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Educational Needs Assessment in Feed Management For County Agents, DHIA Supervisors, Feed Salesmen, Veterinarians, Vocational Agriculture Teachers

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David C. Grusenmeyer

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Roy S. Emery
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EDUCATIONAL NEEDS ASSESSMENT IN FEED MANAGEMENT FOR COUNTY AGENTS, DHIA SUPERVISORS, FEED SALESMEN, VETERINARIANS, VOCATIONAL AGRICULTURE TEACHERS

By

David C. Grusenmeyer

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ABSTRACT

EDUCATIONAL NEEDS ASSESSMENT IN FEED MANAGEMENT FOR COUNTY AGENTS, DHIA SUPERVISORS, FEED SALESMEN, VETERINARIANS, VOCATIONAL AGRICULTURE TEACHERS

By

David C. Grusenmeyer

Literature reviewed concerns educational programs, educational needs and instructional development. A project to train Dairy Herd Improvement Association (DHIA) supervisors to sample feeds for analysis, interpret data and balance least-cost rations for dairymen, using a computer program, was marginally successful.

Inadequate training was a major factor. An educational needs assessment was conducted including DHIA supervisors, county agents, feed salesmen, veterinarians, and vocational agriculture teachers to determine which occupation is best suited for feed management training. The assessment evaluated importance and current knowledge of various nutrition topics for individuals. Veterinarians were identified as most suitable for feed management training followed by county agents and vocational agriculture teachers. These occupations feel feed management training is more valuable than do DHIA supervisors or feed salesmen. Veterinarians also indicated a willingness to invest more study time than county agents or vocational agriculture teachers. Suggestions are made for training program design and evaluation.

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LIST OF TERMS

Balanced Ration -- A combination of feeds and feed ingredients which provides for all nutritional requirements of an animal in the proper nutrient proportions.

Binding Constraint -- The input resource (time, money, material, etc.) which is being used to its maximum or minimum and is impeding further, faster or more efficient progress toward attaining specified goals.

County Agents -- The Cooperative Extension Service personnel responsible for working with the dairy farmers in their county or area.

DHIA -- Dairy Herd Improvement Association, an organization which provides milk testing, mastitis testing, animal identification and other management services to dairy farmers.

DHIA Supervisor -- DHIA employees who visit the dairy farms monthly to provide the organization's services.

Feed Management -- The systematic evaluation, control and administration of all matters involving farm feeds and animal nutrition, including crop selection, production, harvesting and storage as well as basic nutrition, inventory control, feed mixing and delivery, economic optimization and animal health as related to nutrition.

Felt Need -- An educational need perceived by an individual which generates sufficient internal motivation for the individual to wish to fulfill the need as quickly as possible.

Formative Evaluation -- An evaluation conducted before and during program development to discover deficiencies and weaknesses for the purpose of influencing the program during development and testing.

Instructional Development - Instructional Design -- Synonymous terms used to describe the systematic application of learning and teaching theory to the imparting of skills, concepts and information to students.

Perceived Need -- An educational need realized by an individual which is not felt strongly enough to generate internal motivation for the fulfillment of that need.

Summative Evaluation -- An evaluation conducted after the program is complete to make judgments about the program's adequacy.

Telplan Program 31 - Telplan 31 - Program 31 -- Terms referring to the same particular program in the Telplan System, the least-cost dairy ration formulation program.

Telplan System -- An interactive computer system developed by Michigan State University containing more than 75 separate programs.

Touch-Tone Terminal -- A term used to describe a touch-tone telephone when its intended use is as an interactive computer terminal.

Veterinarian -- DVM's who had indicated to the Michigan State University Veterinary School they had a specific interest in bovine practice.

Vocational Agriculture Teachers -- High school vocational agriculture teachers whose reported interest or expertise is in animal production.

INTRODUCTION

Economic trends over recent years have forced production agriculture to higher levels of efficiency. This trend, at the farm level, can easily be seen by the decreasing number of small, low income farms and the increase in larger, higher income farms in the ten year period from 1963 to 1973 (Wright, 1974). In the dairy industry the trend is also visible through the increased number of cows per farm, increased number of cows per man and increased production per cow (Boyd et al., 1972; Wright, 1974; Hoglund, 1975; Michigan Crop Reporting Service, 1977).

When production efficiency is the concern, economics are always a consideration. In dairy production, the item of greatest economic significance is nutrition and feeding management, which may comprise 50% or more of a dairy farm's total operating expense. Nutrition and feed management reflect on farm profitability in their effect on herd health. Nutrition is directly related to such costly diseases as milk fever, ketosis, fat cow syndrome, retained placenta as well as problems of reduced reproductive efficiency, mineral and vitamin deficiencies or toxicities and the animal's resistance to non-nutrient related diseases. Feed management may also affect farm profitability through the use of least-cost ration formulations that will allow maximum profit production.

Balanced rations to stimulate maximum milk production in dairy cattle can be hand calculated. If, however, one wishes to increase

the farm's economic efficiency by feeding least-cost ingredient combinations, meeting the animals' nutritional needs, calculations become complex. Agricultural economists realized the advantages of utilizing a computer to formulate balanced least-cost rations and have been writing linear programs for that purpose since the early 1950's (Waugh, 1951). The programs were somewhat crude and seldom co-authored by nutritionists; as a result, they were not well accepted by the animal industry. In the late 1960's these agricultural economists began teaming with nutritionists to revise the original models into more practical, useful versions. Resulting from these efforts, several programs are available around the country for balancing dairy rations. Some programs are simply computerized Pearson Squares, others are quite sophisticated models taking into account many animal, economic and feed factors. Telplan Program 31, Least-Cost Dairy Rations is one of the more sophisticated programs and is currently available in Michigan and seventeen other states.

In an effort to increase Telplan Program 31 availability to Michigan dairymen, a project was undertaken to train Dairy Herd Improvement Association (DHIA) supervisors in its utilization. The Michigan DHIA would then offer forage sampling and computer ration balancing as an extension of the services they previously offered to dairymen. Part I in this thesis is the presentation of the DHIA Feed Management Project and its results.

The DHIA Feed Management Project was not as successful as anticipated. The primary fault in the project was perceived as an inadequate training program in nutrition and computer ration formulation. Based primarily on DHIA project results and partly on the possibility of attempting similar projects with other organizations (i.e., county

agents, veterinarians, production agriculture teachers, etc.), an educational needs survey was conducted. The survey was intended to determine which occupational groups would be most interested in nutrition education, how extensive the training program should be, what topics should be covered and to what extent each topic should be covered. Part II of this thesis discusses the educational survey and its results.

REVIEW OF LITERATURE

Literature pertaining to the two topics of primary interest in this thesis is scarce. The literature available to the author in the following related topic areas has been reviewed:

1) Training Programs for Utilization of Computer Ration Balancing Facilities

2) Educational Programs in Dairy Production

3) Educational Needs Surveys

4) Instructional Development

Training Programs for Utilization of Computer Ration Balancing Facilities

At the inception of the project to train DHIA supervisors in the use of Telplan Program 31, Least-Cost Dairy Ration, there were no project reports upon which to base our efforts. Since that time a report by La Due (1976) was published summarizing a New York project in which county agents were trained to utilize computerized feed formulation facilities. Agents employed one of three separate modes of ration balancing, touch-tone phone terminal, printing terminal (both utilizing the Telplan System) or mail-in (batch processed on the Cornell University computer). Management agent, dairy agent teams from various New York counties were assigned to one of the three access systems. All agents and specialists received training in the use of their system and in the operation and use of the selected

computer programs. Training involved one two-day session, one one-day session and significant individual consultations.

For Telplan Program 31, telephone connect time on touch-tone and printing terminals, for 203 problem runs requiring 2.5 adjusted analysis per run, averaged 27 minutes per problem at a cost of $7.55 per call. Efficiency improved with experience as agents used significantly less phone time per problem during the second half of the experiment despite the fact that the number of adjusted analyses increased. Computer charges were $3.00 for the first analysis and $.80 for each additional analysis. The average total cost for all remote access Telplan Program 31 runs was $12.55.

The mail-in batch processing mode was least expensive, averaging $4.98 per problem for all programs. However, errors in input data created problems since they could not be corrected quickly by the agent on an interactive terminal. This created processing delays and increased demands on professional computer center staff to correct obvious errors. Also, if users knew a professional was available to correct errors they were less careful with the input assuming the professional would "fill in the missing data." It was estimated that one problem in five required approximately ten minutes of professional time and approximately 75% of these errors could have been avoided with accurate input data.

In the final analysis, agents preferred the remote access system almost 5 to 1 over the mail-in if state funds were used to maintain the terminals in county offices. With this mode of funding, printing terminals were favored over touch-tone terminals. If county funds were to be used for terminal maintenance, the margin narrowed to 3 to 1 preferring a remote access system, with the touch-tone terminal being

favored. If farmer fees were used for terminal maintenance, agents preferred a remote access system 6 to 1 over mail-in with the touch-tone terminal favored.

All agents in the project felt there must be at least some such computer service offered. Emphasis was placed on the need for an interactive remote access system primarily becuase it allows for input-output interaction rather than any need for instant answers.

Educational Programs in Dairy Production

Educational programs in dairy and animal nutrition are found in high school vocational agriculture classes and college animal nutrition and production courses. Many states have available publications such as Moore et al. (1976a, 1976b) which describe extensively suggested course content for vocational agriculture programs. College course content, although not documented to the same extent, often follows the same general outline. These two program types are often in a different framework than extension type nutrition programs.

In addition to farmer short courses conducted by county agents, correspondence courses have been developed and material produced for the instruction in basic dairy cattle nutrition (Aldrich and Adams; Hutjens, 1976; Kesler; Fryman, 1974; Nelson et al., 1975). These courses are, out of necessity, kept short, basic and simple, covering only the absolute essentials of dairy nutrition. Dairy correspondence courses, if well assembled in a short, basic format, are generally well accepted by dairymen, as reported by Hutjens and Radford (1977) and Fryman (1975, 1976).

A review by Holt (1977) points out the changing role of dairy farm managers and their changing educational needs. Holt contends that

development of educational programs in the future must take into account the individual's knowledge level and knowledge requirements. Holt states that reaching different audiences requires specific educational programs. Constructing the necessary variety of programs and material strains existing college faculty and these programs require more empirical studies than are readily available. Holt calls for more applied research by extension personnel in order to develop educational programs that will sell to dairy executives and managers and solve problems associated with large herds.

Another area of the dairy industry which deserves development of educational programs is the area of supportive services for dairy production (i.e., veterinarians, feed salesmen, extension agents, DHIA supervisors, production agriculture teachers, etc.). Little has been documented concerning nutrition instruction for individuals involved in these supportive services.

Surveys of Educational Needs

Educational requirements and competencies needed for employment in agribusiness and natural resources have been studied. These studies, however, deal exclusively with high school vocational education programs. Earlier reports dealing with training for non-farm agricultural occupations have been reviewed by Clark (1959). This literature, however, is confined to high school vocational agriculture programs and is outdated by today's standards.

Clark (1963) outlined the following four step model for development of new programs in the Michigan vocational agriculture education system:

1) Select groups willing to develop new programs - Factors mentioned for consideration were: size of group, job or function of group, group member's abilities, understandings and competencies, financial support, goals, curriculum potential.

2) Advisory committee utilization - Identify a group of experts who are aware of the abilities, understandings and competencies required for successful performance or goal attainment and willing to aid in program development.

3) Continuing education - Maintain adequate performance records and control of program content to insure all material is understandable and current.

4) Follow-up studies of students - Survey graduates of the program sometime after completion to determine program practicality and usefulness.

Clark (1965), utilizing a variation of the model he proposed, published a survey of vocational competencies needed for employment in the feed industry. A list was compiled containing nine functions performed somewhere in the total feed industry. The competencies necessary for performance of each function were listed and verified by extension specialists and feed industry representatives. Following validation of the functions and competencies required for job performance in the feed industry, the skills, understandings and abilities needed to develop each competency were identified. These were then ranked by feed industry representatives on a 4 point scale as to the importance of each in attaining the designated competency. Out of 189 skills, understandings and abilities, 107 received an importance score of 3.0 or above and were selected for further study. These understandings, skills and abilities were then regrouped into a number of instructional experiences and activities. With appropriate modifications, Clark claimed, these experiences and activities may be designed for high school and post-high school instruction.

Albracht (1966) undertook a similar study, but focused specifically on the sales function of the feed industry. Twenty-eight activities for performance of the sales function were identified and verified by a jury of experts. Each activity's importance was rated on a 4 point scale with the nine highest scoring activities included for further study. All activities related to animal feeding and health, originally identified in the study, were also among the nine highest scoring activities. Assisting farmers in planning feeding programs and trouble-shooting feeding problems was identified as the most important activity for performance of the sales function.

Forty competencies were identified and verified as necessary for the accomplishment of the nine sales activities; sixteen (or 40%) dealt with feed management. The more significant competencies dealing with feed management, in relative order of importance, as assessed by the jury of experts, are (Albracht, 1966, p. 136):

Understands feeding practices and programs used in the community
Understands the research findings of livestock feeding trials
Ability to determine rations for specific livestock uses
Understands the composition of farm grains, roughages and supplements
Understands the various methods of preparing livestock feeds, i.e., grinding, pelleting, etc.
Understands the control of livestock pests and parasites
Ability to determine the livestock performance records to keep
Ability to evaluate farmers' roughages, pasture and grain resources
Knowledge of the physical make-up and digestive process of farm animals
Ability to write up and interpret the feeding results of his customers and convey them to management
Knowledge of agricultural practices used in the community

Albracht attempted to identify the loci at which each competency might best be taught. Each member of the jury also indicated at which of six loci (high school, post-high school, 4 year college, adult, dealer, on the job) it would be possible and appropriate to teach each competency. These data indicate a tendency away from the desirability

of teaching the competencies in high school programs. This was possibly due to the trend toward hiring only college graduates into feed sales positions.

Instructional Development

In instructional systems development, Davis et al. (1974, p. 4) suggests there are five types of commonly encountered problems. They are problems of:

1) Direction - Goals and/or objectives of the instruction are not clearly stated and known by all involved.

2) Evaluation - Evaluation procedures and criteria are not specified and known by all involved.

3) Content and Sequence - Content is missing or there is a lack of logical sequence or structure to the subject matter.

4) Methods - Improper teaching methods are used for material being taught or poor conditions exist under which to motivate and promote learning.

5) Constraints - Resources such as instructor skill, student abilities, reference resources and physical facilities are ignored.

Problems in these areas must be avoided if successful instructional systems are to be developed. To aid in the avoidance of these problems Davis et al. (1974, p. 19) offers the following model of the instructional design process.

1) Describe current instructional system
2) Derive and write objectives
3) Describe tasks involved
4) Analyze tasks and objectives
5) Plan evaluation
6) Design instruction
7) Implement instruction
8) Conduct evaluation
9) Revise and recycle

They also caution that this model is not in a linear time frame and that each activity overlaps onto one or several other activities.

Sparks (1972) and Harries (1972) describe a three stage, nine step model for instructional development. This model is more complete and detailed than that of Davis et al., which makes for a more usable, effective end product.

Regardless of which developmental model is followed, all agree with Mager (1962, 1973) that the key to development of successful, effective instruction and an informative evaluation is the specification of well written objectives. Mager (1962), Kapner and Sparks (1972), and Davis et al. (1974) cover the use of behavioral objectives in the evaluation of instructional effectiveness as well as student performance. Griffith (1971) outlines the rationale for use of performance objectives in the teaching of dairy production to improve student learning and interest. According to Campbell (1977), student interest and motivation must be maintained if effective learning is to occur. This must be kept in mind during the instructional development process and a means for generating student interest and motivation planned into the system. There are many methods of achieving this end as described by Campbell (1977) and Foreman (1971). These two articles are devoted almost entirely to identifying ways of generating and maintaining student interest and motivation.

PART I

DHIA FEED MANAGEMENT SYSTEM PROJECT

PROJECT RATIONALE

The values of Telplan Program 31 and similar least-cost ration formulation programs have been demonstrated (Schoonaert, 1973; The WISPLAN System, 1973; Bath et al., 1972, 1968; Dean et al., 1969). Extension agents, progressive dairy farmers and others soon recognized the merit of employing these least-cost ration formulations. County and area agricultural extension agents with the aid of state extension specialists began promoting least-cost ration program use. In some cases, with certain agents, this method of program delivery works well; in other cases, however, problems have arisen (Regional Telplan Meeting, 1974; Hughes, 1973). Some of the problems identified in the above-mentioned papers and in Michigan are:

1) Many agents lack the required background in nutrition to balance dairy rations.
2) Many agents lack the interest and/or desire to get involved.
3) Many agents do not have time to take on the added responsibilities of ration formulation.
4) Agents in general could not possibly work with every dairyman in their area.
5) Agents in general do not actively seek out dairymen in need of computer ration balancing assistance.

