2002

The influence of the use of recommended management practices on milk production in southeast Louisiana

Ronald David Bardwell
Louisiana State University and Agricultural and Mechanical College, rbardwell@agctr.lsu.edu

THE INFLUENCE OF THE USE OF RECOMMENDED MANAGEMENT PRACTICES ON MILK PRODUCTION IN SOUTHEAST LOUISIANA

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The School of Human Resource Education
and
Workforce Development

by
Ronald D. Bardwell
B.S., Southeastern Louisiana University, 1974
M.S., Louisiana State University, 1978
May 2002

DEDICATION

This dissertation is dedicated to my three precious grandchildren, Toby, Lauren, and Taylor. They are truly a blessing in my life.

Dr. Poppa

ACKNOWLEDGMENTS

The writer wishes to express his appreciation to Dr. Michael Burnett for his guidance in developing the study; to Dr. Edward W. Gassie, Dr. Satish Verma, Dr. Earl Johnson, and Dr. Cathleen Williams for their services as graduate committee members; to Dr. Gary Hay, Dr. Charles Hutchison, and Dr. Mike McCormick for their suggestions on preparing the instrument and the recommended dairy practices for the study; to Aubrey Posey for assistance in collection of data.

Special thanks are extended to the Louisiana State University Agricultural Center and the Louisiana Cooperative Extension Service for providing the opportunity for graduate study.

Sincere appreciation is expressed to my wife, Rae, for her support, encouragement, patience and understanding during this twenty-two year graduate program.

TABLE OF CONTENTS

LIST OF TABLES

ABSTRACT

The dairy industry in Southeast Louisiana is one of the largest agricultural industries with a gross farm value of over 74 million dollars. Much of the economy of Southeast Louisiana parishes depends on the dairy industry. Therefore, improvements in production efficiency and/or effectiveness would have an enormous impact on the parish economy. This study identifies the use of recommended practices by dairy producers, thus allowing educational programs to be focused on specific areas of greatest need. The purpose of the study was to describe the management practices of Southeast Louisiana dairy producers and to determine if a relationship existed between the use of recommended practices and annual milk production per cow.

The target population for this study was the dairy producers in Southeast Louisiana. The accessible population for this study was family-owned dairy producers in Southeast Louisiana who were in business during 2000 and still producing milk in September 2001. A simple random sample of 60 dairy producers was drawn from the population list of 319 dairy producers.

The instrument used in the study consisted of three sections designed to measure: personal characteristics of the dairy producer, management programs used, and Extension contacts. The data for this study were collected by personal interview. Some of the major findings of the study are as follows:

The Louisiana Cooperative Extension Service had a positive influence in producer adoption of recommended dairy management practices. As the Extension contacts with dairy producers increased, the overall practice scores increased.

The mean overall practice score was 16.6 out of 30. Producers with a higher use of recommended practices tended to have a higher annual milk production per cow.

Annual milk production per cow ranged from 6, 480 to 20,000 pounds with a mean of 13,524. The four management programs that had a positive relationship with annual milk production per cow were record keeping, feeding management, cow comfort, and reproduction.

The researcher recommends that an Extension publication be printed that includes a comprehensive listing of recommended dairy practices and their effect on milk production.

CHAPTER I

INTRODUCTION

Agriculture is the foundation of the United States' food system. Every day, farmers around the country plant the seeds, tend the crops, milk the cows, and raise the animals that will eventually find their way into local supermarkets. In this capacity, agriculture has contributed to the formation of the nation's economy and culture since colonial times. From county fairs to commodity production, agriculture has given people a regional identity while producing abundant supplies of food (United States Department of Agriculture [USDA], 2001).

The 20th century was a time of rapid and dramatic change for agriculture in the United States. What was once a farming landscape dominated by family operators on small parcels of land has become increasingly dominated by larger and fewer farms. At the turn of the century over 39% of the United States population, 76,212,168, made their living on the farm. Thirty years later, only 24% of the United States population was on the farm. Between 1950 and 1960, people making their living on the farm decreased from 15.2% to 7.5% of the population in America, according to the 1997 U.S. Agricultural Census (United States Department of Agriculture, National Agriculture of Statistics Service [USDA, NASS], 2001).

The declining farm population is a widely noted trend that has radically altered rural communities and the structure of farm production in the United States. In 1996, the farming sector and its related industries accounted for 998 billion dollars (13.1%) of the gross domestic product (GDP) and employed almost 23 million people, 17% of the United States labor force (USDA, 2001). Yet the farming sector is in the midst of a

crisis that has gripped the nation's agriculture for almost a decade. Low commodity prices, limited markets for crops, increasing land prices, and many other factors have led to a decline in the number of farms, farmers and farm businesses in America. This is an alarming signal that the nation's farm culture is in decline. Nationwide, the total number of farms declined 15% between 1982 (2.2 million farms) and 1997 (1.9 million farms) (USDA, 2001).

According to the 1997 Agriculture Census, in 1990 only 1.8% of the United States population of 248,709,873 made a living on the farm. On average, United States farmers are older than other workers in the labor force. The average age of farmers in the United States is 54.3, and the proportion of farmers over 55 rose from 37% in 1954 to 61% in 1997. There is no escaping the fact that the future of American farming is dependent upon a new generation of farm operators (USDA, 2001).

Farming is a decidedly unromantic occupation and for many young people an invariably difficult one. With higher wages in the cities, low prices for raw products and an aging of the farm population, being a farmer in America today speaks to a person's resiliency, resourcefulness, and love of the land (USDA, 2001).

Farming is one of the dirtiest, toughest, and most trying occupations in the world. Any examination of a food system would not be complete without a look at the people behind food production. Dairy farming involves a daily ritual of waking up at two to three in the morning every day of the year, completing the tasks of milking and cleaning, and doing it all over again twelve hours later. These daily trying circumstances have influenced producers to expand or leave the dairy business. The dairy industry follows very much the same path as other major agricultural

commodities throughout the United States; that is, fewer, yet larger producers. USDA figures show that large herds already control a sizeable portion of the nation's milk supply (USDA, 2001).

In 2000, just 2,550 herds or 2.7% of total herd numbers in the United States produced 35.8% of the nation's milk (USDA, NASS, 2001). These herds included those with more than 500 cows. That compares with 29.4% of the milk for this group in 1997. In addition, the 280 operations with more than 2,000 cows produced 10.5 % of the nation's milk in the year 2000, but because they are more efficient they did it with only 9.2% of the nation's cows (USDA, NASS, 2001). The trend toward larger operations will continue but will be gradual because many smaller herd operators have less than 20% debt, and few, if any, enticing employment options exist in rural areas. Thus, many small producers have surprising staying power (USDA, 2001).

In 2000, Louisiana dairy farmers produced 700 million pounds of milk that had a gross farm value of 97.6 million dollars. The value of all cull cows and dairy calves was estimated to be 8.25 million dollars. Milk processing and retail sales within the state added 151.3 million dollars to the value of dairy farm products. Therefore, the total income from the dairy industry in Louisiana during 2000, including value added, was 257.1 million dollars (Louisiana Summary, 2000).

Family-owned dairy farms represent a major agricultural industry in Louisiana, especially in certain geographic areas of the state. While dairy farms are scattered across the state, the largest concentration lies in the southeast and northwest corners. The southeast corner of the state, also known as the Florida Parishes, is the major milk producing area and contains approximately 75% of the state's dairies. Among the

Florida Parishes, the largest milk producing parishes are Tangipahoa, Washington, and St. Helena, respectively. The dairy industry was one of the largest agricultural industries in these three parishes during 2000. In 2000, milk production in Tangipahoa Parish had a gross farm value of approximately 41 million dollars. Washington Parish had a gross farm value of 25 million dollars while St. Helena Parish produced a gross farm value of milk at 8.7 million dollars (Louisiana Summary, 2000). Therefore, fluctuations in the production of milk or in milk prices have a significant impact on the economy of these parishes. It has been estimated that an increase of three and a half pounds of milk per cow per day could potentially increase the combined economic activity of these parishes by over $ 700,000 per month.

There are currently 319 family-owned dairy farms in Tangipahoa, Washington, and St. Helena parishes. Many other families in these three parishes derive their principal income from the dairy business, including farm operators, feed dealers, milk haulers, veterinarians, equipment dealers, seed dealers, and retail outlets. Since the economy of these parishes depends heavily on the dairy industry, improvements in production would have major implications for the parishes. Milk production by area dairy producers, as with most Louisiana dairy producers, lags behind the rest of the Southeast U.S. by approximately 2,500 pounds per cow per year (USDA, NASS, 2001). Although some Florida Parishes dairy producers have annual production per cow averages in excess of 15,000 pounds, many remain below the 12,806 pound state average. Daily milk production is influenced by many practices that are available to the dairy farmer. These are research-based practices that are delivered to the dairy farmer as recommendations from the Cooperative Extension Service.

Cooperative Extension Service

The Cooperative Extension Service has been operating in Louisiana since 1914 as a result of the passage of the Smith-Lever Act. This organization was developed as a partnership of state land-grant universities, the U.S. Department of Agriculture, and parish governments. Extension's job has been to provide education that helps people to help themselves (Sanders, 1966). Extension facilitates the dissemination of information from research stations and the universities to the general public. Unbiased facts from Extension help people identify problems and use new technology in solving them. This is accomplished by helping people make their own decisions and organize to act on those decisions (King, 1992). The Smith-Lever Act ensured the educational nature of the Extension Service by making it a branch of the land-grant university system. (Sanders, 1966).

In Louisiana, the Cooperative Extension Service is one branch of the LSU Agricultural Center. The LSU Agricultural Center is a campus of the Louisiana State University System. The Louisiana Cooperative Extension Service has offices in each parish in the state. These offices have great potential to identify problems and needs, organize groups, and provide information needed by the residents of Louisiana (Sanders, 1966).

Purpose and Objectives

The primary purpose of this study was to describe the management practices of Southeast Louisiana dairy producers and to determine if there is a relationship between the use of management practices recommended by the Louisiana Cooperative Extension

Service and annual milk production per cow among dairy producers in the Southeast Louisiana.

Specific objectives formulated to guide the research were:

1. Describe dairy producers in Southeast Louisiana on selected personal and dairy farming characteristics. The characteristics on which producers will be described include the following: age, educational level, number of years in the dairy business, number of pasture acres (owned/rented), number of crop acres (owned/rented), number of family employees, number of hours family employees work per week, number of non-family employees, number of hours non-family employees work per week, the type of milking parlor, total milk production in 2000, and total number of cows.
2. Determine the annual milk production per cow for dairy producers in Southeast Louisiana.
3. Describe dairy producers in Southeast Louisiana on the use of Cooperative Extension Service's recommended management practices in each of the following programs:
    A. Feeding management,
    B. Reproduction,
    C. Milk quality and milking practices,
    D. Dry cow,
    E. Cow comfort, and
    F. Record keeping.

4. Describe dairy producers in Southeast Louisiana regarding the types and frequency of contacts they have had with the Cooperative Extension Service during the previous year.
5. Determine if a relationship exists between the annual milk production per cow and the frequency of contact that dairy producers in Southeast Louisiana have had with the Cooperative Extension Service in each of the following areas:
   A. visits by Cooperative Extension Service to the producer's farm,
   B. visits by the dairy producer to an extension office, event, or facility,
   C. contact through printed material, and
   D. electronic contacts.
6. Determine if a relationship exists between annual milk production per cow and the use of practices in each of the following management programs: feeding management, reproduction, milk quality and milking practices, dry cow, cow comfort, and record keeping.
7. Determine if a relationship exists between the overall practice score and frequency of contact that dairy producers in Southeast Louisiana have had with the Cooperative Extension Service in each of the following areas:
   A. visits by Cooperative Extension Service to the producer's farm,
   B. visits by the dairy producer to an Extension office, event, or facility,
   C. contact through printed material, and
   D. electronic contacts, and
   E. contact with an LSU dairy extension specialist or DHIA fieldman.

Significance of the Study

At present, Louisiana's average milk production per cow lags behind the Southeast United States region by 2,500 pounds per year (USDA, NASS, 2001). Adoption of research-based management and production practices will continue to improve milk production per cow and maintain a viable dairy industry, which has tremendous impact on the economy of St. Helena, Tangipahoa and Washington parishes. If the above milk deficit is eliminated, annual production in these three parishes should increase by 64 million pounds. This would translate into a 9 to 10 million-dollar increase in economic activity.

The Louisiana Cooperative Extension Service and the Louisiana Agricultural Experiment Station are the branches of the LSU Agricultural Center. The goal of the Agricultural Center is to provide information to the residents of Louisiana that will enable them to enjoy a higher standard of living. Extension agents have the responsibility to disseminate research-based information to the public in their parishes. It is a further responsibility of Extension agents to translate this research-based information into recommendations that the average person can understand and use to improve his or her quality of life.

The Extension dairy education programs of Tangipahoa, Washington, and St. Helena parishes are aimed at assisting dairy producers in increasing production by following research-based practices. Milk production is influenced by many factors. The knowledge of how much influence a research-based extension recommendation has on milk production would greatly assist agricultural agents of the Louisiana

Cooperative Extension Service in developing and implementing relevant programs in the future.

The results of this study should be useful to Louisiana Cooperative Extension Service agents, Louisiana Experiment Station personnel, and other members of the dairy industry to better understand the dairy business in the Southeast parishes of Louisiana and to identify specific factors which affect milk production. Any increase in production could translate into economic gains for farmers and communities and an economic boost to the total economy of the parish. The results of this study could also help to direct dairy and Extension professionals to conduct needed educational programs to benefit the southeast parishes of Louisiana.

CHAPTER II

REVIEW OF RELATED LITERATURE

Cooperative Extension Service (CES)

For the last 86 years, the CES has been an important influence on the development of rural America. The CES was created by the Smith-Lever Act of 1914 as a third arm of the land-grant system in order to transmit information from the college and the Department of Agriculture to the local people. According to the purposes specified in the original legislation, CES is to disseminate and encourage the application of useful and practical information relating to agriculture, home economics, and subjects relating "there to" among the people in the United States not enrolled in land-grant colleges (Sanders, 1966).

The CES had its beginnings in the movement to improve agricultural production. Seaman A. Knapp is considered the father of Extension, being most remembered for use of the demonstration method on Southwest Louisiana farms. Knapp is generally credited for founding the demonstration farms concept.

Until the 1930s Extension was seen as the primary agency representing USDA in local communities. The 1940s and 1950s created abundant food supplies and strong prices which further strengthened the position and role of the CES. The 1960s shifted Extension's concern to include more low-income people, minority groups, and urban residents. The scope of Extension work has continued to increase. Now, not only do Extension agents do the traditional agriculture, home economics, and youth work but they also provide leadership in community and economic development, beautification, water quality, and other programs.

The CES prides itself in responsiveness to local people and local priorities. Extension programs need to appeal to local needs in order to keep a strong clientele.

LCES History

The value of agricultural research and extension to U.S. economic development and to the well-being of the American people has been recognized since the founding of this country. George Washington was the first to make a formal proposal for establishing a federal agency devoted to agriculture. Based on these ideals, Congress established a national system of land-grant universities, in which the LSU Agricultural Center plays a part. The land-grant universities grew from the Morrill Act of 1862 in which Congress donated public lands to support colleges that would stress agriculture and mechanical arts as well as the traditional scientific and classical studies. Pressure grew for research until Congress passed the Hatch Act of 1887. Agricultural Experiment Stations were started in connection with one of the land-grant colleges (True, 1928).

In 1971, a special committee of the LSU Board of Supervisors conducted a comprehensive management study of the LSU System and recommended its agricultural activities have an identity separate from any one of the existing campuses. As a result, in August 1972, the LSU Board of Supervisors established the Center for Agricultural Sciences and Rural Development. Ten years later, the Board changed the name to the LSU Agricultural Center.

Programs and Services

The needs of local clientele drive the programs of the CES. The purpose of the organization is to serve our customer. CES professionals should listen to those they

serve in order to find out what "practical education" needs exist. Agents should have an "ear" to the community.

As far as some programs offered by the LCES, a partial list includes: agriculture, aquaculture, sustainable agriculture, animal science, plant science, and horticulture. Additionally, the home economics programs include: nutrition, family and consumer economics, and family life. Educational programs in the 4-H youth development would include all of the previous mentioned as well as character building, community service, leadership, and volunteerism.

Mission

The overall mission of the LSU Ag Center is to enhance the quality of life for people through research and educational programs that develop the best use of natural resources, conserve and protect the environment, enhance development of existing and new agricultural and related enterprises, and develop human and community resources in rural and urban areas (LSU Agricultural Center, 2001).

Goals

Goals of the LSU Ag Center are to strengthen the productivity and profitability of Louisiana farms; to facilitate the wise use of natural resources and protection of the environment; to develop new agricultural crops and value-added products; to build leaders and good citizens through 4-H youth development; to strengthen families and communities; and to implement nutrition, diet, food safety, and health programs for better living (LSU Agricultural Center, 2001).

Philosophy

The programs conducted by the LSU Agricultural Center are grounded in the basic tenets of the legislative acts which gave rise to the modern agricultural research and extension component of today's land-grant university. Land-grant universities are to promote scientific investigation and experimentation bearing directly on contributing to the establishment of a permanent and effective agricultural industry. They are also to aid in diffusing among the people of the United States useful and practical information and to encourage the application of the same (LSU Agricultural Center, 2001).

Adoption Process

The steps that an individual has to go through before a recommendation is accepted is known as the adoption process. Rogers (1962) defines it as a mental process through which an individual passes from first learning about a new idea to final adoption. The adoption of recommended practices is affected by their willingness to accept new ideas and change.

Rogers (1962) divides the process into five stages as follows:

1. **Awareness** - At this stage the person first learns about a new idea, product, or practice. The person has only general information about it, knows little or nothing about any special qualities, its potential usefulness, or what would likely work for him.
2. **Interest** - At this stage the person develops an interest in the new idea that he has encountered. He wants more detailed information, through listening or reading and is inclined to actively seek this information.

3. **Evaluation** - At the evaluation stage the person weighs the information and evidence accumulated in the previous stages in order to decide whether the new idea, product or practice has any merit and whether it would be useful to him. This stage could be referred to as the "mental trial stage."
4. **Trial** - At this stage the person must actually put the innovation into practice. Competent personal assistance may be required at this stage. The usual pattern is to experiment with the innovation on a small scale, to see if the small-scale experiment proves successful.
5. **Adoption** - At this stage the person decides that the new idea, product, or practice is good enough for full scale and continued use.

Characteristics of Adopters

Lionberger (1960) concluded that adoptions are usually very slow at first, but the rate of adoption increases until approximately half of the potential adopters have accepted the change. After this, acceptance continues, but at a decreasing rate.

Adopters have been broken down into five categories:

1. **Innovators** - These are individuals who are ready to accept new ideas and take certain risks. They are leaders in their industry with a desire for adventure. They are usually well off financially and are able to absorb the loss of an unprofitable innovation. Innovators are usually the cosmopolitan type.
2. **Early Adopters** - Early adopters are the leaders in the community. They are the well-respected and solid people in the community. They are

willing to accept new ideas but with some degree of caution and discretion. The early adopters are considered to be "the man to check with" before using a new idea. These people greatly help in the diffusion process.

3. **Early Majority** - The early majority will adopt new ideas just before the average person will. Once they see that the idea works and is tried and true, they will adopt it.
4. **Late Majority** - The late majority will adopt just after the average person does. Late majority adopters do not adopt until a majority of others do. Usually, they will adopt because of economic and social pressures to do so.
5. **Laggards** - Laggards are the last group to adopt an innovation. This group holds true to tradition and does not want to change. Many times laggards will isolate themselves from others. By the time the laggard adopts a new practice or idea, there is usually already a new innovation to replace it.

