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Mastitis in Dairy Cattle

T. M. Olson
South Dakota State University

F. M. Skelton
South Dakota State University

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MASTITIS in Dairy Cattle

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Summary

1. Mastitis is usually caused by a specific organism, *Streptococcus agalactiae*.

2. Mastitis occurs in one or more of the milking cows in nearly all herds of any size. It is more prevalent in old than in young cows.

3. The most common symptoms of mastitis are: Swollen, inflamed quarters, flakes or lumps of curd in the milk and on the milk strainer pad.

4. Mastitis producing bacteria enter the udder through the streak canal.

5. There are several tests for detecting mastitis in milking cows. The microscopic inspection of milk in which the long chain streptococci organisms are found is the most dependable.

6. Mastitis can be controlled by testing, observing sanitary practices in the barn, use of medicaments, and slaughter of the chronic cases that will not yield to treatment.

Mastitis (Garget) In Dairy Cattle

By T. M. Olson and F. M. Skelton[1]

The control and prevention of diseases and ailments in dairy herds mean more to the success of a well-bred dairy herd than any other single factor. As the herd increases in number and the individuals in the herd improve in production, diseases occur more frequently. This is only natural. With larger numbers more animals contact each other, increasing the possibilities of infection.

High-producing animals are highly developed and therefore hard working. They cannot withstand the hardships and contagion of disease as can the "boarder cow," which is largely on a maintenance basis.

Prevalence of Mastitis

Mastitis is found in small herds of dairy cows as well as in large herds. If all milking herds were checked by means known to detect mastitis, it is doubtful that any herd of any size would be entirely negative to all of the tests. Some researchers have estimated that one or more milking cows in nine of ten dairy herds would react positively to at least one of the tests. This positive reaction does not necessarily mean that the cows show evidence of active mastitis. But it does mean that there is danger of mastitis under inducing conditions, such as bruised udder and lowered resistance.

In some herds in which no control measures are practiced, it is not uncommon to find mastitis in 50 to 75 percent of the cows. It is likely to spread further unless control measures are taken.

Mastitis Decreases Milk Flow

Mastitis exacts a heavy toll on the profits of the dairyman. Milk production of cows infected with this disease may decrease 20 to 30 percent on the average. Heavy-producing cows having mastitis have been known to drop from an average production of 95 pounds of milk a day to 30 pounds. That is not all. Many cows permanently lose the function of one or more quarters of the udder. Statistics show that about 40 percent of all milk cows marketed in the United States are sold because of defective udders. In addition to these losses, infected cows need extra attention when they are milked, thus adding to the work of the dairyman.

Mastitis is a disease that should be eliminated from every dairy herd. Management practices should be taken to keep it out.

[1] T. M. Olson, Dairy Husbandman; and F. M. Skelton, Assistant Dairy Husbandman.

