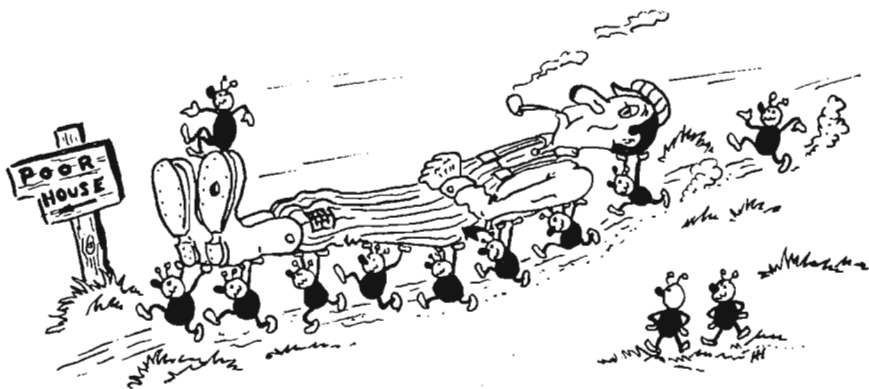


Control---

MASTITIS IN DAIRY CATTLE

--- J. O. Schnautz



"THESE GUYS ARE EASY
WHEN THEY DON'T FIGHT
BACK !!"

Station Bulletin 545

October 1954

AGRICULTURAL EXPERIMENT STATION
OREGON STATE COLLEGE

Corvallis

Oregon

Control---

MASTITIS IN DAIRY CATTLE

**Here are answers to 28 questions
about controlling mastitis in dairy cattle**

--- J. O. Schnautz

Veterinarian, Department of Veterinary Medicine

MASTITIS CONTINUES to be the foremost problem in dairying. Mastitis (garget, caked udder) reduces the value of the best milk cow to carcass value. It is your problem to reduce losses by proper prevention and control measures.

Q. What is mastitis?

A. Mastitis is an inflammation of the udder. It usually is caused by infective bacteria.

Q. How seriously is production affected by mastitis?

A. Conservative estimates place national milk losses above 20 per cent. Exact figures are not available because of the complexity of the problem. In the individual cow, production may be reduced or completely lost temporarily or permanently in one or more quarters. This is repeated in every affected animal in the herd. In many herds mastitis has made dairy production economically unsound.

Q. Is mastitis contagious?

A. Yes. Chronic cases as well as acute cases spread organisms that are infective to other teats of the same cow or to other cows. The organisms are commonly carried on the hands of the milkers, especially if wet milking is permitted, and by the teat cups of milking machines.

Q. What causes mastitis?

A. Bacteria are usually the cause. Injuries, such as bruises, cuts, and sores, aid the entrance of the infective bacteria. Poor management and careless milking methods may add to occurrence.

Q. What bacteria cause mastitis?

A. Most mastitis is a direct result of streptococcal or staphylococcal infection but many other types of organisms occasionally cause udder infection. The infective bacteria usually are present in the udder unnoticed for days to months, but symptoms appear when conditions occur that reduce resistance in the cow's udder.

Q. Are all cases of mastitis detected immediately?

A. No. The infection may be chronic, causing little or no swelling or pain, and little or no change in the milk. Examination of milk samples during the dormant stage detects infection. The dormant stage is a good time to treat. This chronic condition may become active at any time. Flakes, slugs, and other changes in appearance of the milk, as well as off flavor and sometimes a peculiar odor, are characteristics of mastitis milk. Milk production usually is reduced or stopped completely. Acute cases cause redness

of the teats and udder, swelling, fever, and pain. The condition may remain local in the udder, or the cow may become sick generally, with serious involvements, even loss of udder or death of the animal.

