Recommendations for a control program based on preventive medicine

Bovine Mastitis

IN SPITE of improvements in dairy husbandry practices, the availability of a wider range of therapeutic agents, and the efforts of health and agriculture authorities toward control, bovine mastitis continues as a major problem in the dairy industry. The problem is twofold, encompassing both public health hazards to man and economic losses to the dairyman.

A variety of micro-organisms that produce disease in man also inhabit the bovine udder and cause mastitis. Although certain streptococci and staphylococci are considered to be the primary infectious causes of mastitis, numerous other organisms have been shown to be involved, such as *Escherichia coli*, *Corynebacterium pyogenes*, *Pasteurella multocida*, *Mycobacterium bovis*, and many others (see list of infectious causes).

Human infection may result from direct contact with the infected animal or consumption of raw or inadequately pasteurized milk containing pathogenic organisms. Of further public health importance are the staphylococcal enterotoxins in milk which are not destroyed by pasteurization. As a result, fluid milk, dried milk, and cheese have been incriminated in outbreaks of food poisoning in man.

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It has been demonstrated also that milk from cows with mastitis is low in nutritional value and quality. During the past decade the widespread use of antibiotic therapy in mastitis, with the resultant antibiotic residues in milk and milk products from these treated animals, has presented still another possible health hazard. Nonsensitive individuals may become sensitized and hypersensitive persons may have reactions.

Also of importance is the economic loss caused by bovine mastitis, which is estimated to be more than a quarter of one billion dollars annually. This loss is due to lower milk production, a reduction in the productive life of the affected cows, mortality of some animals, and, finally, the expense of veterinary services and drugs.

Predisposing Causes

There are many predisposing or initiating causes of bovine mastitis that are difficult to control, particularly in the small herds where dairying is only one of several farming activities. Such contributing factors include:

- Sloppy, muddy barnyards.
- Unsanitary milking barns.
- Inadequate, drafty shelter.
- Injuries or bruises caused by faulty milking machines, freezing or chapping of teats, and structural features such as high doorsills, narrow, short stalls, protruding nails, and poor fences.
- Improper milking practices such as incomplete or irregular milking, unclean machines, failure to dip teat cups after use on each cow, inaccurate pressure gauge or pressure too high for type of teat cup used, leaving machine on cow too long, failure to segregate cows, milking cows in improper order, improper cleansing of cow before milking, and "wet stripping."
- Physical abnormalities of udder or teats.
- Age of cow.
- Hereditary factors.

• Lack of attention or treatment during "dry periods."

In maintaining an adequate inspection program, there must be complete cooperation between the dairyman, the veterinarian, the processor, and the health department. Neither the prevalence of mastitis nor economic losses can be significantly reduced by treatment of acute cases alone. Any effective program for the control of mastitis must be based on consideration of the total herd.

Recommended Preventive Program

A routine, continuous check or supervision system by a qualified individual has been applied in some of the larger dairies and has proved both successful and profitable. It provides periodic examination of all milking and dry cows in the herd, including all aspects of prevention, diagnosis, and treatment. If a similar system could be applied in the smaller dairies, it should be equally effective. Factors to consider in the continuous check system are:

Biological factors. One infected cow in a herd constitutes a potential hazard, and laboratory examination is essential to determine the etiological agent and effectively cope with it.

Environmental factors. For the most part, environmental factors which influence the health of the herd may be controlled by the application of good sanitation and milking practices as well as by properly designed and maintained equipment. The health of workers who have close contact with the herd must be considered also in an effort to prevent transmission of infections from man to animal.

Herd management. The dairying operation should be planned to provide satisfactorily constructed housing and equipment which will lend itself to effective sanitation measures with the most efficient use of labor. Replacement stock should be carefully selected to minimize the opportunities of introducing infection into the milking herd. Such a continuous program, with careful attention to feeding and milking practices, is essential in the maintenance of a healthy herd.

Infected herds should be followed closely until prevalence of disease and losses are reduced to a minimum. Otherwise, visits to the herds should be scheduled at regular intervals so as to maintain this minimum rate.

Such a system of professional care will assure identification of chronic and acute cases, accurate diagnosis, advice on procedures and continuing remedial measures for infected herds, and specific treatment for infected cows. Also, it will provide dairymen with long-range advice on heredity, breeding programs, nutrition, and other factors related to herd health. A healthy herd assures wholesome, good quality milk and thus reduces public health hazards and economic losses.

