Mastitis Control in Small Holder Dairy Cows



Vol. I : Farmers' Manual

Denis K. Byarugaba, Jessica L. Nakavuma, Christopher D. Laker, Mette Vaarst, Stephen Kiwemba, and Farouk Bogere

Livestock Systems Research Project

AGRICULTURAL SECTOR PROGRAMME SUPPORT
DANIDA

NATIONAL AGRICULTURAL RESEARCH ORGANISATION
NARO

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2004

MUKONO ZARDI
18 MAY 2007
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"When one pauses to think of the extreme complexity and delicacy of the mammary gland; the fact that it is pummeled along between the hind legs of the cow, lain on, kicked, horned; that it contains milk a suitable medium for the growth of a great number of germs; that such milk is open via the teat canal to contamination and is interfered with at least twice a day, it's surprising that any cow ever escapes mastitis"[1].

[1] Hungerford, (1975). Diseases of livestock. Eigth Edn. Mc. Grawhill, Australia

TABLE OF CONTENTS

Acknowledgment iii

Foreward v

1.0 Introduction 1

2.0 What is mastitis 3

3.0 How does the udder look 5

4.0 What causes mastitis 7

5.0 Natural protection against infection 11

6.0 What can the farmer/milker do to avoid mastitis in the cows 12

7.0 Why make an effort to avoid mastitis 21

8.0 When mastitis occurs: how do you detect it 25

9.0 When mastitis occurs: how do i treat it 33

10.0 Why should i keep records 40

11.0 Empower yourself 42

ACKNOWLEDGEMENT

We are grateful to the Livestock Systems Research Project (LSRP) component of the Agricultural Sector Programme Support (ASPS) funded by DANIDA, which supported mastitis research in smallholder dairy and enabled the publication of this farmers' manual on control of mastitis. Mastitis is a serious disease causing the biggest economic losses to the dairy industry. On average every 6 cows in 10 have mastitis, which is often not recognized by farmers. This manual contains a package of appropriate technologies that resulted from the research and interaction with farmers and other experiences elsewhere.

The smallholder dairy farmers in Jinja have been instrumental in the development and testing of some of the technologies recommended in this manual. We are grateful for their cooperation and readiness to allow us work together to provide solutions to one of the major constraints to increased dairy production. The support and collaboration with the FITCA project in Jinja and other stakeholders is also greatly appreciated

We hope that this manual will be very useful not only to small holder dairy farmers but to all other dairy farmers in reducing the levels of mastitis to a minimum.



Dr. Denis K. Byarugaba
Team Leader, Mastitis Control in Small Holder Dairy-LSRP

FOREWORD

Livestock forms an integral part of the household economy. Dairy production has proven to be a viable tool for household poverty reduction and a vehicle for women emancipation in many developing countries. However the potential for the dairy cow is often constrained by critical health factors that some farmers take for granted. Mastitis is one such factor that is often overlooked and ignored despite high economic losses that it can cause.

This manual is an output of research that farmers in Jinja and scientist from the Livestock Systems Research Program (LSRP) conducted over the last two years. Its publication underscores the role that farmers can play in poverty reduction through sharing of knowledge and information. It is a step towards making farmers drivers as well as beneficiaries of change and social transformation. The farmers and scientists who authored this manual are indebted to DANIDA for the support given to the LSRP component of the Agriculture Sector Program Support (ASPS) in the Ministry of Agriculture, Animal Industry and Fisheries. Being a product of farmers effort, it is simple document that should be able to make a difference in food security and income levels of practicing dairy farmers.



Dr. Cyprian Ebong
NATIONAL COORDINATOR - LSRP

1.0 INTRODUCTION

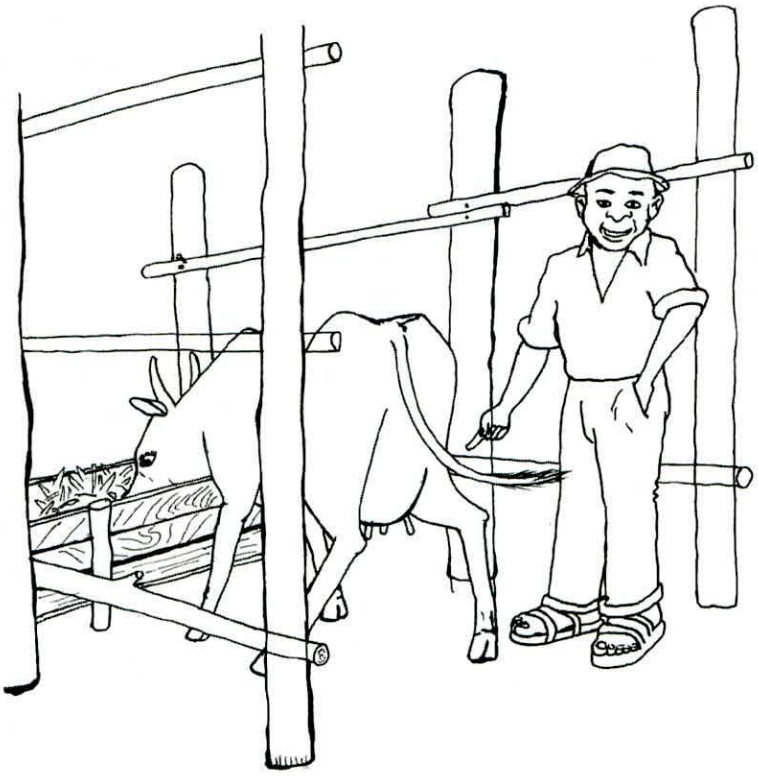
Dairy farming has been growing steadily in Uganda with many farmers adopting high milk producing exotic and cross-bred cattle, and better farming methods. The exotic breeds include the Jersey, Holstein Friesians, Guernsey, Ayshire and the Brown Swiss. Despite efforts to improve dairy farming in Uganda, there still are a number of constraints to increased milk production including diseases, poor feeding and management.

Mastitis, a disease that affects the udder is the most underestimated disease of dairy cattle causing the highest economic losses. Even the dairymen dealing with the cows daily fail to appreciate its full importance. 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.

One of the major objectives of many dairy businesses is making profit from sale of milk, milk products and sometimes the animals. In order to make this profit, every effort must be made to keep the animal healthy and in good condition, well fed and in good surroundings. This enables the cow to produce to her maximum potential. 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 in 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. It is only when the farmers appreciate how mastitis occurs that they can be able to understand and implement the control measures required. The farmers need to know that mastitis can never be completely eradicated because the germs that cause the disease are always present in the surroundings of the cow. However, through good management, it can be controlled and the losses considerably reduced. Most farmers are only aware

of the clinical mastitis which they can see 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. Farmers therefore must show interest in their animals and provide them with good and clean environment to enable them produce to their maximum.



2.0 WHAT IS MASTITIS

2.1 Definition

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.



