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Mastitis management-effective methods to reduce somatic cell counts

Abstract

Mastitis is the most costly health concern in the dairy industry today. Annual losses have been estimated at \$180 to 185 per cow. Based on this figure, annual losses for Kansas producers may exceed \$15 million. Nationally, mastitis may cost the industry \$1.8 billion annually. Although treatment and premature culling for clinical mastitis are costly, about two-thirds of the cost is associated with reduced milk production caused by subclinical mastitis. Effective mastitis control programs are necessary for the dairy industry today. Prevention of subclinical mastitis is the key to lowering the somatic cell counts (SCC). Elevated bulk tank SCC (>250,000/ml) are an indication that a significant number of the cattle are infected with mastitis-causing bacteria and corrective action is required. Key areas to evaluate are cow housing, milking equipment, and milking procedures. Utilization of milk culture data is necessary to determine if elevated SCC are due to environmental or contagious organisms. In addition, cultures of milk samples from individual cows may be needed to identify cattle infected with contagious organisms. Correction of deficiencies in housing, milking procedures, and milking equipment will effectively control environmental mastitis. Identification, segregation, and future culling of animals infected with contagious organisms are necessary for control of contagious mastitis. An effective monitoring system that includes individual-cow SCC, individual-cow bacterial cultures, and bulk tank bacterial cultures will ensure a low bulk-tank SCC and a low level of mastitis. It is a health issue that requires constant attention, because success is achieved with attention to detail on the dairy as a whole, and lack of attention in only one segment of the dairy may result in significant increases in mastitis. Success of the program requires that all employees and the management team (managers, herdsman, veterinarians, nutritionists, milking equipment technicians, and consultants) emphasize increasing milk quality by controlling mastitis.; Dairy Day, 2000, Kansas State University, Manhattan, KS, 2000;

Keywords

Dairy Day, 2000; Kansas Agricultural Experiment Station contribution; no. 01-166-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 861; Dairy; Mastitis; Milk quality; Bacteria; Milk production

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MASTITIS MANAGEMENT - EFFECTIVE METHODS TO REDUCE SOMATIC CELL COUNTS

M. J. Brouk and J. F. Smith

Summary

Mastitis is the most costly health concern in the dairy industry today. Annual losses have been estimated at \$180 to 185 per cow. Based on this figure, annual losses for Kansas producers may exceed \$15 million. Nationally, mastitis may cost the industry \$1.8 billion annually. Although treatment and premature culling for clinical mastitis are costly, about two-thirds of the cost is associated with reduced milk production caused by subclinical mastitis. Effective mastitis control programs are necessary for the dairy industry today. Prevention of subclinical mastitis is the key to lowering the somatic cell counts (SCC). Elevated bulk tank SCC (>250,000/ml) are an indication that a significant number of the cattle are infected with mastitis-causing bacteria and corrective action is required. Key areas to evaluate are cow housing, milking equipment, and milking procedures. Utilization of milk culture data is necessary to determine if elevated SCC are due to environmental or contagious organisms. In addition, cultures of milk samples from individual cows may be needed to identify cattle infected with contagious organisms. Correction of deficiencies in housing, milking procedures, and milking equipment will effectively control environmental mastitis. Identification, segregation, and future culling of animals infected with contagious organisms are necessary for control of contagious mastitis. An effective monitoring system that includes individual-cow SCC, individual-cow bacterial cultures, and bulk-tank bacterial cultures will ensure a low bulk-tank SCC and a low level of mastitis. It is a health issue that requires constant

attention, because success is achieved with attention to detail on the dairy as a whole, and lack of attention in only one segment of the dairy may result in significant increases in mastitis. Success of the program requires that all employees and the management team (managers, herdsmen, veterinarians, nutritionists, milking equipment technicians, and consultants) emphasize increasing milk quality by controlling mastitis.

(Key Words: Mastitis, Milk Quality, Bacteria, Milk Production.)

Introduction

Mastitis is the number one health concern of the dairy industry today. It is not only costly to producers at the farm level, but also reduces the value of milk for the processor and may impact the consumers' acceptability of dairy products. At the farm level, mastitis results in lower milk production, reduced milk quality, increased drug cost, increased culling, increased death losses, and increased labor expense. Although producers will focus on treatment of clinical mastitis, it is most important to develop a mastitis control program that will reduce not only the number of clinical cases, but also the number of subclinical cases. The key to effective mastitis control is prevention and a monitoring system that identifies problems early and corrects them before a significant portion of the herd is infected. Effective mastitis control involves defining the problem, developing solutions, implementing of corrective measures, and utilizing a monitoring system to identify future problems.

