Mastitis Control in Small Holder Dairy Cows

Mastitis, a disease that affects the udder is the most underestimated disease of diary cattle causing the highest economic losses. Despite a variety of control strategies available for control of mastitis, the disease remains unabated. On average, every six cows in ten have mastitis. Most farmers associate the disease with swelling and pain in the udder with changes in the milk. However, the disease can also occur without any visible signs.

The central processing unit for milk in the cow is the udder. For a milking cow, this part must be given special attention to avoid any damage and thus decrease milk production.

The aim of this manual is to explain to farmers the causes of mastitis and amount of losses it causes and empower them with the knowledge of how to control it. Farmers need to know that mastitis can never be completely eradicated because the germs that cause the disease are always present in the surrounding of the cow. However, through good management, it can be controlled and the losses considerable reduced.

Most farmers are only aware of the clinical mastitis which they can see through signs. But this is usually a small percent (less than 10 percent) of the disease on a farm. When the disease occurs without visible signs (sub clinical form) the farmers usually will not treat it, although it causes reduction in milk production and can later show signs or even be transmitted to healthy cows.

What is Mastitis?

This is damage of the mammary gland caused by germs which enter into the mammary gland, multiply and harm it, or it may be due to physical injury.

Types of Mastitis

Mastitis can either be clinical or sub-clinical. Clinical mastitis is that which occurs with visible signs while there are no visible signs in case of sub-clinical mastitis.

Clinical Mastitis can be very varying in seriousness. It can occur suddenly with severe swelling and pain in the udder with bad milk.

The animal may become seriously ill and can even die if not given immediate attention. However, it may also be less serious only affecting the udder and showing bad milk without the whole animal looking sick.

Sub-clinical mastitis is the type without visible signs; even the milk looks normal but there are germs in the milk. It is the type of mastitis which is most common and is usually not known by farmers. It is the type that causes the greatest financial losses to the farmer. It can also persist in the udder for a long time and can once in a while cause visible signs and can be spread from one sick cow to a healthy one during milking. On average, every six cows in ten have this type of mastitis.

How does the Udder look?
An udder consists of 4 mammary glands with 4 teats. 60% of milk is produced in the two hind quarters. The udder is held together by ligaments. There is no flow of milk between the 4 glands.

Teats – These vary from 3-14 cm in length and 2-4 cm wide and in different shape.

**What causes Mastitis?**

Most mastitis cases are caused by germs, which live in the surroundings of the cow (shade, milking place, etc) or come from other sick animals. It can also occur when there are no germs as in cases where there is physical injury to the mammary gland. The different causes of mastitis result in different effects on the gland.

**Where does the infection come from?**

Some germs (contagious organisms), only occur within infected mammary glands (staphylococcus aureus, Streptococcus agalactiae, Streptococcus dysgalactiae, Corynebacterium bovis, Mycoplasma). With these germs, infection of new cows occurs when an infection is transferred from the infected cow to a non-infected cow at milking.

Other types of germs that cause mastitis are found within the surroundings (such as cow’s dung, dirty milker’s hands or the mud or the skin of the cow itself).

These are called environmental organisms (E.coli, Klebsiella spp., Enterobacter spp, Citrobacter spp., Pseudomonas aeruginosa, Bacillus cereus, Bacillus licheniformis, Pasteurella spp., Enterococcus faecalis, Streptococcus uberis, Fungi and yeasts). Disease therefore occurs if there is change in the surrounding conditions that result in the germs getting access into the teat, in combination with the cow, whose defense towards infections may become weaker, e.g. when she is stressed.

**How does infection get into the teat/udder?**

Germs are transferred from the surrounding to the teat through the teat end. For contagious germs, this occurs during the milking process. The germs must be carried from one infected cow to another. This could be milker’s hands or udder towels.

**Mastitis is a result of many different factors which interact**

Mastitis comes about by the interaction between the cow, the germs and the surrounding (including man). The germs are always present but cannot produce mastitis unless the cow lets them come into the teat canal. So, by creating good living conditions for the cow; that is; clean surrounding and taking good care of the cows, many mastitis cases can be avoided.

**Natural protection against infection**

The Udder and the teats are covered with skin which is made of tissue and a layer of dead cells which do not naturally allow germs to grow. Thus if the skin is intact, germs do not enter. It is only when the skin
gets damaged that the germs penetrate and cause disease. The teat canal is also lined by dead cells which also contain substances that do not allow germs to grow.

Usually the shape and size of the teat may make the cow easily get disease germs if they are too long or in bad shape. Pointed or rounded teat ends seem to have the best resistance to germs.