Swollen udder

2.2 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: This type of mastitis can be varying in seriousness. It can occur suddenly with severe swelling and pain in the udder with bad milk.



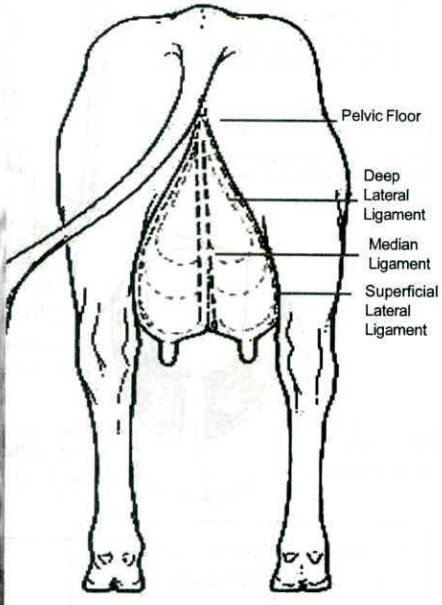
The animal may become seriously ill and can even die if not given immediate attention. However it may also be less serious only affecting the udder and showing bad milk without the whole animal looking sick

Sub-clinical mastitis: This 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.

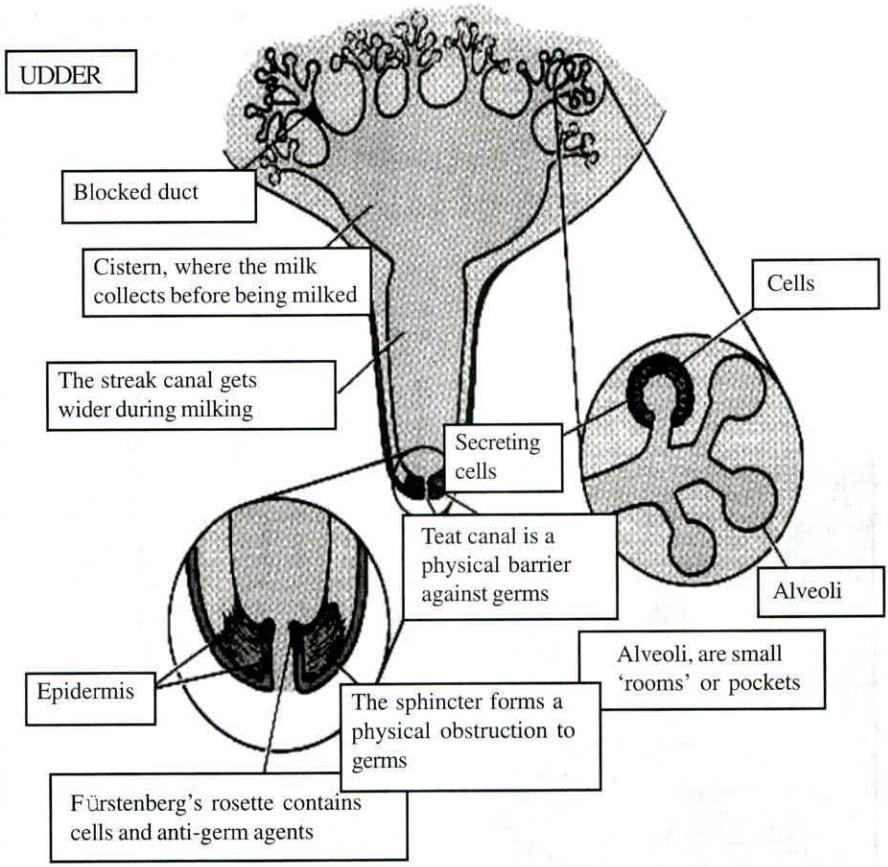
3.0 HOW DOES THE UDDER LOOK

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.



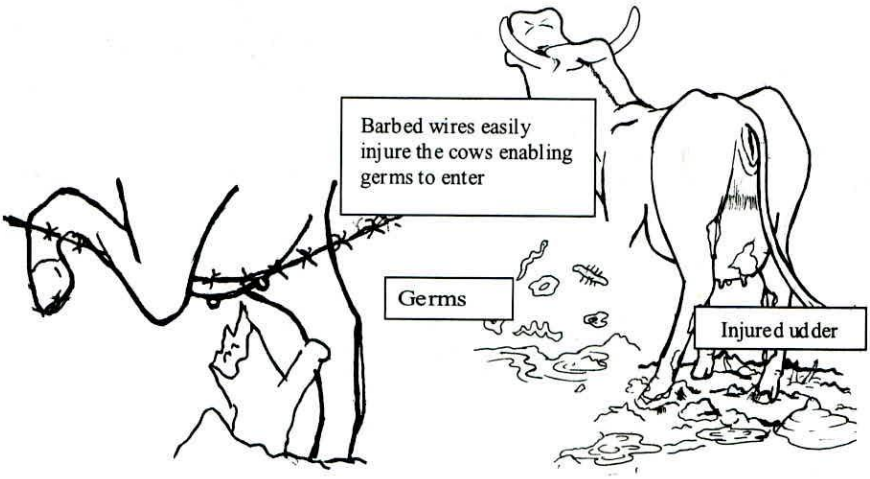


Teats – These vary from 3-14 cm in length and 2-4 cm in width, and in different shape.



4.0 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.

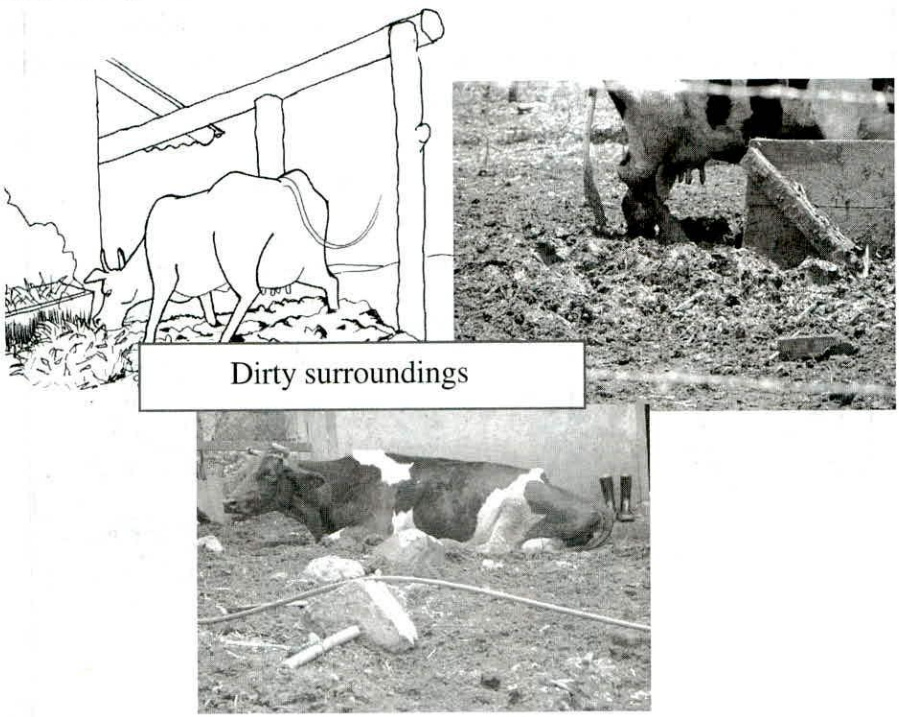


4.1 Where does Infection come from?

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 transfered 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 milkers's hands or the mud or the skin of the cow itself).

