

PRINCIPLE-BASED MASTITIS PREVENTION

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Introduction

In reality, each country or even regions of countries have very different dairy industries. Consider the difference between milking setups on the US Midwest compared to California. The emphasis on mastitis prevention and control vary greatly as does the economic value of the milk products. Public health concerns also vary as does the interest in milk quality. Therefore, principle-based mastitis prevention should be applied to accommodate for these geographic and regional differences rather than specific recommendations.

Principle #1: Milk cows with clean, dry teats and teat ends.

Impact: Milk quality, environmental mastitis, liner slips, milk out and parlor throughput

This will aid in prevention of mastitis from environmental sources and help to preserve milk quality as measured by bacterial plate and coliform counts. Teats and teat ends should be washed with water and dried completely before the milk is taken by hand or machine. Emphasis should be placed on the teat ends. An additional positive step may be predipping with a sanitizing solution similar to those used for post-milking teat dipping. Sprinkler pens and drip-dry pens may be used in large milking plants. Proper maintenance of the sprinklers is essential. These actions also aid the stimulation of adequate milk letdown and timely milk-out thus increasing parlor throughput. Whatever the technique, the end result should be the same...clean, dry teats and teat ends.

Principle #2: Prevent transfer of pathogens from cow to cow during milking.

Impact: Contagious mastitis, milk quality

This has been universally successful to control most contagious mastitis pathogens by preventing spread from one infected cow to non-infected cows during the milking process. Many different techniques can be used to control transfer. The main idea is to do nothing that will pick up bacteria from one cow and move it to another cow. Single use towels (paper, cloth, wipes) should be used in preparation of the udder and teats. Single use simply means the towels are only used on one cow and then discarded. Sponges and common rags are prohibited. Gloves for milkers are helpful and should permit constant washing with irritation to hands. Separate milking units for infected cows, established milking orders to protect the non-infected cows, hospital pens with separate milking equipment are all appropriate methods. Hospital cows should not be milked with the fresh cows. Post-milking teat dipping is very important. The more of the teat that is covered the

more effective will be the teat dip. At least 90% of the teat should be covered. Dipping with a cup is usually more effective than spraying.

Principle #3. Prevent injury to the teats during milking.

Impact: Mastitis, milk out, parlor throughput

Any injuries to the teats or teat ends will eventually end up with a new case of mastitis. Important steps are proper milking techniques (attachment, alignment and removal of machines), proper milking machine design/function, routine and timely changing of inflations, and continuous maintenance of the milking equipment (cleaning pulsators, etc.). Periodic assessment of teat end condition may be a useful indicator. Environmental sources of injuries should also be controlled (bedding, housing, free stall design and maintenance, frostbite). Teat dips should be clearly identified, properly mixed and stored to prevent temperature degradation.

Principle #4. Provide an environment that allows the cows to remain clean between milking.

Impact: Environmental mastitis, milk quality, parlor throughput, cow comfort

Clean bedding and resting areas will prevent contamination of teat ends from environmental sources and reduce the preparation time prior to milking. Proper cow comfort will increase use of freestalls. Assessment of free stall usage is a useful technique to measure cow comfort. Environment will also have a direct influence on milk quality especially if Principle #1 is violated. Items of interest are good drainage, routine removal of manure, and proper ventilation. Prevent overcrowding in housing areas. Appropriate types of bedding are important for different stages of lactation. Dry cows must be provided the very best of care. Additional areas of concern are freestalls (design, size, daily grooming and routine replacement) and the types of bedding utilized (sand, recycled manure, mattresses). Pastured cattle must not be allowed to develop wet wallows in shaded areas.

Principle #5. Early detection of new infections (clinical and subclinical).

Impact: Response to treatment, chronic infections, culling

This is necessary to preserve milk flow, insure desirable response to treatment and to prevent chronic infections. Prompt detection of mastitis will preclude severe mastitis outbreaks. Early detection may be by prestripping prior to milking, observation of the udder and teats, California mastitis test, various forms of electronic somatic cell counting or electrical conductivity. Multiple detection systems are desirable and should be routinely used. Milkers should be trained to use these techniques and management feedback is important.

Principle #6. Proper use of medications.

Impact: Success of treatment, cost control, residues in milk and meat

Appropriate use of medications is necessary to insure treatment success, prevent chronic infections, control cost of medications and prevent antibiotic residues in milk. Written treatment protocols are the key to success. These protocols should assign the various responsibilities such as detection, treatment, record keeping and cow identification to specific individuals. The herd veterinarian should be actively involved in the development of treatment protocols for each herd and training workers that will administer the treatments. Commercially prepared, single use antibiotics should be used and properly stored to insure potency. Extra-label usage of antibiotics should be limited and under the specific advice of the herd veterinarian. Coordinate antibiotic usage in herd with the residue screening test being used by the creamery.

