

# Texas Cooperative Extension Update

Tamilee Nennich, Ellen Jordan, Mario Villarino, and Michael Tomaszewski  
Texas Cooperative Extension  
The Texas A&M University System

## Introduction

A variety of projects are currently underway across the State of Texas. Projects are led by Extension Dairy Specialists and focus on subjects applicable to improving management at the farm level. Only through the cooperation of dairy producers, is it possible to gain information needed to address the issues impacting the Texas dairy industry.

## Texas Dairy Matters Website

During the past year a new web-based educational resource has been developed at <http://texasdairymatters.org>. This website lists dairy educational events in the state, contains fact sheets on various topics, and highlights faculty in dairy at the various institutions of higher education in Texas. Currently a section to assist producers wishing to relocate to Texas is being developed.

## National Feed Management Education Program

Feed management is an essential part of a successful livestock operation. Typically, feed management focuses on strategies to improve the health and productivity of a livestock operation. However, feed management is also an important aspect of environmental decisions.

Comprehensive nutrient management plans (CNMP) have been written for numerous operations in Texas and the United States and many more plans will be written in upcoming years. Although CNMP traditionally focus on manure management, there are a variety of other management areas on operations that affect nutrient management. Feed management greatly affects the nutrient balance of a livestock operation. Feed imports are one of the greatest imports of nutrients to most livestock operations. Since most nutrients enter a farm through feed imports, adjustments in ration formulations and other feed management strategies have an affect on nutrient balance of the entire farm operation. Feed

management provides an opportunity to improve the nutrient status of an operation.

Although feed management is important from an environmental standpoint, feed management is not often addressed by nutritionists, due to a lack of awareness of environmental issues, or by technical service providers (TSP) that develop CNMP, due to their lack of training in the area of nutrition. Therefore, there is a need to develop programs to bridge the gap in information between nutritionists and TSP.

Currently, a national project is underway to address the issue of feed management as it relates to a producer's CNMP. The overall objectives of the program are to: "1.) develop and evaluate a two-tier tool for assessing the impacts of feed management practices on whole farm nutrient balance for animal nutritionists, NRCS staff, and TSP advisors; 2.) develop the content of a Feed Management chapter for the NRCS Agriculture Waste Management Field Handbook (AWMFH); and 3.) develop and implement an education program targeting integration of feed management into a CNMP" (Feed Management Program Brochure, 2006). This project is a multi-species effort focusing on dairy cattle, beef cattle, swine, and poultry.

Over the next two years, tools for assisting in the determination of best feed management practices for implementation on individual farms will be developed and tested across the United States. Educational programs to learn about the use of the tools and general feed management concepts will be held in conjunction with nutrition conferences in several states.

## Phosphorus Feed Management on Dairies in Central Texas

Phosphorus is a nutrient of environmental concern in Central Texas and in many areas of the United States. As phosphorus excretion from dairy animals gained national importance in recent years, emphasis turned towards reducing phosphorus concentrations in the diets of dairy cows. Over the past several

years, educational programs have emphasized reducing dietary phosphorus concentrations to meet animal requirements and prevent overfeeding of phosphorus.

In 1997, a survey was conducted in Texas and the Mid-South Region of the United States to determine the trends in dietary phosphorus in dairy cattle rations (Sansinena et al., 1999). The results of the survey showed that the average dietary phosphorus concentration for high-producing cows was 0.52 % of the dietary dry matter, with ranges from 0.35 to 0.72 % (Sansinena et al., 1999). The high average dietary phosphorus concentrations listed in the survey indicated that there were many opportunities to reduce the phosphorus levels in dairy diets. During the last few years, nutritionists have made an effort to reduce the phosphorus concentrations of formulated rations, but further evaluation is needed to determine the status of phosphorus feeding in dairy cattle diets in central Texas.

Due to the importance of reducing phosphorus in the diets of dairy cattle from an environmental standpoint, a study was implemented to look at the current phosphorus feeding practices in Central Texas. The overall goal of the project is to collect samples of total mixed rations from 50 dairy operations in central Texas to determine the phosphorus concentrations of the diets. In particular, the study is focused on determining if the diets being fed to cows accurately reflect the concentrations of phosphorus in the formulated ration.

Samples of by-product feeds being fed on the dairy operations are being collected in addition to diet samples. By-product feeds have been found to vary greatly in nutrient content, especially when the by-product feeds are from various sources. Analyses of the phosphorus content of the by-product feeds provides a measure of the variation in the nutrient content of the by-products fed in the central Texas region. The determination of phosphorus contents of various feedstuffs will also provide guidance as to the feedstuffs and sources with the greatest variation, and thus provide the greatest opportunity for improvements in ration formulation.

In addition to diet and feed samples being collected, surveys are being completed by dairy producers on general feeding practices and their knowledge as to the importance of phosphorus in the dairy ration. The information collected on the surveys will be used to develop educational programs to assist producers with understanding the importance

of phosphorus feed management on their dairy operations. The educational program will focus on the importance of phosphorus concentrations in dairy diets and the affects it has on manure and nutrient management.