Factors Affecting the Adoption Process

A variety of factors affect the adoption process and the willingness of a producer to adopt a new idea. Lionberger (1960) showed that the rate of adoption is nearly always positively related to the size of operation. King (1992) showed that dairy producers with larger herds tended to have higher milk production per cow and higher recommended practice scores. Large scale farm operations maintain substantial economic resources for use in adopting new technological advances and practices.

Rogers and Shoemaker (1971) state that the early knowers of an innovation are more educated and more likely to adopt a practice than the late knowers. Education is believed to create a favorable mental atmosphere for the acceptance of new practices. Posey (1973) reported that dairymen with a higher educational level tended to have herds with higher average herd milk production. According to King (1992), dairy producers with higher levels of education completed tended to use a higher number of recommended practices and had a higher recommended practice score.

The age of a producer has been shown to have an effect on one's willingness to change and adopt new ideas. According to Lionberger (1960), elderly farmers tend to be less receptive to change because of their personal health, declining energies, and pending retirement, while young and middle-aged farmers tend to show the highest adoption rate, although many times they are not in a position to make changes because of capital restriction and/or lack of final authority. Posey (1973) reported no significant difference between age and average herd milk production.

The amount of capital available to a producer generally is directly related to the rate of adoption of a new practice. High farm income nearly always is associated with high farm practice adoption levels.

According to Posey (1973), dairymen who attended the Parish Dairy Day program, had a higher score on overall contact with Cooperative Extension Service, a higher number of visits by Extension agents, or made a higher number of telephone calls to the Extension agents, or a higher number of visits to the Extension office tended to have herds with higher average milk production. King (1992) reported that dairy producers who called or visited the Extension office more had a higher milk production

per cow. In addition, Dutile (1990) examined the relationship between Extension contacts and the use of Extension recommended practices among beef cattle producers. Dutile also found that both number of visits by the county agent and the number of calls to the Extension office were significantly related to the use of recommended practices.

Dairy Industry

The U. S. dairy industry has seen significant changes over the past 30 to 40 years. Nationwide, the average annual milk production per cow increased from 8,305 pounds in 1965 to 12,000 pounds by the end of 1990, and 18,024 pounds in 2000. This has coincided with a 40% drop in milk cows from approximately 15 million to 9.2 million, over the same period. Since 1980, total milk production in the United States has increased from 135 to 167 billion pounds.

The first significant change according to United States Department of Agriculture (USDA) data is that average dairy herd size in the United States increased 366% from 13.5 cows in 1965 to 49.4 in 1989. Family-owned dairy farms have an average herd size of approximately 88 cows. USDA data show that the number of dairy farms declined from 1.1 million in 1965 to 334,000 in 1980, and 105,250 by 2000 (USDA, 2001).

Secondly, milk production in the United States has shifted significantly, as the southwest and northwest have both increased their share of per capita production. In 1965, the top ten milk producing states were Wisconsin, New York, Minnesota, California, Pennsylvania, Iowa, Michigan, Ohio, Illinois, and Missouri, respectively. In 2000, the top ten milk producing states were California, Wisconsin, New York,

Pennsylvania, Minnesota, Idaho, Texas, Michigan, Washington, and New Mexico (USDA, 2001).

Louisiana dairy producers made substantial increases in milk production between 1960 and 2000. In the 1960s, Louisiana producers averaged approximately 6,000 pounds of milk per cow annually. In 1990, milk production per cow per year had increased to 11,000 pounds. The figures for 2000 indicate a statewide average of 12,806 pounds of milk. Annual milk production per cow in the United States has increased by 10,000 pounds per cow over this 40-year period, while Louisiana's milk production has only risen by 6,500 pounds (USDA, 2001).

Similar to national trends between 1960 and 2000, Louisiana's dairy industry has been characterized by decreased numbers of dairy farms and dairy cows and an increase in herd size. Cow numbers decreased in Louisiana in 1986 due to a nation-wide whole herd buyout program which was included in the farm bill that was legislated in December, 1985. This program led to the slaughter of approximately 5,000 cows in Louisiana and a reduction in the milk supply close to 9.2%. The buyout program was also a factor in the decreasing number of family-owned dairy farms in Louisiana. In 2000, the number of dairy farms in Louisiana was 433. In 1980, over 1,100 dairies were in operation in Louisiana. Cow numbers in Louisiana have dropped from 110,000 in 1980 to 77,518 in 1986 to 54,640 in 2000, a 50.4% decline. In comparison, annual Louisiana milk production declined from 1.03 billion to 700 million pounds in 20 years. More important, however, is the fact that milk production for the state only declined by 32% over the same period (Louisiana Summary, 2000).

Feeding Management Program

There are many management programs that dairy producers utilize every day on their farm. One of the most important is that of feeding management. Feeding the dairy herd includes management decisions. Because nearly 50% of the cost of producing milk is for feed, a balanced ration is important for efficient use of protein and energy (Loper, 1989). An optimum dairy herd feeding program is necessary to be successful (Mertens, 1987). Proper nutrition of dairy cattle involves securing forages and concentrates for dairy cattle and delivering these feeds in such a manner that will produce large quantities of milk by cows in the lactating herd (McGilliard, Swisher, & James, 1983). McCullough (1988) states that dairy cows were designed to utilize forages. Forages can be defined as feeds that include the entire plant, such as pasture, hay, green chop, silage, baleage, and haylage. They contain a relatively high percentage of fiber, and a low percentage of energy, in contrast to concentrate feeds (grain, seeds, and their products) that have low fiber-high energy content (Salivas, Stringer, Kesler, & Hargrove, 1983).

Forages make up the bulk of most dairy rations for physiological and economic reasons (McGilliard et al., 1983). The ratio of forage to concentrate in diets of lactating dairy cows has been reported to affect dry matter intake (Allen, 2000). Forages comprise 40 to 70% of lactating cows' rations. According to McCullough (1988) in dairy rations, forages provide a source of nutrients and fiber, assist in buffering the rumen, and are essential for rumen health. To be profitable in the dairy business, analyzing forage routinely should be a priority. To know the quality of each type of

forage fed and the amount consumed is a requirement for the farmer to develop a sound feeding program for the dairy herd (Carley and Fletcher, 1986).

When forages are high quality, dairy cattle consume greater amounts. Additionally, quality forages contain a higher percentage of nutrients that are more digestible. Man has selected cows for greater milk production with the resulting need being a greater nutrient intake and utilization. However, the basic nutritional physiology of the cow has not changed. She still has to use grain in a system designed for forages. These factors combine to ensure a high percentage of total digestible nutrient (TDN) intake from forages and minimize the need for more expensive concentrate feeds (Philpot, Nelson, Davis, & Oliver,1985). Moderate levels of milk can be produced without feeding concentrates, but only a limited level of production can be obtained from forages alone (Brown , Hillman, & Huffman, 1983).

Dairy cattle consume and utilize a variety of crops as forage, including grasses, legumes, corn, small grain, and other crops. Forage crops that are available to most Louisiana dairy producers are pasture, silage, and hay. Etgen, Reaves, and James (1987) concluded that the forages grown on a producer's farm should depend on the land, labor resources, storage facilities, harvesting equipment, and other feeds.

Dairy production in Louisiana is forage-based because pasture, silage, and hay are usually the least expensive sources of feed for dairy cows. Forage that the dairy cow harvests herself is the cheapest source of nutrients when climatic conditions are favorable for its production (Seger, 1979). The amount of profit from milk production made from an acre of pasture depends on the fertility program and the level of management used. There are several important factors in carrying out a good grazing

management program. The pasture must be productive. A good fertility program and the use of recommended varieties will add to productivity. Also, a productive pasture depends on efficient utilization. Grass must be utilized when it has the necessary nutrients for cows to produce milk. This is when the grass is young, tender and growing rapidly (Monroe, 1973).

Many Louisiana dairy farms experience what is commonly called summer slump (Hay, 1990). When ryegrass pasture begins to mature, quality decreases. Milk yields routinely drop by 5-15 pounds per day on lactating cows grazing ryegrass in mid-to-late May because the total nutrient intake decreases. VanSoest (1975) has shown that forage quality has a dramatic impact on total dry matter and total nutrient intake. Feeding high quality stored forages to milking cows will have a positive impact on production per cow on most Louisiana dairy farms, particularly during the four-five month summer period during which pasture quality is typically low (Philpot et al., 1985).

Interestingly, as much as two-thirds of the total annual requirement for forages must be met from conserved crops (McCullough ,1988). The basic fundamentals of forage preservation come from the fact that wet forage left exposed to air is an ideal medium for the growth of mold, other fungi and bacteria. This results in the destruction of the forage as a feed. Forage conservation consists of altering the usefulness of forage as a medium for the above organisms. As hay is produced, the moisture is lowered to a level below which these microorganisms can grow. When silage is produced, acid amounts increase through anaerobic fermentation which prevent further growth of microorganisms. Making hay preserves the forage by reducing its water content,

usually to below 15% moisture. The decision to conserve forage as silage is to produce enough acid to preserve the silage as long as it is protected from outside air and water.

In particular, ryegrass is one of the premier forages in South Louisiana. It is high in quality, palatability and digestibility when grazed or stored in the proper stage of maturity (Philpot et al., 1985). Louisiana dairy producers are very dependent on winter grazing, and ryegrass is the usual winter grazing crop. Ryegrass is a dependable and productive winter grazing crop from November to May, which is a time when most permanent pastures provide little grazing. The quality of ryegrass forage is well known to most dairy producers due to the boost in milk production when lactating cows are placed on ryegrass pasture. Because of its past history and valuable contributions, ryegrass will continue to be planted by most Louisiana dairy producers (Hay, 1990).

The following research-based recommendations from the Louisiana Cooperative Extension Service help to ensure successful stands of ryegrass:

1. Plant recommended varieties.
2. Use seeds with at least 90% germination.
3. Choose the best suitable soils and sites.
4. Prepare a suitable seed bed.
5. Lime and fertilize by soil test recommendations.
6. Plant at recommended rates and dates. The recommended seeding rate is 30 pounds per acre. The recommended planting date for ryegrass is September 20 to October 15 in prepared seedbed, or October 15 if planted into sod.
7. Don't plant too deep. Ryegrass should be covered with about ½ to ¾ inch of soil.

8. Seedbed should be rolled. Rolling of seedbeds after planting will often be helpful.
9. Application rates of nitrogen of 75-125 pounds per acre will be sufficient.
10. Delay grazing until seedlings are firmly anchored, which is approximately five to six inches tall.

Because quality forage is a major factor in milk production in Louisiana, much interest in harvesting ryegrass as a baleage crop has occurred in the last five years from Southeast Louisiana dairy producers. According to the Southeast Research Station Forage Quality Laboratory, the number of ryegrass baleage samples increased from 16 in 1997 to 160 in 2000. Baleage is silage usually made in a large round bale and stored in an airtight stretch plastic wrap. Unlike haylage, forage stored as baleage, is not chopped prior to ensiling. It is baled at 50-60% moisture compared to about 15% moisture for hay. Because ryegrass and other spring-harvested forages often contain more than 80% moisture, drying time on baleage is considerably less than that required for hay production. Bales may be individually wrapped in plastic or butted on end and stretch-wrapped to form long tubes. Making baleage in tubes is generally faster and requires less plastic than individual wrapping, but individually wrapped bales can be easily transported which permits use of rental land to make baleage and allows baleage to be sold as a commodity similar to hay. The ability to harvest ryegrass earlier in the growing season is a key advantage to baleage production for Louisiana producers. This allows the producer to harvest ryegrass at the optimum stage of maturity (boot to early head stages) when nutrient content is high. High nutritional value of stored forage

increases animal performance (McCormick, 2000). Feeding management involves many things on a dairy farm and, if done properly, can bring large returns on investment. Feeding systems that work best are those that allow the farmer to control feeds consumed by the cow. Anytime cow preference is allowed, there is a chance the ration will be unbalanced, at least for certain cows in the herd, even though the ration is balanced for the average cow. A common characteristic of successful programs is getting the proper amount and types of feed into the right cows in the milking herd (Coppock, 1985). Stallings (1989), Extension Dairy Nutritionist at Virginia Tech, offers the following basics to efficient feeding of a dairy herd. Dairy producers should maintain a proper balance of protein, energy, fiber, minerals, and vitamins in the ration. Cows should be fed for body condition and growth in addition to requirements for production. Dividing grain feeding into several meals a day will provide increased production as well as avoiding extremes in amounts of rumen degradable and rumen undegradable protein in rations. Providing enough coarse feed in the ration will stimulate adequate chewing. The use of feed additives that have a proven return on investment will have an effect on production. To stimulate intake, producers need to feed more frequently and avoid excessively wet rations.

In summary, the most successful feeding programs are designed to provide each animal with a ration with maximum forages that provides the following:

1. Adequate amounts of each nutrient required for maintenance, growth, reproduction and production at maximum or most economical levels.

2. Ingredients in the ration are in a form and condition that are appealing to the cow.
3. The cost does not outweigh the benefit in production.
4. Conducive to the health of the animal and production of milk (Etgen et al., 1987).

Reproduction Program

The impact of artificial insemination on genetic improvement of milk production in the dairy population is unquestionable (Hillers, Thonney, & Gaskins, 1982). The primary objective of any breeding program should be to produce cows with the greatest possible genetic capability to make a profit. The fulfillment of this objective requires cows that can produce large amounts of milk efficiently and that can remain strong and healthy throughout the rigors of a long productive life (Meland, Pearson, White, & Vinson, 1982). The greatest opportunity for genetic improvement in a herd is through the bulls that are selected for use in the breeding program (Hillers et al., 1982). Dairy producers have a choice when selecting sires for their breeding programs. They can choose to breed their cows from younger unproven bulls or older progeny tested bulls. The transmitting abilities of young sires are estimated from pedigree information with relatively low accuracy as compared with older proven sires whose transmitting abilities can be known almost perfectly with large numbers of daughters. The risk of obtaining a poor daughter from a young bull is greater than that of obtaining a poor daughter from a progeny tested sire (Schneeberger, Freeman, & Berger, 1982). Three simple steps through which genetic improvement of the dairy herd can be accomplished include in order of importance the following:

1. Decide which genetic improvement matters.
2. Use artificial insemination extensively, if not exclusively.
3. Practice careful, disciplined sire selection.

Any dairy farmer who is willing to take the time to use A.I. and use semen only from bulls whose production credentials place them near the top of today's active A.I. lists has a genetic improvement program that will be successful. The breeding of dairy cattle by A.I. has given the dairy industry an opportunity to make widespread use of superior genes for improving the performance of dairy cattle (Cassell, 1988). In a survey of producers, dairy producers averaged at least 85% of total income from milk sales, the remainder coming from calf and cull cow sales.

Included in the management of the dairy cow is the breeding program. An important step for efficient production of milk is maintaining good reproductive performance in the herd. Reproductive performance affects the amount of milk produced per cow per day of herd life, the number of replacements needed to maintain a constant herd size, and the length of time a cow stays in the herd. All of these factors affect efficiency and profit. In order to remain competitive, dairy producers must reduce losses that occur because of poor reproduction and must minimize the expenses associated with high rates of culling because of infertility. In practice, this means that a cow should stay in the herd for as many lactations as possible, as long as she is profitable, and that enough replacement heifers should be raised to fill the slots left open from culling cows that are unprofitable. Producers should strive for the following:

1. Calve A. I. sired heifers near 24 months of age.
2. Keep cows in the herd as long as they are profitable.

3. Strive for a calving interval of 12 to 13 months.

4. Make sure that at least 90% of the cows are bred to produce another calf.

To achieve these goals, cows must be kept healthy and their reproductive performance must be kept at a high rate (Britt, 1990).

One of the first potential biotechnology products was bovine Somatotrophin (bST). The mechanism of action of bST involves a series of orchestrated changes in the metabolism of body tissues by which more nutrients can be used for milk synthesis. More milk is produced with less feed for a period of time, but feed of the dairy herd is very crucial (Bauman, 1992).

Milk Quality and Milking Practices Program

Milk is the basic product of the dairy industry. The secretion of large amounts of high quality milk is the basic purpose of the modern dairy cow. Milk is secreted by, stored in, and removed from the udder or mammary glands of dairy cows. Milk and milk products are a "must" in the human's daily diet. Milk is superior to any food for muscle and bone building and maintenance. It is an important source of protein, energy, minerals, and fat-soluble vitamins (A). The removal of large quantities of high quality milk from the udder of dairy cows with minimum damage to the udder is the single most important job of the dairy farmer (Nickerson, 1976). Improper or careless milking practices can result in decreased letdown, increased incidence of udder disease, decreased milk quality, and ultimately, decreased productivity and profitability (Nickerson, 1990). Bovine mastitis, or inflammation of the mammary gland, is the most common and the most expensive disease of dairy cattle throughout most of the

world. Bacterial infection is the primary cause of mastitis. In clinical mastitis, the teat often becomes swollen and painful to the touch, and the milk is visibly altered. In acute mastitis, the cow shows signs of fever, rapid pulse, and a sharp decline in milk production. In contrast, sub-clinical mastitis is subtle and more difficult to detect. The cow appears healthy, the udder shows no signs of inflammation, and the milk seems normal. However, both bacteria and white blood cells (somatic cells) are elevated in the milk. Bacteria which most frequently cause clinical bovine mastitis can be divided into two large groups based on the source of bacteria: contagious pathogens and environmental pathogens. The primary contagious pathogens are *Streptococcus agalactiae* and *Staphylococcus aureus*. The primary environmental pathogens are the coliform bacteria such as *E. coli* and streptococcus species other than *Streptococcus agalactiae*. Mastitis continues to be a serious disease limiting production and reducing the economic return on all dairy farms (Crist et al., 1981). In Louisiana, mastitis costs dairy producers approximately $184 per cow with total yearly losses in excess of $15 million. The loss of milk income due to clinical mastitis is readily apparent as milk production and milk from cows treated with antibiotics must be discarded for three to four days. Economic loss due to sub-clinical mastitis is much greater than that from acute mastitis because the reduction in milk production is gradual, persists for long periods of time, and undermines the yield of the infected cow. Also, nearly 40% of any given herd is sub-clinically infected at any given time and sub-clinically infected cows are reservoirs of infective organisms for other cows in the herd. More difficult to quantify, the economic benefit of managing sub-clinical mastitis has been estimated at $85 per cow by simply reducing the bulk milk somatic cell count from 300,000 cells per

milliliter to 200,000 cells per milliliter. Quality bulk milk will have somatic cell count that is less than 200,000 cells per milliliter. Operating a dairy at an average somatic cell count of 400,000 cells per milliliter, which is a typical annual average, means an average eight percent milk loss or 1,200 pounds per cow per year (Pankey, Barker, Twomey, & Duris, 1983). Studies have found several practices to be effective and economical in controlling mastitis. Owens and Nickerson (1990) developed a five-point plan to reduce the incidence of bovine mastitis. These include the following:

1. teat dipping,
2. dry cow therapy,
3. prompt treatment of clinical cases,
4. proper milking hygiene/use of adequately functioning milking equipment, and
5. culling chronically infected cows.

Procedures for udder preparation must ensure that teats are cleaned manually and dried thoroughly prior to milking machine attachment. Teats are commonly contaminated with bacteria and covered with a certain amount of manure and dirt. Louisiana dairy producers use many methods of cleaning cows, udders, and teats. Commonly, the udder and teats are washed with a pistol grip spray nozzle and then massaged and dried with paper towels. With this method, water is often trapped by hair on udders and flanks and drains down during milking. This water collects on the top of the teat cup and is then pulled into the teat cup by the milking action. Subsequently, it winds up in the teats and the milk. No matter how well the cow was washed, this water is contaminated with bacteria, thus reducing the milk quality and increasing the

incidence of mastitis. In the industry's changing environment, more employees are milking while dairy producers target their time to business decisions (Burns, Wolfgang, & Jayarao, 2001).

