulic assist transmissions. (1-1342)	Mechanic (2) Agricultural Mechanic (1) Mechanic's Helper (2)
Agricultural Power and Machinery Repair and Maintenance - Governing Systems -Identify governor malfunctions. (1-1317) -Service an engine governor and linkage. (1-1315) -Repair an engine governor. (1-1316)	Agricultural Mechanic (1)
Agricultural Power and Machinery Repair and Maintenance - Exhaust System -Replace exhaust system. (1-1247) -Drill and tap broken exhaust and manifold studs. (1-1249)	Agricultural Mechanic (1)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Agricultural Power and Machinery Repair and Maintenance - Power Take-Off -Service and adjust power take-offs. (1-1360) -Trouble shoot power take-offs. (1-1362) -Repair power take-offs. (1-1361)	Agricultural Mechanic (1)
Agricultural Power and Machinery Repair and Maintenance - Cooling System -Test radiator coolant. (2-578) -Inspect and replace damaged water hoses. (2-576) -Remove, adjust and/or replace fanbelts. (2-367, 546, 581) (1-1222) -Replace radiator hose. (2-369, 554) (1-1224) -Identify faulty fanbelts. (2-368, 580) (1-1223) -Replace engine thermostat. (2-371) (1-1229) -Replace water pump. (2-372) (1-1231) -Clean and flush a cooling system. (2-563) (1-1228, 1230) -Test cooling system for leaks. (2-370) (1-226) -Flush and clean radiator. (2-374) -Test thermostat. (2-373, 577) -Replace cooling system thermostat. (2-575) -Repair radiator leaks. (1-1225) -Test radiator pressure caps. (2-574)	Mechanic's Helper (2) Mechanic (2) Agricultural Mechanic (1)
Agricultural Power and Machinery Repair and Maintenance - Ignition Circuit -Replace distributor points and condenser. (2-360) (1-1216) -Remove, clean and evaluate sparkplugs. (2-355, 544) (1-1212)	[See next page]

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Agricultural Power and Machinery Repair and Maintenance - Ignition Circuit continued -Regap and test sparkplugs. (2-545, 356) (1-1213) -Replace primary and secondary ignition cables. (2-364) (1-1220) -Remove and replace ignition distributor. (2-359) (1-1215) -Test and/or replace ignition coil. (2-357) (1-1214) -Replace ignition wires. (2-570) -Adjust vacuum advance. (1-1218) -Trouble shoot and identify ignition problems. (2-354) (1-1211)	Mechanic (2) Agricultural Mechanic (1) Mechanic's Helper (2)
Agricultural Power and Machinery Repair and Maintenance - Starting Circuit -Check armature and fields. (2-393) -Replace starter drive. (2-396) -Trouble shoot starter problems. (2-389) (1-1241) -Remove and replace starter motors. (2-388) (1-1240) -Replace bearings and bushings. (2-392) (1-1243) -Replace starter brushes. (2-390) (1-1242) -Replace starter motor solenoid. (2-395) (1-1244) -Replace bendix gear. (1-1245)	Mechanic (2) Agricultural Mechanic (1)
Agricultural Power and Machinery Repair and Maintenance - Differentials -Analyze the failure of gear or bearing. (2-512) -Drain and refill differentials. (2-589) -Adjust or replace differentials. (1-1355) -Trouble shoot differentials. (1-1356)	Mechanic (2) Mechanic's Helper (2) Agricultural Mechanic (1)

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Agricultural Power and Machinery Repair and Maintenance - Belts, Chains, Gears and Clutches -Adjust V-belts for tension. (1-1306) -Adjust belt tension. (1-1397) -Correctly line up a chain and sprocket. (1-1310) -Maintain and adjust safety clutches. (1-1312) -Adjust or replace clutch assembly. (1-1303) -Adjust high speed chains. (1-1309) -Adjust and repair slip clutches. (1-1314) -Repair roller chains. (1-1308) -Perform minor maintenance on fan belts. (4-98i) -Trouble shoot clutch problems. (1-1302) -Repair hook link chains. (1-1307) -Prepare chains for storage. (1-1311) -Determine sizes and speeds of pulleys. (1-1304)	Agricultural Mechanic (1) Dept. Mgr.-Pet. Prod. (4) Retail Counterman (4) Delivery Driver (4)
Agricultural Power and Machinery Repair and Maintenance - Braking System -Replace brake shoes. (1-1353) -Adjust brake for travel. (1-1352)	Agricultural Mechanic (1)
Agricultural Power and Machinery Repair and Maintenance - Tires -Keep tires properly inflated. (1-1387, 1205) (2-768) -Check air pressure in tires. (2-339) (1-1192) -Recognize the cause of tire wear. (1-1193) -Inspect tires, batteries and other automotive, truck and tractor accessories to determine adjustment or replacement. (4-85)	[See next page]

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Agricultural Power and Machinery Repair and Maintenance - Tires continued -Mount and service tires, batteries and other automotive, truck and tractor accessories. (4-88) -Check tires for defects. (2-338) (1-1191) -Change tires. (6-120, 315) (2-751) (1-1204) -Rotate tires according to manufacturer's instructions. (1-1388) -Repair tires and tubes. (4-87, 98) (2-769) (1-1389) -Check tire wear. (2-340)	Agricultural Mechanic (1) Maintenance Man (2) Mechanic (2) Dept. Mgr.-Pet. Prod. (4) Retail Counterman (4) Delivery Driver (4) Civil Eng. Tech. (6) Soil Cons. Tech. (6)
Special Equipment Maintenance -Care for and maintain scales. (3-39) -Adjust and maintain mowers and swathers. (1-1369) -Care for and maintain engineering equipment. (6-150) -Adjust and maintain planting equipment. (1-1366) -Adjust and maintain disc tillage equipment. (1-1373) -Test, repair or replace relief valves if necessary. (4-71) -Adjust and maintain cultivating equipment. (1-1367) -Recognize malfunction of surveying instruments. (6-132, 341) -Adjust and maintain combines. (1-1372) -Provide maintenance to milking machine as recommended by manufacturer's operators manual. (1-983) -Adjust and maintain balers. (1-1370) -Maintain a high pressure chemical sprayer. (1-1380) -Grind cutter bits for the metal lathe. (1-1150) -Adjust and maintain plows. (1-1368) -Calibrate a chemical sprayer. (1-1381) -Connect sanitary pipe between cream storage vat and churn. (5-352)	[See next page]

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Special Equipment Maintenance continued -Report malfunctions of machinery to supervisor. (5-81, 213, 79) -Adjust and maintain loose hay stacking system. (1-1374) -Clean grinders, meat containers. (5-612) -Adjust and maintain field choppers. (1-1371) -Keep blades of freezers sharp and honed. (5-493) -Have the ability to adequately steel or hone a knife to sharpen. (5-553, 588) -Adjust and clean survey instruments. (6-133, 342) -Make minor adjustments to machinery. (5-82) -Clean ovens. (5-262) -Repair air compressing equipment. (2-629, 628) -Observe malfunction of the machine. (5-212) -Hook bag under end of screen to catch refuse. (5-789) -Detect when grinding rollers need to be replaced. (5-796) -Lubricate equipment. (5-90, 633, 263, 264) -Repair machinery. (5-83, 634) -Maintain and sharpen clippers and shears. (1-948) -Nail covers on wooden crates. (5-156) -Replace worn grinding rollers with hand tools. (5-797)	Dept. Mgr.-G,F&S (3) Retail Counterman (3) (4) Helper (3) Agricultural Mechanic (1) Civil Eng. Tech. (6) Dept. Mgr.-Pet. Prod. (4) Delivery Driver (4) Soil Cons. Tech. (6) GFW Milker (1) GFW Unspecified (1) Buttermaker (5) Plant Worker (5) Molder Operator (5) Meat Cutter (5) Ice Cream Maker (5) Butcher (5) Ovenman (5) Sausage Maker (5) GFW Sheep (1) Shipping Clerk (5)
Basic Agricultural Shop Skills - Welding (General Skills - Arc and Acetylene Welding) -Strike an arc and run a bead. (1-1120) -Properly connect a welder and the electrodes. (1-1114) -Determine the kind of metal to be welded. (1-1119, 1133) -Cut thin steel with an acetylene cutting torch. (2-657) -Pierce and cut holes. (2-661)	[See next page]

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Basic Agricultural Shop Skills - Welding continued	
(General Skills - Arc and Acetylene Welding)	
-Cut thick steel with acetylene torch. (2-658)	
-Cut chamfers (bevels) with acetylene torch. (2-659)	
-Prepare ferrous (iron) metal for arc and acetylene welding. (2-678)	GFW Unspecified (1)
-Demonstrate a basic proficiency in acetylene welding. (1-1363, 1365) (2-528, 610)	Welder (2)
-Demonstrate a basic proficiency in arc welding. (2-529, 611) (1-1364)	Agricultural Mechanic (1)
-Demonstrate a basic proficiency in fabrication welding. (2-530, 87)	Mechanic (2)
-Perform carbon arc cutting. (2-663)	Painter (2)
-Perform metal electrode arc cutting. (2-664)	
(Brazing)	
-Braze ferrous (iron) materials. (2-647)	Welder (2)
-Braze weld. (1-1135)	GFW Unspecified (1)
-Braze metal. (2-609)	Painter (2)
-Braze non-ferrous (non-iron) materials. (2-648, 656)	
(Welding Positions, Joints and Processes)	
-Weld in vertical, horizontal and overhead positions. (1-1123) (2-645, 646, 674, 675)	GFW Unspecified (1)
-Weld in flat positions. (2-644, 670, 640, 673) (1-1121)	Welder (2)
-Make fillet welds in the flat and horizontal positions. (1-1122) (2-643, 672)	
-Make lap joint welds. (2-641)	
-Make outside corner welds. (2-642)	

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Basic Agricultural Shop Skills - Welding continued (Welding Positions, Joints and Processes) -Arc weld corner joint in flat position. (2-671)	[See previous page]
(Special Welding Applications) -Arc weld cast iron. (2-705) (1-1124) -Arc weld high-carbon steel. (1-1125) -Weld galvanized steel. (2-704) -Cut cast iron and steel with electric arc. (1-1127) -Carbon arc weld. (2-676) -Perform air arc cutting. (2-665) -Arc weld brass. (2-708) -Arc weld copper. (2-707) -Build up worn parts; hard surfacing. (1-1126) -Apply hardfacing materials. (2-649) -Hard surface with the oxyacetylene torch. (1-1136) -Silver braze. (1-1137)	Welder (2) GFW Unspecified (1)
Basic Agricultural Shop Skills - Woodwork and Farm Carpentry -Measure and mark wood. (1-1046) -Bore and drill holes in wood. (1-1050) -Plane and smooth wood. (1-1048) -Shape curved and irregular surfaces. (1-1052) -Cut common rafters. (1-1053) -Build stairs and steps. (1-1054)	GFW Unspecified (1)

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Basic Agricultural Shop Skills - Leather Work	GFW Unspecified (1)
-Clean, oil and preserve leather. (1-1062)	
-Splice leather using a waxed thread. (1-1061)	
Basic Agricultural Shop Skills - Pipe Work and Simple Plumbing	
-Cut a gasket. (1-1092)	
-Take care of automatic water system. (1-1096)	
-Repair leaky valves and faucets. (1-1094)	GFW Unspecified (1)
-Remove section of defective pipe. (1-1093)	Dept. Mgr.-Pet. Prod. (4)
-Cut and fit tubing and pipe needed in making liquified petroleum gas installations. (4-82)	Retail Counterman (4)
-Install couplings, valves and measuring gauges needed for liquified petroleum installation. (4-83)	Delivery Driver (4)
-Repair pumps. (1-1095)	Welder (2)
-Measure and cut pipe. (1-1087) (2-660)	
-Thread pipe. (1-1089)	
-Use copper tubing. (1-1091)	
-Ream pipe. (1-1088)	
Basic Agricultural Shop Skills - Soldering and Sheet Metal	
-Clean the surfaces that are to be soldered. (1-1073)	
-Clean, tin and use soldering irons. (1-1074)	
-Solder different metals. (1-1075)	GFW Unspecified (1)
-Solder small holes. (1-1076)	
-Solder seams or joints. (1-1078)	
-Solder patch large holes. (1-1077)	
-Repair tubing. (1-1079)	

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Basic Agricultural Shop Skills - Soldering and Sheet Metal -Cut sheet metal. (1-1082) -Lay out sheet metal work project. (1-1081) -Form sheet metal joints. (1-1083) -Rivet sheet metal. (1-1084)	GFW Unspecified (1)
Basic Agricultural Shop Skills - Electrical Work and Electric Motors -Replace fuses. (1-1104) -Protect electric motors against overload. (1-1106) -Align electric motor. (1-1396) -Clean and lubricate electric motors. (1-1107, 1398, 1394) -Attach wires to terminals. (1-1100) -Properly mount electric motors. (1-1393) -Splice electric wires. (1-1098) -Repair electric cords. (1-1102) -Wire simple circuits. (1-1105) -Figure electric motor pulley size and speeds. (1-1108) -Know electrical terminology such as: volts, amps, watts ohms. (1-1097) -Charge a storage battery. (1-1110) -Make extensions of an existing wiring system. (1-1111) -Clean motor commutator. (1-1395) -Reverse electric motor. (1-1399) -Change electric motors from 120 to 240 volts. (1-1400) -Install an electric fence. (1-1112) -Demonstrate the various types and sizes of electric motors on the basis of bearing type, protective devices and motor mounts. (4-138)	GFW Unspecified (1) Agricultural Mechanic (1) Retail Counterman (4) Helper (4) Dept. Mgr.-Parts & Serv.(4) Delivery Driver (4)