The teat end is usually closed. It only opens during milking and takes about 25 minutes after milking. This is illustrated below. If animals lie in dirty environment before the teat ends close, the germs can easily enter. But if the animal remains standing, the ends close and germs cannot enter.

What can the farmer/milker do to avoid mastitis in the cows?

1. **Give the cows good housing conditions**
   - Provide clean and adequately ventilated buildings for the cows
   - Provide sufficient area for the animal to exercise
   - Provide clean, dry and adequate bedding
   - Remove manure regularly and dispose it to a distant area or provide composite pit or to the gardens
   - Provide good drainage to avoid stagnant water ponds.

2. **Give the cows proper feeding**
   Feed the cows with a balanced ration. Be sure that the water supply for your cows is clean and sufficient. Many cows do not get enough water and this reduces milk yield, and it stresses the cow – which increases the risk of mastitis.

3. **Look after your cows systematically and often**
   - Regularly monitor all the cows on the farm for all health problems
   - Check the general condition of the cow
   - Pay particular attention to the udder
   - Always cross check the history of the cow about the previous illness including mastitis before purchase.

4. **Prepare your cows well for milking**
   - The cow’s teats should be washed with an individual towel which are washed, disinfected and dried before each use. Ideally there should be a clean towel for each cow at each milking.
• Use clean, warm water containing disinfectant for washing teats
• Clean the udder and dry it prior to milking
• Clean and wipe teats dry before applying milking salve
• If you use pre-drip, make sure it covers most of the teat and it is thoroughly removed before applying the milking salve.

5. **Milk your cows carefully**

• Use a strip cup to check for abnormal milk
• Cows should be rapidly milked within 5 to 10 minutes
• Hold the teat with the thumb and fore-finger and use the rest to squeeze the milk out completely.
• Apply a post dip disinfectant by dipping most of each teat in the teat dip cup containing disinfectant
• Too much or too little is not good
• Use properly diluted disinfectant for each purpose and make sure it is still effective following manufacturer’s instructions.
• Provide feeds and water to cows so that they remain standing to avoid exposing the open teat ends to germs before they close at least for 2 hours after milking

6. **Start drying off in due time**

• Reduce concentrate intake for several days prior to drying off, usually beginning 7-8 weeks earlier
• This period is also important to prepare the udder for the next lactation and be born as a strong calf
• Factors such as previous milk production, body condition at dry off, previous health history, and age must be considered when planning how to dry off each cow.
• Take away most concentrate feed from the cow, one-two days before the last milking
• Do not stop milking the cow at once but milk the cow every other day
• Make sure you teat-dip the cow’s teat before drying off completely
• Check the udder very carefully during drying off and immediately after drying off
• Provide very clean beddings and surrounding for the cow when she is going to calve.

How to detect Mastitis

Mastitis is detected during examination of the udder which may include:

Detailed inspection with the eyes. Look for the following signs visually (with eyes)

• Is swelling and increased size of the udder
• Do the quarters look the same
• Are there injuries or wounds
• Reddening or blue discoloration

Systematic touching and feeling the udder and teats (palpation). Touch and feel the udder and teats for the following

• Are there scars and changes in the teat?
• Is there hardening, warm quarters/heat, knots?

Milking out and observing abnormalities (color, consistency, smell, taste, solids). Look for abnormal changes in the milk

• Strip out some milk on a dark, shiny plate—preferably a milking cup or a clean mug or plate to detect changes in the milk
• Are there any changes in color, is the milk brown?
• Are there any clots, flakes and pus?
• Does the milk from all four quarters look the same?
• Are there changes in smell or taste?
• Is the milk watery? Wateriness is detected in prolonged cases when the cow is lactating but may also be seen in dry cows
• Does the milk have some blood?

If possible carry out a cow-side test or send samples to a laboratory for additional tests

Quick cow-side tests (screening tests)
These are simple tests which can be done on the cow’s side and immediately reveal whether the cow has mastitis or not. For example

**California mastitis test (CMT).** In normal milk, no changes will be observed in the purple reagent while in infected cases a thick mucus-like clot forms.

**Indicator paper**

When infection occurs in a quarter, a change in acidity of the milk will occur. This change can be tested by the cow’s side using a sensitive indicator paper specifically manufactured for testing for this purpose. There are four spots on the paper one each quarter as shown below. Milk from normal quarters will not change the original yellow color while the milk from diseased quarters will change the yellow spot to green or bluish green. This is a handy test and easier to perform than the CMT.

**Collection of milk samples for sending to the lab**

It is important to collect a good clean sample – otherwise the result will be wrong. Therefore the milk must not be contaminated.