A new method of cleaning the cow in preparation for milking was studied at the Agricultural Experiment Station in Baton Rouge, Louisiana. This method provided sanitation without the use of water. This new method involved using pre-moistened, sanitary, disposable towels, commonly used for infant care, to clean each teat prior to milking. Only the teats were cleaned, regardless of how much dirt or manure was on the udder. This method was compared with the standard procedure of washing with a water hose and drying with paper towels. Standard plate counts and preliminary incubation counts were significantly reduced by wiping rather than washing. Counts in the washing test were in the normal ranges expected; whereas, in the wiping tests, both counts were decreased by more than 50% (Adkinson, Farmer, & Jenny, 1993). Dairy producers traditionally regard the mammary glands of open heifers as not infected. They usually do not examine mammary secretions until first milking or during the first episode of mastitis after heifers have given birth. The greatest development of milk producing tissue occurs during the first pregnancy, when mammary glands must be protected from the harmful effects of mastitis-causing bacteria to ensure maximum milk production. Trinidad, Nickerson, Alley, and Adkinson (1989) recommend three practices to help reduce the incidence of mastitis among heifers. They include:

1. control flies,
2. use individual calf hutches to avoid suckling among calves, and
3. segregate pregnant heifers from dry cows.

Schultze (1983) suggests that the dairy cow's greatest risk for intramammary infections is during the dry period, especially during the first few days. According to the National Mastitis Council, dry cow infections are a major problem in terms of economics and human frustration, costing U.S. dairy farms some $2 million annually. Many infected cows are culled involuntarily, or, at least, they have impaired production as a result of contacting mastitis during the dry period. Dry cow treatment with an antibiotic, if administered promptly after the last milking of the lactation, will reduce the incidence of mastitis, according to Goodger, Galland, and Christnase (1988). Dry cow therapy of dairy cattle is very important in a mastitis control program. The following advantages of dry cow therapy are suggested by the National Mastitis Council (NRC) (1990):

1. Much higher dose of antibiotic can be used safely.
2. Retention time of the antibiotic in the udder is much longer.
3. The cure rate is higher than for lactating therapy.
4. The incidence of new infections during the dry period is reduced.
5. Damaged tissue may be regenerated before freshening.
6. Clinical mastitis at freshening is reduced.
7. The risk of contaminating milk with drug residue is reduced.

Most herds will benefit at drying off from treating every quarter of every cow. This procedure will reach all infected quarters and is more effective than selective treatments (Schultze, 1983). The treatment procedures for drying of cows as recommended by the National Mastitis Council (1990) is as follows: Clean and sanitize teats carefully before

infusing antibiotics into a quarter. Without proper preparation, organisms present on the teat end may be forced into the udder and result in a more severe infection than the one for which the treatment was intended. Teats should be washed with a safe, effective disinfectant and dried. A separate piece of cotton soaked in 70% alcohol should be used to disinfect each teat. Teats on the far side of the udder should be sanitized first, then the teats on the near side. Quarters should then be treated in reverse order. Dip teats in an effective germicidal teat dip after treatment.

In addition, Pankey et al. (1983) suggest there is little, if any, value in treating cows at drying off and again two or three weeks later. The second treatment may pose the additional risk of forcing organisms into the gland and increases the risk of antibiotic residue in the milk after freshening. In summary, the most common method for mastitis control is the prevention of new infections by practicing good milking hygiene. The basis for this type of control is that udder infections are caused by pathogens spread from cow to cow during the milking procedure (Davidson, 1974). Controlling mastitis in the dry period should be a major priority, and the most successful strategy for accomplishing this goal is dry cow treatment. Research shows that dry treatment cures up to 50% of mastitis cases that originated in lactation, and results in more than 50% fewer new infections during the dry period.

Dry Cow Program

It has often been said that the best time to improve a herd's production is when the cow is not producing. Research has shown that a sound, nutritionally-balanced dry cow program can increase milk yields from 500 to 2,000 pounds in the next lactation. When dry cow management is a priority on a dairy farm, cows come through the dry

period in better condition, with fewer calving problems and higher milk production during the subsequent lactation. The length of the dry period is critical to good dry cow management. During the dry period, the secretory tissue in the mammary gland breaks down and new tissue is produced. The dry period should be no less than 60 days for first lactation cows and no less than 45 days for second and greater lactation cows (Sorensen & Enevldsen, 1991). Proper management of the dry cows begins during the latter part of the previous lactation. In recent years, a quantify program has begun by using a body condition scoring system on a one-to-five point scale. One unit of this scale represents about 120 pounds of body weight. A good goal is for cows to be at a body condition score of 3.5 at dry off. During the dry period, a cow should maintain her body condition and gain weight moderately (Gearhart & Erb,1990). A cow should gain 120 to 140 pounds during a pregnancy for an 85-pound calf. Studies have indicated that losing a full point in body condition score during the dry period costs the animal 1,200 pounds of milk in the next lactation (Moore, 1998).

Most experts agree that the body condition increase in the dry period should be limited to .5 body condition score (BCS) or 50 to 70 pounds of fat deposition. Cows in the dry period should be separated into at least two groups: a far-off and a close-up group. The far-off group consists of animals from dry off to two-to-three weeks prior to calving. Cows within three weeks of calving should be in the close-up group. The far-off group may need to be further divided depending on body condition and nutritional needs. Having a close-up group allows for closer observation of the cows to help with calving. This also allows for separate feeding to meet their unique nutritional needs. Far-off dry cows' nutritional requirements on a total ration dry matter basis would have

a 12.5-13% crude protein and a total digestible nutrient level near 60%. Close-up dry cows' nutritional requirements on a total ration dry matter basis would have a 15-16% crude protein and a net energy of lactation between .68-.70 M cal/lb. (Tomlinson,1998). The beginning of the dry period should be considered as the start of the next lactation and not the end of the previous lactation. When the dry cow period ends, lactation begins. If the lactation begins in the fall as compared to the spring, a 509 pound increase of milk will be produced (Moore, Hutchison, & Ortego, 2000).

Cow Comfort Program

Milk production is reduced by heat stress in dairy cattle caused by high ambient temperatures within all ranges of humidity (Armstrong, 1994). Heat stress occurs when a dairy cow's heat load is greater than her capacity to lose heat. Although dairy cows dissipate heat in several ways, such as conduction, convection, and radiation, evaporative cooling is the cow's primary mechanism for heat loss when the temperature is above 70° F. Evaporative cooling occurs when sweat or moisture evaporates from the skin or respiratory tract (Stokes, 2001). This can be accomplished by soaking the cow and blowing air on her to evaporate the water. This is why dairy cattle perspire and increase respiratory rates during heat stress. Heat stress affects higher producing cows more than lower producers because higher producers consume more nutrients and produce more metabolic heat (Johnson, Ragsdale, Berry, & Shanklin, 1963). Environmental modification to minimize heat stress, along with a good nutritional program, are necessary to maintain dry matter intake (DMI) and milk yield during the summer months. An increase of between 3 to 14 pounds of milk per day has been shown from cows that have been cooled when compared to cows not cooled

(Armstrong, 1994). Cows need an abundance of clean, cool water. Water is closely linked to performance, and cows consume 2 to 4 pounds of water for each pound of feed intake, and an additional 3 to 5 pounds of water for each pound of milk produced. As ambient temperatures increase from 40 to 80° F, cows that produce 40 pounds of milk per day will increase intake of water from 16 to 26.5 gallons per day. Cows that produce 80 pounds of milk per day will increase intake of water from 26 to 45 gallons per day (National Research Council, 2001). Access to an eight-foot return alley water trough is adequate for milking parlors with less than 25 stalls per side (West, Mathis, & Mullinix, 1995). Water troughs should be shaded to prevent water temperatures from increasing, thus reducing water intake. Troughs should be dumped daily to keep water fresh, cool and clean. If humans would not drink the water, cows might not drink it either (West, Mullinix, & Sandifer, 1991). Shade for dairy cattle is considered essential for all milking and dry cows to minimize loss in milk production (Armstrong, 1994). Cows in pasture situations should be provided with solid shade. Temperature humidity index (THI) reflects the combined effect of ambient temperature and relative humidity. Indexes above 72 are usually associated with heat stress in cattle (Stokes, 2001). Research indicates that compared with high producing cows exposed to direct sunlight and temperature when the humidity index exceeds 80° during daylight hours, shaded cows will produce approximately 4 to 9 pounds of additional milk per day (Smith, Harner, & Brouk, 2000). Providing 38 to 45 square feet of a solid shade per mature dairy cow is adequate to reduce solar radiation. A height of at least 14 feet with a north-south orientation will be beneficial. Using more porous materials such as shade cloth is not as effective as solid shades (Armstrong, 1994).

The holding pen adjacent to the milking parlor is the most stressful area for a dairy cow on all dairy farms. Areas should be shaded and cooled to make a desirable place for cows to gather right before milking (Harner, Smith, Brouk, & Murphy, 2000). An Arizona trial in 1983 of cows producing 60 pounds of milk per day showed that cooled cows produced 1.9 pounds more milk than cows not cooled (Armstrong, et al., 1999). A method to cool the holding pen would be to use low volume sprinklers to wet cows and fans to hasten evaporation of the water. Research in a high humidity climate utilizing a feed barn found the benefit of cooling cows from a fan and sprinkler system. Cows were wet for a short period of 1-2 minutes with sprinklers or misters. Evaporating the water from the cows for a period of 13-15 minutes was achieved with the use of the fans. Cows' respiration rate per minute was reduced from 87, applying water via misting, to 72, applying water via sprinkling. Improved milk production of 4 to 6 pounds of milk per day and 2 to 8 pounds feed intake increase per day was reported (Strickland, Bucklin, Norstedt, Beede, & Bray, 1989). Lin et al. (1998) reported an increase in milk production per cow per day of over five pounds when sprinklers, misters, and fans were used as compared to fans only.

Heat stress of the dairy cow is further aggravated by heat production from the cow's own body. Generally, the higher producing cow generates greater heat load from digestion and metabolism. Responses to heat stress include panting and sweating. As the cow's body temperature increases, a higher maintenance requirement means cows need to increase feed intake to maintain milk production. However, the opposite happens. Feed intake declines when ambient temperatures exceed 78° F. The result is

that milk production may decline as much as 30% (McDowell, 1976). Adjustment in both nutrition and bunk management plays a major role in heat stress abatement.

Record Keeping Program

Probably the one single deficiency of management that costs dairy producers the most in lost income is the lack of good records (James, 1983). Complete and accurate records are the backbone of a highly profitable dairy farm operation. Such records should include the minimum data on production, reproduction, health, and income for each cow and for the herd as a whole. These records should also include detailed accounting information of income and expenses for the entire farm (Galton, 1984). The primary purpose of dairy records is to give the dairyman detailed information on individual cows, as well as the entire herd, for day-to-day decision making, evaluation of past management decisions, and planning. The desirable characteristics of a dairy record keeping system are that it is simple, complete, accurate, up-to-date, understandable, and requires a minimum amount of time to keep (Galton, 1984). Dairy Herd Improvement (DHI) testing programs have been used since their inception in 1905 in Michigan as a management tool for efficient milk production. DHI has also been a valuable asset for selling breeding stock and surplus dairy cattle, especially for purebred breeders. In addition, according to Schmidt and Pritchard (1987), the widespread use of DHI programs has provided records to evaluate bulls and cows for their transmitting ability. Approximately 48% of all dairy cows in the U.S. are enrolled in a DHI program. Studies by Schmidt and Pritchard (1987) have shown that cows in herds on DHI programs produce considerably more milk than those not on a program. The Southern United States lags behind the national average, ranging from 63% of the

dairies in Georgia to only 21% of dairies in Kentucky that are enrolled in DHI programs. According to the most recent enrollment summary from the Dairy Records Processing Center, Louisiana now has a total of 138 herds on test, which is approximately 33% of the total number of herds in the state. This represents a total of 19,000 cows with an average milk production of 15,223 pounds compared to an 11,076 pound average for those not on a testing program.

CHAPTER III

METHODOLOGY

Population and Sample

The target population for this study was the dairy producers in Southeast Louisiana. The accessible population for this study was the dairy producers of family-owned farms in Southeast Louisiana parishes that were producing milk in the year 2000 and still producing in September 2001. The Louisiana Department of Health and Human Resources, Milk and Dairy Products Division, maintains a list of Louisiana dairy producers. A regional office located in Amite, Louisiana, supplied the researcher with a complete list of the 338 dairy producers in three parishes, St. Helena, Tangipahoa, and Washington. Each of the producers on this list was checked to verify that they were in business in 2000 and still operating in September 2001 and that they were family-owned. This criteria specified each producer was included in the accessible population. Nineteen producers were eliminated resulting in an accessible population of 319 family-owned dairy producers. The minimum sample size was determined using Cochran's formula. Calculations to arrive at this minimum sample size are as follows:

$$n_B = \frac{t^2 \times s^2}{d^2} = \frac{(1.96)^2\,(2300)^2}{(525)^2} = \frac{(3.8416)(5290000)}{275625} = \frac{20{,}322{,}064}{275625}$$

$$n_B = 74$$

$$n = \frac{n_B}{1 + \frac{n_B}{N}} = \frac{74}{1 + \frac{74}{319}} = \frac{74}{1.23} = 60$$

t = 1.96 at 5% risk that actual error exceeds acceptable margin of error
d = margin of error (3% of 17,500 lbs./year)

s^2 = estimated variance $\left(\frac{\text{estimated range}}{6}\right)^2$

n_B = unadjusted sample size
n = minimum needed sample size

A simple random sample of 60 dairy producers was drawn from the 319 dairy producers in St. Helena, Tangipahoa, and Washington parishes.

Instrumentation

The instrument selected for use was developed to meet the objectives of the current study. The instrument was based on an extensive review of related literature and research.

After the instrument was developed, the researcher established the content validity of the instrument through a review by a panel of experts that included: a Research Station associate professor, the Research Station resident director, two dairy science professors, and two LSU dairy extension specialists. The panel was given a copy of the instrument and the objectives of the study and asked to evaluate the instrument as to whether it would accomplish the objectives of the study, and if the items were clear. Appropriate changes in the instrument were made according to the recommendations of the panel. To further establish the validity of the instrument, the researcher conducted a field test of the instrument prior to data collection with a sample of six dairy producers drawn from the population. The field test sample was selected from the producers listed on the frame of the accessible population who were not selected as participants in the study. These were drawn from the lower third of the random sampling list to allow for the inclusion of randomly drawn alternates to replace any refusals among the drawn sample.

The instrument, after the initial revision, consisted of three main sections. Section one included items related to the personal and professional characteristics of dairy producers. Section two sought information about contacts with Louisiana Cooperative Extension Service personnel. Section three included six subsections for the areas of management programs. Questions in this section were directed toward determining which recommended management practices were being followed. Each section had several items related to the management practices that were investigated. These six subsections included:

1. Feeding Management Program
2. Reproduction Program
3. Milk Quality and Milking Practices Program
4. Dry Cow Program
5. Cow Comfort Program
6. Record Keeping Program

A copy of the instrument used for data collection in the study is included in Appendix A.

Data Collection

The data for this study were collected by personal interview. The initial contact with the dairy producers was by a letter mailed to the address determined when the population frame was established. A copy of the letter is attached as Appendix B. The purpose of the letter was to explain the goals of the survey, to indicate who was conducting the research, to emphasize the importance of the study, and to request assistance. Letters were mailed first class. Three days after the letters were mailed to

the 60 dairy producers, telephone calls were initiated to arrange meetings with the dairy producers to complete the questionnaire. Following the phone conversation, farm visits were scheduled to gather the proposed data. The data were collected during the last two weeks of September, 2001. All the data collection visits were made by the researcher except four visits. Four dairy producers were not available on the initial visit, so these were conducted by the Washington Parish County agent. This agent accompanied the researcher on all visits in Washington Parish. From the original random list of 60 dairy producers, three were replaced with alternates from the computerized random sample list. One dairy producer began shipping milk in February, 2000, while another went out of the dairy business in August, 2001. The third dairy producer had been ill for some time and was not able to participate in the study.

Data Analysis

The alpha level was set at .05 *a`priori*. Procedures for statistical analysis are discussed by objective.

Objective one was to describe the dairy producers in Southeast Louisiana parishes by selected personal and dairy farming characteristics. The characteristics included the following: age, educational level, number of years in the dairy business, number of pasture acres, number of crop acres (owned and rented), number of family employees, number of hours family employees work per week, number of non-family employees, and number of hours non-family employees work per week. In addition, the type of milking parlor, total milk production in 2000, and the total number of cows were included as farming characteristics.

Variables which were measured on a categorical scale of measurement, that is, nominal and ordinal scales, were summarized using frequencies and percentages. The variable measured on a nominal scale was type of milking parlor. Educational level was an ordinal scale of measurement.

Variables that were measured on a continuous scale of measurement, that is, the interval or higher scale of measurement, were summarized using means and standard deviations. These variables include age, number of years in the dairy business, number of pasture and crop acres (owned and rented), total number of cows, and total milk production in 2000. Also included were the number of family employees and non-family employees, and the number of hours that family employees and non-family employees worked per week.

Objective two was to determine the annual milk production per cow for each dairy producer in Southeast Louisiana. Production data for each dairy producer was collected from milk cooperative receipts for the year 2000. Calculations were made from survey data to determine annual milk production per cow by dividing milk production by total number of cows per producer. The milk production per cow per dairy producer was totaled, and an annual milk production per cow for all producers was calculated.

Objective three was to describe dairy producers on the use of Extension recommended management practices in each of the following programs: feeding management, reproduction, milk quality and milking practices, dry cow, cow comfort, and record keeping. Data collected were summarized using frequencies and percentages.

Objective four was to describe dairy producers in Southeast Louisiana regarding the types and frequency of contacts they had had with the Louisiana Cooperative Extension Service during the previous year. Data collected were summarized using frequencies and percentages.

Objective five was to determine if a relationship existed between amount and type of Louisiana Cooperative Extension Service contacts with producers and annual milk production per cow. Correlation coefficients were calculated to determine the relationship between contacts with Extension personnel through office or farm visits, dairy days, circular letters, and electronic contacts and annual milk production per cow.

Objective six was to determine if a relationship existed between annual milk production per cow and the use of the following management programs: feeding management, reproduction, milk quality and milking practices, dry cow, cow comfort, and record keeping. Correlation coefficients were calculated to determine the relationship between annual milk production per cow and management programs.

Objective seven was to determine if a relationship existed between the overall practice score and frequency of contact that dairy producers in Southeast Louisiana have had with the Cooperative Extension Service in each of the following areas: (a) visits by Cooperative Extension Service to the producer's farm, (b) visits by dairy producers to an Extension office, event, or facility, (c) contact through printed material, and (d) electronic contacts, and (e) contact with an LSU dairy extension specialist or the DHIA fieldman.

CHAPTER IV

FINDINGS

The findings of the study are presented in this chapter and are organized by its objectives.

Objective One

The first objective of the study was to describe dairy producers in Southeast Louisiana on selected personal and dairy farming characteristics. The characteristics on which producers were described included the following: age, educational level, number of years in the dairy business, number of pasture acres (owned/rented), number of crop acres (owned/rented), number of family employees, number of hours family employees worked per week, number of non-family employees, number of hours non-family employees worked per week, the type of milking parlor, total milk production in 2000, and total number of cows.

The first characteristic on which dairy producers were described was their self-reported age. Ages of respondents ranged from a low of 23 years to a high of 69 years. The mean age of study participants was 47.7 years (SD = 11.54).

Respondents were also described on the variable, educational level. Half (n = 30, 50%) of the study respondents indicated that they had received a high school diploma. In addition, six (10%) indicated that they had completed a college degree; however, none of the participants had completed a degree beyond the baccalaureate level (See Table 1).