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Basic Agricultural Shop Skills - Electrical Work and Electric Motors continued	
-Understand the fundamentals of electricity. (4-59)	[See previous page]
-Connect dry cells. (1-1109)	
Basic Agricultural Shop Skills - Farm Blacksmithing	
-Bend and straighten iron. (1-1160)	
-Temper metal to desired hardness. (1-1163)	GFW Unspecified (1)
-Heat iron in a forge. (1-1158)	
-Build and maintain a forge fire. (1-1157)	
-Draw and upset iron. (1-1161)	
-Work tool steel. (1-1162)	
Basic Agricultural Shop Skills - Concrete Work	
-Protect concrete while curing. (1-1069)	
-Build and prepare forms. (1-1067)	
-Properly mix materials into concrete. (1-1065)	GFW Unspecified (1)
-Reinforce concrete. (1-1066)	
-Determine the proportions of materials for mixing concrete. (1-1064)	
-Place concrete. (1-1068)	
-Remove concrete forms. (1-1070)	
-Set bolts in concrete that has already hardened. (1-1071)	
Basic Agricultural Shop Skills - Rope Work	
-Finish the ends of a rope. (1-1057)	GFW Uspecified (1)
-Make hitches. (1-1058)	
-Splice rope. (1-1059)	
-Make rope halters. (1-1060)	

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Basic Agricultural Shop Skills - Cold Metal Work -Drill holes in metal. (1-1145) -Lay out and mark metal. (1-1140) -Distinguish between different kinds of iron and steel. (1-1139) -File metal. (1-1142) -Bend cold metal. (1-1146) -Thread metal. (1-1148) -Rivet metal. (1-1147)	GFW Unspecified (1)
Equipment, Supplies and Materials Recommendations and Selections -Select appropriate machinery lubricants. (1-1375, 1297) (4-62, 90, 92) -Select proper equipment to combat fire. (3-58) -Select the proper electrodes for all types of arc welding. (2-669) (1-1116) -Recommend filters for tractors, trucks and cars based on manufacturer's recommendations. (4-93) -Recommend crop varieties that will maximize returns in terms of yield and market acceptance. (3-3) -Recommend transmission and differential oils based on manufacturer's recommendations. (4-89) -Recommend hydraulic fluid based on manufacturer's recommendations. (4-91) -Recommend type, size and quality of tires, batteries and other accessories according to manufacturer's recommendations. (4-86) -Select correct fuse size. (1-1103) -Recommend crop and seed varieties appropriate to area. (4-124) -Recommend lubrication equipment needed for farm use. (4-77)	Agricultural Mechanic (1) Dept. Mgr.-Pet. Prod. (4) Lvstk.&Crop Prod. Parts & Serv. Retail Counterman (3) (4) Delivery Driver (4) All Job Titles (3) Welder (2) GFW Unspecified (1) Dept. Mgr.-G,F&S (3) Helper (3) Shipping Clerk (5) Soil Consv. Tech. (6) All Mill (5) Technical Specialist (3)

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Equipment, Supplies and Materials Recommendations and Selections continued -Select correct types and sizes of V-belts. (1-1305) -Select wire sizes. (1-1099) -Recommend appropriate type and size of livestock feeding and watering equipment needed by various livestock feeding and watering operations. (4-103) -Determine proper radiator cap. (1-1227) -Select pipe and pipe fittings for a job. (1-1086) -Recommend the kinds of equipment commonly needed in a grain, feed, seed and fertilizer facility. (3-14) -Recommend garden seed varieties which are appropriate to area. (4-125) -Recommend equipment for livestock confinement, handling and weighing. (4-109) -Recommend the appropriate types and size of power tools needed for welding. (4-154g) (1-1130, 1117, 1115) -Recommend appropriate types and size of livestock equipment needed for castrating, docking, marking, clipping and fitting. (4-110) -Select appropriate fasteners (nails, hinges, etc.). (1-1051) (4-155a, 155b) -Determine electric motor size and type to meet customers' needs. (4-137) -Select drilling equipment. (1-1144) (4-154d) -Recommend fencing materials such as wire, posts, gates. (4-104) -Recommend the appropriate types of paints and other finishing materials. (4-155d) -Select kinds and grades of lumber for a job. (1-1045) (4-155f[1])	Agricultural Mechanic (1) Dept. Mgr.-Pet. Prod. (4) Lvstk.&Crop Prod. Parts & Serv. Retail Counterman (3) (4) Delivery Driver (4) All Job Titles (3) Welder (2) GFW Unspecified (1) Dept. Mgr.-G,F&S (3) Helper (3) Shipping Clerk (5) Soil Consv. Tech. (6) All Mill (5) Technical Specialist (3)

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Areas and Competencies - Study Code* and Competency Number	Job Titles#
Equipment, Supplies and Materials Recommendations and Selections continued -Determine type and size of water pump to use under varying conditions. (4-144) -Recommend the appropriate types and size of hand tools needed for farm machinery. (4-153j) -Recommend size and type of pipe to use in farmstead watering systems. (4-146) -Recommend electric fence controllers, wires, posts and insulators. (4-103) -Recommend the appropriate types and size of hand tools needed for welding. (4-153g) -Recommend the appropriate types and size of hand tools needed for fencing. (4-153k) -Select pre-assembled containers. (5-154) -Recommend the appropriate types and size of power tools needed for power machinery. (4-154h) -Recommend the appropriate types and size of hand tools needed for electrical work. (4-153b) -Recommend appropriate types and size of grain box canvas covers. (4-134) -Recommend the appropriate materials for adhesives. (4-155o) -Recommend the appropriate types and size of hand tools needed for power machinery. (4-153i) -Recommend the appropriate types and size of connectors. (4-155e) -Select materials for concrete. (1-1063) (4-155f[7], 155f[5]) -Recommend the appropriate types and size of hand tools needed for carpentry work. (4-153a)	Agricultural Mechanic (1) -Dept. Mgr.-Pet. Prod. (4) Lvstk.&Crop Prod. Parts & Serv. Retail Counterman (3) (4) Delivery Driver (4) All Job Titles (3) Welder (2) GFW Unspecified (1) Dept. Mgr.-G,F&S (3) Helper (3) Shipping Clerk (5) Soil Consv. Tech. (6) All Mill (5) Technical Specialist (3)

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Equipment, Supplies and Materials Recommendations and Selections continued -Select pipe tools for the shop. (1-1085) (4-154b) -Recommend the appropriate types and size of hand tools needed for plumbing work. (4-153c) -Recommend the appropriate types and size of power tools needed for motor and machine testing equipment. (4-154i) -Recommend water spreading systems. (6-463) -Recommend the appropriate types and size of materials for reinforcement iron: (4-155[8]) -Recommend appropriate types and size of equipment for pleasure horses. (4-116) -Recommend the appropriate types and size of power tools needed in electrical work. (4-154c) -Recommend the appropriate types and size of insulation. (4-155f[2]) -Recommend the appropriate types and size of shingles. (4-155f[4]) -Recommend the appropriate types and size of building paper. (4-155f[3]) -Recommend the appropriate types and size of plastics. (4-155f[10]) -Recommend the appropriate types and size of power tools needed for carpentry work. (4-154a) -Recommend the appropriate types and size of power tools needed for sheet metal work. (4-154e) -Recommend the appropriate types and size of hand tools needed for cold metal work. (4-153d) -Recommend the appropriate types and size of tile. (4-155f[9])	Agricultural Mechanic (1) Dept. Mgr.-Pet. Prod. (4) Lvstk.&Crop Prod. Parts & Serv. Retail Counterman (3) (4) Delivery Driver (4) All Job Titles (3) Welder (2) GFW Unspecified (1) Dept. Mgr.-G,F&S (3) Helper (3) Shipping Clerk (5) Soil Consv. Tech. (6) All Mill (5) Technical Specialist (3)

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Equipment, Supplies and Materials Recommendations and Selections continued -Recommend the appropriate types and size of hand tools needed for masonry work. (4-153L) -Recommend the appropriate types and size of hand tools needed for sheet metal work. (4-153e) -Recommend the appropriate types and size of hand tools needed for hot metal work. (4-153f) -Recommend the appropriate types and size of power tools needed for hot metal work. (4-154f) -Recommend the appropriate types and sizes of hand tools needed for leather work. (4-153h) -Recommend the appropriate types and sizes of rock. (4-155f[6]) -Select blacksmithing equipment for the farm shop. (1-1156) -Select sprays and dusts for the appropriate cropping practice. (6-701)	[See previous page]
Equipment Operation - Various Specialized Equipment -Remove milking machine cups when milking is completed. (1-978) -Attach milking machine cups to teats of the cow. (1-977) -Tend and operate milking machine. (1-979) -Use fire-fighting equipment provided. (4-60) (1-1168) -Operate seed-treating and seed-cleaning equipment. (3-51) -Operate air powered tools. (2-777) -Operate the various pumps and valves needed to deliver and store bulk petroleum products safely and efficiently. (4-69) -Operate diesel engine equipment. (2-147, 790)	[See next page]

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Equipment Operation - Various Specialized Equipment continued -Operate and adjust equipment commonly used in a grain, feed, seed and fertilizer facility. (3-15) -Operate a high pressure washer. (2-604) -Demonstrate the ability to operate the service station's gasoline and diesel pumps. (4-95) -Saw wood with hand and power saws. (1-1047, 1143) -Operate large gas engine equipment. (2-146, 789) -Operate a transit. (6-136, 344) -Pull curd knives through curd. (5-397) -Observe thermometer and regulate heat. (5-399) -Measure areas with a planimeter and/or scale. (6-149) -Use dumpy and hand level. (6-145, 368, 373) -Know the several processes in starting the mill. (6-743) -Operate a steam cleaner. (2-567, 600, 750) -Measure aerial photographs with a planimeter. (6-416) -Operate centrifuges. (5-419) -Use standard and special tools and equipment needed for installing and removing liquified petroleum gas containers. (4-81) -Operate homogenizers. (5-447) -Use level to obtain percent of slope. (6-156, 355) -Use planimeter to determine drainage areas. (6-191, 433) -Operate timing pumps. (5-446) -Tend stationary or rotary hearth oven that bakes bread, pastries, etc. (5-251) -Observe the overall automatic operation of the oven loading and unloading. (5-255) -Operate mixer. (5-626, 615, 170, 276)	GFW Milker (1) GFW Hay (1) All Job Titles (4) GFW Unspecified (1) Set-up Man (2) Salesman (2) Painter (2) Lab Technician (5) Civil Eng. Tech. (6) Soil Cons. Tech. (6) Cheesemaker (5) Miller (6) Mechanic's Helper (2) Pasteurizer (5) Ovenman (5) [Continued on following page]

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Equipment Operation - Various Specialized Equipment continued -Operate small gasoline engines. (2-788, 144) -Operate a forklift. (2-747, 776, 136) -Read gauges for temperature and moisture control. (5-618, 374, 644) -Use scale and graduated containers. (5-274) -Use planimeter to determine areas of reservoir sites. (6-183, 435) -Operate a heavy duty jack. (2-605) -Operate grinders or blenders. (5-417) -Operate spirit level. (6-163) -Separate curds with hand scoop to release whey. (5-398) -Cut cold metal with cold chisel. (1-1141) -Use leveling instruments, hand level, plaintable, transit for running ditches. (1-1733) -Operate agitator. (5-418, 393) -Use a knife skillfully. (5-552, 587) -Explain and demonstrate liquified petroleum equipment to customers. (4-80) -Use planimeter to determine flood and sediment storage areas. (6-192, 434) -Cut dough into uniform portions with knife or hand-powered divider. (5-234) -Operate pre-breaker for condemned carcasses. (5-641) -Observe the operation of auxillary equipment. (5-749) -Operate machinery essential in the flour sifting process. (5-757) -Put on chains. (6-121, 316) -Buck bales into a wagon or a truck using a hand hook. (1-1033) -Dump ingredients into mixing machine, bowl or steam kettle. (5-275)	[Continued from previous page] Sausage Maker (5) Mixer (5) Plant Worker (5) Buttermaker (5) Irrigator (1) Butcher (5) Meat Cutter (5) Bench Hand (5) Baker-Retail (5) Render Operator (5) Ice Cream Maker (5) Pasteurizer (5) Smutter (5) GFW Sheep (1) Shipping Clerk (5) Buhr-Mill Operator (5)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Equipment Operation - Various Specialized Equipment continued -Place dough on pans, molds or sheets. (5-279) -Spray paint. (2-787) -Operate a gasoline blow torch. (1-1072) -Operate ovens. (5-420, 280) -Use the alidade and planetable to make surveys. (6-167) -Operate one or more continuous freezers and other equipment. (5-470) -Operate vacuum pasteurizer. (5-450) -Use power equipment (grinder, cubing machine, power saw). (5-569, 648, 625) -Assemble pipes, fittings and equipment for operation using a wrench. (5-489) -Operate silent cutter (blender). (5-627) -Cut wood with chisels. (1-1049) -Operate pumps. (5-475) -Plot map using planetable. (6-158, 357) -Understand the operation of equipment that uses liquified petroleum gas as fuel. (4-58) -Use an alidade for topographic mapping. (6-159, 358) -Use hand cutting tools (knife, cleaver, saw, etc.). (5-568) -Apply glaze, icings or other topping to baked goods using spatula or brush. (5-284) -Insert pans of raised dough in oven to bake using peel or hook. (5-239) -Observe flow entering machines to prevent over-loading. (5-791) -Operate hasher and washer. (5-649) -Insert novelty dies in filler head to separate flavors and form center designs. (5-486)	[See previous pages]