## **RFID Pilot Project**

Radio frequency identification (**RFID**) provides a method for identifying animals through electronic means. Electronic identification reduces transcription errors and assists in data entry. Quality RFID systems offer improvements in animal management and prevent costly errors resulting from the wrong identification of animals. In addition, RFID is proposed to be part of the State and National Animal Identification programs and may be required on cattle operations.

As RFID systems and eartags are developed, the products need to be evaluated to determine their durability, accuracy, and ease of use. Texas Cooperative Extension and the Texas Animal Health Commission are cooperating on a pilot project to evaluate four brands of RFID eartags. The goal of the project is to evaluate the ease of application, accuracy of identification, and the durability and retention of the eartags in approximately 15,000 dairy animals in the state. At this time, ten herds with different housing types have been identified as part of this pilot project. To date, over 7,000 RFID eartags have been attached in these herds. Evaluation of the eartags will begin after they have been attached for a period of six months.

An additional goal of this project is to quantify the increase in accuracy attained by implementing this technology in herd management. Determination of the economic benefits associated with the utilization of the RFID technology will be important to assess the overall value of the program.

Although the RFID eartags may be a required part of the State and National Animal Identification programs to assist with animal trace back, the RFID system provides management opportunities for dairy producers. First of all, the RFID system provides for 100 % accuracy in animal identification. Tying the RFID system to the herd management system ensures that the correct animal is being identified more easily and accurately than historic visual eartag programs. Additionally, movement of animal data to the National Animal Identification System database designated by the Texas Animal Health Commission will be possible through linkages developed for RFID systems.

## The Texas Demonstration Project for Johne's Disease Control

Johne's disease, (pronounced YO-knees) is a chronic, debilitating, intestinal disease identified more than a century ago. It remains a common and sometimes costly infectious disease of cattle. Johne's disease has been documented in cattle herds throughout the U.S. Furthermore, Johne's disease is not limited to cattle, since it has been diagnosed in a variety of domestic and free-ranging animals; such as sheep, goats, deer, llamas, elk and bison, as well as other ruminants. The infection is not limited to the U.S. as clinical Johne's disease has been reported in almost all countries around the world.

The bacteria causing Johne's disease, *Mycobacterium avium* subspecies *paratuberculosis* (MAP) has been isolated in some human patients with Crohn's disease, as have numerous other bacteria and viruses. Since studies evaluating the role of MAP in Crohn's disease have been equivocal, uncertainty about potential risk to public health from this organism persists. Some researchers have concerns about MAP in undercooked meat, unpasteurized milk products, and water. Because of continued potential public health concerns relating to this disease, animal production industries must address this disease.

### Testing for Johne's disease

Both fecal culture and blood serum antibody tests (ELISA) are available to producers to determine the disease status of a herd or an animal. Current tests for Johne's are good tools although they have some limitations, particularly in accurately determining the disease status of the individual animal. Both tests fail to detect early infection because antibody development and detectable fecal shedding do not usually occur until late in the course of the infection. In addition, serum tests can result in false positives, thus should only be used as a screening test or management tool. The serum tests can be confirmed with a fecal culture test; however fecal shedding of MAP is not continuous and only occurs in later stages of the disease. Therefore false negatives may occur on the fecal culture, although specificity of the test is high. The difficulty in detecting early infections and the long period before clinical signs develop may allow Johne's disease to remain a hidden herd problem. However, informed use of tests, along with a history of clinical signs of

disease in the herd, can provide information to assist disease management in individual cows and the herd.

In September 2003, Texas Cooperative Extension developed the Johne's Disease Control Demonstration Project for the Texas Dairy and Beef Industries with funds from USDA-APHIS. The primary objective of this project was to evaluate the long-term effectiveness and feasibility of management related disease control methods on the development of Johne's disease and infection in three beef and two dairy herds. The secondary objectives were to provide information and materials for education and training of public and private practice veterinarians and cattle producers; develop and evaluate management, testing, and monitoring strategies for use in control of Johne's disease in cattle herds; and to critically analyze results to determine additional research needs.

Three beef and two dairy herds interested in reducing the incidence or eradicating Johne's disease were included in the project initially. Herd A was a producer of purebred Brahman cattle with just under 40 head and started testing for Johne's disease in 2002. The second producer had 900 head (Herd B) of Brahman influenced cattle and started in the demonstration program in 2003. The third herd (Herd C), consisting of approximately 100 Brahman cows, started testing for Johne's disease in 2002 and joined the project as a demonstration herd in 2004. All herds had a history of Johne's disease, clinical manifestations of the disease, and an expressed interest in the demonstration program. All the beef herds share the same management plans consisting of:

- Yearly testing of the complete herd using ELISA and fecal culture;
- Culling of fecal culture positive cows and offspring;
- Selective culling of ELISA positive cases; and
- Separate management of ELISA positive cows by creating separate *bio-security herds*. (Cows that tested ELISA positive are managed and grazed separately from the rest of the herd. Herd reductions (if needed) are taken from the bio-secure herd.)