Table 1

Highest Level of Education Completed by Family-Owned Dairy Producers in Southeast Louisiana

Educational Level	n	%
Less than high school	10	16.7
Graduated from high school	30	50.0
Received some college hours	14	23.3
Graduated from college	6	10.0
Graduate degree from college	0	0.0
Total	**60**	**100.0**

Respondents who indicated that they had completed a college degree were also asked to indicate their major field of study in that degree. Since only six had completed degrees, these individuals were the only respondents to this item. Of the six, four (66.7%) reported having completed their degree in the area of animal science. One respondent (16.7%) reported completing a degree in industrial technology, and one respondent reported only that the degree completed was a Bachelor of Arts degree, but declined to indicate the specific field of study.

Another variable on which respondents were described was years in the dairy business. The number of years that respondents had operated a dairy ranged from a low

of 2 to a high of 50. The mean number of years that the respondents had been in the dairy business was 22.7 years (SD = 11.65).

Respondents were also described on the total number of cows, milking and dry, on their farm. The total number of cows that the respondents reported ranged from 50 to 286, with a mean of 114.0 head (SD = 50.90).

The total milk production in pounds during the year 2000 was another characteristic on which study participants were described. The total annual milk production that the respondents reported ranged from 324,000 pounds to 4,690,400 pounds. The mean of the total annual pounds of milk produced was 1,580,259.3 pounds (SD = 893,700.50).

Total acres that the producers farmed during the year 2000 was another variable in the study. The total acres of the farm consisted of any land that dairy producers used in the operation. All acres that were owned or rented, whether the land was used for pasture, hay, or crops was included. The total acres reported by respondents ranged from a low of 40 to a high of 535. The mean number of acres reported in this study was 227.0 (SD = 110.65).

In addition to the total acres of land used in the dairy operation, respondents were also asked to identify the number of acres for pastures (both owned and rented) and the number of acres used for crops (both owned and rented). Regarding acreage in pastures, 56 (93.3%) producers reported owned acreage in pastures. Among these 56 respondents, the number of owned acres in pastures reported ranged from 45 to 500 with a mean of 168.3 acres (SD = 95.32).

Respondents were also asked to indicate the number of pasture acres they rented for their dairy operation. Thirty-four (56.7%) indicated that they did rent pasture acreage, while 26 (43.3%) did not report any rented pasture acres. Among the 34 producers that reported rented pasture land, the number of acres ranged from 25 to 302 with a mean value of 99.9 acres (SD = 74.85).

Producers were also asked to report the number of acres in crops they owned and rented as part of their operation. Regarding acres in crops owned, five of the participants (8.3%) indicated that they owned land that was in crops as part of their dairy operation. Acreage reported by these five individuals ranged from a low of 20 to a high of 200 with a mean number of acres of 124.0 (SD = 87.64).

Similarly, four of the producers (6.7%) indicated that they had rented acreage in crops as part of their dairy operation. Number of rented acres reported by these respondents ranged from 35 to 100 with a mean value of 63.3 (SD = 27.97).

Another aspect of the dairy business described in this study was the use of labor on the farm. Respondents were asked to report the number of both family and non-family employees as well as the number of hours worked by each of these two groups of employees. Regarding the number of family employees, the respondents were asked to report the number of family members that worked on the dairy farm other than themselves. A total of 37 (61.7%) indicated that they employed one or more family members on the farm. The number of family members employed by these 37 producers ranged from a low of one to a high of three, with a mean number of 1.5 family employees (SD = .65).

Producers who employed family labor were also asked to indicate the total number of hours that these family employees worked on a weekly basis. The 37 respondents who indicated that they used family employees, reported number of hours worked ranging from a low of 10 hours to a high of 180 hours. The mean hours worked by family employees was 62.6 (SD = 42.72).

As part of the measurement of labor use on the farm, producers were also asked to indicate the number of non-family employees on their farm. A total of 36 (60.0%) producers reported that they employed non-family employees. The respondents who did have non-family employees were also asked to report the number of non-family employees on their farm. The number of non-family employees hired by these 36 producers ranged from one to five with a mean number of 1.7 (SD = .91) non-family employees on the dairy farms.

When producers who hired non-family employees were asked to report the number of hours the non-family employees worked per week, the hours ranged from a low of 12 hours/week to a maximum of 140 hours/week. The mean number of non-family employee hours was 63.9 (SD = 38.24).

When asked what type of milking parlor was used, the majority of respondents (n = 37, 61.7%) indicated that they used a herringbone style of parlor. In addition, 14 producers (23.3%) indicated that a flat barn was used. Only one producer (1.7%) reported use of a side-opening parlor (See Table 2).

Objective Two

The second objective of the study was to determine the annual milk production per cow for dairy producers in Southeast Louisiana. The total milk production per

Table 2

Type of Milking Parlor Used by Family-Owned Dairy Producers in Southeast Louisiana

Milking Parlor	n	%
Herringbone	37	61.7
Flat barn	14	23.3
Parallel parlor	8	13.3
Side opening	1	1.7
Total	**60**	**100.0**

farm, in pounds, was collected from the dairy producer's year-end statement. The total number of cows per farm was also collected at the time of the interview. The annual milk production per cow was calculated by dividing the total milk production, in pounds, by the total number of cows on the farm. The annual milk production per cow ranged from 6,480 pounds to 20,000 pounds with a mean of 13,525.0 pounds (SD = 3,148.17).

Objective Three

The third objective of the study was to describe dairy producers in Southeast Louisiana on their utilization of Cooperative Extension Service recommended management practices in each of the following areas: feeding management, reproduction, milk quality and milking practices, dry cow, cow comfort, and record keeping.

Feeding Management Program

The first area of recommended programs examined was that of feeding management. Feeding management included variables related to the nutrition of the dairy animals.

Feeding system. Respondents were asked to choose which of nine feeding systems best described the one used on their farm. The system selected by the majority of respondents was the system that included "Hay, pasture, ryegrass, and all the grain in the parlor" (n = 33, 55.0%). All of the other eight systems offered were selected by five or fewer respondents. In addition, five other alternative feeding systems were identified by a small number of the study participants (See Table 3).

Ration Balanced. Study participants were asked to respond to the question, "How often is your ration balanced for your milk herd?" from five available options. The response that was selected by the majority of participants was, "When I Have Trouble" (n = 34, 56.7%). The recommended practice for ration balancing for the milking herd is at least once every three months. Six producers (10.0%) indicated once a month, while eight producers (13.3%) indicated once a quarter (See Table 4).

Balance their own ration. Dairy producers were asked to respond to the question, "Do you balance your own milking ration?" Thirteen producers (21.7%) indicated that they balanced their own lactation ration, while 47 producers (78.3%) indicated that they did not balance their own.

Grain feeding. Regarding how they determined the amount of grain to feed their cows, 12 dairy producers (20%) responded that milk cows were fed grain

Table 3

Feeding System Utilized as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Feeding System	n	%
Hay, pasture, ryegrass, and all the grain in the parlor	33	55.0
Hay, pasture, corn silage, ryegrass baleage, and grain in the parlor	5	8.3
Hay, pasture, ryegrass baleage, and grain in the parlor	4	6.7
Hay, pasture, ryegrass pasture, wet brewer's grain, and grain in the parlor	4	6.7
Hay, pasture, and all the grain in the parlor	3	5.0
Total mixed ration (TMR) and ryegrass pasture	2	3.3
Total mixed ration only	2	3.3
Hay, pasture, corn silage, ryegrass baleage, and grain in parlor	2	3.3
Hay, pasture, ryegrass baleage, wet brewer's grain, and grain in parlor	2	3.3
Hay, pasture, ryegrass haylage, wet brewer's grain, and grain in parlor	1	1.7
Hay, pasture, corn silage, crabgrass baleage, and grain in parlor	1	1.7
Hay, TMR with corn silage as the base, and grain in parlor	1	1.7
Hay, pasture, wet brewer's grain, and all the grain in the parlor	0	0.0
Hay, pasture, corn silage and by products such as whole cottonseed and grain in the parlor	0	0.0
Total	**60**	**100.0**

Table 4

Frequency of Balancing the Milking Herd's Ration as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Frequency	n	%
Once a month	6	10.0
Once a quarter	8	13.3
Twice a year	10	16.7
Once a year	2	3.3
When trouble occurs	34	56.7
Total	**60**	**100.0**

according to individual production, while 30 producers (50%) fed all cows the same amount according to herd average. Eighteen respondents (30%) indicated that milk cows were fed all the grain they could eat during milking.

Grain in the parlor. When asked if they fed all of the grain mix in the parlor, 53 (88.3%) of the participating dairy producers responded "yes." Seven of the responding producers (11.7%) reported that all grain was not fed in the parlor.

Forages analyzed. Respondents were asked to indicate when they analyzed their forages. The response that was selected by the largest number of participants was "never" (n = 29, 48.3%). In addition, 12 producers (20.0%) indicated "rarely" as their response to this item (See Table 5).

Table 5

Frequency of Forage Analysis as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Frequency	n	%
Never	29	48.3
Rarely	12	20.0
Sometimes	15	25.0
Often	4	6.7
Always	0	0.0
Total	**60**	**100.0**

Frequency of grain mix analyzed. When study participants were asked the question, "When do you analyze your grain mix?", the largest group of respondents (n = 21, 35.0%) indicated "never." Twenty producers (33.3%) indicated "rarely," while 15 producers (25.0%) indicated "sometimes" (See Table 6).

Acres of ryegrass planted. When asked how many acres of ryegrass they planted, the largest group of respondents (n = 24, 40.0%) reported that they planted between 51 and 100 acres. Three producers (5.0%) indicated zero acres, while six producers (10.0%) indicated 50 acres or less. Five producers (8.3%) indicated that over 200 acres of ryegrass were planted (See Table 7).

Grazing management. When asked what type of grazing management they practiced, the majority of respondents (n = 35, 58.3%) indicated "extensive rotational."

Table 6

Frequency of Grain Mix Analysis Reported by Family-Owned Dairy Producers in Southeast Louisiana

When	n	%
Never	21	35.0
Rarely	20	33.3
Sometimes	15	25.0
Often	4	6.7
Always	0	0.0
Total	**60**	**100.0**

Table 7

Acres of Ryegrass Planted as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Number of Acres	n	%
Zero	3	5.0
50 or less	6	10.0
51-100	24	40.0
101-150	13	21.7
151-200	9	15.0
Over 200	5	8.3
Total	**60**	**100.0**

Fourteen producers (23.3%) indicated "continuous," while seven producers (11.7%) indicated "intensive rotational" as the type of grazing management used (See Table 8).

Table 8

Type of Grazing Management Practiced as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Management System	n	%
Extensive rotational	35	58.3
Continuous	14	23.3
Intensive rotational	7	11.7
None	4	6.7
Total	**60**	**100.0**

Ryegrass baleage. Another recommended practice in the area of feeding management is utilization of ryegrass baleage as a forage for the milking herd. The majority (n = 44, 73.3%) of producers responded "no" when asked if they fed ryegrass baleage to their milking herd, while 16 (26.7%) producers reported that they did feed ryegrass baleage to their herd.

Years of feeding ryegrass baleage. When asked how many years ryegrass baleage had been utilized in their rations, 46 producers (76.7%) indicated "none," but 14 (24.3%) indicated a number of years. Of the respondents that reported a number of years ryegrass baleage had been used, five producers (35.7%) indicated that they had

fed this type of forage for one year, while one producer (7.2%) indicated two years (See Table 9).

Table 9

Years Ryegrass Baleage Had Been Utilized in Rations as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Number of Years	n	%
1	5	35.7
2	1	7.2
3	5	35.7
4 or more	3	21.4
Total	**14**	**100.0**

Note. Forty-six (76.7%) producers reported "none" in response to the number of years ryegrass baleage had been used.

Storage of round bales. Respondents were also asked to indicate where they stored round bales of hay. The recommendation for this practice is that bales should be stored inside a barn. Among the respondents, 25 (41.7%) indicated that they followed this practice. However, 33 (55.0%) reported that they stored their round bales of hay outside on the ground and uncovered. The remaining two producers (3.3%) stored round bales of hay outside of the barn on the ground, but covered.

Frequency of soil testing. The largest group of respondents (n = 30, 50.0%) indicated that they soil test permanent pastures less than once every three years as recommended. The next most frequent response was "once a year" which was provided by 19 (31.6%) of the producers (See Table 10).

Table 10

Frequency of Soil Test in Permanent Pastures as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Frequency	n	%
Twice a year	1	1.7
Once a year	19	31.6
Every other year	10	16.7
Less than every three years	30	50.0
Total	**60**	**100.0**

Pounds of nitrogen on first application. When asked how many pounds of nitrogen were applied on first application for hay in spring, the majority of respondents (n =42, 70.0%) indicated that they applied between 60 and 70 pounds of nitrogen. Five producers (8.3%) indicated "none" was applied in the spring (See Table 11).

Cuttings of hay. When asked how many weeks elapse between cuttings of hay, the largest group of respondents (n = 16, 26.7%) indicated that they wait a period of eight weeks between cuttings of hay. The second most frequently given response was six weeks (n = 15, 25.0%). Nine (15.0%) respondents indicated that they cut hay only once, making numbers of weeks between cuttings not applicable (See Table 12).

Pasture management plan. Study participants were asked to respond to a series of items related to selected aspects of a pasture management plan. They were asked to indicate "yes" or "no" for each item regarding whether or not it was part of their plan.

Table 11

Amount of Nitrogen Applied on First Application for Hay in the Spring as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Pounds Applied	n	%
None	5	8.3
30-40	7	11.7
60-70	42	70.0
90-100	5	8.3
Over 100	1	1.7
Total	**60**	**100.0**

Table 12

Weeks Between Cuttings of Hay as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Number of Weeks	n	%
Cut hay once	9	15.0
4	3	5.0
5	9	15.0
6	15	25.0
7	8	13.3
8	16	26.7
Total	**60**	**100.0**

The pasture management activity that was reported to be practiced by the largest number of participants was "Adequate fencing and access to shade and water for each pasture" with 81.7% (n = 49) of the participants reporting use of this practice. The practice used by the smallest number of respondents was "Utilization schedule that includes crops planted and growing schedules to ensure maximum utilization of all available land resources" (n = 13, 26.0%) (See Table 13).

Table 13

Utilization of Selected Practices in a Pasture Management Plan Among Family-Owned Dairy Producers for Southeast Louisiana

	Yes		No		Total	
Pasture Management Practices	**n**	**%**	**n**	%	n	**%**
Adequate fencing and access to shade and water for each pasture	49	81.7	11	18.3	60	100
Fertilization schedule according to soil test recommendations for each pasture	44	73.3	16	26.7	60	100
Soil testing for each pasture	35	58.3	25	41.7	60	100
Pest management schedule for each pasture	17	28.3	43	71.7	60	100
Utilization schedule that includes crops planted and growing schedules to ensure maximum utilization of all available land resources	13	26.0	37	74.0	50[a]	100

[a]**Ten participants did not respond to this item.**

Percent of forages that are corn silage. Producers were asked to indicate the percent of forages fed to the milking herd that was corn silage. The response category

that was identified by the largest number of producers was "none" (n = 51, 85.0%). Only nine (15%) reported one of the recommended levels of response by indicating "26-50%," "51-75%," or " 76-100%" (each of these responses was reported by three (5%) of the respondents) (See Table 14).

Table 14

Percent of Forages in Rations for Milking Herd That is Corn Silage as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Percent of Forages	n	%
None	51	85.0
1-25	0	0.0
26-50	3	5.0
51-75	3	5.0
76-100	3	5.0
Total	**60**	**100.0**

Reproduction Program

The second management program addressed in the survey was reproduction. The first reproduction practice on which producers were described was the amount of use of artificial insemination (AI). Respondents were asked to select the category of response that was most descriptive of the portion of their milking herd that were progeny of AI from the following categories: 0%, 1-24%, 25-49%, 50-74%, 75-99%, or 100%. The largest group of respondents (n = 21, 35.0%) indicated that none (0%) of

their milking herd was progeny of AI. The next largest response category (n = 12, 20.0%) was 1-24% of the herd that resulted from AI. Overall, 21 (35.0%) reported AI progeny percentage categories of 50% or higher (See Table 15).

Table 15

Percent of Milking Herd that is Progeny of Artificial Insemination as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Percent of Herd	n	%
Zero	21	35.0
1-24	12	20.0
25-49	6	10.0
50-74	6	10.0
75-99	7	11.7
100	8	13.3
Total	**60**	**100.0**

Reproductive examinations. When asked if they routinely use a veterinarian for reproductive examinations, 36 respondents (60%) indicated "yes," while 24 respondents (40%) indicated "no."

Frequency of examinations. When asked how often reproductive examinations are performed, 24 (40%) producers had reported they did not routinely use a veterinarian to perform reproductive examinations and they therefore did not respond to this item. Of the respondents that reported the use of veterinarians, the

largest group (n = 15, 41.6%) indicated that examinations were performed every four weeks. Eleven producers (3.6%) indicated reproductive examinations were performed every 12 weeks. One producer (1.7%) who indicated that examinations were performed, did not respond to the item regarding frequency of examinations (See Table 16).

Table 16

Frequency of Reproductive Examinations as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Frequency	n	%
4 weeks	15	42.9
6 weeks	2	5.7
8 weeks	7	20.0
12 weeks	11	31.4
Total	**35**	**100.0**

Note. Twenty-four (40.0%) producers reported they did not use a veterinarian for reproductive examinations. One producer (1.7%) did not respond to the item regarding frequency of examinations.

Calving interval. The largest group of respondents (n = 25, 41.7%) reported that their herd had a calving interval of 13-14 months. In addition, 20 (33.3%) of the respondents indicated a 14-15 month calving interval, and 15 (25.0%) reported a 12-13 month calving interval. No respondent reported a calving interval greater than 15 months.

Weight of heifers at calving. When asked the weight of heifers at calving, the majority of respondents (n = 31, 51.7%) indicated that the heifers weighed between 951 and 1,050 pounds. The second largest group of producers (n = 14, 23.3%) indicated heifers weighed between 1051 and 1,150 pounds at calving (See Table 17).

Table 17

Weight of Heifers at Calving as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Pounds	**n**	%
less than 800	2	3.3
800 - 950	10	16.7
951 - 1,050	31	51.7
1051 - 1,150	14	23.3
over 1,150	3	5.0
Total	**60**	**100.0**

Age of heifers at calving. When asked how old heifers were at calving, the majority of respondents (n = 33, 55.0%) indicated that their heifers calved between 24 and 26 months of age. Nine producers each (15.0%) indicated that their heifers calved at less than 24 months of age and at 27 to 28 months of age (See Table 18).

Calving season. Most producers (n = 40, 66.7%) indicated that the majority of their heifers calve during the fall. Two producers (3.3%) indicated that most of their

Table 18

Age of Heifers at Calving as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Months	n	%
less than 24	9	15.0
24 - 26	33	55.0
27 - 28	9	15.0
29 - 30	6	10.0
more than 30	3	5.0
Total	**60**	**100.0**

heifers calve in the summer, and four producers (6.7%) reported that their heifers calve throughout the year (See Table 19).

First calf cows. When asked the percent of their milking herd that are first calf cows, the largest group of respondents (n = 27, 45.0%) indicated that their milking herd contained less than 25% first calf cows. An additional 21 (35.0%) of the producers reported that 25 to 30% of their milking herd was in the first lactation (See Table 20).

Dry cow ration. Twenty-three respondents (38.3%) indicated that dry cows are fed a milking ration for less than one month. Eighteen respondents (30%) indicated that they fed a milking ration for more than one month, while 19 respondents (31.7%) indicated that dry cows were not fed a milking ration until they calved.