Due to these factors, many dairymen have not had least-cost ration formulations available to them, or in some cases available only to a limited extent. In an effort to circumvent the problems and reduce the agents' ration balancing work load, the following was proposed:

To include the computer formulation of nutritionally balanced, least-cost rations for dairy cattle as an extended service of the Michigan DHIA

DHIA supervisors, trained in the use of Telplan Program 31, could perform this personalized feed management service as an extension of milk testing, mastitis testing, animal identification and other services they now perform. This proposal and the action it generated sought to accomplish the following objectives:

1) To develop educational material and conduct training sessions for DHIA supervisors on the use of Telplan Program 31.
2) To assist DHIA supervisors in implementing ration formulations on dairy farms for a period of six months.
3) To determine acceptance by herd owners of the ration formulation service as an extension of DHIA services.
4) To determine acceptance of the DHIA supervisor as a nutrition planning resource person.
5) To determine the willingness of dairymen to pay full cost of the service which, to this time, was available free or at a very small cost.
6) To identify why non-users did not utilize the computer ration balancing service.
7) To determine whether selected DHIA supervisors can in fact do an acceptable computer ration balancing job.

In November, 1975, preparations began for a pilot project based on the proposal and objectives mentioned.

PROCEDURE

Cooperation for the DHIA Feed Management System project was secured from the Michigan Dairy Herd Improvement Association, The Michigan Cooperative Extension Service and Michigan State University. Ten DHIA supervisors were chosen to participate in the pilot project based on the following criteria:

1) The DHIA state manager's assessment of the supervisor's ability to handle the work involved.
2) The DHIA supervisor's willingness to participate in the project.
3) The DHIA supervisor having adequate time available to devote to the project.

The ten chosen supervisors and their respective county extension agents attended a one-day training workshop at the Michigan State University campus. The workshop's purpose was to explain the project, computer usage, forage sampling, collection of farm feeding data, interpretation of computer outputs and other relevant topics. Each workshop participant also received an information and reference manual containing the following:

1) Fee schedule for DHIA Feed Management project.
2) Ohio livestock ration evaluation program information (Pritchard and Staubus, 1975).
3) Detailed operating instructions for touch-tone terminal use on the Telplan system (Harsh, 1975).
4) User's manual for Telplan Program 31, the least-cost ration balancing program (Harsh et al., 1972).
5) Nutritional reference information.
6) An extension publication on basic dairy cattle nutrition (Hillman et al., 1975).
7) Example computer ration balancing problems.
8) Name, address and phone number of individuals to contact if problems arose.

The workshop also provided the opportunity for supervisors and agents to see a demonstration and receive practice using, Telplan Program 31 via touch-tone terminals. However, due to busy schedules, few supervisors were able to get significant practice using the system.

In addition to training DHIA supervisors, information packets were sent to each dairyman for whom the supervisors tested. These packets contained general information about the project and Telplan Program 31, describing what results the dairyman might expect if he were to utilize the service. For purposes of the pilot project the service was limited to DHIA herds only. Each supervisor was instructed to solicit, from among client herds, dairymen wishing to implement a computer balanced ration and/or send feeds for laboratory analysis.

There were two modes for field delivery of the feed management service, scheme I and scheme II, with only one major difference between the two. In scheme I the DHIA supervisor actually operated the touch-tone terminal and formulated the ration. In scheme II the supervisor collected necessary farm feeding data which were sent to Michigan State University for ration formulation. Other supervisor responsibilities common to both schemes were:

1) Solicit herds for ration formulation.
2) Collect and mail feed samples for lab analysis.
3) Collect farm feeding data.
4) Aid dairymen in solving ration implementation problems.

Each supervisor was expected to formulate rations under both scheme I and scheme II. Herds within supervisor were then to be grouped, one from scheme I, one from scheme II and one herd not using the DHIA feed management service, as a control. The grouping criteria were: 1) breed, 2) herd production average, 3) herd size, 4) dollar return

over feed cost. Twelve measurable criteria and other parameters of interest were delineated to provide measurements for determining project success:

1) Increased milk production.
2) Reduced feed cost.
3) Dairymen's attitude toward the project.
4) Percentage of dairymen running a ration balancing program who actually implemented it.
5) Reasons for not implenting the ration after it was formulated.
6) Estimated rate of repeated usage of the service.
7) Willingness of the dairymen to pay for the service.
8) Dairymen's attitudes toward DHIA supervisors.
9) Increased income over feed cost.
10) Reasons for going to computer ration formulation.
11) Speed of getting results back to dairymen.
12) Use made of the information provided through the forage analysis or ration formulation.

With the aforementioned groups and criteria for evaluation of project success, the following comparisons could be made:

Scheme I vs. Scheme II (in aggregate and by supervisors) -- To determine whether there was a response difference between the two schemes either in herd production response or dairymen's attitudes. To gain some indication as to whether individual supervisors were more successful under one scheme than the other.

Scheme I and Scheme II vs. Control -- To evaluate the production response caused by implementation of a computer formulated ration.

Supervisor vs. Supervisor for all possible supervisor pairs within Scheme I -- To determine whether there is a difference in attitude or production response from one supervisor to another.

Approximately one to two months after implementation of the computer formulated ration, each dairyman was to receive a questionnaire. The questionnaire would attempt to determine general feelings for the program, its acceptability, its usefulness and noted effects on herd productivity.

RESULTS AND DISCUSSION

DHIA Feed Management Project Observations

The DHIA Feed Management Project was initiated in February, 1976, and many problems were encountered in its implementation. Ten DHIA supervisors attended the January training workshop. Of the ten, two withdrew from the project on the training day after discovering the work load involved. At the end of the pilot study only four supervisors remained interested in the project. Several possible reasons, identified by the author, for lack of project success are:

1) Insufficient training program and training materials.
2) Poor communication between project coordinator and DHIA supervisors.
3) Insufficient time on the part of DHIA supervisors to study and gain a working knowledge of nutrition and computer ration balancing.
4) Insufficient time available, on the part of DHIA supervisors, to promote and provide the feed management service.
5) Apprehension on the part of DHIA supervisors to actually provide the service due to inadequate training.
6) Competition in certain regions from feed mills, salesmen, and county agents who provide the service free or at a small fraction of the DHIA charge.
7) Poor timing for project implementation (Spring vs. Fall).
8) DHIA supervisors who felt that they were not adequately compensated for their time involvement.
9) "Scare stories" told by dairymen and county agents discouraged DHIA supervisors from attempting to formulate rations.

The problem of poor timing and poor communications could be corrected easily. A close systematic communication network is important in a project of this nature. The communication system, in order to be effective, must be simple, easily used, and understood

by all involved. Telephone communication, upon which this project relied, is not always the best choice. Supervisors quite often could not be reached by phone. Time of year chosen for project implementation is also an important factor. In late winter, spring and summer there is little ration balancing done. In winter and early spring, most dairymen have their feeding regime set utilizing stored feeds. In late spring and summer, pasture, green chop, and haylage are available and few dairymen worry about balancing rations. During fall and early winter most ration balancing is done as cows come off pasture and dairymen determine what combination of stored roughages and forages they should feed.

Competition from the feed industry and county agents for laboratory analysis and computer ration formulation cannot be easily overcome. Feed salesmen, in general, need make no charge for these services knowing the expense will be made up in feed sales. County agents cannot make a charge for their labor as it is a part of their job and, until recently, had a grant to pay for computer time. This meant the only charges a dairyman had to pay, going through the county agent, were those of a telephone call and a lab analysis. DHIA supervisors, on the other hand, have only the prospect of additional income as incentive to offer the service to dairymen. This in itself priced the service far above any charge to dairymen from an extension oriented program or feed company. The fee schedule for the DHIA Feed Management Project is presented in Table 1. La Due (1976) reported a charge of $12.00 in the New York extension project for the same service which cost $21.00 in the DHIA project, the difference being due entirely to supervisor compensation. This, then, may raise the question, should the Extension Service be permitted to maintain

Table 1. DHIA feed management system fee schedule

	1 sample	2 samples	3 samples
Forage Testing			
lab analysis	$12.00	$24.00	$36.00
sampling charge (supervisor)	4.00	5.00	6.00
postage	2.00	4.00	6.00
Total	$18.00	$33.00	$48.00
Ration Balancing (one ration with required adjusted analysis)			
computer charge	5.00	5.00	5.00
telephone charge (long-distance call night rate)	5.00	5.00	5.00
supervisor fee collecting farm data	1.00	1.00	1.00
balancing ration	10.00	10.00	10.00
Total	$21.00	$21.00	$21.00
Forage Testing plus Ration Balancing			
break-even buffer charge	3.00	3.00	3.00
Total Charge	$42.00	$57.00	$72.00

programs of this type for service to dairymen? A case could be made in support of that idea. However, since the primary business of extension is education rather than service, there is little basis for any project unless it contains a significant educational component. After initial development, programs that become principally service, such as computer ration formulation, should be provided by commercial agribusiness. The problem and its solution are quite complex; my intention is simply to make a point which deserves consideration.

The remaining factors contributing to the lack of project success appear to be linked, either directly or indirectly, to ineffective training programs for Telplan Program 31 and/or basic dairy cattle nutrition. It was agreed by most individuals involved that the one-day training workshop used to instruct DHIA supervisors was not sufficient. This becomes especially apparent in comparison to the training procedure employed by La Due (1976). Too much information was presented in too short a time to achieve effective comprehension and integration of ideas. In addition, material which should have been covered was omitted due to insufficient time. This meager training program led to many complications:

1) Supervisors were apprehensive of using Telplan Program 31, for fear of making a mistake.
2) Supervisors did not know how to handle particular situations resulting in their shying away from those situations or calling for help they should not have needed.
3) Excessive study time, outside the supervised workshop, was required to gain adequate mastery of the information to allow intelligent handling of the DHIA Feed Management Service.
4) A longer time expenditure than expected was required to gather farm feeding data, code the computer input forms and formulate an acceptable ration resulting in supervisors having inadequate time and/or feeling underpaid for their time involvement.

Since 1975, outside the DHIA Feed Management System Project, no formal computer ration balancing instruction has been conducted in Michigan. Also, during this period there was an extensive turnover of county agricultural extension personnel. As a result, many individuals using Telplan Program 31 do not have a full understanding of the program and what it does. Due in part to this lack of understanding, a large amount of time, expense and effort is expended in formulation of acceptable rations. This becomes the basis of what are referred to as "scare stories" which some DHIA supervisors heard, such as, "It took the county agent and I six hours one day to formulate a single ration."; "Our phone bill ran over $30.00 one day and we still didn't get a single ration we were satisfied with."; "We can never get the computer to use home grown feeds; it always tells us to go out and buy feeds we know we don't need." These problems arise primarily from an inadequate knowledge of least-cost ration balancing, inaccurate input data and an unawareness of how linear programming converges on a solution. The situation is perpetuated too by insufficient printed reference material explaining Telplan Program 31 options, use and interpretation.

DHIA Supervisor Survey

Thirteen rations were claimed to have been balanced in the project. However, due to communication breakdown, only three were reported. Collecting follow-up data on only three herds would not have provided much useful data, so its collection was not attempted. Even though the pilot project did not meet with the success expected, valuable information was gained from the attempt. This information

should prove useful in patterning similar projects involving DHIA as well as other farm service organizations.

A questionnaire was sent to all supervisors selected for the pilot project (except the two who withdrew on the training day) in an attempt to identify attitudes and involvement in the project. A copy of this questionnaire and frequency data are found in Appendix A. Statistical analysis of eight surveys would be meaningless; however, a look at trends in the data would be beneficial. The supervisor's questionnaire centers around two basic points, the DHIA supervisor's ability to provide computer ration balancing services to his dairymen and the dairymen's attitudes toward the project as perceived by the supervisor.

Only two supervisors indicated the training program provided adequate training for effectively working with the least-cost ration program. However, these two individuals never attempted to use Telplan Program 31 and all who did claimed training was inadequate. Half the supervisors indicated they felt qualified to explain the project to dairymen and gather farm data. However, at least one individual, claiming to be qualified to explain the project and gather data, consistently collected incomplete and inaccurate data. Only 50% of the supervisors felt they had enough time available to provide dairymen with adequate ration balancing services. This percentage would be higher if computer formulation were not one of the responsibilities and supervisors only took feed samples and gathered farm feeding data. County agents seem to be good resources for assistance since 75% of the supervisors indicated the agent was both available and able to help with problems.

The supervisors' overall impression of the dairymen's attitude toward the project was encouraging. Seventy-five percent of the supervisors felt they were well accepted by the dairymen in discussing feeding programs. This response agrees with the questionnaire response by dairymen where 53% said they would or might allow the supervisor to formulate their herd's ration and only 34% said they definitely would not allow it. The supervisor does appear to be an acceptable nutrition planning resource person, within limits. It must be kept in mind, however, that this was a select group of supervisors. The same acceptance could not be expected when all DHIA supervisors are considered. Also, personality type and background will have great bearing on the supervisor's acceptance by dairymen. Sixty-three percent of the supervisors indicated it was not difficult to convince dairymen there were benefits from computer balanced rations and that dairymen were knowledgeable about what the project was attempting to do for them. The supervisors also indicated that 50% of the dairymen to whom they gave nutritional information used the information for feeding program improvement. This coincides with data from the dairymen's questionnaire and is a respectable adoption rate.

Several supervisors indicated they could not generate dairymen interest in the project because feed mills, feed salesmen and county agents provided the service free or at very low cost. Others said it was a good service if the supervisor had the time to devote to it, but they did not. Numerous comments were received both during and after the pilot project concerning the lack of a good training program. This is possibly the greatest single factor contributing to the lack of program success. The difficulty level of the work was

not beyond the DHIA supervisor's ability. However, a more complete training program must be designed.

Dairymen Survey

In order to collect data concerning attitudes of dairymen exposed to the DHIA Feed Management Pilot Project, a questionnaire survey was used (Appendix B). Of the 276 questionnaires mailed out, 77, or 27.9%, were returned in time for analysis, of which nearly 34% contained incomplete information. The poor response may be attributed to a failure to make the project known to dairymen despite the special mailing to each. This conjecture is further sustained by the questionnaires returned wherein it is noted DHIA supervisors discussed the project with only 36% of the respondents. Further support for this belief comes from dairymen's comments which indicated they received no information regarding the project either by mail or from the supervisor. Several supervisors also indicated they discussed the feed management project with only those dairymen asking about it. Due to this low response, statistical analysis and interpretation must be performed with caution.

Questionnaire data were analyzed three ways: 1) overall, 2) broken down by production level, and 3) broken down by herd size. The response frequency data for all three groupings are tabulated in Appendix C. Chi-square analysis for 2 x 2 contingency tables were performed on questions in which difference in response rate indicated there may be a significant response difference between high and low production or large and small herds. One question showed a response difference between high and low production herd owners which was significant at the 10% level ($P<.1$). These data indicate that significantly more

higher producing herds have their rations formulated by feed salesmen than lower producing herds. This could have practical significance in the project with regard to overcoming the problem of competition with feed salesmen in providing ration balancing and forage testing services. There could be other benefits to focusing emphasis on lower producing herds as well. These benefits would include: 1) herds with lower production need help more urgently; 2) it is much easier to get a production response from a lower producing herd; 3) the production response is likely to be much more dramatic in lower producing herds; and 4) income over feed cost is more likely to increase in lower producing herds.

The data indicate that other questions might also have significant differences in responses. However, due to insufficient sample size in certain cells of the contingency table, the Chi-square analysis was not a valid test. Whether some response differences are significant or not, it may still be beneficial to examine the trends. The data show a tendency for the larger herds to have their rations formulated by feed salesmen to a lesser extent than smaller herds. This would indicate that the problem of competition by feed salesmen might be further avoided by promoting the project more intensely in the larger herds. This would also have additional benefits for project success since any production increase or reduced feed cost on a per cow basis would be more pronounced overall in a large as opposed to a small herd. In addition, other data (Appendix C) tend to indicate that dairymen from large herds more readily accept computers as management aids than do dairymen from smaller herds.

Earlier in this report the high service charge was cited as a possible detriment to the DHIA Feed Management Project. Responses to

the question on project cost, however, do not bear this out. Dairymen who were aware of the cost indicated greater than 3 to 1 that the cost was within reason. Strong arguments have been made by dairymen, county agents and agricultural economists that laboratory analysis and least-cost ration formulation are worth even more than DHIA Feed Management Project charges. The author also believes, however, that for many dairymen saying the cost is within reason is one thing and actually agreeing to pay for the service may be entirely different. The practical significance is that the necessary charge may be made for the services provided but must be kept to a minimum and justified. This must also be accompanied by a good promotional effort and factual data to convince the dairyman to actually spend the money.