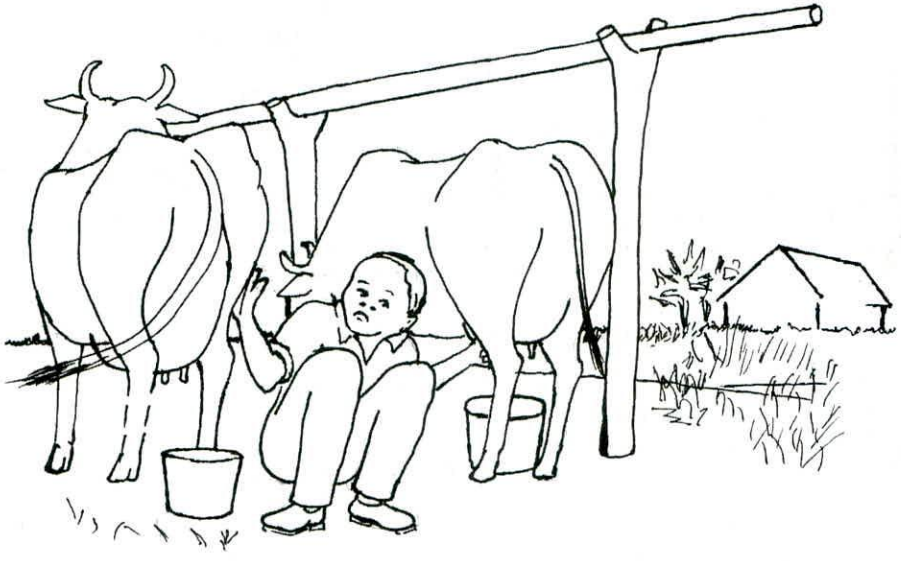


Dirty surroundings

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.

4.2 How does Infection get into the teat/udder

Germs are transferred from the surroundings 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.

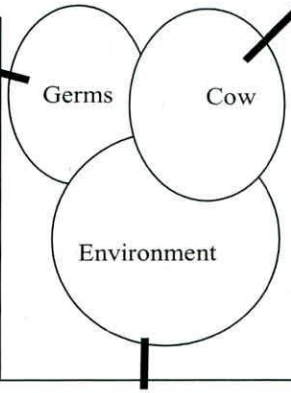


4.3 Mastitis is a result of many different factors which interact

Mastitis comes about by the interaction between the cow, the germs and the surroundings (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 surroundings and taking good care of the cows, many mastitis cases can be avoided.

Factors which bring about mastitis

Germs:
Ability to survive in the surroundings
Ability to enter the teats
Ability to attach and start an infection
Resistance to drugs
The amount (dose) of germs



Cow factors:
Genetics (inherited factors: e.g. shape and size of teats, udder size, milk production)
Breed (high milking breeds more susceptible)
Hormonal factors, e.g. estrogen level
Age and parity – often older cows get mastitis more often
Stage of lactation – most cases are seen around calving and drying off.

Eternal surroundings

Season (rainy or dry season)
Hot weather (causes stress and more mastitis)
Topography

Internal surroundings (Husbandry and Management Practices)

Housing

- System. e.g., zero-grazing gives more mastitis
- Too little space
- Dirty surroundings
- Damp or wet surroundings (Good, dry and comfortable bedding materials prevents mastitis)

Feeding

- Overfeeding with concentrates before calving results in edema (collection of fluid) and increases the risk for mastitis
- Unbalanced feeding reduces the ability of the animal to fight diseases
- Contaminated feeds (feeds with germs) may increase the risk of mastitis

Management routines

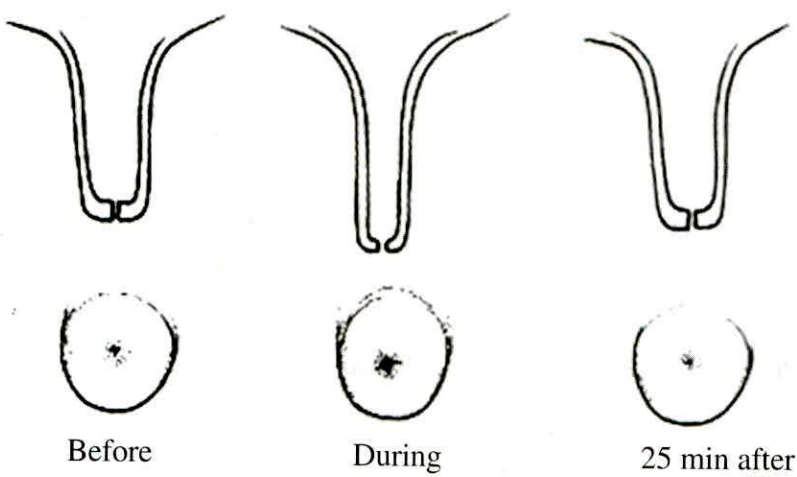
- Lack of hygiene may lead to mastitis.
- Poor milking procedures
  - Pulling teats instead of squeezing them
  - Milking infected cows before clean ones
- Poor methods of drying off – see drying off methods (section 6.6).
- Stress of all kinds increases the risk!
- Human-animal relations! This is a maior source of stress.

5.0 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.