Table 19

Season of the Year When Heifers Calve as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Season	n	%
Fall	40	66.7
Winter (D,J,F)	8	13.3
Spring	6	10.0
Calve all year	4	6.7
Summer	2	3.3
Total	**60**	**100.0**

Table 20

Percentage of Milking Herd That are First Lactation Cows as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Percent	n	%
less than 25	27	45.0
25 - 30	21	35.0
31 - 35	9	15.0
36 - 40	2	3.3
over 40	1	1.7
Total	**60**	**100.0**

Age of milking herd. When asked the average age of their milking herd, the largest group of respondents (n = 21, 35.0%) indicated the average age of the milking herd was 55 to 60 months. An additional 17 producers (28.3%) reported that the average age of their herd was from 49 to 54 months, while 15 producers (25.0%) indicated the average age of their herd was between 41 and 48 months (See Table 21).

Table 21

Average Age of Milking Herd as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Months	n	%
40 or less	1	1.7
41 - 48	15	25.0
49 - 54	17	28.3
55 - 60	21	35.0
more than 60	6	10.0
Total	**60**	**100.0**

Bovine somatotrophin. Fifty-six producers (93.3%) indicated that bovine somatotrophin (bST) hormone was not used routinely in the milking herd, while four producers (6.7%) indicated that bovine somatotrophin hormone was used routinely in the milking herd.

Milk Quality and Milking Practices Program

Milking equipment thoroughly checked. When asked how often they have their milking equipment thoroughly checked, the largest group of respondents (n = 27, 45.0%) indicated the milking equipment was checked every year. Twenty-six producers (43.3%) indicated that equipment was thoroughly checked "when something goes wrong" (See Table 22).

Table 22

Frequency That Milking Equipment Was Thoroughly Checked as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Frequency	n	%
Twice a year	2	3.3
Every year	27	45.0
Every two years	4	6.7
Every three years	1	1.7
When something goes wrong	26	43.3
Total	**60**	**100.0**

Dry cow treat. When asked if they dry cow treat every cow at drying off for mastitis, 43 producers (71.7%) indicated "yes," while 17 producers (28.3%) indicated "no."

Milking procedures. When asked what kind of udder preparation they use, the largest group of respondents (n = 16, 26.7%) indicated that they "wash, pre-dip, and

dry." Another 12 producers (20.0%) reported that they "wash and dry single towel," while 12 producers (20.0%) indicated that they "wash and dry multiple-use rag or towel" (See Table 23).

Table 23

Kind of Udder Preparation Used as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Preparations	n	%
Wash, pre-dip, and dry	16	26.7
Wash and dry single towel	12	20.0
Wash and drip dry	12	20.0
Pre-dip and dry	10	16.7
Wash and dry multiple-use rag or towel	7	11.7
Wash only	3	5.0
Total	**60**	**100.0**

Pre-strip. Thirty-one respondents (51.7%) indicated that cows were pre-stripped before attaching the milking unit, while 29 respondents (48.3%) indicated cows were not pre-stripped before attaching the milking unit.

Attach milking unit. Participating dairy producers were asked to respond to the question, " Do you apply milking unit within one minute of drying?" The majority of respondents (n = 47, 78.3%) responded "yes," while 13 respondents (21.7%) indicated that the milking unit was not attached within one minute after drying.

Vacuum shut off. Producers were asked if they shut off the vacuum before removing the unit from the cow. In response to this question, 58 (96.7%) indicated "yes" and two (3.3%) indicated "no."

Somatic cells. Monthly somatic cell count for each dairy producer's milk supply was obtained from a regional office of the Board of Health. A quarterly score was calculated by taking the average of the three months in each quarter of the year. The mean somatic cell count for the third (summer) quarter was 499,750, while the mean count for the first (winter) quarter was 351,933. Ranges of somatic cells were from 120,000 to 1,300,000 (See Table 24).

Table 24

Quarterly Somatic Cell Count of Family-Owned Dairy Producers in Southeast Louisiana

	Somatic Cell Count		
Quarter[a]	**Range**	**Mean**	**Standard Deviation**
First	140,000-605,000	351,933	118,438
Second	120,000-1,015,000	364,000	146,275
Third	150,000-1,300,000	499,750	202,376
Fourth	220,000-750,000	433,833	145,830

[a]Months included in each quarter included the following: First–January, February, March; Second–April, May, June; Third–July, August, September; Fourth–October, November, December.

Post teat dip. When asked if teats were dipped in approved disinfectant after milking, 51 respondents (85%) indicated "yes," while nine respondents (15%) indicated "no."

Cows' calving season. In response to the question, "When do you calve the majority of cows," the majority of respondents (n = 49, 81.6%) indicated most cows calved in the fall. Four producers (6.7%) indicated spring, while four producers (6.7%) indicated that cows calved year round (See Table 25).

Table 25

Season of the Year When Cows Calve as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Season	n	%
Fall	49	81.6
Spring	4	6.7
Calf all year	4	6.7
Summer	2	3.3
Winter (D,J,F)	1	1.7
Total	**60**	**100.0**

Dry Cow Program

Dry cow group. The first practice examined in the dry cow program used by dairy producers was the number of groups of dry cows in the herd. Forty-one

respondents (68.3%) indicated that they had only one group of dry cows, while 19 respondents (31.7%) indicated that they had two groups of dry cows.

Body condition. When asked if their dry cows lose body condition, 11 producers (18.3%) indicated that cows do lose condition, but 49 producers (81.7%) indicated cows do not lose condition.

Body condition score. The majority of producers (n = 45, 75%) indicated the body condition score (BCS) of cows at drying off was from 3.1 to 3.5. Six respondents (10%) indicated cows had a BCS of between 2.5 and 3.0, while nine respondents (15%) indicated a BCS of between 3.6 and 4.0 at the end of lactation.

Metabolic disorders. Dairy producers were asked to indicate the proportions of their herd that experienced selected metabolic disorders. Respondents were asked to report this information as the category of percentages that most accurately described the incidence of each of the conditions among the fresh cows in their herd. The condition which was reported to have the smallest presence in the fresh cows overall was "displaced abomasum," with 48.3% indicating that none of their fresh cows had this condition. "Ketosis" was reported as being present in the majority of herds (37 or 61.7% indicated that 1% or more of their herd had this condition). However, all of these producers reported that levels of incidence were between 1 and 25%. Both of the conditions, "retained placenta" and "metritis" were reported to be present in most of the herds represented in this study. "Metritis" was reported by two (3.3%) producers as being present in 51 to 75% of their cows, and four producers (6.7%) reported that from 26 to 50% of their fresh cows had this condition (See Table 26).

Body condition loss on fresh cows. When asked how much body condition fresh cows lose during the first 60 days of lactation, one producer (1.7%) indicated a response of "do not know." The majority of respondents (n = 35, 58.3%) indicated

Table 26

Percent of Fresh Cows With Selected Metabolic Disorders as Reported by Family-Owned Dairy Producers in Southeast Louisiana

	Percent of Cows											
	0		1-25		26-50		51-75		76-100		**Total**	
Disorder	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Displaced Abomasum	29	48.3	31	51.7	0	0	0	0	0	0	60	100
Ketosis	23	38.3	37	61.7	0	0	0	0	0	0	60	100
Little or No Appetite	17	28.3	42	70.0	1	1.7	0	0	0	0	60	100
Milk Fever	10	16.7	47	78.3	2	3.3	1	1.7	0	0	60	100
Retained Placenta	4	6.7	52	86.7	4	6.7	0	0	0	0	60	100
Metritis	4	6.7	50	83.3	4	6.7	2	3.3	0	0	60	100

fresh cows lost between 0 and .5 BCS, and 21 producers (35.0%) indicated a .6 to 1.0 loss in BSC (See Table 27).

Anionic salt. When asked how long anionic salt is fed in close-up rations, 57 (95%) producers indicated that it was not used. Only one producer (1.7%) fed anionic salt from 10 to 14 days, while two producers (3.3%) fed anionic salt 15 to 21 days.

Table 27

Body Condition Score Loss of Fresh Cows During First Sixty Days of Lactation as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Body Condition Score	n	%
0 - .5	35	58.3
.6 - 1.0	21	35.0
1.01 - 1.5	3	5.0
Do not know	1	1.7
Total	**60**	**100.0**

Cow Comfort Program

Free stalls. When asked if cows had access to free stalls, none of the 60 producers in this study reported having free stalls available for their cattle.

Shade. Fifty-eight producers (96.7%) reported that their cows have access to shade in all pastures. Only two producers (3.3%) did not have shade for cows in all pastures.

Fans. Producers were asked to indicate if they had fans to cool the milking herd in the holding lot. The majority of respondents (n = 33, 55.0%) indicated that they did not have fans, while 27 (45.0%) reported that they did have fans.

Sprinklers. Fifty producers (83.3%) reported that they used sprinklers on their milking herd during hot weather in the holding lot. Ten producers (16.7%) did not use sprinklers in the holding lot for the milking herd.

Fresh water. Fifty-six producers (93.3%) responded "yes" when asked if they provided fresh water for the milking herd prior to and after milking. Four producers (6.7%) answered "no" to this question.

Cooling ponds. Producers were asked to indicate whether or not the milking herd had access to cooling ponds. Only 15 producers (25%) responded "yes" to this question, while 45 producers (75%) indicated that the milking herd did not have access to ponds for cooling.

Shade in holding pen. Fifty-five producers (91.7%) indicated that the holding pen had some type of shade, while only five producers (8.3%) did not have any shade in the holding pen.

Record Keeping Program

Production records. When asked if milk production records were kept on individual cows, 21 producers (35%) indicated "yes," while 39 producers (65%) indicated "no."

DHIA. Of the 21 producers who reported keeping individual cow production records, 18 producers (85.7%) indicated that these records included Dairy Herd Improvement Association (DHIA) records. Three (14.3%) of those who kept individual production cow records were not keeping DHIA records. The 18 producers who kept DHIA records make up 30% of the total group of respondents.

Cost to produce. Producers were asked if they knew how much it cost them to produce 100 pounds of milk. Only eight producers (13.3%) responded "yes" to this item, while 52 producers (86.7%) indicated that they did not know how much it cost them to produce 100 pounds of milk.

Breeding records. Forty-four producers (73.3%) indicated breeding records were kept on individual cows, while 16 producers (26.7%) indicated breeding records were not kept on individual cows.

Records. Responding dairy producers were also asked to indicate what type of records were kept. Records included calving, health, and financial. Fifty producers (83.3%) indicated calving records were kept, while 10 producers (16.7%) indicated calving records were not kept. Forty producers (66.7%) indicated health records were kept on the herd, while 20 producers (33.3%) indicated health records were not kept on the herd. Financial records were reported to be kept by 44 producers (73.3%), while 16 producers (26.7%) indicated that they did not keep financial records on their herd.

In addition to describing the use of each of the management programs included in the study, the researcher developed a recommended practice sub-score for each of the six programs examined as well as an overall practice score which encompassed all six programs. The development of these scores served two primary purposes in accomplishing the goals of the study. First, subsequent objectives of the study involved the measurement of relationships between the use of recommended practices and other variables, such as the annual milk production per cow. If these associations were to be measured for each of the management practices separately, there would be unacceptable inflation of the experiment-wise error in the study. The use of six management program sub-scores and one overall practice score minimized this inflation of the study's alpha level. Additionally, the scores were developed to further describe and provide a useful measure of the areas of needed educational programs by Cooperative Extension Service personnel.

The calculation of the management programs sub-scores was accomplished using the following procedures:

1. The validated instrument was submitted to a panel of experts in the area of dairy production for the purpose of identifying the practices that impact milk production. This panel was asked to identify all practices that should be included in a practice score and to recommend the level of weighting each item should receive in the computation of the score(s).
2. The panel was able to reach consensus regarding the items that should be included in the score(s). All items recommended for inclusion in the scores were recommended to receive a weighting of 1 for the use of the practice and 0 if the practice was not used. Additionally, items that provided the respondent with three or more possible responses received a specific recommendation for each of the available responses. For example, the item, "How often is your ration balanced for your milk herd?" had five possible responses. The possible responses were scored as follows: "A. Once a month" was scored 1; "B. Once a quarter" was scored 1; "C. Twice a year" was scored 0; "D. Once a year" was scored 0; and "E. When I have trouble" was scored 0.
3. Each item included in the panel's recommendation was recoded so that the responses that were judged as following the recommended practice were scored 1 and responses that were judged as not following the recommended practice were scored 0.

4. The practices that were recommended to be included in the practice score for each of the management programs were then summed to produce a sub-score for that area (e.g. Feeding Management, Reproduction, etc.).
5. The six management program sub-scores were then summed to provide an overall practice score.

A listing of all management practices included in the scores and the specific scoring procedure for each item is included in Appendix C. How participants in the study were assessed in regard to their overall use of dairy management practices is shown in Table 28.

Feeding management program sub-score. The feeding management program sub-score ranged from a low of zero to a high of 9. The mean was 3.2 with a standard deviation of 1.58. The largest group of producers, 56.6 %, had a feeding management program sub-score of 3 (28.3%) or 4 (28.3%) (See Table 29).

Reproduction program sub-score. The recommended reproduction program sub-score ranged from a low of zero, the minimum possible score, to a high of 5, the maximum possible score. The mean was 2.5 with a standard deviation of 1.03. The largest group of producers, 66.6%, had a sub-score of 2 (33.3%) or 3 (33.3%) (See Table 30).

Milk quality and milking practices program sub-score. The recommended milk quality and milking practices program sub-score ranged from a low of zero, the minimum score, to a high of 5, the maximum score. The mean was 4.2 with a standard deviation of 1.02. The largest group of producers, 43.3%, had a score of 5, while 40.0% had a score of 4 (See Table 31).

Table 28

Extent of Use of Selected Dairy Management Practices as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Practices	Yes		No	
	n	%	n	%
Shut off vacuum before removing unit	58	97	2	3
Fresh water prior to and after milking	56	93	4	7
Shade in holding lot	55	92	5	8
Body condition score of dry cows	54	90	6	10
Post dip teats	51	85	9	15
Udder preparation for milking	50	83	10	17
Sprinklers in holding lot	50	83	10	17
Dry cow's body condition	49	82	11	18
Calving season of heifers	48	80	12	20
First nitrogen application for hay	48	80	12	20
Attach milking unit within one minute	47	78	13	22
Rotational graze pastures	44	73	16	27
Individual breeding records	44	73	16	27
Dry cow treat for mastitis prevention	43	72	17	28
Age of heifers at calving	42	70	18	30
Reproductive examination with a veterinarian	36	60	24	40
Soil test	30	50	30	50
Fans in holding lot	27	45	33	55
Round bale hay storage	25	42	35	58
50% of herd is progeny from artificial insemination	21	35	39	65
Individual production records	21	35	39	65
Two dry cow groups	19	32	41	68
Dairy Herd Improvement Association records	18	30	42	70
Feed ryegrass baleage	16	27	44	73
Feed balanced rations	14	23	46	77
Feed corn silage	9	15	51	85
Know cost to produce a hundred pounds of milk	8	13	52	87
Analyze forage	4	7	56	93
Analyze grain mix	4	7	56	93
Weight of heifers at calving	3	5	57	95

Note. A total of 30 practices were included in the calculation of the overall practice score.

Table 29

Feeding Management Program Sub-score of Family-Owned Dairy Producers in Southeast Louisiana

Program Sub-score	n	%
0	2	3.3
1	7	11.7
2	8	13.4
3	17	28.3
4	17	28.3
5	5	8.3
6	2	3.3
7	1	1.7
8	1	1.7
9	0	0.0
Total	60	100.0

Note. The mean feeding management program sub-score was 3.2 with a standard deviation of 1.58. Possible range = 0-9.

Dry cow program sub-score. The recommended dry cow program sub-score ranged from a low of zero, the minimum score to a high of 3, the maximum score. The mean was 2.0 with a standard deviation of .74. The majority of producers, 56.7%, had a sub-score of 2 (See Table 32).

Table 30

Reproduction Program Sub-score of Family-Owned Dairy Producers in Southeast Louisiana

Program Sub-score	n	%
0	1	1.7
1	9	15.0
2	20	33.3
3	20	33.3
4	9	15.0
5	1	1.7
Total	**60**	**100.0**

Note. The mean reproduction program sub-score was 2.5 with a standard deviation of 1.03. Possible range = 0-5.

Table 31

Milk Quality and Milking Practices Program Sub-score of Family-Owned Dairy Producers in Southeast Louisiana

Program Sub-score	n	%
0	1	1.7
1	0	0.0
2	4	6.7
3	5	8.3
4	24	40.0
5	26	43.3
Total	**60**	**100.0**

Note. The mean milk quality and milking practices program sub-score was 4.2 with a standard deviation of 1.02. Possible range = 0-5.

Table 32

Dry Cow Program Sub-score of Family-Owned Dairy Producers in Southeast Louisiana

Program Sub-score	n	%
0	2	3.3
1	9	15.0
2	34	56.7
3	15	25.0
Total	**60**	**100.0**

Note. The mean dry cow program sub-score was 2.0 with a standard deviation of .74. Possible range = 0-3.

Cow comfort program sub-score. The recommended cow comfort program sub-score ranged from a low of 1, the minimum score to a high of 4, the maximum score. The mean was 3.1 and the standard deviation was .85. The largest group of producers, 46.7 %, had a sub-score of 3 (See Table 33).

Record keeping program sub-score. The recommended record keeping program sub-score ranged from a low of zero, the minimum score, to a high of 4, the maximum score. The mean was 1.5 with a standard deviation of 1.27. The largest group of producers, 41.7%, had a sub-score of 1 (See Table 34).

Overall practice score. The overall practice score ranged from a low of 8 to a high of 24. The mean score was 16.6 with a standard deviation of 4.13. The minimum possible overall practice score was zero, and the maximum possible overall practice

Table 33

Cow Comfort Program Sub-score of Family-Owned Dairy Producers in Southeast Louisiana

Program Sub-score	n	%
1	4	6.7
2	6	10.0
3	28	46.7
4	22	36.7
Total	**60**	**100.0**

Note. The mean cow comfort program sub-score was 3.1 and standard deviation of .85. Possible range = 1-4.

Table 34

Record Keeping Program Sub-score of Family-Owned Dairy Producers in Southeast Louisiana

Program Sub-score	n	%
0	13	21.7
1	25	41.7
2	5	8.3
3	12	20.0
4	5	8.3
Total	**60**	**100.0**

Note. The mean record keeping program sub-score was 1.5 with a standard deviation of 1.27. Possible range = 0-4.

score was 30. The largest number of producers, 13.3%, had an overall practice score of 22 (See Table 35)

Table 35

Overall Practice Scores of Family-Owned Dairy Producers in Southeast Louisiana

Practice Score	n	%
8	1	2.0
10	2	3.0
11	4	7.0
12	4	7.0
13	5	8.0
14	5	8.0
15	6	10.0
16	4	7.0
17	4	7.0
18	6	10.0
19	4	7.0
20	1	2.0
21	1	2.0
22	8	13.0
23	4	7.0
24	1	2.0
Total	**60**	**100.0**

Note. The mean was 16.6 with a standard deviation of 4.13. Possible range 0-30.

Objective Four

The fourth objective of the study was to describe the dairy producers in Southeast Louisiana regarding the types and frequency of contacts they had with the Cooperative Extension Service during the previous year.

Contact. Respondents in the study were asked to provide an overall assessment of the extent of their contact with the Extension Service by responding to the question, "How much contact would you say that you had with the Extension Service in 2000?" They were provided four categories of response ranging from "no contact" to "much contact" to give their answer. The largest group of respondents (n = 26, 43.3%) indicated "little contact" as their answer to this question. In addition, 22 (36.7%) reported "some contact" as their response to this item. Only three participants (5.0%) indicated that they had "no contact" with the Cooperative Extension Service during the year 2000 (See Table 36).

Table 36

Contact with Extension Service as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Contact	n	%
Much contact	9	15.0
Some contact	22	36.7
Little contact	26	43.3
No contact	3	5.0
Total	**60**	**100.0**

In addition to the overall assessment of Extension contacts, respondents were asked to report their Extension contacts in several specific areas.