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Equipment Operation - Various Specialized Equipment continued -Shear wool from sheep using power driven clippers or hand shears. (1-947) -Operate condensers. (5-421) -Remove baked goods from oven with hook and place them on tiered racks. (5-257) -Operate vibrating screens. (5-422) -Bend containers with metal tape by hand or machine. (5-187) -Cut iron using hardy. (1-1159) -Control reel or conveyor type oven. (5-259) -Operate a metalworking lathe. (1-1149, 1151, 1152, 1154, 1153) -Operate strapping machine. (5-157) -Bake on a grill. (5-281) -Recut grooves in mill stones using grinder, power drill or hammer and chisel. (5-769)	[See previous pages]
(Conveyors, Trolleys, Hoists, etc.) -Operate overhead hoist. (2-775) -Stop conveyor and remove clogged material. (5-746) -Feed products onto conveyors; hoppers. (5-94) -Feed carton into machine and remove them from discharge conveyor. (5-91) -Directly place materials or products on trucks using either hands, hoists or winches. (5-76, 134) (1-1791) -Start, stop and regulate speed of the conveyor belt. (5-292, 744) -Place materials or products on conveyors, pallets or plastic trays. (5-75)	Butcher (5) Meat Cutter (5) Shipping Clerk (5) Miller (6) Plant Worker (5) Warehouseman (5) Truck Driver (1) Hand Bagger (5)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Equipment Operation - Various Specialized Equipment continued (Conveyors, Trolleys, Hoists, etc.) -Convey materials and items from receiving or production areas to storage by hand or using machinery. (5-74, 133, 160, 574, 593)	[See previous page]
Equipment Operation - Testing and Analysis Devices -Use balances, moisture testers, screens and dockage machines used in grading grain. (3-25) -Operate and read devices for detecting heating of grain in storage (hot spots). (3-35) -Set ignition timing using a timing light. (2-363) (1-1219) -Use a hydrometer to determine the specific gravity of a battery. (2-350, 541) (1-1209) -Use testing equipment. (5-373) -Have the ability and knowledge to operate balances to weight materials. (5-733, 193) -Set breaker point dwell using a dwell meter. (1-1217) -Use micrometer and plastigage to check crankshaft main and rod journal clearance. (1-1286) -Determine the voltage of a battery using the voltmeter. (2-351, 542) (1-1210) -Measure shaft RPM with a tachometer. (1-1185) -Test charging circuit using a voltmeter or ammeter. (1-1232) -Determine resistance using ohmmeter. (2-365) (1-1221) -Operate a hydraulic tester. (1-1336) -Diagnose an engine with an analyzer. (1-1195) -Operate an exhaust analyzer. (1-1194) -Make accurate measurements using micrometers. (1-1155, 1184)	Dept. Mgr.-G,F&S (3) Retail Counterman (3) Helper (3) Mechanic (2) Agricultural Mechanic (2) Mechanic's Helper (2) Buttermaker (5) Chemist (5) Divider Operator (5) GFW Unspecified (1) Dairy Herd Imp. Sup. (6)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Equipment Operation - Testing and Analysis Devices continued -Have the ability and knowledge to operate a digester to perform protein tests. (5-730) -Use a strip cup to detect udder infections. (6-56)	[See previous page]
Equipment Operation - Major Equipment -Drive a vehicle with varying forward speeds. (1-1780) -Adjust farm implements under field conditions for maximum efficiency. (1-1764) (3-6) -Operate an automobile. (6-9) -Operate light duty trucks. (2-740) -Operate farm machinery and power units under a variety of field conditions. (1-1762) -Operate power machinery. (1-1181, 997) (2-330, 24, 752) -Attach accessory equipment to basic farm power unit. (1-1763) -Operate equipment on and off roads through all kinds of traffic and terrain, in all weather conditions for the purpose of hauling passengers and cargo. (1-1778, 998) -Equip and handle trucks in adverse weather conditions (sanding equipment and chains). (1-1784) -Operate a truck at the proper speed and distance in the harvesting operation so the combine can maintain constant operations and does not need to stop to unload. (1-1783) -Drive a truck. (6-118, 313) (5-111, 113) (2-765) -Drive a truck under 3 tons to transport materials in liquid or package form. (1-1781) -Calibrate farm implements to apply specific amounts of chemicals. (3-24)	Dept. Mgr.-G,F&S (3) Retail Counterman (3) Helper (3) Truck Driver (1) Machinery & Equip. Opr.(1) Dairy Herd Imp. Sup. (6) Maintenance Man (2) Agricultural Mechanic (1) GFW Crop Production (1) Combination (1) Mechanic (2) Manager (2) Civil Eng. Tech. (6) Salesman-Driver (5) Technical Specialist (3)

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Equipment Operation - Major Equipment continued	
-Drive a truck under 3 tons to transport personnel to and from specific destinations. (1-1782)	[See previous page]
-Understand the operation of tillage equipment. (6-125, 329)	
-Understand the operation of planting equipment. (6-124, 328)	
-Understand the operation of harvesting equipment. (6-126, 330)	
-Drive a snow cat. (6-317)	
Equipment Operation - Welding and Related Activities	
-Adjust acetylene torch to neutral, carbuerized and oxidized flame. (2-636)	
-Cut using oxyacetylene flame. (1-1138)	
-Set up and operate oxyacetylene equipment. (1-1132)	
-Operate a DC motor driven welder. (2-666)	
-Make acetylene welds with filler rod. (2-639)	
-Operate a transformer type AC welder. (2-668)	
-Operate drill presses. (2-729)	Welder (2)
-Operate an acetylene torch. (2-608)	GFW Unspecified (1)
-Operate power grinders. (2-725, 731)	Painter (2)
-Operate an acetylene generator. (2-637)	
-Solder with welding equipment. (1-1080)	
-Make acetylene welds without the use of welding rod. (2-638)	
-Operate a rectifier type AC-DC arc welder. (2-667)	
-Use the carbon arc torch. (1-1129)	
-Operate a power hacksaw. (2-723)	
-Operate an automatic cutting device. (2-662)	
-Operate a notching machine. (2-726)	
-Operate a forge. (2-724)	

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Equipment Operation - Office Machines	Feedlot Manager (1)
-Use an adding machine. (2-161, 244, 279)	Manager (2)
-Operate a cash register. (2-164, 242, 277)	All Job Titles (3)
-Use the telephone to transact business. (6-14, 103, 303) (2-31) (3-51) (4-36)	Salesman (2)
	Partsman (2)
	Clerical Worker (2)
-Operate calculating and bookkeeping machines. (2-264, 162)	Dairy Herd Imp. Sup. (6)
-Operate office machines. (2-269) (1-1524) (4-37)	Civil Eng. Tech. (6)
-Use a computer. (2-163)	Soil Cons. Tech. (6)
Equipment Operation - Starting, Stopping, Adjusting, Regulating, etc.	
-Turn controls to achieve specified temperature. (5-180)	
-Turn valves and regulate gauges to regulate temperature. (5-376)	Mixer (5)
-Adjust machine when units vary from standard. (5-194)	Buttermaker (5)
-Open chute or conveyor to add materials. (5-748)	Divider Operator (5)
-Adjust timing and temperatures for different products for uniform merchandise. (5-261)	Miller (5)
	Ovenman (5)
-Observe and adjust gauges and turn valves to regulate heat or humidity of oven. (5-254)	Cheesemaker (5)
	Plant Worker (5)
-Start pump to convey sterile solution through equipment. (5-353)	Pasteurizer (5)
-Adjust valves to fill vat with milk. (5-390)	Sausage Maker (5)
-Adjust conveyors or control valves, spouts, etc. to regulate flow of product. (5-86)	Lab Technician (5)
	Ice Cream Maker (5)
-Open churn. (5-360)	Bench Hand (5)
-Start machine to mix ingredients for specific times. (5-178)	Smutter (5)
-Start churn. (5-356)	Buhr-Mill Operator (5)
-Know the operation of machinery to adjust pressure, etc. (5-445)	
-Regulate temperatures. (5-449)	
-Stop machines. (5-80)	

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Equipment Operation - Starting, Stopping, Adjusting, Regulating, etc. continued -Regulate gauges. (5-519) -Start machines. (5-78, 624) -Turn valves. (5-177) -Adjust handcrank to adjust capacity of dividing compartments. (5-191) -Adjust laboratory apparatus. (5-416) -Turn valves to regulate flow of air, water or oil to meet laboratory specifications. (5-754) -Regulate feeder mechanism of machines not equipped with automatic regulators. (5-755) -Adjust controls to obtain specified freezing temperature, air pressure and machine speed. (5-484) -Adjust filler head to insure proper amount of product in each container. (5-487) -Adjust drafts or thermostatic controls to regulate oven temperature. (5-240, 283) -Start beater, scraper and expeller blades to mix contents. (5-482) -Regulate valves to force mix into freezer barrels. (5-479) -Regulate valve to transfer contents to filling machine to fill cartons, cups, cones or molds. (5-485) -Flip switch to position hearth for loading and unloading when tending rotary hearth oven. (5-258) -Turn valves and regulate gauges to regulate flow of water, refrigerant and butter oil through chilling vat. (5-377) -Open valves. (5-84) -Adjust speed of feeding conveyor on dividing machine. (5-192)	Mixer (5) Buttermaker (5) Divider Operator (5) Miller (5) Ovenman (5) Cheesemaker (5) Plant Worker (5) Pasteurizer (5) Sausage Maker (5) Lab Technician (5) Ice Cream Maker (5) Bench Hand (5) Smutter (5) Buhr-Mill Operator (5)

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Equipment Operation - Starting, Stopping, Adjusting, Regulating, etc. continued	
-Adjust slides in bin spouts. (5-782)	Mixer (5)
-Open and close slides in spouts to route grain to various grinders and sifters. (5-783)	Buttermaker (5)
-Start elevator to route grain from storage bins to machines. (5-784)	Divider Operator (5)
-Adjust valves to regulate water temperature and level in washer. (5-785)	Miller (5)
-Adjust valves to adjust air suction to remove dust from separators. (5-786)	Overman (5)
-Turn wingnuts to adjust angle of separator screens according to grain flow and amount of refuse. (5-788)	Cheesemaker (5)
-Start machine to process grain. (5-790)	Plant Worker (5)
-Adjust feed chutes to regulate flow of grain to rollers. (5-792)	Pasteurizer (5)
-Adjust tension on drive belts, conveyors or chains. (5-89)	Sausage Maker (5)
-Adjust valves to regulate flow of air through drier. (5-787)	Lab Technician (5)
-Turn wheels to adjust pressure of grinding stones to achieve specified fineness of meal. (5-766)	Ice Cream Maker (5)
	Bench Hand (5)
	Smutter (5)
	Buhr-Mill Operator (5)
Equipment Operation - Manuals, Parts Lists, Journals, Tables, etc.	Set-up Man (2)
-Follow assembly procedure prescribed by the manufacturer. (2-779)	Partsman (2)
-Read and follow parts bulletin. (2-223)	GFW Hay (1)
-Maintain parts catalog. (2-203)	Machinery & Equip. Op. (1)
-Use the parts catalog to determine stock number and replacement part. (2-209)	Truck Driver (1)
-Be familiar with the operator's manual for the equipment operated. (1-1026, 1760, 1776)	Agricultural Mechanic (1)
-Consult operators manual for lubrication instructions. (1-1377, 1376)	Salesman (2)
	Manager (2)
	[Continued on next page]

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Equipment Operation - Manuals, Parts Lists, Journals, Tables, etc. continued -Interpret labels, tags and charts on merchandise. (2-169) -Read and follow technical service manuals. (2-13, 66, 134, 222, 329, 780) (6-16, 173, 372) (1-1180, 1519) -Use catalogs to determine parts specifications. (4-78) -Read and understand trade magazines. (2-183) -Read and interpret standard tables. (6-141) -Use parts catalog and a parts price list. (2-117, 210) -Read and interpret guides and procedural manuals. (6-367) -Use electrician's Underwriters Code Book. (1-1101)	[Continued from previous page] Dairy Herd Imp. Sup. (6) Supervisor (2) Civil Eng. Tech. (6) Feedlot Manager (1) Dept. Mgr.-Petro. Prod. (4) Parts, Serv. (4) Retail Counterman (4) Delivery Driver (4) GFW Unspecified (1)
Equipment Operation - Machinery Set-up and Assembly -Assemble oxyacetylene welding equipment. (2-635) -Set up a transit. (6-135, 343) -Assemble pipe and pipe fittings. (1-1090) -Assemble machinery. (5-448) -Set up laboratory apparatus. (5-415) -Assemble freezer. (5-490) -Assemble wooden or cardboard containers. (5-153) -Set up power clipper unit and other equipment used in shearing sheep. (1-945)	Welder (2) Civil Eng. Tech. (6) Soil Cons. Tech. (6) GFW Unspecified (1) Pasteurizer (5) Lab Technician (5) Ice Cream Maker (5) Shipping Clerk (5) GFW Sheep (1)
Agricultural Buildings and Conveniences - Construction -Plan a feedlot for maximum efficiency. (1-1555) -Construct a feedlot corral system. (1-1556) -Construct a feedlot scale system. (1-1557) -Construct a feedlot water system. (1-1558)	[See next page]