Data on the formulation of rations indicate that most rations currently being fed are formulated by the dairymen, followed by feed salesmen and county agents. When dairymen were asked who they would choose to balance their rations, however, county agents were the top choice followed by the dairyman, state or area extension specialist, feed salesmen and, fifth, DHIA supervisors. The rankings were determined by two different methods, both arriving at the same order for the top four spots. The first method simply gave each option one point for being the dairyman's first or only choice; the sums then determined the rank. The second method utilized only those questionnaires which had at least the top three choices ranked. It awarded 15, 10 and 5 points for each first, second, and third choice, respectively; the sum for each choice then determined the final ranking.

Overall, dairymen indicate they are willing to accept the computer as a management aid in their feeding program. Their major concerns

with computer utilization seem to be: 1) they have some question as to whether the assumptions the computer works on are correct (this may be more a function of inaccurate input data); 2) it is not the computer they have reservations about but rather the individuals involved in using it. The first concern may be founded in a lack of knowledge and experience in computer utilization. One way to overcome the problem is through educational programs and material which familiarize individuals involved in the dairy industry with computer utilization. The same is true of the second concern. However, to alleviate this one the dairyman's confidence must be gained. The popular choice of dairymen to have county agents formulate herd rations indicates that to some extent county agents and the Extension Service have gained this confidence. They have done so only after years of study and experience working with dairymen. This confidence is not won overnight and the key thing to note is the process begins with study, not going directly into the field to work with dairymen. Currently, to get the required education and training for assisting dairymen with feeding programs, individuals must return to college. Few individuals involved in support services to dairy farms could afford returning to college for study in nutrition and feed management, even though it would improve the quality of their service to dairymen. This indicates an alternative training method should be devised for individuals wishing to improve their abilities in this area.

SUMMARY AND RECOMMENDATIONS

A project was initiated to train DHIA herd supervisors in the use of Telplan Program 31, least-cost dairy rations, and forage sampling for lab analysis. This DHIA Feed Management Project was incorporated as an extension of the various services previously offered by the DHIA. Problems were encountered and the project was less successful than expected. However, 13 rations were balanced and 45 feed samples were taken for laboratory analysis. Supervisors' attitudes and involvement and dairymen's attitudes toward the project were surveyed.

If this type project is to be attempted in the future, the following recommendations will help insure its success:

1) First and foremost, all individuals involved must be genuinely interested in the project, understand everything expected of them including the time commitment they must make and have capabilities commensurate with task requirements. People make projects go; without their cooperation in getting the work done, any project would be doomed to failure.

2) An adequate training program for all individuals involved is paramount. Cramming as much information into one day as was done in this project makes an impossible situation for the participants. That kind of training gives them enough information to be either dangerous or afraid to try anything. A well planned, carefully designed training program with ample time for information presentation, discussion, practice and time between sessions for thought and study is essential. This approach will help to insure that individuals learn what they need to know.

3) Allow plenty of time for preparation and review of training material. Hurried production results in errors, omissions and sometimes totally useless material.

4) Have a well defined, easily understood communication channel which matches the needs of the individuals and the information being transferred. If possible, offer several different communication modes and allow the individuals involved to determine which best suits their liking.

5) Once the project participants have finished their training, administer a test to be assured each individual knows all that is required. The test should be as life-like as possible and sufficiently long to cover all aspects of the instruction. This will assure the project directors that the individuals can handle the work and will also build the individual's self-confidence.

6) If a price must be charged for the project's service, justify all costs and keep them to a minimum. Develop promotional material or presentations to help clients see byond the cost to the benefits of using the service.

The DHIA Feed Management Project, or similar project with another organization, given certain modifications, could work. The attempt to organize this project, although not totally successful, has yielded valuable experience. There are two possible primary explanations for the lack of program success: 1) an inadequate training program for the DHIA supervisors and 2) inadequate time, on the DHIA supervisors' part, to devote to project involvement. Unfortunately, these two factors are confounded so as to make it difficult to tell which is actually the major problem. It is an experience common to most individuals that any task takes longer to complete if one lacks adequate training and experience. It is also a common experience that any program of instruction which is not well prepared and well organized requires a greater effort on the part of the student to master the material. Therefore, until a time efficient training program is

developed and individuals are adequately trained, one can never be certain inadequate time is truly the problem.

In the development of any instructional program the place to start, according to the instructional development models of Davis et al. (1974), Harries (1972) and Sparks (1972), is by analyzing the current setting. In order to get where one intends to go, one must first know where he is starting from. A survey was therefore proposed to determine how knowledgeable DHIA supervisors believe they are in the subject of nutrition and how much effort they are willing to devote toward gaining the required proficiency.

The possibility exists that DHIA supervisors may have insufficient time available to devote toward a Feed Management Training Project and might not be the most desirable occupational group to involve in such a project. As a result, it was further proposed that the survey be expanded to include county agents, feed salesmen, veterinarians, and vocational agriculture teachers. This would allow additional options as to which occupational group is trained and included in a Feed Management Project, based on the analysis of their suitability for the job.

PART II

SURVEY OF EDUCATIONAL NEEDS IN DAIRY FEED MANAGEMENT

PROJECT RATIONALE

As mentioned previously, the models of Davis et al. (1974), Harries (1972) and Sparks (1972) all begin with an analysis of the current setting in the development process for instructional programs. Knowles (1970, p. 91-97) and Parker (1972, p. 113-121) further substantiate the need for assessment of educational needs, especially when dealing with adults. Knowles states it is almost universally predictable that programs based primarily on what someone (even an advisory council) thinks people ought to learn will fail. It is therefore suggested that a survey of individuals' needs and interests be conducted prior to development of a training program. Knowles (1970, p. 95) supports this suggestion by stating, "The only valid source of information about interests of adults is the individuals themselves."

Since an assessment of educational needs in dairy cattle feed management, for the occupational groups with which the author was concerned, had never before been conducted, a needs assessment was required. Given the population involved and the information required, a survey questionnaire was thought to be the most appropriate means of collecting needed information. Personal interviews with each individual were impractical, especially after the survey was expanded to include county agents, feed salesmen, veterinarians and vocational agriculture teachers. Dairymen were also included on the questionnaire. However, the intended instruction was for use in training

individuals to assist dairymen and not geared toward dairymen themselves. For this reason it was believed a survey of dairymen's educational needs would be of little value, so they were deleted from the study.

The objectives of the survey were:

1) To assess the interest of the various groups in a training program on dairy cattle feed management.
2) To assess, within each group, educational background and extent of knowledge in nutrition.
3) To assess the extent to which each group gives nutritional information and advice to dairymen.
4) To assess the perceived value of self-instructional packages about nutrition and the amount of time individuals are willing to spend studying such material.
5) To assess what the various groups believe they should or would like to learn in order to give sound nutritional advice to dairymen.

With these objectives in mind, a survey was constructed and mailed to county agents, DHIA supervisors, feed salesmen, veterinarians, and vocational agriculture teachers.

PROCEDURE

With the assistance of Dr. Irvin J. Lehman, Michigan State University Learning and Evaluation Service, a questionnaire (Appendix D) was developed to achieve the objectives stated. The questionnaire covered four pages, requiring ninety-one separate responses and taking approximately 15 minutes to complete. Following initial construction, the questionnaire was subjected to extensive review by members of the Michigan State University Dairy Science Department and the Learning and Evaluation Service. After four revisions, the questionnaire was deemed suitable for printing and mailing.

Once the organizations to be included in the survey were identified, lists of names and addresses were obtained. The county agent mailing list was extracted from the 1977 Michigan Cooperative Extension Service Staff Directory. At least one agent in each county received a questionnaire. These agents were selected by Dr. Don Hillman, based on their involvement in dairy extension. The mailing list for DHIA supervisors was provided by Mr. Al Thelen, manager of the Michigan DHIA. The mailing list of vocational agriculture teachers involved in animal production was extracted from the 1976-1977 Michigan Agriculture and Natural Resources Educators Directory through assistance from the Agriculture and Natural Resources Education Institute. The list of veterinarians was provided by Dr. Louis E. Newman, Michigan State University Veterinary Clinic, and included only those veterinarians indicating an interest in bovine practice. A mailing list

for feed salesmen was more difficult to acquire. Requests for names and addresses of Michigan-based feed salesmen were sent to feed companies listed in the 1977 Michigan Grain and Agri-Dealers Association Directory and some farm magazine advertisements. Response to the requests was poor overall. One company called for more information, then later apparently decided not to comply with the request. Other companies granted the request with enthusiasm and offered further assistance if needed. Table 2 shows the total number of individuals in each of the occupational mailing lists.

Table 2. Size of survey

Occupation	Number of Individuals
County agent	82
DHIA supervisors	81
Feed salesmen	20
Veterinarians	236
Vocational agriculture teachers	57
Total	476

All names and addresses were coded, on computer cards, in a format compatible with the DHIA's address label printer computer program. The DHIA computer was then used to print a gummed label for each individual on the mailing list. Envelopes were labeled and stuffed with a cover letter (Appendix E), the questionnaire, and a self-addressed, posted return envelope. Mailings were staggered to ease the workload of stuffing envelopes and coding return data, which were entered into the computer for analysis.

RESULTS AND DISCUSSION

Characterization of Populations

Two hundred twenty-four, or 47.1%, of the questionnaires were returned in time for analysis and 51, or 22.8%, contained additional comments, suggestions or offers of assistance (frequency data are found in Appendix F). This is a substantial return when considering no gimmicks or follow-up notices were employed to increase response rate. The response rate itself shows that considerable interest exists in dairy feed management training, to varying degrees, within each of the occupational groups surveyed. The number of respondents in each occupation and the percent return are shown in Table 3.

Table 3. Survey return rate

Occupation	Number of Respondents	% Return
County agent	58	70.7
DHIA supervisor	18	22.2
Feed salesmen	19	95.0
Veterinarians	95	40.2
Vocational agriculture teachers	34	59.6
Total	224	47.1

The 95% return from feed salesmen is misleading for two reasons:

1) In at least one case the company's regional office sent out a notice to its feed salesmen specifically instructing them to complete and return the questionnaire.
2) Samples of the questionnaire sent to the companies with the request for names and addresses of salesmen were completed and returned. These data were tabulated as responses but unfortunately were not recorded as questionnaires sent out.

Taking only the second explanation into account, the author believes 70% is a more accurate figure for return of feed salesmen questionnaires. In addition, the fact that some salesmen received instructions from their regional office to complete and return the questionnaire also biased their return rate upward.

Further understanding of the differences in response rate is in order if these data will be used to indicate interest in the feed management training program. It is generally true that groups with less formal education tend to be low responders in questionnaire surveys (Erdos, 1970, p. 146). Therefore, DHIA supervisors, being at a lower level of formal education in the survey population, would be expected to respond at a lower rate in the survey. Another factor is that busy individuals with large demands and a high value on their time, such as veterinarians, tend to be low responders on questionnaire surveys. This, coupled with the fact they are paid by the job and taking time out to complete a survey is essentially money gone from their pockets, explains their lower response rate. County agents and vocational agriculture teachers on salary from public funds would be losing nothing by taking time out to complete the questionnaire. Taking into account all the factors mentioned, the questionnaire had a respectable return rate which followed expected trends among the occupations.

It is pointless and perhaps dangerous to analyze these survey data on the basis of overall responses, unless there are no response differences based on occupation, amount of nutritional advice given, or the value of feed management training to the individual. To determine this, the data were analyzed via one-way analysis of variance by occupation, by amount of nutritional advice given, and by perceived value of training to the individual. The analysis indicated few meaningful significant response trends as a function of the perceived value of the proposed training material to the individual, or by the amount of nutritional advice given. The significant trends shown were those which would be expected:

1) The more valuable individuals believed a training package would be for themselves, the more valuable they believed it would be for the entire dairy industry.
2) The more nutritional advice individuals claimed to give, the more they tended to notice nutritional and feed management problems on farms.

Analysis of variance by occupation showed significant differences between groups in several responses. Several of these differences are worthy of note in considering development of a training program in feed management.

DHIA supervisors have significantly fewer years of employment in their respective occupation than county agents, vocational agriculture teachers, feed salesmen or veterinarians. This is due primarily to a higher personnel turnover rate among DHIA supervisors than the other occupations. Serious consideration must be given as to how much time, effort and expense could justifiably be invested in training an individual who may terminate his employment in the occupation after a relatively short period. Since it requires field experience and time to become proficient at giving feed management advice to

dairymen, perhaps training efforts should be concentrated on more stable occupational groups.

Further analysis indicates county agents, vocational agriculture teachers and veterinarians have attained a significantly higher level of formal education than feed salesmen or DHIA supervisors. This probably has little bearing on the individual's ability to learn information and give sound feed management advice. It may, however, have implications on the starting point of a training program and the speed with which training can progress. This may also lead to another cost-benefit consideration if substantially more resources will be required to train individuals from the lower formal education level. Formal education, therefore, may become an important consideration in the design of a training program.

Sixty-four percent of all respondents indicated a need to learn how to use Telplan Program 31. The breakdown is presented by occupation in Table 4. Veterinarians and vocational agriculture teachers

Table 4. Respondents' felt need to learn to use Telplan Program 31

Occupation	Yes	No
County agent	53.5*	46.5*
DHIA supervisor	47.1	52.9
Feed salesmen	44.4	55.6
Veterinarians	75.3	24.8
Vocational agriculture teachers	67.6	32.4
Overall response	64.0	36.0

*Percent of respondents within occupation.

tended to perceive a greater need to learn to use Telplan Program 31, though not a statistically significant greater need. These data indicate that, at least for veterinarians and vocational agriculture teachers, extensive training in the use of Telplan Program 31 is desirable in a feed management training program. In determining the extent of training required to become proficient in Telplan Program 31 utilization, it may be beneficial to determine the adequacy of present training. County agents appear to be significantly greater users of the computer program than the other occupations and should, therefore, give the most valid assessment of training adequacy. Table 5 contains the response breakdown as to how adequate Telplan Program 31 training was for only those agents claiming to have used the program. Thirty percent of the agents claimed their training was

Table 5. Quality of training for Telplan Program 31 as perceived by county agents who used the program

Quality	Number	Percent*
Very adequate	3	7.5
Adequate	25	62.5
Inadequate	10	25.0
Very inadequate	2	5.0
Total	40	

*Percent of county agents who indicated they had used Telplan Program 31.

inadequate. This large percentage may indicate that current training methods for Telplan Program 31 need some revision. Therefore, if current Telplan Program 31 material is to be used in the feed

management training program, it must first be critically reviewed, revised and evaluated to insure its effectiveness.

A determination of expected participation in a feed management training program must be made before development can be justified. Three primary reasons might explain why an individual would assign high value to a training program:

1) A desire to apply the knowledge or skills.
2) A desire to improve one's job.
3) A desire to make up a deficiency.

It has been shown, in surveys, that these desires are the three most important reasons adults participate in any educational program (Axford, 1970, p. 401; Knox, 1977, p. 179). If one accepts these three desires as primary reasons for assigning high value to a training program, then the "value of training" response may be used to indicate expected participation. Therefore, the individual's perceived value of a feed management training program, for himself, is an important consideration as a program participation indicator. If the percent of individuals assigning high value to feed management training is small, program development should be reconsidered.

In planning and evaluating adult extension programs, 25% or greater participation among eligible individuals would be considered successful given good weather conditions and program accessibility. This may then be used as a thumb rule by which to evaluate probable program success. An individual's perceived value of feed management training could be used as an indicator of probable program participation. Examination of these response data yielded Table 6. Two factors must be realized when reviewing these data and drawing conclusions from them:

Table 6. Value of feed management training material to survey respondents

Occupation	VV	V	LV	NV	Adjusted Value Score**
County agents	36.8*	56.1	7.0	0.0	111.3
DHIA supervisors	12.5	68.8	18.8	0.0	87.6
Feed salesmen	11.1	36.8	44.4	5.6	53.5
Veterinarians	48.9	43.6	7.4	0.0	117.0
Vocational agriculture teachers	41.2	52.9	5.9	0.0	114.7
Overall response	38.9	49.8	10.9	0.5	

VV - Very Valuable
V - Valuable
LV - Little Value
NV - No Value

*Percent of respondents within occupation.

**Adjusted value score = % VV x 1.5 + % V.

1) It has been shown repeatedly in human research that people try very hard to say what they think the researcher wants to hear and not necessarily what they believe.
2) A person may truly believe a program to be very valuable but this does not guarantee the individual will be interested enough to devote time for involvement.

