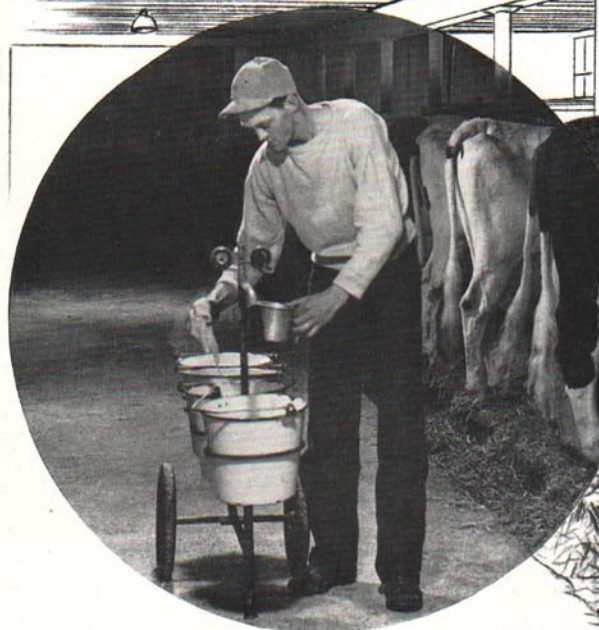


MASTITIS CONTROL

In Michigan Herds



MICHIGAN STATE UNIVERSITY

Cooperative Extension Service • East Lansing

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Mastitis Control in Michigan Herds

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Do dairy farmers in your neighborhood have trouble with mastitis in their herds? Mastitis causes more trouble than any other disease of dairy cattle in Michigan. Records of dairy testing groups show it to be the number one disease causing removal of cows from their herds.

Mastitis lowers milk production by destroying milk-forming tissue and replacing it with scar tissue. Production falls off slowly at times, but quite rapidly at other times. Quality decreases too. The milk may contain flakes, slugs, cells, serum, or blood. Mixing the milk with "clean" milk in cans or a bulk tank can cause some loss. High bacteria counts from infected milk can cause the entire lot to be rejected at the dairy.

Mastitis shortens milking life. Herd replacement costs increase, and the dairyman must spend extra time, effort, and money to treat infected cows.

Cows with infected udders drop in value as milk cows. They even lose salvage value by selling as a lower grade of beef. Sometimes they become a total loss through death. The U. S. Department of Agriculture estimates the loss in the United States to mastitis at 250 million dollars a year.

If more farmers better understood the nature of this disease, they could prevent many cases and treat existing cases better.

MASTITIS SYMPTOMS

Mastitis is defined as any inflammation of the cow's udder. It often causes changes, or symptoms, which we can see. Other times, these symptoms are so mild that we do not notice them. Cows with unnoticed symptoms are called chronic cases; they may be carriers or spreaders of the disease. These chronic cases are often the most dangerous because the dairyman is not aware of them.

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The most common symptoms show in the milk. Flakes that are often produced may be so small that the farmer needs a strip cup to detect them; or they may be large enough to interfere with milking. In more severe cases, the milk may become watery, bloody, or both.

The udder may swell and become painful, causing lameness as the cow moves. Changes in color of the udder may occur as the disease progresses, with red turning to blue or bluish black. The udder tends to become cold and clammy to the touch as swelling and congestion interfere with blood circulation.

The cow may finally go off feed, develop a high fever, stand with ears drooped, head down, very depressed — a very sick animal. Death may follow in 24 to 36 hours. Or the cow may recover and appear normal, only to remain a carrier of the disease.

CAUSES

Infectious

Farmers have had mastitis problems in their herds for many years. They have asked many questions about the disease. Researchers in Michigan and other states have found answers to many of their questions.

One of the most important facts scientists have uncovered is that there are many kinds and many causes of mastitis, and all may produce the same symptoms. Although most diseases have one specific cause, mastitis has many causes. Germs of various families of strep, staph, coli, pseudomonas, clostridia, yeasts, molds, fungi and, possibly viruses may cause the disease. Cases resulting from these living organisms are called *infectious* mastitis.

Noninfectious

Another large group of causes produce *noninfectious* mastitis. This results from injury, chilling, accidents, or physiological or body adjustment. Accidents can occur in the barn, pasture, or barnyard and cause bruising or other injury to the udder.