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Agricultural Buildings and Conveniences - Construction continued. -Construct a feedlot feed processing, handling and storage systems. (1-1560) -Construct a feedlot electrical system. (1-1559) -Design appropriate catch pens and holding equipment for artificial insemination. (1-1414) -Construct appropriate quarters for lambing, calving and farrowing. (1-886) -Construct feedlot pen surfaces. (1-1562) -Construct walls around feedlot. (1-1563) -Lay out and erect a small building. (1-1055) -Interpret blueprints to determine a bill of materials. (4-130) -Read blueprints. (2-727) (1-1056) -Plan and develop mechanical feeding systems. (1-909) (3-4) -Construct livestock housing. (1-1561)	Feedlot Manager (1) Artificial Inseminator (1) GFW Livestock (1) Beef (1) Hogs (1) Combination (1) Unspecified (1) Retail Counterman (4) Helper (4) Welder (2) Technical Experts (3)
Agricultural Buildings and Conveniences - Maintenance and Repair -Inspect fences to determine necessary repairs. (1-1453) -Keep fences, buildings and equipment in a good state of repair. (1-923, 1567) -Repair buildings and equipment. (1-1203)	Cowboy (1) GFW Livestock (1) Beef (1) Hogs (1) Combination (1) Agricultural Mechanic (1) Feedlot Manager (1)
Agricultural Buildings and Conveniences - Housekeeping -Keep department clean, orderly and attractive. (2-227) -Maintain cleanliness of service and sales area. (4-102) -Practice good housekeeping around the bulk service plant. (4-74)	[See next page]

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number*	Job Titles#
Agricultural Buildings and Conveniences - Housekeeping continued -Develop an organized system of housekeeping for the business. (4-51) -Maintain cleanliness in the work area. (2-334, 561) (1-1169, 1170, 1188) -Maintain appearance of the sales room and sales lot. (2-108) -Arrange parts room for efficient use. (2-241) -Organize a facility for effective merchandising. (2-6) -Organize shop equipment to enable easy location of tools. (1-1166) -Clean livestock pens and housing. (1-881) -Clean storage area. (5-578, 597)	Partsman (2) All Job Titles (3) (4) Mechanic (2) Mechanic's Helper (2) GFW Unspecified (1) Agricultural Mechanic (1) Salesman (2) Manager (2) GFW Livestock (1) Beef (1) Hogs (1) Combination (1)
Soil and Water Management - General -Interpret SCS standards and specifications. (6-102, 302) -Determine compliance with cost shared practices. (6-394) -Report supporting data for cost sharing. (6-101, 301) -Report compliance with conservation practices installed. (6-100, 300) -Do progress coding. (6-325)	Civil Eng. Tech. (6) Soil Cons. Tech. (6)
Soil and Water Management - Soils -Take soil samples for fertilizer analysis. (3-14) -Recommend treatment to adjust pH to appropriate levels. (3-17) -Explain the importance of soil pH to plan adaptability. (3-18) -Identify soil deficiencies from symptoms of growing plants. (3-20) -Test soils for pH levels. (3-16)	[See next page]

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Codes and Competencies - Study Code* and Competency Number	Job Titles#
Soil and Water Management - Soils continued	
-Interpret soil symbols. (6-400)	
-Identify soil and water problems. (6-407, 183) (3-9)	
-Read and interpret soil maps. (6-175, 424)	Soil Cons. Tech. (6)
-Interpret a soil survey (6-399)	Civil Eng. Tech. (6)
-Determine the adaptability of soils to crops to be grown. (3-7)	Dept. Mgr.-Fert. & Chem.(3)
-Determine soil depths. (6-425)	Outside Salesman (3)
-Determine soil texture grade. (6-186)	Retail Counterman (3)
-Determine soil texture. (6-427)	Helper (3)
-Take a soil sample. (6-185, 422)	Technical Specialist (3)
-Determine water movement in the soil. (6-426)	
-Determine soil texture grade. (6-423)	
-Collect soil samples. (6-398)	
-Run soil test. (6-184, 421)	
Soil and Water Management - Irrigation Systems and Practices	
-Survey irrigation ditches. (6-200, 461)	
-Understand various irrigation systems. (6-211, 469)	
-Survey drainage ditches. (6-199, 460)	
-Explain how to control irrigation water. (6-457)	Civil Eng. Tech. (6)
-Stake water drainage ditches. (6-452)	Soil Cons. Tech. (6)
-Discuss irrigation and drainage problems. (6-210, 468) (2-153)	Retail Counterman (4)
-Advise producers as to water use. (6-196)	Helper (4)
-Explain proper irrigation procedures. (6-456)	
-Inspect construction of open drains. (6-466)	
-Determine best method of applying irrigation water. (6-459)	
-Solve irrigation problems. (6-458)	

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Soil and Water Management - Irrigation Systems and Practices continued	
-Determine the capacity of water pumps for delivery of a given volume of water. (4-143)	
-Determine the amount of water that will be needed for irrigation. (4-148)	
-Determine effect of existing water rights. (6-201)	Civil Eng. Tech. (6)
-Demonstrate a basic understanding of water law. (6-202)	Soil Cons. Tech. (6)
-Plan field drain ditches. (6-451)	Retail Counterman (4)
-Design and layout water diversion ditches. (6-454, 198, 197)	Helper (4)
-Plan surface water drainage. (6-464)	
-Layout tile drains. (6-453)	
-Compare the relative advantage of different types and sizes of sprinkler irrigation systems. (4-150)	
-Design open drains. (6-465)	
-Survey for flood control. (6-462)	
-Determine size of tile drain pipe. (6-455)	
Soil and Water Management - Watershed	
-Define drainage areas on maps. (6-187)	
-Survey for flood control. (6-190)	
-Design range livestock watering devices. (6-195)	
-Explain how to prepare a site for a farm pond. (6-448)	Civil Eng. Tech. (6)
-Survey the watershed for a pond site. (6-446)	Soil Cons. Tech. (6)
-Select a farm pond site. (6-445)	
-Layout grassed waterways. (6-189, 442)	
-Locate grassed waterways. (6-429)	
-Design a spillway for a farm pond. (6-447)	

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number-	Job Titles#
Soil and Water Management - Watershed continued	
-Design grassed waterways. (6-188, 430)	Civil Eng. Tech. (6)
-Determine grassed waterway dimensions. (6-431)	Soil Cons. Tech. (6)
-Calculate water run off. (6-443)	
-Determine watershed runoff. (6-444)	
-Determine appropriate shape for grassed waterways. (6-432)	
Soil and Water Management - Conservation Practices	
-Read aerial photographs. (6-414)	
-Locate contour lines. (6-378)	
-Interpret aerial photographs. (6-415)	
-Work with producers in determining conservation practices. (6-181)	
-Explain the value of a farm and ranch conservation plan. (6-406)	
-Interpret land use capabilities. (6-401)	
-Assist in the development of a farm plan. (6-402)	
-Assist district conservationist in pre-planning conservation activities. (6-392)	Soil Cons. Tech. (6) Civil Eng. Tech. (6)
-Identify land capabilities classes. (6-174, 388)	
-Inspect and advise suggested practices. (6-411)	
-Follow-up application of applied practices. (6-180)	
-Establish contour strip cropping. (6-179, 379)	
-Prepare land capability maps. (6-408)	
-Compute areas of contour strips. (6-385)	
-Explain terrace construction procedure. (6-387)	
-Recommend contour cultivation. (6-397)	
-Determine range carrying capacity. (6-403)	
-Inventory range conditions. (6-404)	
-Make snow survey. (6-418)	

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#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 9 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Soil and Water Management - Engineering Practices -Plot data. (6-147) -Place stakes. (6-139) -Make elementary drawings. (6-142) -Run cross-sectional surveys. (6-153, 352) -Plot cross-section and profiles. (6-165, 365) -Serve as a chainman. (6-138, 369) -Serve as rodman. (6-137, 362) -Determine plot elevations. (6-161, 360) -Determine plot distances. (6-160, 359) -Sketch contours. (6-162, 361) -Make topographic surveys. (6-157, 356) -Measure horizontal distances by chaining. (6-374) -Set grade stakes. (6-155, 354) -Set alignment stakes. (6-154, 353) -Use simple drafting procedures. (6-144) -Draw simple curves. (6-148) -Mark and set grade stakes. (6-363) -Make overlays. (6-164, 364) -Use basic lettering. (6-143) -Run work limit boundary. (6-151) -State a contour line. (6-375) -Pound stakes. (6-349) -Stake terraces. (6-376) -Run centerlines and baselines. (6-152, 351) -Locate and stake a terrace line. (6-345) -Handle bits. (6-348)	Civil Eng. Tech: (6) Soil Cons. Tech. (6)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

Arrayed in Table 10 are those agricultural business management and marketing competencies needed by agri-business employees according to selected sub-cores. The job titles associated with this set of competencies are generally in the areas of management and supervision or are very closely associated with business management. Therefore, the competencies reflect a need for a considerable amount of knowledge about economics as well as business and personal management for those employees in the upper levels of the business. It should also be noted that, within the (almost all) sub-cores, job titles appear that represent all agri-business areas studies.