Q. What are some mastitis symptoms?

A. Listed below are some of the most frequent symptoms. Any or all of these conditions may indicate mastitis infections in a herd:

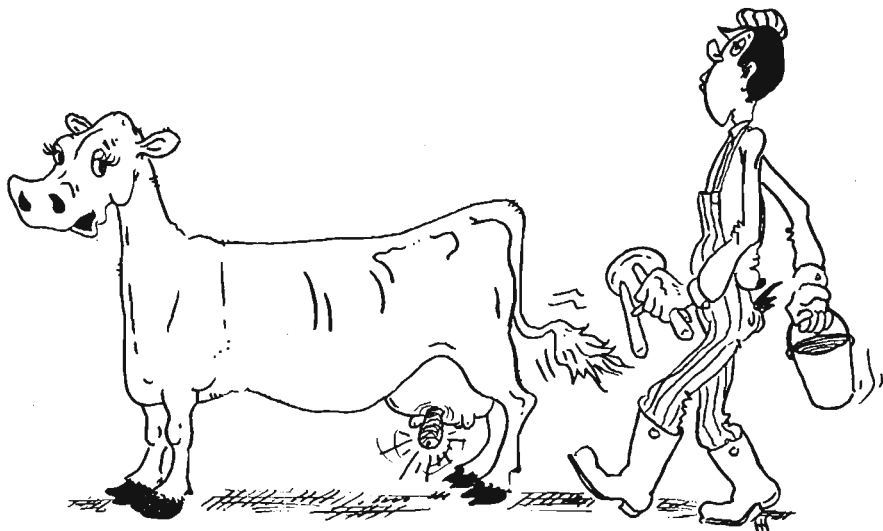
- Blind quarters and meaty udders.
- Lumps in udders.
- Lumps, flakes, strings, and whey in strip cup.
- Difficulty in straining milk.
- End of teat sore or sealed over.
- Sore or swollen teat causing milking to be painful to the cow.
- Milk reduced in amount and changed in odor, flavor, and appearance.

- Udder swollen, red, and hot.
- Cow sick and off feed.
- Udder may become blue, cold, necrotic and slough off, and cow may die.
- High bacteria count.

Q. What is the best milking procedure?

A. The question of "hand milking vs. machine milking" has been replaced by "What is the best type of machine?" Let's discuss briefly some of the normal physiology and anatomy associated with milking, to point out the possible disturbances that can be prevented.

One minute of udder manipulation and massage while washing, wiping, and strip-cup testing stimulates the release of the hormone oxytocin from the posterior lobe of the pituitary gland. Oxytocin stimulates the milk



**"IF I COULD ONLY TELL HIM TO
HANDLE THAT ONE GENTLY !!!"**

The first indication of mastitis is often a change in a cow's good behavior due to teat and udder pain.

glands to contract, forcing the milk they have stored toward the teats. Oxytocin acts when the cow is contented. Any acute disturbance such as annoyance, pain, or fright stimulates the flow of another hormone, adrenaline, by the adrenal glands. Adrenaline prevents the oxytocic effect and thus the milk is "held up" by no wilful control of the cow. Milking should take complete advantage of this hormone activity beginning within a minute after the thorough stimulation, and finishing within 7 minutes thereafter.

Vacuum of the machine should not exceed 15 pounds, but good milking can be done at a lower vacuum. Vacuum for the machine and unit should be adjusted properly at installation and tested regularly but not tampered with by the milker. Rapid milking saves time. It also develops better milking habits and reduces creeping and vacuum damage that will occur when the machine is hanging on a milked-out quarter.

Q. How does the anatomy of the cow encourage mastitis?

A. Wounds occur most frequently to cows with large and pendulous udders and/or large teats. Self-inflicted wounds by stepping on these parts is the commonest source of udder injury.

Q. What are some usual udder disturbances leading to mastitis?

A. Wire cuts, cow pox wounds, scratches, wounds opening the milk cistern, and leaking teats are some of the common causes.

Q. How can injured teats be protected from infection?

A. Injuries opening the teat canal are difficult to protect from infection.

Less spectacular wounds often are accompanied with excessive physiological changes of the surrounding tissue and a rapid acute case of mastitis develops. Never minimize a teat or udder injury, since it often aggravates a hidden infection into a mastitis flare-up. It is best to introduce antibiotics into the injured quarters immediately to prevent common mastitis developments. Milking machine injuries are discussed under milking procedure (p. 4).