Cause of Mastitis

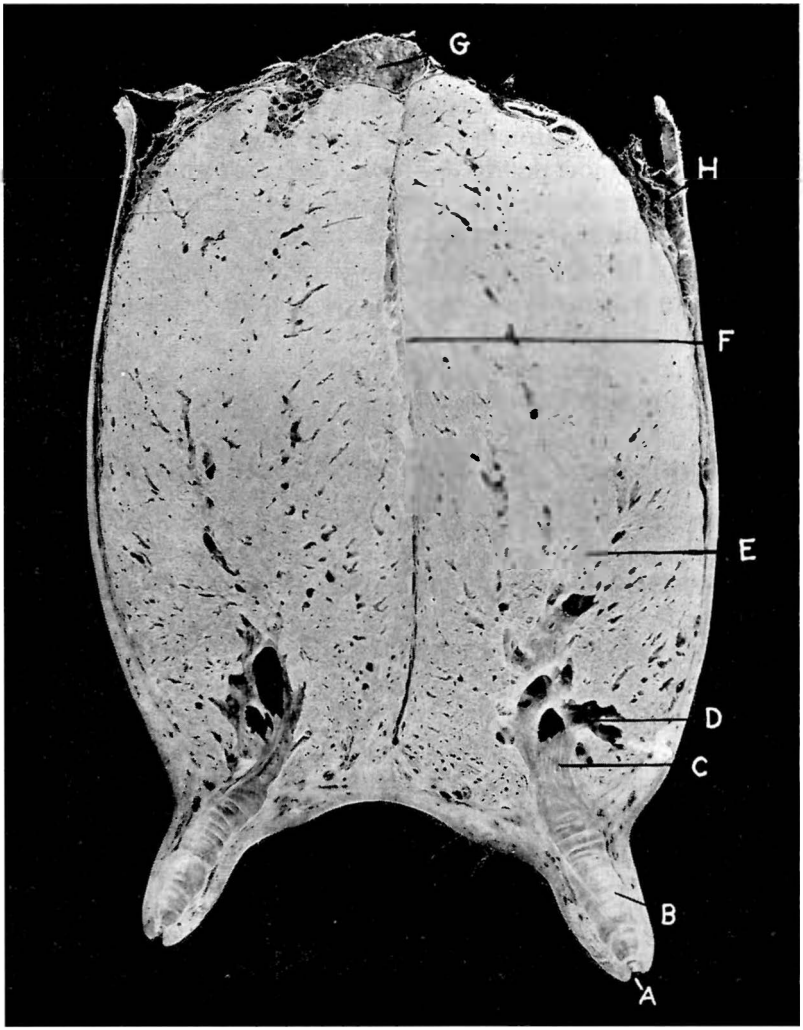
Mastitis is an inflammation of the udder caused by bacteria (germs). The bacteria are found in barns, in materials kept in barns, and on the hands of milkers. They are also on milking machines, particularly on the rubber parts which are allowed to become dirty. When these rubber parts have been used for some time, they frequently have tiny cracks which cannot readily be seen with the naked eye but are visible under the microscope. These cracks harbor millions of bacteria. Unless the rubber is carefully and thoroughly cleaned, it is an important source of contamination. The germs enter the udder through the teat canal or through cuts, abrasions, or other injuries to the udder.

Because the udder of a dairy cow is such a sensitive organ, as well as because germs can enter it through bruises, every precaution should be taken not to injure it. The following practices should be followed to avoid injuring the udder.

1. Handle the udder gently.
2. Leave the milking machine on only until the cow has been milked dry, not after she is dry.
3. Follow manufacturers' directions for operating the milking machine. Do not increase the vacuum of a milking machine above what the manufacturers recommend.
4. Be sure that the udder is not injured by being kicked, bunted, or stepped upon by other cows.
5. Drive cows at a walk. Faster driving causes the udder to swing.
6. Provide enough bedding, otherwise the cows are forced to lie on cold rough floors where the udder is exposed to sharp gutter edges.
7. Use teat tubes, teat dilators, and teat plugs only as a last resort. Drying up an infected quarter is preferable.
8. Milk cows regularly.
9. Be careful when drying off cows.
10. Keep milking machines clean and have good inflations.

Considerable experimental work on mastitis has been done by the South Dakota Station and other experiment stations. It has been definitely established that most of the cases of mastitis show *Streptococcus agalactiae*. Occasionally staphlococci are found.

When either of these organisms are found in the milk of any quarter, or a large number of leucocytes are found, the presumption is that streptococci or staphlococci were the cause of the mastitic condition. It is apparent that only a trained bacteriologist under-



Cross section of the rear quarters of a cow's udder. A-streak canal, B-teat cistern, C-gland cistern, D-milk ducts, E-mammary or secretory tissue, F-median suspensory ligament, G-supra mammary lymph gland, H-skin.

stands how to prepare the milk so that these organisms can be seen under a microscope. It also requires a trained technician to identify the organisms.

Practical feeders frequently attribute mastitis to heavy feeding, particularly of high-protein feeds. However, no experimental data are available to show that feeds of any kind cause mastitis. Feeding trials in which cottonseed meal was fed in liberal amounts did not indicate that this high-protein feed induced mastitis.