TABLE 10

AGRICULTURAL BUSINESS MANAGEMENT AND MARKETING COMPETENCIES
BY
SUB-CORES AND JOB TITLES

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles #
General Management -Develop objectives for the business that can be used by management to promote business growth. (2-5) -Determine feed supply needed well in advance of feedlot demands. (1-1536) -Manage feedlot manure handling problems. (1-1566) -Understand federal and state laws regarding grain, feed, seed and fertilizer business. (3-9) -Recognize the conditions and circumstances requiring immediate attention and labor. (1-809) -Develop management objectives for promoting business growth. (4-3) -Negotiate sales contracts. (2-43) -Recognize the need to change managerial practices when necessary. (1-805) -Understand sales policies of the business. (2-135) -Understand the legal responsibility of a business serving the public. (3-8) (4-5) -Interpret company policies. (2-50, 64) -Establish and enforce safety regulations. (2-39, 65) -Explain and use contracts and other legal instruments needed in the business operation. (3-43) -Use records as an aid in measuring goal achievement. (1-801)	Manager (2) Feedlot Manager (1) All Job Titles (3) (4) F& R Foreman (1) Supervisor (2) Salesman (2) Supervisor (5) Dairy Herd Impr. Sup. (6)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 10 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
General Management continued -Distinguish the difference of highest yield and most efficient yield in production. (1-808) -Explain equipment warranty and guarantee provisions. (2-95) -Understand the types of business organization. (3-1) -Recognize the legal implications to business with regard to the Occupational Safety and Health Act. (4-4g) -Analyze sales reports. (2-45, 47) -Understand the advantages and disadvantages of different types of business organization. (3-2) -Understand and be able to apply the basic requirements for starting a business. (3-6) -Estimate amount of sales. (2-46) -Recognize the legal implications to business with regard to pricing laws. (4-4d) -Recognize the legal implications to business with regard to Feed and Drug Laws. (4-4e) -Formulate store security policies. (2-17) -Make estimates of potential sales in your area. (2-176) -Identify the legal responsibilities of a business serving the public. (2-25, 145, 35) -Manage office functions. (2-7) -Have a knowledge of all production processess. (5-20) -Explain how environmental factors affect the feed efficiency of livestock enterprises. (3-9) -Recognize the legal implications to business with regard to pollution laws. (4-4f) -Plan and develop production procedures. (5-26)	Manager (2) Feedlot Manager (1) All Job Titles (3) (4) F&R Foreman (1) Supervisor (2) Salesman (2) Supervisor (5) Dairy Herd Impr. Sup. (6)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 10 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
General Management continued -Coordinate all activities of production. (5-21) -Oversee sanitation standards. (5-31) -Consult with company executives. (5-24) -Originate and assess measures to designate or improve production methods, equipment performance and product quality. (5-27) -Oversee the maintenance of plant equipment. (5-36) -Be familiar with plant lay-out. (5-22) -Interpret production records. (6-32) -Requisition supplies. (5-55) -Be familiar with production capacities of each department. (5-23) -Be knowledgeable about all machinery used in the plant. (5-30) -Recognize the legal implications to business with regard to labor laws. (4-4a) -Recognize the legal implications to business with regard to transportation laws. (4-4c) -Describe the types of business organizations (individual owner, partnership, cooperative or corporation. (4-1) -Be aware of raw material sources and supply. (5-28) -Direct quality control. (5-37) -Recognize the legal implications to business with regard to tax laws. (4-4b) -Confer with department heads to formulate programs regarding availability of raw materials. (5-25) -Make modifications in machines and equipment. (5-38) -Prepare time and costs estimates. (5-33) -Analyze economic trends. (5-52) -Determine sales forecasts. (5-51)	Manager (2) Feedlot Manager (1) All Job Titles (3) (4) F&R Foreman (1) Supervisor (2) Salesman (2) Supervisor (5) Dairy Herd Impr. Sup. (6)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 10 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Financial Management - Analysis and Assessment continued -Estimate the percent of income used for family living. (1-828)	[See previous page]
Financial Management - Purchasing and Budgeting -Allocate monies in preparing working budget. (2-40) -Set up and use feedlot budget. (1-1475) -Prepare a livestock or poultry feeding budget, estimating feed costs, value of product and return over feed costs. (3-1) -Plan and estimate farm budgets to determine expenses. (1-817) -Figure crop and livestock budgets estimating costs and potential income. (1-829) -Compute quantities of material to be used. (5-54) -Have technical knowledge of the materials or products in the products being produced. (5-57) -Reject sub-standard goods and services. (5-63) -Identify the purchasing needs for the business. (5-61) -Purchase goods or services. (5-64) (6-10) -Spell out specifications of acceptability for raw materials. (5-62) -Prepare a budget, estimating cost of production and returns per acre of major crops produced in area. (3-4)	Department Mgrs. (3) (4) Manager (2) Feedlot Manager (1) Outside Salesman (3) (4) Counterman (3) (4) Helper (3) (4) F&R Foreman (1) Supervisor (5)
Financial Management - Credit -Develop a sound credit policy for a grain, feed, seed and fertilizer business. (3-14) -Explain company policy on price delivery and credit. (2-170) -Compute the cost of granting credit. (3-16) -Determine business credit needs. (2-37)	All Job Titles (3) (4) Salesman (2) Manager (2)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 10 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
General Management continued -Read flour analysis chart provided by mill. (5-32)	[See previous page]
Financial Management - Analysis and Assessment -Analyze the financial structure of the business. (2-4) -Analyze the business enterprises on cost and return basis. (2-41) -Prepare and interpret a financial statement for the business. (2-18) (3-13) -Understand the sources of capital for each type of business. (3-3) -Recognize the volume required for a successful farm business. (1-812) -Measure the financial progress by reviewing and comparing records from previous years. (1-823) -Figure the costs and the returns from using farm machinery to save or substitute for labor. (1-824) -Know the capital requirement per enterprise. (1-830) -Figure the depreciation schedule of farm equipment and buildings. (1-821) -Prepare a net worth statement of the operation. (1-838) -Prepare an income (profit-loss) statement from the current year's business transacted. (1-820, 1482) -Identify all sources of income (family, crops, off-farm) to assess assets. (1-827) -Figure the rate of return per dollar invested in each enterprise. (1-836) -Figure the management return. (1-832) -Determine the cash value of insurance policies on assessing assets. (1-822) -Analyze costs and returns of such improvement projects as drainage, liming, fertilizer, etc. (3-10)	Manager (2) All Job Titles (3) F&R Foreman (1) Feedlot Manager (1) Technical Experts (3)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 10 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Financial Management - Credit continued	
-Make a credit analysis to determine customer ability to repay. (4-13) (3-17) (2-129)	All Job Titles (3) (4) Salesman (2) Manager (2)
-Demonstrate a knowledge of the fundamentals of customer credit. (4-12)	
-Compute interest costs. (2-165)	
-Identify and recommend sources of credit available in the community. (3-15) (2-126)	
-Determine with the customer, the amount of credit needed. (2-127)	
-Compute credit costs. (2-19, 128) (1-1512)	
Financial Management - Marketing	
-Determine the possible returns from different methods of selling grain. (3-16)	Feedlot Manager (1) All Job Titles (3) (4) GFW Livestock (1) Beef (1) Hogs (1) Combination (1) Supervisor (5) Technical Experts (3)
-Keep abreast of market trends using several available information sources. (1-1468)	
-Understand and be able to apply the basic principles of economics to distribution and marketing of grain, seed, feed and fertilizer. (3-7)	
-Explain the relationship of cash grain prices to futures. (3-17)	
-Buy livestock at the best time and price. (1-1469)	
-Interpret market information in market bulletins, newspapers and radio. (3-27)	
-Order feedlot feed supply to take advantage of market changes. (1-1537)	
-Locate sources of market information. (3-26) (2-26)	
-Determine when livestock are ready for market. (1-898, 1472)(3-32)	

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 10 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Financial Management - Marketing continued	
-Identify economic and environmental factors that influence types of livestock and poultry which should be produced in an area. (3-8)	Feedlot Manager (1) All Job Titles (3)(4) GFW Livestock (1) Beef (1) Hogs (1) Combination (1) Supervisor (5) Technical Experts (3)
-Develop a basis chart for various commodities. (3-19)	
-Conduct a market survey. (3-19)	
-Discuss agricultural outlook information with farmers to assist in planning cropping programs. (4-127)	
-Determine the most economical weights to market livestock. (1-897)	
-Arrange for delivery and different modes of transportation. (5-65) (1-1577, 1707, 1708, 1709)	
-Be aware of marketing and distribution problems. (5-53)	
-Understand marketing, contract and credit conditions. (5-56)	
Financial Management - Pricing	
-Understand a "whole goods" price list. (2-118)	Salesman (2) All Job Titles (3) (4) Manager (2) Supervisor (2) Supervisor (5)
-Price grain based on grade, weight and quality. (3-36)	
-Make appraisals of used machinery and equipment. (2-107)	
-Understand the role of prices in the marketplace. (3-12)	
-Determine price of merchandise by computing proper margin. (4-30) (3-36)	
-Explain the relationship of markup to margin. (3-37)	
-Compute merchandise markup. (2-20) (3-35)	
-Compute retail and labor markup. (2-21)	
-Handle adjustments, returns and special price allowances. (2-171)	
-Determine cash discounts. (2-159)	
-Determine percent of markup, selling price and profit. (2-83, 160)	
-Determine prices of products produced in accordance with state laws. (5-60)	

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 10 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Financial Management - Pricing continued -Estimate price based on market reports, grades, transportation, supplies, etc. (5-59)	[See previous page]
Financial Management - Insurance -Determine need for and purchase comprehensive business insurance. (2-38) -Calculate equipment insurance costs. (2-136) -Plan the farm insurance programs. (1-839)	Manager (2) Salesman (2) F&R Foreman (1)
Financial Management - Profits -Use production practices and equipment which save labor and increase profits. (1-811) -Understand the importance and the function of business profits. (3-5) (4-2) -Analyze a business enterprise to determine profit leaks by determining the extent of unexplained disappearance of inventory. (4-7b) -Compute profit margins. (2-22) -Analyze a business enterprise to determine profit leaks by determining if pricing structure set by management is being attained. (4-7a) -Understand how each type of business organization divides its profits or losses. (3-4) -Understand the economic prinicple of diminishing returns. (1-831)	F&R Foreman (1) All Job Titles (3) (4) Manager (2)
Personnel Management - General -Rearrange facilities to improve worker efficiency. (2-69, 70)(1-1520)	[See next page]

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 10 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Personnel Management - General continued	
-Demonstrate a general understanding of the tasks performed by all employees under his supervision. (2-76)	
-Analyze routine jobs to eliminate travel and motion. (1-854)	Supervisor (2)
-Supervise and coordinate activities of workers engaged in production, manufacturing and processing of products. (5-39)	Feedlot Manager (1)
-Initiate worker incentive programs. (2-72)	F&R Foreman (1)
-Interpret company policy and production procedures to subordinates. (5-45)	Supervisor (5)
-Recommend changes in working conditions. (5-44)	
-Understand union policy. (5-49)	
Personnel Management - Selection, Training and Supervision	
-Make definite arrangements and agreements with hired workers about working conditions (hours, wages, days off, meals). (1-868, 1505, 1517) (2-36)	
-Train workers to perform their job efficiently. (1-851, 1491)	
-Give instructions to workers quickly and clearly. (1-858, 1497)	
-Evaluate workers' ability to perform various jobs. (1-857, 1496)	F&R Foreman (1)
-Assign jobs to workers according to their abilities and interests. (1-856, 1495) (2-60)	Feedlot Manager (1)
-Recognize and emphasize the important aspects of a job. (1-853, 1493)	Manager (2)
-Lead but not needlessly dominate workers. (1-866, 1503)	Supervisor (2)
-Evaluate employee performance. (2-3, 62)	Supervisor (5)
-Judge the qualifications of prospective workers. (1-860, 1499)	
-Exercise patience and tolerance with workers resulting in minimum labor turnover. (1-865, 1502)	

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 10 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Personnel Management - Selection, Training and Supervision continued	
-Determine employee benefits. (2-51, 1518)	
-Allow workers to use their own judgement when necessary to complete a job. (1-867, 1504)	
-Supervise workers engaged in maintenance of farm machinery and equipment. (1-861, 1570)	
-Appraise employee performance for possible discharge or disciplinary action. (2-74), (1-1522)	
-Identify worker conflicts that might reduce production. (2-71)	
-Recommend employees for promotion and/or transfer. (2-73) (1-1521)	F&R Foreman (1)
-Hire and fire employees. (5-48) (1-862, 1500) (2-1)	Feedlot Manager (1)
-Assist workers and their families in finding housing. (1-1507)	Manager (2)
-Conduct in-service training programs for company employees. (2-2, 86) (5-50)	Supervisor (2)
-Train new employees. (5-40)	Supervisor (5)
-Instruct employees in the fullfillment of their duties. (5-41)	
-Handle workers' grievances. (5-43)	
-Provide for relaxation after regular working hours. (1-869)	
-Determine the extent an employer should become involved in personal problems of employees. (1-870, 1506)	
Personnel Management - Labor Management	
-Assign appropriate priorities to the feedlot work to be done. (1-1494)	
-Observe safety precautions in general to avoid potential loss of man-hours of labor. (1-1490, 850)	Feedlot Manager (1)
-Recognize the conditions and circumstances requiring immediate attention and labor. (1-1479)	F&R Foreman (1)
	Supervisor (2)
	Supervisor (5)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 10 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Personnel Management - Labor Management continued -Plan the overall farm work schedules. (1-845, 1487) -Organize workers for efficient job performance. (2-61) -Anticipate and prepare for peak work loads in the farm work schedule. (1-842, 1484) -Figure the relative amount and the seasonal distribution of the labor required in each farm enterprise. (1-1488) -Plan the daily work schedule. (1-843, 1485) -Determine when the farm operator's time is more profitably utilized in management activities than as labor. (1-815) -Adjust employee work schedules. (2-68) -Estimate the amount of work to expect of workers in a working day. (1-841, 1483) -Use labor productively during slack periods of the regular work schedule. (1-859, 1498) -Determine labor use in various enterprises. (1-863) -Observe and act upon the changes in labor requirement per unit as the size or volume of each farm enterprise increases or decreases. (1-844, 1486) -Obtain the performance of physical labor over extended periods when necessary. (1-848) -Project manpower requirements. (5-47) -Summarize and analyze labor records to improve efficiency of labor use. (1-852, 1492, 1478) -Estimate man-hour requirements required to complete various jobs. (2-63, 316) -Plan surveys to determine effectiveness of manpower utilization. (5-46)	Feedlot Manager (1) F&R Foreman (1) Supervisor (2) Supervisor (5)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

Competencies related to merchandising products sold by various agri-businesses are presented in Table 11. The nature of the competencies vary greatly, covering the merchandising activities of skilled workers as well as those of business managers. However, the bulk of the competencies would be performed by skilled level personnel.

A review of the competencies show a definite relationship between the competency and the level of the position in the business. The bulk of the competencies at the skilled worker level relate to the technical aspects of agri-business and are very specific to a job title. Mastering the competency would require varying amounts of training. On the other hand, many of the merchandising competencies required by employees relate to management and sales are quite general in nature and would apply to similar job titles in any agri-business.

