

Training Notes
For
Community Animal Health Workers

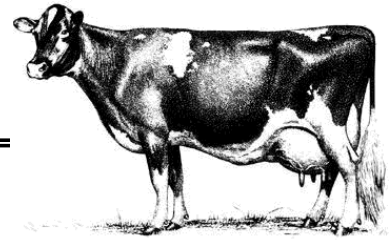
Dairy cattle

Small Scale Livestock and Livelihoods Program
PO Box 1604, Lilongwe Malawi



Dairy cattle

Session 1: Introduction to dairy cattle production



Session Objectives:

At the end of this training session, each participant should be able to:

1. Describe the advantages of dairy cattle production in the smallholder context
2. Understand the main elements which are important in dairy cattle production
3. Recognise the breeds of dairy cows present in Malawi

General information on dairy cattle production

Exercise:

Discuss the reasons why smallholders raise dairy cows in Malawi. Compare your answers with the points listed below.

- Reasons for keeping dairy cows:
 - Source of milk for human consumption
 - Source of income through selling milk
 - Source of manure for improving soil fertility and crop yields
 - A good way of making profitable use of crop residues
 - Source of beef/meat from steers and culled cows when slaughtered




Exercise:

Discuss the basic necessities for successful dairy cattle production under smallholder systems in Malawi. Consider the aspects which are listed below and discuss each of these in more detail.

- Dairy production is a serious enterprise. It is a business. It is an activity which cannot be undertaken in a simplistic manner. It is more complicated than keeping local beef cattle. It requires several key elements which must be managed properly, including:
 - feeding/nutrition
 - breeding
 - housing
 - control of diseases
 - marketing and infrastructure
 - training and adequate management skills
- Dairy cows in smallholder systems should be kept in a khola to control diseases. If dairy animals are grazed outside, they may die from diseases carried by ticks.

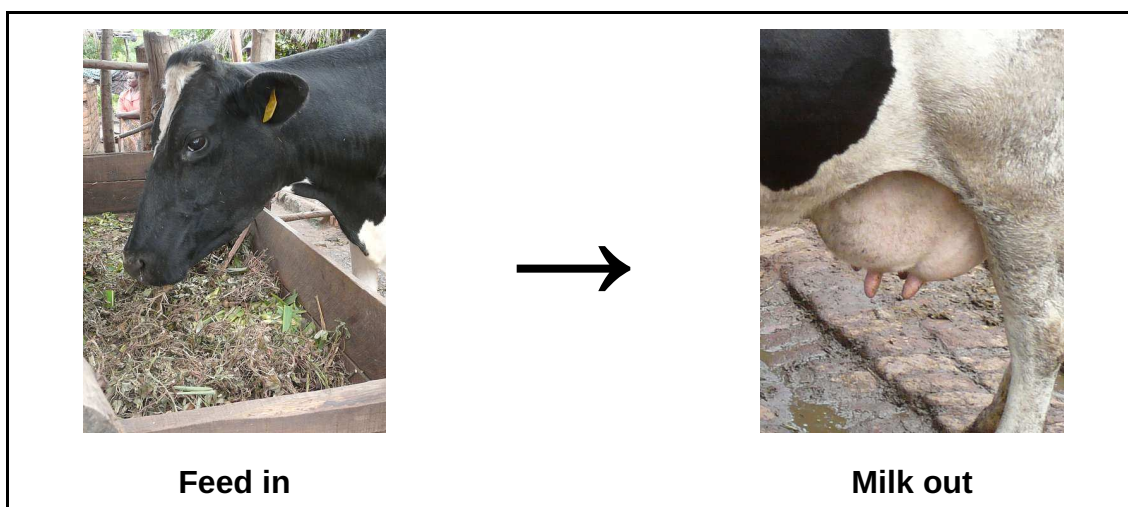
Breeds of dairy cattle in Malawi

- World wide, there are many many different breeds of dairy cows. Only a few of these breeds are present in Malawi. We will not attempt to describe all dairy breeds, we will concentrate on the few breeds that are present in Malawi.

Breed		Comments
Holstein/Friesian		High milk yield Medium butter fat (cream) content (3%)
Jersey		Medium milk yield High butter fat content
Ayrshire		Medium milk yield Medium butter fat content Not common in Malawi

Milk production

- Milk is produced from the time a calf is born. The milk produced during the first few days is called colostrum. Colostrum contains special components called antibodies which protect the calf against diseases. It is important that the calf gets colostrum from its mother soon after birth. When the calf is first born, it should be given full access to the colostrum. Ensure that the calf gets as much colostrum as it wants during the first four days after birth.
- After 4 days, milk only three quarters for collection and leave one for the calf to suckle. Do not leave the same quarter every time, rotate the one which is left for the calf.
- From the age of 3-4 weeks, the calf will start to show an interest in the solid feed available. Eating grass stimulates proper development of the stomach.
- By three months of age, the calf should be eating a good quantity of plant feed. At this stage the calf can be fully weaned and fed a full ration of plant materials.
- Milking of the cow should always be a peaceful, routine operation. It typically takes about 5-10 minutes. Milking should always be completed in the same place at the same time each day, with minimal noise and bustle. Each quarter should be completely milked out at each milking, one in the morning and one in the evening. This will stimulate the udder to continue to produce more milk.
- When the cow feeds, the nutrients in the feed are absorbed and converted to nutrients in the blood. These nutrients in the blood are carried to the udder and converted into milk. Food and water make nutrients and nutrients make milk. No feed, no nutrients, no milk!
- **Lack of adequate feed and water is probably the most common cause of poor milk production in dairy cows in Malawi.**