Nonetheless, these data will give some indication as to how much participation may be expe-ted from the various occupations. The "very valuable" and "valuable" responses should be combined for a better indication of probable participation. It is reasonable to assume that individuals who indicate "very valuable" are somewhat more likely to participate than individuals who indicated "valuable." The author realizes it is impossible to quantify this difference, but nonetheless believes it is important to account for the difference in

some way. If an individual responding "very valuable" is 1.5 times as likely to participate in a program than if only "valuable" had been indicated, an "adjusted value score" (Table 6) could be calculated. The "adjusted value score" divided the occupations into two "value level" groups:

1) A high "value" group, from which greatest participation could be expected, consisting of veterinarians, vocational agriculture teachers and county agents.
2) A lower "value" group consisting of DHIA supervisors and feed salesmen from whom less participation could be expected.

Consideration must be given to these data when determining which occupational group to concentrate initial training efforts on. It is obvious that a training program in feed management would have a greater chance for success among the higher rather than the lower "value" occupations.

The next data set for consideration involves the amount of time individuals are willing to commit to studying feed management training material. It would be fruitless to develop a fifteen-hour training program if people are only willing to spend five hours studying it. Therefore, it is important to adjust training program length to coincide with the amount of time individuals will commit to it. Table 7 shows the time commitment individuals of the various occupational groups are willing to make. Several general trends are indicated in the table. Overall about 50% of the individuals will commit five to ten hours to project involvement and one-quarter of the sample population lies above and below, willing to commit either very little time or as much time as needed. These data, however, would be more meaningful if looked at in combination with the "value" individuals place on feed management training. Any training programs developed

Table 7. Amount of time survey respondents are willing to devote toward training program involvement

Occupation	Hours ≤4	5-7	8-10	11-15	>15
County agent	26.8*	23.2	37.5	3.6	8.9
DHIA supervisor	29.4	5.9	35.3	0.0	29.4
Feed salesmen	41.2	17.6	5.9	5.9	29.4
Veterinarians	13.8	18.1	29.8	4.3	34.0
Vocational agriculture teachers	18.2	36.4	24.2	9.1	12.1
Overall response	21.0	21.5	29.2	4.6	23.8

*Percent of respondents within occupation.

should be designed to suit the needs of those individuals most likely to participate. If only those individuals are considered who indicated training in feed management would be "valuable" or "very "valuable" to them personally, Table 8 could be generated.

Table 8. Amount of time individuals placing high value on training are willing to devote toward program involvement

Occupation	Hours ≤5-7	≥8-10
County agent	47.1*	52.9
DHIA supervisors	23.1	76.9
Feed salesmen	22.2	77.8
Veterinarians	26.4	73.6
Vocational agriculture teachers	53.3	46.7
Overall response	35.9	64.1

*Percent of respondents indicating "valuable" or "very valuable" for survey question 12.

These data are more useful since they represent responses of individuals most likely to participate in a training project. They must, however, be interpreted with caution. DHIA supervisors and feed salesmen would appear to be suitable groups to utilize a training program since they seem more willing to commit a larger amount of time to studying the material. However, their "value scores" (Table 6) are lowest of the five occupations and for this reason would probably not be the best target groups for initial training efforts. This then raises the question, should an initial feed management training project involve an occupational group with lower participation but higher motivation of participants to learn or a group with a larger percent participation but lower motivation to learn?[1]

The final choice of occupational group, for which the initial feed management training program should be developed, must rest on a careful appraisal of all previously discussed factors. In addition, another determinant in occupational choice, which was mentioned previously but not discussed, is the cost-benefit ratio involved. Any instructional development and training effort has an associated cost in the form of human, monetary and material resources. As a return for resource investment the program benefits some individual or group, with the program determining the benefits. This then may raise certain questions which will aid the selection of an occupation with which to work:

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[1]Motivation to learn may be assessed by the amount of time an individual is willing to spend studying the material. If individuals are willing to spend large amounts of time studying, they must for some reason be highly motivated to learn. If, on the other hand, individuals are not motivated to learn the material, they will not spend their time studying it.

1) Which occupation will require the smallest investment of resources for training?
2) Which occupation will have the least difficulty gaining the dairymen's confidence?
3) Which occupation will take the least amount of time for training?
4) Are individuals from one occupation better able to see problems on farms and give more immediate advice?
5) Are individuals from one occupation more or less likely to elicit cooperation from dairymen?
6) How much follow-up guidance will the various occupations require?
7) Which group will best utilize the knowledge gained?

The idea is to minimize cost, in human, monetary and material resources, while maximizing returns, in the form of program benefits.

After consideration of all facets previously discussed, the author has ranked the five occupations. The order is based on the occupation's desirability as a target for developing a feed management training program.

1) Veterinarians
2) County agents
3) Vocational agriculture teachers
4) DHIA supervisors
5) Feed salesmen

County agents and vocational agriculture teachers are close choices by comparison and may be substituted up and down for each other. DHIA supervisors and feed salesmen were likewise close choices and their rank may also be switched. Veterinarians stand out as the first choice and are recommended for serious consideration for development of a dairy feed management training program.

Training Program Development

After the target occupation has been selected, the training program itself must be developed. Several questions are immediately raised:

1) Will one training program suffice, or must it be different for each occupation?
2) Which topics should be included in training?
3) To what extent should each topic be covered?
4) How long should the training program be?
5) At what pace should the information be presented?
6) What type presentation should be used (i.e., slide-tape, programed text, workshops, etc.)?
7) How should the program be evaluated?

The first question has been addressed to a limited extent, and it appears separate training programs may be required. This, along with questions 2 and 3, will be dealt with later during the determination of program content. Optimum length for a feed management training program is variable among occupations. Table 9 contains suggested program lengths for the five occupations. These suggestions come from

Table 9. Suggested training program lengths

Occupation	Length of Program
Veterinarians DHIA supervisors Feed salesmen	9-11 hours
County agents Vocational agriculture teachers	6-8 hours

data in the previous section on characterization of the populations. Questions involving pace and type of presentation must be answered by constantly evaluating the program during its development. This ties in closely with how the program is to be evaluated and will be discussed following the determination of program content.

The questionnaire's second major section deals with subject matter content of feed management training programs. A list of 39 topics, related to feed management, was included on the questionnaire. Each respondent was asked to indicate how important he felt it was for a dairy nutrition advisor to be knowledgeable about each topic. Respondents were then asked to indicate how familiar they were with each topic. Data from these responses gave certain indications:

1) How much the individuals know about a particular topic.
2) How important they believe each topic is to know about.
3) If there are differences among occupations as to how important certain topics are to know about.
4) If there are any differences among the occupations as to how much they know about any particular topic.

Analysis of these data must proceed with caution to guard against overinterpretation. It must be remembered that the questionnaire's topic portion contains nominal data; numbers were assigned only for interpretive convenience. These numbers may be statistically analyzed. However, one cannot be sure the difference between "important" and "very important" is the same in someone's mind as the difference between "important" and "slightly important" or "slightly important" and "not important." The differences must all be made equal in order to interpret the data, but care must be taken not to overinterpret what is there. Also, the survey was set up such that topic sensitization could have occurred. The mere fact that respondents read the list of topics before they were asked to indicate how much they knew about each could have affected their responses.

Regression analysis was performed on the "topic importance" response data by occupation, with "% of herds in your area to which you give nutritional advice", "value of this type instructional package to you in your work" and "current knowledge level" for each

corresponding topic, used as covariates. Several significant interactions were found between one or more of three covariates and the importance assigned to some topics. For example:

> The more county agents know about nutrient deficiency symptoms, the more important they tend to believe the topic is. (P = .04)
>
> The more advice vocational agriculture teachers give, the more important they tend to believe it is to know about estimation of forage quality by smell, texture and color. (P = .04)
>
> The more valuable a self-instructional package is to the veterinarian, the more important he tends to believe it is to know about fat cow syndrome. (P = .03)

These response interactions make for interesting discussion and speculation about the populations and their characteristics. In an instructional development framework, however, examining the interactions is of little value for the following reasons:

1) As previously mentioned, these are nominal data to which numbers have been assigned but true values cannot be determined.
2) In developing an instructional system one must work with population parameters, not individuals. If each occupation were further broken down by "amount of advice given", "value of the instructional package" and "current level of knowledge", the groups would be so small and so many in number it would be impractical to develop training programs for each.
3) If many variations in a training program were developed a large administrative effort would be required to keep all training programs straight and assure each individual or small group got the appropriate program.
4) Little can be solidly based on the "amount of advice given" parameter because of the question's nature and wording. For example, if a respondent has 11 herds in his area and gives advice to 9, he would fall into the highest "advice level"; another respondent may have 100 herds in his area, give advice to 35 and thus fall into a lower "advice level" when he actually gives more advice than the first respondent.

5) The cost-benefit ratio of developing different training packages for groups within occupations would not be favorable. The amount gained in better instruction would not justify the investment of time, effort and money.

The content of any training program should reflect, as closely as possible, the needs and desires of those individuals most likely to participate. As previously discussed, the response to question 12 ("How valuable would a self-instructional package be to you in your work?") may be used to indicate an individual's likelihood to participate. Therefore, only topic responses from those individuals indicating the instructional package would be "valuable" or "very valuable" were used to determine program content. A one-way analysis of variance by occupation was run on these response data. Scheffé's tests at the $P<.05$ level showed no significant differences in topic importance between occupations. That is, each topic tended to have the same relative importance for all surveyed occupations. However, many significant differences between occupations were found in the individual's current knowledge about certain topics (Appendix G). For instance, veterinarians claimed to know significantly more about ruminant digestive physiology than did DHIA supervisors or county agents. On the other hand, county agents and feed salesmen claimed to know significantly more about inventory control than did veterinarians.

This analysis indicates that all individuals seem to agree on what a nutritional advisor must know but they differ, as a function of occupation, in their entry level of knowledge. Therefore, it appears a single feed management training progam will not suffice and modifications will be needed based on the participant's occupation.

Mean scores for topic importance (Questionnaire Part III, Appendix D) were used to rank the 39 topics from most to least important (Appendix H). Mean values for all occupations combined were used for ranking since there were no significant differences between occupations with regard to topic importance. To assess how knowledgeable respondents were about the various topics, they were asked to indicate their degree of familiarity with each topic (Questionnaire Part VI, Appendix D). To determine the extent to which each topic must be covered for the occupation involved, the following was done. Mean familiarity scores (also referred to as knowledge scores) within occupation were subtracted from corresponding overall mean importance scores to arrive at a "knowledge deficiency index." That is, the difference between what is known about a topic and what should be known. The author realizes two incompatible terms are being subtracted, knowledge from importance. This does not cause problems since the inconsistency is realized and the desired outcome is achieved:

1) Topics perceived less important, about which the individuals are knowledgeable, will have a small or negative difference; rank would be low and less topic coverage required.
2) Topics perceived important, about which little is known, will have a large difference indicating more extensive coverage is needed.
3) Topics with other perceived importance and knowledge combinations exist, yielding knowledge deficiency index values between the two extremes, these topics could then receive coverage accordingly.

Appendix J contains the topic ranks for each of the five occupations based on the discrepancy between what is known and what should be known (i.e., theperceived educational need). The values for this ranking were arrived at by subtracting the mean topic knowledge value, claimed by each occupation's respondents (Questionnaire Part

VI, Appendix D) from the mean importance value for that topic (Questionnaire Part III, Appendix D). It is important to realize that simply because individuals perceive the value of knowledge they do not have, it does not mean they feel the need to acquire it. The distinction must therefore be made between an individual's perceived educational needs and felt educational needs. Educational programs must be based on felt needs to attract participants, then geared toward perceived or actual needs to accomplish the educators' goals. Examination of topic ranks in Appendix J gives further evidence to the idea each occupation may require specific training program modifications.

In considering the array of topics for inclusion in a training program and the extent of coverage for each, several considerations must be made. First, determine who will be involved and to what use the training will be put. It is pointless to train an individual or group extensively in feed management if their only intention is to sample feeds for laboratory analysis and assist dairymen in interpreting the results. Second, previously discussed factors must be considered such as educational background, expected participation, time commitment to learning, etc. Third, the instructional developer must know what topics the individuals involved believe are important (Appendix H). Appendix K also contains additional topics which respondents believed were important enough to write in. These are the topics most likely to spark interest in the target population. Fourth, after interest has been sparked, something must be done to stimulate participation. To accomplish this stress the inclusion of topics ranking high on both the topic importance list (Appendix H) and the perceived needs list for that occupation (Appendix J). For example,

in a training program for veterinarians heavy emphasis on calcium, phosphorus and magnesium requirements would not be a wise choice. Even though it ranks high in topic importance, veterinarians tend to believe they already know enough about it. Nutrient requirements of lactating cows is a better main emphasis topic being high on both lists and more likely to stimulate interest and participation. Topics of this nature may also be used as "springboards" to move into topics of less perceived importance or those which the participants "think" they know all about. In any feed management training program the instructional developer cannot confine himself only to topics individuals want to learn. The objective is to know, select and emphasize what participants believe they want or need to learn, then slip in, or lead into, the less interesting topics. It is important that individuals be led into these secondary topics by developing in them a felt need to learn, not by forcing the material on them.

The time devoted to teaching the various topics in a training program is variable and depends on several considerations. First, the objectives of the training program and knowledge base of the individuals involved must be considered. In some cases a particular topic may require only brief mention whereas in another situation extensive coverage might be needed. These two circumstances would obviously require different time allotments be devoted to the topic involved. Second, the training program length itself would have great bearing on the time spent on any one topic. Obviously, various topics could be covered in much greater detail during a two-day shortcourse as opposed to a one-day workshop. Third, the presentation method involved may affect the amount of time devoted to a particular topic. This is especially noticeable when comparing

audiovisual with strictly spoken or written programs. In many cases the explanation a topic requires may be greatly reduced by utilizing well designed visuals or well planned practice exercises, whenever these options are feasible. The fourth consideration in allotting program time to various topics is topic importance. This relates to the program's objectives, to some extent, which would dictate which topics are important. The more important topics should obviously be afforded more time than less important topics. A fifth consideration in program time allotment is the program participants' perceived need to learn, the difference between what they know and what they believe they need to know. Regardless of how important the topics are, adults will not participate in giving extensive coverage to material they already know. Less time, therefore, should be spent on material participants are already familiar with.

Several other issues must be dealt with before an instructional program can be developed. One which is closely related to the aforementioned considerations is the pace at which the program can progress. The pace should be governed primarily by the participants' ability to comprehend the facts and acquire the skills being taught. The only dependable method for determining correct instructional pace is by program evaluation with a small group, then continued evaluation with larger groups, revising the instruction where necessary. Pace has implications with regard to time devoted to particular topics; this varies both among topics and among occupations. Depending on the participants' background, certain topics may need to progress at different rates. In this way, pace also affects the time required for the entire training program. A slower pace necessitates a longer program in order to meet specified behavioral objectives. Depending

on the program's most binding constraint, program length may require changing or alterations may be required in program objectives and goals. If training program length is pushed to the maximum and the pace is still too fast for the participants, then certain topics must be deleted from the program. Regardless of how the problem of pace is solved, it must be set fast enough to make the program interesting yet slow enough so as not to "lose" the participants.

Once the audience and subject matter for the training program have been identified, the presentation medium can be selected. The presentation medium chosen should reflect consideration for the subject matter involved and participants' preferences. If the topics to be taught require extensive use of pictures, a method must be chosen which will allow effective use of visuals. If procedures or skills are being taught, presentation methods must be employed which will allow for adequate practice in using the procedure or skill. Consideration must also be given to the program participants in presentation method selection. If slide projectors or video tape players are not readily available, it would be impractical to develop a program based on slide-tape or video tape presentation. Likewise, if prospective participants cannot or will not take off from their jobs to attend a workshop, then that would not be a viable alternative. Discussion with various prospective participants should yield valuable information as to what presentation method would best suit them. Further modifications of presentation methods may be made if program evaluations indicate such adjustments are needed. Some respondents' suggestions for training program format may be found in Appendix L.

Training Program Evaluation

After all the aforementioned items have been dealt with, there remains one additional consideration before actual program development can begin. That is, formulating an evaluation scheme to provide timely, credible, and manageable data for developmental decision-making. Two types of evaluation exist, summative and formative; both are essential for adequate project assessment.

First the formative evaluation must be dealt with. According to Steele (1975) this includes evaluating the extent of individuals' needs, which has been done through use of the previously discussed questionnaire. In addition, formative evaluation must be made during every phase of program development and deal with such questions as:

1) Are the results important to the program's execution?
2) Do the results contribute more to the participants and society than if the resources were invested in other things?
3) Are the results produced at a reasonable cost?
4) Are the results sufficient in terms of the overall need?
5) Is there a lack of resources?
6) Is it feasible to test a prototype?
7) What indications are given by the summative evaluation of the prototype?
8) Are portions of the project making assumptions which cannot be met?
9) What is the participant's motivation to learn the material?