Some causes of noninfectious mastitis are outlined below.

Improper milking

- Milkers on too long or on too soon
- Lack of individual attention to some quarters
- Improper washing and dipping
- Solution too hot or too cold



Fig. 1. Chapped teat ends (note lighter areas) open the door to mastitis.

- Solution too strong
- Solution weak or dirty
- Chapping from failure to dry, etc.

- Incorrect machine installation and adjustments
- Dirty pipelines and connections
- Inflations fat-filled, dirty, hardened, cracked, wrong size
- Improper removal of milkers; vacuum not broken before removal
- Rough handling, irregularity of schedule, incomplete milking, discomfort, stress

Barnyard or Pasture Causes

- Teats stepped on; cuts from fences, old tools, etc.
- Bruises from fights; being driven too fast by dogs, horses, boys, tractors
- Playfulness when turned out after long confinement
- Activity and excitement associated with heat
- Pressure injury on udder from small or poorly bedded stalls
- Sills too high, broken partitions, obstructions
- Too much mud and manure in yard, stables, and pastures — especially in bogs and marshes

Physiological Changes

- Physiological adjustment strains at freshening and drying up
- Hormonal changes and allergies (needs more study)

Infectious and noninfectious mastitis may occur independently. Some specialists claim that injury must take place before infection can set in. Others believe that infection does occur without injury but does not spread rapidly.

In any case, injuries aid spread. Infections find invasion easier when injuries prepare the way.

Damaged or chapped teat ends and injured udders are ripe for infection. A poor job of milking adds to the possibilities of "a real mess of mastitis." Healthy teat ends and udders may resist infection for long periods, even when germs are present in other cows in the herd. And even though damaged teat ends open the way to infection, if no carriers are present or the milker is careful, the damage may heal before infection occurs. Noninfectious cases clear readily when the cause is removed. (See figure 1.)

If an infection takes hold, mastitis becomes much more serious. The presence of carrier cows adds to the danger of infection. This is especially true if a farmer makes little or no effort to prevent spread between cows.

How farmers can prevent spread of mastitis is described in the following section on Management.

PREVENT MASTITIS WITH GOOD HERD MANAGEMENT

Prevention of mastitis is more important than its cure. Good dairy herd management is the key to prevention. Yet, even with the best management, dairymen may still have mastitis problems. If they do, they will get best control results by combining proper diagnosis, treatment, sanitation, and effective management.

Bacteria capable of causing infectious mastitis are always present in the everyday surroundings of your cows. By preventing injury to the cows, providing proper housing, and following good milking practices, you may build resistance in your herd high enough to prevent infection from taking hold.

Consider the following steps in mastitis control in relation to your herd.

- **Know the health status of your herd.** Have quarter milk samples taken to find out if any cows are infected and, if so, the kind of bacteria causing the trouble. If your herd is free from trouble, you may



Fig. 2. This stall is well bedded but too small to accommodate the cow comfortably and safely.

need such an examination only once or twice a year. Have the infected cows checked often to see what progress you are making with treatment and improved management practices.

● **Make management changes to remove the causes of infection.** Once you know the situation in your herd, you can adjust cow handling and milking procedures to prevent spread of infection (as well as use treatment to wipe out existing infection). Milk heifers first, clean cows next, suspected mastitis cows third, and any cows known to be infected last.

If you use several milker units for a large herd, limit one unit to infected animals. Use a strip cup at every milking and the California mastitis test weekly to get a warning before serious trouble hits your herd. (See page 13.)

● **Avoid udder and teat injury.** If your cows' teats are chapped, scratched, cut, or crushed by being stepped on, or the udder shows signs of being bumped and bruised, look for the cause. Inspect your barn — are the stalls big enough for your cows? Are the lots and fields free of wire, pieces of metal, and other junk that may cause injury? Are the fences well stretched to discourage any cows from trying to go through or over?

To avoid udder injury:

1. Provide stanchion barn stalls that are well bedded and large enough for your cows. Stalls should be big enough so cows will not stand in the gutter and udders will not hang over the edge of the platform as in Fig. 2.

2. Pave your lot near the barn where cows may be confined or travel on the way to the barn.

3. Get rid of high sills or other hazards in the area traveled by the cows.

4. To avoid chapping, keep bacteria-killing solutions for washing teats and udders within recommended strength. If chapping or sore teats are a problem, use an udder ointment or lotion that is mild in odor and that will be absorbed before the next milking.

