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DAIRY FARM MANAGEMENT SIMULATION GAMING

By

Jeffrey Dell Myers

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ABSTRACT

DAIRY FARM MANAGEMENT SIMULATION GAMING

By

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Virtually no simulation experiences are available for teaching dairy herd management, even though such experiences are considered the best instructional form for teaching agricultural topics where real life experiences are unavailable. Simulation gaming is a mode of instruction in which the inherent active participation of the student provides a high motivation for learning, as well as first-hand experience at decision-making. Simulation experiences are known to be equally effective to all other instructional forms in teaching factual material.

A simulation experience, in the form of a board game, was developed to teach dairy herd management practices and principles to students ages 12 to 19. The game was tested with 4-H members in six Michigan counties. The results of the testing show that, having played the game, members demonstrated attitudes more closely aligned with progressive dairy herd management and increased confidence in their dairy herd management abilities.

DEDICATION

This thesis is dedicated to my parents and to my grandparents. Their respect for education laid much of the groundwork for my pursuit of this degree. The diligent work ethic that they showed, through daily farm life, provided the basis for my drive to succeed, while their constant support nurtured my belief that I can achieve whatever goals I undertake. Their love makes them ever present in my life and continues to help me strive, every-day to be the best person that I can be.

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To my family and personal friends - you all are a part of this degree and I thank you!

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CHAPTER I

INTRODUCTION

Those people most frequently supplying future dairy farm managers with basic dairying knowledge are 4-H leaders and vocational agriculture teachers (Foley, et. al., 1972). The goal of these dairy youth educators is to offer dairy herd management instruction to provide young people with the knowledge base necessary for success as future dairy herd managers.

The preferred instructional methodology in vocational agriculture is to provide real-life experiences (Drawbaugh and Hull, 1971). For example, animal husbandry skills are gained by students working with live animals. It is apparent that in order to obtain the associated skills of managing a dairy operation, a young, inexperienced person cannot be allowed to manage an actual dairy enterprise. When the learning experience is impractical to provide under actual conditions, simulation experiences become a desirable alternative (Drawbaugh and Hull, 1971). Simulation experiences are exercises where participants assume roles in environments modeled after real situations. Such a simulation experience, used to instruct youth in dairy herd management, is the subject of this research paper.

Need for the Study

Many trends in dairying indicate that solid managerial ability will be advantageous to achieving success as a dairy herd manager. Because the dairy business involves larger monetary investments, wise managerial decisions are essential to obtain sufficient profits. With the diversity and complexity of dairy farm management increasing at a rapid rate, those dairy farm managers who keep abreast of and use up-to-date information will have a competitive edge over those who do not.

An attempt to develop these more demanding managerial abilities should be possible through an educational program designed and focused on dairy herd management.

Problem Statement

If, as vocational agriculture emphasizes, a simulation experience is an effective instructional alternative to experiences impractical in real conditions, then simulation experiences in dairy herd management need to be evaluated for their educational potential. Upon investigation it is apparent that there are virtually no dairy herd management simulation experiences which have been developed and researched as teaching tools. Therefore, the purpose of this research project was to develop a dairy herd management simulation game, and test that simulation as an instructional instrument.

Research Questions

The data collected during this study were used to answer the following questions about the dairy herd management simulation game.

1. What were the sample population's attitudes toward dairy herd management and towards specific management practices before and after game play?
2. Which of the sample population's dairy herd management attitudes significantly changed after game play?
3. Which of the sample population's characteristics most highly correspond to progressive dairy herd management attitudes after game play?
    a. sex
    b. years in 4-H
    c. school grade average
    d. dairy farm experience
    e. 4-H Dairy Quiz Bowl experience
    f. interaction of sex and farm experience
    g. interaction of years in 4-H and school grade average
    h. interaction of years in 4-H and 4-H Dairy Quiz Bowl experience
    i. interaction of school grade average and

farm experience

j. interaction of school grade average and 4-H Dairy Quiz Bowl experience

4. Did the sample population evaluate the simulation game as an enjoyable exercise?
5. Did the sample population evaluate themselves as potentially more successful dairy herd managers after game play?

Limitations of the Study

The study was limited to 4-H Club Members, most carrying the dairy project, from six Michigan counties. Counties were selected with the assistance of Dr. Gale Baumgardner, Dairy Extension Specialist. The study was limited to those 4-H members who voluntarily attended sessions at which the game was played.

CHAPTER II

REVIEW OF LITERATURE

This study of dairy herd management simulation gaming encompasses three areas:

The Successful Dairy Herd Manager: Who is the successful dairy herd manager, and why is his managerial ability important?

Simulation Gaming: What is simulation gaming, and how do educators view it as an instructional tool?

Agriculture Simulation Gaming: How is simulation gaming viewed in terms of effective vocational agriculture instruction?

The Successful Dairy Herd Manager

> The part of the holding of a farm or landholder which pays best for cultivation is the small estate within the ring-fence of his skull. Charles Dickens

The successful dairy farm manager is one who takes his available resources of land, labor and capital, decides how to allocate each resource and resolves problems caused by the limitations of each resource (Foley, et al., 1972). The result should be a profitable enterprise. The successful dairy herd manager is defined as having a positive attitude along with the abilities to plan, work, think,

evaluate, foresee and acquire knowledge (Etgan and Reaves, 1978).

Successful dairy farming used to depend primarily on land and labor, but managerial ability has become critically important for success in this highly competitive industry (Foley, et al., 1978). Dairy farming's transformation into a sophisticated business first requires goal setting and then resource allocation in order to achieve set goals (Etgan and Reaves, 1978).

The manager of a dairy business must be proficient in many areas: breeding, feeding and managing a herd; veterinary skills; producing, harvesting and storing crops; accounting; carpentry; electricity; mechanics; plumbing; milk sanitation; milk and cattle marketing; and buying skills for the purchase of feed, fertilizer, farm machinery and supplies (Foley, et al., 1978). Maintaining competence across this spectrum of skills is complicated by the continual advancements in each area.

The size of dairy herds has been continually increasing; the average herd size increased from 10.0 to 37.6 between 1954 and 1974 (Etgan and Reaves, 1978). With larger dairy herds of higher producing cows, sharper management skills are required to combine cows, land, labor and capital into a profitable dairy operation (Etgen and Reaves, 1978).

In 1981 realistic debtload ranges for dairy farms were $2,500 to $4,000 per cow (Steevens, et al., 1983).

This investment has been continually rising and is a major factor limiting success (Campbell and Marshall, 1975). Since 1972 expenditures like fertilizer, energy, feed, interest rates on borrowed money, farm machinery and building materials have risen at faster rates than milk price (Foley, et al., 1978). The dilemma of input costs rising faster than milk prices requires dairy herd managers to operate more efficiently to maintain previous profit levels.

Therefore, a growing need exists for solid managerial ability in operating a dairy herd. Aiming to develop more successful dairy herd managers, we turn to the field of education to examine simulation gaming's potential as a teaching tool.

Simulation Gaming

The area of simulation and gaming includes role playing, social simulations, simulation games, instructional games and learning games. These learning devices differ from traditional approaches in two major ways: (1) they offer a real world complexity, and (2) persons learn by experiencing the results of their actions (Avedon and Sutton-Smith, 1971). The simulation and gaming process is outlined by Taylor and Walford (1978):

1. Participants take on roles which are representations of roles in the real world, and then make decisions in response to their assessment of the setting in which they find themselves.

2. They experience simulated consequences which relate to their decisions and performances.

3. They monitor the results of their actions and reflect on the relationship between their own decisions and the resultant consequences (Taylor and Walford, 1978).

The simulation game is an activity spelling out roles, resources, rules, and goals, while incorporating them to demonstrate a real situation (Clavner, 1978). As educational instruments, simulation games aim to teach facts and principles, develop the participant's decision-making ability, provide insight through assuming otherwise unattainable roles, and to develop social skills including communication, competition and following social rules (Pascale and Ehrman, 1980).

Gaming originated centuries ago with war games, yet formal educational use of games did not begin until the 1960's. Use of simulation games as educational tools has a pragmatic basis: a person's learning is most favorable when the learning environment is creating interest, satisfying needs, stimulating thinking, allowing for active participation, using two or more senses, and maintaining a favorable environment for success (Blanton, 1980). From these premises, advantages of simulation gaming have been postulated, observed and documented.

A magical aura is created by taking on new, otherwise unattainable roles, helping simulation games to motivate the student more than traditional teaching approaches

(Gordon, 1970). The student is transformed from a passive observer to an active participant (Bruner, 1967). Along with this active role, gaming provides the student with a goal which encourages information seeking to achieve the goal (Tansey and Unwin, 1969). Cherryholmes (1966), using research findings from six simulation studies, showed that simulations produce more interest than other instructional approaches. Using communicative interaction as a measurement for motivation, Boocock found more interaction pertaining to local elections among those students who played Election Campaign than those who attended regular classes (Chartier, 1973). In a study using a business simulation, Edwards (1971) found students perceived themselves as more motivated in learning when taught by simulation than if taught by more traditional approaches. Although increased motivation is no guarantee of more knowledge learned, increased participant enjoyment in learning may contribute to both the ease of managing students and the improvement of their attitude towards learning (Avedon and Sutton-Smith, 1971).

Simulation gaming allows participants to further develop their decision making skills, aiming for a greater frequency of desired outcomes due to correct decisions being made (Smith, 1982). Anderson (1970) determined that students in business education and general education curricula acquired the ability to compare credit sources better through

consumer credit simulation gaming than through traditional teaching methods.

The decision making process requires the evaluation of:

1. Alternative courses of action,
2. Consequences of each alternative,
3. Probability of the consequence occurring,
4. Desirability of the possible outcomes (Smith, 1982).

Simulation games are corollary to the decision making process because they require establishment of decision priorities, appraisal of available information, and the selection and execution of various courses of action under conditions of incomplete information, uncertainty, risk and pressure of time and consequences (McLean, 1979). Lee and O'Leary (1971), for example, found high school students experiencing Inter-Nation Simulation could more effectively function in complex and ambiguous decision-making environments than the control group which did not play the game.

Simulation game participants become more adept at making correct decisions, not only because they must evaluate decisions more thoroughly, but also because they experience the consequences of decisions made. Games allow students to 'sit in the hot seat' - to feel the direct impact of their decisions (Taylor and Walford, 1978). The participants can monitor the implications of his decision in two ways:

> He can observe that the course of action that he embarked on in the exercise resulted in a desired result.....which improved his position relative to that of the other players. Alternatively, if the feedback shows that the course of

> action resulted in his being at a disadvantage relative to others he will then have to make another decision to rectify these disadvantages (Tansey and Unwin, 1969).

This ability to see the consequences of one's actions builds the feeling of a more predictable and controllable environment for the participant (Coleman, 1971). In Lee and O'Leary's study (1971) using Inter-Nation Simulation, students developed a greater sense of confidence in their ability to handle occupations which emphasized decision making skills. Edwards (1971) found that students having played a business simulation felt more confident in their abilities to succeed.