Session 2: Feeding of dairy cows

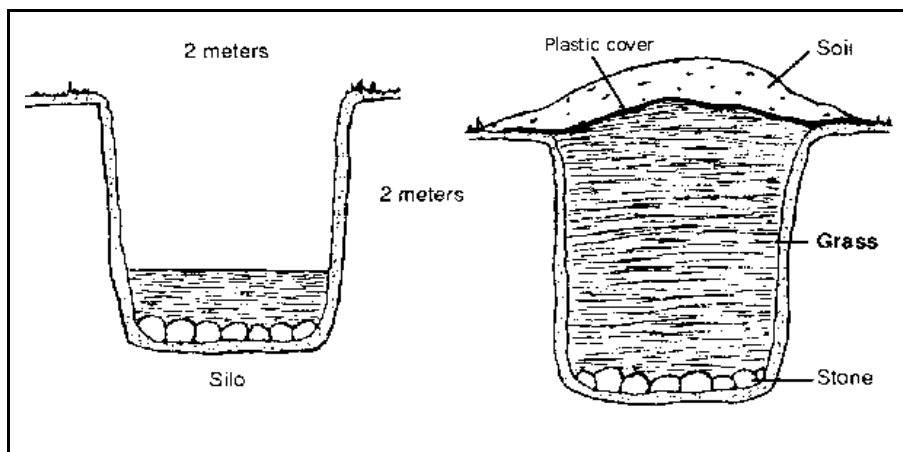
Session Objectives:

At the end of this training session, each participant should be able to:

- 1. Understand the basic principles of feeding for dairy cows**
- 2. Describe types of pasture suitable for dairy**
- 3. Understand the basics of fodder conservation**

- The basic sources of feed for dairy cattle include fresh pasture, crop residues, conserved feed, dairy rations and concentrates. Fodder trees can be a useful additional source of feed.
- Fresh pasture can be cut and carried to the khola. Often the pasture is specially planted as a source of feed for the cows. Pastures which can be used for feeding dairy cows include Napier grass (nsanjere), Rhodes grass, Desmodium, silverleaf, and other pasture types.
 - Fresh pasture should be chopped into smaller lengths, about 10 cm, before being given to cows. If it is not chopped, the cows will not eat as much. Less feed, less milk!
- Crop residues can include dried groundnut tops, maize stover, rice stover, and other crop residues.
- Feed can be conserved in several ways.
 - Hay can be made from pasture. The grass can be cut when it is still green, when it is about to flower. It should then be dried in the sun for a day or two, then raked up and tied into bales. When properly protected from rain and pests, hay will retain much of its nutrient value and last many months. Grass that is cut too late, after it has already turned brown and dry in the pasture, will have very low nutritive value. Grass that is not dried properly before baling will become mouldy and unpalatable. Some mouldy grass contain poisons which may cause animals to become sick.

- Silage can be made from fresh green pasture or crops such as maize. It involves preparing a pit of suitable size, filling this pit with chopped green plant material, pressing the material down, then covering the pit to prevent entry of air from above. Over time, the material ferments and is preserved in the process. On opening, the material will smell of ammonia. It should be used within a day or two of opening.



Small scale silage pit

(Courtesy FAO "A manual for the primary animal health care worker")

- Crop residues can be collected when they are completely dry. They can be tied or stacked in a shady place for future use as a feed for animals. Crop residues are similar to hay, if they are cut too late, after they have already turned brown and dry in the field, they will have very low nutritive value. Crop residues that have not dried properly before collection, will become mouldy and unpalatable. Some mouldy plants contain poisons which may cause animals to become sick.
- Dairy rations can be purchased in bulk. These feeds are usually quite expensive compared to home-prepared feeds and are not often used in Malawi. Prepared rations have the advantage that the balance of nutrients is usually correct for lactating dairy cows.
- Fodder trees should be planted and cuttings can later be used as feed for dairy cows. Fodder trees used in this way in Malawi include Leucaena, Sesbania and Albizia.



Leucaena - a useful fodder tree

Session 3: The basics of nutrition for ruminants

Session Objectives:

At the end of this training session, each participant should be able to:

- 1. Understand the basic components of a ration for ruminants**
- 2. Understand the basic nutritional needs of ruminants**
- 3. Understand the basic nutritive value of some major feed ingredients**
- 4. Know how to prepare a ration suitable for dairy cows**

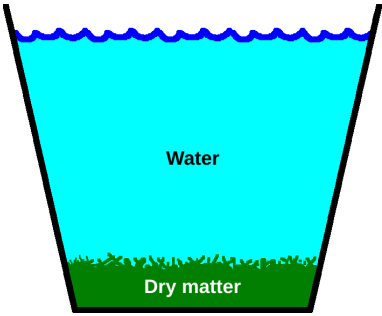
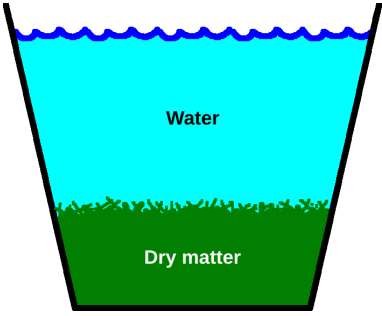
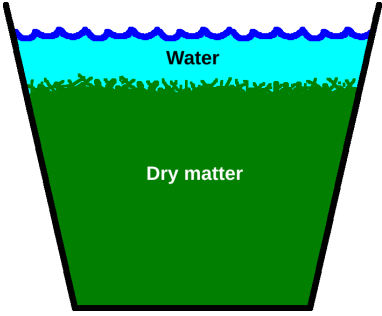
Exercise:

During a visit to a reasonably well run smallholder dairy farm, discuss the following aspects of feeding:

- the amount of feed eaten each day by a lactating dairy cow
- what types of feed are available
- what are the important nutrients in that feed
- the availability of clean water
- the availability of mineral licks
- how much milk is produced each day by one cow

The components of animal feeds

- The important components of feed for animals include
 - energy (especially carbohydrates and fats but also other components)
 - protein
 - minerals and vitamins
 - water
- Different feeds contain different amounts of water. Fresh green pasture can contain over 80% water and dry hay can contain less than 10% water. For nutritional calculations, we need to separate the water from the other components. We consider only the other components, the dry matter. We talk about **dry matter intake**.
- **Dry matter** is the part of the feed which remains when we remove all the water. It is the part which contains all of the energy, protein and minerals and vitamins. It also contains fibre which does not get utilised as a nutrient.