5. Keep yards and fields free from any debris that might cause injury.

● **Adopt a milking routine that will promote high milk production and udder health.** Proper operation of the milking machine is perhaps the greatest contributing factor to healthy udders.

1. Use a strip cup to check 2 or 3 streams of milk from each quarter. This practice indicates the presence of abnormal milk, makes



Fig. 3. Strip cup used in checking milk from each quarter before milking.

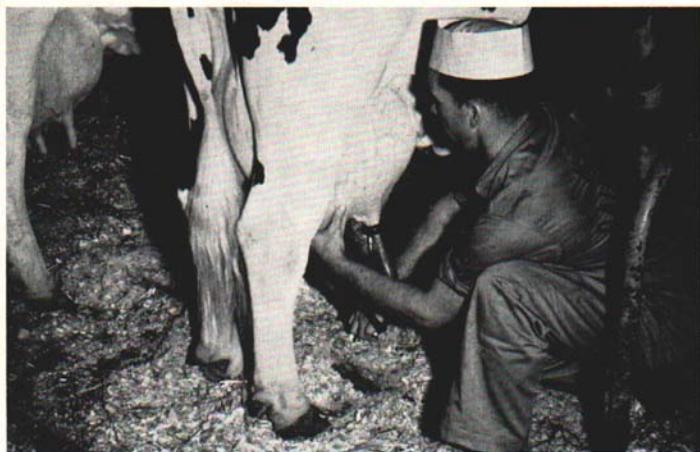


Fig. 4. Gentle handling of udders and a close watch on machines are both musts in good herd management.

sure that the teat canal is open, and eliminates high-bacteria-count milk from the milk supply.

2. Wash the udder with warm, sanitizing solution (chlorine or other bactericides) 1 or 2 minutes before milking; then wipe dry. This prepares the cow for milking by stimulating milk letdown. It also provides a clean teat surface, which contributes to high-quality milk.

To wash the udder, spray with a solution, then wipe with a paper towel; or wash with an individual towel which has soaked in the sanitizing solution.

3. Put the milking machine on within 1 or 2 minutes after preparing the cow. Train your cows to milk rapidly. Experience has shown there is less trouble with mastitis in herds where average milking time is 3 to 4 minutes per cow. Some cows take longer, but most of them will respond to shorter milking time.

It is important that an operator handle no more than two machines (in a stanchion barn) so that he is on hand to check his cows, manipulate the udder for machine stripping, and get the machine off in the shortest possible time. Where a pipeline milker is available, a good operator can handle three machines. Some cows milk out unevenly, so drop the teat cup off a quarter as soon as it is milked out.

Remove the machine gently by breaking the vacuum so as to protect the muscle on the teat opening.

4. As soon as you remove the machine, disinfect the lower half-inch of each teat with sanitizing solution. Use a cup for individual teat dipping or a container big enough to dip all four teats at one time. Keep the solution clean and at proper strength.¹

5. After milking each cow, rinse the teat cups in cold or lukewarm water to remove the milk. Then dip them in a chlorine solu-

¹ Make up chlorine solutions with a maximum of 200 parts per million (p.p.m.).

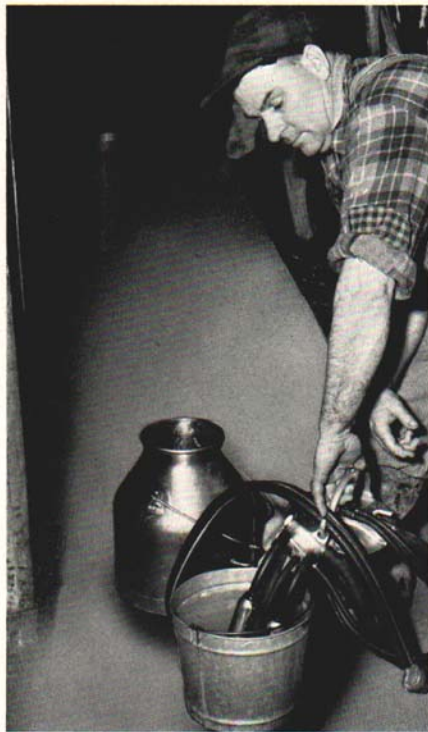


Fig. 5. Rinse the machine with cold or lukewarm water immediately after milking each cow. Then dip in a sanitizing solution.

tion or other approved sanitizing agent. (The pre-rinse helps maintain the strength of your chlorine solution.) For maximum benefits, the teat cups should be exposed to the solution for 1 to 2 minutes, counting from when they go into the solution until they are put on the cow.