Procedures for collecting samples:

- Disinfect teat ends with a disinfectant solution and clean towel
- Stimulate milk let down and discard first stripping. In dry cows, due to limited milk do not discard any stripped milk
- Carefully scrub teat ends with separate cotton soaked in 70% alcohol without touching the teat end
- Remove the cup from the sample bottle and hold it with inner surface downward in the same hand as the sample bottle. Hold the sample bottle not to allow contamination
- Collect the milk sample at minimum pressure and preferably by a single squeezing of the teat ensuring that the teat end does not touch the tip of the container
- Fill the container more than two thirds capacity
- Transport the samples on ice if its hot weather or if it takes several hours before examination.

When samples are sent to laboratories, tests are conducted to find out

- The germs causing the disease
- The number of cells which are not normally present in milk (somatic cell counts)
- Which drugs can best kill the germs (drug sensitivity)
Look at the entire cow

If the germs have moved to the rest of the body, there will be

- Increased temperature
- Increased breathing and difficulty breathing
- Depression (laziness)
- Decreased feed intake

How to treat Mastitis

There are four broad categories of eliminating mastitis

Supporting the mastitis sick cow for spontaneous recovery

Spontaneous recovery occurs in only 20% of confirmed infections for a variety of mastitis-causing germs, and most occur in quarters with mild or recently acquired infections; rarely in the case of chronic infections

The cow should be generally supported:

- Provide fresh drinking water, high quality feed, and comfortable surrounding
- Provide clean, dry, bedding in well ventilated surroundings

Record daily production, appearances of milk and water and feed intake to monitor recovery progress

Use of anti-inflammatory products can be used but this should be done under veterinary supervision

Frequent stripping of affected quarters (six times a day) is recommended. This increases blood flow in the affected gland and removes germs, improves the ability of the animal to protect herself. Oxytocin may be used to help in milk let down to facilitate removal of milk.

All these ways of support can be given to the cow in order to support her to self cure – but can definitely also be given in combination with any other therapy (medical treatment or alternative treatment)

Culling chronically sick cows

Cull all chronically infected cows. A chronic sick cow may be the source of infection in the herd. Culling is often the only practical means to eliminate chronic infections that do not respond to repeated therapy.

Medical treatment

How to treat with medicine into the teats
Clean the teat end: scrub vigorously with disinfectants such as cotton balls soaked in 70% alcohol and allow to dry

Hands must be thoroughly washed to prevent transmission of infection.

Full insertion of the conventional mastitis tube syringe can result in temporary dilation of the teat end muscle. In addition, the keratin plug that normally seals the teat canal is either pushed aside or partially removed. However both of these situations create a larger than normal teat canal opening, allowing entry of germs.

Medical treatment during lactation

Acute toxic mastitis with coliforms

- Use carefully selected antibiotics
- Administration of electrolyte fluids, anti-inflammatory agents, glucose, bicarbonate, and calcium is recommended

Acute clinical (non-toxic) mastitis

- Intramammary infusion with an approved drug for a minimum of 3 days, accompanied by frequent hand stripping to remove secretions, bacteria and cellular debris is often adequate
- The above treatment should be continued until at least 24 hours after the disappearance of clinical symptoms; otherwise the infection may only be suppressed to the sub-clinical level.

Unseen mastitis

Generally, the treatment of sub-clinical mastitis during lactation is indicated for some germs. The conventional treatment of other sub-clinical infections in lactation is generally not recommended because the cure rate may be as low as 10% and rarely exceeds 50%. Such infections are best treated at drying off.

Medical treatment in drying off

Dry cow therapy produces the best results in suring existing infections caused mainly by contagious germs and it may prevent the development of new infections caused by germs from the surroundings. The potential benefits of dry cow therapy include;

- Higher cure rates than lactation therapy
- Higher concentrations of long-acting antibiotics can be used safely
- Retention time of antibiotic in the udder is longer
- Incidence of new infections during the dry period is reduced
• Clinical mastitis at calving is reduced

Permanent dry-off of quarters with repeated infections

A procedure for retaining good milking cows with repeated infections for future production is to stop milking one quarter which is chronically mastitis. Such a quarter may develop into a smaller and harder gland because of the infection and scar tissue in the gland. When drying off, the risk of spreading the infection to other glands or cows is significantly reduced. The drying off can be done gradually, but can also be further helped through medical treatment of the gland, and stopping milking it afterwards.

Combining treatment in teats with treatment in the body

Sometimes germs hide in the udder behind scar tissue and in the cow’s own cells. These germs are very difficult to reach—but it is better prognosis to treat the cow in the body as well as in the teat, as the blood will take the medicine to the udder and attack the bacteria from behind.

Some medicines for teat treatment do not work well together with the medicines for body treatment. Veterinarians’ recommendations should therefore be followed strictly.

In difficult cases, a veterinarian can be approached for surgical removal of chronically infected quarters.