Principle #7. Control duration of infections.

Impact: Decreased prevalence, decreased culling

Infection duration should be minimized whenever possible. Long duration chronic infections heavily damage the secretory tissues resulting in lost milk production. Additionally, chronically infected cows are the source of infection for many other cows within the herd. Along with Principle #5, dry cow antibiotic treatment at the end of lactation for all cows in all quarters is a very effective method for controlling duration of infection. In some cases, treatment of dry cows towards the end of the dry period with lactating cow antibiotics has been shown to be effective especially for environmental pathogens.

Principle #8. Monitor mastitis status.

Impact: Prevent outbreaks, culling information

The prevalence and incidence of mastitis within the herd must be known and monitored on a regular basis. A surveillance system will allow early identification of herd problem areas before they seriously impact milk production. Monitoring can be by somatic cell counting, written records of clinical cases, and culture of the bulk tank milk, fresh cows, clinical cases and high SCC cows. Culture should be for bacteria and mycoplasma. Monitoring information can be stratified by days in milk and lactation status to aid in identification of problem areas. Action points should be established for each item monitored to insure a rapid response.

Principle #9. Raise mastitis free replacements.

Impact: Permit culling for production, reduced herd prevalence

This will insure ability to cull for mastitis in older cows, lower the prevalence of herd infection and preclude the need to purchase adult cow replacements. Key items are to prevent teat suckling in calves, feed mastitis-free milk and provide a clean environment. When waste milk from the hospital cows is fed to calves, it should be pasteurized to minimize risk of infecting young calves. Fly control is necessary to prevent teat injury and spread of mastitis pathogens to replacement heifers.

Principle #10. Assume all purchased replacements are infected.

Impact: Control introduction of new pathogens

When purchase of replacement is necessary, whether heifers or cows, assume that they are infected at the time they enter the herd. Try to obtain an accurate mastitis history from the herd of origin - bulk tank SCC, individual cow SCC, bulk tank culture - before purchase. All replacements should be cultured, ideally prior to entering the milking strings, but at least as soon as possible after entering the herd. This will control spread of new organisms from new cows to the current herd. Monitoring is absolutely required if animals are routinely purchased.

Principle #11. Provide adequate nutrition to preclude increased susceptibility to mastitis.

Impact: Control new infection rate

The mammary gland can resist most infections if it is adequately supplied with the essential nutrients it needs to maintain resistance to new infections. Those microminerals which are important are selenium, copper, zinc, vitamin A and vitamin E. When these are not supplied in adequate quantities, the rate of new infections may increase. TMR is the easiest means to provide the proper amounts. Injections provide levels of only short duration and salt block give mixed results due to variable intake.

Suggested levels of supplementation (amount/cow/day):

| | |
|-----------|-----------------------------------------------|
| Selenium | 6 mg |
| Copper | 200-250 mg |
| Zinc | 900-1200 mg |
| Vitamin A | 100,000 – 150,000 IU |
| Vitamin E | 400-800 IU, milking cows 1000 IU, dry cows |

Principle #12. Fly control.

Impact: Teat end injury, new infection rate

Flies are known to carry bacteria from one place to another. Often they will carry mastitis pathogens including *Staphylococcus aureus* from one source to the teat ends of heifers or cows. They can also cause sites for infections by biting the teat ends. Basic fly control involves prevention of breeding sites through routine removal of manure and decaying feeds. Insecticide ear tags and sprays may also be helpful.

Principle #13. Provide routine milker training

Impact: All areas of mastitis prevention and control, milk quality

New milkers should be trained and other milkers should be routinely refreshed on the milking techniques that they are expected to use. Old habits are difficult to break so starting out with the proper techniques may improve compliance. Feedback on mastitis control and milk quality can be used as re-enforcement and encouragement. Bulk tank somatic cell counts, plate counts, coliform counts, etc should be posted for milkers to see.

Principle #14. Assigned responsibilities for all areas of mastitis prevention.

Impact: Job knowledge, shared responsibility, improved compliance

For each of these principles, there should be a written job assignment to a specific individual. Everyone should know and understand their part in mastitis prevention. When mastitis outbreaks occur, the weak link can be identified and corrective action taken. The use of TQM (Total Quality Management), HACCP (Hazard Analysis Critical Control Point) BTM (Break-through Management) technology can be applied for this principle.

Summary

Despite the variations in production husbandry and management across borders and geographical regions, attention to these principles of mastitis prevention can be applied with success in any location. It is up to the dairymen to contrive ways to apply each principle in a way that is appropriate for his type of dairy and management system. Dairymen the world over are ingenious and can get the job done. The results of routine attention will be low prevalence of mastitis and higher production of quality milk.