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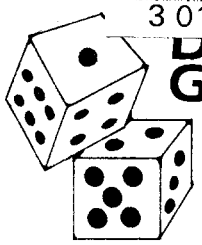

DON'T GAMBLE... Prevent Mastitis

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Mastitis remains the predominant, most costly infectious disease of the lactating dairy cow. New, dramatic approaches to mastitis control are frequently popularized, and promises of a new era in mastitis control and treatment are not unusual. The test of time and careful appraisal under farm conditions results in failure or the conclusion that the program is effective, providing that sound dairy management and practical milking procedures are also utilized.

The practices outlined here are the sound, practical dairy practices that have withstood the test of 50 years of dairying and remain as valuable today as when they were first acknowledged.

In economic loss to the dairy farmer, mastitis is the most important disease of dairy cows. Losses may be due to one or all of the following: (1) decreased production, (2) poor quality milk, (3) destruction of one or all quarters of the udder, (4) cost of treatment and, in some instances, (5) death.

WHAT IS MASTITIS?

Unlike tuberculosis and brucellosis, mastitis is caused by many different types of microorganisms.

Mastitis is an inflammation of the udder brought about by the activity of these germs which are always present in the cow's surroundings. Nearly all quarters of nearly all cows contain potential mastitis-producing organisms.

Microorganisms must have favorable conditions to cause inflammation (mastitis). The stress upon the cow and her udder by improper management provides conditions under which the microorganisms may cause mastitis.

SIGNS OF MASTITIS

The main symptoms of acute mastitis include heat, redness, pain, swelling and grossly abnormal secretions of the mammary gland. Because mastitis is an inflammation of the cow's udder, any or all of these symptoms may appear in varying degrees at any one time. Mild cases may exist with no clinical evidence of inflammation.

MASTITIS TESTS

Because of the numerous types of microorganisms and physiological conditions causing mastitis, no single test has been found to be appropriate for absolute diagnosis of mastitis.

Bacteriological Examination of Quarter Samples

The routine use of this test on a herd of cattle provides information regarding the specific microorganisms within each quarter. This test has been used on a monthly or semi-annual basis, followed with medication to quarters containing specified types of organisms.

If the specific organism is eliminated by medication, others of equal mastitis-producing potential soon replace it. The cost of aseptic milk sampling, laboratory examination, medication and discarding of milk from medicated cows makes this a costly testing procedure. It is of doubtful contribution to the control of mastitis.

Bacterial Counts

Bacterial counts of the composite (milk from all cows) herd milk samples often are advocated to indicate how much mastitis there is within a herd. Bacterial counts indicate only dairy utensil sanitation and/or milk cooling procedures. High bacterial count of milk does not indicate mastitis.

Direct Cell Counts

In the past, the terms cell count, total cell count or leukocyte count have been used interchangeably

and indiscriminately. In recent years the term cell count has been replaced by the term somatic cell count. The term leukocytes refers specifically to neutrophil leukocytes. The presence of epithelial cells in the milk is the result of physiological activity associated with milk secretion and the release of mammary tissue cells (somatic cells) into the milk. The presence of leukocytes in milk is an indication of the presence of inflammation in the mammary gland and the migration of leukocytes from the blood vessels. Leukocytes aid in controlling microorganisms that are associated with mastitis through the process of ingesting the organism and destroying it.

CELL COUNT COULD BE AFFECTED BY NUMEROUS FACTORS

The cell count in milk may vary from 20,000 per milliliter to 1,500,000 or more per milliliter. Cell counts of 300,000 are considered average, and milk having counts of 1½ million or more is considered unfit for human consumption and indicative of the presence of a mastitis problem in the cattle from which it originated.

The foremilk usually has the lowest cell counts while the strippings usually have the highest cell counts. Cows stripped by milking machine will have higher counts than those stripped by hand. This is particularly true when the milking machine operator is careless and not removing each inflation as soon as the quarter is dry.

Cell count is also affected by the milking interval. The shorter the period between milkings the higher the cell counts. Diurnal variation of cell counts have also been observed. The cell count will be high during the first hour post-milking, reach a peak at midday then decrease and rise again following the evening milking. The count is usually lowest just before milking. Incomplete or omitted milking will also increase cell counts. These facts indicate the importance of employing an absolute routine program of collection of milk for each test if comparisons of counts are to be of value.

Stress at milking time apparently results in the release of hormones, such as the corticosteroids, that influence cell counts. Stress may be initiated by a change in routine, beating, unaccustomed sounds such as airplanes or a barking dog, or the presence of a veterinarian or other people not routinely present during the milking period.

Seasonal temperatures will also affect cell count. Exposure of cows to above normal or below normal temperatures for extended periods (more than one week) will result in increased cell counts. It has been proposed that extensive temperature changes result in decreased milk production, hence the concentration of cells per ml or a higher cell count. Conversely, it has been demonstrated that the cell count is decreased due to a dilution factor in higher producing herds or during periods of high production.