Dairy day. When asked about their attendance at Parish Extension Dairy Days, 27 producers (45%) indicated that they did attend one of the Dairy Days, while 33 producers (55%) did not attend.

Farm visits. One of the areas of Extension contact assessed was the total number of visits by an Extension agent to the producer's farm. When these data were examined, the majority of respondents (n = 34, 56.7%) in the study indicated that the Extension agent did not visit their farm during the year 2000. The largest number of visits reported by the responding producers was 15, with two of the participants (3.3%) indicating this number of visits. Overall, the mean number of visits to the producer's farm by an Extension agent was 1.6 (SD = 3.08) (See Table 37).

Office visit. When respondents were asked to indicate the total number of times they visited their Extension office during the same time period (the year 2000), reported visits ranged from 0 to 15. The largest group of respondents (n = 25, 41.7%) indicated that they did not visit the Extension office. The second largest group (n = 12, 20.0%) reported two visits to the Extension office. Overall, the mean number of visits to the Extension office was 2.5 (SD = 3.58) (See Table 38).

LSU dairy extension specialist. When producers were asked if they had any contact with an LSU dairy extension specialist in the year 2000, 14 respondents (23.3%) indicated a "yes" response, while 46 respondents (76.7%) replied "no."

Table 37

Number of Farm Visits by Extension Agent as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Number of visits	n	%
0	34	56.7
1	8	13.3
2	5	8.3
3	5	8.3
4	3	5.0
5	1	1.7
7	1	1.7
8	1	1.7
15	2	3.3
Total	**60**	**100.0**

Note. Mean number of visits was 1.6 (standard deviation = 3.08).

DHIA fieldman. Producers were also asked if they had any contact with the DHIA fieldman in 2000. The majority of study participants (n = 39, 65.0%) replied "no" to this question, while 21 (35.%) indicated a "yes" response.

Read information. Respondents were asked if they read the information received from the Extension office. Fifty-nine of the producers (98.3%) reported they had read the information provided. One producer (1.7%) indicated the information was not read.

Table 38

Number of Producer Visits to Extension Office as Reported by Family-Owned Dairy Producers in Southeast Louisiana

Number of Visits	n	%
0	25	41.7
1	3	5.0
2	12	20.0
3	7	11.7
4	3	5.0
5	3	5.0
7	2	3.3
8	2	3.3
15	3	5.0
Total	**60**	**100.0**

Note. The mean number of visits by producers was 2.5 (standard deviation = 3.58).

Objective Five

The fifth objective of the study was to determine if a relationship existed between the annual milk production per cow and the frequency of contact that dairy producers in Southeast Louisiana had with the Cooperative Extension Service in each of the following areas:

a. visits by Cooperative Extension Service to the producer's farm,

b. visits by the producer to an Extension office, event, or facility, and

c. contact through printed material.

No relationships with electronic contacts were examined because very few producers indicated they had used this method. The Pearson Product Moment Correlation Coefficient was used to determine if a relationship existed between annual milk production per cow and each of the following: (a) number of visits to the producer's farm, and (b) number of visits by the producer to the Extension office. The Point Biserial correlation was used to determine if a correlation existed between annual milk production and the following: (a) whether or not the producer attended the parish's Dairy Day; (b) whether or not the producer had contact with an LSU dairy extension specialist; (c) whether or not the producer had contact with the DHIA fieldman; and (d) whether or not the producer read information received from Extension office. Of these six relationships examined, three were found to be statistically significant.

For interpretation of correlation coefficients, Davis' proposed set of descriptors was used (Davis, 1971). The coefficients and their descriptions are as follows:

Coefficient	Description
.70 or higher	very strong association
.50 to .69	substantial association
.30 to .49	moderate association
.10 to .29	low association
.01 to .09	negligible association

The Extension contact that was found to have the highest relationship with annual milk production per cow was whether or not producers reported that they had

contact with the DHIA fieldman during the year of investigation (r = .38, p = .003). The nature of this relationship was such that producers who indicated having had contact with the DHIA fieldman tended to have higher levels of milk production. Based on Davis' descriptors, there was a moderate association between contact with the DHIA fieldman and annual milk production per cow.

The Extension contact that was found to have the second highest relationship with annual milk production per cow was whether or not producers reported contact with an LSU dairy extension specialist during the year of investigation (r = .37, p = .004). The nature of this relationship was such that producers who indicated having had contact with an LSU dairy extension specialist tended to have higher levels of milk production. Based on Davis' descriptors, there was a moderate association between contact with an LSU dairy extension specialist and annual milk production per cow.

Visits to the Extension office also proved to be significantly related to annual milk production per cow (r = .33, p = .011). The nature of the association was such that producers who reported more visits to the Extension office tended to have higher annual milk production per cow. Based on Davis' descriptors, there was a moderate association between visits to the Extension office and annual milk production per cow.

The remaining variables examined had no significant relationship with annual milk production on a per cow basis. Table 39 presents the calculated correlation coefficients between Extension contacts and annual milk production per cow.

Table 39

Relationship Between Annual Milk Production Per Cow and Selected Forms of Extension Contacts for Family-Owned Dairy Producers in Southeast Louisiana

Extension Contacts	r	n	p
Contact with DHIA Fieldman	.38[a]	60	.003
Contact with Dairy Specialist	.37[a]	60	.004
Number of visits to Extension office	.33[b]	60	.011
Number of visits from Extension agent	.19[b]	60	.152
Read information from Extension office	.15[a]	60	.242
Attended Dairy Day activity	.14[a]	60	.281

[a]Point Biserial Correlation Coefficient
[b]Pearson Product Moment Correlation Coefficient

Objective Six

The sixth objective was to determine if a relationship existed between annual milk production per cow and the use of practices in each of the following management programs: feeding management, reproduction, milk quality and milking practices, dry cow, cow comfort, and record keeping. The Pearson Product Moment Correlation Coefficient was used to measure the relationship between annual milk production per cow and each of the management program scores (the overall and each of the six sub-scores). When these calculated correlations were examined, the overall practice score

was found to have the highest correlation with annual milk production per cow (r = .56, p < .001). The nature of the association was such that producers who had higher overall practice scores tended to have higher annual milk production per cow. Based on Davis' descriptors, there was a substantial association between the overall practice score and annual milk production per cow.

When the six management program sub-scores were examined for their association with annual milk production per cow, the factor that was found to have the highest association with annual milk production per cow was record keeping (r = .48, p < .001). The nature of the association was such that producers who reported the use of more of the recommended practices related to record keeping tended to have higher levels of annual milk production per cow. Based on Davis' descriptors, there was a moderate association between the record keeping program sub-score and annual milk production per cow.

Three other management program sub-scores were found to be significantly related to annual milk production per cow. The feeding management program sub-score (r = .43, p = .001), the cow comfort program sub-score (r = .42, p = .001), and the reproduction program sub-score (r = .36, p = .005) were found to be positively related to annual milk production per cow. Based on Davis' descriptors, there was a moderate association between annual milk production per cow and each of these program sub-scores (See Table 40).

Objective Seven

The seventh objective was to determine if a relationship existed between the overall practice score and frequency of contact that dairy producers in Southeast

Table 40

Relationship Between Annual Milk Production Per Cow and Management Program Scores of Family-Owned Dairy Producers in Southeast Louisiana

Program Scores	r[a]	n	p
Overall	.56	60	<.001
Record keeping	.48	60	<.001
Feeding management	.43	60	.001
Cow comfort	.42	60	.001
Reproduction	.36	60	.005
Dry cow	.20	60	.300
Milk quality and milking practices	.14	60	.300

[a]**Pearson Product Moment Correlation Coefficient**

Louisiana had with the Louisiana Cooperative Extension Service in each of the following areas: (a) visits by Cooperative Extension Service to the producer's farm, (b) visits by dairy producer to an Extension office, event or facility, and (c) contact through printed material, and (d) contact with an LSU dairy extension specialist or DHIA fieldman.

The Pearson Product Moment Correlation Coefficient was used to determine if a relationship existed between the overall practice score and each of the following: (a) number of visits to the producer's farm, (b) number of visits by the producer to the Extension office. The Point Biserial Correlation Coefficient was used to determine if a relationship existed between the overall practice score and each of the following: (a)

whether or not the producer attended Dairy Day, (b) whether or not the producer had contact with an LSU dairy extension specialist, (c) whether or not the producer had contact with the DHIA fieldman, and (d) whether or not the producer read information received from the Extension office. Of these six relationships examined, four were found to be statistically significant. For interpretation of correlation coefficients, Davis' proposed set of descriptions was used (Davis, 1971).

The Extension contact that was found to have the highest relationship with the overall practice score was whether or not producers reported that they had contact with an LSU dairy extension specialist during the year of investigation ($\underline{r} = .55$, $\underline{p} < .001$). The nature of this relationship was such that producers who indicated having had contact with an LSU dairy extension specialist tended to have a higher overall practice score. Based on Davis' descriptors, this relationship was described as a substantial association.

The Extension contact that was found to have the second highest relationship with the overall practice score was whether or not producers reported that they had contact with the DHIA fieldman during the year of investigation ($\underline{r} = .47$, $\underline{p} < .001$). The nature of this relationship was such that producers who indicated having had contact with the DHIA fieldman tended to have a higher overall practice score. Based on Davis' descriptors, there was a moderate association between contact with the DHIA fieldman and overall practice score.

Number of visits by the producer to the Extension office also proved to be significantly related to overall practice score ($\underline{r} = .34$, $\underline{p} = .008$). The nature of the association was such that producers who reported more visits to the Extension office

tended to have a higher overall practice score. Based on Davis' descriptors, there was a moderate association between visits to the Extension office and the overall practice score.

Visits by Extension agents to the producer's farm also proved to be significantly related to overall practice score ($r = .31$, $p = .015$). The nature of the association was such that producers who reported more visits by the Extension agent tended to have a higher overall practice score. Based on Davis' descriptors, there was a moderate association between visits to the producer's farm and overall practice score.

The remaining variables examined had no significant relationship with overall practice score. Table 41 presents the calculated correlation coefficients between Extension contacts and overall practice score.

Table 41

Relationship Between Overall Practice Score and Selected Forms of Extension Contacts by Family-Owned Dairy Producers in Southeast Louisiana

Extension Contacts	r	n	p
Contact with LSU dairy extension specialist	.55[a]	60	<.001
Contact with DHIA fieldman	.47[a]	60	<.001
Number of visits to Extension office	.34[b]	60	.008
Number of visits from Extension agent	.31[b]	60	.015
Attend Dairy Day activity	.14[a]	60	.269
Read information from Extension office	.05[a]	60	.729

[a]Point Biserial Correlation Coefficient
[b]Pearson Product Moment Correlation Coefficient

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Purpose and Objectives

The primary purpose of this study was to describe the management practices of Southeast Louisiana dairy producers and to determine if there was a relationship between the use of management practices recommended by the Louisiana Cooperative Extension Service and annual milk production per cow among dairy producers in Southeast Louisiana. Specific objectives of the study included:

1. Describe dairy producers in Southeast Louisiana on selected personal and dairy farming characteristics. The characteristics on which producers were described included the following: age, educational level, number of years in the dairy business, number of pasture acres (owned/rented), number of crop acres (owned/rented), number of family employees, number of hours family employees work per week, number of non-family employees, number of hours non-family employees work per week, the type of milking parlor, total milk production in 2000, and total number of cows.
2. Determine the annual milk production per cow of dairy producers in Southeast Louisiana.
3. Describe dairy producers in Southeast Louisiana on use of Cooperative Extension Services recommended management practices in each of the following programs:
    A. Feeding management,
    B. Reproduction,

C. Milk quality and milking practices,

D. Dry cow,

E. Cow comfort, and

F. Record keeping.

4. Describe dairy producers in Southeast Louisiana regarding the types and frequency of contacts they have had with the Cooperative Extension Service during the previous year.

5. Determine if a relationship exists between the annual milk production per cow and the frequency of contact that dairy producers in Southeast Louisiana have had with the Cooperative Extension Service in each of the following areas:

A. visits by Cooperative Extension Service to the producer's farm,

B. visits by the producer to an Extension office, event, or facility,

C. contact through printed material, and

D. electronic contacts.

6. Determine if a relationship exists between annual milk production per cow and the use of practices in each of the following management programs: feeding management, reproduction, milk quality and milking practices, dry cow, cow comfort , and record keeping.

7. Determine if a relationship exists between the overall practice score and frequency of contact that dairy producers in Southeast Louisiana have had with the Louisiana Cooperative Extension Service in each of the following areas:

A. visits by Cooperative Extension Service to the producers farm.

B. visits by dairy producer to an Extension office, event, or facility,

C. contact through printed material, and

D. electronic contacts.

E. contacts with an LSU dairy extension specialist or DHIA fieldman.

Methodology

The target population for this study was the dairy producers in Southeast Louisiana. The accessible population for this study was defined as the family-owned dairy producers in St. Helena, Tangipahoa, and Washington Parishes who produced milk in the year 2000 and were still producing in September 2001. A simple random sample of 60 was taken from the population list of 319 dairy producers. The Louisiana Department of Health and Human Resources Milk and Dairy Division supplied the researcher with the complete and updated list of dairy producers in St. Helena, Tangipahoa, and Washington Parishes.

The data for this study were collected by personal interviews with St. Helena, Tangipahoa, and Washington Parish dairy producers using a researcher-designed interview schedule. The instrument was based on an extensive review of related literature. The instrument was validated by a panel of experts.

Sixty producers agreed to participate in the study. Letters were mailed to producers and telephone calls were made three days later to arrange a time for interviews. Producers were interviewed in the last two weeks of September, 2001. The following is a summary of the major findings of the study.

Findings

Objective One

1. Respondents' ages ranged from 23 to 69 years with a mean age for dairy producers of 47 years.
2. Fifty percent of the producers had earned a high school diploma. Seventeen percent had not completed high school, while 23% completed some college hours. Ten percent reported having a college degree.
3. The number of years respondents had operated a dairy ranged from 2 to 50 with a mean of 22.7 years.
4. The average number of cows, milking and dry, reported was 114 head. Cow numbers ranged from 50 to 286.
5. Total annual production in pounds of milk per dairy producer ranged from 324,000 to 4,690,400. The average milk production per dairy producer was 1,580,259 pounds per year.
6. Total acres utilized by producers in their dairy operation ranged from 40 to 535. The average acres utilized by producers was 227.
7. Ninety-three percent of producers owned acreage in pastures. Of the producers that reported owning pastures, acres used for pastures ranged from 45 to 500. The average acres owned for pastures was 168.
8. Fifty-seven percent of dairy producers rented pastures for their dairy operation. Acres rented by producers used for pastures ranged from 25 to 302. The average acres rented for pastures was 100.

9. The number of family employees ranged from one to three. The mean number of family employees was 1.5. Sixty percent of the dairy producers had only one family employee.
10. The number of hours family employees worked per week ranged from 10 to 180. The mean hours family employees worked per week was 62.5.
11. The number of non-family employees ranged from one to five. The mean number of non-family employees was 1.7.
12. Fifty percent of the dairy producers had one non-family employee.
13. The number of hours non-family employees worked per week ranged from 12 to 140. The mean hours non-family employees worked per week was 64.

Objective Two

14. Annual milk production per cow ranged from 6,480 to 20,000 pounds. The mean was 13,524.

Objective Three

15. The feeding management program used by the majority of the respondents included: 55% of the dairy producers fed hay, pasture, ryegrass, and all the grain in the parlor.
16. Forty-eight percent of the dairy producers reported that they never analyzed their forages.
17. Thirty-five percent of the dairy producers reported that they never analyzed their grain mix.
18. Grazed pastures are extensively rotated by 58% of the dairy producers.

19. Twenty-seven percent of the dairy producers fed ryegrass baleage. Twenty-one percent of these dairy producers have fed ryegrass baleage for four years.
20. Fifty-eight percent of the dairy producers had a soil test management plan for pastures. Seventy-three percent of the dairy producers fertilized according to the results.
21. Eighty-two percent of the dairy producers had adequate fencing and access to shade and water in each pasture.
22. Thirty-five percent of the dairy producers had herds with at least 50% progeny from artificial insemination.
23. Sixty percent of the dairy producers used a veterinarian for routine reproductive examinations.
24. Of the dairy producers who used a veterinarian for routine reproductive examinations, 43% used the service every four weeks.
25. Thirty-two percent of the dairy producers did not feed dry cows a milking ration until calving.
26. Seventy-two percent of the dairy producers treated dry cows for mastitis.
27. Seventy-eight percent of the dairy producers reported that they applied the milking unit within one minute of drying.
28. Ninety-seven percent of the dairy producers shut off vacuum before removing the milking unit from the cow.
29. Eighty-five percent of the dairy producers post dipped teats in approved disinfectant after milking.
30. Ninety-seven percent of dairy producers had shade in all pastures.

31. Forty-five percent of dairy producers had fans in holding lots.
32. Eighty-three percent of dairy producers used sprinklers in holding lots.
33. Ninety-three percent of dairy producers had fresh water in holding lots.
34. Ninety-two percent of dairy producers had shade in holding lots.
35. Thirty-five percent of the dairy producers kept individual production records.
36. Thirty percent of dairy producers were enrolled in DHIA.
37. Seventy-three percent of dairy producers kept breeding records on individual cows.

Objective Four

38. Twenty-three percent of the respondents reported that they had contact with an LSU dairy extension specialist.
39. Thirty-five percent of the respondents reported that they had contact with the DHIA fieldman.
40. Ninety-eight percent of the dairy producers read information received from the Extension Service.

Objective Five

41. A positive correlation was found between contact with the DHIA fieldman and annual milk production per cow ($\underline{r} = .38$, $\underline{p} = .003$).
42. A positive correlation was found between contact with an LSU dairy extension specialist and annual milk production per cow ($\underline{r} = .37$, $\underline{p} = .004$).
43. There was a positive correlation between the number of visits to the Extension office and annual milk production per cow ($\underline{r} = -33$, $\underline{p} = .011$).

Objective Six

44. A positive correlation was found between the overall practice score and annual milk production per cow ($r = .56$, $p < .001$).

45. A positive correlation was found between record keeping program sub-score and annual milk production per cow ($r = .48$, $p < .00l$).

46. A positive correlation was found between feeding management program sub-score and annual milk production per cow ($r = .43$, $p = .001$).

47. A positive correlation was found between cow comfort program sub-score and annual milk production per cow. ($r = .42$, $p = .001$).

48. A positive correlation was found between reproduction program sub-score and annual milk production per cow ($r = .36$, $p = .005$).

Objective Seven

49. A positive correlation was found between the overall practice score and contact with an LSU dairy extension specialist ($r = .55$, $p < .001$).

50. A positive correlation was found between the overall practice score and contact with the DHIA fieldman ($r = .47$, $p < .001$).

51. There was a positive correlation between the number of visits by producers to the Extension office and the overall practice score ($r = .34$, $p = .008$).

52. There was a positive correlation between the number of farm visits by Extension agents and overall practice score ($r = .31$, $p = .015$).

Conclusions and Recommendations

1. The Louisiana Cooperative Extension Service has a positive influence on the use of recommended practices by dairy producers.

This conclusion is based on the following findings from the study: Of the five areas of Extension contact examined, four were found to be positively related to the extent of overall use of recommended production practices, and the fifth area (electronic contacts) was eliminated from the analysis due to the fact that so few of the producers included in the study reported that they had used this contact method. Therefore, all of the types of Extension contact were found to have a positive influence on the extent of use of recommended production practices. The correlations between the Extension contacts and the overall practice score were: (a) $\underline{r} = .55$, ($\underline{p} < .001$) between overall practice score and whether or not the producer reported that they had contact with the LSU dairy extension specialist; (b) $\underline{r} = .47$ ($\underline{p} < .001$) between overall practice score and whether or not the producer reported that they had contact with the DHIA fieldman; (c) $\underline{r} = .34$ ($\underline{p} = .008$) between the overall practice score and the number of visits by producers to the Extension office; and (d) $\underline{r} = .31$ ($\underline{p} = .015$) between the overall practice score and the number of farm visits by the Extension agent.