Green fresh pasture contains about 75-85% water and 15-25% dry matter	
Maize silage contains about 60-65% water and 35-40% dry matter	
Dry hay or stored crop residues contain 10-15% water and 85-90% dry matter	

- We can see that if an animal eats 10 kg of fresh green pasture, it will only consume about 1.5-2.5 kg of dry matter. However, if the animal eats 10 kg of dry hay or crop residues, it will consume 8.5-9.0 kg of dry matter.

Dry matter intake requirements

- An adult dairy cow will eat dry matter equal to about 2-3% of its own body weight each day.
- This is about 12-18 kg of dry matter each day for a large cow.
- This means that if the cow eats only green pasture, it would need to eat about 50-90 kg of feed per day to get that amount of dry matter. In practice, a cow will not consume that much pasture in one day.
- If the cow eats only dry hay, it would need to eat about 14-20 kg of feed to get the same amount of dry matter. Remember though that hay made from grass that is cut too late, after it has already turned brown, will have very low nutritive value. It will be mostly fibre and will have very low energy content.

Minerals and vitamins

- Ruminants (sheep, goats and cattle) are different from other animals. They can produce many of the vitamins that other animals must get from their feed. It is not usually necessary to give ruminants any supplementary vitamins.
- Sometimes a dairy animal needs an extra boost of minerals. These can be supplied in a mineral block. The block is solid and the cow licks it to get a little at a time. Too much minerals can kill the animal. Never allow a cow to consume a large portion of the block at one time.

A home-made mineral block

- The following is a recipe for a urea-molasses mineral block which can be used in Malawi. This recipe should be used as a guide only. Depending on environmental and climatic conditions, the consistency of the block may vary. In all cases it is essential to ensure that **no more than about 100 grams of the block is consumed by a cow in one day**. It is often necessary to place the block in the khola for only a short time each day until the cattle get used to it.

Urea-molasses mineral block

ingredients	Amount (% or parts by weight)
Molasses	35
Urea	15
Bone meal or mineral mix	2
Kitchen salt (with or without vitamins)	5
Cement or bentonite/lime	13
Maize husks, fine ground wheat or rice bran	20
Soya meal	10
Total	100

The ingredients must be measured accurately and mixed thoroughly. The soft mixture is placed in containers of such size as to hold approximately 1 kg of the mixture. The block is left to harden for at least one week before use. The final block should be firm and should not crumble. It must be of a consistency that each cow cannot get access to more than about 100 grams of the mixture in any one day.

Session 4: Breeding of dairy cows

Session Objectives:

At the end of this training session, each participant should be able to:

- 1. Understand the basic principles of breeding for dairy cows**
- 2. Understand the advantages and disadvantages of natural mating and of artificial insemination under Malawian conditions**
- 3. Recognise the signs of heat in dairy cows and train farmers in recognising heat**

Exercise:

Discuss the basic reproductive parameters for dairy cattle:

- signs of heat
- duration of heat
- oestrus interval
- gestation period

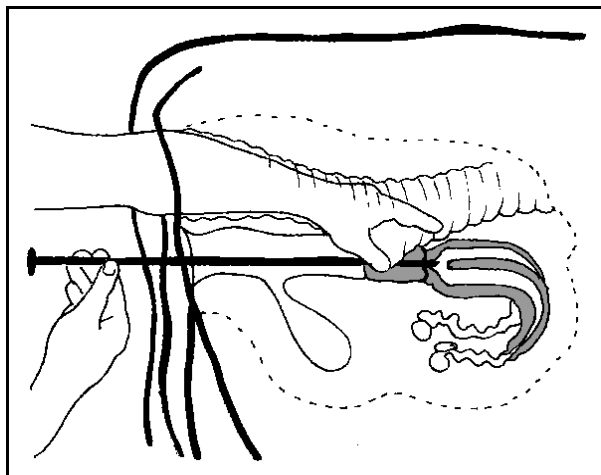
Basic reproductive parameters for dairy cows

- Oestrus (or heat) is the period when a cow will accept to be mated by a bull.
- Age at first heat in dairy cattle may be 10-18 months.
- Oestrus interval (the interval between heats) is normally about 21 days. It may be from 18-24 days in some animals.
- The duration of oestrus is 10-24 hours.
- Recommended time for insemination is twice, the first at 12 hours after the first signs of heat and the second at 24 hours after the first signs of heat.
- The gestation period (period between mating and calving) is about nine months or 278 days.
- Time of the first oestrus after calving is 60-90 days.

Breeding in dairy cattle**1. Natural mating** using a bull:

- Advantages of natural mating:
 - There is very high chance of conception since the bull is a good timer.
 - No need for heat detection.
 - Semen storage is cost free and reliable.
- Disadvantages:
 - Very high costs on feed, management and veterinary drugs for the bull.
 - The genetic quality of the semen is not as high as semen from tested bulls.
 - Not economical when there are few cows or when the bull serves cows belonging to many owners. Who looks after the bull?
 - Very difficult to replace high quality bulls under Malawi conditions.
 - Risk of transmission of reproductive diseases is high.

2. **Artificial Insemination (AI)** is a process whereby semen is manually introduced into the vagina of cow/heifer artificially when it is on heat. Special knowledge and instruments are required.
- Advantages of artificial insemination:
 - No need to keep bulls.
 - Genetic quality of semen can be excellent.
 - No transmission of reproductive diseases.
 - Disadvantages:
 - Lower conception rates compared to natural mating.
 - Heat must be accurately detected.
 - Very high costs for equipment and maintenance of the semen (liquid nitrogen and special equipment is required).
 - Need for trained personnel to conduct AI.
 - As a general rule, artificial insemination, where it is available, is the much preferred method of breeding of dairy cows in Malawi.