The milking technique, or cow management, can definitely affect cell counts. Leaving the inflations on when milk is no longer present, vacuum fluctuations or worn out inflations all will initiate high cell counts because the mammary gland injury results in inflammation. Other sources of mammary gland injury include: slippery floors, high door sills, and inadequate bedding in combination with cold and drafts.

Drugs or intramammary medications will cause inflammation and higher cell counts. These include: ACTH, corticosteroids and antibiotics or sulfonamides and their vehicles (carriers), particularly if they are given intramammarly.

The cell counts of milk are high at parturition (colostrum) then decrease followed by a steady increase with a peak at termination of lactation. At drying-off time the mastitis cow will have a higher count than a non-mastitis cow. The average cell count of each cow increases with each lactation. When the dry period extends over 90 days the cell count will be higher during the following lactation. Breed differences have been reported and larger herds usually have higher cell counts than smaller herds. Cell count will vary between quarters of a cow and the presence of specific pathogenic bacteria will often, but not always, cause increased counts.

Determination of Cell Count

Two methods of determining cell counts in milk are presently available. They include the microscopic counting of a milk sample smear (Breed method) and the electronic cell counter. Accuracy and reliability of either of these tests depends on the milk collection methods and processing procedures. For comparative purposes, all samples should have repetitious procedures and time of collection. The methods employed and collection time should be presented in all reports if the results are to be adequately evaluated. Either of these counting tests provide the most accurate cell determination methods presently available.

Mastitis Screening Tests

Numerous mastitis screening tests have been developed to aid the dairyman in detecting mastitis

before clinical evidence develops. These tests in turn have been utilized in the selection of "quality milk" for human consumption. All of these tests are dependent upon the cell content in milk and the degree of their reaction is closely related to cell count.

Whiteside Test

The Whiteside test is a simple test procedure consisting of mixing accurately measured quantities of milk and a 4 percent solution of sodium hydroxide or alkl-arylsulfonate -0.5 percent and sodium hydroxide-1.5 percent on a glass plate and stirring with a glass rod. The degree of reaction is determined by the degree of thickening of the milk and the size and number of white clot formation. This test will consistently have a higher correlation of reaction to the number of cells present in milk than any of the other screening tests. It is also a valuable bulk milk sample test capable of indicating the presence of a single mastitic quarter in the milk collected from 15 or more cows.

California Mastitis Test

The California Mastitis Test is a modification of the Whiteside Test. Its principal proposed advantage is that it can be employed at the cow's side. This test consists of placing a varying quantity of milk from each quarter in each of four cups placed on a white plastic paddle. Variable quantities of milk and a detergent (alk-arylsulfonate-3 percent plus a 1:10,000 solution of bromcresol purple) are mixed in each cup. The degree of mastitis is determined by the color reaction (pH) and the degree of thickening of the mixture. This test has a lower degree of correlation wth the total cell count than does the Whiteside test. It also has been used to detect the herd incidence of mastitis by evaluation of bulk tank milk samples.

Wisconsin Mastitis Test

The WMT is a modification of the Brabant Test and employs the CMT reagent which is diluted 1:1 with distilled water. As in the Brabant test the evaluation is based on the rate of flow of a milk reagent mixture from a specifically prepared tube.

Brabant Mastitis Test

The milk samples to be evaluated are passed through a glass capillary to which a funnel is attached. The viscosity of the milk determined the flow rate which is timed.

Catalase Test

Catalase is a cell enzyme which is in low concentration in "normal" milk. This is another that closely correlates with cell count.

All of the described tests are dependent upon the number of cells present in the milk and are employed as a means of detecting quality milk or mastitis-free milk. Present acceptable levels of cell count after which milk is not acceptable for human consumption is 1½ million or more cells per milliliter. One can question the legitimacy of an arbitrary figure of this nature when it is well recognized that the most nutritious and valuable disease-preventing milk for the newborn is colostrum, which always has a high cell count. One might also ask how it is established that a specific cell count denotes the deficiency of quality and healthfulness in milk when there is no documented evidence of the occurrence of toxicity, decreased growth, enteritis or other disease entities when milk of 1.5 million cells per milliliter or more is fed to experimental animals or man.

Strip Cup Mastitis Test

Some tests are not practical or applicable to the daily examination of each quarter for mastitis by the dairyman. The dairyman does, however, have an excellent daily testing procedure that will detect the very earliest clinical signs of mastitis. This is the mastitis strip cup. The most applicable strip cup is a black-surfaced plate attached to a container that will hold the discarded milk. The black plate is most applicable to detection of mastitis if it has grooves similar to those of a phonograph record. The removal of two or three streams of foremilk from the udder and onto the black surface of the plate provides a means of visual evidence of early clinical mastitis in the form of milk clots and fluid consistency. In addition, it provides the removal of the milk containing the highest concentration of bacteria. The routine application of the procedure also aids in stimulating milk let-down. Figure 1 shows the mean cell concentration equivalence for several of the mastitis screen tests as related to their score.

CAUSES OF MASTITIS

When the cow or her udder is subjected to stress, the always present microorganisms within the udder will cause mastitis.

Milking

Keep milking machines in the best operating condition. Milking machine dealers can help do this. Some of the primary problems include too small a vacuum pump and pipe line to deliver sufficient vacuum to the operating units.