These results are similar to those found by King in a study conducted in 1992. In King's study Extension contacts in the areas of telephone calls, farm visits and Extension office visits were found to be related to the extent of use of recommended practices. In addition, Dutile (1990) examined the relationship between Extension contacts and the use of Extension recommended practices among beef cattle producers. Dutile also found that both number of visits by the county agent and the number of calls to the Extension office were significantly related to the use of recommended practices.

Based on this conclusion, the researcher recommends that the faculty of the Cooperative Extension Service develop and publish a comprehensive listing of the

recommended dairy production practices. While it is true that producers can contact the Cooperative Extension Service and inquire about any practice or area of production practices, no comprehensive listing of the recommendations is currently available to producers. Many times, producers may not be aware of the potential benefits of adopting a specific practice or group of practices. In fact, they may not even be aware of new recommendations. If a comprehensive listing were available, the potential impact on the adoption of recommended practices could be improved. In addition, while this listing should be made available through electronic media, it should also be printed and mailed to the dairy producers in the state. Two factors from this study support this method of dissemination: first, very few of the dairy producers indicated that they actually visited the LSU Agricultural Center's web site, while almost all of the producers indicated that they did read the printed material distributed to them by the Ag Center.

The researcher further recommends that a follow-up study be conducted to this current research to determine the specific types of interactions between the producers and the faculty of the Cooperative Extension Service that are effective. By measuring the nature of the interactions, the Extension Service can better identify the most effective utilization of their limited resources to maximize the impact on the producers. If specific types of interactions can be associated with the higher levels of use of recommended practices, additional emphasis can be placed on these interactions.

2. The Louisiana Cooperative Extension Service has a positive influence on milk production on family-owned dairy farms.

This conclusion is based on the findings that, when dairy producers have personal contact with the Extension office, the annual milk production per cow tends to increase. There was a positive correlation between the number of visits by producers to the Extension office and annual milk production per cow ($\underline{r}$ = .33, $\underline{p}$ = .011). Also, the producers that had contact with an LSU dairy extension specialist and DHIA fieldman tended to have higher annual milk production per cow. There was a correlation between contact with DHIA fieldman and annual milk production per cow ($\underline{r}$ = .38, $\underline{p}$ = .003). There was a correlation between contact with an LSU dairy extension specialist and annual milk production per cow ($\underline{r}$ = .37, $\underline{p}$ = .004).

Posey (1973) also found that both number of visits by the Extension agent and number of visits by the dairy producer to the Extension office were significantly related to a higher milk production per cow per year.

A highly significant relationship was also found between the number of telephone calls to the Extension agent and the overall score of adopted recommendations by dairy producers to a higher milk production per cow per year. King (1992) reported that visits to the Extension office by dairy producers and the number of telephone contacts with dairy producers were significantly related to higher annual milk production per cow.

The researcher strongly recommends that the LSU Agricultural Center professionals address the challenging opportunity as the findings of this study are viewed. Annual milk production per cow ranged from 6,480 to 20,000 pounds with a mean of 13,524 pounds. All four types of contacts with Extension were significantly related to annual milk production. As the number of contacts were increased between

Extension and the dairy producers, annual milk production per cow increased. The researcher firmly believes that an increase in face-to-face contacts with dairy producers would result in a decrease in the number of dairy producers going out of business. The LSU Agricultural Center has a choice in either allocating additional responsibilities from current research and extension dairy faculty to spend more time on the dairy farm, transfer faculty from within the organization, or seek funds from non-traditional sources to employ an additional Extension agent to serve this 250 million dollar, in value-added, family-owned industry. If we do not increase these contacts, dairy producers will continue to go out of business.

3. The use of recommended practices has a positive influence on milk production on family-owned dairy farms.

This conclusion is based on the findings that when dairy producers adopt more of the recommended practices, annual milk production per cow tends to increase. A positive correlation was found between the overall practice score and annual milk production per cow ($\underline{r} = .56$, $\underline{p} < .001$). In addition, four of the six recommended practice program sub-scores (record keeping, cow comfort, feeding management, and reproduction) were found to be positively correlated with annual milk production per cow. Each of these relationships indicated that the use of higher numbers of recommended practices tended to be associated with higher levels of milk production.

Findings of this study have confirmed that a positive relationship exists between the use of recommended practices and milk production, and the results also provide information regarding specifically which practices are and are not being used by producers. Therefore, the researcher recommends that additional research be conducted

which has as its purpose to determine why these practices are not being used. Knowledge of why practices are not being used would be extremely helpful to Extension professionals in designing educational programs to focus on awareness, economics, or other issues.

4. The majority of producers do not use recommended production record keeping practices.

This conclusion is based on the following findings from the study: The mean record keeping program sub-score was only 1.5 (on a zero to four scale). In addition, the majority of the producers (n = 38, 63.3%) had record keeping program sub-score of zero or one, further documenting the low level of adherence to recommended record keeping practices. Only 35% of producers reported that they kept individual production records on their cows, and only 13.3% of the producers indicated that they knew how much it cost them to produce 100 pounds of milk. This issue is especially important in consideration of evidence indicating that deficiency in the use of records results in a greater loss of income than any other area of practice. Additionally, as herd size increases, production costs become even more important (James, 1983).

The researcher recommends that LSU Ag Center economists present the use of computerized business analysis programs to dairy producers. This could also be posted on the LSU Agricultural Center Animal Science web page. Business analysis would include all production costs in a calendar year.

5. The use of record keeping practices has a positive influence on milk production on family-owned dairy farms.

This conclusion is based on the finding that a significant positive correlation was observed between the record keeping program sub-score and annual milk production per cow ($r = .48$, $p < .001$). Record keeping was the management program sub-score that had the highest correlation with annual milk production per cow, yet it had the lowest percent of dairy producers actually using the recommended practices. Posey (1973) also found a significant relationship between farm records and higher average milk production.

Based on this conclusion and these findings, the researcher would recommend that agents and specialists of the Cooperative Extension Service develop an educational program focused on both the benefits of record keeping as well as procedures for effective record keeping on the dairy farm. As part of this educational program, Extension faculty should identify characteristics of desirable record keeping systems (especially computerized systems) and be prepared to demonstrate the use of these systems.

6. Southeast Louisiana dairy producers are deficient in the use of a veterinarian for routine reproductive examinations.

This conclusion is based on the finding that 40% of the study participants indicated that they do not routinely use a veterinarian for reproductive examination of their cows. In addition, of the 60% of producers who reported that they do routinely use a veterinarian for reproductive examinations of their cows, the majority (51.4%) indicated that they had the examinations performed at intervals of eight weeks or more while the recommended examination interval is four weeks. The reason that this conclusion has major implications for the outcomes of this research is the significance

of the reproductive function to the success of dairy operations. To remain at a high level of lifetime milk production, cows must be reproductively sound. One of the major reasons, if not the major reason, that cows leave the herd in Louisiana is that they do not breed back within a reasonable time to achieve at least a 13-14 month calving interval. With the cost of heifer replacements in the herd, a culling rate of approximately 33% per year, and reproduction being a major contributor to the success of a dairy operation, a routine reproductive examination program could have a positive effect on conception rates and decrease culling in dairy herds. The possibility exists that a substantial change could be made in the culling rates. Culling rates of approximately 25% could increase the average number of years a cow remains in the dairy in Louisiana from three to four.

The researcher recommends that research be conducted to determine the effect of reproductive examinations at different time intervals on conception rates, calving intervals, and overall profitability of the dairy operation.

7. Most Southeast Louisiana dairy producers are deficient in the recommended feeding of dry cows.

This conclusion is based on the finding that 68% of dairy producers have one group of dry cows. Proper dry cow nutrition is complex and is poorly understood by many dairy producers. The nutritional requirements for dry cows 45 days before calving are very different than those for dry cows 15 days before calving. Furthermore, at least 51% of the dairy producers reported a 1 to 25% occurrence of metabolic disorders such as milk fever, retained placentas, ketosis, or displaced abomasums in the fresh cows. In order to decrease metabolic disorders in fresh cows, dairy producers

should be aware that prevention should start approximately 100 days prior to the dry period. Body condition can be improved much easier as the cow enters the last third of her lactation period. Proper management of the dry cows begins during the latter part of the previous lactation (Sorensen & Enevldsen, 1991).

Body condition of cattle is an important link to reduce metabolic disorders in fresh cows. A good goal is for cows to be at a body condition score of 3.5 at dry off. During the dry period, a cow should maintain her body condition and gain weight moderately (Gearhart & Erb, 1990).

The researcher would recommend that educational programs on dry cow nutrition be planned and conducted by Extension dairy specialists for the dairy producers in Southeast Louisiana. Programs would include a body condition scoring (BCS) school where producers were taught the techniques on how to evaluate the body condition of dairy cattle and to place a numerical score of 1 to 5 for each cow; that is, 1 being too thin and 5 being too fat. Scoring of dairy cattle by the dairy producers should take place at three specific times: 100 days prior to drying off, at drying off, and at calving.

8. Most Southeast Louisiana dairy producers are deficient in providing a balanced ration for their milking herd.

This conclusion is based on several findings in this study. The mean feeding management program sub-score was 3.2 out of a possible 9. Furthermore, 56% of the responding dairy producers scored three or lower on the feeding management program sub-score. Additionally, 57% of dairy producers only balanced their rations when trouble occurred. Eighty-six percent of the dairy producers fed all the grain in the

parlor. Forty-eight percent of the dairy producers never analyzed their forages, while 35% of the dairy producers never analyzed their grain mix.

In order to properly balance rations for lactating cows, producers must know the analyses of all ingredients. Ingredients, whether forages or concentrates, are combined to ensure maximum production for the milking herd. Quality forages contain a higher percentage of nutrients that are more digestible. When forages are high quality, dairy cattle consume greater amounts. These factors combine to ensure a high percentage of total digestible nutrient (TDN) intake from forages and minimize the need for more expensive concentrate feeds (Philpot et al., 1985).

The researcher would recommend that an educational program be developed by dairy specialists and county agents of the Cooperative Extension Service to improve nutrient deficiencies in dairy rations. The program should emphasize the following issues: proper techniques of collecting samples of concentrates and forages, interpreting and understanding the analyses, and balancing rations for protein, fiber, energy, and minerals.

9. The majority of Southeast Louisiana dairy producers follow recommended cow comfort practices.

This conclusion is based on the finding that over 83% of the dairy producers scored at least a three out of a possible score of four on the recommended cow comfort program sub-score. In addition, three of the four cow comfort practices were used by 83% or more of responding producers. Eighty-three percent of the dairy producers used sprinklers, and 92% of the dairy producers had shade in the holding lot. Ninety-three percent of the dairy producers provided fresh water prior to and after milking.

However, only 45% of the dairy producers reported having fans in the holding lot. Fans and sprinklers have been shown in previous research to be the most critical components of dissipating heat in the summer time. This research has shown an increase of five to seven pounds of milk per cow per day in summer conditions by use of shade, sprinklers, and fans in the holding area (Lin, 1998).

Based on these findings, the researcher would recommend that an educational program be implemented to increase the use of fans in the holding lot. The program should include the cost and return of using fans, air flow patterns from different kinds of fans, and placement of fans for maximum increase of cow comfort.

10. The majority of Southeast Louisiana dairy producers follow recommended milking practices.

This conclusion is based on the following findings from the study: More than 83% of the participating dairy producers scored at least a four out of a possible five on the recommended milk quality and milking practices program sub-score. Also, the overall mean on the milk quality and milking practices program sub-score was 4.15 (maximum possible score of 5.0). Each of the recommended practices included in the milk quality and milking practices program sub-score was reported as used by more than 70% of the producers. One of the practices, such as shutting off the vacuum before removing unit from the udder was adopted by 98% of the producers.

Based on these findings, the researcher recommends that agents of the Cooperative Extension Service inform producers of the outstanding performance they are exhibiting in this area of dairy production. This positive information could be used

as a method of establishing a relationship with producers who have substantial needs for improvement in other areas of management practices.

REFERENCES

Adkinson, R. W., Farmer, W. S. & Jenny, B. F. (1993). Feeding practices and income over feed cost on pasture-oriented dairy farms in Louisiana. *Journal of Dairy Science, 76*, 3547.

Allen, M. S. (2000). Effect of diet on short-term regulation of feed intake by lactating dairy cows. *Journal of Dairy Science, 83*, 1598.

Armstrong, D. V. (1994). Heat stress interaction with shade and cooling. *Journal of Dairy Science, 77*, 2044.

Armstrong, D. V., Hillman, P. E., Meyers, M. J., Smith, J. F., Stokes, S. R., & Harner III, J. P. (1999). *Heat stress management in free stall barns in Western United States*. Proceedings of 1999 Western Dairy Management Conference.

Bauman, D. E. (1992). Review of an emerging animal technology. *Journal of Dairy Science, 75*, 3432.

Brown, L. D., Hillman, D., & Huffman, L. E. (1983). Grass silage vs. hay for lactating dairy cows. *Journal of Dairy Science, 66*, 407.

Britt, J. H. (1990). *Managing a herd for production*. North Carolina State University, Department of Animal Science.

Burns, C., Wolfgang, D., & Jayarao, B. (2001). Milking practices do affect milk quality. *Hoards Dairyman 146*, 406.

Carley, D. H. & Fletcher, S. M. (1986). An evaluation of management practices used by Southern dairy producers. *Journal of Dairy Science, 69*, 2458.

Cassell, B. F. (1988). Genetic improvement involves simple selection. *Hoards Dairyman*, p. 159.

Coppock, C. E. (1985). Energy nutrition and metabolism of the lactating cow. *Journal of Dairy Science, 68*, 3403.

Crist, W. L., Heider, L. E., Sears, P. M., Barr, H. L., Kowalski, J. J. & Schmidt, G. H. (1981). Effectiveness of educational efforts in implementing mastitis control procedures in commercial dairy herds. *Journal of Dairy Science, 65*, 828.

Davidson, T. (1974). Experiments in controlling staphylococcal mastitis. *Res. Vet. Science*, 4, 64 .

Davis, J. A. (1971). *Elementary Survey Analysis*. Englewood Cliffs, N.J: Prentice Hall

Dutile, Stanely J. (1990). *Management practices used by cow-calf beef producers in Lafayette Parish*. Unpublished master's thesis. Louisiana State University, Baton Rouge, LA.

Etgen, W. M., Reaves, P. M., & James, R. E. (1987). *Dairy cattle: Feeding and management*. (7th ed.). New York: John Wiley and Sons

Galton, D. M. (1984). *Dairy herd management Year: Agric*. p. 112.

Gearhart, M. A. & Erb, H. N. (1990). Relationship of changes in condition score to cow health in Holsteins. *Journal of Dairy Science, 73*, 3132.

Goodger, W. J., Galland, J. C., Christnase, V. E. (1988). Survey of milking management practices on large dairies and their relationships to udder health and production variables. *Journal of Dairy Science, 7l*, 2535.

Harner, J. P., Smith, J. F., Brouk, M. & Murphy, J. P. (2000). *Reducing heat stress in holding pens*. Dairy Lines. Kansas State University.

Hay, G. M. (1990). *Summer slump in lactating cows*. Louisiana Cooperative Extension Service Pub.

Hillers, J. K., Thonney, S. C. & Gaskins, C. T. (1982). Economic comparison of breeding dairy cows artificially versus naturally. *Journal of Dairy Science, 65*, 861.

James, R. B. (1983). *Relationships between selected characteristics of Tennessee dairy producers and their farm operations and the numbers and types of contacts they had with extension, the numbers and types of extension's recommended production practices followed, the numbers of cows they owned, and their herd average, pounds of milk produced per cow in 1979*. Unpublished thesis. University of Tennessee, Knoxville, Tenn.

Johnson, H. D., Ragsdale, A. C., Berry, I. L & Shanklin, J. (1963). *Missouri Agric. Exp. Stn. Bull*. 846.

King, R. (1992). *Factors affecting milk production in Washington Parish*. Unpublished thesis. Louisiana State University, Baton Rouge, Louisiana.

Lin, J. C., Moss, B. R. Koon, J. L., Flood, C. A., Smith III, R. C., Cummins, K. A. & Coleman, D. A. (1998). Comparison of various fan, sprinkler, and mister systems in reducing heat stress in dairy cattle. *App. Eng. Agric. L4*, (2)177.

Lionberger, Hubert F. (1960). *Adoption of new ideas and practices*. Ames, IA: The Iowa State University Press.

Loper, D. C. (1989). *How do you feed a herd for profitable production*? Loper Systems, Carona, California.

LSU Agricultural Center. Retrieved September 21, 2001 from http://www.lsu.agctr.com.

Louisiana Summary, Agriculture and Natural Resources. LSU AgCenter, 2000.

McCormick, M. (2000). *Baleage: The good, the bad, and the ugly*. Eleventh annual meeting of the Mississippi-Louisiana Dairy Management Conference, p. 27.

McCullough, M. E. (1988). Forages in dairy rations. *Hoards Dairyman*, p 223.

McDowell, J. (1976). Effect of climate on performance of Holsteins in first lactation. *Journal of Dairy Science, 59*, 965.

McGilliard, M. L., Swisher, J. W. & James, R. E. (1983). Grouping lactating cows by nutrient requirements for feeding. *Journal of Dairy Science, 66*, 1084.

Meland, O. M., Pearson, R. E., White, J. M. & Vinson, W. E. (1982). Response to selection for milk yield in Holsteins. *Journal of Dairy Science, 65*, 2131.

Mertens, D. R. (1987). Predicting intake and digestibility using mathematical methods of rumen function. *Journal of Animal Science*, 64, 1548.

Monroe, W. E. (1973). *Warm season grazing management*. Louisiana Cooperative Extension Publication.

Moore, R. (1998, September). *Dry cow management*. Dairy News. Mississippi State University.

Moore, R. Hutchison, C. & Ortego, A. (2000). *The most desirable calving season for dairies in Mississippi and Louisiana*. Publication 233l.

National Mastitis Council. (1990). *Dry cow therapy*.

National Research Council. (2001). *Nutrient requirements of dairy cattle*. Seventh revised edition.

Nickerson, S. C. (1990). *Defense mechanism of the cow*. Twenty-ninth annual meeting of the National Mastitis Council, p. 157.

Nickerson, T. A. (1976). Chemical composition of milk. *Journal of Dairy Science, 43*, 598.

Owens, W. E. & Nickerson, S. E. (1990). *New treatment strategies*. Dairy Research Report, Hill Farm Research Station, p. 15.

Pankey, J. W., Barker, R. M., Twomey, A. & Duris, G. (1983). Comparative efficiency of dry cow treatment regimens against Staphylococcus aureus. *Vet. Journal, 30*, 13.

Philpot, W. N., Nelson, B. D., Davis, R. L., & Oliver, W. M. (1985). *Production and utilization of forage*. Dairy Res. Report, La. Agric. Exp. Sta. p. 25.

Posey, A. (1973). *Factors associated with dairy herd production in three Southeast Louisiana parishes*. Unpublished Master's Thesis. Louisiana State University, Baton Rouge, LA.

Rogers, E. M. (1962). *Diffusion of innovations*. New York: The Free Press.

Rogers, E. M. & Shoemaker, F. F. (1971). *Communication of Innovations*. New York: The Free Press.

Salivas, H. G., Stringer, W. C., Kesler, E. M. & Hargrove, G. L. (1983). Performance of dry cows in Midlactation fed high quality gross pastures and concentrate at 3 per cent of energy requirements. *Journal of Dairy Science, 66*, 514.

Sanders, H. C. (1966). *The Cooperative Extension Service*. Englewood Cliffs, N.J. Prentice Hall, Inc.