Heat detection (oestrus detection)

Exercise:

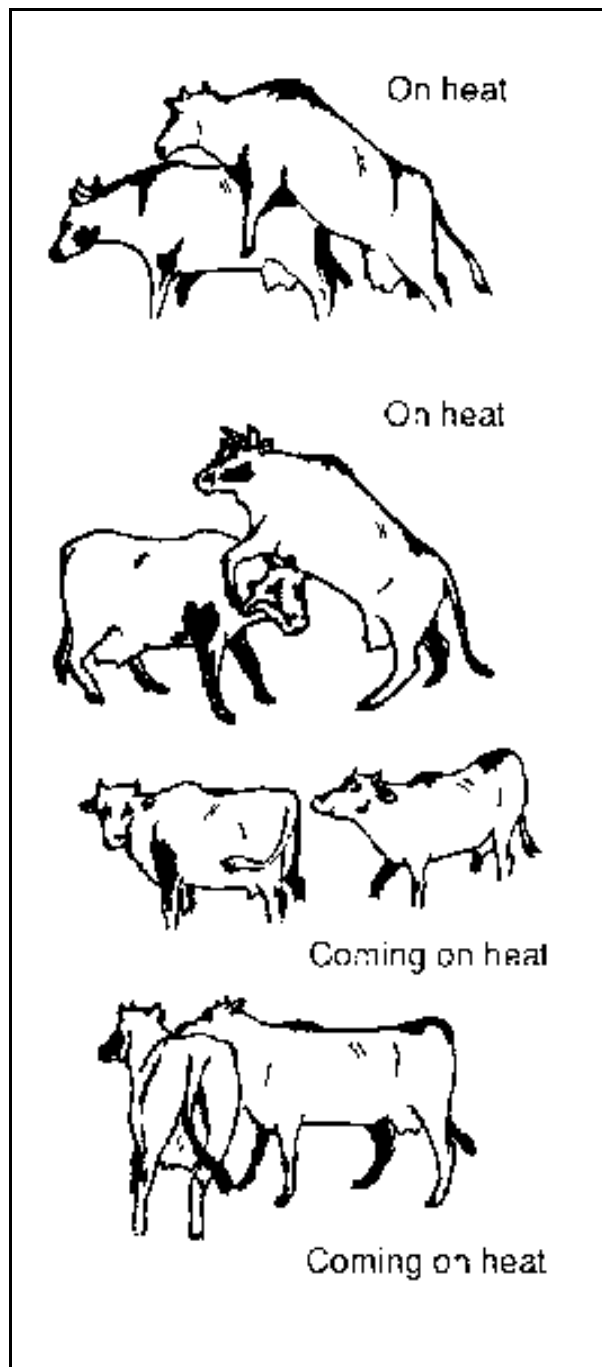
Why is it important to know when a cow is on heat?

What do you know about the signs of heat in a dairy cow?

List the signs you might see.

Compare your list with the points listed below.

- Knowing when a cow is on heat is important. The process of getting milk first starts with getting the cow pregnant. The sooner you get the cow pregnant, the sooner you will be collecting milk.
- If we know the cow is on heat, we can make sure she is served or inseminated artificially. If we miss this heat, it will be 21 days before the next heat. That means the calf will be born 21 days later. That means we will be collecting milk 21 days later. Good heat detection means earlier milk production.
- The signs of heat in a dairy cow include some or all of the list below. However, it is important to remember that under different conditions, cows may display more obvious signs or they may display no signs at all, even though they are on heat. Signs of heat will be more obvious if the cow is in a group. They will also be more obvious if she has more room to move around with the group. They may be less obvious if she is alone or confined in a small area.
- Signs of heat in dairy cows:
 - clear mucous discharge
 - mounting other cows or being mounted by other cows
 - chin resting and rubbing
 - swollen vulva
 - frequent urination
 - frequent bellowing
 - restlessness, sniffing behaviour
 - decreased milk production
 - loss of appetite



Signs of heat

(Courtesy FAO "A manual for the primary animal health care worker")

- Observation for heat should be done carefully. It is not something which will be obvious on one casual glance.
 - Cows should be observed at least twice every day.
 - Cows should be observed for up to 20 minutes to ensure that the signs of heat are not overlooked. Observation for a shorter period is not sufficient
 - the cow in heat may remain quite normal for many minutes.

Session 5: Housing for dairy cattle under smallholder conditions

Session Objectives:

At the end of this training session, each participant should be able to:

- 1. Describe the basic purpose of proper housing for dairy cows**
- 2. Describe the design of a basic khola suitable for dairy cows in a smallholder system**
- 3. Train farmers on how to construct a basic khola**

Exercise:

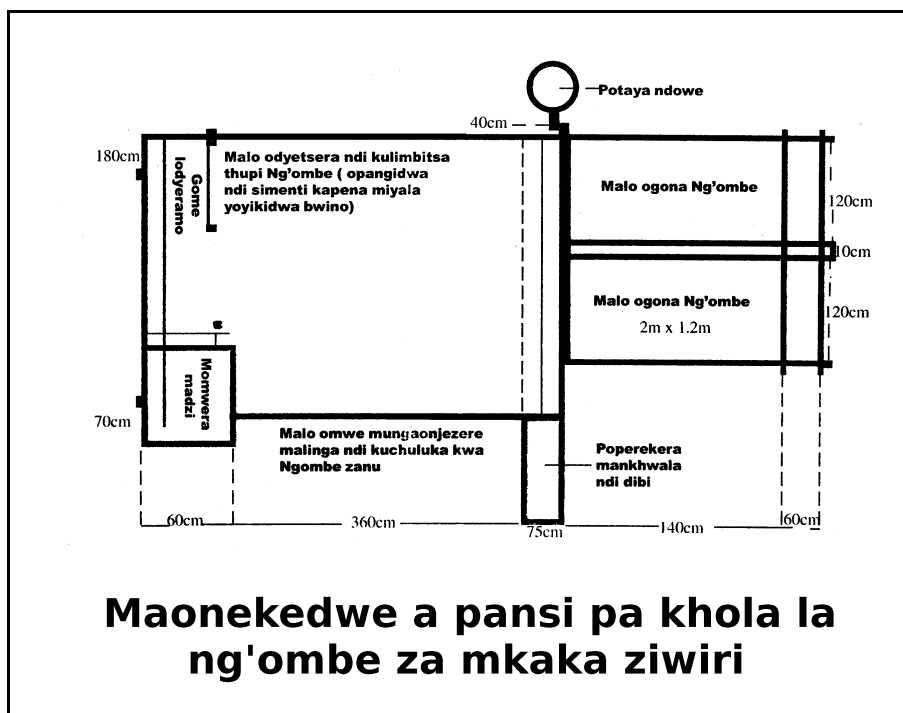
Discuss what are the fundamental purposes of a suitable khola for dairy cows, ie what should it enable us to do and how does it make the life of dairy cattle easier.

What is the correct width for a race for dairy cattle, a width which allows the cows to pass through but does not leave space for them to turn around?

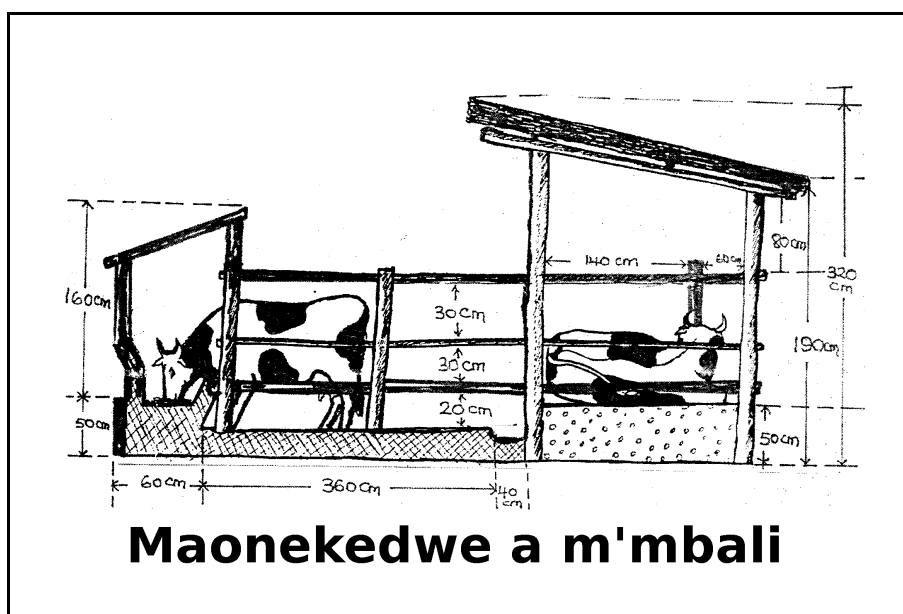
What makes a good khola?

A good khola will take into consideration the following:

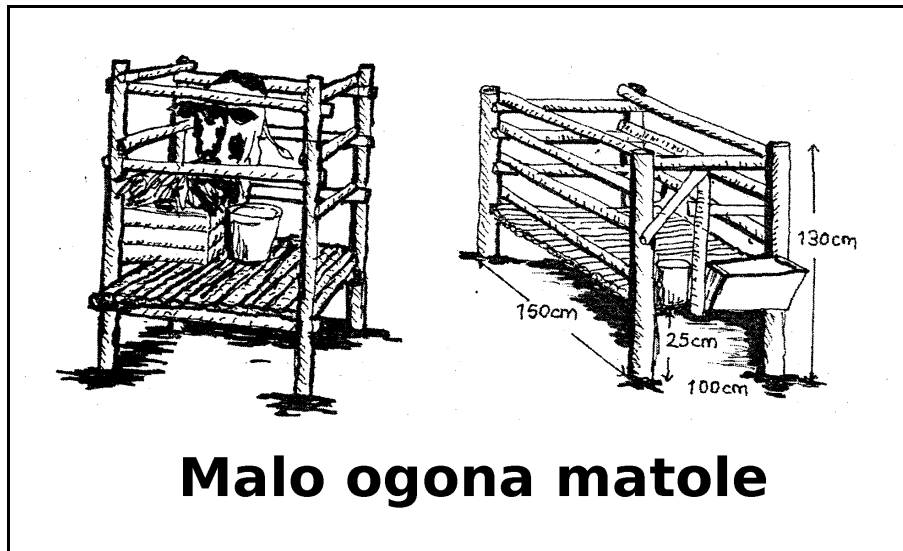
- **Siting:** How close should the khola be to the house? Is smell important? Is the risk of theft important? Is the site on high ground free from inundation during the wet season? Where does the wind usually come from?
- **Protection from the weather, rain, heat, and excessive draughts.:** This is important for the cows, their calves and the owners. Good roofing is important.



- **Muddy floors:** The design must avoid excessively muddy and dirty floors. Firm flooring of bricks or concrete is best. The gradient of the floor must be at least 3% (3 cm drop in one metre) to allow adequate run-off.
- **Proper drainage of the floor area is necessary** so that mud and manure can easily be removed.
- **Bedding:** A clean, comfortable area in which the cows can rest. The slope should be such that the cow's forequarters are slightly higher than the hindquarters.



- Milking: An area for milking which is easily accessible but which restricts excessive movement of the cow during milking.