Q. What conditions may cause a sudden outbreak?

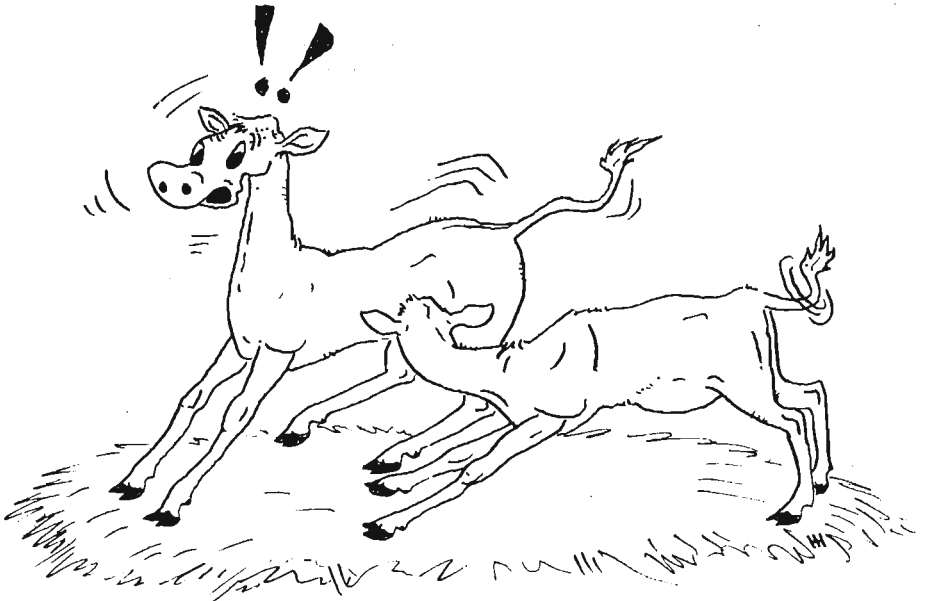
A. Milking changes such as a change of milkers is the history frequently accompanying flareups. Adverse weather conditions are the cause of greater mastitis flareups in the autumn and winter. These are not new infections, but dormant or chronic cases that become acute. Teats injured by being stepped on or sores associated with cow pox are often present. Milking machines in disrepair or left on after milking is completed are frequent offenders. The introduction of an infected cow into the milking string is the most common cause of trouble.

Q. Are all breeds susceptible?

A. Yes. Cows with the largest teats and udders are more often affected because of mechanical injury to the teats and udder.

Q. What are the probabilities of a clean herd becoming infected?

A. Safeguards for purchasing cows should include: Isolation of the animal until tests are completed, bacteriological examination of the milk, and a careful examination of the udder.



“SURELY YOU WEREN'T TOLD
ABOUT MASTITIS !”

Sucking often causes permanent mastitis. Raise calves separately during the milk feeding age.

Q. At what age are cows affected?

A. All ages may be affected and the cow is continually exposed to mastitis. Older animals are more likely to be affected because of the greater length of exposure time.

Q. Why do some heifers have infected udders at their first freshening?

A. Pail-fed calves tend to suck each other. Sucking removes the seal in the teat canal. Bacteria can gain entrance. Calves fed mastitis milk are therefore likely to infect each other while sucking. Such infected heifers will often have active mastitis before their first freshening. Young calves while receiving milk should have iso-

lated stalls where sucking others is impossible. When isolation is not practical, tie calves separately for about an hour after feeding or until the desire for sucking is gone.

Q. Can mastitis be treated successfully with drugs?

A. Yes, if treated early. Careful udder palpation should detect those animals that need to be culled. Always suspect a lumpy udder as being mastitis infected. Collect fore milk for laboratory examination. Bacteriological findings are good guides for treatment. Recheck milk samples 3 weeks after treatment, but continue treatment and sampling until the herd is free from infection. It is usually best to have your veterinarian cull cows which don't

respond after two or three series of treatments. Only after following satisfactory sanitary measures and desirable milking and isolation procedures should treatment be attempted with chronic infections.