Simulation games confront problems or issues in their totality, showing a multiplicity of factors that is more true to life than traditional teaching approaches (Kachaturoff, 1978). This similarity to life enables the student to see the relevance of learning (Clavner, 1978) and provides greater transfer of what has been learned to pertinent life experiences:

> The more similar the stimuli in two situations, the more positive transfer there is from one to the other (Cruickshank, 1971).

Providing the opportunity for students to assume lifelike roles and make decisions without relying on adults helps develop confidence "in their ability to think analytically and creatively about intellectual problems (Kachaturoff, 1978).

While simulation games offer more lifelike learning, there are also some marked advantages for the opposite reason, i.e., because games are not the real world. Simulation games telescope time, taking decisions that require years to evaluate and compressing that real time into shorter periods of simulated time (Stadsklev, 1974). Simulated time creates a responsive learning environment by providing immediate feedback (Cruickshank, 1971). While simulation games allow participants to experience simulated implications of decisions, games spare participants the real world consequences. Because simulation gaming participants assume new roles, they view the 'world' partially through eyes other than their own. Therefore, they are less guarded about what they see and tend to be more flexible (Taylor and Walford, 1978). The roles enacted in games can be played out at much lower monetary and emotional costs than comparable life situations.

Simulation games change the teacher's role from that of judge and jury to the less dominant. But no less important, role of interpreter and advisor (Clavner, 1978). The traditional teacher-to-student mode of communication is changed to a student-to-student mode (Stadsklev, 1974). Increased student interaction has a beneficial effect on student socialization in several areas: the shy student must behave in a communicative manner, students learn to view each other in a new way and become more tolerant of other peoples'

inadequacies (Stadsklev, 1974). Simulation gaming encourages students to learn independently (Clavner, 1978). While it is unlikely for students, when given knowledge under teacher-directed instruction, to seek ways of using that knowledge, simulation games can instill the importance of searching out answers to questions (Tansey and Unwin, 1969).

Gaming, with an appropriate mixture of skill and chance, allows persons of different abilities to play together, providing somewhat greater opportunities for success to the lower achiever since success is only partially based on skill (Coleman, 1971). The lower achiever's new found success could serve as a confidence builder in an environment that usually does not offer them positive reinforcement.

Students who perform poorly in school and students with limited prior knowledge in a given subject are the students considered most likely to benefit from a simulation game experience (Coleman, 1970). In Anderson's study (1970) using the Consumer Game, high school students in business and general education curricula learned to better select a credit source by playing the simulation game than by traditional instruction. Frass (1979) found previous knowledge to be a significant characteristic in an economics study: students without previous economic training attained higher levels on posttest when taught by the simulation gaming method rather than by lecture-discussion.

When comparing simulation gaming to conventional

instructional techniques for the students' level of learning factual material, Taylor and Walford (1978) state that, "of all validation studies completed, we know of none which suggests that simulation is any worse." Although this finding is contested by Garvey and Seiler, who found their recitation control group learned more than students playing Inter-Nation Simulation (Chartier, 1973), most studies find learning from simulation gaming to be at least equal to learning from traditional instruction. Baker (1968) found students playing Pre-Civil War Simulation had a significant increase in learning over traditional classes. Using computer-based economic games, Wing (1966) concluded there was no difference in amount of learning between the simulation group and the conventional classroom. Karweit and Livingstone (1969) observed no significant differences in learning between three experimental groups using a computer game and the control group.

Simulation games serve a valuable purpose when used with other educational material because games provide avenues for discussion and make the seemingly abstract more real and concrete (Avedon and Sutton-Smith, 1971). Likewise, they can be used to attract students' attention at the beginning of a unit or to summarize important facts at the end of a unit (Drawbaugh and Hull, 1971).

As with any teaching approach, gaming has intrinsic shortcomings. Although the competition in gaming helps

motivate participants, if winning is overly emphasized, participants may be misled from the real learning objectives (Avedon and Sutton-Smith, 1971). Also, games can be abused when directed by lazy or inexperienced teachers (Avedon and Sutton-Smith, 1971).

Recognizing education's strong support for simulation gaming, we turn to agricultural education's perspective of simulation gaming as an instructional mode.

Agricultural Simulation Gaming

> Success in teaching a vocational education subject.....involves the ability to make the instruction meaningful to the student (Drawbaugh and Hull, 1971).

Dale's "Cone of Experience" characterizes instructional experiences on a continuum of abstract to concrete (Drawbaugh and Hull, 1971). Along this continuum, simulation games would be considered "contrived experiences" - one of the more meaningful instructional forms. Vocational agriculture instructors are encouraged to use simulation experiences as an alternative to learning experiences which are difficult to provide under real conditions (Drawbaugh and Hull, 1971).

Simulation games are particularly effective in teaching farm management concepts (Seeley, 1973). Osburn found a farm management game to be as effective as classroom lecture, and that when used to supplement lecture, a higher level of learning resulted than when either was used alone (Osburn, 1973).

Few agricultural simulation games have been developed, and most simulation games marketed have not been tested. Individuals teaching agricultural topics need more resources available in order to have the teaching variety that makes learning more enjoyable (Drawbaugh and Hull, 1971).

Summary

Success as a dairy herd manager is an increasingly difficult goal to attain. Achieving success requires maintaining an up-to-date knowledge on a variety of topics, properly handling the more intense management situation of large herds, and managing large investments with keen business skills.

Since instructing youth on actual dairy farms is not often a feasible means to teach dairy herd management, other alternatives must be examined. Simulation gaming is an alternative teaching method in which the participant learns from the consequences of his action. Active participation increases motivation and presents the opportunity to make decisions helping to develop the participants' evaluative skills. Taking on lifelike roles allows the learning to be transferred to life. Student to student communication promotes a less frequently used avenue of learning and promotes socialization. The chance factor in simulation gaming reduces the influence of student ability on success at the game, thereby providing a positive learning

experience for those students of lower ability. Simulation gaming has been found as effective in teaching factual material as other instructional methods and serves as a positive supplementary learning experience to traditional approaches.

Simulation gaming is an instructional mode which may be effective in helping young people develop the skills necessary for success in managing dairy herds. Although there is a dearth of literature on agriculture simulation gaming, simulation gaming is compatible with agricultural educational theory. It is a particularly effective instructional form for teaching farm management, because it closely resembles life.

CHAPTER III

MATERIALS AND METHODS

This section describes the design of this research project, from the development of the dairy herd management simulation game through the statistical analysis of the results collected at experimental sites.

The materials and methods encompass the following:

Population: What is the group of individuals to whom this research project is directed?

The Dairy Herd Management Simulation Game: What were the goals and guidelines used in the development of the dairy herd management simulation game?

Leader's Guide: What is the intent of the game's Leader's Guide?

Survey Design: What goals and guidelines were used to develop the survey?

Data Collection: What methods were used to collect the data?

Statistical Analyses: What statistical analyses were used to give meaning to the data collected?

Population

The sample population for this project consisted of 4-H Club members (most of whom were enrolled in the dairy

project) from six Michigan counties: Barry, Huron, Ingham, Sanilac, Shiawassee and Washtenaw. Ten counties were originally selected with the assistance of Dr. Gale Baumgardner, Michigan Dairy Youth and Extension Specialist. The major consideration in selecting counties was that each had a strong dairy industry. An inherent interest in the dairy industry was necessary to gain attendance since participation was voluntary. Other considerations included proximity and the likelihood of Cooperative Extension Service collaboration. Once counties were selected as experimentation sites, nearby counties were invited to attend to increase potential participation.

County Extension personnel from 10 counties were contacted by phone in November, 1983, and all agreed to participate. County Extension personnel were then sent copies of a letter describing the project (Appendix A). The letter was distributed among their dairy project members and leaders. This letter invited members to participate in the project, briefly described the game and what would take place, recommended member age and included a schedule listing all sites. This information was distributed in several ways: mailing the letter, distributing the letter at dairy events or publishing similar information in a county 4-H newsletter.

Sixty-three 4-H members from six counties participated in the research project. No 4-H Club members from Eaton, Ionia, Monroe or Montcalm counties subsequently attended

experimental sites.

The Dairy Herd Management Simulation Game

The dairy herd management game was specifically developed for this research project. Its purpose was to increase the participant's awareness of dairy herd management practices and principles. The game consisted of a game board, accessory game items, rules and a leader's guide.

The first step in designing an educational game is determining the educational objectives for the age group targeted (Tansey and Unwin, 1969). The objectives for a 12 to 18 year old group were:

-to learn that a dairy herd should be well managed before enlarging herd size,

-to increase awareness of up-to-date management practices involved in a dairy operation,

-to detect relationships between dairy management practices and income,

-to discover there is a time span between when management practices are adopted and dividends from those improvements are received,

-to prioritize management practices.

Stadsklev established seven guidelines for simulation game design, each of which is listed below. Following each guideline are comments which apply that respective guideline specifically to the development of the dairy herd

management game.

1. Identify the roles of participants in the real-life situation and of the players in your game (Stadsklev, 1974).

In the game, participants take on the role of a dairy herd manager, i.e., the person making the decisions about the management of the herd. Within that role and the resources available, the participant decided what management practices will be adopted in his dairy herd and how quickly he will enlarge his herd's size.

2. Determine each player's goals and choose a measure of success for each player (Stadsklev, 1974).

All players have the same measure of success, i.e., to build his herd from 10 to 100 cows. The money used to buy cows is earned by purchasing selected management practices and cows. This overall measure of success, stated in the Rules, is attained by achieving the unstated goals of (1) adopting those management practices which yield the greatest return on investment and (2) increasing herd size only when the best possible management can be provided.

3. Identify the resources available to each player, which he can use to influence the outcome in his favor.....When you have identified each kind of resources, determine their relative importance (Stadsklev, 1974).

The resources available to each player consist of management practices, cows and initial capital. The game encompasses 177 management situations which were developed from management practices found in Etgen and Reaves, Dairy

Cattle Feeding and Management (1978) and Ohio State University's Ohio Dairy Guide Leaflets (1978). Management practices were grouped into similar areas under the following headings: Milking, Feeding, Heifer Raising, Genetics and Reproduction, Health and General Management. Within each area, with the exception of "Heifer Raising", the most important management practice was selected. That practice was termed, the "Major Management Practice". Next within each area, several management practices of relatively major importance were selected to be used on the playing surface. Several management practices remained, many of which are beyond a manager's control. These practices were printed on "Chance" cards. Monetary values were assigned to each management practice: values were not approximations of real worth, but rather were assigned, hoping to show the relative worth of one management practice to another. The relative worth of management practices was judged by the researcher.

Cows were assigned a lower dollar-for-dollar return than management practices in order to decrease the importance of cow numbers relative to management.

4. Determine the interactions between players in the game - that is, the way in which each player's actions affect the other players and their chances for success (Stadsklev, 1974).

A non-competitive model was designed to foster a more cooperative spirit in game play, with winning creating

sufficient motivation. All management options are made as equally available as possible to all participants, subject to available capital and the roll of the die. Participants cannot, in any way, monopolize the availability of management practices to other players.