Data from these and other formative evaluation questions should be used to influence the program during development and while it is in progress. Evaluations which influence ongoing program development have great value; they improve and give immediate benefits, according to Brack (1975).

Once the program is executed, a summative evaluation is required to determine how well the program accomplished its goals. Logsdon (1975), Steele (1975) and Sabrosky (1966) offer the following types

of questions for consideration in a summative evaluation:

1) What percent of participants were performing the learned function before the program?
   --immediately after the program?
   --sometime after the program?
2) What changes occurred after the program?
3) To what extent can the changes be attributed to the program?
   --what percent of participants said the program helped them make the changes?
4) What percent of the dairymen involved reacted favorably?
5) What do the participants report are the strengths, weaknesses, and needed changes in the program?
6) Which teaching methods were most effective? Why?
   --least effective? Why?
7) Which subject matter was most useful?
   --needed more extensive coverage?
   --needed less coverage?
8) What changes are now implied for future programs?
9) Are the results sufficient in the expectations of the participants and the amount of time and energy they invested?
10) Is there any evidence that it is realistic to expect a program to produce more results than this one has, given the same budget, personnel, and working conditions?
11) If the results are insufficient, does it mean the program is ineffective or that changes need to be made in how the program is carried out?

Coupling the summative evaluation data from questions like these with previously gathered formative evaluation data will provide program developers with information they need to make required program modifications. Also, all programs produce effects in addition to those stated as program goals or outcomes. Scriven (1972) suggests evaluators collect information about as many program outcomes as is feasible, not just those outcomes identified by the program designer. These program "side effects" take many forms, some have positive effects, some negative and some neutral. In any case, they need to be identified and studied so they may be rectified or used to the program's advantage, whichever is the case.

Steele (1975) refers to evaluation as a developmental management tool. If evaluation is to be used effectively as a developmental

management tool, there must be a clear understanding of why the evaluation is being conducted and what it is to accomplish. This means the evaluation scheme must be determined before program development is begun. Few programs are developed without initial faults and weaknesses; only a preconceived, well planned formative evaluation will smooth over a program's rough spots on its first use. This, coupled with an extensive summative evaluation, will allow subsequent program use to proceed with only minor program bugs if any at all.

SUMMARY AND RECOMMENDATIONS

An educational needs assessment was conducted for county agents, DHIA supervisors, feed salesmen, veterinarians and vocational agriculture teachers. This assessment's main focus was to evaluate training needs in feed management. Information was also gathered to characterize the various occupations with respect to how useful a training program would be for them. Four hundred seventy-six questionnaire surveys were mailed out and 47% were returned in time for analysis. From analysis of the data in the questionnaire's first half, it may be concluded that veterinarians should be the occupation for which to develop an instructional program. In all parameters considered, veterinarians ranked quite high as a favorable target occupation for feed management training. The author therefore recommends they be given serious consideration for feed management training. The same analysis also showed county agents and vocational agriculture teachers are a close pair, ranking somewhat behind veterinarians, in potential as target occupations for feed management training.

The questionnaire's second half focuses on the training program's topic content. In the discussion of these data other considerations are pointed out which must be made during training program design and development. Due to the number of variables involved in developing an educational program, it is impractical to prescribe specific program content at this time. It must be left up to the individual program

designer as to exactly how the data should be interpreted and the program put together for a particular situation. For this reason the discussion is limited to specifying ideas and guidelines for program development rather than suggesting specific program content. Possible program topics were ranked by perceived importance over all occupations (Appendix G) and by the individuals' perceived need to learn about the topic (Appendix H). These topic lists, along with other topic suggestions from respondents (Appendix J), will provide a basis for instructional developers to determine specific program content. In addition, a summary of selected respondents' comments concerning program development might also give program designers some insight as to how they might deliver the instruction (Appendix L).

The author recommends a suitable occupational group be chosen (preferably veterinarians) as a target for feed management training program development. Once this selection is made the specifics of the previously discussed program development considerations can be worked out for that occupation under the conditions present. From this point the best fitted instructional program should be developed and continually evaluated to insure success. It is further recommended that during program development and evaluation professional assistance and consultation be obtained from Michigan State University's Learning and Evaluation Service. This will help insure no vital points in program design are missed and that development and evaluation will run more smoothly.

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APPENDICES

APPENDIX A

DHIA FEED MANAGEMENT PROJECT SUPERVISOR QUESTIONNAIRE

Please complete the questionnaire and return in the envelope provided.

1. Number of rations balanced 13.

   Number of samples taken for analysis 45.

2. Did the dairymen use the information you provided them to improve their herd's nutritional status?

	YES	NO	DON'T KNOW
	4	2	2
%	50	25	25

3. Do you feel you received adequate information and training to effectively work with the least-cost ration program?

	YES	NO	N/A
	2	5	1
%	25	63	12

4. When talking with the dairymen, did you feel qualified (or would you have felt qualified) to explain the project and gather farm data?

	YES	NO	N/A
	4	3	1
%	50	38	12

5. Was the county agent both available and able to give you help and advice?

	YES	NO	N/A
	6	1	1
%	75	13	12

6. Did you feel you had enough time available to provide adequate ration balancing services to the dairymen?

	YES	NO	N/A
	4	3	1
%	50	38	12

7. Did you feel you received adequate compensation for your time and efforts?

	YES	NO	N/A
	5	2	1
%	63	25	12

8. Did you feel you were well accepted by the dairymen when discussing their feeding program?

	YES	NO	N/A
	6	2	0
%	75	25	0

9. Did you find it difficult to convince dairymen they could benefit from computer ration formulation?

	YES	NO	N/A
	2	5	1
%	25	63	12

10. Did you feel the dairymen were knowledgeable about the program and what it was trying to do?

	YES	NO	N/A
	5	3	0
%	63	37	0

Additional Comments:

APPENDIX B

DHIA FEED MANAGEMENT PROJECT DAIRYMEN QUESTIONNAIRE

Please complete the questionnaire and return in the envelope provided.

1. Number of cows milking and dry _____.

2. Rolling herd average _____.

3. Did your D.H.I.A. tester discuss forage lab analysis or ration balancing with you?

   YES _____ NO _____

4. Prior to receiving literature from D.H.I.A. and your herd tester were you aware of the least-cost dairy ration balancing program?

   YES _____ NO _____

5. Did your D.H.I.A. tester --

   --take samples for lab analysis? YES _____ NO _____

   --formulate a balanced ration? YES _____ NO _____

6. If the D.H.I.A. tester provided you with any feeding information did you make use of it to change your feeding program?

   YES _____ NO _____

7. Do you feel the cost involved is within reason?

   YES _____ NO _____

8. Would you feel confident in allowing your D.H.I.A. tester to formulate a computer balanced ration for your herd?

   YES _____ NO _____

9. If no to question 8, would you choose to formulate your rations? (please rank the following in order of choice 1, 2, 3, etc.)

_____ D.H.I.A. tester
_____ Feed salesman
_____ County Extension Agent
_____ Yourself
_____ State or Area Extension Specialist
_____ Feed mill
_____ Other (specify) _____

10. How was your present ration formulated?

_____ Feed salesman
_____ County Agent using computer
_____ Self-formulated
_____ Self-formulated with aid of County Extension Agent
_____ Other (specify) _____

11. Do you believe computers can be a valuable aid to assist in making management decisions on your farm?

YES _____ NO _____

12. What reservations do you have about using the computer to balance your dairy rations? (check all that apply)

_____ it gives me more information than I need or understand
_____ it costs too much for what I get out of it
_____ it doesn't give me enough information
_____ I'm not sure the assumptions the computer works on are correct
_____ I believe computers can and do make mistakes
_____ I have no reservations about using the computer
_____ it takes too much time and effort to assemble the needed farm data for what the program is worth
_____ it is not the computer I have reservations about but rather the individuals involved in running it
_____ Other (specify) _____

Additional Comments:

APPENDIX C

DHIA FEED MANAGEMENT PROJECT

DAIRYMEN QUESTIONNAIRE DATA

#	QUESTION		HIGH PRODUCTION LEVEL 14501, n=36				LOW PRODUCTION LEVEL 14500, n=35				OVERALL FREQUENCY n=77				LARGE HERDS 60 COWS, n=39				SMALL HERDS 59 COWS, n=36			
			YES	NO	N/A	OMIT	YES	NO	N/A	OMIT	YES	NO	N/A	OMIT	YES	NO	N/A	OMIT	YES	NO	N/A	OMIT
3	Did supervisor discuss lab analysis	N	15	21			11	24			28	49			17	22			11	24		
	or ration balancing with you	%	41.7	58.3			31.4	68.6			36.4	63.6			43.6	56.4			31.4	68.6		
4	Were you aware of the least cost	N	21	15			22	12	1		47	29	1		27	11	1		22	12	1	
	ration program before DHIA project	%	58.3	41.7			62.9	34.3	2.9		61.0	37.7	1.3		69.2	28.2	2.6		62.9	34.3	2.9	
5	Did the supervisor take samples	N	4	32			2	33			6	70		1	5	34			2	33		
	for lab analysis	%	11.1	88.9			5.7	94.3			7.8	90.9		1.3	12.8	87.2			5.7	94.3		
	Did the supervisor formulate a	N	1	35			1	34			2	74		1	2	37			1	34		
	balanced ration	%	2.8	97.2			2.9	97.1			2.6	96.1		1.3	5.1	94.9			2.9	97.1		
6	Did you make use of project info.	N	3	1	32		1	2	32		4	4	66	3	4	2	32	1	1	2	32	
	to change your feeding program	%	8.3	2.8	88.9		2.9	5.7	91.4		5.2	5.2	85.7	3.9	10.3	5.1	82.1	2.6	2.9	5.7	91.4	
7	Do you feel the cost involved	N	7		27	2	7	3	25		15	4	54	4	9	1	26	3	7	3	25	
	is within reason	%	19.4		75.0	5.6	20.0	8.6	71.4		19.5	5.2	70.1	5.2	23.1	2.6	66.7	7.7	20.0	8.6	71.4	
8	Would you feel confident allowing	N	14	14	6	2	17	10	3	5	35	26	9	7	20	11	5	3	17	10	3	5
	supervisor to formulate ration	%	38.9	38.9	16.7	5.6	48.6	28.6	8.6	14.3	45.5	33.8	11.7	9.1	51.3	28.2	12.8	7.7	48.6	28.6	8.6	14.3
10	Was your current ration formulated by																					
A	Feed salesman	N	16	19		1	8	25		2	26	47		4	11	27		1	15	18		3
		%	44.4	52.8		2.8	22.9	71.4		5.7	33.8	61.0		5.2	28.2	69.2		2.6	41.7	50.0		8.3
B	County agent using computer	N	5	30		1	4	29		2	10	36		4	8	30		1	1	32		3
		%	13.9	83.3		2.8	11.4	82.9		5.7	13.0	81.8		5.2	20.5	76.9		2.6	2.8	88.9		8.3
C	Self-formulated	N	18	17		1	19	14		2	40	33		4	18	20		1	21	12		3
		%	50.0	47.2		2.8	54.3	40.0		5.7	51.9	42.9		5.2	46.2	51.3		2.6	58.3	33.3		8.3
D	Self-formulated w/ county agent	N	3	32		1	3	30		2	7	66		4	4	34		1	3	30		3
		%	8.3	88.6		2.8	8.6	85.7		5.7	9.1	85.7		5.2	10.3	87.2		2.6	8.3	83.3		8.3
E	Other	N	2	33		1	5	28		2	7	66		4	4	34		1	3	30		3
		%	5.6	91.7		2.8	14.3	80.0		5.7	9.1	85.7		5.2	10.3	87.2		2.6	8.3	83.3		8.3
11	Computers can be a valuable farm	N	26	7	1	2	31	1		3	60	8	1	8	34	1		4	24	7	1	4
		%	72.2	19.7	2.8	5.6	88.6	2.9		8.6	77.9	10.4	1.3	10.4	87.2	2.6		10.3	66.7	19.4	2.8	11.1
12	Reservations about computer use																					
A	Gives me more info. than I	N	3	25		8	5	26		4	9	52		16	5	27		7	4	24		8
	need or understand	%	8.3	69.4		22.2	14.3	74.3		11.4	11.7	67.5		20.8	12.8	69.2		17.9	11.1	66.7		22.2
B	Costs too much for what I	N	2	26		8	4	27		4	7	54		16	1	31		7	6	22		8
	get out of it	%	5.6	72.2		22.2	11.4	77.1		11.4	9.1	70.1		20.8	2.6	79.5		17.9	16.7	61.1		22.2
C	Doesn't give me enough	N	1	27		8		31		4	1	60		16		32		7	1	27		8
	information	%	2.8	75.0		22.2		88.6		11.4	1.3	77.9		20.8		82.1		17.9	2.8	75.0		22.2
D	Not the assumptions the computer	N	9	19		8	6	25		4	15	46		16	10	22		7	5	23		8
	works on are correct	%	25.0	52.8		22.2	17.2	71.4		11.4	19.5	59.7		20.8	25.6	56.4		17.9	13.9	63.9		22.2
E	I believe computers can and do	N	6	22		8	5	26		4	11	50		16	5	27		7	6	22		8
	make mistakes	%	16.7	61.1		22.2	14.3	74.3		11.4	14.3	64.9		20.8	12.8	69.2		17.9	16.7	61.1		22.2
F	I have no reservations about	N	11	17		8	11	20		4	23	38		16	12	20		7	10	18		8
	using the computer	%	30.6	47.2		22.2	31.4	57.1		11.4	29.9	49.4		20.8	30.8	51.3		17.9	27.8	50.0		22.2
G	Takes too much time and effort	N	4	24		8	2	29		4	6	55		16	3	29		7	3	25		8
	with input for what it's worth	%	11.4	66.7		22.2	5.7	82.9		11.4	7.8	71.4		20.8	7.7	74.4		17.9	8.3	69.4		22.2
H	It's not the computer but the people	N	2	26		8	9	22		4	11	50		16	7	25		7	4	24		8
	running it that I wonder about	%	5.6	72.2		22.2	25.7	62.9		11.4	14.3	64.9		20.8	17.9	64.1		17.9	11.1	66.7		22.2
I	Other	N	5	23		8	7	24		4	12	49		16	8	24		7	4	24		8
		%	13.9	63.9		22.2	20.0	68.6		11.4	15.6	63.6		20.8	20.5	61.5		17.9	11.1	66.7		22.2

9	Rank choice to balance your ration's	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
A	DHIA supervisor	60	6	45	7	105	5	60	5	45	6
B	Feed salesman	130	3*	90	4	220	4	100	4	120	2
C	County extension agent	180	1	120	3	280	1	190	1	100	3*
D	Yourself	130	2*	135	1	265	2	155	3	110	1
E	State or area extension specialist	110	4	130	2	260	3	160	2	100	4*
F	Feed mill	40	7	55	5*	100	6	45	6	55	5
G	Other	75	5	55	6*	70	7	40	7	30	-

* tie

APPENDIX D

EDUCATIONAL NEEDS ASSESSMENT QUESTIONNAIRE

Part I: For questions 1-6 please answer each question by writing in the appropriate number in the blank to the left.

____ 1. I am a

1) County Agent
2) Dairyman
3) DHIA Supervisor
4) Feed Salesman
5) Veterinarian
6) Vocational Ag Teacher

____ 2. How many years have you worked at your profession indicated above?

____ 3. My highest level of formal education was:

1) Some high school
2) High school graduate
3) Some college
4) College degree
5) Advanced college degree

DAIRYMEN DISREGARD QUESTIONS 4-6

____ 4. Approximately how many dairy herds are in your service area?

____ 5. Approximately what percentage of the dairy herds in your area do you give nutritional advice to?

1) none
2) 1-20
3) 21-40
4) 41-60
5) 61-80
6) 81-100

____ 6. What percentage of the dairy herds you visit do you estimate have nutritional or feed management problems?

1) none
2) 1-20
3) 21-40
4) 41-60
5) 61-80
6) 81-100

7. Where did you receive most of your knowledge about dairy nutrition? (you may " " more than one)

____ Reading books and magazines

____ Extension programs

____ Other adult education programs

____ High school animal nutrition courses

____ College animal nutrition courses

____ College ruminant nutrition courses

****

Part II: For questions 8-13 mark the number of your resopnse in the blank to the left of the question.

____ 8. How familiar are you with Telplan Program 31, Least-Cost Computer Formulated Rations for dairy cattle?

1) Use the program frequently and am knowledgeable about it.
2) Used the program only a few times.
3) Seen the program used or demonstrated but never run it myself.
4) Only aware of it.
5) Know nothing about it.