TABLE 11

MERCHANDISING COMPETENCIES
BY
SUB-CORES AND JOB TITLES

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles #
Salesmanship and Selling -Quote grain prices to farmers. (3-20) -Maintain continuous contact with potential and previous customers. (2-131) -Close a sale. (3-45) -Demonstrate the importance of personal sales traits and a pleasing personality. (2-110) -Receive and fill telephone orders for parts. (2-215, 168) -Follow up prospective sales. (2-166) -Determine and overcome major customer objections. (2-114) -Discuss intelligently and demonstrate if necessary, the merits of materials commonly handled by a farm service center. (4-31) -Accept, record and follow up telephone orders. (4-35) -Make an aggressive sales presentation without being "high pressure". (4-41) (2-186) -Explain equipment warranty and guarantee provisions. (2-142) -Exhibit thoughtfulness and consideration in scheduling calls. (2-177) -Understand the buyer's viewpoint. (2-184) -Cope with direct product competition. (2-179) -Handle customer complaints. (2-167) -Keep current with what competition is doing. (2-181) -Obtain customer support. (2-188)	All Job Titles (3) (4) Salesman (2) Partsman (2) Mechanic (2)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources.
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 11 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Salesmanship and Selling continued -Solicit customer business after pointing out customer needs. (4-22, 40) -Interpret for the customer labels, tags and charts on merchandise. (4-32) -Demonstrate tactful questioning. (2-187) -Conduct retail sales. (2-205) -Determine and overcome minor customer objections. (2-113) -Maintain sales portfolio. (2-172) -Determine the most appropriate time to make contacts. (2-185) -Develop a plan for working territory. (2-190) -Inspect damaged part to determine part required or advise customer of part needed according to description of trouble. (2-208, 344) -Suggest a variety of ways that the customer will benefit from the sale. (2-111) -Help customers to determine the amount of money and/or time saved by using certain equipment. (2-120) -Tell a concise, coherent, well-organized sales story. (4-39) (2-178) -Use a variety of closing techniques. (2-115) -Suggest options that will create a larger sale and a more satisfied customer. (2-112) -Suggest the proper timing of the purchase so as to produce the greatest tax advantage. (2-122) -Demonstrate a basic knowledge of sales techniques. (4-38) -Develop and follow a schedule for delivering petroleum products according to customer needs. (4-64) -Explain parts warranty and guarantee provisions. (2-238) -Evaluate the effect of product competition. (2-180)	All Job Titles (3) (4) Salesman (2) Partsman (2) Mechanic (2)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 11 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Salesmanship and Selling continued	
-Compute costs and returns on the use of machinery and equipment. (2-193)	
-Demonstrate the steps of successful selling. (3-25)	
-Help customers to determine the profit they can expect by using different equipment. (2-121)	All Job Titles (3) (4) Salesman (2) Partsman (2) Mechanic (2)
-Demonstrate the techniques for successful farm and ranch calls. (3-34) (2-123)	
-Advise customer on substitution or modification of parts when replacement is not available. (4-79) (2-211)	
-Demonstrate use of different types of sales techniques (telephone, face-to-face, etc.). (3-24)	
Promotion	
-Find prospective customers. (2-174)	
-Increase volume of business through product and service knowledge and by promotion to regular and prospective customers. (4-21)	
-Determine customer buying periods. (2-48)	
-Organize the farm service center for effective merchandising, including developing attractive displays and literature racks. (4-14) (3-33)	Salesman (2) All Job Titles (3) (4) Salesman-Driver (5) Manager (2) Dairy Herd Impr. Sup. (6) Civil Eng. Tech. (6) Soil Cons. Tech. (6)
-Organize and conduct sales meetings. (3-23)	
-Inform customers of new products or services. (5-115)	
-Plan and conduct fertilizer and agricultural chemical demonstrations. (3-12)	
-Plan and carryout promotion days. (3-41)	
-Develop a monthly sales promotion activity calendar based on promotional days or seasonal activity. (4-16)	

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 11 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Promotion continued	
-Plan and conduct feeding demonstrations. (3-30)	Salesman (2)
-Call on prospective customers to solicit new business. (5-114)	All Job Titles (3) (4)
-Organize and conduct clinics for customers and staff members. (8-21)	Salesman-Driver (5)
-Promote sales by conducting livestock feeding experiments. (4-107)	Manager (2)
-Plan and develop such special events as a field day, open house and other promotional events. (4-19)	Dairy Herd Impr. Sup. (6)
-Prepare and present public presentations. (2-9, 85) (6-18, 109, 111, 310, 309) (3-22, 29)	Civil Eng. Tech. (6)
	Soil Cons. Tech. (6)
Displays and Advertising	
-Set up window and interior displays. (2-109, 204) (3-42)	Salesman (2)
-Plan business advertising. (2-42, 175) (4-18)	All Job Titles (3) (4)
-Develop a monthly advertising calendar. (4-15) (3-39)	Manager (2)
-Set up sales displays and posters. (5-120, 609)	Salesman-Driver (5)
Stock Control and Inventory	
-Maintain parts identification. (2-205)	
-Unpack and check items received against a shipping invoice. (2-219, 745, 785)	
-Determine seasonal needs for parts. (2-240)	
-Mark and store parts in stockroom according to prearranged plan. (2-214)	[See next page]
-Ascertain make, year and type of parts needed. (2-207)	
-Fill orders. (5-146) (2-200, 201, 213)	
-Identify and dispose of excess and obsolete stock. (2-228)	
-Develop an effective system of inventory control. (4-29) (3-34) (2-81, 229)	

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers..

TABLE 11 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Stock Control and Inventory continued	
-Clean and inspect new parts for shipping damage in preparation for installation. (1-1187) (2-333, 218, 784)	Partsman (2)
-Examine returned parts to determine if they are defective. (2-212)	Maintenance Man (2)
-Order parts. (1-1190) (2-217, 756)	Set-up Man (2)
-Count and weigh incoming articles and compare against invoice. (5-575, 594, 135)	Warehouseman (5)
-Collect or pick up empty containers and rejected merchandise. (5-121)	All Job Titles (3) (4)
-Place stock on shelves or racks. (5-119) (2-221)	Supervisor (2)
-Keep inventories of materials and supplies. (5-435, 468, 495, 496) (2-202, 786) (1-1165, 1164)	Agricultural Mechanic (1)
-Count and compare quantity and identification number of units against order. (5-151)	Mechanic (2)
-Examine stock to verify conformance to specifications. (5-138)	Butcher (5)
-Insure proper rotation of stock. (5-142)	Meat Cutter (5)
-Sort products as to size, type or product code. (5-143, 290, 293)	Salesman - Driver (5)
-Prepare stock inventories. (2-15, 757) (5-148)	Lab Technician (5)
-Verify production count. (5-260)	Pasteurizer (5)
-Fill requisitions, work orders and material requests. (5-137, 147)	Ice Cream Maker (5)
	GFW Unspecified (1)
	Shipping Clerk (5)
	Ovenman (5)
Collections and Handling Cash	
-Make proper change. (2-243, 278)	Partsman (2)
-Be accountable for the merchandise by charge tickets or returned products. (5-125)	Clerical Workers (2)
-Make collections for deliveries. (5-118, 611) (6-52) (1-1787)	Salesman - Driver (5)
-Balance cash against cash inventories. (5-124)	Meat Cutter (5)
-Make credit collections. (2-49, 173)	Manager (2)
	Salesman (2)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 11 - Continued

Job Cores and Competencies - Study Code* and Competency Number	Job Titles#
Processing -Care for and handle milk properly. (1-984) -Maintain proper temperatures. (5-358) -Pasteurize cream. (5-370) -Weigh and measure ingredients. (5-175, 231, 272, 474, 621) -Add and remove water as required. (5-367) -Observe mixing to insure thorough blending. (5-179, 452) -Place pans of unbaked goods on oven shelf. (5-252, 253) -Add moisture to materials to facilitate flow into machines. (5-756) -Pasteurize and separate milk to obtain prescribed butterfat content. (5-389) -Read and be able to follow a recipe or formula. (5-230, 171, 214, 270, 271, 386, 451, 471, 472, 620) -Combine ingredients. (5-232) -Kill bacteria, especially pathogens. (5-457) -Add ingredients as specified during mixing cycle. (5-183) -Admit measured amount of pasteurized cream into churn. (5-355) -Pump buttermilk from churn. (5-359) -Obtain ingredients. (5-174, 388) -Bake products. (2-277) -Spray butter with chlorinated water to remove residue buttermilk. (5-361) -Place ingredients in mixing machine. (5-623, 176) -Empty ingredients into a container. (5-629) -Spread or sprinkle toppings (jelly, cinnamon, poppy seeds, etc.) on specialties. (5-237) -Execute the duties of a lead man for producing quality products. (5-440)	GFW Milker (1) Buttermaker (5) Mixer (5) Bench Hand (5) Ice Cream Maker (5) Sausage Maker (5) Pasteurizer (5) Ovenman (5) Miller (5) Cheesemaker (5) Molder Operator (5) Divider Operator (5) Baker-Retail (5) Meat Cutter (5) Render Operator (5) GFW Sheep (1) Butcher (5) Shipping Clerk (5) Smutter (6) GFW Livestock (1)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources

#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 11 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Processing continued -Finish sponge. (5-181) -Prepare batters, doughs, fillings and icings. (5-273) -Dust units of dough to prevent sticking. (5-196) -Fill hopper of feeder with candy, fruits and nuts using scoop. (5-476) -Bone and trim cuts of meat. (5-600) -Grind meat. (5-628) -Load cooker. (5-642) [This competency was misnumbered in the Products report on page 122] -Be able to determine when process is completed. [Rendering] (5-647) -Observe conveyor system to insure continuous flow of material. (5-745) -Re-route mill flow in the event of break-down or blockage. (5-747) -Be familiar with standard meat cuts. (5-601) -Cut and trim meat as ordered by customer. (5-604) -Have knowledge of temperature control regulations for processing of meat. (5-579, 598) -Determine time cycles at start of shift. (5-173) -Prepare mix for homogenizing. (5-456) -Mold dough into loaves or desired shapes. (5-235, 278) -Place pans of dough in proof box to rise. (5-238) -Weigh containers. (5-161, 488, 85, 610) -Select waste products from slaughtering operation. (5-640) -Separate meat from tallow. (5-645) -Dissolve sugar, dry milk, egg yolk, etc. (5-455) -Reduce carcass to primal pieces. (5-599) -Cut and trim meat to size for display. (5-603) -Scoop flour or starch into sifters. (5-195)	GFW Milker (1) Buttermaker (5) Mixer (5) Bench Hand (5) Ice Cream Maker (5) Sausage Maker (5) Pasteurizer (5) Ovenman (5) Miller (5) Cheesemaker (5) Molder Operator (5) Divider Operator (5) Baker-Retail (5) Meat Cutter (5) Butcher (5) Shipping Clerk (5) Smutter (6) GFW Livestock (1) GFW Sheep (1) Render Operator (5)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 11 - Continued

Job Duties and Competencies - Study Code* and Competency Number	Job Titles#
Processing continued -Observe progress of units of dough through machines that automatically round, proof and shape dough. (5-197) -Have a basic knowledge of meats. (5-550, 585) -Place dough in pans by hand. (5-201, 236) -Wash carcass for final inspection. (5-562) -Place meat in containers. (5-606) -Empty milk receptacle. (1-980) -Advise plant foreman or supervisor of materials or products needed. (5-442) -Dislodge clogged grain. (5-794) -Pour syrups into holder of rippling pump. (5-477) -Use press to further extract tallow. (5-646) -Convey meat to storage bin. (5-651) -Reduce carcass to retail cuts. (5-583, 602) (1-896) -Decorate cakes. (2-285) -Knead dough. (5-233) -Be familiar with antemortem procedures. (5-554) -Melt butter. (5-453) -Determine the amount of moisture in fleece to schedule shearing. (1-952) -Clip wool close to hide to remove fleece in one piece. (1-949) -Wrap muslin cloth about dressed carcasses to improve appearance of carcass. (5-577, 596) -Separate cream to obtain butter oil. (5-371) -Develop new recipes for cakes and icings. (5-286)	GFW Milker (1) Buttermaker (5) Mixer (5) Bench Hand (5) Ice Cream Maker (5) Sausage Maker (5) Pasteurizer (5) Ovenman (5) Miller (5) Cheesemaker (5) Molder Operator (5) Divider Operator (5) Baker-Retail (5) Meat Cutter (5) Butcher (5) Shipping Clerk (5) Smutter (6) GFW Livestock (1) GFW Sheep (1) Render Operator (5)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 11 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Quality Control -Grade grain according to USDA Grain Standards Act. (3-23) -Blend various qualities of grain to meet grade. (3-42) -Use aeration, drying and turning techniques to preserve grain quality. (3-34) -Perform laboratory tests according to prescribed standards. (5-411) -Conduct various types of tests to determine protein in grain. (3-24) -Determine product substances for quality control, process control and/or product development. (5-414) -Test at proper intervals. (6-7) -Note color of product during baking to insure uniformity of finished products. (5-256) -Test for salt content and acidity. (5-372) -Communicate test results directly to plant manager. (5-438) -Check to insure finished quality of product (proper closing, appearance of carton). (5-97) -Determine necessary amounts of ingredients to add for specified grade. (5-375) -Prepare seed to meet state certification laws. (3-48) -Observe color of product being baked. (5-282) -Clear away damaged products or containers. (5-95) -Determine the proper butterfat content of products. (5-454) -Compare butter with color chart. (5-362) -Discard misshapen units. (5-200, 219) -Report abnormalities of offal on carcass to supervisor. (5-567) -Separate heavy tags, dung locks and badly stained wool from clean portion of the fleece. (1-954)	Lab Technician (5) Dairy Herd Impr. Sup. (6) Ovenman (5) Buttermaker (5) Plant Worker (5) Pasteurizer (5) Baker-Retail (5) Divider Operator (5) Molder Operator (5) Butcher (5) GFW Sheep (1) Smutter (5) Chemist (5) Dept. Mgr.-G,F&S (3) Retail Counterman (3) Helper (3)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 11 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Quality Control continued -Examine processed grain to determine cleanliness. (5-793) -Recognize abnormalities of offal on carcass. (5-566) -Conduct tests and experiments with various additives. (5-716) -Test to determine that quality standards are met. (5-718) -Test to determine that purity standards are met. (5-719) -Test products to insure compliance with food and drug laws. (5-720)	[See previous page]
Receiving, Packaging and Labeling -Properly label milk samples for identification. (6-30) -Properly pack milk samples for shipment. (6-31) -Visually inspect materials, products and containers at each step of the packaging process. (5-98, 295, 96) -Label ingredients according to federal regulations. (5-100, 298, 632) (3-54, 53) -Pack special selections or arrangements of products. (5-294) -Stamp, stencil or glue identifying information and shipping instructions on containers. (5-159) -Attach postage or bill of lading. (5-162) -Prepare products for shipment. (5-150) -Position and hold container in machine. (5-92) -Record weight, size and type of products packaged. (5-101, 296) -Receive meat from packer or supplier. (5-571, 590) -Sack wool. (1-955) -Fold and tie each wool fleece into a bundle. (1-953) -Wrap protective material around product. (5-144, 291, 297) -Insert items into containers using spacers, fillers and protective padding. (5-155)	Dairy Herd Impr. Sup. (6) Plant Worker (5) Handbagger (5) Sausage Maker (5) Shipping Clerk (5) Butcher (5) Meat Cutter (5) GFW Sheep (1) Warehouseman (5) Dept. Mgr.-G,F&S (3) Retail Counterman (3) Helper (3)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 11 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Receiving, Packaging and Labeling continued -Prepare shipping tags. (5-140)	[See previous page]
Shipping -Properly protect and secure load. (1-1786) -Load and unload trucks. (2-741, 764, 778) (1-1383) (5-112) (3-44) -Demonstrate safe and efficient loading and unloading procedures for tank delivery truck. (4-68) -Be familiar with state and federal regulations regarding the transportation of agricultural commodities across county and state lines (crop and livestock inspections, weight restrictions and load limits). (1-1785) -Prepare trucks, railroad cars for livestock shipment. (1-904, 1568) -Unload live animals from stock truck. (5-573, 592)	Truck Driver (1) Maintenance Man (2) Set-up Man (2) Agricultural Mechanic (1) Salesman Driver (5) GFW Livestock (1) Beef (1) Hogs (1) Combination (1) Sheep (1) Feedlot Manager (1) Butcher (5) Meat Cutter (5)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

Clerical competencies needed by workers in agri-business are displayed under appropriate sub-cores in Table 12. A large number of employees in all agri-businesses studied have need for some clerical competencies.