5. Determine the sequence of events (Stadsklev, 1974).

The board is a sequence of dairy management practices, with once around the board representing one year.

Management practices are bought each year while participants move around the board, but return values are not paid until the end of the year. This design emphasizes the crucial point that when improved management practices are adopted, it may be some time before income is realized. Not receiving payment until the end of the year also restricts each player's available capital, requiring him to plan his strategy more carefully.

At the end of the year all monies are collected, and players must evaluate their financial status to decide whether to buy more cows and whether to buy a health program for the coming year. This is the only time either cows or the health program may be purchased; therefore, a critical analysis must be made as to how much capital the player will need to spend during the coming year and where he wishes to spend it.

6. Determine the external factors - those outside the player's decisions and actions - that will affect the outcome (Stadsklev, 1974).

Each player begins the game with $6000 and 10 cows. These amounts were arrived at by trial and error and selected because they limit available capital for several years, requiring players to be selective about the management practices they purchase during the early part of the game.

Chance cards must be drawn when a participant lands on the corresponding board squares, randomly distributed around the board. The chance cards pertaining to health (Impending Infections) are, in part, controllable; the purchase of a Health Program decreases the severity of the costs.

The roll of the die, obviously beyond the player's control, determines which management practices lying on the board are purchasable.

7. Identify the physical factors affecting the outcome of the situation and organize them onto a playing board (Stadsklev, 1974).

The game board is divided into color coded management areas: General Management, Milking, Feeding, Heifer Raising, Genetics and Reproduction, and Health. Each area that has a major management card covers at least six board spaces so that no matter what the roll of the die, each player will land within each area. Therefore, every year each player may purchase every major management practice.

The game design is such that at the end of the year the most effective playing strategy is to retain enough capital (at least $15,000) to buy the most management practices possible the successive year. In the game, buying

management practices is more profitable than buying more cows because of a higher dollar return for dollar invested. If there is sufficient capital beyond the retained portion, then cows should be purchased in order to yield some return on the money, rather than not investing it at all.

If a player incurs a cost beyond his available cash, assets may be redeemed at a liquidation price far below the purchase price the player originally paid. This is designed to make the player accountable for his financial situation.

With these design factors in mind, the board presentation was formulated. Interactions were intermingled within the game to enhance the game's playability. The game action is outlined in the Rules (Appendix B).

The initial game was a project for an Instructional Simulation class and critiqued by instructor Dr. Ted Ward, Department of Administration and Curriculum, Michigan State University. A personal evaluation of the game was made using Furjanic's Game Evaluation Chart (Fields, et al., 1978); self-diagnosed affirmative responses were sought to relevant questions.

Game Evaluation Chart

Question	Yes	No	Possible Game Modifications
WHAT IS THE CENTRAL PROBLEM OF THE GAME?			
-Are the educational objectives clearly defined?	___	___	_____
-Do the objectives relate to the course content?	___	___	_____
WHAT ARE THE ACTIVITIES AND CHOICES AVAILABLE TO PLAYERS?			
-Do students have an opportunity to make basic strategy decisions?	___	___	_____
-Is the game free of too much chance input?	___	___	_____
-If the game provides for physical activity, does this activity fit your class management style?	___	___	_____
-Does the strategy for winning correspond to the educational objectives?	___	___	_____
ARE THE RULES CLEAR AND USABLE?			
-Are the rules aimed at the level of student who will be playing the game?	___	___	_____
-If the players have difficulty understanding the rules, can the rules be taught in order to facilitate playing?	___	___	_____
DO THE LOGISTICS OF THE GAME FIT YOUR STYLE OF CLASS MANAGEMENT?			
-Whether you prefer working with small groups or one large group, is that preference provided for?	___	___	_____
-Are all players allowed to participate actively?	___	___	_____
WHAT SUMMARY ACTIVITIES CONCLUDE THE GAME?			
-Do summary activities relate directly to the educational objectives?	___	___	_____
-Are there opportunities for students to generalize on their moves or choices beyond the scope of their participation in the game?	___	___	_____
-Will the time invested in the game yield a worthwhile amount of learning? (Or can the concept involved be better taught in another way?)	___	___	_____

The game was critiqued by Michigan State University faculty members Dr. Gale Baumgardner, Dr. Russell Erickson and Dr. John Speicher, all from the Department of Animal Science and Kirk Heinze, Department of Agricultural and Extension Education, as well as several dairymen and undergraduate dairy science students.

Using suggested revisions, a game board was developed. The simulation game was presented to a dairy herd management seminar and played by two sets of four undergraduate students, all members of the Michigan State University Dairy Club. Based upon suggestions, further changes were made.

Leader's Guide

To prepare facilitators for using a game, special materials, i.e., a leader's guide, should be developed covering what the game is designed to teach, rules of the game, suggested postgame discussions and a summary of game action and strategy (Gordon, 1970). The postgame discussion should review the simulation game's action with its intent to help students learn the concepts and principles involved (Williams, 1980). The discussion should take the simulated model and compare it to the actual situation the model is to represent (Taylor and Walford, 1978).

> The adequacy of the summary provided in debriefing can be most effectively demonstrated by pairing the educational objectives stated in the teacher's guide and the questions provided for the debriefing. Ideally, the basic concepts and relationships in the objectives are linked directly

into the questions (Stadsklev, 1974).

Appendix C is the game's "Leader's Guide", which describes the objectives, the target audience, how the game operates, an explanation of winning strategies and debriefing questions.

Survey Design

The dairy herd management survey was developed by the researcher to determine:

-demographic characteristics of the population,

-the sample population's attitude toward specific dairy herd management practices,

-the sample population's attitude toward items comparing the importance of two dairy herd management practices,

-the sample population's attitude towards general dairy herd management principles.

The 'Introduction' to the Pretest (Appendix D) explains the purpose of the survey to the participants. The 'General Information' provides demographic items pertinent to the study including sex, years in 4-H, overall school grade average, dairy farm experience, and participation in Dairy 4-H Quiz Bowl.

Next are the dairy management survey items, written in closed form, permitting only specific responses. There are five possible responses, based on a Likert scale (Borg and

Gall, 1979) of "strongly agree", "agree", "no opinion", "disagree", and "strongly disagree".

Each survey item was written mindful of Borg and Galls' rules (1979) for constructing questionnaire items. They include:

1. Clarity is essential. If your results are to be valid an item must mean the same thing to all respondents...

2. Short items are preferable to long items as short items are easier to understand.

3. Negative items should be avoided since they are misread by many respondents...

4. Avoid "double-barreled" items, which require the subject to respond to two separate ideas with a single answer...

5. Do not use technical terms, jargon, or "big words" that some respondents might not understand...

6. Finally, it is important that an effort be made to avoid biased or misleading questions...

The survey's wording was critiqued to make the survey a more valid instrument. Individuals who critiqued the survey included: Dr. Gale Baumgardner, Animal Science, Michigan State University; Jerry Centers, Michigan FFA Consultant; Julie Drake, 4-H and Youth Extension Agent, Ionia County; Dr. Russell Erickson, Animal Science, Michigan State University; Darlene Hannenberg, graduate student, Agriculture and Extension Education, Michigan State University; Kirk Heinze, Agricultural Communications, Michigan State University; Leroy Olson, formerly with Learning and Evaluation Services, Michigan State University; and Emily

Phelps, former high school vocational agriculture teacher, Maryland.

The posttest survey was comprised of the same items, slightly reworded, and reordered (Appendix E). Near the beginning of both the pretest and posttest were two blind items, i.e., items not used in the results. The blind items were included to differentiate the two tests. Differentation helped decrease a bias caused by a student's realization that the posttest was the 'same' as the pretest. The attempt to differentiate, without changing meaning, was necessary because the pretest and posttest were administered within a short time of one another.

The testing instrument, game and research proposal were submitted for review to the University Committee of Research Involving Human Subjects (UCRIHS) and approved in December, 1983.

Data Collection

The research project was conducted at six, countywide 4-H meetings, to which dairy project members were invited. At the beginning of the meeting, introductory information was covered and pretest data were collected. The survey was administered by the researcher.

After completion of the survey, games were distributed, and the researcher briefed the group about the game. Students learn more from simulation gaming when they understand

from the outset why they are playing the game and what is expected of them (Chartier, 1973). The briefing included:

1. The problem that the game poses to the player.
2. The actors in the game and their objectives.
3. The physical layout of the game.
4. A demonstration of the 'first move' in the game (Gordon, 1970).

With the help of undergraduate students who had played the game, the researcher assisted 4-H members playing the game. When available, 4-H volunteer leaders, parents and Extension Agents served as bankers. Near the completion of a one and a half hour playing period, the researcher conducted a discussion of the debriefing questions. At the end of the one and a half hour period, about half of the groups had determined a winner. Not all groups were able to finish, thereby keeping participant interest high.

Games were put away and the posttest administered to determine if there had been any change in participant knowledge about dairy herd management practices and principles. The survey was followed by a questionnaire asking for 4-H members' responses to specific comments concerning the game (Appendix F). 4-H leaders, parents and Extension personnel also completed a questionnaire about the game as a teaching tool (Appendix G).

Of the 64 surveys administered, all but one were used. One survey was completed by an underage 4-H member (seven-year-old) who did not comprehend the statements and marked all responses the same. Several surveys had individual

items eliminated because of an accidental omission on either the pretest or the posttest.

Method of Analysis

Survey data were coded and entered for statistical analysis. Pretest and posttest survey responses were coded as follows:

Strongly Agree - 1

Agree - 2

No Opinion - 3

Disagree - 4

Strongly Disagree - 5

The statistical analysis was done with the assistance of Dr. John Gill and Mr. Dennis Banks of the Michigan State University Animal Science Department. Computer expertise was provided by Mr. Manuel Villereal.

Paired Data

Paired data were the participant's pretest and posttest score for each survey item. Survey responses were first analyzed by running a t-test for paired data. The null hypothesis was that the pretest mean equals the posttest mean. The hypothesis of equality was rejected on those survey items significant at the .05 level.

Multiple Regression

A regression equation was then devised for each survey item significant at the .05 level under the t-test for paired data. Running the regression helps determine which audience characteristic variables were more closely related to the posttest score. Variation due to pretest was accounted for by fitting the pretest score as the first variable in the model. The regression then considered the following variables:

sex,
years in 4-H,
school grade average,
farm experience,
dairy bowl experience,
the interaction of sex and farm experience,
the interaction of years in 4-H and grade average,
the interaction of years in 4-H and dairy bowl experience,
the interaction of grade average and dairy bowl experience,
and the interaction of grade average and farm experience.

Summary

4-H Club members from six Michigan counties comprised the sample population for this research project. The simulation game played by the 4-H members was designed to increase members' dairy herd management expertise. A leader's guide, providing guidelines for facilitators using the game, was developed. Surveys, used as testing instruments, aimed to measure members' attitudes toward dairy herd management practices both before and after game play. Data were collected at county wide meetings, which members voluntarily attended, and then analyzed, first by a t-test for paired data and then by a multiple regression.