Schmidt, G. H. & Pritchard, O. E. (1987). Effect of increased production per cow on economic returns. *Journal of Dairy Science, 70*, 2695.

Schneeberger, M., Freeman, A. E. & Berger, P. M. (1982). Income and risk for dairy producers selecting sires for A.I. *Journal of Dairy Science, 65*, 988.

Schultze, W. D. (1983). Effects of a selective regimen of dry cow therapy on intra mammary infection and on antibiotic sensitivity of surviving pathogens. *Journal of Dairy Science, 66*, 892.

Seger, L. C. (1979). *Feeding Louisiana dairy cows*. Louisiana Cooperative Extension Service Publication.

Smith, J. F., Harner, J. P. & Brouk, M. J. (2000). *Management strategies to control heat stress*. Dairy Lines. Kansas State University.

Sorensen, J. T. & Enevldsen, C. (1991). Effect of dry period length on milk production in subsequent lactation. *Journal of Dairy Science, 74*, 1277.

Stallings, C. C. (1989). *Feeding management for efficient milk production*. Virginia Extension Service Publication.

Stokes, S. (2001). *Get ready for the summer heat. Balanced dairying production*. Texas Agricultural Extension Service, Vol. 24.

Strickland, J. T., Bucklin, R. A., Norstedt, R. A., Beede, D. K., & Bray, D. R. (1989). Sprinkler and fan cooling system for dairy cows in hot, humid climates. *Appl. Eng. Agric., 5*(2),231.

Tomlinson, J. E. (1998, October). Dry Cow and Transition Cow Nutritional Management. *Dairy News*. Mississippi State University.

Trinidad, P., Nickerson, S. C., Alley, T. K., & Adkinson, R. W. (l989). Mastitis in dairy heifers. *Louisiana Agriculture, 32,* 4.

True, A. C. (1928). *A History of Agricultural Extension Work in the United States 1785-1923, United States Department of Agriculture*. Publication 15. Washington, D.C.: Government Printing Offices.

United States Department of Agriculture from 1990 Census of population. Retrieved August 15, 2001 from **http://www.clagettfarm.org/ruralcommunity.html**

United States Department of Agriculture from National Agriculture of Statistics Service (USDA,NASS). Retrieved August 11, 2001, from **http://Usda.nass.gov/census/**

VanSoest, P. J. (1975). Factors influencing voluntary intake of roughage by ruminants. *Journal of Animal Science, 24*, 834.

West, J. W., Mathis, M. J., & Mullinix, B. G. (1995). Effects of increasing dietary NDF from Bermuda grass hay on performance of lactating dairy cows during cool and hot weather. *Journal of Dairy Science, 78*(Suppl I), 208.

West, J. W., Mullinix, B. G. & Sandifer, T. G. (1991). Changing dietary electrolytes balance for dairy cows in cool and hot environrments. *Journal of Dairy Science, 74*, 1662.

APPENDIX A

Management Practices Used by Dairy Producers
September, 2001

Section I - Demographics

1. Age _____
2. Education level
   A. Less than high school _____
   B. Graduated from high school _____
   C. Received some college hours _____
   D. Graduated from college _____ Degree _____
   E. Graduate degree from college _____
3. Total years dairy farming _____
4. Total number of cows _____
5. Total milk production in 2000_____
6. Total acreage _____
7. Acres for pastures _____ owned _____ rented _____
8. Acres for crops _____ owned _____ rented _____
9. Number of family employees _____
10. Hours family employees work per week _____
11. Number of non-family employees _____
12. Hours non-family employees work per week _____
13. Type of milking parlor
    A. Flat barn
    B. Herringbone
    C. Side opening
    D. Parallel parlor

Section II – Extension contacts

14. How much contact would you say that you had with Extension Service in 2000?
    A. Much contact
    B. Some contact
    C. Little contact
    D. None

15. Did you attend one of the parish's Extension Dairy Days in 2000?
    A. Yes
    B. No

16. Approximately how many times in 2000 did an Extension agent visit your farm? _____

17. Approximately how many times in 2000 did you visit your Extension office? _____

18. Approximately how many times in 2000 did you visit www. lsu.agctr.com? _____

19. Did you have any contact with an LSU dairy extension specialist in 2000?
    A. Yes
    B. No

20. Did you have any contact with the DHIA fieldman in 2000?
    A. Yes
    B. No

21. Did you read the information that was received from the Extension Service in 2000?
    A. Yes
    B. No

Section III - Feeding Management Program

22. Which of the following feeding system best describes your farm?
    A. Hay, pasture, and all the grain in the parlor
    B. Hay, pasture, wet brewers grain, and all the grain in the parlor
    C. Hay, pasture, corn silage, and by products such as whole cottonseed and grain in the parlor
    D. Hay, pasture, TMR with corn silage as the base, and grain in parlor
    E. Hay, pasture, ryegrass baleage, and grain in the parlor
    F. Hay, pasture, ryegrass baleage, wet brewers grain, and grain in parlor
    G. Hay, pasture, ryegrass, and all the grain in the parlor
    H. Total mixed ration (TMR) and ryegrass pasture
    I. Total mixed ration only

23. How often is your ration balanced for your milking herd?
    A. Once a month
    B. Once a quarter
    C. Twice a year
    D. Once a year
    E. When I have trouble

24. Do you balance your own milking ration?
    A. Yes
    B. No

25. How do you determine how much grain you feed your cows?
    A. According to individual production
    B. Feed all cows the same according to herd average
    C. Feed cows all they can eat during milking
    D. Feed one pound of grain to two pounds of milk
    E. Don't know

26. Do you feed all of the grain mix in the parlor?
    A. Yes
    B. No

27. When do you analyze your forage?
    A. Never
    B. Rarely
    C. Sometimes
    D. Often
    E. Always (every cutting)

28. When do you analyze your grain mix?
    A. Never
    B. Rarely
    C. Sometimes
    D. Often
    E. Always(every time you change forages)

29. How many acres of ryegrass did you plant?
    A. None
    B. 50 acres or less
    C. 51-100
    D. 101-150
    E. 151-200
    F. More than 200

30. What type of grazing management did you practice?
    A. None
    B. Continuous
    C. Extensive rotational
    D. Intensive rotational

31. Do you feed ryegrass baleage to your milking herd?
    A. Yes
    B. No

32. Ryegrass baleage has been utilized in my rations for how many years?
    A. None
    B. 1 year
    C. 2 years
    D. 3 years
    E. 4 or more years

33. Where are the round bales of hay stored?
    A. Do not use
    B. Inside barn
    C. Outside on the ground, but covered
    D. Outside on the ground, but uncovered
    E. Outside off the ground, but covered
    F. Outside off the ground, but uncovered

34. How often do you soil test your permanent pastures?
    A. Once a year
    B. Twice a year
    C. Every other year
    D. Less than every three years

35. How many pounds of nitrogen per acre are applied on first application for hay in the spring?
    A. None
    B. 30-40 lbs.
    C. 60-70 lbs.
    D. 90-100 lbs.
    E. More than 100 lbs.

36. Approximately, how many weeks are there between cuttings of hay?
    A. 4
    B. 5
    C. 6
    D. 7
    E. 8

37. Do you have a definite pasture management plan for your dairy that includes the following?
    A. Soil testing of each Pasture
        1. Yes
        2. No
    B. Fertilization schedule according to soil test recommendations for each pasture
        1. Yes
        2. No
    C. Utilization schedule that includes crops planted and growing schedules to ensure maximum utilization of all available land resources
        1. Yes
        2. No
    D. Adequate fencing and access to shade and water for each pasture
        1. Yes
        2. No
    E. Pest management schedule for each pasture
        1. Yes
        2. No

38. What percent of forages fed to milking herd is corn silage?
    A. None
    B. 1-25
    C. 26-50
    D. 51-75
    E. 76-100

Section IV – Reproduction Program

39. What percent of the milking herd is progeny of artificial insemination?
    A. Zero
    B. 1-24
    C. 25-49
    D. 50-74
    E. 75-99
    F. 100

40. Do you routinely use a veterinarian for reproductive exams?
    A. Yes
    B. No

41. How often are exams performed?
    A. 4 weeks
    B. 6 weeks
    C. 8 weeks
    D. 12 weeks

42. What is your calving interval (in months)?
    A. 12 up to13
    B. 13 up to14
    C. 14 up to15
    D. 15 up to16
    E. More than 16

43. What is the weight of heifers at calving?
    A. Less than 800 lbs.
    B. 800-950 lbs.
    C. 951-1050 lbs.
    D. 1051-1150 lbs.
    E. More than 1150 lbs.

44. What is the age of heifers at calving?
    A. Less than 24 months
    B. 24 to 26 months
    C. 27 to 28 months
    D. 29 to 30 months
    E. More than 30 months

45. How long do dry cows eat milking rations?
    A. Less than l month
    B. More than 1 month
    C. Not until calving

46. When do the majority of the heifers calve?
    A. Winter (D,J,F)
    B. Fall
    C. Spring
    D. Summer

47. What percent of the milking herd are first calf cows?
    A. 25 or less
    B. 26 to 30
    C. 31 to 35
    D. 36 to 40
    E. More than 40

48. What is the average herd age, in months, of your milking herd?
    A. 40 or less
    B. 41 to 48
    C. 49 to 54
    D. 55 to 60
    E. More than 61

49. Do you routinely use Bovine Somatrophin (bST) hormone in your milking herd?
    A. Yes
    B. No

Section V – Milk Quality and Milking Practices Program

50. How often do you have your milking equipment thoroughly checked?
    A. Every year
    B. Every two years
    C. Every three years
    D. When something goes wrong

51. Do you dry cow treat every cow at drying off for mastitis?
    A. Yes
    B. No

52. What kind of udder preparation do you use?
    A. Wash only
    B. Wash and dry single towel
    C. Wash and drip dry
    D. Wash and dry multiple use rag or towel
    E. Pre-dip and dry
    F. Wash, pre-dip, and dry

53. Do you pre-strip cows before attaching milking unit?
    A. Yes
    B. No

54. Do you apply milking unit within one minute of drying?
    A. Yes
    B. No

55. Do you shut off vacuum before removing unit from cow?
    A. Yes
    B. No

56. What was the somatic cell averages for each quarter of 2000?
    A. First _____(J,F,M)
    B. Second _____
    C. Third _____
    D. Fourth _____

57. Are teats dipped in an approved disinfectant after milking?
    A. Yes
    B. No

58. When do you calve the majority of cows?
    A. Winter (D,J,F)
    B. Spring
    C. Summer
    D. Fall

Section VI - Dry Cow Program

59. How many groups of dry cows are there?
    A. One
    B. Two

60. Do your dry cows lose body condition?
    A. Yes
    B. No

61. What is the body condition score of the majority of cows that you turn dry?
    A. Less than 2.5
    B. 2.5-3.0
    C. 3.1-3.5
    D. 3.6-4.0
    E. More than 4

62. What percent of your fresh cows have each the following?

	0	1-25	26-50	51-75	76-100
A. Metritis	_____	_____	_____	_____	_____
B. Displaced abomasum	_____	_____	_____	_____	_____
C. Little or no appetite	_____	_____	_____	_____	_____
D. Retained placenta	_____	_____	_____	_____	_____
E. Ketosis	_____	_____	_____	_____	_____
F. Milk fever	_____	_____	_____	_____	_____

63. How much body condition do fresh cows lose between calving and 60 days post partum?
    A. Do not know
    B. 0 to .5 Body condition score (BCS)
    C. .6 to 1 BCS
    D. 1.01 to 1.5 BCS
    E. 1.51 to 2.0 BCS
    F. More than 2 BCS

64. How much energy does the close-up dry cow intake?
    A. Do not know
    B. .57mcal/lb.
    C. .58 to .67mcal/lb.
    D. .68 to .74mcal/lb.
    E. .75 to .84mcal/lb.

65. How long are close-up cows fed anionic salt in rations?
    A. Do not use
    B. 10 to 14 days
    C. 15 to 21 days
    D. 22 to 28 days
    E. More than 28 days

Section VII - Cow Comfort Program

66. Do your cows have access to free stalls?
    A. Yes
    B. No

67. Do you have shade for cows in all pastures?
    A. Yes
    B. No

68. Do you have fans to cool the milking herd in the holding lot?
    A. Yes
    B. No

69. Are sprinklers used on the milking herd during hot weather in the holding lot?
    A. Yes
    B. No

70. Is fresh water provided to the milking herd prior to and after milking?
    A. Yes
    B. No

71. Does the milking herd have access to cooling ponds?
    A. Yes
    B. No

72. Does the holding pen have some type of shade?
    A. Yes
    B. No

Section VIII - Record Keeping Program

73. Do you keep milk production records on individual cows?
    A. Yes
    B. No

74. If yes, does this include Dairy Herd Improvement (DHI) records?
    A. Yes
    B. No

75. Do you know how much it costs you to produce a hundred pounds of milk?
    A. Yes
    B. No

76. Do you keep breeding records on individual cows?
    A. Yes
    B. No

77. Are these records kept on your herd?

	Yes	No
Calving	_____	_____
Health	_____	_____
Financial	_____	_____

APPENDIX B

LETTER SENT TO DAIRY PRODUCERS

September 14, 2001

Dear

I need your help!!! I need your help!!!

You were randomly chosen from a list of 319 dairymen in St. Helena, Washington, and Tangipahoa Parishes. On behalf of the LSU AgCenter, I will be calling you within the next week or so to schedule a visit to your dairy.

We are seeking information concerning your production and management practices as it relates to milk production

We will be developing educational programs from the gathered data to assist you in increasing your profit.

I am very aware of your busy daily schedule and promise that my visit will be as brief as necessary!

Thank you.

Sincerely,

Ronnie Bardwell
Area Dairy Agent

RB/bs

APPENDIX C

OVERALL PRACTICE SCORE
SEPTEMBER 2001

These 30 questions were included in determining the overall practice score for family-owned dairy producers in Southeast Louisiana. Each possible answer for all questions received a "zero or 1." Dairy producers received a "zero or 1" on all 30 questions. Answers that are recommendations from Cooperative Extension Service concerning all six areas of management programs were scored a "1." Any producer who answered a question that was not a recommendation scored a "zero." Each dairy producer's score could have been between zero to thirty. Total for each dairy producer became the overall practice score.

Section I – Feeding Management Program

1. How often is your ration balanced for your milking herd?
   - A. Once a month =1
   - B. Once a quarter =1
   - C. Twice a year =0
   - D. Once a year =0
   - E. When I have trouble =0

2. When do you analyze your forage?
   - A. Never =0
   - B. Rarely =0
   - C. Sometimes =0
   - D. Often =1
   - E. Always (every cutting) =1

3. When do you analyze your grain mix?
   - A. Never =0
   - B. Rarely =0
   - C. Sometimes =0
   - D. Often =1
   - E. Always =1

4. What type of grazing management did you practice?
   - A. None =0
   - B. Continuous =0
   - C. Extensive rotational =1
   - D. Intensive rotational =1

5. Do you feed ryegrass baleage to your milking herd?
   - A. Yes =1
   - B. No =0

6. Where are the round bales of hay stored?
   - A. Do not use =0
   - B. Inside barn =1
   - C. Outside on the ground, but covered =0
   - D. Outside on the ground, but uncovered =0
   - E. Outside off the ground, but covered =0
   - F.. Outside off the ground, but uncovered =0

7. How often do you soil test your permanent pastures?
   - A. Once a year =1
   - B. Twice a year =1
   - C. Every other year =1
   - D. Less than every three years =0

8. How many pounds of nitrogen per acre are applied on first application for hay in the spring?
   - A. None =0
   - B. 30-40 lbs. =0
   - C. 60-70 lbs. =1
   - D. 99-100 lbs. =1
   - E. More than 100 lbs. =1

9. What percent of forages fed to milking herd is corn silage?
   - A. None =0
   - B. 1-25 =0
   - C. 26-50 =0
   - D. 51-75 =1
   - E. 76-100 =1

Section II – Reproduction Program

10. What percent of the milking herd is progeny of artificial insemination?
    - A. Zero =0
    - B. 1-24 =0
    - C. 25-49 =0
    - D. 50-74 =1
    - E. 75-99 =1
    - F. 100 =1

11. Do you routinely use a veterinarian for reproductive exams?
    - A. Yes =1
    - B. No =0

12. What is the weight of heifers at calving?
    - A. Less than 800 lbs. =0
    - B. 801-950 lbs. =0
    - C. 951-1050 lbs. =0
    - D. 1051-1150 lbs. =0
    - E. More than 1150 lbs. =1

13. What is the age of heifers at calving?
    - A. Less than 24 months =0
    - B. 24-26 months =1
    - C. 27-28 months =1
    - D. 29-30 months =0
    - E. More than 30 months =0

14. When do the majority of the heifers calve?
    - A. Winter (D,J,F) =1
    - B. Fall =1
    - C. Spring =0
    - D. Summer =0

Section III – Milk Quality and Milking Practices Program

15. Do you dry cow treat every cow at drying off for mastitis?
    - A. Yes =1
    - B. No =0

16. What kind of udder preparation do you use?
    - A. Wash only =0
    - B. Wash and dry single towel =1
    - C. Wash and drip dry =1
    - D. Wash and dry multiple use rag or towel =0
    - E. Pre-dip and dry =1
    - F. Wash, pre-dip, and dry =1

17. Do you apply milking unit within one minute of drying?
    - A. Yes =1
    - B. No =0

18. Do you shut off vacuum before removing unit from cow?
    - A. Yes =1
    - B. No =0

19. Are teats dipped in an approved disinfectant after milking?
    - A. Yes =1
    - B. No =0

Section IV – Dry Cow Program

20. How many groups of dry cow are there?
    - A. One =0
    - B. Two =1

21. Do your dry cows lose body condition?
    - A. Yes =1
    - B. No =0

22. What is the body condition score of the majority of cows that you turn dry?
    A. Less than 2.5 =0
    B. 2.5-3.0 =0
    C. 3.1-3.5 =1
    D. 3.6-4.0 =1
    E. More than 4 =0

Section V – Cow Comfort Program

23. Do you have fans to cool the milking herd in the holding lot?
    A. Yes =1
    B. No =0

24. Are sprinklers used on the milking herd during hot weather in the holding lot?
    A. Yes =0
    B. No =1

25. Is fresh water provided to the milking herd prior to and after milking?
    A. Yes =1
    B. No =0

26. Does the holding pen have some type of shade?
    A. Yes =1
    B. No =0

Section VI – Record Keeping Program

27. Do you keep milk production records on individual cows?
    A. Yes =1
    B. No =0

28. If yes, does this include Dairy Herd Improvement (DHI) records?
    A. Yes =1
    B. No =0

29. Do you know how much it costs you to produce a hundred pounds of milk?
    A. Yes =1
    B. No. =0

30. Do you keep breeding records on individual cows?
    A. Yes =1
    B. No =0

VITA

The writer, Ronald David Bardwell, was born in Independence, Louisiana in Tangiphoa Parish on September 25, 1952. He obtained his elementary and junior high school education at Champ Cooper Jr. High and attended Ponchatoula High School until his senior year. He graduated in 1970 from Valley Forge Academy in Amite, Louisiana.

He enrolled at Southeastern Louisiana College in 1970 and in 1974 obtained a Bachelors of Science degree in Animal Science. He enrolled at Louisiana State University in Baton Rouge in 1975 and in 1978 obtained a Masters of Science degree in Dairy Science with emphasis in Reproductive Physiology with a minor in Experimental Statistics. He attended the University of Arkansas in the spring and summer of 1978.

On August 1, 1978 he was employed by the Louisiana Cooperative Extension Service as Assistant County Agent in Avoyelles Parish. He transferred to St. Helena Parish in September, 1981. He was promoted to Associate County Agent in 1982 and to County Agent in 1986. He became Area Dairy Agent in September 1999, a capacity in which he served at the time of this study.