____ 9. Do you feel you have a need to learn how to use Telplan Program 31?

1) Definitely yes
2) Yes
3) No
4) Definitely no

____10. How adequate do feel your training is in the use of Telplan Program 31?

1) Never received training
2) Very adequate
3) Adequate
4) Inadequate
5) Very inadequate

____11. How valuable would a self-instructional package as described in the cover letter be to the dairy industry?

1) Very valuable
2) Valuable
3) Little value
4) No value

____12. How valuable would a self-instructional package be to you in your work?

1) Very valuable
2) Valuable
3) Little value
4) No value

____13. What is the maximum amount of time you would be willing to spend studying a self-instructional package of the type described?

1) 4 hours or less
2) 5 to 7 hours
3) 8 to 10 hours
4) 11 to 15 hours
5) more than 15 hours

****

Part III: For dairy nutrition advisers, knowledge of certain topics or areas may vary in importance. For the topics listed below, please indicate how important it is that a nutrition adviser be knowledgeable about them. Respond by circling the appropriate answer on the LEFT HAND SIDE.

vi -- Very important
i -- Important
si -- Slightly important
ni -- Not important

USE ONLY THE COLUMNS ON THE LEFT HAND SIDE AT THIS TIME. IGNORE THE RIGHT HAND SIDE.

Circle One				TOPICS	Circle One			
vi	i	si	ni	14. Ruminant digestive physiology	vf	f	sf	nf
vi	i	si	ni	15. Nutrient requirements for lactating cows	vf	f	sf	nf
vi	i	si	ni	16. Nutrient requirements for dry cows	vf	f	sf	nf
vi	i	si	ni	17. Nutrient requirements for heifers	vf	f	sf	nf
vi	i	si	ni	18. Nutrient requirements for calves	vf	f	sf	nf
vi	i	si	ni	19. Estimating quantities of feed fed	vf	f	sf	nf
vi	i	si	ni	20. Inventory estimation of dry matter	vf	f	sf	nf
vi	i	si	ni	21. Inventory control	vf	f	sf	nf
vi	i	si	ni	22. Ketosis	vf	f	sf	nf
vi	i	si	ni	23. Fat cow syndrome	vf	f	sf	nf
vi	i	si	ni	24. Milk fever	vf	f	sf	nf
vi	i	si	ni	25. Nutrient deficiency symptoms	vf	f	sf	nf
vi	i	si	ni	26. Displaced abomasum	vf	f	sf	nf
vi	i	si	ni	27. Gastrointestinal parasites	vf	f	sf	nf
vi	i	si	ni	28. Energy requirements	vf	f	sf	nf
vi	i	si	ni	29. Protein requirements	vf	f	sf	nf
vi	i	si	ni	30. Fiber requirements	vf	f	sf	nf
vi	i	si	ni	31. Ca, P, Mg requirements	vf	f	sf	nf
vi	i	si	ni	32. Other mineral requirements	vf	f	sf	nf
vi	i	si	ni	33. Vitamin A, D, E requirements	vf	f	sf	nf
vi	i	si	ni	34. Forage preservatives	vf	f	sf	nf
vi	i	si	ni	35. Forage harvesting schedules	vf	f	sf	nf
vi	i	si	ni	36. Forage crop selection	vf	f	sf	nf
vi	i	si	ni	37. Estimating forage quality by smell,texture,color	vf	f	sf	nf
vi	i	si	ni	38. Expected forage and grain yeilds	vf	f	sf	nf
vi	i	si	ni	39. Feeding value of common grains and forages	vf	f	sf	nf
vi	i	si	ni	40. Identification of common feeds	vf	f	sf	nf
vi	i	si	ni	41. Harvesting and storage of forage and grains	vf	f	sf	nf
vi	i	si	ni	42. Sampling feed and forage for lab analysis	vf	f	sf	nf
vi	i	si	ni	43. Interpreting lab analysis results	vf	f	sf	nf
vi	i	si	ni	44. Dividing the dairy herd	vf	f	sf	nf
vi	i	si	ni	45. Determining whole herd feed requirements	vf	f	sf	nf
vi	i	si	ni	46. Thumb rules of ration balancing	vf	f	sf	nf
vi	i	si	ni	47. Ration evaluation by hand calculation	vf	f	sf	nf
vi	i	si	ni	48. Ration balancing by hand calculation	vf	f	sf	nf
vi	i	si	ni	49. Gathering adequate farm nutritional data	vf	f	sf	nf
vi	i	si	ni	50. Using Telplan Program 31 for ration balancing	vf	f	sf	nf
vi	i	si	ni	51. Using Telplan Program 31 for ration evaluation	vf	f	sf	nf
vi	i	si	ni	52. Relative economic value of feedstuffs for protein, energy, etc.	vf	f	sf	nf
vi	i	si	ni	53. Others (please specify)_____	vf	f	sf	nf
vi	i	si	ni	54. Others _____	vf	f	sf	nf

****

Part VI: In this section we are interested in learning about how familiar you are with the topics or areas listed in numbers 14-54. Please indicate your degree of familiarity by circling the appropriate response in the columns on the RIGHT HAND SIDE. Please begin with number 14.

vf -- Very familiar
f -- Familiar
sf -- Somewhat familiar
nf -- Not familiar

****

Part V: On the franking slip, please give any additional comments, suggestions or ideas you may have on how we might better train individuals to give advice and assistance in nutrition and feeding systems management.

Again, thank you for your participation.

APPENDIX E

EDUCATIONAL NEEDS ASSESSMENT QUESTIONNAIRE COVER LETTER

We need your help in a questionnaire survey concerning dairy nutrition and feed system management. Our intention is to develop a series of instructional material about dairy nutrition.

We are all aware that survival and continued growth of dairy farms depends on the ability of dairymen to earn an acceptable profit. Proper nutrition and efficient, economic feed management are important keys to increasing dairy farm profits. For this reason, dairymen, and those of us who supply services to the industry, are concerned with nutrition and feeding. Unfortunately, many individuals lack the training required to assist dairymen with nutritional problems or management of feed systems. As a result, several people have suggested the entire dairy industry might benefit from a self-instructional package that could be studied at home. Such a self-instructional package would increase the number of people capable of giving nutrition and feed management advice and perhaps make the job easier for those already involved in that type of work.

This package will be designed for use at home or in an organized shortcourse; however, we are not locked into any method and are open to your suggestions. In fact, we need your help now in compiling a list of topics to be included in this instructional package. If you have already had extensive experience in giving nutritional advice, your knowledge of what others need to be taught is invaluable. If you have not had experience giving nutritional advice, you probably have some idea of what you might need or like to know. Also, telling us how much you presently know will allow us to avoid boring you with information you already know.

Your signature is not required on this questionnaire so please be frank in your responses. This should take you no longer than 15-20 minutes to complete and need not be done all at one time. Please return the questionnaire using the self-addressed envelope by June 10, 1977, so a tabulation and analysis of the data can be made.

Thank you in advance for your participation and cooperation.

Sincerely yours,

Clinton E. Meadows
Extension Specialist

David Grusenmeyer
Graduate Research Assistant

ek

P.S. If you wish to receive the results of this survey, or assist further in the development and evaluation of the self-instructional package, drop me a letter or phone 517-353-5435. Your assistance both now on the questionnaire and later in evaluation would be greatly appreciated.

APPENDIX F

EDUCATIONAL NEEDS ASSESSMENT QUESTIONNAIRE

FREQUENCY DATA

FREQUENCIES

Question Numbers and Responses (Appendix D)	Overall		County Agents		DHIA Supervisors		Feed Salesmen		Veterinarians		Voc. Ag. Teachers	
	N	%	N	%	N	%	N	%	N	%	N	%
1	224		58	26	18	8	19	8	95	42	34	15
2												
1-2 years	23	10	7	12	8	44	0	--	8	8	0	--
3-9 years	65	29	13	23	7	39	8	44	25	26	12	35
10-15 years	35	16	6	11	1	6	2	11	16	17	10	30
16- up years	98	44	31	54	2	11	8	44	46	48	12	35
3												
1	1	1	0	--	0	--	1	5	0	--	0	--
2	11	5	0	--	6	33	5	26	0	--	0	--
3	9	4	0	--	5	28	4	21	0	--	0	--
4	59	27	16	29	7	39	9	47	21	22	6	18
5	141	64	40	71	0	--	0	--	73	78	28	82
4												
0-50 herds	92	45	13	23	11	69	3	21	42	49	23	72
51-100 herds	35	17	12	21	2	12	4	29	20	23	1	3
101-200 herds	40	20	16	29	2	12	4	29	12	14	6	19
201-400 herds	22	11	10	18	1	6	3	21	5	6	2	6
401- up herds	15	7	5	9	0	--	0	--	7	8	0	--
5												
1	29	13	4	7	1	6	2	10	11	12	5	15
2	84	38	17	30	6	33	3	16	32	34	22	67
3	47	21	15	26	10	55	7	37	21	23	3	9
4	36	16	13	23	1	6	5	26	16	17	2	6
5	10	5	2	3	0	--	0	--	7	8	1	3
6	14	6	6	11	0	--	2	10	6	7	0	--
6												
1	6	3	1	2	0	--	2	10	2	2	1	3
2	57	26	7	12	8	47	3	16	23	25	16	49
3	45	21	10	18	5	29	3	16	22	23	5	15
4	42	19	19	34	3	18	4	21	10	11	6	18
5	38	17	12	21	1	6	2	10	20	21	3	9
6	31	14	7	13	0	--	5	26	17	18	2	6
7												
1 yes/no	153/68	69/31	36/20	36/46	16/2	89/11	12/7	63/37	66/28	70/30	23/11	32/68
2 yes/no	102/121	46/54	41/17	71/29	9/9	50/50	5/14	26/74	31/63	33/67	16/18	47/53
3 yes/no	26/197	12/88	3/55	5/95	2/16	11/89	5/14	26/74	13/81	14/86	3/31	9/91
4 yes/no	15/208	7/93	4/54	73/93	3/15	17/83	2/17	11/89	4/90	4/96	2/32	6/94
5 yes/no	151/71	68/32	41/16	72/28	3/15	17/83	9/10	47/53	68/26	72/28	30/4	88/12
6 yes/no	89/132	40/60	17/40	30/70	4/14	22/78	7/12	37/63	48/46	51/49	14/20	41/59
8												
1	26	12	23	40	0	--	1	6	2	2	0	--
2	37	17	18	31	2	12	3	17	11	12	3	9
3	73	33	13	22	6	35	7	39	26	28	21	62
4	55	25	4	7	5	29	6	33	33	35	7	21
5	30	14	0	--	4	24	1	6	22	23	3	9
9												
1	30	14	8	13	1	6	0	--	13	14	8	24
2	110	50	23	40	7	41	8	44	57	61	15	44
3	76	35	27	47	9	53	7	39	22	24	11	32
4	4	2	0	--	0	--	3	17	1	1	0	--
10												
1	72	33	3	5	11	64	8	44	44	47	6	18
2	6	3	3	5	1	6	0	--	2	2	0	--
3	50	23	29	51	2	12	6	33	9	10	4	12
4	67	31	18	32	2	12	2	11	30	32	15	44
5	24	11	4	7	1	6	2	11	8	9	9	26
11												
1	76	35	14	25	4	25	4	22	43	47	11	32
2	120	56	36	64	12	75	8	44	44	48	20	59
3	17	8	5	9	0	--	5	28	4	4	3	9
4	3	1	1	2	0	--	1	6	1	1	0	--
12												
1	85	39	21	37	2	12	2	11	46	49	14	41
2	109	50	32	56	11	69	7	39	41	44	18	53
3	24	11	4	7	3	19	8	44	7	7	2	6
4	1	1	0	--	0	--	1	6	0	--	0	--
13												
1	46	21	15	27	5	29	7	41	13	14	6	18
2	46	21	13	23	1	6	3	18	17	18	12	36
3	64	29	21	37	6	35	1	6	28	30	8	24
4	10	5	2	4	0	--	1	6	4	4	3	9
5	51	24	5	9	5	29	5	29	32	34	4	12

	Import.		Famil.		Import.		Famil.		Import.		Famil.		Import.		Famil.		Import.		Famil.		Import.		Famil.	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
14 **																								
vi/f	91	42	54	26	15	27	5	10	6	37	1	7	7	37	5	28	46	50	36	41	17	50	7	22
i/f	93	43	103	50	32	57	24	46	6	37	5	33	10	52	8	44	32	35	44	50	13	38	22	69
si/f	32	15	41	20	9	16	21	40	4	25	7	47	2	10	3	17	13	14	7	8	4	12	3	9
ni/f	0	--	7	3	0	--	2	4	0	--	2	13	0	--	2	11	0	--	1	1	0	--	0	--
15																								
vi/f	182	83	47	23	45	79	9	18	14	87	0	--	17	90	13	72	78	85	19	22	28	82	6	18
i/f	32	15	109	53	11	19	25	15	2	13	8	53	1	5	4	22	12	13	52	59	6	18	20	61
si/f	4	2	43	22	1	2	15	30	0	--	6	40	1	5	0	--	2	2	15	17	0	--	7	21
ni/f	0	--	5	2	0	--	1	2	0	--	1	7	0	--	1	6	0	--	2	2	0	--	0	--