CHAPTER IV

RESULTS

This chapter presents the analysis of data to answer research questions posed in Chapter I. Data collection instruments were the Dairy Management Surveys (Appendices D and E) used as the pretest and posttest. Information from the surveys provided the demographics of the sample population as well as the data for the statistical analyses, t-test for paired data and multiple regression. Answers to the Member Questionnaire (Appendix F) and the Parent, Leader, Agent Questionnaire (Appendix G) were also compiled.

Of the 64 pretest/posttest surveys administered to 4-H members, 63 were used for statistical analysis.

The Population

The population (Table 1) was 4-H members from six Michigan counties who had voluntarily attended a countywide meeting designed solely for testing the simulation game. Most members carried the 4-H 'Dairy Cow and Calf' project.

The population consisted of more males than females. Partitioning the number of years in 4-H (0 to 2, 3 to 4, and 5 or more) approximated the 4-H age divisions of junior, intermediate and senior, respectively. There were twice as

Table 1. The Population Characteristics

Characteristic	Frequency	Percent
1. Sex	63	100
Males	38	60.3
Females	25	39.7
2. Years in 4-H	63	100
0 to 2 years	14	22.2
3 to 4 years	15	23.8
5 or more years	34	54.0
3. School grade average	63	100
A	19	30.2
B	34	54.0
C	10	15.9
4. Dairy Farm Experience	63	100
Live on dairy farm	49	77.8
Do not live on dairy farm but had some farm experience	9	14.3
Do not live on dairy farm and had no farm experience	5	7.9
5. Dairy Quiz Bowl Experience	63	100
Yes	28	44.4
No	35	55.6

many members who had been in 4-H at least five years when compared to either of the other two age categories. Most of the members who had been in 4-H two or less years were under 12 years of age, the minimum age recommended for game play.

The distribution for school grade average shows the majority of students having a B average. Most of the population came from dairy farms, and of those who did not come from farms, most had some dairy experience. With only slightly larger numbers, more of the population had no county dairy quiz bowl experience than did have such experience.

Change in Survey Response After Game Play

A t-test was run on the paired data of each survey item to determine whether member's dairy management attitudes significantly changed after playing the game. Seventeen of the 30 survey items showed a significant change (.05 level) in response from pretest to posttest, all changing in the desired direction (Table 2).

Survey items can be categorized as single management practices, general management principles, or a comparison of two management practices. Within those survey items referring to a single management practice, five of seven were significant at the .05 level. A change in attitude towards seven of ten general management principles were significant, and of the 13 comparisons of two management

Table 2. Survey Items Showing a Significant Change* After Game Play

Survey Items Concerning a Single Management Practice

- -Cows whose milk production is 20% below the herd average should be sold from the herd.
- -A herd health program is necessary for every dairy herd.
- -Cows should be bred when in standing heat.
- -A calf's navel should be treated with iodine at birth.
- -It is wiser to clean a cow's udder with individual paper towels than with a sponge.

Survey Items Concerning General Management Principles

- -A dairy farm operation will be more profitable when the manager plans goals.
- -When money is limited, managers should spend money on those management practices which have the greatest return for their dollar.
- -Greater profit can result from investing in a well-managed dairy operation than placing money in a savings account.
- -A dairyman who anticipates problems and takes care of them will be more successful.
- -Adopting up-to-date dairy herd management practices will help increase a dairyman's earnings.
- -A dairy manager should intensify his management practices before buying more cows.
- -Managers who frequently evaluate performance and thereby, revise plans, will have a less profitable dairy operation.

Survey Items Comparing Two Management Practices

- -Accurate four times per day heat detection should be a regular practice before using a type mating evaluation program.
- -Feeding a balanced ration is more important than using urea as a protein source.
- -Shipping Grade A milk should be a higher priority than machine stripping cows.
- -A dairyman should be shipping Grade A milk before milking his cows three times a day.
- -Enrolling cows on a DHI program will be more beneficial than positive identification of each cow.

*Significant at .05 level

practices, five showed significant attitude changes.

Multiple Regression Equations

A multiple regression equation was derived for each survey item significant under the t-test. The regression model (Table 3) shows which audience characteristics are related to changed attitudes, regarding more progressive dairy herd management. The regression equation, after accounting for the influence of the pretest score, considers the influence of the following student characteristic main effects:

-sex,

-years in 4-H,

-grade average,

-amount of dairy farm experience, and

-participation in 4-H dairy quiz bowl.

The equation also considers the effect of the following interactions:

-sex and farm experience,

-years in 4-H and grade average,

-years in 4-H and participation in dairy quiz bowl,

-grade average and farm experience, and

-grade average and participation in dairy quiz bowl.

After running the complete model on every survey item, any interactions not significant at a .2 level were dropped from the respective equation and a new model run. The

Table 3. Regression Equation Model for Survey Items*

$$\text{Model } Y = b_o + b_1 \text{ pre} + b_2 \text{ SX} + b_3 \text{ YRS} + b_4 \text{ GRAV} + b_5 \text{ FRM} + b_6 \text{ DYBL} + b_7 \text{ (SX)(FRM)} + b_8 \text{ (YRS)(GRAV)} + b_9 \text{ (YRS)(DYBL)} + b_{10} \text{ (GRAV)(FRM)} + b_{11} \text{ (GRAV)(DYBL)} + e$$

WHERE:

- Y = Posttest score
- b_o = Constant
- pre = Pretest score
- SX = Sex
  - 0 = male
  - 1 = female
- YRS = Years in 4-H
  - 1 = 0 to 2 years
  - 2 = 3 to 4 years
  - 3 = 5 or more years
- GRAV = School Grade Average
  - 2 = C
  - 3 = B
  - 4 = A
- FRM = Dairy Farm Experience
  - 0 = no dairy farm experience
  - 1 = some dairy farm experience, did not live on farm
  - 2 = live on dairy farm
- DYBL = Dairy Quiz Bowl Experience
  - 0 = no
  - 1 = yes

(SX)(FRM) = Interaction of Sex and Dairy Farm Experience
(YRS)(GRAV) = Interaction of Years in 4-H and School Grade Average
(YRS)(DYBL) = Interaction of Years in 4-H and Dairy Quiz Bowl Experience
(GRAV)(FRM) = Interaction of School Grade Average and Dairy Farm Experience
(GRAV)(DYBL) = Interaction of School Grade Average and Dairy Quiz Bowl Experience
e = experimental error

*coefficients have been dropped from equations as discrete variables confound the meaning of them.

resultant model explained the most variation of the attitude change for that individual survey item.

The amount of variation accounted for by audience characteristics was obtained by taking the difference in the adjusted r2 value for each survey item's final regression equation and a regression equation including only the pretest variable. Only survey items, where at least five percent of the variation was described by audience characteristics, were further evaluated.

Tables 4 through 8 show survey items in which at least five percent variation was explained by audience characteristics. The regression equation, significant under the F-test at the .05 level, for each survey item is included, with coefficients dropped since discrete variables confound their meaning. Pretest and posttest means within cells of individual variables significant at the .2 level were investigated to give meaning to the sign associated in the regression equation. A discussion follows describing each of these survey items.

Audience characteristics accounted for seven percent of the variation in the response to "Cows whose milk production is 20% below the herd average should be sold from the herd." Pretest and posttest means for the regression equation's significant variables are listed in Table 4. (Lower mean scores are preferable since agreement with the statement would be more consistent with progressive

Table 4. Regression Equation and Significant Variable's Cell Means for Member Response to, "Cows whose milk production is 20% below the herd average should be sold from the herd."

$$Y = b_o + \overset{***}{pre} + frmexp - gravg - yrs + \overset{*}{sx} - drybwl - \overset{*}{sxfr} + \overset{*}{yrsdry}$$

*Significantly different (P< .2)
**Significantly different (P< .1)
***Significantly different (P< .05)

Sex . Farm Experience

Sex	Dairy Farm Experience	N	Pretest Mean	Posttest Mean
Male	none	2	2.50	2.00
Male	some	6	2.50	2.17
Male	live on farm	28	2.96	2.50
Female	none	3	2.67	2.33
Female	some	3	3.67	3.33
Female	live on farm	19	2.37	1.89

Years in 4-H · Dairy Bowl

Years in 4-H	Dairy Bowl	N	Pretest Mean	Posttest Mean
0 - 2	no	12	2.67	2.17
0 - 2	yes	2	3.50	2.50
3 - 4	no	10	3.00	2.10
3 - 4	yes	5	3.40	2.80
5 or more	no	12	2.25	1.75
5 or more	yes	20	2.70	2.65

management.) Investigating posttest means of the interaction, sex and farm experience, it can be seen that females, living on farms had the strongest level of agreement (1.89) after having pretested likewise (2.37). It is noted that there are few members not living on farms. For the interaction, years in 4-H and dairy bowl experience, each interaction group shifted at least one-half unit towards stronger agreement on the posttest, except for those members who had been in 4-H the longest and had experience in the dairy bowl program. Regarding the same interaction, within each age division, members with no dairy bowl experience posttested and pretested with stronger agreement when compared to members with dairy bowl experience (i.e., 5 year 4-H members with no dairy bowl experience had a 1.75 posttest mean, while 5 year 4-H members with dairy bowl experience had a 2.65 posttest mean).

The statement, "Cows should be bred when in standing heat", represents poor management and should elicit disagreement, so higher mean scores represent the more progressive attitude. Nine percent of the variation was explained by the audience characteristics, with means for significant variables shown in Table 5. Members who lived on farms or had some farm experience posttested on the agreement side of no opinion (2.67 and 2.11, respectively), while those with no farm experience had a posttest mean of 4.20, indicating disagreement (a large change from their

Table 5. Regression Equation and Significant Variable's Cell Means for Member Response to, "Cows should be bred when in standing heat."

$$Y = b_o + \underset{***}{pre} - \underset{*}{frmexp} + \underset{**}{sx} + drybwl + \underset{*}{gravg} - yrs$$

*Significantly different ($P < .2$)
**Significantly different ($P < .1$)
***Significantly different ($P < .05$)

Farm Experience

Dairy Farm Experience	N	Pretest Mean	Posttest Mean
none	5	2.20	4.20
some	9	2.33	2.11
live on farm	49	2.22	2.67

Sex

Sex	N	Pretest Mean	Posttest Mean
Male	38	2.32	2.39
Female	25	2.12	3.20

Grade Average

Grade Average	N	Pretest Mean	Posttest Mean
C	10	2.50	2.50
B	34	2.32	2.47
A	19	1.95	3.26

pretest mean 2.20). Female's posttest mean of 3.20 denotes a more progressive attitude than does the male's posttest mean of 2.39 (both sexes agreed with the pretest statement). Under grade average, 'A' students pretested with the most agreement (1.95), while being the only group to posttest towards disagreement (3.26). 'C' students did not change between tests (2.50), while 'B' students moved somewhat in the desired direction (pretest - 2.32; posttest - 2.47).