Defining the Problem

The first step in defining the problem is to admit that a mastitis problem exists in the herd. Many producers feel that they are producing quality milk. However, when the somatic cell counts (SCC) of bulk-tank milk are reviewed, counts that range from 400 to 500 thousand/ml are not unusual. Is this quality milk? That depends upon your definition. The legal limit is 750 thousand/ml, so the milk is under the legal limit. However, some processors discount milk with this level of SCC. Other countries already have reduced the lower limits to 500 thousand/ml, and the U.S. may need to adopt lower standards to open export markets in various countries. Yes, the milk is legal, but we can do better. Each producer should set a goal and work toward that goal. Many progressive dairy producers strive to hold bulk-tank SCC under 250 thousand/ml. A few have lower goals.

Significant production increases are associated with lower SCC. Table 1 outlines the expected losses in milk as SCC increases from 50 thousand/ml. Cows in their second or greater lactation are affected more than first-lactation cows. Their lactation average SCC of 400 thousand/ml is associated with a loss of 600 lb of milk, whereas the same SCC level in older cows is associated with a 1,200-lb loss. Currently, the average SCC of Kansas herds on DHI test exceeds 400 thousand/ml. Based on this information, milk production on Kansas dairies is reduced by over 1,000 lb/cow/lactation. It is no wonder that states that lead in milk production/cow are also those that excel in milk quality as determined by SCC.

Producers should recognize that the most costly mastitis losses are due to subclinical mastitis. Many times, producers are more interested in the latest treatment for clinical mastitis, but subclinical cases are generally more costly. Subclinical mastitis occurs when no visible changes are detected in the udder, and the milk is free of visible abnormalities. In such cases, the SCC will be elevated and the presence of bacteria may be detected in cultures. These cows not only

increase the bulk-tank SCC, but serve as a bacterial reservoir leading to the infection of additional cows.

Producers should strive to maintain a bulk-tank SCC of <250 thousand/ml. Counts above this level indicate a mastitis problem, and steps should be taken to identify the problem and start corrective action. The first step is to identify the types of organisms that are contributing to the elevated SCC. Samples of the bulk-tank milk should be cultured to identify whole-herd problems.

Samples should be taken from the bulk tank on 5 consecutive days or from five milk pickups. They need to be taken from the top of the tank after the milk has been agitated for 15 min. Every effort must be made to prevent contamination of the sample during this process. Remember that bacteria are everywhere in the environment. Hands, sampling tools, and nonsterile vials can serve as sources of contamination. In addition, sampling from the bottom of the tank can result in contamination from the valve port. Use a clean dipper or sterile syringe to remove a sample and transfer it to a sterile milk sample vial. Filling the vial 50% full is sufficient. Seal the vial with the cap and immediately place it in a freezer. Freezing the sample immediately stops bacterial growth and provides the laboratory with a sample that accurately represents the true bacterial population of the bulk tank. Allowing the sample to set in a warm room even for a short period of time will allow bacteria to grow and increase in number. Because different bacteria grow at variable rates under similar conditions, allowing growth to occur in the sample results in erroneous results. Once all five samples are collected and frozen, ship the samples to the laboratory in an insulated container with frozen ice packs. It is important to ship the samples so that they arrive at the laboratory frozen or cold. Thus, shipping method and day of shipment should be discussed with the laboratory to ensure that the samples arrive in good condition and on a day of the week that allows the laboratory to receive the samples and begin the cultures.

The laboratory should return the results of the bulk-tank cultures in a few days. The results may be returned directly to the farm or the herd veterinarian. Table 2 is useful in developing the solution to the farm mastitis problems.

Developing the Solution to Mastitis Problems

Based on the bulk-tank cultures, several decisions can be made. First, is the problem environmental, contagious, or a combination? As indicated in Table 2, environmental problems are best corrected with proper cow management. Milking clean, dry udders and utilizing correctly adjusted equipment with proper milking procedures will reduce many of the environmental pathogens and, thus, reduce environmental mastitis. The other major concern with environmental mastitis is the housing area. Cows need a clean, dry resting area. Bacteria require nutrients, warmth, and a moist environment. Removal of any of the three reduces their growth. Correction of housing deficiencies and the utilization of dry cow treatments at dry-off provides the best protection. Remember that the cow is most likely to develop a new mastitis infection in the first and last 2 wk of the dry period. Thus, the housing environment during the dry period is critical to effective mastitis-control programs.