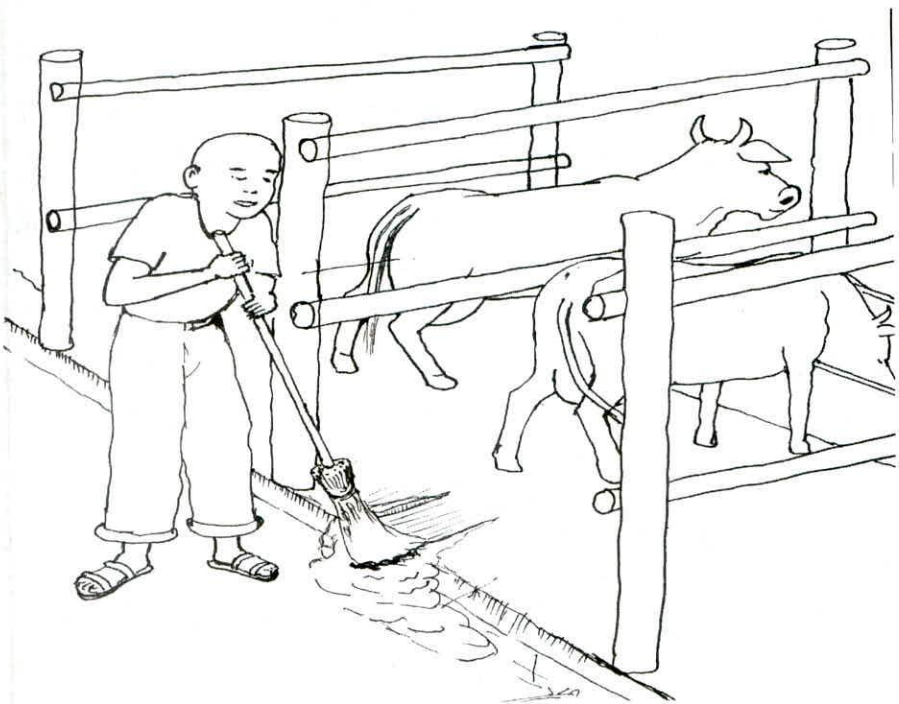
The teat end is usually closed. It only opens during milking and takes about 25 minutes to close after milking. This is illustrated below. If animals lie in dirty environment before the teat ends close, the germs can easily enter. But if the animal remains standing, the ends close and germs cannot enter.



6.0 WHAT CAN THE FARMER/MILKER DO TO AVOID MASTITIS IN THE COWS

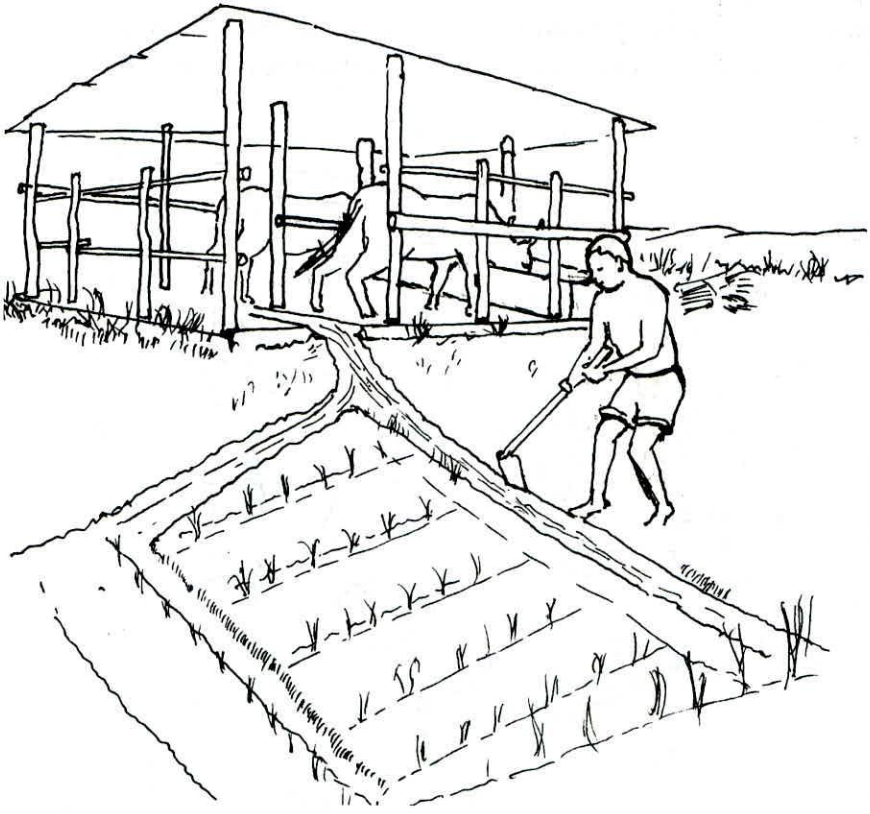
6.1 Give the cows good housing conditions

- 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

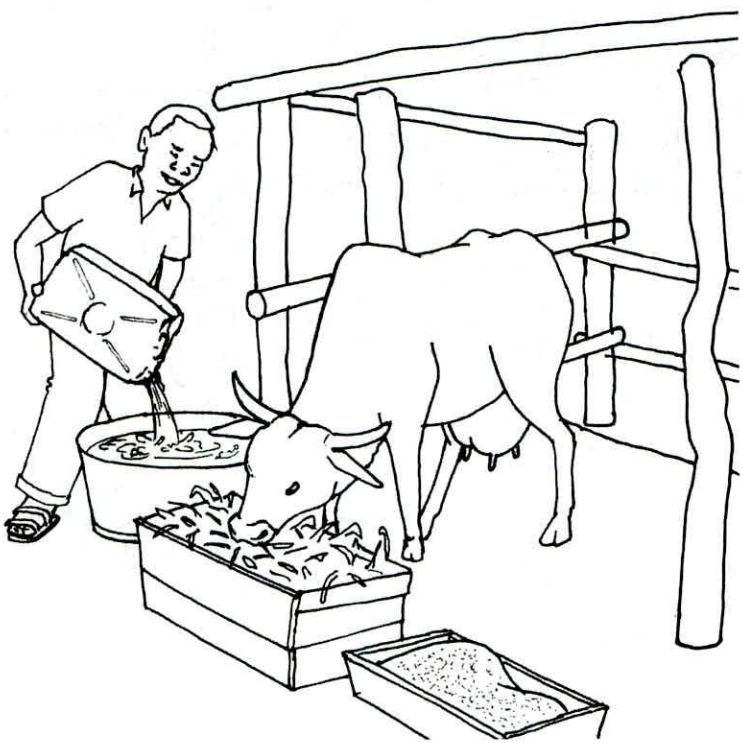
- Provide good drainage to avoid stagnant water ponds