Audience characteristics contributed 14 percent of the variation in response to the statement, "A dairyman who anticipates problems and takes care of them will be more successful." An examination of significant variables in Table 6, reveals all posttest means at a level of agreement. Therefore possible variation will be sought in pretest means. Members who had participated in dairy bowl agreed with the pretest statement (1.96), while those with no such experience were not quite at a level of agreement (2.17). Those members living on farms also pretested in agreement (2.00), whereas those with some or no farm experience pretested more towards 'no opinion' (2.11 and 2.80 respectively). Female's pretest mean, 1.88, was between agreement and strong agreement, while male's pretest mean, 2.21, was between agreement and 'no opinion'. Members with five or more years in 4-H were in agreement with the statement before game play (1.76), while those with less years were not (3 to 4 year members - 2.40, 0 to 2 year members - 2.50). Considering the inter-

Table 6. Regression Equation and Significant Variable's Cell Means for Member Response to, "A dairyman who anticipates problems and takes care of them will be more successful."

$$Y = b_o + pre^{***} - drybwl^{***} - gravg + frmexp^{***} + sx^{**} - yrs^{***} - sxfr + yrsdry^{***}$$

*Significantly different ($P < .2$)
**Significantly different ($P < .1$)
***Significantly different ($P < .05$)

Dairy Bowl

Dairy Bowl	N	Pretest Mean	Posttest Mean
No	35	2.17	1.63
Yes	28	1.96	1.57

Farm Experience

Dairy Farm Experience	N	Pretest Mean	Posttest Mean
none	5	2.80	1.60
some	9	2.11	1.44
live on farm	49	2.00	1.63

Sex

Sex	N	Pretest Mean	Posttest Mean
Male	38	2.21	1.53
Female	25	1.88	1.72

Years in 4-H

Years in 4-H	N	Pretest Mean	Posttest Mean
0 - 2	14	2.50	1.79
3 - 4	15	2.40	1.60
5 or more	34	1.76	1.53

Years in 4-H · Dairy Bowl

Years in 4-H	Dairy Bowl	N	Pretest Mean	Posttest Mean
0 - 2	no	12	2.42	1.92
0 - 2	yes	2	3.00	1.00
3 - 4	no	10	2.30	1.60
3 - 4	yes	5	2.60	1.60
5 or more	no	13	1.85	1.38
5 or more	yes	21	1.71	1.62

action, years in 4-H and dairy bowl experience, five year members agreed with the pretest statement whether or not having had dairy bowl experience (1.71 and 1.85, respectively), although in the younger age divisions, members with no dairy bowl experience pretested closer to agreement than those with dairy bowl experience (i.e., 3 to 4 year 4-H members with no dairy bowl experience pretested 2.30, while 3 to 4 year members with dairy bowl experience pretested 2.60). Once again, all posttest catagorical means were at a level equal to agreement.

In member response to, "A dairyman should be shipping Grade A milk before milking his cows three times per day", eleven percent of the variation was attributed to audience characteristics. Table 7 shows the regression equation and significant cell means. Students with 'A' grade averages agreed with the posttest statement (2.04), whereas 'B' and 'C' students are increasingly closer to 'no opinion' (2.24 and 2.50, respectively). Both years in 4-H groups, three to four and five or more, posttested near to agreement with the statement (2.09 and 2.13, respectively), while members of two years or less were closer to 'no opinion' (2.64). Male's posttest mean, 2.13, is closer to agreement than is the female's posttest mean, 2.36.

Seven percent of variation was attributable to audience characteristics for member response to the statement, "Managers who frequently evaluate performance and thereby,

Table 7. Regression Equation and Significant Variable's Cell Means for Member Response to, "A dairyman should be shipping Grade A milk before milking his cows three times per day."

$$Y = b_o + pre^{***} - gravg^{***} - frmexp - yrs^{***} + drybwl + sx^{***}$$

*Significantly different ($P < .2$)
**Significantly different ($P < .1$)
***Significantly different ($P < .05$)

Grade Average

Grade Average	N	Pretest Mean	Posttest Mean
C	10	2.90	2.50
B	34	2.62	2.24
A	19	2.84	2.04

Years in 4-H

Years in 4-H	N	Pretest Mean	Posttest Mean
0 - 2	14	2.93	2.64
3 - 4	15	2.73	2.13
5 or more	34	2.65	2.09

Sex

Sex	N	Pretest Mean	Posttest Mean
Male	38	2.76	2.13
Female	25	2.68	2.36

revise plans, will have a less profitable dairy operation." A 'disagree' response would be aligned to progressive management. Table 8 indicates that for the characteristics, grade average, 'A' students were the only group to pretest on the 'agree' side of 'no opinion' (2.84). 'A' students posttested between 'no opinion' and 'disagree' (3.47), as did the 'B' students, who showed little change from pretest to posttest (pretest-3.38, posttest-3.53). Members who had been in 4-H two years or less showed little change between pretest and posttest, and posttested on the agreement side of 'no opinion' (2.79). Members of five years or more in 4-H posttested closer to 'disagree' (3.85) than did the three to four members (3.27) after both groups made similar quantitative shifts from pretest scores.

The implication of the significant audience characteristics found in these regression equations will be described in the Discussion.

Student Reaction to Dairy Herd Management Simulation Gaming

After finishing the posttest survey, 62 members completed a questionnaire asking their opinions on the dairy herd management simulation game (Appendix F).

When asked whether they enjoyed the game, all 62 respondents said yes. The most frequently given responses as to why participants enjoyed the game were:

-gained knowledge,

-had fun,

Table 8. Regression Equation and Significant Variable's Cell Means for Member Response to, "Managers who frequently evaluate performance and thereby, revise plans, will have a less profitable dairy operation."

$$Y = b_o + \underset{***}{pre} - \underset{***}{sx} + \underset{*}{frmexp} + drybwl + \underset{***}{gravg} + yrs - yrsdry$$

*Significantly different ($P < .2$)
**Significantly different ($P < .1$)
***Significantly different ($P < .05$)

Grade Average

Grade Average	N	Pretest Mean	Posttest Mean
C	10	3.10	3.30
B	34	3.38	3.53
A	19	2.84	3.47

Years in 4-H

Years in 4-H	N	Pretest Mean	Posttest Mean
0 - 2	14	2.71	2.79
3 - 4	15	2.80	3.27
5 or more	34	3.53	3.85

-made your own decisions,

-it was lifelike, and

-winning is a challenge.

Eighty-one percent of the members felt the game presented a lifelike view of dairying. A wide variety of points were made as to how the game resembled life; the major ones were:

-management practices designated on the board are necessary to run a successful dairy,

-because you need to invest money to make money,

-the game shows every day occurances,

-the game lets you make management decisions and lets you decide how to spend money,

-because dairymen have to make decisions on what they would do with their money,

-you must start out slow and plan, and

-you buy, sell and care for cows.

The major points cited indicating a lack of realism were:

-you make money too fast,

-the game should have loans, and

-a lot of things in the game don't happen in life.

When members were asked if having played the game, could help them more successfully manage a dairy herd, 91 percent responded yes. The major reasons given were:

-I better understand management,

-because you learn what to invest in and what not to invest in,

-I feel I can be more successful at making decisions, and

-because I know what mistakes can be made.

Parent, 4-H Leader, and County Extension Personnel Reaction to Dairy Herd Management Simulation Gaming

At the conclusion of the program, parents, 4-H leaders and county extension personnel were asked to complete a questionnaire (Appendix G), commenting on the dairy herd management simulation game.

When asked whether the game was relevant to the member's interest and needs, all 12 respondents answered yes. The one comment which was made, was that the game gave members the opportunity to think out decisions made in dairy management.

When questioned about the game's realism, eight adults felt the game simulated life, while one adult answered both yes and no. Comments on the game's realism were:

-the game put a lot of emphasis on management compared to herd size - I think that's important.

-taught planning skills, money management, and

-the game simulates real life close enough to make the skill fun.

Suggestions for improving the realism of the game

were:

-possibly include blocks on the board that cause immediate debt,

-implant debts (perhaps new buildings), and

-maybe more difficulties.

When asked if the game initiated and provided for discussion during the debriefing, all seven adults answering, said yes. Yet several comments were made that discussion needed encouragement from teen leaders and adults, particularly when working with the younger members.

All twelve respondents observed members enjoyed the activity.

All ten adults responding felt members helped to teach each other during game play and commented that:

-there was good communication between players,

-older members helped younger members with decisions to buy, and

-members remind each other when they goofed.

All ten respondents felt the game would be useful in their club or county situation. Remarks made in reference to the game's applicability were:

-I would like to try it at Quiz Bowl, especially for younger members,

-it is good for a club or county meeting, although time could be a problem,

-an excellent tool for leaders to use to encourage

discussion,

-the members I observed were knowledgeable about dairy; this would be a good game to introduce non-dairy youth to the dairy industry,

-excellent learning tool, and

-Yes! Thank You! What a fantastic teaching tool you have given us! I am very excited about your game and intend to use it, if and when it becomes available to us. I have other family members (non-farm) who love games, and I think would enjoy being a farmer for a little while.

Having made this statistical analysis of data and summarization of comments by 4-H members and adults, the next step is to examine the implications of these results.

CHAPTER V

DISCUSSION

Having tabulated the results of this research project, the question arises, 'What do the results indicate about the game's effectiveness as an educational tool?'.

The results of the t-test for paired data indicate a change in dairy herd management attitudes in a direction more closely aligned to successful management. This change of members' attitudes provides evidence that the dairy herd management simulation game has valid use as an instructional tool.

The assertion of the game's effectiveness, based on attitude change, must be put in the perspective of possible experimental bias. The voluntary participation by individuals may have prevented getting an accurate cross section of members, although the sample population is not unlike what we might expect for 4-H members carrying the dairy project. Results may be influenced by the novelty effects of the simulation, benefitting simply by being different from normal instruction (Borg and Gall, 1979). The short time between pretest and posttest, intentionally designed to help attribute changes in attitude to the game because of the absence of a control, creates the potential for testing bias,with students becoming 'test-wise' (Borg and Gall,

1979). Administering the pretest immediately before the game may have sensitized members, heightening awareness of those management practices in both the pretest and game, and thereby influencing attitude changes (Borg and Gall, 1979). Experimenter effects should be considered because each instructor would differ in the way he administers the game, thereby changing the game's potential effectiveness in bringing about more progressive management attitudes (Borg and Gall, 1979).

Table 2 includes those survey items showing a significant change under the t-test for paired data. A much higher proportion of single management practice items, five of seven, and general management principle items, seven of ten, were significant when compared to those items comparing management practices, five of thirteen. The game seems to be more effective in teaching single management practices and general management principles.

The comparison of management practices is not as effectively taught in this simulation game and may be best taught by another simulation form. One fallacy in teaching prioritization of management practices through the game is that since the relative importance of practices varied within each given set of circumstances, the same practice is not always the most important. Instruction comparing management practices may be better suited to case study instruction where specific information more clearly dictates that one

management practice is the most important.