Avoid air lock to make sure the solution contacts the entire inner surface of each teat cup inflation.

● **Keep milking machines clean and working properly.** If your milking machine is to remove the maximum amount of milk in the shortest possible time, it must be in good mechanical condition. Major items that need checking are: inches of vacuum, pulsation rate, and condition of the inflations. If the vacuum lines were properly installed and the pulsator adjusted correctly, it is up to you to see that the equipment is properly maintained.



Fig. 6. Checking the vacuum pressure is necessary to maintain proper milking machine operation.

1. Check the vacuum pressure at several points along the line with the minimum and maximum number of units operating. Clean the vacuum line at least every 6 months and more often if you know that milk has gotten into the line. Use the following procedure:

- (a) Prepare a lye solution by adding a 13-ounce can of lye to a 12- to 14-quart pail of hot water. Use no more solution at one time than tank capacity on the milking machine pump.
- (b) Using the airhose, suck about 1 quart of the solution into the stall cock nearest the pump. Do the same at each stall

cock, working away from the pump. (In case the line hasn't been cleaned for some time, this should avoid breaking loose scale that would plug the line.) If you flush the line monthly, you can draw all the solution into the last stall cock.

- (c) Drain the lye solution out of the pump tank.
- (d) Rinse the line with hot water; use the same procedure as for lye solution.
- (e) Let the pump run with all stall cocks open to dry out the line. A drop or two of oil on each stall cock will prevent corrosion.

2. Take the milking machine apart and wash it thoroughly after every milking. The following procedure is suggested:

- (a) Rinse with cold or lukewarm water immediately after milking.
- (b) Brush-wash all equipment in warm water containing a good dairy cleaner.
- (c) Rinse in hot water and place on storage racks.
- (d) Rinse all equipment just before use with a bacteria-killing solution of proper strength.
- (e) Where inspection service permits, place the teat cup assembly on a rack between milkings and soak it in a 0.5 percent lye solution. (Make up a stock solution by adding one 13-ounce can of lye to 1 gallon of water. Add 6 ounces of this stock solution to 1 gallon of water for the solution rack).
- (f) To prevent milkstone deposits, use an acid cleaner once a week on all equipment.

3. Keep inflations clean, elastic, and in proper shape for fast and complete milking. Milk fat weakens elasticity of rubber and encourages bacteria growth; lye will remove this milk fat.

- (a) To prepare this lye solution, add one 13-ounce can of lye to each 1½ to 2 gallons of water needed to cover the inflations. A steel pail with holder as shown in Fig. 7 is very satisfactory. (A covered container will protect children from the strong lye solution.)
- (b) To care for inflations properly, use two sets of inflations. While you use one set for a week, soak the other set in lye solution. Once a week, remove the rubber that has been soaking in the lye solution, rinse, brush with a good washing solution, and exchange with those that have been on the machine.



Fig. 7. Covered container for storing caustic lye solution.

● **Select healthy herd replacements.** The best policy is to raise your own replacements to avoid bringing disease into the herd. Manage your calves and heifers to guard against bacteria invasion of the udder tissue. Keep young calves in individual pens or stanchioned at feeding to avoid their sucking one another. Sucking breaks the teat seal, this opening the way for mastitis germs to enter and become established in the udder. If you buy cows, be sure they have been tested for mastitis infection.

Make a regular routine of these various items of herd management and milking procedures. It may seem like an overwhelming task. You will spend less time and effort with this recommended routine than if your cows become infected with mastitis and require individual attention. Then you will be concerned with diagnosis and treatment.

DIAGNOSIS AND TREATMENT

Proper diagnosis is the first step in a mastitis control program. Until you learn the condition of all the cows in your herd, you won't know where to begin cutting out mastitis losses.

First, find and treat the "carrier cows," or cows that are actively infected but that show no outward symptoms. Often, the cows that

you least suspect are the ones that quietly but surely spread mastitis through your herd.