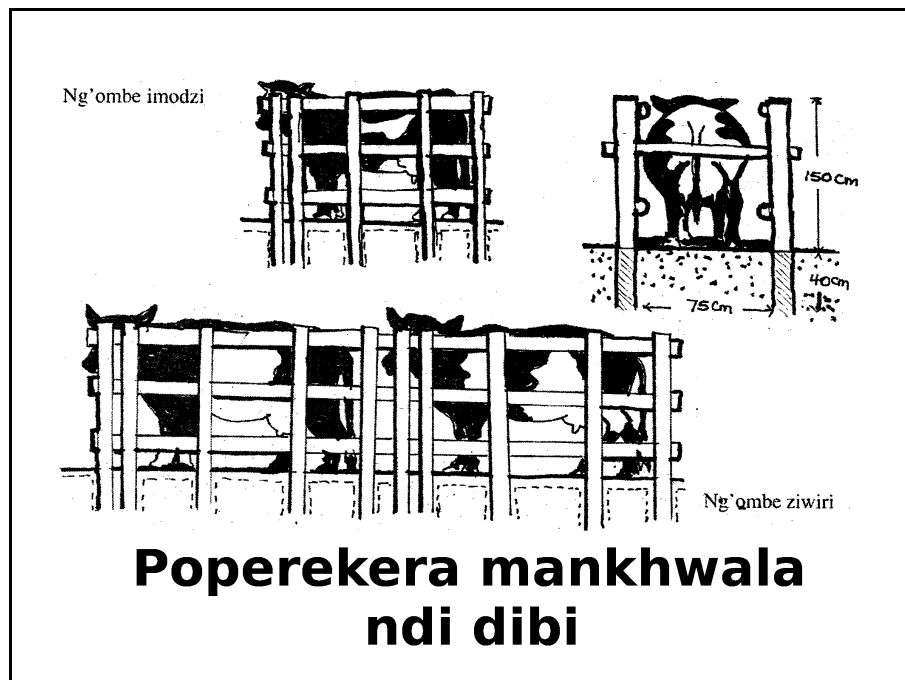


- Restraint: The khola needs a crush in which cows can be examined and treated. The width of the race should be 75 cm, no wider. The horizontal rails should be on the inside of the upright poles, not on the outside.
- Calves: A protected area is required where the calf can be restricted but stay close to its mother. A raised calf pen is usually preferred.



- Feed troughs which are durable and easily accessible. Durable water troughs. Feed and water troughs are usually raised above ground level.
- Feed storage: An area (often in the roof) where feed such as crop residues can be stored in adequate quantities.

- Manure: An area just outside the khola where manure can be stockpiled before use elsewhere.



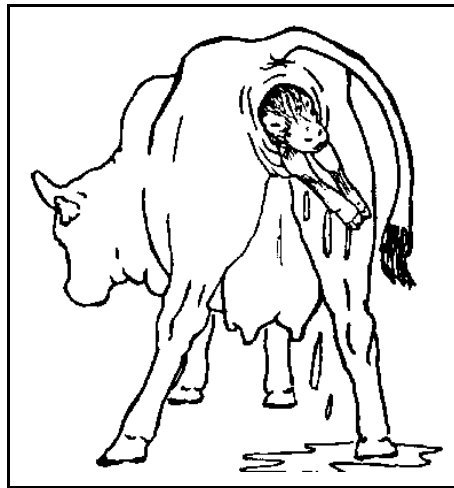
Session 6: Calving difficulty (dystocia)

Session Objectives:

At the end of this training session, each participant should:

- 1. Know what is a normal calving**
- 2. Know some of the common abnormal calf presentations**
- 3. Be able to correct some of the more simple abnormal calf presentations**

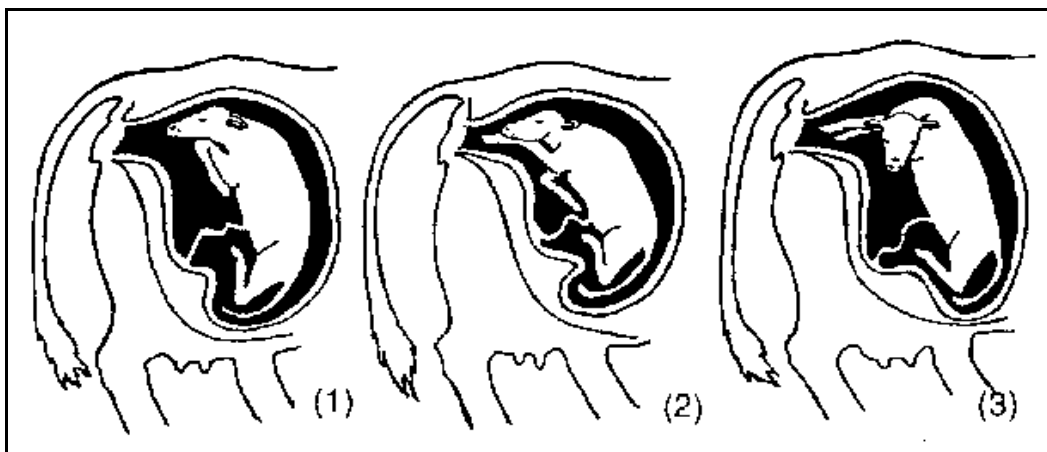
- Most of the time, dairy cattle calve normally without any assistance. It is always best to allow the animal to calve normally. Do not interfere unless something is wrong.
- In a normal calving, the two front feet will appear, just ahead of the nose.



Normal calving

(Courtesy FAO "A manual for the primary animal health care worker")

- Always give the cow time to deliver normally. You should wait until the cow has tried for at least two hours.
- Occasionally however, something does go wrong and there may be a need to help correct the problem.