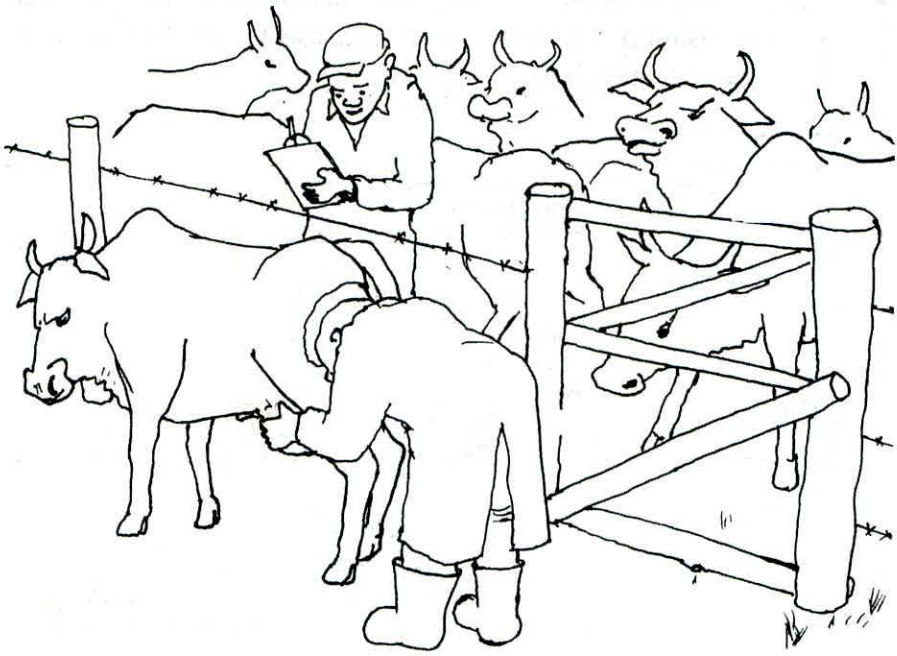
6. 2 Give your cows proper feeding

- 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 the milk yield, and it stresses the cow – which increases the risk of mastitis.



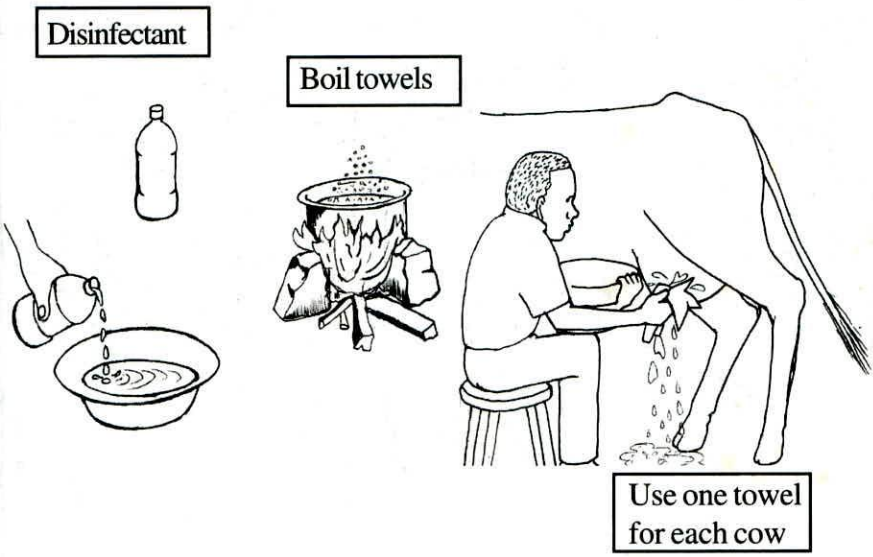
6. 3 Look after your cows systematically and often



- 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 illnesses including mastitis before purchase.

6. 4 Prepare your cows well for milking

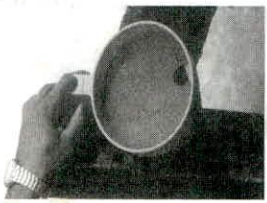
- The cow's teats should be washed with an individual towel which are washed, disinfected and dried before each use. Ideally there should be a clean towel for each cow at each milking.



- 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-dip, make sure it covers most of the teat and it is thoroughly removed before applying the milking salve

6. 5 Milk your cows carefully

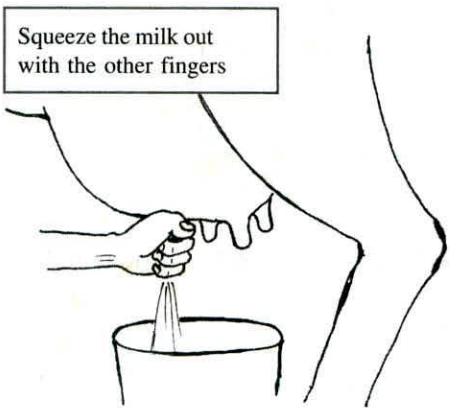
- Use a strip cup to check for abnormal milk



  - Cows should be rapidly milked within 5 to 10 minutes

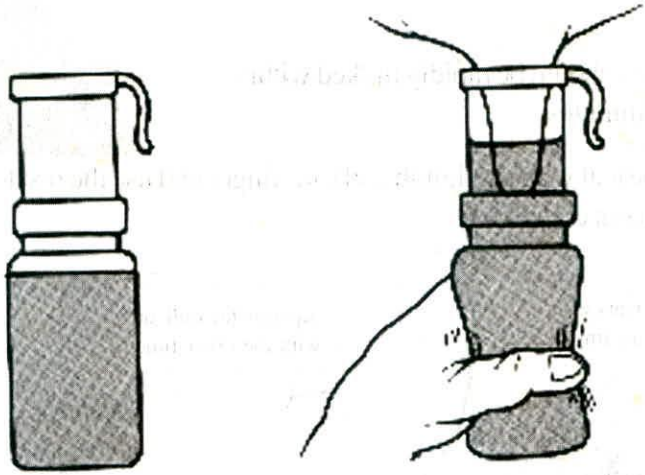
- Hold the teat with the thumb and fore-finger and use the rest to squeeze the milk out completely



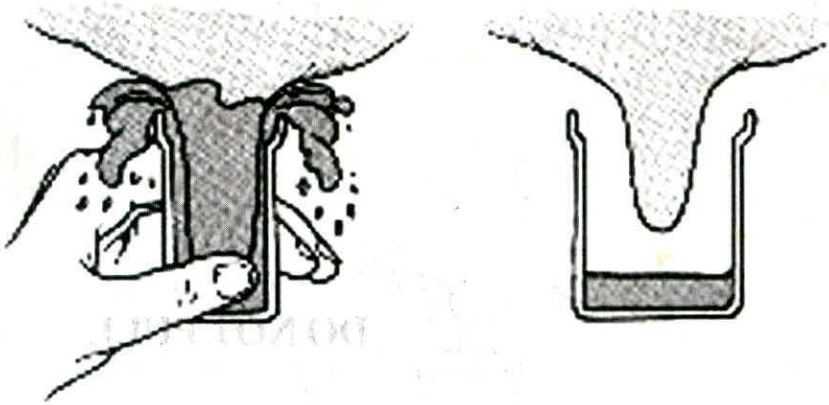




- Apply a post dip disinfectant by dipping most of each teat in the teat dip cup containing disinfectant



- Too much or too little is not good.



- Use properly diluted disinfectant for each purpose and make sure it is still effective following the manufacturers 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. 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
- It is also important to enable the calf develop in the best way possible 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 teatdip the cow's teats before drying off completely.
- Check the udder very carefully during drying off and immediately after drying off
- Provide very clean beddings and surroundings for the cow when she is going to calve.