How to Find Carrier Cows

Several tests will help you to spot the cows that are responsible for mastitis spread. Use a strip cup regularly so you can spot the first abnormal milk. Don't trust a strip cup, though, for the earliest warning of mastitis. Infection has usually existed for some time before abnormal milk shows up.

One barn test, the California mastitis test or CMT, indicates the amount of irritation to an udder. This irritation can lead to later infection; it warns the dairyman that he should improve his milking and management practices to prevent later infection. If you use this test, run it weekly; if many reactions are apparent, further cultural or laboratory testing needs to be done. CMT does not detect infections nor does it tell the difference between noninfectious and infectious mastitis. *It should not be the only basis for an antibiotic treatment program.*

CMT material can be purchased from your local veterinarian.



Fig. 8. Visual strip cup examination of milk to check for abnormalities.



Fig. 9. California Mastitis Test (CMT) showing changes in milk due to irritation in the udder.

None of the barn tests which the dairyman carries on are accurate enough to be the only basis for a mastitis control program. They don't show all the infected quarters, they don't tell which cases are infectious and which aren't, and they give no clue as to the cause of infection.

Every dairyman should periodically arrange for a careful collection of milk from all quarters and send it to a laboratory for cultural or microscopic examination. Better yet, use a local veterinarian — he's qualified to collect and test milk to establish the status of each cow in your herd.

Treat Only After Diagnosis

In too many cases, dairymen treat their own cows with antibiotics without first using laboratory tests to find whether treatment is needed and what antibiotic to use. Only in emergency cases should treatment be made without first seeing lab results. In an emergency, call a veterinarian to take a milk sample from each quarter, then treat with the antibiotic that he feels is best. Be sure to take a sample before treatment, otherwise you can't detect the type of infection.



Fig. 10. Collection of milk sample for laboratory diagnosis.

Normally, when dealing with acute mastitis, have your veterinarian choose the proper antibiotic according to past experience — being sure to sample before treatment. If a herd is experiencing many flare-

ups, collect samples, then go ahead and treat the cows. Send the samples to a laboratory for culture and sensitivity tests. The laboratory will grow the organism on several test plates, then put various antibiotics on the plates to find which ones control the organism. The one that works in the lab is most likely to work in the cow's udder.

Make another test 7 to 10 days after treating your cows to check the success of the treatment. Continue retesting and retreatment until all animals test negative. Ridding a herd of infectious mastitis usually takes about 3 to 5 months of an intensive program.

Disadvantages of Random Treatment

To be effective, antibiotic treatment for mastitis must fit the cause and conditions. To use antibiotics at random without proper diagnosis can be expensive and dangerous for several reasons.

First, if the mastitis is noninfectious, antibiotics have limited value; instead, the cause of irritation must be eliminated. (See Causes of Noninfectious Mastitis, page 4.)

To treat all quarters is expensive, and it causes loss of unnecessary milk, *since milk from treated quarters must be discarded for 72 hours after treatment*. And treating only quarters that show symptoms often results in missing many quarters that are harboring infectious agents. The most good is accomplished when early detection — possible *before* blobs show up in the strip cup — leads to treatment of infected quarters. This will prevent further damage to the udders.



Fig. 11. Laboratory diagnosis of milk sample.



Fig. 12. Treatment of cow with infected quarters.

Careless use of antibiotics can result in the establishment of resistant organisms and organisms not usually found in the udder. These new organisms may not respond to present antibiotics. And careless handling of injection tools or untrained treatment of abnormal conditions can often be a further cause of the condition that is supposedly being cured.

Treatment for mastitis involves overall prevention in the herd as well as drug treatment for individual cows. Research has shown that drug treatment alone doesn't do the job — it takes a complete management program.

Results in two test herds brought this out. In one herd, 24 to 36 quarters were treated monthly with drugs selected by laboratory tests. In spite of these repeated treatments, mastitis continued to pester the herd. The reinfection took place between treatments because management practices weren't changed.