Many farmers use two complete sets of rubber inflations for each machine and change inflations each week. Inflations not in use should be cleaned thoroughly and stored in a cool, dry place. Clean rubber inflations milk faster and last longer. Do not use rubber inflations for more than 1,500 milkings.

When milk flow stops, remove the teat cups at once. Continued milking may injure the sensitive tissue lining of the teat and the lower portions of the udder. Then conditions are right for the organisms causing mastitis to start an infection.

Pay particular attention to animals that milk out rapidly or have one quarter that milks out more rapidly than others. When production is 5 pounds of milk or less per milking, stop milking with the milking machine.

The type of milking facility, degree of automation built into a facility and skill of the operator determine the number of milking units an operator can safely handle. Under optimum conditions the maximum number of units an operator can handle is three.

Housing and the Housing Area

Cold concrete floors, lack of bedding, open hay or straw chutes, broken windows or doors and improper ventilation may place stresses upon the cow's udder.

Injury to udder or teats usually leads to mastitis. Prevent injury by providing stalls of adequate size, and by keeping the barnyard and pasture free of sharp rocks, barbed wire, tin cans and other rubbish. Concrete approaches to the milking parlor of the barn should be roughened enough to prevent slipping and designed to provide complete drainage.

Wet, muddy barnyards and stagnant ponds of water always contain potential mastitis-producing organisms. Cows will stand udder-deep in such stagnant pools during hot weather. Chapped and sore teats may also result from this exposure.

Inheritance

The most important factor of inherited mastitis resistance is udder attachment and teat placement. An extremely large udder with weak attachment becomes pendulous as the cow ages and is subject to frequent injury.

Feed

Feed is not important in causing mastitis nor in preventing it. There is no evidence that high protein rations play a direct part in producing mastitis. Also, there is no proof that high concentrations of various vitamins and minerals help to prevent or cure mastitis.

Feeding forages high in estrogens (female hormone) may bring on mastitis if the cow is later in her lactation period.

PREVENTION AND TREATMENT

Most mastitis can be prevented with the application of recognized common sense management procedures. Dependence upon vaccines and antibiotics is an exercise in futility.

Vaccination

Vaccination with mixed bacterins and toxoids has, at various times, received much attention as a means of mastitis prevention. Because many different microorganisms may cause mastitis, it is impossible to prepare a vaccine that will always protect against mastitis.

Vaccination is of doubtful benefit and cannot replace sensible management and dairy practices. Vaccines may have failed because too many dairy farmers attempted to replace good management with vaccination.

All well controlled investigations indicate that vaccination is of no demonstrable benefit and may be responsible for post-vaccination reactions resulting in decreased milk production and even death of the cow.

Treatment

The dairyman who gives full time to mastitis prevention and depends on a competent veterinarian for treatment when it is required usually has lower veterinary costs and few problems with mastitis.

Most mastitis begins as a mild case and becomes gradually more severe. Effects of these mild cases can be counteracted by removing all of the milk by hand milking from the infected quarters as soon as the clots or stringy milk appear on the strip cup. Follow this by removing all milk every one or two hours until the milk becomes normal. Before milking, stimulate the cow for milk letdown by washing the udder in warm water and massaging.

If frequent removal of milk from the infected quarters seems to have no effect, consult a veterinarian at once. If there is any doubt as to which procedure to follow - whether to continue this partial milking or call the veterinarian - don't gamble. Call the veterinarian.

Avoid the use of highly advertised intramammary medicines. The antibiotic content of these preparations is seldom strong enough to counteract the infection. Most of these preparations fail to penetrate the involved mammary area and remain in the lower third of the mammary gland. Antibiotics in the preparation are not released for distribution throughout the gland but are milked out in later milkings.

Only FDA approved medication should be used on dairy cattle. See the current list of FDA approved drugs and their uses.

All milk from treated quarters should be discarded for the period following treatment as designated on the label of the drug container or according to the veterinarian's instructions. Mixing of milk containing antibiotics with marketable milk is considered adulteration and is punishable by law. Antibiotics in milk interfere with the manufacture of dairy products, may injure people who are sensitive to the antibiotic, or produce antibiotic-resistant organisms in human or cow.

A recent proposed mastitis preventive measure is dipping of teats with various sanitizers. This management procedure will aid in controlling mastitis providing other management procedures are not neglected. Correct use of non-irritating teat dips may help reduce mastitis because it removes the milk residue on the end of the teat. The application of massage with a dry towel following removal of the milking machine will also accomplish this and also stimulate circulation and the closure of the teat meatus which aids in preventing the penetration of mastitis producing organisms. Teat dipping has definitely decreased the incidence of cowpox infection. The continuous use of incorrectly designed teat cups has caused teat dipping irritation and has aggravated the mastitis problem instead of reducing it in some herds. One conclusion appears to be made by nearly all advocates of teat dipping; it is beneficial and will aid in decreasing the mastitis problem providing the long recognized management procedures of adequate housing, adequate milking equipment and competent milking procedures are always employed simultaneously with teat dipping.

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