Difficulties in calving

(Courtesy FAO "A manual for the primary animal health care worker")

- If any calving difficulties do occur, you can sometimes help the cow give birth.
- Before doing anything, restrain the cow so that she cannot damage herself. Wash the cow's rear with plenty of clean water and stop any dirt from getting into the uterus. Soapy water will assist you to intervene. Wash your own hands and arms too.
- Put your hand into the uterus and try to determine which way the calf is facing and where the head and legs are. It is often necessary to push the calf back into the uterus to give yourself room, so that you can manipulate the head and legs into the correct position. Do not try to push back when the uterus is in a contraction - it is too strong. Wait for the contraction to pass and then push.

- Once the head and legs are in the correct position, a clean rope can be tied to **both** of the calf's front legs so that you can assist by pulling on the legs. You may need an assistant to help you pull but **do not apply excessive force** - you may damage the cow and lose both the cow and calf. Also do not pull unless the cow itself is pushing - wait until the next uterine contraction pushes the calf outwards before you attempt to help by pulling on the rope.
- If these steps do not succeed, you will need to call the mlangizi.
- Getting the calf to breathe after birth is important, especially if the cow doesn't clean the calf.
- Make sure the calf can breathe and that its mouth and nose are free of mucus. If you tickle the inside of a nostril, the calf will snort which helps to clear out the mucus and get the calf breathing.

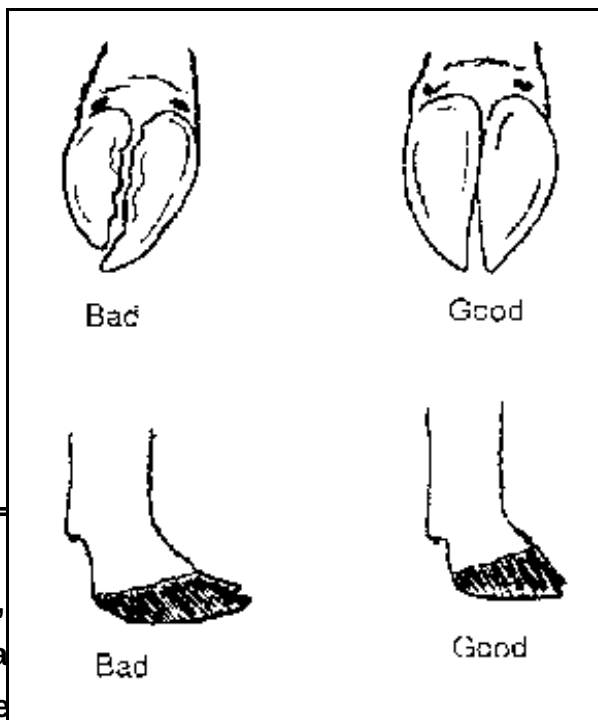
Session 7: Hoof trimming

Session Objectives:

At the end of this training session, each participant should be able to:

1. Recognise hooves which are in need of trimming
2. Know how to trim cattle hooves without causing harm to the animal

- It is not uncommon for the hooves of cattle to become overgrown or abnormally shaped. This is often seen in the wet season when the ground is soft.
- Overgrown hooves are painful and the animal may suffer and eat less feed.
- The hooves can be trimmed with a pair of hoof trimmers or a sharp knife. They should be brought back to a normal shape.
- Cattle hooves are similar to our fingernails. If you cut too far down, the animal feels pain and bleeds.
- Remove only **a little at a time**.
- **Stop** if any bleeding occurs.
- On the sole of the hoof, the under-part which contacts the ground, **stop** if you have removed so much horn that you can press the sole in with your thumb.



Session 8: Common diseases of dairy cattle

Session Objectives:

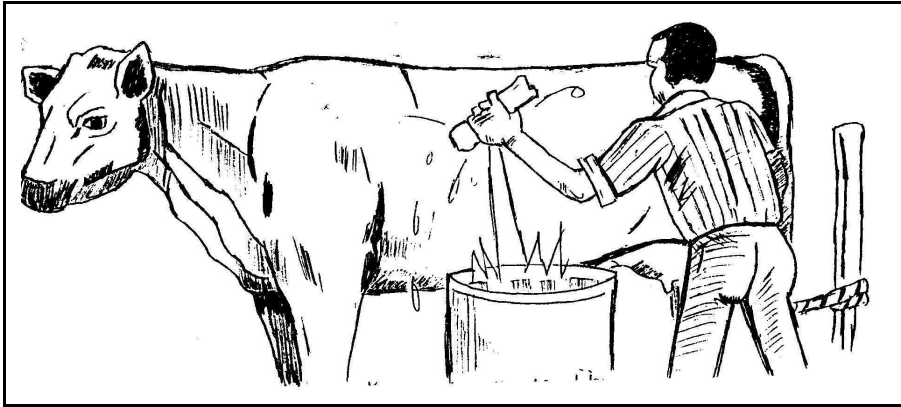
At the end of this training session,

1. List the most common diseases
2. Understand what causes the diseases
3. Know how best to manage the diseases
4. Know how to prevent and/or treat the disease

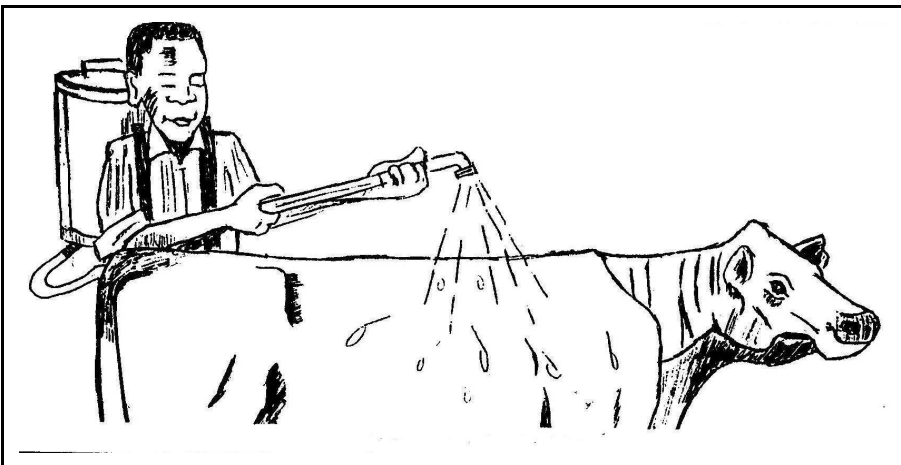
Hoof shape - overgrown and normal
(Courtesy FAO "A manual for the primary animal health care worker")

Exercise:

Discuss what are the most common causes of deaths, sickness or lost production in dairy cattle under smallholder conditions in Malawi.