Preventive Methods

Effective Controls

Institute a periodic examination by a veterinarian of all milking and dry cows in the herd:

1. To determine general health of each cow.
2. To examine udder for lumps and injuries.
3. To collect milk samples from all cows in the milking string for laboratory examination.
4. To discuss and advise on herd practices, sanitation, nutrition, and other factors related to mastitis prevention and control.

Segregation of Infected Animals

Isolate cows with mastitis and milk separately (if practical) or milk cows in the following order:

1. Cows with no evidence of mastitis.
2. Cows with normal udders, but shedding mastitis bacteria as shown by culture of milk samples.

Infectious Causes

Streptococcus agalactiae
Streptococcus dysgalactiae
Streptococcus pyogenes
Staphylococcus aureus
Escherichia coli
Aerobacter aerogenes
Klebsiella pneumoniae
Pseudomonas aeruginosa
Corynebacterium pyogenes
Pasteurella multocida
Clostridium perfringens
Nocardia asteroides
Cryptococcus neoformans
Mycobacterium bovis (tuberculosis)
Paracolon bacteria
Salmonella serotypes
Actinomyces bovis
Brucella abortus
Brucella melitensis
Leptospira pomona

3. Cows with udders showing some physical evidence of past or present mastitis.

4. Cows with acutely affected or badly damaged udders as a result of severe infections.

Disposition of Mastitic Mammary Secretions

In all cases of disease, suspected disease, or treatment, obtain the advice of the veterinarian on disposition of milk from the affected cows.

1. Dispose of mammary secretions abnormal in appearance or from obviously infected quarters so they are not accessible to animals or used in any way for human consumption.

2. Discard from market milk supply secretion from quarters infused with antibiotics for at least 72 hours following last infusion.

Sanitation and Good Milking Practices

1. Avoid sloppy and muddy barnyards.
2. Maintain milking barn in clean condition.
3. Keep the udder trimmed of long hair.
4. Have a regular milking schedule.
5. About 1 minute before milking, wash udder with a warm solution containing at least 200 ppm available chlorine. Use a separate clean towel and do not dip or place a used towel back in the solution.
6. Use a strip cup or plate.
7. Use the milking machine properly; follow manufacturer's instructions.
8. Keep teat cup liners clean and in good repair.
9. Put machine on cow as soon as the "let down" occurs; take it off as soon as the milk is removed from the udder.
10. Strip rapidly by machine or hand.
11. Immediately after milking, dip teats in an approved mild antiseptic solution or swab teat ends with mild antiseptic.
12. After removal from each cow, dip teat cups in lukewarm water or antiseptic solution, then in a fresh warm chlorine (200 to 250 ppm) or other approved antiseptic solution.
13. Wash hands frequently; do not permit "wet-hand" milking.
14. Disinfect stalls where cows with mastitis are kept.

Good Herd Management

1. Use home-raised heifers as replacements; or have each purchased replacement thoroughly examined by a veterinarian, have milk samples from each quarter of the udder analyzed, and isolate the animal until sure she is free of mastitis.
2. Construct milking barn to allow plenty of standing room; have no steps at all or very low steps at doorways.
3. Keep barnyards, barn, and pastures free of mud, trash, debris, machinery, and other sources of filth or injury.
4. Be sure stall beds are of adequate size, neither too narrow nor too short, with partitions or curbs between cows.
5. Provide plenty of clean bedding, preferably straw or a mixture containing straw.
6. Clean and disinfect cow beds periodically.
7. Drying off cows:
   (*a*) Reduce grain and water intake of heavy producers.
   (*b*) Stop milking, except to relieve the udder when it seems too full.
   (*c*) If mastitis is present, keep pus or infected secretions milked out; treat.
   (*d*) Allow 8 weeks as a minimum dry period, and as much as 3 months for cows known to have had mastitis.
   (*e*) Observe frequently during the dry period, and obtain veterinary advice and treatment when needed.
8. Remove from the herd cows which are in heat to prevent the animals from mounting each other and bruising their udders.
9. Do not allow calves to suck each other.
10. Do not feed calves raw milk from cows with mastitis.
11. Feed calves pasteurized milk.
12. Reduce the concentrated feed intake of a cow with mastitis.
13. Be sure that diagnosis is specific, that treatment is correct, effective in amount, and continued for sufficient length of time, and that all other needed remedial action is carried out for prevention of mastitis within the entire herd.