It cannot be said that overfeeding cows on concentrates does not result in trouble. When cows are over-fed on concentrates and go off feed, their resistance is lowered and they may contract any disease. If cows are exposed to heavy infections of mastitis while in this condition, they may come down with an attack of mastitis.

Symptoms and How to Detect Mastitis

It is important that the milker recognize mastitis in its early stages, because if the cow is to be cured or the disease controlled, action must be taken as soon as possible after the infection is discovered.

In acute cases the cow becomes sick and the physical appearance of the milk changes materially. No herdsman should have any trouble in determining the difficulty. In chronic cases the disease may come on so gradually that it escapes the attention of the milker or herdsman. A strip cup or strip plate should be used by the milker to note whether the milk is normal.

Flaky or lumpy milk. Two types of abnormal milk are due to mastitis. One is caused when the udder of a heavy producing cow becomes chilled. If the cows have been housed in a warm barn and are allowed to lie down outside on the cold ground, some of them may produce flaky or lumpy milk for one or two milkings, and then the milk becomes normal again. This is a non-infectious type of mastitis. However, it is well to make certain that it has cleared up, as this condition may also be the beginning stages of an infectious type of mastitis. The only certain method of identifying mastitis is to have the milk tested by a competent laboratory technician.

The infectious type is more difficult to recognize unless regular tests are made on the milk. However, there are symptoms that a close-observing herdsman will recognize as the beginning stages of mastitis.

Swollen quarter. A swollen quarter, particularly if it is feverish, is an indication of inflammation. Milk out such a quarter, using a strip cup or strip plate to note whether there are any flakes or lumps resembling milk curd. If the milk is abnormal, it should be milked into a separate pail in which some disinfectant has been placed to kill any bacteria that may be present. Do not strip the abnormal milk on the floor. Such stripping spreads the infection to other cows.

Unhealthy appearance. In some types of mastitis the first symptom noticed is that the cow fails to eat. Her temperature is above normal. She looks listless, her hair becomes rough and dry and her eyes dull. She may not milk half as much as she did on the previous milking. If nothing is done the cow may recover in a few days or she may die. With this type of mastitis the cow will very likely lose the function of one or more quarters and give much less milk for the balance of the lactation and during subsequent lactations.

In other cases the inflammation may persist until the quarter breaks open and discharges pus. This is an insanitary, unsightly condition in a cow that is producing milk for human consumption. Get the services of a veterinarian as soon as the cow is observed to be off feed. If she isn't worth keeping, dry her up and sell her for slaughter. Don't sell her to a dairyman. Unless she is treated and cured, she may not be worth keeping as a milk cow. Moreover, she becomes a potential spreader of mastitis.

Scar tissue. In many cases mastitis may not be detected until scar tissue has formed in the udder. When the udder is infected with mastitis the mammary tissue is replaced with scar tissue. An experienced dairyman can discover this tissue in the udder of a cow by palpating (handling) the udder. Obviously the udder must be milked dry before palpating. Lumps in the udder or hard resistant tissue usually indicate mastitis, or that the disease is temporarily arrested. This type of an udder should not be confused with a "meaty" udder, which is natural to some cows. Many dairymen who have experimented with mastitis think that palpating the udder is one of the easiest and most effective means of determining the disease.

Streptococci in milk. There are several laboratory tests by which mastitis can be detected. These tests are determined on the milk from the cow and should be performed by qualified technicians. They are bromthymol blue, chloride, microscopic, and Hotis tests.

When the properly incubated and stained milk samples are examined under the microscope and long chain streptococci organisms are found, infection is present in the udder. In much of the experimental work which is being done on mastitis, a positive microscopic test is the best evidence that the cow has mastitis.

How Mastitis Spreads

The spread of infectious mastitis is largely by specific bacteria. Various types of bacteria are responsible for mastitis but many research workers have found that 90 percent of mastitic cases are caused by *Streptococcus agalactiae*. When these bacteria are present in the udder, they are given off in the milk. Then they can be found on the milker's hands, the teat cups and dairy utensils. If the milk from the cows having mastitis is milked into the bedding or the gutter, the dust in the barn air becomes laden with mastitic bacteria. Flies may carry the bacteria from the teats of one cow to another and thus spread the infection.