If contagious organisms are found in the bulk-tank cultures, a different approach is needed. Because contagious mastitis is spread at milking, it is important that the infected cows be identified and segregated to prevent the spread of the organisms to additional cows. The only way to identify the infected cattle positively is through individual-cow milk cultures. This requires that a sample be taken from the cow utilizing sterile sampling techniques and submitted for bacterial evaluation. As with the bulk-tank samples, it is very important that the sample not be contaminated during the process. Bacteria are everywhere. They cling to udder hair, udder skin, milkers hands, and every surface in the milking parlor. It is recommended that gloves be worn and that the udder be clean and dry before sampling.

Samples should be taken prior to milking, and each teat end should be scrubbed with alcohol. Discard one squirt of milk prior to sampling and collect equal amounts from each teat if all quarters are being sampled. Filling the vial only 50% full is sufficient. Immediately freeze or place the vial on ice. Remember that bacterial grow well in warm, moist environments containing nutrients. Thus, warm milk is an excellent medium for bacterial growth. If the samples sit in the warm milking parlor for several hours until milking is complete, erroneous results will occur, and contagious animals may be missed. It is generally unusual for a single quarter to be infected with more than one organism. If results for individual cow milk cultures show two or more organisms, contamination likely has occurred.

Individual-cow milk samples are utilized to identify the cows infected with contagious mastitis. Once these cows are identified, they should be either culled or segregated into a separate group and milked last. The contagious pathogens are generally resistant to antibiotics. Thus, when a cow is infected, it likely will become a carrier. Separation from clean cows will minimize the risk to others. Dry treatments also are usually not effective on these organism, and if the cow remains on the farm for another lactation, it should be considered infected with a contagious pathogen. Permanent visual identification may be helpful.

Implementation of the Corrective Measures and Monitoring Systems

When problems have been identified and a control plan developed, it needs to be implemented immediately. This requires team effort, and everyone must place priority on the plan to ensure that it is implemented exactly. A monitoring system utilizing DHIA, bulk-tank SCC, bulk-tank cultures, and individual-cow milk samples at freshening should ensure that problems are detected early and corrected. When purchasing cattle, milk samples from all lactating cows should be cultured before they enter the herd. Samples from dry animals should be cultured upon freshening.

Allowing one contagious carrier to enter the herd could result in the culling of a high percentage of the herd. Effective mastitis-control programs are not based on just correcting problems but on preventing

problems from occurring. This requires constant attention to detail on the dairy as well as evaluation of culture data on a continual basis.

Table 1. Estimated Differences in Lactation Milk Yield Associated with Increased SCC Score

Lactation Average		Difference in Milk Yield ¹	
Linear SCC Score	SCC (1000s/ml)	Lactation 1	Lactation ≥2
		(lb/305 days)	
0	12.5	---	---
1	25	---	---
2	50	---	---
3	100	-200	-400
4	200	-400	-800
5	400	-600	-1,200
6	800	-800	-1,600
7	1,600	-1,000	-2,000

¹Losses are relative to yields of cows with an SCC score of 2.
Source: National Mastitis Council.

Table 2. Interpreting Results of Bulk Tank Milk Cultures

Bacteria Type	Source	Suggested Control Procedures
<i>Streptococcus agalactiae</i>	Infected udders (contagious)	Use separate towels to wash and dry udders Use postmilking teat dip Dry treat all cows at dry-off
<i>Staphylococcus aureus</i>	Infected udders (contagious)	Use separate towels to wash and dry udders Use postmilking teat dip Dry treat all cows at dry-off Cull chronically infected cows Milk infected cows last
<i>Mycoplasma</i> species	Infected udders (contagious)	Follow proper milking procedures Use premilking teat disinfection Use postmilking teat dip Milk infected cows last Culture all replacement animals Culture all cows and heifers at calving Cull infected cattle when possible Maintain a closed herd
Non- <i>agalactiae</i> <i>Streptococci</i>	Environment	Milk only clean, dry udders Improve cleanliness of housing environment Use premilking teat disinfection Use postmilking teat dip Dry treat all cows at dry-off
Coliforms	Environment	Milk only clean, dry udders Improve cleanliness of housing environment Use premilking teat disinfection Consider vaccination program
Coagulase-negative <i>Staphylococci</i>	Environment	Keep udders clean Milk only clean, dry udders Improve cleanliness of housing environment Use postmilking teat dip Dry treat all cows at dry-off

Source: National Mastitis Council.