7.0 WHY MAKE AN EFFORT TO AVOID MASTITIS

Mastitis is very expensive. It is the most underestimated single disease that affects dairy cattle and causes a major economic loss.

Reduced milk production is the most important loss responsible for about 70% of the total loss

The economic cost of any disease is the sum of production losses due to morbidity (sickness) and mortality (death) plus the costs of control.

Mastitis losses:

1. Loss in milk production or reduced milk yield. When a quarter gets infected, its production decreases and may even stop completely depending on the cause, type and duration of infection.

2. Drug costs which include drugs used for treatment of clinical and subclinical cases.

3. Veterinary fees for frequent services given for diagnosis, treatment and advice.

4. Extra labour costs. Extra labour is required to discard milk, wash extra equipment, treat cows and extra time to handle each cow.

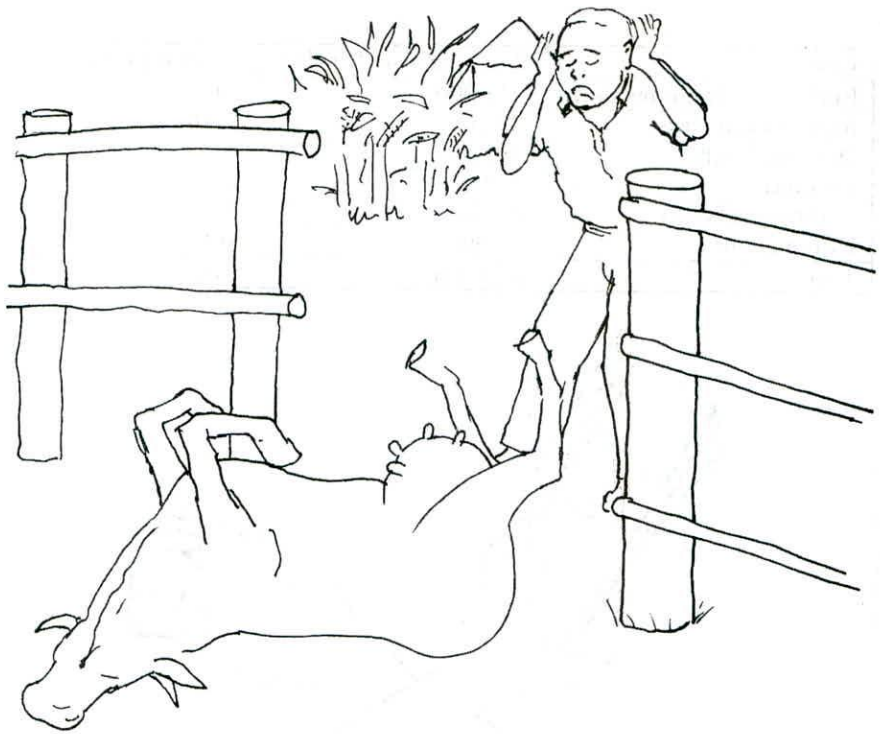
5. Discarded milk: Affected milk with clots must be discarded. It is unacceptable to consumers and processing industries. Milk should also be discarded during treatment residual periods.



6. In the milk processing industry, there are losses due to change in the chemical composition of the milk and problems due to antibiotics in milk as well as the bacterial quality of the milk.

7. Genetic loss. The potential milk production of a good producing cow and its subsequent off springs are never achieved if a cow gets mastitis.

8. Occasional death of the cows resulting in loss of milk and income

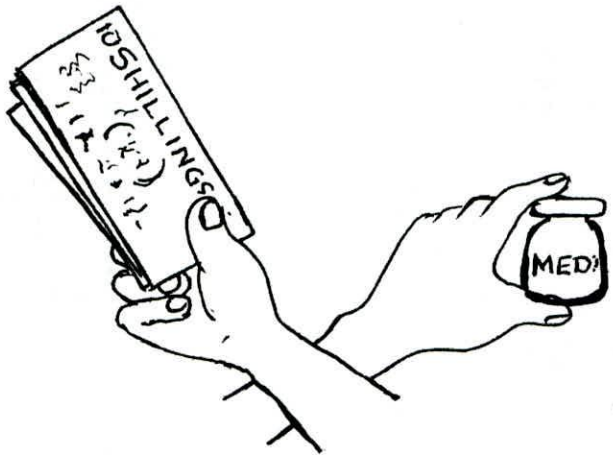


9. Increased replacement costs. The cows with mastitis are sold off too early.

Unseen mastitis (sub-clinical mastitis) which most farmers do not know about forms over 90% of the total mastitis cases.

Table 1: Cost Estimates for losses associated with Mastitis annually in exotic and crossbreds

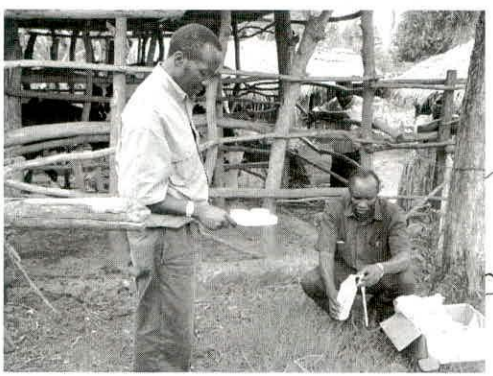
Loss	Loss per cow (Ugshs)	% of total loss
Reduced milk production	231,000	66
Replacement costs	79,100	22.6
Discarded milk	19,950	5.7
Treatment	14350	4.1
Vetrinary services	5,250	1.5
Extra Labour	3,500	0.1
Total	350,000	100



8.0 WHEN MASTITIS OCCURS: HOW DO YOU DETECT IT

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

- Detailed inspection with the eyes
- Systematic touching and feeling the udder and teats (palpation)
- Milking out and observing abnormalities (color, consistency, smell, taste, solids)
- If possible carry out a cow-side test or send samples to a laboratory for additional tests.





8.1 Look for the following signs visually (with eyes)

- Is there swelling and increased size of the udder.

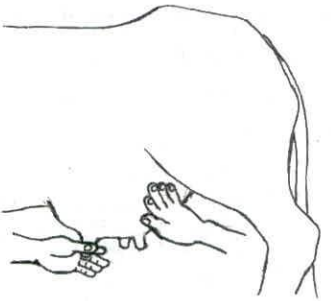


- Do the quarters look the same size?
- Are ther injuries or wounds?