The purpose of running the regression model was to indicate how closely related audience characteristics were to changed dairy management attitudes gained from having played the game. Results of the regression model should be considered cognizant of the fact that the main reasons for contradictory information in gaming research are administrative variables, learner variables, procedural effects and group variables (Williams, 1980). Administrative and procedural variables were reasonably consistent. The grouping of participants, at each playing board, likely accounted for variation in the results as some groups were more homogeneous relative to age, sex and background while others were more heterogenous. Also, some groups had adults serving as teller while others did not. With only five main audience characteristics analyzed, other learner variables certainly contributed towards the unaccounted for variation.

Only five of seventeen regression equations showed a minimum of five percent variation due to audience characteristics. With so little variation explained, no valid generalized statements can be made in regard to which audience characteristics play an important role in knowledge gained from the educational experience. Therefore, the discussion of audience characteristics is most appropriately handled relative to the specific survey item.

For the statement, "Cows whose milk production is 20% below the herd average should be sold from the herd", the interaction of the participant's 'Years in 4-H' and 'Dairy Bowl Experience' was significant. The singular group not to have a change in attitude, from pretest to posttest, was those members who have been in 4-H the longest and have had dairy bowl experience. This unchanged response may be indicative of the experienced members having strongly held attitudes, which are less subject to change, because of more well developed backgrounds in dairy herd management. As well, the more experienced members, having more knowledge, may find this practice does not warrant as much importance relative to other practices with which they are familiar. Both reasons could also explain why, within each 'Years in 4-H' division, those members with no dairy bowl experience postscored best.

"Cows should be bred when in standing heat" should elicit a 'Disagree' response as cows should be bred 12 hours after standing heat for the highest rate of conception. Those members with no farm experience posttested better than any of the more experienced members. This may be due to the fact that farm children learn to detect estrus through the observance of standing heat and then inaccurately associate that with the ideal time of breeding. Having time and time again observed heat, and having each time associated breeding to that visual sign, ideal time of breeding

could be a difficult attitude for farm children to change. The fact that females scored better on the posttest than males could be attributed to them working less with the cows, thereby not having an inaccurate perception of optimum breeding time so strongly established. While 'A' students agreed the most strongly on the pretest, they were the only 'Grade Average' division to move to the disagreement side of 'No Opinion'. They seem to have been more likely to discern the ideal time of breeding having played the game.

When investigating significant variables for the statement, "A dairyman who anticipates problems and takes care of them will be more successful", it can be seen that all posttest cell means show agreement. Since all posttest cell means show agreement, pretest cell means were analyzed to discern the significance of the variables. Those students who had dairy bowl experience, lived on farms, or had been in 4-H five or more years, agreed with the pretest statement more strongly than their counterparts with no dairy bowl experience, who did not live on farms or were in 4-H less than five years. This supports an assumption that these characteristics (dairy bowl, farm life, 4-H) may have already helped to develop the progressive attitude on more elementary principles. It is noted that females pretested on the agreement side of this basic management principle, while males did not.

The statement "A dairyman should be shipping Grade A milk before milking his cows three times a day", represents the comparison of two unrelated management practices, assigned different weights in the game. The comparison of two management practices increases an assumed level of difficulty due to the need for members to combine separate factors from within the game. This seems to be substantiated by pretest cell means lying near 'No Opinion'. 'Grade Average' proved a significant variable with 'A' students posttesting in agreement while 'B' and 'C' students did not. Likewise, 4-H members with more years of experience, three or more, agreed with the statement after game play, while members with fewer years in 4-H did not. The added years in 4-H may have provided members with more knowledge, enabling them to relate the two factors.

For the management principle, "Managers who frequently evaluate performance and thereby revise plans, will have a less profitable dairy operation," 'A' and 'B' students posttested better than 'C' students, with 'A' students making the greatest change from their pretest scores, apparently influenced more strongly by the game. Once again, 'Years in 4-H' showed a significant impact on the attitude response with each increasing 'Years in 4-H' category indicating attitudes more indicative of progressive dairy herd management.

Therefore the regression model has shown that rather than certain audience characteristics consistently interplaying with the gaming experience, that the influence of the audience characteristics varies specific to the statement's level of difficulty, complexity and relevance to the experience of members.

The positive motivational aspect of gaming seems supported by the member's unanimous response that they enjoyed participating in the simulation game. It is interesting to note that the reason for enjoyment was equally divided between the activity being fun and a source of knowledge. The learning incentive gained from 'playing' lifelike roles can be seen in the member's enjoyment in making lifelike decisions. Gaming's competitive stimulus is manifested in the members' desire to win.

Eighty-one percent of the members found the game realistic: three of the five most frequent responses as to how the game was realistic concerned money investment. Other responses related the realism of the game's management practices. A lack of realism was noted by too rapid an accumulation of money and the absence of loaning, both of which are acknowledged shortcomings of the simulation experience, and difficult to incorporate while keeping 'game play' simplistic.

A self-evaluation showed that over ninety percent of the members felt they could more successfully manage a dairy

herd after playing the simulation game. Although this in no way assures greater success as future dairy herd managers, it does give an indication of greater confidence in one's abilities. Members perceived themselves 'better' managers because of an increased understanding of specific management practices as well as having improved decision making skills.

Parents and other adult volunteers present, typical of those who serve as instructors in informal educational programs like 4-H, were enthusiastic about the game as a teaching tool. The opportunity for members to think out management decisions, lifelikeness, discussion stimulus, enjoyable activity and the opportunity for one member to help teach another, were some of the game's attributes confirmed by the adults. Volunteers seemed receptive to a new avenue to teach traditional material to their 4-H members as well as recognizing its potential for use with non-farm people.

Returning to our original research questions, we can say that before game play members' dairy herd management attitudes were, for the most part, oriented towards progressive dairy herd management. Playing the dairy herd management simulation game brought about attitudes which were significantly, more closely aligned to successful management. The desired changes in attitude could not be generally attributed to any specific audience characteristics,

although specific characteristics had relevant relationships to individual management items. All members enjoyed the game, recognizing it as a fun way to gain knowledge. Finally, an increase in member confidence was seen by a majority of members perceiving a greater ability in themselves to successfully manage a dairy herd after game play.

CHAPTER VI

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This project set out to develop a youth-oriented, dairy herd management simulation gaming experience which could be easily implemented by youth educators. The project also aimed to scientifically evaluate the simulation's effectiveness through measuring the change in members' attitudes toward progressive dairy herd management after having played the game.

The impetus for this project arose from the need for agricultural teachers, as well as 4-H volunteer leaders, to have educational materials available to enhance their ability to teach dairy herd management. The need for agriculture simulations was noted due to the absence of simulation gaming, particularly tested gaming, in the field.

The simulation game was developed as an activity to be used as one segment of an entire dairy herd management unit, having the benefits of increasing participant motivation and enhancing decision making skills through a more lifelike learning experience.

Research Instruments

The population used to test the dairy herd management

simulation game comprised of 63 4-H members, ages eight to eighteen, from Barry, Huron, Ingham, Sanilac, Shiawassee and Washtenaw counties in Michigan. Members voluntarily attended sessions at which the game was played.

The dairy herd management board game incorporated dairy herd management practices and principles, in a model of minimal competition, targeting the following objectives for participants:

-to learn that a dairy herd should be well managed before enlarging herd size,

-to increase awareness of up-to-date management practices involved in a dairy operation,

-to detect relationships between dairy management practices and income,

-to discover there is a time span between when management practices are adopted and dividends from these improvements are received,

-to prioritize management practices.

A Leader's Guide was prepared to assist instructors in administering the game.

Members were pretested with a Likert survey to determine their attitudes towards dairy herd management practices and principles. After playing the game for approximately a one and one-half hour session, debriefing questions were asked. The posttest was then administered in order to detect attitude changes which might have occurred.

Major Findings

Upon completion of testing, data were first analyzed using a t-test for paired data. Results showed members having attitudes more closely aligned with progressive dairy herd management after playing the game. A regression formula was designed to determine which audience characteristics were more closely related to the changed attitudes. It was found that no audience characteristics could be generally attributed to attitude changes, but rather were specific to the individual management survey items in question.

Members found the game to be a fun way to learn, as well as an activity that improved their self-perception as successful future dairy herd managers. Adult volunteers had positive reactions to the potential of the game as an informative teaching tool and enthusiastically expressed the desire to use the game in their respective settings.

Conclusions

From the empirical data collected and the remarks of both youth and adults concerning the simulation game, it can be said that this dairy herd management simulation game is an effective teaching tool for developing more progressive dairy herd management attitudes. It offers 4-H members an exciting way of learning about dairy herd management practices and principles, and offers adults a unique way of

teaching traditional material, that before was unavailable.

Recommendations

This simulation game was developed as an extra teaching tool, for vocational agriculture teachers and 4-H volunteer leaders. It was not meant to replace valuable hands on experience, nor replace the detail and specificity offered by more traditional approaches. And so, it is not evaluated as a superior means of instruction but rather as an alternative which appears to be effective.

Recommendations for Future Study

1. Future research concerning this dairy herd management game should not concern itself with the prioritization of management practices since such prioritization can be taught with more validity by alternative teaching methods, such as case study.
2. Stronger results could be attained if future research pretested further ahead of 'game play' so that sensitization of members to the testing instrument was less likely to occur. Posttesting later, as opposed to immediately after debriefing, would more accurately measure the long term retention of the population. A control would be necessary in conjunction with these in order to account for any history bias, and would thereby strengthen the results.

3. In future research, playing the game over several different sittings might allow members to 'absorb' more information from the game, thereby giving more definitive results.
4. Training assistants to work with players in a teaching mode, rather than in the more simplistic role of clarifier, would provide more human input and give results showing the game used to its fullest capacity.
5. A larger sample population could give more insight to which audience characteristics relate to attitude changes.
6. More stringent testing of the survey instrument would increase both the validity and accuracy of measurements.

Future Dairy Herd Management Simulation Gaming

1. With gaming's limitation for teaching prioritization of management practices, it is recommended that case studies be developed for such instruction and tested.
2. Future dairy herd management gaming should be developed for the age group, eight to twelve, with easier to understand vocabulary and more simplistic instructions.
3. Future dairy herd management simulations need to emphasize the economic aspects of farming, in particular the borrowing and lending of money.

4. Computers are playing an increasingly important role in both formal and informal educational institutions. Tested simulations, adaptable to computer, could be an effective alternative for those learning as well as those providing the instruction.

APPENDICES

APPENDIX A

DEPARTMENT OF ANIMAL SCIENCE
ANTHONY HALL
EAST LANSING • MICHIGAN • 48824

December 22, 1983

Dear 4-H Member:

Come join your county 4-H members for a new, exciting event - Dairy Gaming!

My name is Jeff Myers, a graduate student at Michigan State University, and I have developed a dairy herd management board game. The game covers major dairy farm management decisions: feeding, heifer raising, milking, reproduction, herd health, in addition to general management. As a herd operator, you make the decisions on managing your herd, but consider yourself warned - despite brilliant management you may fall victim to management mysteries, impending infections or reproductive revelations.

The project, which includes testing the game, is under the supervision of Dr. Gale Baumgardner, Dairy Youth Extension Specialist.