Q. Is it necessary to treat all infected animals?

A. Yes. Remove and isolate animals showing the presence of infective bacteria until treatment is successful.

Q. How effectively have drugs eliminated the infection?

A. Drugs have been used in eliminating streptococci, especially *S. agalactiae*. Their efficiency in properly selected cases, after microscopic examinations, ranges from 50 to 95 per

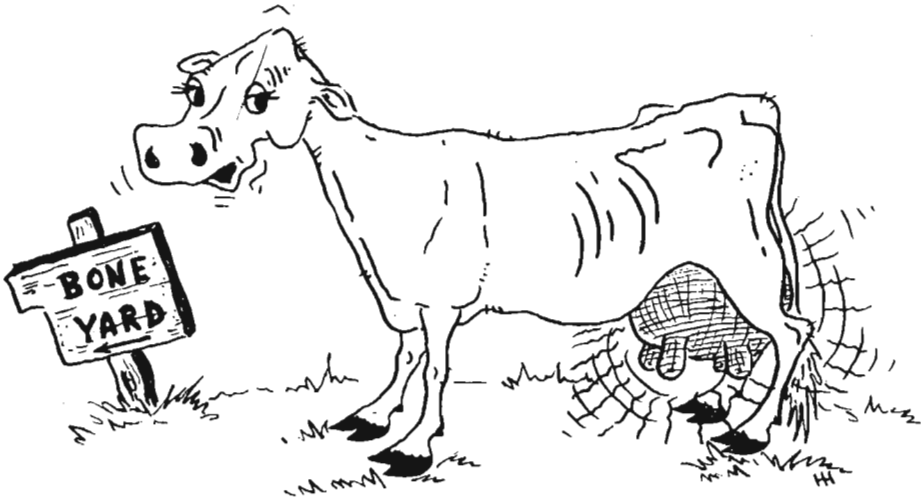
cent cures. The efficiency varies with prevailing conditions.

Q. How is the appropriate treatment determined?

A. Consider condition of the udder, type of organisms present, as determined by microscopic examination, and stage of lactation when selecting a treatment.

Q. Which drugs are effective?

A. Most treatment is directed first toward removing *Streptococcus agalactiae*. Penicillin has proved to be effective for the above organism in dosages beginning as low as 25,000 units per quarter. More penicillin per injection gives a greater number of recoveries until 100,000 to 200,000 unit dosage is



"IT SURE GETS BLUE
IN A HURRY!!"

Immediate treatment is important in controlling mastitis. The infection spreads rapidly and udder damage also may spread in a few days.

reached, the dose being governed by the size of the quarter and the type of organism present. The superiority of any one drug or combination is debatable. Streptomycin usually is added to the penicillin in the prepared udder treatments. Large doses of streptomycin are effective in the acute gangrenous cases of mastitis due to gram negative organisms. Call your veterinarian immediately when gangrenous udder infections occur. Aureomycin, as well as terramycin and neomycin as prepared for udder infusion, have proved effective. Sulfas and antibiotic combinations also are effective. When one series of treatments has been administered, a change to another drug often eliminates organisms that have a natural or acquired resistance to the first drug used.

Q. How often should an infected quarter be treated?

A. Three treatments for the penicillin or penicillin-streptomycin combination are recommended. Treat at 24-hour intervals, milking out at the 12-hour periods between treatments. Another method is treating immediately after each milking. Two treatments for aureomycin have proved advisable, the treatments being 24 or 48 hours apart while milking out at regular milking.

Q. What form of injection is preferred?

A. The ointment type of material has proved effective. Ease of application has made it the universal choice.

Q. Is treatment economical?

A. Antibiotics are becoming less expensive. Early treatment is more than 75 per cent effective. Treatment in re-

cent infections is usually completely successful, and treatment is much cheaper than replacing the cow. Replacements, besides being expensive, must be checked for mastitis and may possibly bring other diseases into the herd, such as brucellosis, tuberculosis, and reproductive diseases.