Question Numbers and Responses (Appendix D)	Overall				County Agents				DHIA Supersisors				Feed Salesmen				Veterinarians				Voc. Ag. Teachers			
	Import.		Famil.		Import.		Famil.		Import.		Famil.		Import.		Famil.		Import.		Famil.		Import.		Famil.	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
16																								
vi/f	162	74	43	21	37	65	9	18	12	75	0	--	15	79	11	61	72	78	18	21	26	27	5	15
i/f	49	22	108	53	19	33	25	15	2	12	6	40	3	16	4	22	18	20	54	61	7	21	19	58
si/f	7	3	49	24	1	2	15	30	2	12	8	53	1	5	2	11	2	2	15	17	1	3	9	27
ni/f	0	--	4	2	0	--	1	2	0	--	1	7	0	--	1	6	0	--	1	1	0	--	0	--
17																								
vi/f	122	56	39	19	31	54	11	27	11	69	0	--	10	53	10	56	48	52	13	15	22	65	5	15
i/f	85	39	100	49	23	41	22	39	3	19	6	40	8	42	6	33	39	42	50	57	12	35	16	49
si/f	10	5	62	30	3	5	17	32	1	6	8	53	1	5	1	6	5	5	24	27	0	--	12	36
ni/f	1	0	4	2	0	--	1	2	1	6	1	7	0	--	1	6	0	--	1	1	0	--	0	--
18																								
vi/f	140	65	38	19	33	59	10	20	12	75	0	--	12	67	8	44	59	64	15	17	24	73	5	15
i/f	66	31	106	52	20	36	22	43	2	13	7	47	6	33	9	50	30	33	51	58	8	24	17	52
si/f	8	4	54	26	3	5	18	35	1	6	6	40	0	--	1	6	3	3	20	23	1	3	10	30
ni/f	1	0	7	3	0	--	1	2	1	6	2	13	0	--	0	--	0	--	2	2	0	--	1	3
19																								
vi/f	88	41	28	14	31	54	5	10	5	31	0	--	11	58	11	61	24	26	8	9	17	50	4	12
i/f	109	50	89	44	24	42	29	58	10	63	10	67	8	24	5	28	52	57	32	36	15	44	13	39
si/f	19	9	71	35	2	4	14	28	1	6	5	33	0	--	1	6	14	15	39	44	2	6	12	36
ni/f	1	0	16	8	0	--	2	4	0	--	0	--	0	--	1	6	1	1	9	10	0	--	4	12
20																								
vi/f	43	20	11	5	19	34	4	8	2	12	0	--	8	44	5	28	10	11	1	1	4	12	1	3
i/f	116	54	57	28	29	52	20	41	10	63	3	21	7	39	10	56	49	54	15	17	21	64	9	27
si/f	47	22	81	40	8	14	19	39	3	19	5	36	2	11	2	11	26	29	42	48	8	24	13	39
ni/f	6	3	53	26	0	--	6	12	1	6	6	43	1	6	1	6	5	5	30	34	0	--	10	30
21																								
vi/f	19	9	8	4	7	13	3	6	2	12	0	--	4	24	2	12	5	6	2	2	1	3	1	3
i/f	103	50	42	21	27	51	15	31	7	44	4	29	6	35	7	41	44	50	10	11	19	58	6	18
si/f	68	33	75	37	16	30	20	41	4	25	3	21	7	41	6	35	31	35	31	35	10	40	15	46
ni/f	16	8	77	38	3	6	11	22	3	19	7	50	0	--	2	12	8	9	46	52	3	9	11	33
22																								
vi/f	74	34	85	41	11	20	4	8	9	56	1	7	8	44	6	33	29	31	70	79	17	50	4	12
i/f	113	52	63	31	36	65	19	37	3	19	5	33	8	44	9	50	53	57	19	21	13	38	11	33
si/f	26	12	45	22	8	15	23	45	4	25	6	40	2	11	1	6	9	10	0	--	3	9	15	46
ni/f	1	1	13	6	0	--	5	10	0	--	3	20	0	--	2	11	2	2	0	--	1	3	3	9
23																								
vi/f	82	38	38	40	11	19	5	10	8	50	2	13	7	39	6	33	44	47	67	75	12	35	3	9
i/f	101	46	64	31	38	67	20	40	3	19	3	20	9	50	8	44	38	41	22	25	13	38	11	33
si/f	32	15	39	19	7	12	21	42	5	31	6	40	2	11	2	11	10	11	0	--	8	24	10	30
ni/f	3	1	19	9	1	2	4	8	0	--	4	27	0	--	2	11	1	1	0	--	1	3	9	27
24																								
vi/f	78	36	91	45	9	16	5	10	9	56	2	13	8	42	7	39	34	37	71	81	18	53	6	18
i/f	107	49	68	33	24	74	22	44	3	18	4	27	8	42	9	50	42	45	17	19	12	35	16	49
si/f	33	15	40	20	6	10	20	40	4	25	8	53	3	16	1	6	16	17	0	--	4	12	11	33
ni/f	1	0	5	2	0	--	3	6	0	--	1	7	0	--	1	6	1	1	0	--	0	--	0	--
25																								
vi/f	94	44	53	26	22	39	3	6	9	56	1	7	11	58	4	22	35	38	42	48	17	50	3	9
i/f	85	39	69	34	26	46	10	20	5	31	3	20	5	26	9	50	38	42	39	45	11	32	8	25
si/f	33	15	65	32	7	13	33	64	2	13	7	47	3	16	4	22	16	18	6	7	5	15	15	47
ni/f	4	2	16	8	1	2	5	10	0	--	4	27	0	--	1	6	2	2	0	--	1	3	6	19
26																								
vi/f	57	26	76	37	6	10	2	4	8	50	0	--	5	28	3	17	28	30	68	76	10	29	3	9
i/f	108	50	56	27	30	54	15	29	4	25	6	40	11	61	10	56	46	50	19	21	17	50	6	18
si/f	49	23	56	27	20	36	26	51	4	25	8	53	1	6	3	17	17	18	2	2	7	21	17	51
ni/f	3	1	18	9	0	--	8	16	0	--	1	7	1	6	2	11	2	2	0	--	0	--	7	21
27																								
vi/f	40	18	70	34	7	12	0	--	7	44	1	7	4	22	2	11	14	15	64	72	8	23	3	9
i/f	114	53	51	25	26	46	9	18	7	44	3	20	10	56	11	61	52	57	23	26	19	56	5	15
si/f	59	27	64	31	24	42	32	64	2	12	8	53	4	22	3	17	24	26	1	1	5	15	20	61
ni/f	4	2	20	10	0	--	9	18	0	--	3	20	0	--	2	11	2	2	1	1	2	6	5	15
28																								
vi/f	127	59	41	20	38	67	8	16	7	44	1	7	14	78	12	67	48	52	16	18	20	61	4	12
i/f	83	38	104	51	17	30	27	54	9	56	8	53	4	22	3	17	41	45	46	53	12	36	20	61
si/f	4	2	54	27	2	3	14	28	0	--	4	27	0	--	2	11	1	1	25	29	1	3	9	27
ni/f	2	1	4	2	0	--	1	2	0	--	2	13	0	--	1	6	2	2	0	--	0	--	0	--
29																								
vi/f	141	65	49	24	40	70	12	23	10	36	1	7	15	79	13	72	51	55	18	21	25	73	5	15
i/f	71	33	108	53	14	25	26	51	6	37	8	53	2	10	3	17	40	44	48	54	9	27	23	70
si/f	5	2	45	22	3	5	13	26	0	--	5	33	2	10	1	6	0	--	21	24	0	--	5	15
ni/f	1	0	3	1	0	--	0	--	0	--	1	7	0	--	1	6	1	1	1	1	0	--	0	--
30																								
vi/f	125	58	40	20	33	59	7	14	9	56	1	7	15	38	12	67	50	54	16	18	18	53	4	12
i/f	80	37	100	49	18	32	29	57	6	38	7	47	3	17	3	17	38	41	43	49	15	44	18	55
si/f	10	5	57	28	5	9	12	23	1	6	6	40	0	--	2	11	3	3	26	30	1	3	11	33
ni/f	1	0	7	3	0	--	3	6	0	--	1	7	0	--	1	6	1	1	3	3	0	--	0	--
31																								
vi/f	129	59	50	25	29	51	8	16	10	63	1	7	15	79	12	67	57	62	26	30	18	53	3	9
i/f	83	38	99	49	25	44	25	50	5	31	5	33	4	21	3	17	33	36	52	59	16	47	14	42
si/f	5	2	48	24	3	5	14	28	1	6	7	47	0	--	2	11	1	1	9	10	0	--	16	49
ni/f	3	1	7	3	0	--	3	6	0	--	2	13	0	--	1	6	1	1	1	1	0	--	0	--
32																								
vi/f	87	40	30	15	22	39	4	8	7	44	1	7	8	42	5	28	33	36	18	20	17	50	2	6
i/f	104	48	91	44	29	51	23	45	7	44	4	27	7	37	6	33	46	51	49	56	15	44	9	27
si/f	25	12	73	36	6	10	19	37	2	12	8	53	4	21	6	33	11	12	19	22	2	6	21	64
ni/f	1	0	11	5	0	--	5	10	0	--	2	13	0	--	1	6	1	1	2	2	0	--	1	3

Question Numbers and Responses (Appendix D)		Overall				County Agents				DHIA Supervisors				Feed Salesmen				Veterinarians				Voc. Ag. Teachers			
		Import.		Famil.		Import.		Famil.		Import.		Famil.		Import.		Famil.		Import.		Famil.		Import.		Famil.	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
33																									
	vi/f	91	42	39	19	21	37	4	8	6	37	0	--	10	53	9	50	35	38	22	25	19	56	4	12
	i/f	98	45	100	49	27	47	25	49	7	44	5	33	7	37	6	33	43	47	51	58	14	41	13	39
	si/f	28	13	59	29	9	16	19	37	3	19	8	53	2	10	2	11	13	14	14	16	1	3	16	49
	ni/f	1	0	7	3	0	--	3	6	0	--	2	13	0	--	1	6	1	1	1	1	0	--	0	--
34																									
	vi/f	31	14	7	3	12	21	1	2	2	12	0	--	3	16	2	11	10	11	2	2	4	12	2	6
	i/f	104	48	50	25	29	52	23	45	8	50	5	33	5	26	5	28	45	49	11	13	17	50	6	18
	si/f	70	32	94	46	13	23	25	49	4	25	3	20	7	37	8	44	33	36	38	44	13	38	20	61
	ni/f	12	6	53	26	3	4	2	4	2	12	7	47	4	21	3	17	4	4	36	41	0	--	5	15
35																									
	vi/f	51	24	26	13	16	29	11	22	4	25	1	7	6	33	2	11	15	17	5	6	10	29	7	21
	i/f	108	50	73	36	25	45	28	56	9	56	5	33	8	44	8	44	50	55	19	22	16	47	13	39
	si/f	48	22	78	38	13	23	11	22	1	6	8	53	4	22	7	39	22	24	40	45	8	24	12	36
	ni/f	8	4	27	13	2	3	0	--	2	13	1	7	0	--	1	6	4	4	24	27	0	--	1	3
36																									
	vi/f	50	23	23	11	13	23	12	23	4	25	0	--	5	28	1	6	18	20	2	2	10	29	8	25
	i/f	124	58	88	43	33	59	31	61	10	63	7	47	9	50	10	56	51	56	26	30	21	62	14	44
	si/f	38	18	67	33	9	16	8	16	2	12	6	40	4	22	6	33	20	22	38	43	3	9	9	28
	ni/f	3	1	26	13	1	2	0	--	0	--	2	13	0	--	1	6	2	2	22	25	0	--	1	3
37																									
	vi/f	54	25	22	11	19	33	5	10	3	19	1	7	5	26	3	17	18	20	9	10	9	26	4	12
	i/f	97	45	90	44	28	49	31	61	6	37	4	27	6	32	10	56	38	42	33	38	19	56	12	36
	si/f	53	24	80	39	10	18	15	29	6	37	9	60	6	32	4	22	27	29	37	42	4	12	15	46
	ni/f	13	6	13	6	0	--	0	--	1	6	1	7	2	10	1	6	8	9	9	10	2	6	2	6
38																									
	vi/f	15	7	29	14	3	5	17	33	8	53	1	7	3	16	1	6	3	3	3	3	6	18	7	21
	i/f	96	45	88	43	24	43	27	52	6	40	5	31	9	47	12	71	38	42	23	26	17	50	21	64
	si/f	92	43	60	29	27	48	8	15	1	7	6	37	7	37	3	18	43	48	38	43	9	26	5	15
	ni/f	11	5	29	14	2	4	0	--	0	--	4	25	0	--	1	6	6	7	24	27	2	6	0	--
39																									
	vi/f	62	29	40	20	18	32	10	20	5	33	1	6	4	21	8	47	21	23	13	15	14	41	8	24
	i/f	132	61	110	54	32	57	35	68	9	60	7	44	14	74	7	41	59	65	43	49	18	53	18	55
	si/f	20	9	52	25	6	11	6	12	1	7	8	50	1	5	1	6	10	11	30	34	2	6	7	21
	ni/f	1	0	3	1	0	--	0	--	0	--	0	--	0	--	1	6	1	1	2	2	0	--	0	--
40																									
	vi/f	38	18	70	34	10	18	17	23	4	27	2	12	2	10	8	47	15	16	30	34	7	21	13	39
	i/f	95	44	114	56	23	40	31	61	4	27	11	69	11	58	7	41	39	42	46	52	18	53	19	58
	si/f	71	33	19	9	23	40	3	6	7	47	3	19	5	26	1	6	27	29	11	12	9	26	1	3
	ni/f	13	6	2	1	1	2	0	--	0	--	0	--	1	5	1	6	11	12	1	1	0	--	0	--
41																									
	vi/f	50	23	33	16	15	26	15	29	6	40	1	6	3	17	3	18	17	19	8	9	9	26	6	18
	i/f	112	52	113	55	31	55	30	58	4	27	8	50	9	50	11	65	49	54	41	47	19	56	23	70
	si/f	49	23	45	22	11	19	7	13	5	33	4	25	5	28	2	12	22	24	28	32	6	18	4	12
	ni/f	4	2	15	7	0	--	0	--	0	--	3	19	1	5	1	6	3	3	11	13	0	--	0	--
42																									
	vi/f	65	30	42	20	14	25	9	17	4	27	0	--	7	37	13	76	33	36	18	20	7	21	2	6
	i/f	106	49	81	39	29	52	31	60	6	40	4	25	11	58	3	18	45	49	35	40	15	44	8	24
	si/f	44	20	57	28	12	21	11	21	5	33	6	37	1	5	0	--	14	15	27	31	12	35	13	39
	ni/f	1	0	26	13	1	2	1	2	0	--	6	37	0	--	1	6	0	--	8	9	0	--	10	30
43																									
	vi/f	100	47	36	18	25	45	5	10	5	33	1	6	10	56	12	71	50	55	16	18	10	29	2	6
	i/f	87	41	76	37	21	37	25	49	6	40	1	6	8	44	3	18	34	37	41	47	18	53	6	18
	si/f	26	12	69	34	9	16	20	39	4	27	6	38	0	--	1	6	7	8	28	32	6	18	14	42
	ni/f	1	0	24	12	1	2	1	2	0	--	8	50	0	--	1	6	0	--	3	3	0	--	11	33
44																									
	vi/f	65	30	48	23	18	32	8	16	2	13	2	12	11	58	11	65	27	29	24	27	7	21	3	9
	i/f	100	46	96	47	25	45	31	61	8	53	5	31	7	37	4	23	46	50	43	49	14	41	13	39
	si/f	45	21	50	24	13	23	11	21	4	27	7	39	1	5	1	6	16	17	15	17	11	32	16	49
	ni/f	6	3	11	5	0	--	1	2	1	7	2	12	0	--	1	6	3	3	6	9	2	6	1	3
45																									
	vi/f	69	32	27	13	18	32	6	11	5	33	1	6	12	67	9	53	22	24	7	8	12	35	4	12
	i/f	114	54	92	45	32	57	31	60	7	47	2	13	5	28	7	41	53	59	38	43	17	50	14	42
	si/f	28	13	73	35	6	11	13	25	2	13	9	56	1	5	0	--	14	16	39	44	5	15	12	36
	ni/f	2	1	14	7	0	--	2	4	1	7	4	25	0	--	1	6	1	1	4	5	0	--	3	9
46																									
	vi/f	86	40	29	14	23	41	5	10	5	33	2	13	5	26	8	47	35	38	10	11	18	53	4	12
	i/f	112	52	98	48	29	52	31	60	8	53	5	31	12	63	6	35	48	52	40	45	15	44	16	50
	si/f	16	7	67	33	4	7	14	26	2	13	5	31	2	11	2	12	7	8	34	39	1	3	12	38
	ni/f	2	1	10	5	0	--	2	4	0	--	4	25	0	--	1	6	2	2	4	5	0	--	0	--
47																									
	vi/f	75	35	27	13	22	40	4	8	4	27	2	12	11	61	9	53	26	28	9	10	12	35	3	9
	i/f	108	50	73	36	25	45	21	41	7	47	2	12	7	39	5	29	52	57	29	33	17	50	16	49
	si/f	31	14	81	40	8	15	23	45	4	27	7	44	0	--	2	12	14	15	38	43	5	15	11	33
	ni/f	0	--	24	12	0	--	3	6	0	--	5	31	0	--	1	6	0	--	12	14	0	--	3	9
48																									
	vi/f	77	36	32	16	23	42	6	12	4	29	2	12	12	67	10	59	26	28	10	11	12	35	4	12
	i/f	103	48	74	36	22	40	19	37	7	50	3	19	4	22	5	29	52	57	30	34	18	53	17	52
	si/f	33	15	78	38	10	18	25	49	3	21	7	44	2	11	1	6	14	15	35	40	4	12	10	30
	ni/f	0	--	21	10	0	--	1	2	0	--	4	25	0	--	1	6	0	--	13	15	0	--	2	6
49																									
	vi/f	81	38	22	11	23	40	6	11	4	27	1	6	9	50	8	47	34	37	6	7	11	32	1	3
	i/f	100	46	89	43	25	44	28	54	10	67	5	31	7	39	8	47	40	43	37	42	18	53	11	33
	si/f	35	16	81	39	9	16	18	35	1	7	6	38	2	11	0	--	18	20	40	45	5	15	17	52
	ni/f	0	--	14	7	0	--	0	--	0	--	4	25	0	--	1	6	0	--	5	6	0	--	4	12

Question Numbers and Responses (Appendix D)	Overall				County Agents				DHIA Supervisors				Feed Salesmen				Veterinarians				Voc. Ag. Teachers			
	Import.		Famil.		Import.		Famil.		Import.		Famil.		Import.		Famil.		Import.		Famil.		Import.		Famil.	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
50																								
vi/f	43	22	12	6	19	34	10	19	1	8	1	6	0	--	1	6	16	20	0	--	7	23	0	--
i/f	101	52	37	18	24	34	20	38	6	46	1	6	7	39	2	12	49	63	11	13	15	50	3	9
si/f	44	23	73	36	13	23	20	39	5	38	2	13	8	44	8	47	10	13	27	32	8	27	16	49
ni/f	0	--	81	40	0	--	2	4	1	8	12	75	3	17	6	35	3	4	47	55	0	--	14	42
51																								
vi/f	37	19	8	4	13	24	6	12	1	8	1	6	0	--	1	6	15	19	0	--	8	27	0	--
i/f	103	53	35	17	26	47	20	39	6	46	1	6	7	39	2	12	50	64	9	11	14	47	3	9
si/f	47	24	75	37	16	29	22	43	5	38	2	13	8	44	8	47	10	13	27	32	8	27	16	49
ni/f	7	4	84	42	0	--	3	6	1	8	12	75	3	17	6	35	3	4	49	57	0	--	14	42
52																								
vi/f	65	31	19	10	16	29	4	8	5	33	1	6	4	21	6	35	24	27	5	6	16	47	3	9
i/f	114	54	82	42	31	55	29	60	6	40	5	31	8	42	8	47	53	60	29	35	16	47	11	34
si/f	31	15	69	35	9	16	12	25	4	27	6	38	5	26	1	6	11	12	36	43	2	6	14	44
ni/f	3	1	26	13	0	--	3	6	0	--	4	25	2	11	2	12	1	1	13	16	0	--	4	13