We will be using two different games, testing my management game the same way a teacher might test you. You will be answering some questions before and after you play one of the games. Only you and I will ever see your answers - no grade for you, only for the game! Although we cannot promise that you will be smarter or a better decision maker after the game, we can promise fun as you help us design and improve our game.

After watching you play the games, parents and leaders will spend some time discussing how to best use the game and changes that would improve the game. We will also talk about similar materials you would like to have developed to help your club programs.

Any interested 4-H club members may participate! The game is designed more for 4-Hers over age 12, but all age members are welcome.

TIMES AND PLACES FOR DAIRY GAMING

1. <u>Ingham/Eaton:</u> Saturday, January 14 - 1:00 - 4:00 p.m.
   Farm Bureau Building
   134 West Maple, Mason, MI
   1/2 block west of courthouse, on northside of street.

2. Huron/Sanilac: Saturday, January 21 - 12:30 - 3:30 p.m.
   Farm Bureau Building, Bad Axe, MI
   Go north of Bad Axe on 53. Cross the railroad tracks. Farm Bureau Building will be on left side.

3. Shiawassee: Saturday, January 28 - 10:30 - 2:00 p.m.
   Casino Building, McCurdy Park, Corunna, MI

4. Ionia/Montcalm: Saturday, February 4 - 1:00 - 4:00 p.m.
   Ionia County Extension Office
   Coming south on M-66. In Ionia come to M-21 - go east. At next light go south on M-66. At next light go east on Washington Street. Go 3 or 4 blocks on north side of road - 110 E. Washington.

5. Barry: Saturday, February 11 - 12:30 - 3:30 p.m.
   Barry County Extension Office
   301 South Michigan Avenue, Hastings, MI

6. Washtenaw/Monroe: Wednesday, February 15 - 6:00 - 9:00
   Washtenaw County Extension Office
   From US 23 North take Ypilanti Exit. Turn right onto Washtenaw Avenue. Turn left on Hogback. Turn right into Washtenaw County Service Center. It is the 3rd building on the right - enter at side door at the big red square.

If you would like to participate in Dairy Gaming, simply bring the signed consent form to the program. See you there!

This letter has been prepared by Jeff Myers.

Sincerely,

Gale Baumgardner
Dairy Youth Specialist

CONSENT FORM FOR MEMBERS
Dairy Gaming Form

I understand that the Dairy Gaming program is designed to test new educational materials, of which there is no guaranteed benefit. I know that my participation can be withdrawn at any time.

Member_____

Parent_____

Date_____ County_____

APPENDIX B

FILLING THE MILK PAIL

GETTING TO KNOW THE GAME BOARD

The game board is divided into various management related colored spaces; Orange is General Management, White is the Milking Operation, Pink is Feeding, Green is Heifer Raising, Tan is Reproduction and Genetics, and Yellow is Health. Each time around the board represents one year.

OBJECT

The object of the game is to be the first dairy farm manager to obtain a 100 cow herd. The money used to buy cows is earned through purchase of management practices and cows.

MATERIALS

One FILLING THE MILK PAIL game complete with:

- 1 game board
- 4 playing tokens
- 1 die
- 4 cards for each major management practice (DHIA, Milk Market, Feed Analysis, Genetically Superior Bulls, Health Program)
- Chance type cards (38 Management Mysteries, 33 Milking Melodies, 23 Feeding Fables, 17 Heifer Happenings, 26 Reproductive Revelations, 13 Impending Infections)
- Milk Pail payment cards (designated dollar values of 1500, 2000, 3000)
- 40 cows (ten each of four colors)
- Play Money (100's, 500's, 1000's, 5000's)

PREPARATION

The game is for 2 or 4 players. Before play begins:

- place major management practice cards, face up, outside their respective color coded areas,
- place chance type cards, face down, within their respective color coded areas,
- assign a banker to organize the money, milk pail payment cards and cows.

Investigate cards before play.

GAME PLAY

Each player starts the game with $6000 and 1 cow token (each cow token represents 10 cows).

Before movement begins each player must decide whether to purchase a Health Program for the first year. Players then move around the game board by rolling the die, moving the number of spaces indicated.

PURCHASE OF BOARD MANAGEMENT PRACTICES

Individual board play management practices can be bought if the player lands on the exact spot. If purchased, pay the banker the stated Cost and secure a Milk Pail payment card with the correct Return value. Any number of players can purchase the same practice during the same year.

PURCHASE OF MAJOR MANAGEMENT PRACTICES

Major management practices lie outside the board. They may be purchased when landing anywhere within their respective color coded management areas.

DHIA - Orange
Milk Market - White
Feed Analysis - Pink
Genetically Superior Bulls - Tan

A management practice may not be purchased (during the current year) once the player leaves that practice's color coded area. Purchase the practice by paying the banker the stated Cost (all major management practices cost $2000) and secure that practice card. All players may buy the same major management practices.

CHANCE TYPE CARDS

When landing on any chance type area (e.g. management mysteries), the respective chance type card must be drawn, read aloud and acted upon accordingly (pay teller Cost or receive Return from teller). Return the card to the bottom of the stack.

IMPENDING INFECTIONS

When landing on Impending Infections draw one card from the Impending Infection cards and read aloud. Pay the required Cost in accordance with whether or not a health program was purchased. Note: Impending Infection cards either cost only those players with no Health Program or cost more for those players with no Health Program than those players with a Health Program.

IF YOU RUN OUT OF MONEY

If a chance type card or Impending Infection card requires payment beyond one's available cash, major management cards may be redeemed at $1000, Milk Pail payment cards may be redeemed at $500, and each cow token may be redeemed at $10,000. If all assets are exhausted, the player is eliminated from play.

AT THE END OF THE YEAR

On your last roll at the end of each year, always stop at STOP (no matter what the roll of the die). Cash in all management practice cards and Milk Pail payment cards with the teller for their RETURN value. Also collect $500 for each cow in the herd (or $5000 for each cow token). Return all cards.

Assess your financial position. Decide on the purchase of the Health Program for the coming year and more cattle. Cows must be bought in groups of ten (1 token) for $20,000. Move to START.

Leave START on next roll.

WINNING THE GAME

The game should be played until one player has 100 cows (ten cow tokens). That person is the winner.

APPENDIX C

APPENDIX C

LEADER'S GUIDE

FILLING THE MILK PAIL

A Dairy Herd Management Game

Purpose

FILLING THE MILK PAIL is an instructional game which attempts to simulate dairy management practices and their outcomes. Objectives are:

-to conceptualize the relationship between dairy management practices and income,

-to conceptualize the greater importance of top management practices as compared to increasing herd size,

-to conceptualize that dividends from improved management practices have a time delay.

-to increase awareness of management practices involved in managing a dairy operation,

-to prioritize management practices.

Target Group

The game is designed for use with dairy project 4-H members age 12 through 18.

Debriefing

The cognitive learning is designed into the game. The results of management practices are realized through play action. Success partially involves making use of many successful management practices, emphasizing those which yield the greatest results. To be victorious, one must expand their herd while retaining sufficient funds to purchase a maximum number of management practices (management practice purchase supersedes increasing the number of cows in its return on each dollar invested). Luck does play a role in the availability of board play practices and through chance type cards. Results of the decisions made can be discussed in a post game debriefing.

FILLING THE MILK PAIL

GETTING TO KNOW THE GAME BOARD

The game board is divided into various management related colored spaces; Orange is General Management, White is the Milking Operation, Pink is Feeding, Green is Heifer Raising, Tan is Reproduction and Genetics, and Yellow is Health. Each time around the board represents one year.

OBJECT

The object of the game is to be the first dairy farm manager to obtain a 100 cow herd. The money used to buy cows is earned through purchase of management practices and cows.

MATERIALS

One FILLING THE MILK PAIL game complete with:

- 1 game board
- 4 playing tokens
- 1 die
- 4 cards for each major management practice (DHIA, Milk Market, Feed Analysis, Genetically Superior Bulls, Health Program)
- Chance type cards (38 Management Mysteries, 33 Milking Melodies, 23 Feeding Fables, 17 Heifer Happenings, 26 Reproductive Revelations, 13 Impending Infections)
- Milk Pail payment cards (designated dollar values of 1500, 2000, 3000)
- 40 cows (ten each of four colors)
- Play Money (100's, 500's, 1000's, 5000's)

PREPARATION

The game is for 2 or 4 players. Before play begins:

- place major management practice cards, face up, outside their respective color coded areas,
- place chance type cards, face down, within their respective color coded areas,
- assign a banker to organize the money, milk pail payment cards and cows.

Investigate cards before play.

GAME PLAY

Each player starts the game with $6000 and 1 cow token (each cow token represents 10 cows).

Before movement begins each player must decide whether to purchase a Health Program for the first year. Players then move around the game board by rolling the die, moving the number of spaces indicated.

PURCHASE OF BOARD MANAGEMENT PRACTICES

Individual board play management practices can be bought if the player lands on the exact spot. If purchased, pay the banker the stated Cost and secure a Milk Pail payment card with the correct Return value. Any number of players can purchase the same practice during the same year.

PURCHASE OF MAJOR MANAGEMENT PRACTICES

Major management practices lie outside the board. They may be purchased when landing anywhere within their respective color coded management areas.

DHIA - Orange
Milk Market - White
Feed Analysis - Pink
Genetically Superior Bulls - Tan

A management practice may not be purchased (during the current year) once the player leaves that practice's color coded area. Purchase the practice by paying the banker the stated Cost (all major management practices cost $2000) and secure that practice card. All players may buy the same major management practices.

CHANCE TYPE CARDS

When landing on any chance type area (e.g. management mysteries), the respective chance type card must be drawn, read aloud and acted upon accordingly (pay teller Cost or receive Return from teller). Return the card to the bottom of the stack.

IMPENDING INFECTIONS

When landing on Impending Infections draw one card from the Impending Infection cards and read aloud. Pay the required Cost in accordance with whether or not a health program was purchased. Note: Impending Infection cards either cost only those players with no Health Program or cost more for those players with no Health Program than those players with a Health Program.

IF YOU RUN OUT OF MONEY

If a chance type card or Impending Infection card requires payment beyond one's available cash, major management cards may be redeemed at $1000, Milk Pail payment cards may be redeemed at $500, and each cow token may be redeemed at $10,000. If all assets are exhausted, the player is eliminated from play.

AT THE END OF THE YEAR

On your last roll at the end of each year, always stop at STOP (no matter what the roll of the die). Cash in all management practice cards and Milk Pail payment cards with the teller for their RETURN value. Also collect $500 for each cow in the herd (or $5000 for each cow token). Return all cards.

Assess your financial position. Decide on the purchase of the Health Program for the coming year and more cattle. Cows must be bought in groups of ten (1 token) for $20,000. Move to START.

Leave START on next roll.

WINNING THE GAME

The game should be played until one player has 100 cows (ten cow tokens). That person is the winner.

A crucial debriefing question is, "How does this compare to real life?" Anxiety may arise from a knowledge of which management practices should be employed, but the roll of the die prohibiting one to exercise their full ability. This discussion will bring out the short comings of the game and should strengthen the student's transfer to the real life situation.