A review of these competencies show considerable commonality. This is particularly true for those competencies relating to record keeping, report writing, letter writing, production records, invoices, receipts and purchase orders. It is evident that those employed in agri-businesses have greater need for clerical competencies than workers employed in production agriculture.

TABLE 12

CLERICAL COMPETENCIES
BY
SUB-CORES AND JOB TITLES

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles #
General -Understand the operation of the business. (2-270) -Understand the business organization. (2-271) -Answer phone. (2-266) -Type correspondence and reports. (2-265) -Maintain neat, accurate records. (6-41, 804) -Prepare and interpret a financial statement. (4-26) -Act as receptionist. (2-267) -Do general filing. (6-323) (2-96, 216, 268) (4-122,25)	Clerical Worker (2) Dairy Herd Impr. Sup. (6) Smutter (5) Soil Cons. Tech. (6) Supervisor (2) Partsman (2) All Job Titles (3) (4)
Bookkeeping -Balance books. (2-254) -Summarize cash receipts and expenditures. (2-255) -Balance daily cash receipts. (2-257) -Summarize accounts payable and receivable. (2-256) -Balance accounts receivable. (2-258) -Keep records of financial transactions of the business. (2-250) -Compute, type and mail monthly statements to customers. (2-262) -Transfer data to general ledger. (2-253) -Enter details of transactions as they occur in chronological order in account and cash journals. (2-251) -Summarize details on separate ledgers. (2-252)	Clerical Worker (2) Salesman (2) Partsman (2) Feedlot Manager (1) F&R Foreman (1) Dairy Herd Impr. Sup. (6) Manager (2) All Job Titles (3) (4)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 12 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Bookkeeping (continued) -Calculate employee wages from plant records or timecards and make up check or withdraw cash from bank for payment of wages. (2-259) -Complete books to and through trial balance. (2-263) -Maintain sales records and accounts. (2-137, 226) -Prepare withholding, Social Security and other tax reports. (2-261) -Calculate and pay federal, state and local taxes. (2-260) -Bill animals for marketing. (1-1473) -Prepare month end balance sheet. (2-272) -Prepare profit and loss sheet. (2-273) -Prepare expense accounts. (2-143) -Prepare records of yearly sales. (2-276) -Prepare or assist an accountant in the preparation of farm income tax returns. (1-840) -Set up and use cash flow sheets. (1-1477) -Enter details of transactions as they occur in hronological order in account and cash journals. (1-1523) -Execute the employer responsibilities for Social Security, withholding taxes, insurance (including liability) and comply with regulatory laws related to hired workers. (1-864, 1501) (6-54) -Calculate federal, state and local taxes. (2-34) -Demonstrate an understanding of basic double-entry bookkeeping system. (4-23) -Have a knowledge of bookkeeping practices. (6-55) -Prepare month-end balance sheet. (1-1525) -Handle banking procedures. (6-53)	Clerical Worker (2) Salesman (2) Partsman (2) Feedlot Manager F&R Foreman (1) Dairy Herd Impr. Sup.(6) Manager (1) All Job Titles (3) (4)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 12 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Record Keeping -Record breeding records. (6-46) -Maintain time and production records. (2-75) -Prepare and keep fuel inventory records and reports. (4-66) -Record survey information. (6-166, 146, 366) -Maintain customer service records. (2-78) -Prepare reports of purchases and sales transactions by maintaining needed records, such as sales, cash and credit transactions. (4-24) -Log day cow is to calf. (1-1419) -Keep separate inventory and expense records for major pieces of feedlot equipment. (1-1569) -Keep records of collections. (5-123) -Prepare and keep customer records, including yearly sales by products, average fill, storage size and credit rating. (4-65) -Keep records of quantities delivered to customers. (5-122) -Keep records of tests made. (5-433) -Keep records of time cycles. (5-406) -Provide cow identification. (6-48) -Obtain individual cow records for computer input. (6-44) -Keep records of maintenance and repair on machinery and equipment. (1-1765) -Keep records of ingredients used. (5-405)	Artificial Insem. (1) Supervisor (2) Dairy Herd Impr. Sup. (6) Civil Eng. Tech. (6) Soil Cons. Tech. (6) Feedlot Manager (1) Salesman-Driver (5) Machinery Equip. Op. (1) Salesman (2) Partsman (2) F&R Foreman (1) Supervisor (5) Bench Hand (5) Lab Technician (5) [Continued next page]

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 12 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Record Keeping(continued) -Maintain supervisors performance record. (6-50) -Prepare a washout sheet. (2-82, 192) -Prepare job sheets. (6-171) -Set up and use inventory records. (1-1476) (2-220) -Keep records of labor use and accomplishments. (1-849, 1489) -Keep records of quality control measures. (5-434) -Keep accurate records of laboratory experiments. (5-725) -Keep machine yield records. (5-102, 382, 407, 467, 497) -Keep production records. (5-204, 226, 243, 381, 466, 494, 774) (6-42, 43) -Keep daily log of number of hours each piece of equipment is used. (1-1768) -Keep records of materials or items received or distributed. (5-104, 145) -Keep and compile stock records. (5-103) -Add times and temperatures to dough record sheet. (5-244) -Prepare production and labor records. (5-35) -Keep production and storage records. (6-763) -Keep records of whether product is to be sacked or handled in bulk systems. (6-775)	[Cont. from previous page] Cheesemaker (5) Divider Operator (5) Molder Operator (5) Ice Cream Maker (5) Chemist (5) Plant Worker (5) Buttermaker (5) Warehouseman (5) Pasteurizer (5) All Job Titles (3) (4). Buhr-Mill Operator (5) Miller (6)
Writing Letter and Reports -Prepare sales reports. (2-275, 182, 239) -Prepare clear, concise written reports. (2-8, 84, 274) (3-28) (4-28) (5-34) (6-51, 116, 321) (1-1508) -Write clear, concise letters. (6-19, 117, 322) (1-1509, 1696) (2-10, 132, 225) (3-32) (4-27)	[See next page]

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 12 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Writing Letters and Reports (continued) -Prepare narrative of daily accomplishments. (6-324) -Prepare time and attendance reports for employees. (6-115)	Civil Eng. Tech. (6) Clerical Worker (2) Salesman (2) Partsman (2) Manager (2) Supervisor (2) Supervisor (5) Dairy Herd Impr. Sup. (6) All Job Titles (3) (4) Soil Cons. Tech. (6) Feedlot Manager (1) Herdsman (1)
Business Forms -Prepare a scale ticket. (3-41) -Fill out company invoices and sales contracts. (2-138) -Fill out a work order. (2-100, 99, 67) (4-100) (6-172) -Prepare a Bill of Lading. (3-45) -Write up a sales ticket. (3-46) (4-101, 34) -Make out a receipt. (2-98, 16, 116, 224, 748) (1-1511) (3-33) -Make out an invoice for merchandise left. (5-117) -Prepare delivery orders. (2-80, 194) (5-116) -Prepare purchase orders. (2-14) (1-1510) (3-44) (4-33) -Write and submit bids. (2-124)	All Job Titles (3) (4) Civil Eng. Tech. (6) Salesman (2) Supervisor (2) Salesman-Driver (5) Manager (2) Partsman (2) Maintenance Man (2) Feedlot Manager (1)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources

#Numbers after job titles correspond to Study Codes and Figure numbers.

Leadership competencies required by workers at all levels are presented in Table 13. A careful review shows there are commonalities in relation to all the job titles. However, it should be noted that, even though they are very similar in nature, the specific knowledge and understanding required to perform the competency at an acceptable level could vary with each agri-business.

Those competencies relating to job attitude and human relations seem to be particularly important for employees.

TABLE 13

LEADERSHIP COMPETENCIES
BY
SUB-CORES AND JOB TITLES

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles #
Personal Qualities and Qualifications -Demonstrate personal integrity as an employee of the firm. (4-50) -Maintain a satisfactory attendance record. (5-12) (6-223, 482) -Demonstrate acceptable personal appearance - personal hygiene. (5-9) (4-48) (6-220, 473) -Be licensed when required for the type of equipment operated. (1-995, 944, 1775, 1025) -Accept routine tasks without becoming disinterested. (5-11, 71) -Employee's background and experience should include post-high school training in technical agriculture in crop production. (4-53a) -Employee's background and experience should include post-high school training in technical agriculture in livestock production. (4-53b) -Employee's background and experience should include post-high school training in general farm management. (4-53d) -Enjoy working outdoors. (6-113, 480) -Have the strength requirements to lift heavy items. (5-130) -Withstand extreme temperature conditions. (6-222, 481) -Employee's background and experience should include post-high school training in farm mechanics. (4-53c) -Have the appropriate license if license is required. (5-110, 29, 410) (2-749)	GFW-Crop Production (1) Sheep (1) Hay (1) Maintenance Man (2) Truck Driver (1) All Job Titles (4) (5) (6)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 13 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Personal Qualities and Qualifications (continued) -Demonstrate a basic mechanical ability. (6-2, 123, 320) (5-77, 203, 408, 444, 723, 761, 772, 803) -Demonstrate experience in dairy farming or a dairy background. (6-5, 112, 311) (4-54) -Maintain union membership. (5-73, 131, 436, 443)	[See previous page]
Job Attitude -Demonstrate a willingness to work. (5-1) (2-27) (4-46) (6-212, 470) (1-1513) -Demonstrate the ability to work independently. (5-4) (2-28) (6-215, 473) (1-1514) -Demonstrate a desirable job attitude about the organization when working with fellow employees, potential customers and customers. (5-8) (4-49) (6-219, 477) -Demonstrate the ability to project a desirable image for firm. (5-10) (2-30) (4-44) (6-221, 479) -Demonstrate a willingness to learn or take supervision. (5-2) (6-213, 471) -Demonstrate the ability to follow directions of supervisor. (5-3) (6-214, 472) -Schedule jobs. (6-105, 305) -Budget time. (2-189)	All Job Titles (4) (5) (6) Manager (2) Feedlot Manager (1) Salesman (2)
Human Relations -Demonstrate the ability to establish good customer relations. (4-42) -See and respect customer's point of view. (3-53) (2-33)	[See following page]

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 13 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Human Relations (continued) -Handle customer complaints courteously. (4-43) -Understand customer feelings. (2-32) -Express himself to customers. (2-133) -Classify and cope with different types of customers. (2-125) -Recognize mannerisms that may be detrimental to potential customers. (2-191) -Empathize with customer. (3-52) -Communicate effectively to customers or foreman. (2-337) -Understand human relations with fellow workers. (2-93) -Understand human relations with management personnel. (2-94) -Understand human relations relating to the business. (2-92) -Demonstrate the ability to get along with others. (5-5) (6-11, 216, 474) (2-29) (4-45) (1-1515) -Demonstrate the ability to work cooperatively as a member of a team. (5-7) (4-47) (6-218, 476) -Consult with supervisors. (6-107, 307) -Consult with producers. (6-106, 306, 12) -Cooperate with landowners. (6-108, 308) -Make appointments with producers. (6-104, 304, 15) -Advise dairy producers. (6-13) -Supervise the activities of subordinates. (5-42, 202, 242, 380, 403, 437, 441, 498, 726, 762, 773, 800) (1-1440) -Supervise work of sub-professional assistants. (6-114, 312)	All Job Titles (3) (4) (6) Manager (2) Salesman (2) Mechanic (2) Supervisor (2) Feedlot Manager (1) Ranch Cook (1)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

Table 14 contains those miscellaneous competencies that relate to all job titles and have limited commonality. In many cases, the competency related to a single job title within a specific agri-business. It will be noted that many of these competencies will be developed as the result of the general vocational program. Also included in Table 14 are competencies that the researchers felt would require no training.