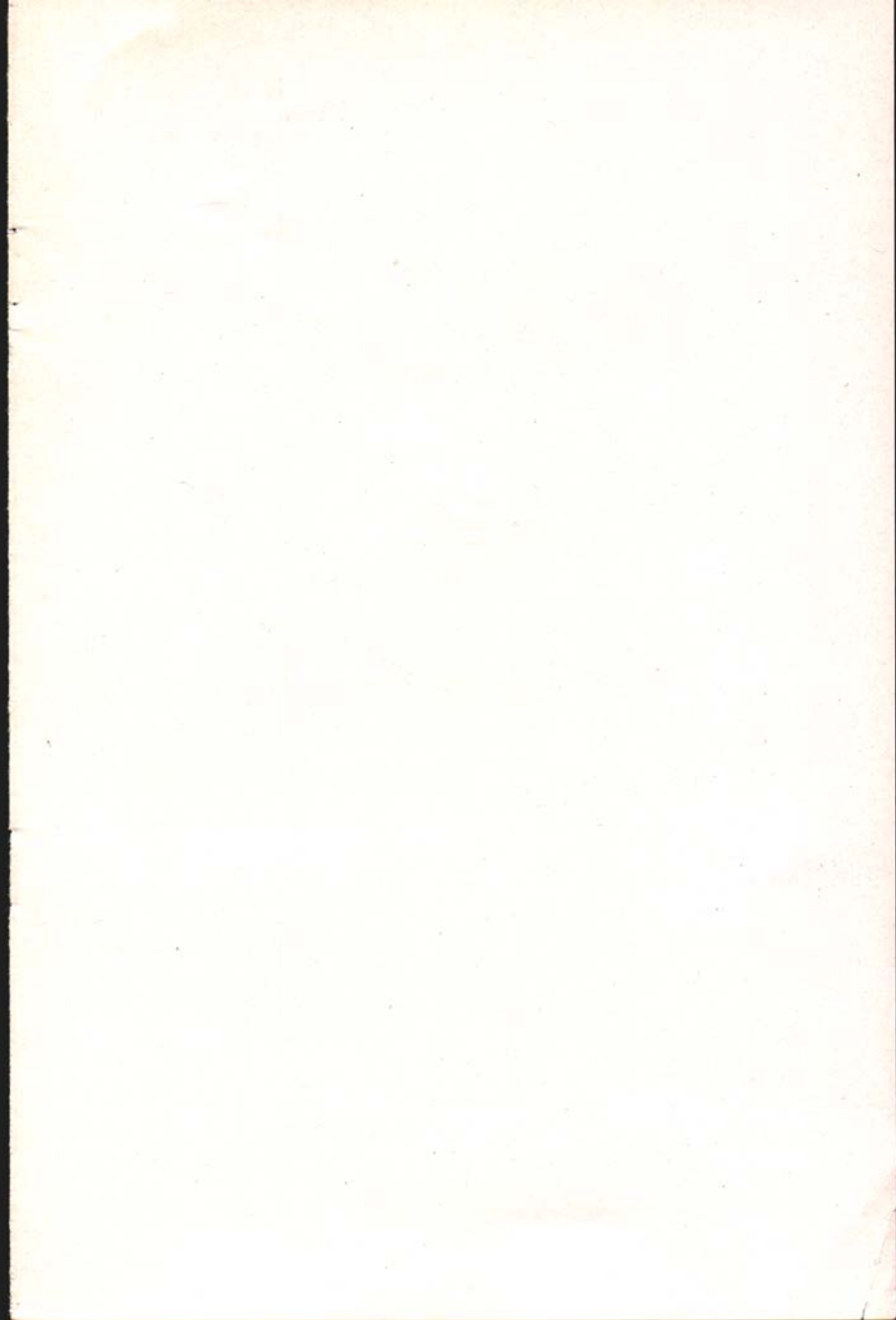
In another herd, negative results came after 4 months of testing, treating, and improved management practices. This herd was still free of mastitis 6 months later.

Right now, there are no antibiotics that can be injected into muscles that will eliminate bacterial organisms from the udder. The best use for antibiotics is infusion into the udder. However, if an animal has a systemic involvement, parenteral treatment (injection into muscles, veins, or abdominal cavity) may be of value. The fact that the obvious signs such as garget no longer exist doesn't mean the animal is free of bacterial agents.

Dairymen often ask about vaccination for preventing mastitis. Up to now, testing programs with various vaccines indicate that they offer no cures and little protection. Vaccines may lessen the outward signs of abnormal milk problems.

When accurate, reliable diagnostic service is available from your local veterinarian, his services for handling mastitis problems are valuable. Savings resulting from his service will more than equal the cost of home treatment by the dairyman.





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