The bacteria enter the healthy udder through the teat canal. The sphincter muscles (circular muscles at the end of the teat) are more relaxed during and right after milking, therefore there is more likelihood of the bacteria entering the udder during or soon after the milking process.

Many milking cows and virgin heifers have the bacteria in the udder. All that is necessary to bring on mastitis is some inducing factor, such as bruising, butting or otherwise injuring the mammary tissue, or even lowering the vitality or disease-resisting ability of cows. Cows which have recently freshened or have had attacks of diseases and therefore have a lower resistance, may suddenly have an attack of mastitis. Cows which become chilled when they drink cold water or are exposed to cold winds or inclement weather, may also have an attack of mastitis.

Prevention and Control

"An ounce of prevention is worth a pound of cure" is even more applicable in the case of mastitis than most other diseases, because the disease attacks the udder, a highly sensitive organ and is very difficult to cure when it can be cured at all. Therefore, the dairyman should be exceedingly careful in managing to prevent mastitis from entering the herd.

Keep cows comfortable. No successful dairyman will permit his cows to be milked or handled in such a manner that they are injured in any way. Every precaution should be taken to make the cows comfortable. Feed them and care for them so that they can resist slight infections.

A cow's physical condition should be watched so carefully that as soon as she is ailing she will be cared for. If she needs the services of a veterinarian, call one immediately. If she needs home treatment, see that she gets it.

Keep barns clean. Sanitation is highly important in the management of a dairy herd. A slovenly, untidy barn is no place to produce a food as precious as milk. Sanitation not only means a superior product but goes a long way in keeping the herd healthy enough to ward off minor infection. Cleanliness of milking machines, barns, dairy utensils, and the milkers and others who handle the milk should be beyond question.

Milkers should be healthy. The organisms which produce septic sore throat in human beings can grow in the udder of cows and cannot be distinguished from the *Streptococcus agalactiae* under the microscope. Therefore, no one with sore throat or any other communicable disease should be permitted to milk cows or handle the milk. It should always be kept in mind that milk is a very good medium for growth of all bacteria. Therefore every precaution should be observed to prevent contamination.

Good Milking Practices

Gentleness in milking and handling the cows is important. A rough hand-milker or one who does not understand the operation of a mechanical milker will frequently bring on mastitis. Once it is in the herd, the same type of person will cause mastitis to spread. Careless milking and herd management are probably the greatest factors contributing to the occurrence and spread of mastitis in dairy herds.

The cow should be comfortable and entirely at ease when she is being milked. Anything which might scare her or cause her to become nervous and excited when being milked must be avoided. Avoid injury to the cow's teats and udder.

If a teat has been stepped on or otherwise injured, the use of a milking tube to get the milk from the injured quarter usually re-

sults in infection. Chances are that better results will be had by not using the tube. Keep the teat clean with a disinfectant wash and allow the quarter to dry up. It is extremely difficult to use a milking tube under barn conditions and not introduce infection. Infecting a quarter by using a milking tube usually results in the loss of the quarter. It may even result in generalized infection and the loss of the cow.

The udder of a cow should be prepared for milking and then the cow should be milked as rapidly as possible. The teats and udder should be washed with a warm chlorine solution (250 parts per million) before milking. This practice not only prepares the cow to let down her milk but washes away and destroys any bacteria which may be on the teat. After the cow has been milked, a good practice is to dip the teats in a shallow pan or cup of chlorine solution containing 250 parts per million of available chlorine. This practice will destroy any bacteria that may be left on the teats and later enter the teat canal.

The teat-cups on the milking machine should be dipped into a chlorine solution after milking each cow to avoid carrying bacteria from one cow to the next. In hand milking the milker should wash his hands for the same reason. These practices take time and are often inconvenient to perform, but they are important factors in maintaining the health of the herd and in controlling mastitis.