For the dairy herds, two herds were identified based on the fact that they had initiated a Johne's disease control program on their own and had sought assistance for management of Johne's disease. Dairy W initiated a colostrum management program in April 2001 based on ELISA test results with off-farm rearing of replacements. This herd began in the demonstration program in 2002 and currently has

3500 milking cows and intends to continue expanding as the market permits. Dairy E constructed new heifer calf rearing facilities in the fall of 2001, began pasteurizing the waste milk fed to calves in January 2002, and started a colostrum management program in June of 2003 after ELISA testing cows for Johne's disease at dry off. At this time in the demonstration project, 196 of 1752 animals tested have been ELISA positive in Dairy E. Both Dairy W and E have had fecal culture positive animals identified since inception of the project.

**Results to date**

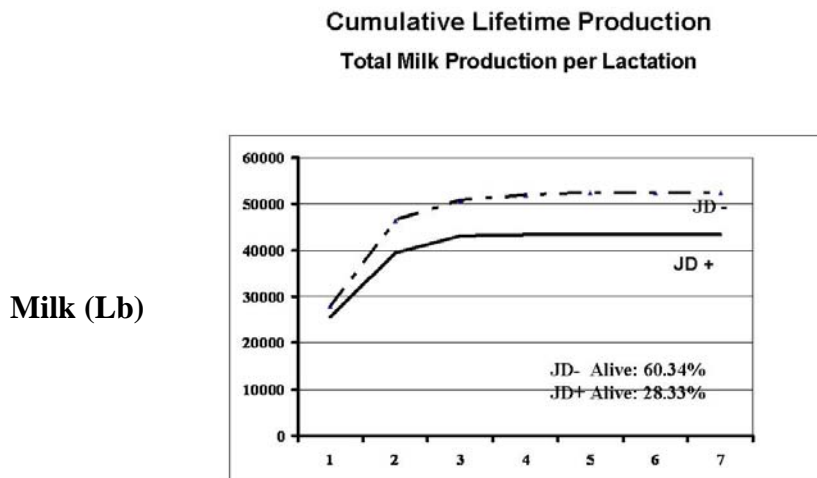
The number of positive cases of Johne's disease based on ELISA tests found during 2002 were 5.12% (herd A), and 2.60% (herd B). During 2003, ELISA positive cases were 10.25% (herd A), 5.94% (herd B), and 39.21% (herd C). During 2004, ELISA cases were 10.25% (herd A), 8.26% (herd B), and 38.11% (herd C). Fecal culture results did not detect any positive animals in herd A, two positive cases in herd B in 2004, four cases in herd C during 2003, and no positive cases in herd C in 2004. Results to date suggested three possible scenarios: a) Brahman and Brahman crossed cattle can have immune responses against MAP detectable by ELISA, before bacterial elimination; b) available diagnostic methods for fecal culture are unable to detect low levels of MAP elimination; or c) non-specific immune response is detected by ELISA, creating a number of false-

positive cases in the absence of MAP elimination. On the other hand, fecal positive cases showed high ELISA test results 75% of the time, when serial testing was conducted.

A milk production comparison was conducted using a retrospective cohort study (n=240) on Dairy W. The cohort study comparison was conducted according to lactation, age, and concurrent diseases (mastitis, respiratory disease, lameness, digestive disease, and reproductive disease) of the animal. A significant detrimental effect of Johne's disease on milk production in cows with sub-clinical disease was identified (Figure 1).

**Implications for beef**

Although widely known, Johne's disease is a poorly understood disease that exhibits lengthy incubation periods and limited test accuracy. Under these circumstances, veterinarians, animal health officials, and beef producers face challenges in the interpretation of test results for Johne's disease (Kennedy and Benedictus, 2001). Variation in test results reduces test confidence; thus making decisions based on test results difficult. Our experience indicates that eliminating individual animals based on a single ELISA test for detecting Johne's disease will result in poor culling decisions.



**Figure 1.** Cumulative total milk production of Johne's positive and Johne's negative cows in a cohort study

Consecutive testing, however, can provide better results. Although not very predictive in identifying positive cases, ELISA testing can be used to monitor individuals in absence of the disease or exposure. Due to the complexity of Johne's disease, producers with Johne's disease-free herds are encouraged to acquire herd additions from Johne's disease-free herds to avoid possible introduction of the disease into the herd.

### **Implications for dairy**

Results to date indicate a significant reduction in milk production (9,019 lb lifetime milk production per animal) from ELISA positive cows when compared to ELISA negative cows (Figure 1). The decline in milk production for the ELISA positive cows began in the second lactation and remained for the rest of their productive life, regardless of when detected as ELISA positive.

## **Conclusions**

The Johne's disease, RFID, and feed management projects will provide valuable information to producers to improve the health of the cows, to provide strategies that will improve nutrient management on dairy operations, and to assist with on-farm management and animal identification.

## **Literature Cited**

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