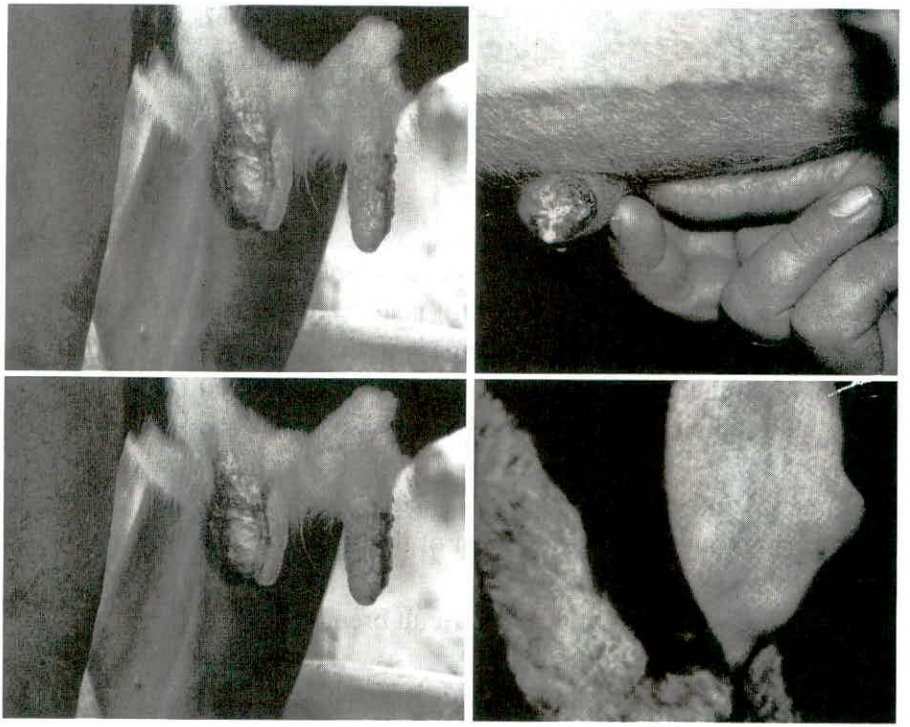


- Reddening or blue discoloration

8.2 Touch and feel the udder and teats for the following



- Are there scurs and changes in the teat?



- Is there hardening, warm quarters/heat, knots?

8.3 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 cows is lactating but may also be seen in dry cows
- Does the milk have some blood?

8.4 Look at the entire cow

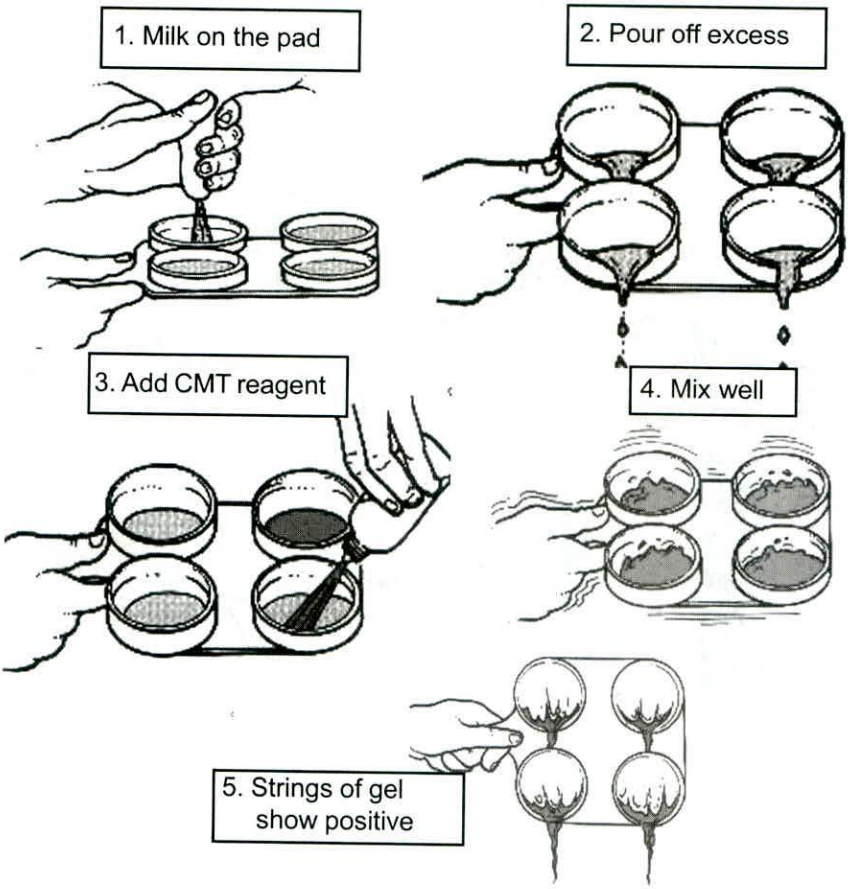
If the germs have moved to the rest of the body, there will be:

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

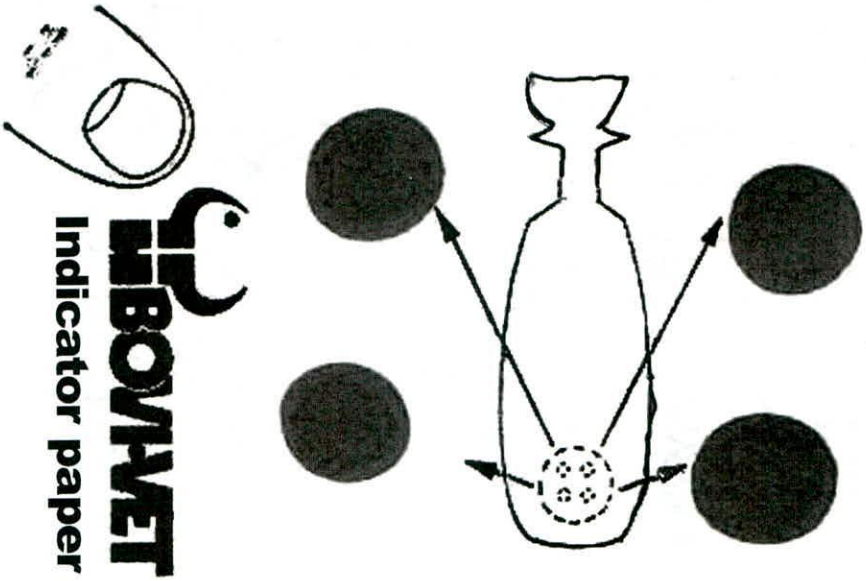
8.5. Quick Cow-side Tests (Screening Tests)

These are simple teats 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 for 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.

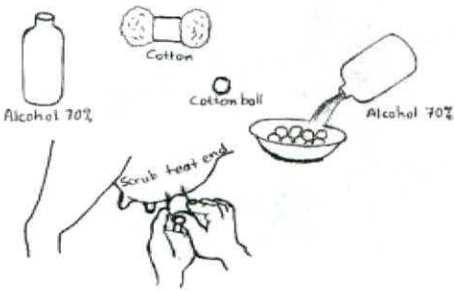


8.6 Collection of milk samples for sending to the lab

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 it's hot weather or if it takes several hours before examination.