Q. How should treatment be checked?

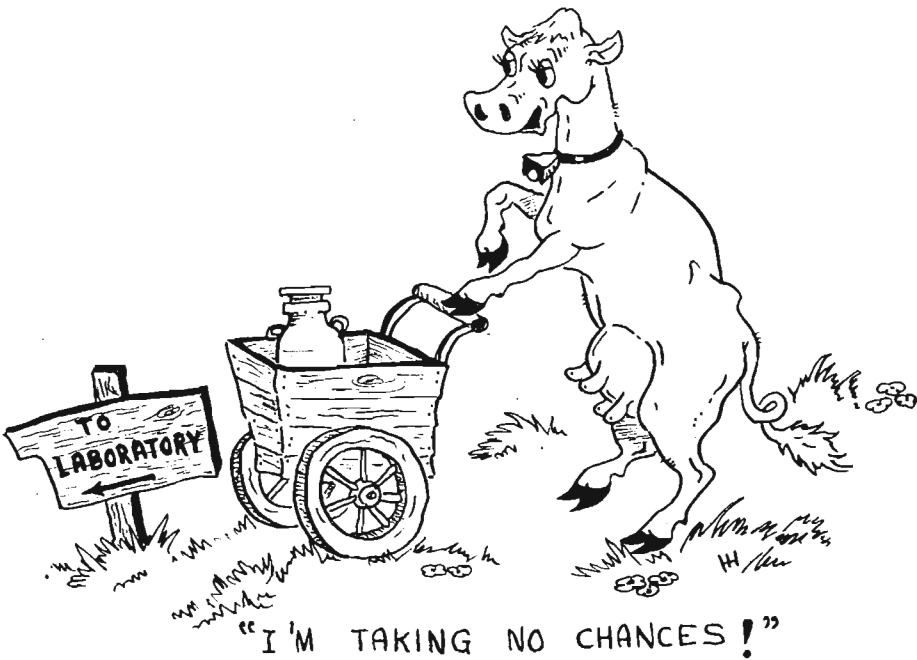
A. Laboratory tests are most desirable. Examination 3 weeks after treatment is recommended and should be made to find out if additional treatment is necessary.

Q. Will animals once cured be immune to mastitis?

A. Infected quarters that have been definitely cured may be re-infected, especially if they are leaky or injured, thus allowing an easy avenue of entrance for infective bacteria. Otherwise, they appear to be as resistant as any other healthy quarter. Infection may enter at any subsequent time. It is therefore essential to employ good sanitation practices and provide the best of care for all animals.

Q. What type of shelter helps control mastitis?

A. Quarters should be clean and well ventilated to insure good health of the animal. Deep, dry bedding should be supplied constantly in the quarters. Loafing sheds have several advantages over stanchions, but more space per cow is needed. Sometimes animals have trouble rising. Such animals frequently injure their teats and udder in the stanchion type of quarters.



Test newly acquired animals or animals you think might have mastitis. Testing, followed by proper treatment, gives best results and reduces chances of hard-to-cure infections.

Q. How should milk be sampled for a laboratory test?

A. Individual quarter samples are best. Samples must be taken with sterile precautions. The fore milk is the more heavily laden with bacteria, and their effects; hence the samples should be collected after the udder is prepared for milking. The teats, especially the ends, should be swabbed with a good germicide such as 70% alcohol. The hands of the milker must be as

clean and sterile as the teat from which the sample is taken. The tube should be slanted while the sample is being taken, to reduce the possibility of falling particles entering the open tube. The cap or stopper should be held so that the portion entering the tube does not become contaminated. Tubes should be filled two-thirds full to prevent milk leakage around the stopper or cap. Samples should be refrigerated until they reach the laboratory.

Protecting a Herd from Mastitis

Sound dairy methods with a fundamental knowledge and practice of principles of sanitation and hygiene are essential. Here are some suggestions:

1. **Raise your own replacements.** This removes the threat from bringing new animals that may be infected into the herd.

2. If you buy, purchase replacement animals that have been in full production a month or longer so that milk can be bacteriologically analyzed and the udder may be examined manually when milked out. Isolate all purchases until these examinations have been made.

3. **Feed lightly a week to ten days before calving** and continue to do so until the udder returns to normal. Then increase feed gradually. Pre-calving milking reduces congestion in severely congested udders.

4. **Use strip cup** on each animal every milking.