Dip wash



Dip spray

Mastitis	Mastitis is an infection in the udder. It slows milk production, makes milk unsuitable for consumption, makes the cow sick, and may kill the cow.
Cause	Mastitis is caused by bacteria. There are several different types of bacteria which can cause mastitis.
Signs and symptoms	<p>Mastitis should be suspected if some of the following are found:</p> <ul style="list-style-type: none"> • the milk is not clean, there are lumps in the milk, or the colour is different from normal • the udder is hot, painful or swollen (the animal may kick when being milked) • the skin of the teats is cracked • the animal stops eating and appears sick
Prevention	<p>The milker should always wash his/her hands with soap before milking.</p> <p>The udder should be washed with clean water and allowed to dry before milking.</p> <p>Mastitis may spread to other cows. Bacteria can get on the hands of the person milking and spread to other cows. To prevent this happening, any animals with mastitis should always be milked last..</p>
Treatment	<p>Treatment of mastitis is more likely to be successful if it is started early.</p> <p>The affected quarter(s) should be washed with clean water and then stripped out. Stripping means milking the quarter and massaging it till there is no milk left. Sometimes, this is the only treatment required - the quarter is stripped out every morning and evening (or several more times each day) and it may return to normal.</p> <p>Alternatively, the quarter can be drained by using a teat catheter.</p> <p>Sometimes antibiotics can help if they are introduced into the udder through the teat canal. The teat canal is where the milk comes out of the teat. Special intra-mammary antibiotics in tubes can be obtained for this purpose.</p>

Milk fever	Milk fever is a condition seen when a cow becomes weak or paralysed at or soon after calving. It is sometimes called "parturient paresis"
Cause	<p>Towards the end of pregnancy, the cow has to produce a lot of milk and colostrum for the calf. The milk requires lots of calcium which must come from the body reserves.</p> <p>If the calcium levels in the cow's blood drop below a certain level, signs of milk fever develop.</p>
Signs and symptoms	 <p>The cow will sit down on her sternum, often with her head turned round towards her flank as shown here. The name "milk fever" is misleading - there is no fever, the temperature is normal.</p> <p>Later still, the cow will go into a coma, gradually get worse, and die.</p>
Prevention	Add minerals to the cow's feed. MCP is one mineral which can raise calcium levels. This is especially important late in pregnancy.
Treatment	Milk fever can be treated with calcium borogluconate injection. This must be given slowly over a period of 10-20 minutes - too much calcium all at once may kill the cow.

Tick-borne diseases	<p>Tick-borne diseases are diseases which are spread by ticks. They are similar to malaria in man. (Malaria is a blood parasite which is spread by mosquitoes).</p>
Cause	<p>These diseases are caused by tiny parasites which sometimes get into the blood.</p> <p>All cattle in Malawi can suffer from tick-borne diseases but dairy cattle tend to suffer more easily than Malawi Zebu.</p>
Signs and symptoms	<p>Salivation, lacrymation, fever, inappetence, swollen lymph nodes, death.</p>
Prevention	<p>The way to avoid tick-borne diseases is to avoid ticks on the cattle. Dairy cows should not be grazed in the field where the ticks live, but should be confined in their khola where feed can be brought to them. That way the ticks do not infest the cattle.</p> <p>Dairy cattle can also be treated with chemicals which kill ticks. These chemicals are called acaracides. Some are applied through dipping, some are applied through spraying, and some are applied by pour-on. In all cases, it is important to follow the instructions on the product label.</p>
Treatment	<p>Sometimes treatment of tick-borne diseases is possible if it is started early. It will not be successful if the animal has already reached the stage where it is very sick. There are several different drugs which might be useful for treatment.</p>

Hardware trauma (hardware disease)	
Cause	Cattle can easily eat small bits of wire, or nails, or other material like plastic bags. These objects can sometimes pass straight through but at other times they cause sickness and perhaps death.
Signs and symptoms	The animal becomes sick within a few days and may die. If the damage is minor, the animal may lose its appetite and lose weight and give less milk.
Prevention	It is always important to remove any foreign objects, especially metal and plastic, from the feed of dairy cows. It is also important to make sure these objects are not left lying around the floor of the khola or any other places where the cattle may pass.
Treatment	There is no practical treatment for hardware disease. Farmers should prevent it happening beforehand. There is no way to treat it after it has happened.

Review questions

1. What are the common breeds of dairy cows found in Malawi?
2. What is the most common cause of poor milk production in dairy cows in Malawi?
3. Give three methods by which dairy feed can be conserved for use during the dry season.
4. What is the approximate percentage of dry matter in:
Fresh pasture?
Dry hay?
Dried crop residue such as ground nut tops?
5. At what age does a heifer first come on heat?
6. What is the average duration of oestrus?
7. What is the average oestrus interval?
8. How long after calving does a cow normally come on heat?
9. What are the common signs of heat in dairy cows?
10. What are the main advantages and disadvantages of:
Natural mating using a bull?
Artificial insemination?
11. What is the correct internal width for a race or crush for dairy cattle?
12. In a normal calving, which parts of the calf are first to appear?
13. List the common signs of mastitis.
14. When is milk fever most likely to affect a dairy cow?
15. What can cause hardware trauma?