8.7 Laboratory tests

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)



9. 0 WHEN MASTITIS OCCURS: HOW DO I TREAT IT

There are four broad categories of eliminating mastitis.

9.1 Supporting the mastitis sick cow for spontaneous recovery

Spontaneous recovery occurs in only about 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 surroundings.
    - Provide clean, dry, bedding in well ventilated surroundings
- Record daily production, appearance of milk, and water and feed intake to monitor recover 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 the 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)

9.2 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.



9.3 Medical treatment

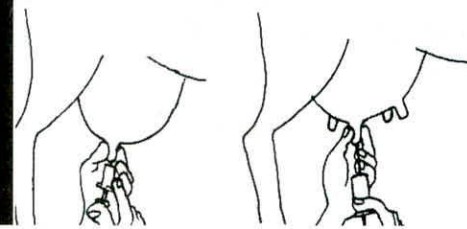
9.3.1 How to treat with medicine into the teats

- 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.





9.3.2 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, treatment of sub-clinical mastitis during lactation is indicated only 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.

9.3.2 Medical treatment at drying off

Dry cow therapy produces the best results in curing existing infections caused mainly by contagious germs and it may prevent the development of new infections caused mainly 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 mastitic. Such a quarter may develop into a smaller and harder gland because of the infection and scar tissue in the gland. When 'drying it 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.

9.3.4 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. Veterinarian's recommendations should therefore be followed strictly! Listen to your vet.

9.3.5 Why does treatment sometimes fail

Treatment failures may be due to

- Delayed treatment,
- Use of the wrong drugs or dose levels,
- Stopping treatment too soon leading to resistance of germs to drugs,
- Protection of germs from the drug by damaged tissue products
- Presence of deep-seated infections that are walled off by scar tissue, clots, and swelling.

9.3.6 Dangers of using drugs (Drug residues)

- Drug resistance in humans can occur as a result of consuming animal products (milk and meat), which contain drug residues. Therefore, every effort must be made to ensure that milk products and meat are free of drug residues!
- Consumption of animal products containing drug residues may cause allergic reactions in humans.
- Withdrawal times for all drugs must be followed strictly.

9.4 Non medical treatment

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



- Indigenous forms of treatment if proved useful may be applied.

10.0 WHY SHOULD I KEEP RECORDS

Records are very important in dairy production for many reasons:

- They help you to monitor whether you are making a profit from your business
- They help you to make informed decisions in your business
- They help you to monitor the performance of the animals
- They allow animal health practitioners to track the health history of the animals in order to make rational decisions in subsequent treatment choices

Important records

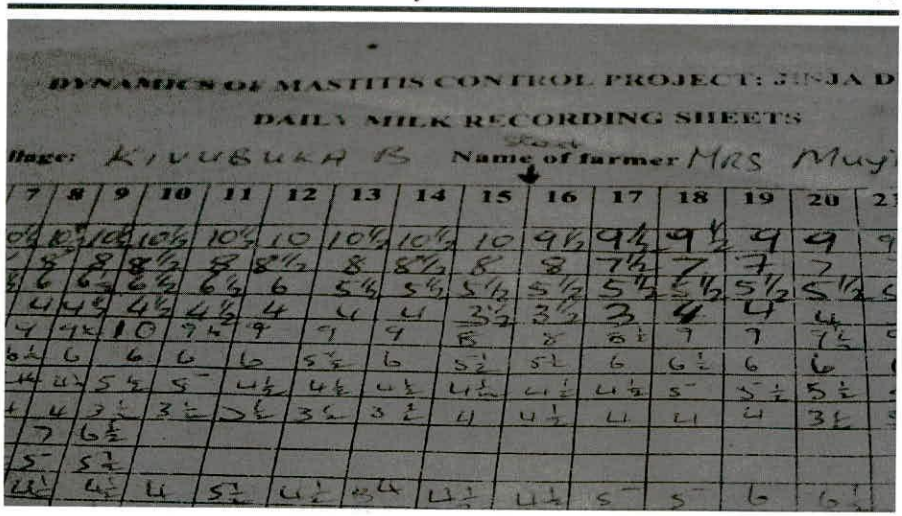
Health Records

These involve keeping all records of treatments, vaccinations and other health related issues on the farm. All the veterinary practitioners who carry out any treatment should record what they have done and why they have done so. They should be encouraged to put the cost of such treatment for you to see. You may be spending money treating an animal which is not producing much.

Production Records

These are important to help you to monitor the performance of the animal. You can even tell whether something is wrong with the animal by checking the daily milk production. Sudden fall in milk production may indicate the animal is sick. This also happens when the animal is on heat but regain her production levels after that period.

An easy way to keep production records is to keep a sheet of paper like shown below or a book where you record both morning and evening records.


DYNAMICS OF MASTITIS CONTROL PROJECT: JINJA D

DAILY MILK RECORDING SHEETS

Name of farmer MRS Muy

7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
8½	8½	10½	10½	10	10½	10½	10	9½	9½	9½	9	9	9	
8	8½	8	8½	8	8½	8	8	8	7½	7	7	7	7	
6	6½	6½	6	6	5½	5½	5½	5½	5½	5½	5½	5½	5½	
4	4½	4½	4½	4	4	4	3½	3½	3	4	4	4	4	
4	4½	10	7½	9	7	9	8	8	8½	7	7	7	7½	
6½	6	6	6	6	5½	6	5½	5½	6	6½	6	6	6	
4	4½	5½	5	4½	4½	4½	4½	4½	4½	5	5½	5½	5½	
4	4	3½	3½	3½	3½	3½	4	4½	4	4	4	3½		
7	6½													
5	5½													
4½	4½	4	5½	4½	4½	4½	4½	5	5	6	6½			

Reproduction Records

These include recording when the animals are seen on heat, when they clave down, the sex of the calves, the bulls that have served the cow. These records are important if you are to make sure your cow produces efficiently, giving you a calf at least every year. It also helps you to know when you should dry off the cow to give her time to prepare for the next lactation

Financial Records

Dairy farming is usually a business and ones needs to take stock of all the transactions in the business in order to determine whether one is making a profit or losses. Such records will include records of the inputs bought, treatment costs, feeds, insemination costs, labor etc and the income generated from sales of milk, calves, heifers or the cows themselves. If the expenditure is found to be more than the income, then you need to re-examine the whole enterprise in order to make it profitable.

11.0 EMPOWER YOURSELF

Knowledge is power. It enables you to make informed decisions. Knowing how milk is made right from the grasses your animal eats to the white final product that comes though the udder is essential.



It helps you to realize how it is important to take good care of your animal so that she can give you sufficient milk.

- Attend all trainings available to learn more to look after your animals well
- Visit your friends and discuss with them and learn form their experiences.



Form farm field learning groups and invite specialist to train you in all areas of interest, so that you can make the best out of your cow. It is easier to access resources in a group than on individual basis.



Do not be a passive participant in the group. Participate actively.







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