5. **Place infected cows at one end of milking string** if an isolation stable is not available. Never let infected animals stand beside healthy ones. Always milk infected animals last and milk infected quarters by hand. Infected milk should not be used for human consumption. Calves and pigs usually thrive on it. Some infected cows with damaged udders may be kept as nurse cows. (Very young calves may develop diarrhea from mastitis milk.) Calves will do well having continuous access to the cow or if placed with the cow at regular feeding time. The calves should be tied separately for $\frac{1}{2}$ hour or placed in separate stalls if removed from the

cow. Isolation of calves is desired to prevent their sucking each other and therefore infecting the juvenile udders. Mastitis organisms placed on the teats of the small calf by the mouth of another calf sucking it causes the bacteria to enter the teat and cause injury. The bacteria may remain in the udder until the heifer matures and at the time of first calving reveal a mastitic udder or blank quarters.

6. **Drying off infected quarters** is often the most satisfactory way to control mastitis spread. Occasionally, such quarters produce normally in the subsequent lactation but usually the organism persists and may become active later or spread the infection to others. The quarter that dries off spontaneously due to mastitis before the regular drying off time, or especially those that do so early in lactation, rarely produce normally again because of glandular tissue damaged.

7. **Do not use teat plugs or tubes.** Treat all teat injuries immediately.

8. **Call your local veterinarian** at the first sign of mastitis. This is the time when the greatest amount of production loss can be averted.

9. **Infected cows** should be dried off carefully. Keep the dry cows where they will be seen frequently. Treat infected quarters before they go dry and treat the udder again after the last milking. If abnormal material accumulates during the dry period, milk out and repeat treatment.

10. **Do not leave machine on too long.** Remove milking machine when milking is completed.

11. **Sanitation** includes a careful and well regulated series of procedures that can be learned by every dairyman. Brief reference only is made to several essential measures:

- Do not permit wet milking.
- Wash hands after milking each cow.
- All dairy quarters should be clean, dry, amply ventilated, and comfortable. Loafing sheds are desirable.
- All milking equipment should be sterilized by steam or adequate chemical means. A chlorine solution of 200 parts per million is satisfactory. Quarternary ammonium compounds are desirable.
- Never milk onto the floor. Infected material may be carried by flies, litter, or direct contact to an uninfected quarter. Milk on the floor produces a good medium for the growth of bacteria.
- Painted or whitewashed walls are highly desirable.
- Lime or superphosphate on floors is beneficial and especially so where floors are not scrubbed.
- Gutters should drain freely and be cleaned at least twice daily.
- Proper ventilation not only aids the general health of the animal but helps reduce humidity and keeps floors dry.
- Clipping of udders and rear quarters facilitates cleaning cows.
- Hands as well as udders should be washed clean and dried immediately before milking.
- Use one towel to wash and dry each udder and then discard or rinse and soak towel in an approved germicide.
- Milking machine should be handled so teat cups do not contact floor, litter, or anything but the teats.
- Rinse, then disinfect, teat cups in germicide after each cow.
- Dipping teats in disinfectant solution after milking is an added safeguard.

12. **There is no satisfactory vaccination** for mastitis.

13. Streptococci, staphylococci, and bacilli that commonly affect the udder **all gain access through the normal teat openings** or through injuries. Infections from the bloodstream were common with tuberculosis, brucellosis, and some of the more rare types of diseases that fortunately are not a serious problem at the present time.

14. **Tests used for mastitis detection** range from very simple to comprehensive and detailed.

- Blotter color tests.
- Microscopic smear tests.
- Culture tests.

The simple color reactions as read in blotter tests give some indication of abnormality. It is a pH (acidity) reading. The pH of the milk is nearly constant in a healthy cow while in the full flow of milk. Some physiological disturbance besides bacterial infection may change the pH.

Tests for clinical evaluation should reveal the type of organisms present and if they are pathogenic to the udder. Treatment subsequent to such a test can be more critically checked and evaluated.

The simple blotter test is desirable as a herd check each 4 to 6 months. Critical laboratory tests should be made to determine quarters needing treatment or retreatment.