FILLING THE MILK PAIL allows students to experience dairy management practices, thereby conceptualizing the impact of management practices on dairy economics.

Debriefing Questions

1. What strategies help in winning the game?

2. How does the delay in management practice returns affect your game play? Is this realistic?

3. Where are the greatest returns on money invested (between cattle versus management practices, amongst management practices)?

4. How does this game compare to real life?

APPENDIX D

APPENDIX D

Name_____

DAIRY MANAGEMENT SURVEY

Introduction

This survey aims to answer several questions.

1. What factors do you think affect the economics of a dairy operation?

2. Which personal characteristics of a successful dairy manager do you believe are most important?

3. Which dairy management practices do you think are more important?

Please indicate your responses to the following statements as honestly as possible. There are no right or wrong answers. The results of this survey can only be as accurate as your responses. Your thoughtful consideration of each item is requested. All responses will be strictly confidential and will be compiled with those other participants.

PLEASE SELECT ONLY ONE RESPONSE FOR EACH ITEM. Your cooperation in completing this survey is greatly appreciated.

General Information

Please check the appropriate catagory for each item.

1. Sex: Male_____ Female_____

2. Year in 4-H: _____

3. Overall school grade average: Below C_____, C_____, B_____, A_____.

4. Do you live on a dairy farm? Yes_____ No_____

   If you do not live on a dairy farm, have you had dairy farm experience? Yes_____ No_____

5. Have you ever tried out for your county Dairy Quiz Bowl Team? Yes_____ No_____

Statements

For the following statements please indicate by circling whether you SD (strongly agree); A (agree); N (have no opinion); DA (disagree); or SD (strongly disagree).

PLEASE SELECT ONLY ONE RESPONSE FOR EACH ITEM.

		strongly agree	agree	no opinion	disagree	strongly disagree
		SA	A	N	DA	SD
6.	Dairy farmers can milk cows faster in a stanchion barn than in a milking parlor.	SA	A	N	DA	SD
7.	A calf's navel should be treated with iodine at birth.	SA	A	N	DA	SD
8.	A dairyman should intensify his management practices before buying more cows.	SA	A	N	DA	SD
9.	Holsteins are the most profitable dairy breed.	SA	A	N	DA	SD
10.	A herd goal of having heifers calve at 24 months of age is economically more important than using genetically superior sires.	SA	A	N	DA	SD
11.	It makes little difference if a herd is fed as one group, in two groups, or in three groups.	SA	A	N	DA	SD
12.	Adopting up-to-date dairy herd management practices will help increase a dairyman's income.	SA	A	N	DA	SD
13.	Feeding high quality grain is more important than feeding high quality forage.	SA	A	N	DA	SD
14.	Cows should be bred when in standing heat.	SA	A	N	DA	SD
15.	Feeding a balanced ration should be achieved before feeding several times a day to achieve maximum feed intake.	SA	A	N	DA	SD
16.	Milking cows three times a day should be a higher priority than dipping with teat dip after milking.	SA	A	N	DA	SD
17.	Shipping Grade A milk should be a higher priority than machine stripping cows.	SA	A	N	DA	SD

		strongly agree	agree	no opinion	disagree	strongly disagree
		SA	A	N	DA	SD
18.	Using young sires is more profitable than using genetically superior sires.	SA	A	N	DA	SD
19.	Milking machines should be inspected by a qualified service person twice yearly.	SA	A	N	DA	SD
20.	Enrolling cows on a DHI program will be more beneficial than positive identification of each cow.	SA	A	N	DA	SD
21.	Accurate four times per day heat detection should be a regular practice before using a type mating evaluation program.	SA	A	N	DA	SD
22.	A dairyman who forsees problems and compensates for them will be more successful.	SA	A	N	DA	SD
23.	Cows milking 20% below the herd average should be sold from the herd.	SA	A	N	DA	SD
24.	Managers who frequently evaluate performance and thereby, revise plans, have less profitable dairy operations.	SA	A	N	DA	SD
25.	Using magnetic feeders for high producers should have priority over getting adequate bunk space for the herd.	SA	A	N	DA	SD
26.	A successful dairy herd manager continually updates his knowledge in many areas.	SA	A	N	DA	SD
27.	Raising calves in hutches is more important than feeding them colostrum at birth.	SA	A	N	DA	SD
28.	Greater profit can result from investing in a well-managed dairy operation than placing money in a savings account.	SA	A	N	DA	SD
29.	A herd health program is necessary for all dairy herds.	SA	A	N	DA	SD
30.	Management decisions have minimal effect on farm profit.	SA	A	N	DA	SD

		strongly agree	agree	no opinion	disagree	strongly disagree
		SA	A	N	DA	SD
31.	A dairyman should be shipping Grade A milk before milking his cows three times per day.	SA	A	N	DA	SD
32.	Selling low producing cows because beef prices are high is more important than selling cows with production 20% below herd average.	SA	A	N	DA	SD
33.	Feeding a balanced ration is more important than using urea as a protein source.	SA	A	N	DA	SD
34.	When money is limited, managers should spend money on those management practices which have the greatest return for their dollar.	SA	A	N	DA	SD
35.	It is wiser to clean a cow's udder with individual paper towels than with a sponge.	SA	A	N	DA	SD
36.	When a dairyman improves management practices there is an immediate monetary return.	SA	A	N	DA	SD
37.	A dairy operation will be more profitable when the manager plans goals.	SA	A	N	DA	SD

APPENDIX E

APPENDIX E

Name_____

DAIRY MANAGEMENT SURVEY

Statements

For the following statements please indicate by circling whether you SA (strongly agree); A (agree); N (have no opinion); DA (disagree); or SD (strongly disagree).

PLEASE SELECT ONLY ONE RESPONSE FOR EACH ITEM.

	strongly agree	agree	no opinion	disagree	strongly disagree
	SA	A	N	DA	SD
1. Grade cows are worth more money than registered cows.	SA	A	N	DA	SD
2. Cows whose milk production is 20% below the herd average should be sold from the herd.	SA	A	N	DA	SD
3. Three times a day milking should be a higher priority than dipping with teat dip after milking.	SA	A	N	DA	SD
4. A cow's conformation (type) affects how long she remains in the herd.	SA	A	N	DA	SD
5. Accurate four times per day heat detection should be a regular practice before using a type mating evaluation program.	SA	A	N	DA	SD
6. A dairy farm operation will be more profitable when the manager plans goals.	SA	A	N	DA	SD
7. A herd health program is necessary for every dairy herd.	SA	A	N	DA	SD
8. Cows should be bred when in standing heat.	SA	A	N	DA	SD
9. Selling low producing cows because beef prices are high is more important than selling cows with production 20% below herd average.	SA	A	N	DA	SD

		strongly agree	agree	no opinion	disagree	strongly disagree
		SA	A	N	DA	SD
10.	A herd goal of calving heifers at 24 months of age is economically more important than using genetically superior sires.	SA	A	N	DA	SD
11.	Feeding a balanced ration is more important than using urea as a protein source.	SA	A	N	DA	SD
12.	A successful dairy herd manager has up-to-date knowledge in many areas.	SA	A	N	DA	SD
13.	When money is limited, managers should spend money on those management practices which have the greatest return for their dollar.	SA	A	N	DA	SD
14.	Shipping Grade A milk should be a higher priority than machine stripping cows.	SA	A	N	DA	SD
15.	A calf's navel should be treated with iodine at birth.	SA	A	N	DA	SD
16.	Management decisions have minimal affect on farm profitability.	SA	A	N	DA	SD
17.	Feeding high quality grain is more important than feeding high quality forage.	SA	A	N	DA	SD
18.	It is wiser to clean a cow's udder with individual paper towels than with a sponge.	SA	A	N	DA	SD
19.	Greater profit can result from investing in a well-managed dairy operation than placing money in a savings account.	SA	A	N	DA	SD
20.	A dairyman who anticipates problems and takes care of them will be more successful.	SA	A	N	DA	SD
21.	Adopting up-to-date dairy herd management practices will help increase a dairyman's earnings.	SA	A	N	DA	SD
22.	When a dairyman improves management practices there is an immediate monetary return.	SA	A	N	DA	SD

		strongly agree	agree	no opinion	disagree	strongly disagree
		SA	A	N	DA	SD
23.	A dairyman should be shipping Grade A milk before milking his cows three times per day.	SA	A	N	DA	SD
24.	Milking machines should be inspected by a qualified service person twice yearly.	SA	A	N	DA	SD
25.	A dairy manager should intensify his management practices before buying more cows.	SA	A	N	DA	SD
26.	Raising calves in hutches is more important than feeding them colostrum at birth.	SA	A	N	DA	SD
27.	Feeding a balanced ration should be achieved before feeding several times a day to maximize feed intake.	SA	A	N	DA	SD
28.	Managers who frequently evaluate performance and thereby, revise plans, will have a less profitable dairy operation.	SA	A	N	DA	SD
29.	Using young sires is more profitable than using genetically superior sires.	SA	A	N	DA	SD
30.	Enrolling cows on a DHI program will be more beneficial than positive identification of each cow.	SA	A	N	DA	SD
31.	It makes little difference if a herd is fed as one group, in two groups, or in three groups.	SA	A	N	DA	SD
32.	Using magnetic feeders for high producers should be a higher priority than getting adequate bunk space for the herd.	SA	A	N	DA	SD

APPENDIX F

APPENDIX F

MEMBER QUESTIONNAIRE

1. Did you enjoy the game? Why or why not?

2. Are the instructions and rules clear? What was hard for you to understand?

3. Is the game hard to play? What changes would you make so that the game is easier to play?

4. Do you feel the game presents a life-like view of dairying? Why or why not?

5. Having played the game, do you feel you could be more successful at managing a dairy herd? Why or why not?

6. What did you like most about the game? Why?

7. What did you like least about the game? How would you improve those parts?

8. Any other comments?

APPENDIX G

APPENDIX G

PARENT/LEADER/AGENT QUESTIONNAIRE

Check One: Parent_____ Leader_____ Agent_____

1. Is the game's content relevant to the interest and needs of the members? What might be changed?

2. Is the game appropriate for members age 12 through 18? If not, is the game appropriate for younger or older members?

3. Is the time required to conduct the game realistic? If not, should the time requirement be shortened or lengthened?

4. Are the game's objectives clear and concise? Which objectives need clarification?

5. Are the objectives fulfilled by the game? Which objectives fell short?

6. Do the instructions explain game play and rules clearly? What changes might help clarify?

7. In playing the game, are the procedures and rules difficult to follow? What changes might allow members to understand the procedure more easily?

8. Does the game simulate real life? How could one improve the real lifelikeness?

9. Does the game, through emphasis on concepts, skills and decision making, initiate questions and provide for discussion during the debriefing?

10. Was the exercise enjoyed by members? What would have increased enjoyment?

11. Did members help teach members during game play? Why or why not?

12. Would this game be useful to your particular club or county situation? What would make it more useful?

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