Cows which have lost one or more quarters and whose udders indicate considerable scar tissue should be slaughtered. There is little chance of curing such cows and they may be a source of spreading the infection to other cows in the herd. Cows having considerable scar tissue in their udders are not likely to be profitable producers.

Infected cows which are to be retained in the herd should be isolated from the balance of the milking herd. If it is impossible to house such cows in a separate barn, they can be placed in one section of the barn and milked last to avoid spreading the infection to uninfected cows.

Treatment of Mastitis

If a cow is treated as soon as mastitis is discovered, there is a chance of curing her. However, if the disease is allowed to run its course and form scar tissue or destroy the mammary tissue, there is little likelihood of effecting a cure. Milk production of the cow will

decrease and probably never again reach her previous production.

Treat during dry period. A cow can be treated while in milk but more satisfactory results follow when the cow is treated during the dry period. Because of the virulence of the infection, however, it is sometimes not wise to wait until she dries up. Moreover, if the milk is to be used, she must be given attention immediately. Have her checked by a veterinarian. If this is not possible, bathe the udder in hot water continuously for several hours. Have the water as hot as the hand can bear. This treatment may take the inflammation down and bring the quarters back to normal secretion.

In the college herd, cows whose milk has had long chain streptococci are treated during the dry period even though no streptococci are found in the milk immediately before the cows go dry.

Products for injection. Several products have proved effective in destroying the bacteria in the udder. They are injected into each quarter. Some of them should be used when the cow is dry because if used when she is in milk they will irritate the udder and cause difficulty in milking. Several other products used by this Station had no ill effects when the cow was in heavy milk and yet in some cases rid the udder of bacteria.

The following materials have been used with more or less success in controlling or curing mastitis at the South Dakota Station: Tyrothricin, Novoxil (silver oxide in mineral oil), Sulvatil (Sulfanilamide in mineral oil), Sulfamerazine (in water or mineral oil).

The sulfa-products were found to be the least irritating to the gland tissue and therefore can be used with the milking cow as well as the dry cow. When Novoxil was used on milking cows, considerable tissue was destroyed and the milk remained abnormal for as long as a week after treatment. When either Sulvatil or Sulfamerazine was used with water or mineral oil, the milk became normal after one or two milkings following the treatment.

These treatments should be given by the local veterinarian. Several treatments are often necessary before mastitis clears up. It is also well to have all four teats treated even though mastitis is discovered in only one teat. Work at this Station indicates that when one infected quarter is treated, the following months' tests will frequently show that other quarters are infected. By treating all four teats at the same time, there is a good chance that the infection can be eliminated from the entire udder.

A number of preparations are on the market for injecting into the infected quarter via the teat canal. Before any material is injected, the teat should be thoroughly cleaned with a disinfectant solution. Chlorine (250 parts per million) may be used. The danger of infection must be guarded against.

How much to inject is usually given on the container. Special tips for the syringe are provided with some preparations. When distilled water is the medium for carrying the material into the udder, a teat tube and rubber tubing properly attached to a flask are effective. A syringe is used for most products.

Many experiment station workers have been successful in curing mastitis in 9 of 10 cows treated. Others report results not so good. The only way a dairyman can find how successful either of these products will be in his herd is to treat the infected cows and await results. **Do not use unknown and untried products for injecting into the udder, as the mammary tissue is very sensitive.**

Milk From Mastitis Cows

No data are available to indicate that the organism in mastitis, *Streptococcus agalactiae,* is pathogenic (disease producing) to man. However, a heavy infection might prove serious. Feeding mastitis-infected milk to calves is not recommended. In many cases of clinical mastitis, the milk is so abnormal in appearance and odor that no one would want to use it for any purpose.

Although the milk from an infected quarter cannot be used safely, milk from the other quarters of the udder is normal and can be used.

Where the milk cannot be tested for mastitis and it appears abnormal in color or has flakes or chunks of curd in it, it should not be used for human consumption.