TABLE 14

MISCELLANEOUS COMPETENCIES
BY
SUB-CORES AND JOB TITLES

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles #
<u>Sanitation</u> -Carry out a good sanitation program. (1-970) -Insure that food products are kept clean. (5-458) -Clean and sterilize equipment. (5-460, 432, 492) (1-981, 982, 1423, 1424) -Be aware of all sanitary procedures. (6-4) (5-70, 379, 385, 431, 459, 491, 570, 589, 722, 760, 771, 802) -Demonstrate proper use of milking equipment to meet sanitary standards. (4-112) -Interpret health standards. (6-40)	GFW Milker (1) Pasteurizer (5) Lab Technician (5) Ice Cream Maker (5) Artificial Inseminator (1) Dairy Herd Impr. Sup. (6) Plant Worker (5) Buttermaker (5) Cheesemaker (5) Butcher (5) Meat Cutter (5) Chemist (5) Miller (5) Buhr-Mill Operator (5) Smutter (5) Retail Counterman (4) Helper (4)
<u>Safety</u> -Detect and correct housekeeping practices that are safety hazards. (3-61, 57) -Follow all safety rules related to driving a truck. (2-767) (1-1385, 1779, 1777)	[See next page]

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 14 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Safety continued	
-Identify and correct unsafe practices in grain-handling equipment. (3-56)	
-Use safety measures in electrical wiring. (1-1113)	
-Know and comply with safety rules relating to the operation of each major piece of farm machinery. (1-996, 1766)	
-Properly place fire fighting equipment. (1-1167) (3-59)	
-Demonstrate safety measures in arc welding. (1-118)	
-Use safety precautions in oxyacetylene welding. (1-1131)	All Job Titles (3) (4)
-Demonstrate safe and efficient loading and unloading procedures for tank truck delivery. (4-68)	Maintenance Man (2)
-Fill customer tanks and drums with fuel or oil, following recommended safety practices. (4-67)	Agricultural Mechanic (1)
-Recommend safe refueling procedures to producers when using either liquid fuels or LP-gas. (4-75)	Truck Driver (1)
-Recommend a safety program when working with fertilizers and chemicals. (3-13) (4-121) (1-1004) (5-702)	GFW Unspecified (1)
-Work safely and neatly. (5-6) (6-217, 475)	GFW Crop Production (1)
-Develop programs to eliminate potential hazards to livestock and poultry. (3-29, 28)	Machinery and Equip. Op. (1)
-Develop a program to meet the requirements of the Occupational Safety and Health Act Regulations. (4-52, 152, 151)	All Job Titles (6)
-Observe all safety procedures. (5-721, 759, 770, 801)	All Job Titles (5)
Storage	
-Recommend moisture levels for safe storage of grain. (3-31)	[See next page]
-Bin grain according to quality and condition. (3-32)	

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 14 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Storage continued -Inspect grain containers to determine suitability for moving grain. (3-43) -Recommend and make proper bin preparation to insure safe storage of grain. (3-38) -Recommend storage procedures that will avoid contaminants and according to the safety standards of the National Fire Association, state regulations and Occupational Safety and Health Act regulations. (4-63) -Store seed to protect against moisture, insects, etc. (3-49) -Prepare machines and equipment for storage. (1-1767) -Store fertilizers to avoid storage problems. (3-26) -Explain the basic parts of the Uniform Grain Storage Agreement. (3-46) -Determine moisture in grain. (3-26) (1-1018) (5-709) -Store hydraulic fluid to insure freedom from dust and moisture. (4-94) -Purge new storage vessels and fill tanks. (4-70) -Properly store transfer hose to avoid kinking or deterioration. (4-72) -Determine with the customer the size of bulk storage needed for fuels and lubricants. (4-76) -Recommend programs for maintaining the quality of stored grain. (4-135) -Determine when grain and hay can be stored safely. (4-129) -Know the proper storage procedures for grain. (5-708) (1-1017) -Store articles in cooler, bins on floor or shelves according to identifying information. (5-141)	Dept. Mgr. - Hardware (4) Dept. Mgr. - Pet. Prod.; Parts & Serv. (4) Machinery and Equip. Op.(1) All Mill (5) GFW Crop Production (1) Hay (1) Warehouseman (5) Butcher (5) Meat Cutter (5) Mixer (5) Render Operator (5) Dept. Mgr. - G,F&S; Ag. Chem & Fert. (3) Retail Counterman (3) (4) Helper (3) (4) Retail Salesman (3) Delivery Drivers (4)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 14 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Storage continued -Rotate stored meats to avoid over-aging and spoilage. (5-576, 595) -Determine the type and size of water storage tanks to use under varying conditions. (4-145) -Store meats under approved conditions. (5-572, 591) -Pack ensilage for storing, using appropriate equipment. (1-1032) -Fill storage tanks or barrels. (5-187) -Cover stock or hay pile to protect from spoilage. (1-1034) -Be aware of various storage bin capacities. (5-799) -Store tallow in tank. (5-650) -Receive, store and issue equipment, material supplies products, etc. (5-132)	[See previous page]
Math -Use simple arithmetic formulas. (6-140) -Demonstrate a basic understanding of trigonometry and geometry. (6-134, 346) -Calculate yardages. (6-168) -Be able to use basic mathematics. (5-58) -Add decimals. (6-65) -Convert gallons to pounds. (6-63) -Convert decimals to percents. (6-66) -Convert pounds to ounces. (6-62) -Calculate parts per million. (6-64) -Convert fractions to decimals. (6-70) -Convert percentage to decimals. (6-74) -Divide decimals. (6-67) -Multiply decimals. (6-68)	All Job Titles (6) Supervisor (5)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 14 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
Math continued -Add and subtract fractions. (6-69) -Convert decimals to fractions. (6-71) -Divide fractions. (6-72) -Multiply fractions. (6-73)	[See previous page]
No Significant Training Required -Follow orders of employer. (1-1437) -Wash dishes and clean silverware. (1-1747) -Prepare, season and cook by appropriate methods, all food consumed by employees or residents of a ranch. (1-1435) -Plan menus. (1-1436) -Assist in meal planning and purchasing of foodstuffs. (1-1745) -Oversee activities of children. (1-1748) -Change linens. (1-1750) -Wash linens and other garments by hand or machine. (1-1752) -Remove racks from proof box. (5-250) -Mix ingredients and bake breads and pastries. (1-1438) -Answer doorbell and telephone. (1-1754) -Transfer bread pans to other devices (monorail racks, bread racks). (5-224) -Estimate consumption and order foodstuffs. (1-1439) -Unload full pans. (5-221) -Place pans on rack. (5-222) -Prepare and cook food according to employers instructions. (1-1746) -Clean furnishings, floors and windows using vacuum cleaner, mops, brooms, cloths and cleaning solutions. (1-1749) -Make beds. (1-1751)	Cook (1) Maid (1) Ovenman (5) Plant Worker (5) Molder Operator (5) GFW Sheep (1) Mixer (5) Bench Hand (5)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Res...

#Numbers after job titles correspond to Study Codes and Figure numbers.

TABLE 14 - Continued

Sub-Cores and Competencies - Study Code* and Competency Number	Job Titles#
No Significant Training Required continued -Mend and iron clothing, linens and other household articles using hand iron or electric ironer. (1-1753) -Feed pets. (1-1755) -Cook and maintain a camp. (1-943) -Take sponge from fermentation room. (5-182) -Remove baked goods from oven and place on cooling racks. (5-241) -Unload packaged product. (5-99) -Feed empty pans into the machine. (5-220) -Place count tags on pans. (5-225) -Push rack into proofing box. (5-223) -Travel with chuck wagon to prepare food on the range. (1-1441)	Cook (1) Maid (1) Ovenman (5) Plant Worker (5) Molder Operator (5) GFW Sheep (1) Mixer (5) Bench Hand (5)

*1-Production 2-Mechanics 3-Grain, Feed & Seed 4-Supplies and Services 5-Products 6-Resources
#Numbers after job titles correspond to Study Codes and Figure numbers.

CHAPTER III

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions were extrapolated on the basis of the data summarized within this study.

1. A series of core courses can be developed which will enable vocational educators to prepare future employees for a cluster of agri-business occupations.

2. Increased emphasis should be placed on the use of cooperative vocational education to prepare employees for unique competencies important to a very limited number of job titles.

3. Emphasis should be placed on developing within students an understanding of basic economic principles as it applies to the management of agri-business firms.

4. The competencies required of employees in the several areas of agri-business depend, to a degree, upon the size of the business.

5. All students should be informed about the various types of business organization.

6. To provide adequately trained employees for agricultural job titles, it will be necessary to provide an articulate training program which includes high school, post high school and university training.

7. Programs to train employees for the several agricultural job titles will vary in length.

8. Leadership and human relation skills training should be incorporated and emphasized as an integral part of all agri-business training programs.

9. A basic understanding of agriculture production principles would be beneficial to employees entering agri-business educational programs; this

might be acquired through practical agricultural experience or through an agricultural production core program.

10. An educational core program in selling and salesmanship (merchandising) could be developed which would be appropriate for agri-business job titles requiring such competencies.

Recommendations

Based on the findings of all manpower research efforts, the following recommendations are made:

1. Future curriculum development activities should evolve around the core concept with the development of instructional units based on identified competencies. These units should be developed so they may be used singly or as a part of an extensive course.

2. Performance objectives for curriculum material should be based on competencies identified.

3. Further studies should be conducted to determine the educational level at which competencies required in various job titles should be taught.

4. Provisions should be made to update job competencies on a regular basis.

5. Curriculum conferences should involve high school, post-secondary and university personnel in an effort to develop an articulated agricultural education training program for Montana.

CHAPTER IV

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CHAPTER V

APPENDIX A

COMPETENCY NUMBERS AND RELATED JOB TITLES LISTED BY STUDY FOR AGRICULTURAL PRODUCTION, AGRICULTURAL RESOURCES, AGRICULTURAL MECHANICS AND AGRICULTURAL PRODUCTS

COMPETENCY NUMBERS FOR THE GRAIN, FEED AND SEED STUDY LISTED BY SUBJECT MATTER TABLES

COMPETENCY NUMBERS LISTED BY TABLE FOR THE SUPPLIES AND SERVICES STUDY

COMPETENCY NUMBERS AND RELATED JOB TITLES LISTED BY STUDY

Study, Competency Number and Job Title		Study, Competency Number and Job Title	
Agricultural Production Study		Agricultural Mechanics Study	
800 - 871	Farm and Ranch Foreman	1 - 51	Manager
880 - 926	GFW Livestock, Beef, Dairy, Combination, Hogs	60 - 100	Supervisor
935 - 955	GFW Sheep	105 - 194	Salesman
970 - 984	Milker	200 - 244	Partsman
995 - 1018	GFW Crop Production	250 - 279	Clerical Worker
1025 - 1035	GFW Hay	285 - 317	Technician
1045 - 1170	GFW Unspecified	325 - 534	Mechanic
1175 - 1400	Agricultural Mechanic	540 - 591	Mechanic's Helper
1410 - 1424	Artificial Inseminator	600 - 629	Painter
1435 - 1441	Cook	635 - 731	Welder
1445 - 1457	Cowboy	740 - 770	Maintenance Man
1465 - 1577	Feedlot Manager	775 - 794	Set-Up Man
1695 - 1709	Herdsman		
1715 - 1734	Irrigator		
1745 - 1755	Maid		
1760 - 1768	Equipment Operator		
1775 - 1791	Truck Driver		

COMPETENCY NUMBERS AND RELATED JOB TITLES LISTED BY STUDY

Continued

Study, Competency Number and Job Title	
Agricultural Products Study	
1 - 12	All Job Titles, All Industries
20 - 65	All Supervisors, All Industries
70 - 104	Plant Workers
110 - 125	Salesman - Drivers
130 - 148	Warehouseman
150 - 162	Shipping Clerk
170 - 187	Mixer
190 - 204	Divider Operator
211 - 226	Molder Operator
230 - 244	Bench Hand
270 - 286	Baker - Retail
250 - 264	Ovenman
290 - 298	Hand Bagger
350 - 382	Buttermaker
385 - 408	Cheesemaker
410 - 438	Lab Technician
440 - 468	Pasteurizer
470 - 498	Ice Cream Maker
550 - 583	Butcher
585 - 612	Meat Cutter

Study, Competency Number and Job Title	
Agricultural Products-Continued	
615 - 634	Sausage Maker
640 - 651	Render Operator
700 - 710	Crop Production
715 - 735	Chemist
740 - 763	Miller
765 - 775	Buhr-Miller
780 - 804	Smutter
Agricultural Resources Study	
1 - 75	Dairy Herd Improvement Supervisor
100 - 223	Civil Engineering Technician
300 - 482	Soil Conservation Technician

COMPETENCY NUMBERS FOR THE GRAIN, FEED AND SEED STUDY
LISTED BY SUBJECT MATTER TABLES

Competency Number	Table
1 - 34	Table 8 - Feeds
1 - 30	Table 9 - Agricultural Chemicals
1 - 53	Table 10 - Business Management

COMPETENCY NUMBERS LISTED BY TABLE FOR THE SUPPLIES AND SERVICES STUDY ##

Competency Number	Table
1 - 54	Table 1 - General
55 - 102	Table 2 - Petroleum Products & Automotive, Truck & Tractor Accessories
103 - 155	Table 3 - Livestock and Crop Production and General Farm Management

Competencies are also listed in the Appendix in the example of the instrument.