* Import. = Important; Famil. = Familiarity

** vi/f = very important or very familiar
i/f = important or familiar
si/f = slightly important or slightly familiar
ni/f = not important or not familiar

APPENDIX G

OCCUPATIONS SIGNIFICANTLY DIFFERENT WITH RESPECT TO TOPIC KNOWLEDGE

Occupations not listed under a topic heading are not different from any of the occupations listed and would appear in all knowledge level groups. (Scheffé .05)

Less Knowledge	Intermediate Knowledge	Greater Knowledge
Ruminant digestive physiology		
DHIA Supervisors County Agents		Veterinarians
Nutrient requirements for lactating cows		
DHIA Supervisors County Agents		Feed Salesmen
Nutrient requirements for dry cows		
DHIA Supervisors County Agents Vocational Ag. Teachers		Feed Salesmen
Nutrient requirements for heifers		
DHIA Supervisors Vocational Ag. Teachers		Feed Salesmen
Inventory estimation of dry matter		
DHIA Supervisors Vocational Ag. Teachers Veterinarians		Feed Salesmen
Inventory control		
Veterinarians		County Agents Feed Salesmen

Less Knowledge	Intermediate Knowledge	Greater Knowledge
Ketosis		
DHIA Supervisors		Feed Salesmen
Vocational Ag. Teachers		Veterinarians
County Agents		
Fat cow syndrome		
Vocational Ag. Teachers	DHIA Supervisors	Feed Salesmen
DHIA Supervisors	County Agents	Veterinarians
County Agents	Feed Salesmen	
Milk fever		
DHIA Supervisors		Veterinarians
County Agents		
Vocational Ag. Teachers		
Nutrient deficiency symptoms		
Vocational Ag. Teachers	DHIA Supervisors	Feed Salesmen
DHIA Supervisors	County Agents	Veterinarians
County Agents	Feed Salesmen	
Displaced abomasum		
Vocational Ag. Teachers	DHIA Supervisors	Feed Salesmen
County Agents	Feed Salesmen	Veterinarians
DHIA Supervisors		
Gastrointestinal parasites		
Vocational Ag. Teachers		Veterinarians
County Agents		
DHIA Supervisors		
Feed Salesmen		
Ca, P, Mg requirements		
DHIA Supervisors		Veterinarians
Vocational Ag. Teachers		Feed Salesmen
Vitamin A, D, E requirements		
DHIA Supervisors		Veterinarians
		Feed Salesmen
Forage preservatives		
Veterinarians		County Agents

Less Knowledge	Intermediate Knowledge	Greater Knowledge
Forage harvesting schedule		
Veterinarians		County Agents
Forage crop selection		
Veterinarians		Vocational Ag. Teachers Feed Salesmen County Agents
Expected forage and grain yields		
DHIA Supervisors Veterinarians		County Agents
Sampling feed and forage for lab analysis		
DHIA Supervisors Vocational Ag. Teachers	Veterinarians County Agents	County Agents Feed Salesmen
Interpreting lab analysis results		
DHIA Supervisors Vocational Ag. Teachers	County Agents Veterinarians	Feed Salesmen
Dividing the dairy herd		
Vocational Ag. Teachers DHIA Supervisors	DHIA Supervisors Veterinarians	Veterinarians Feed Salesmen
Determining whole herd feed requirements		
DHIA Supervisors Vocational Ag. Teachers Veterinarians	Veterinarians Vocational Ag. Teachers County Agents	County Agents Feed Salesmen
Ration evaluation by hand calculation		
DHIA Supervisors Veterinarians		Feed Salesmen
Ration balancing by hand calculation		
DHIA Supervisors Veterinarians		Feed Salesmen
Gathering adequate farm nutritional data		
DHIA Supervisors Vocational Ag. Teachers Veterinarians		Feed Salesmen

Less Knowledge	Intermediate Knowledge	Greater Knowledge
Using Telplan Program 31 for ration balancing		
DHIA Supervisors Vocational Ag. Teachers Veterinarians		County Agents
Using Telplan Program 31 for ration evaluation		
DHIA Supervisors Vocational Ag. Teachers Veterinarians		County Agents
Relative economic value of feedstuffs for protein, energy, etc.		
DHIA Supervisors Vocational Ag. Teachers Veterinarians		County Agents

APPENDIX H

TOPIC RANK BY TOPIC IMPORTANCE OVER ALL OCCUPATIONS FOR INDIVIDUALS INDICATING "VALUABLE" OR "VERY VALUABLE" ON QUESTION 12

Numerical value below is the mean importance score for the corresponding topic as indicated in Part III of the questionnaire (Appendix D).

2.832 Nutrient requirements of lactating cows

2.735 Nutrient requirements of dry cows

2.633 Protein requirements

2.622 Nutrient requirements of calves

2.566 Ca, P, Mg requirements

2.551 Energy requirements

2.541 Fiber requirements

2.536 Nutrient requirements of heifers

2.367 Thumb rules of ration balancing

2.352 Interpreting lab analysis results

2.332 Estimating quantities of feed fed

2.311 Ruminant digestive physiology

2.306 Other mineral requirements

2.306 Vitamin A, D, E requirements

2.281 Nutrient deficiency symptoms

2.256 Fat cow syndrome

2.255 Ration balancing by hand calculation

2.253 Ketosis

2.250 Ration evaluation by hand calculation

2.245 Gathering adequate farm nutritional data

2.236 Milk fever

2.224 Feed value of common grain and forages

2.209 Determining whole herd feed requirements

2.199 Relative economic value of feedstuffs for protein, energy, etc.

2.117 Sampling feed and forage for lab analysis

2.092 Use of Telplan Program 31 for ration balancing

2.066 Dividing the dairy herd

2.061 Forage crop selection

2.056 Use of Telplan Program 31 for ration evaluation

2.046 Displaced abomasum

2.015 Harvesting and storage of forage and grain

1.985 Inventory estimation of dry matter

1.959 Forage harvesting schedules

1.034 Estimation of forage quality by texture, smell, color

1.913 Gastrointestinal parasites

1.776 Forage preservatives

1.760 Identification of common feeds

1.708 Inventory control

1.592 Expected forage and grain yields

APPENDIX J

TOPIC RANK BY PERCEIVED NEED TO LEARN AND BY OCCUPATION FOR INDIVIDUALS INDICATING "VALUABLE" OR "VERY VALUABLE" ON QUESTION 12

Numerical value below is the difference between mean importance score (Questionnaire Part III, Appendix D) and mean familiarity score (Questionnaire Part IV, Appendix D) for the corresponding topics.

County Agents

.941 Nutrient deficiency symptoms

.889 Nutrient requirements of lactating cows

.792 Nutrient requirements of dry cows

.735 Nutrient requirements of calves

.724 Gastrointestinal parasites

.706 Displaced abomasum

.702 Ketosis

.683 Other mineral requirements

.679 Ca, P, Mg requirements

.654 Fiber requirements

.627 Ration evaluation by hand calculation

.611 Nutrient requirements of heifers

.608 Energy requirements

.608 Vitamin A, D, E requirements

.596 Fat cow syndrome

.594 Ruminant digestive physiology

.578 Interpreting lab analysis results

.576 Protein requirements

.557 Ration balancing by hand calculation

.519 Milk fever

.502 Thumb rules of ration balancing

.483 Estimating quantities of feed fed

.396 Gathering adequate farm nutritional data

.396 Using Telplan Program 31 for ration evaluation

.362 Inventory estimation of dry matter

.338 Determining whole herd feed requirements
.318 Using Telplan Program 31 for ration balancing
.312 Inventory control
.312 Relative economic value of feedstuffs for protein, energy, etc.
.191 Forage preservation
.158 Sampling feed and forage for lab analysis
.073 Feed value of common grains and forages
.066 Dividing the dairy herd
.047 Estimating forage quality by smell, texture, color
-.090 Forage crop selection
-.135 Forage harvesting schedule
-.193 Harvesting and storage of forage and grain
-.580 Identification of common feeds
-.634 Expected forage and grain yield

DHIA Supervisors

1.737 Interpreting lab analysis results
1.692 Nutrient requirements for lactating cows
1.631 Inventory control
1.630 Using Telplan Program 31 for ration balancing
1.590 Using Telplan Program 31 for ration evaluation
1.349 Sampling feed and forage for lab analysis
1.206 Determining whole herd feed requirements
1.197 Nutrient requirements of dry cows
1.173 Ration evaluation by hand calculation
1.084 Nutrient requirements of calves
1.059 Thumb rules of ration balancing
1.045 Relative economic value of feedstuffs for protein, energy, etc.
1.028 Ca, P, Mg requirements
1.024 Ration balancing by hand calculation
1.014 Gathering adequate farm nutritional data
.998 Nutrient requirements of heifers
.985 Inventory estimation of dry matter
.973 Nutrient deficiency symptoms
.921 Vitamin A, D, E requirements
.871 Fat cow syndrome

.864 Protein requirements

.859 Energy requirements

.844 Other mineral requirements

.791 Ketosis

.776 Forage preservatives

.773 Ruminant digestive physiology

.772 Fiber requirements

.686 Feed value of common grains and forages

.630 Harvesting and storage of forages and grains

.605 Gastrointestinal parasites

.599 Forage crop selection

.544 Milk fever

.508 Displaced abomasum

.486 Estimating quantities of feed fed

.451 Dividing the dairy herd

.438 Expected forage and grain yield

.396 Estimating forage quality by smell, texture, color

.344 Forage harvesting schedule

-.163 Identification of common feeds

Feed Salesmen

.536 Using Telplan Program 31 for ration balancing

.500 Using Telplan Program 31 for ration evaluation

.332 Forage preservatives

.195 Other mineral requirements

.135 Gastrointestinal parasites

.089 Ruminant digestive physiology

.066 Nutrient requirements of calves

.059 Nutrient deficiency symptoms

.054 Nutrient requirements of lactating cows

.034 Thumb rules of ration balancing

.101 Ca, P, Mg requirements

-.015 Fiber requirements

-.034 Protein requirements

-.041 Forage harvesting schedule

-.043 Nutrient requirement for dry cows

-.051 Forage crop selection

-.077 Fat cow syndrome

-.112 Estimating quantities of feed fed

-.116 Energy requirements

-.131 Nutrient requirements of heifers

-.138 Vitamin A, D, E requirements

-.176 Displaced abomasum

-.181 Inventory control

-.191 Ketosis

-.208 Milk fever

-.220 Feed value of common grains and forages

-.237 Inventory estimation of dry matter

-.306 Ration evaluation by hand calculation

-.311 Gathering adequate farm nutritional data

-.318 Harvesting and storage of forages and grain

-.357 Relative economic value of feedstuffs for protein, energy, etc.

-.399 Estimating forage quality by smell, texture, color

-.412 Ration balancing by hand calculation

-.426 Interpreting lab analysis results

-.461 Determining whole herd feed requirements

-.630 Expected forage and grain yields

-.661 Sampling feed and forage for lab analysis

-.684 Identification of common feeds

-.712 Dividing the dairy herd

Veterinarians

1.274 Using Telplan Program 31 for ration evaluation

1.264 Using Telplan Program 31 for ration balancing

.962 Inventory estimation of dry matter

.926 Inventory control

.912 Forage crop selection

.856 Forage preservatives

.810 Forage harvesting schedule

.780 Estimating quantities of feed fed

.775 Nutrient requirements of lactating cows

.773 Ration evaluation by hand calculation

.715 Ration balancing by hand calculation

.705 Relative economic value of feedstuffs for protein, energy, etc.

.696 Nutrient requirement of calves

.666 Nutrient requirements of dry cows

.624 Gathering adequate farm nutritional data

.616 Nutrient requirements of heifers

.610 Protein requirements

.608 Thumb rules of ration balancing

.599 Fiber requirements

.574 Energy requirements

.539 Determining whole herd feed requirements

.501 Interpreting lab analysis results

.420 Expected forage and grain yields

.396 Feed value of common grains and forages

.394 Estimating forage quality by smell, texture, color

.394 Harvesting and storage of forage and grain

.333 Ca, P, Mg requirements

.294 Other mineral requirements

.278 Sampling feed and forage for lab analysis

.166 Vitamin A, D, E requirements

.032 Dividing the dairy herd

-.034 Ruminant digestive physiology

-.144 Nutrient deficiency symptoms

-.481 Identification of common feeds

-.514 Fat cow syndrome

-.529 Ketosis

-.569 Milk fever

-.701 Displaced abomasum

-.777 Gastrointestinal parasites

Vocational Agriculture Teachers

1.436 Using Telplan Program 31 for ration balancing

1.414 Interpreting lab analysis results

1.400 Using Telplan Program 31 for ration evaluation

1.086 Sampling feed and forage for lab analysis

1.037 Fat cow syndrome

1.000 Nutrient deficiency symptoms

.995 Gathering adequate farm nutritional data

.985 Inventory estimation of dry matter

.972 Ca, P, Mg requirements

.962 Other mineral requirements

.921 Displaced abomasum

.863 Nutrient requirements of lactating cows

.860 Nutrient requirements of dry cows

.841 Nutrient requirements of calves

.802 Inventory control

.801 Estimating quantities of feed fed

.788 Gastrointestinal parasites

.761 Relative economic value of feedstuffs for protein, energy, etc.

.760 Fiber requirements

.755 Nutrient requirements of heifers

.753 Ketosis

.707 Energy requirements

.687 Ration evaluation by hand calculation

.681 Vitamin A, D, E requirements

.670 Determining whole herd feed requirements

.651 Forage preservatives

.633 Protein requirements

.586 Thumb rules of ration balancing

.567 Ration balancing by hand calculation

.535 Dividing the dairy herd

.403 Estimating forage quality by smell, texture, color

.392 Milk fever

.193 Feed value of common feeds and grains

.186 Ruminant digestive physiology

.146 Forage harvesting schedule

.123 Forage crop selection

-.048 Harvesting and storage of forage and grain

-.471 Expected forage and grain yields

-.615 Identification of common feeds

APPENDIX K

ADDITIONAL TOPICS SUGGESTED BY RESPONDENTS FOR INCLUSION IN A FEED MANAGEMENT TRAINING PROGRAM

What's in commercial feed mixtures
    How to find out
    Why it's important

Good vs. Poor mineral supplements

Nutrition in relation to nutrient absorption

Alternative feeds

Good vs. Poor vitamin supplements

Cost and nutrient value of concentrates

Feed bunk design and space requirements

Feeding non-protein nitrogen

Feeding industry by-products

Effect of environment on nutrition

Dry matter intake for certain feeds and weight of animals

Nitrate and nitrite poisoning

Why butterfat test varies with certain rations

Effect of ensiling feeds on nutrients

Nutrients available from high moisture feeds

Importance of high quality dry roughage

Evaluating needs of high producing cows

Role of trace elements

Dietary fat levels for lactating cows

"Protected" nutrients

Molds and spoilage

Plant toxicity

Knowledge of clients' nutritional IQ

Openness of dairymen to new ideas and concepts

Knowledge of your own nutritional IQ

Digestibility of feeds

Palatability of feeds

Feed value losses from green chopping

EStimating reasonable production level by looking at herd

Genetics and its limitations on production

Feed as related to mastitis

Feed as related to fat

Understanding feed tag information

APPENDIX L

SUMMARY OF SELECTED COMMENTS FROM RESPONDENTS FROM THE EDUCATIONAL NEEDS ASSESSMENT QUESTIONNAIRE

Packaged programs with slides, tapes and handout material would be best for individualized programs.

Think in terms of presenting it in small packets of closely related subjects. It will be tough to keep it simple and interesting.

Conduct workshops through the state. Some individuals don't have time to read books and bulletins on nutrition. However, a workshop specifically designed for ruminant nutrition would be very beneficial.

Conduct a one week intensified program for vocational agriculture teachers. Possibly during the week of up-date sessions.

Current up-dates and reviews or new ideas on old problems would be helpful to a practicing veterinarian. Keep them brief and practical.

Often small things and basic management skills are most needed. Dairymen are highly resistant to advice on small things. They need lots of tact, which should be included in training.

Keep materials from being too complicated. Good basic common sense nutrition is needed.

Training should be strongly oriented toward problem solving since primarily problems are being solved rather than general feeding recommendations given.

Conduct an annual 2 - 3 - 5 day program devoted to what's new in dairy cattle nutrition, handled by a major university or organization.

The course would be better as a shortcourse and not home study.

Organized shortcourses followed by home study self-instructional packages with periodic up-dates would be best.