1.0 Introduction

Beef production in Malawi aims at providing increased quality beef and beef products to ensure food, nutrition and income security. This can be achieved when farmers have access to approved beef breeds such as Brahman, Boran, Malawi zebu. Strategies for beef production shall include: promotion of growing of improved pastures, formation of beef cooperatives, upscaling stall feeding of steers and cull animals and promotion of feedlot programmes and value addition. Beef production can be divided into two basic systems, extensive and intensive systems. . The two systems can also be combined so that animals are kept under extensive up to a certain age and they are then placed in feed lots for finishing. Where the two are combined animals spend 85 – 90% of their lives on pasture.

BREEDS AND BREEDING

Beef breeds available in Malawi are Malawi zebu, Brahman, Boran, and their crosses. These breeds are preferred because of their genetic make up, conformation, high feed conversion efficiencyand high growth rate. In order to improve growth rate, carcass quality of the Malawi zebu breed, farmers are encouraged to do selection of the breeding stock within the Malawi zebu flock. Farmers can also cross the Malawi zebu with large framed breeds such as Brahman.

Qualities of good breeding beef animals are:-

(a) Bull

- should have high growth rate and well developed body
- Selected from high productive parents
- Should not be too fat or too thin
- Normal rounded testicles with appropriate circumference and not split at the end
- Disease free

(b) Cow

- Cows/heifers should be selected from cows that calve down every year.
- Normal udder with four teats
- Calving ease

- Good mothering ability
- High weaning weights
- Disease free.

PLEASE NOTE:

- The recommended breeding ratio is 1bull to 30-40 cows.
- On a ranch where there are enough breeding bulls, the animals can be split into 30 – 40 cows per a bull to reduce competition and possible injuries.
- Heifers should be bred before cows to reduce disease transmission

In Malawi where the farmer wants to do seasonal controlled breeding animals should be allowed to mate from January to March so that they calve down around December when there is adequate feed.

2.0 BEEF CATTLE PRODUCTION SYSTEMS

2.1 Extensive Beef Production System

In extensive beef production system cattle are raised and can be sold to those with feedlots/stall feeders to finish them or butcher men. Examples of extensive system are free range and ranching systems.

Free range/herding: this is what is practiced by most smallholder farmers in the country. The animals are herded into non cultivated communal areas during cropping season and allowed to feed on crop residues after harvest.

Ranching: this is practiced on a privately owned land or range which is left to natural pastures. Animals are allowed to range freely. Watering points and night shelter is provided. The land may be split into paddocks for different seasons or for different age groups.

2.1.1

2.1.2 Housing

- Cattle kholas should be constructed on a raised ground in order to maximize drainage.
- It should be strong enough to protect the animals from predators
- Well thatched shades should be provided to protect the animals from sunshine and rainfall.
- Bedding in form of maize stocks should be provided and maintained.
- Troughs for feed supplementation and drinking water should be placed around the khola
- Calves should be put in separate pen at night to provide them with the warmth required

2.1.3 Feeding

In extensive production system cattle should be allowed to graze a minimum of five hours during rainy season and 8 hours in dry season. During dry season animals should be given feed supplements, this would be inform of crop residues such as maize stocks, groundnut haulms, potato vines and hay.

- Madeya (maize bran) can also be given as a supplement but should not be more than 4 kg per animal per day.
- Where possible farmers should provide mineral licks mainly during dry season to improve digestibility and intake of the low quality roughages.
- Farmers should also be encouraged to grow pastures and fodder crops such as Rhodes grass Napier and Leucaena which can be preserved and conserved as hay and silage for dry season feeding.
- Water is very important and should be provided all the time. Feed intake can also improve with adequate supply of water

2.1.4 Other Management Tools

2.1.4.1 Calf rearing

- The calves should be allowed to suckle within the first 48 hours and full time for the first 3 - 5 days. This will allow them to get enough colostrum which is important for the immunity of the calves.

- After 5 days the calf can be allowed to suckle twice a day.

- From 2 weeks gradually introduce high quality roughages to aid in rumen development.
- The calves should be kept in a separate pen as the cows go grazing and only to be allowed out when the cows are back from grazing.
- Depending on the level of management the calves can be weaned at 6-8 months of age and be put on high quality roughages.
- The calves can also be supplemented with concentrates, and minerals.
- They should be regularly de-wormed.
- All young male animals that are not needed for breeding should be castrated.

2.2 INTENSIVE BEEF PRODUCTION SYSTEM

2.2.1 Feed lot and Stall Feeding.

The two methods are the same in principle, the major difference being the scale of operation. Stall feeding is practiced by smallholder farmers while feed lot is at a large scale and practiced by commercial producers.

Animals put in stalls or feed lots are fed specially formulated feeds high in energy, protein, fibre, minerals and vitamins with the aim of finishing them for beef. Stall feeding /feedlot improves carcass quality and is beneficial to farmers where premiums are paid for quality grade. The animals are kept for about 50 -150 days depending on the condition at placement into the stalls.

The advantages of stall feeding or feedlot are:-

- These are more efficient ways of attaining slaughter weight.
- Less land is required
- Efficient use of feed

2.2.1.1 Sources of animals for stall feeding and feed lot

Animals for feedlot / stall feeding include all the animals that have attained a certain age and are not selected as breeding stock. These can be sourced from own stock or private farms, government farms and cattle markets.

2.2.1.2 Housing

- Use locally available materials (pole and thatch)
- One steer require a pen of 2.1m long, 2.1m wide and 2.4m high
- The length of the a khola will depend on the number of cattle to be stall fed
- Provide a feed rack for feeding roughages and troughs for concentrates and water
- Provide adequate bedding all the time

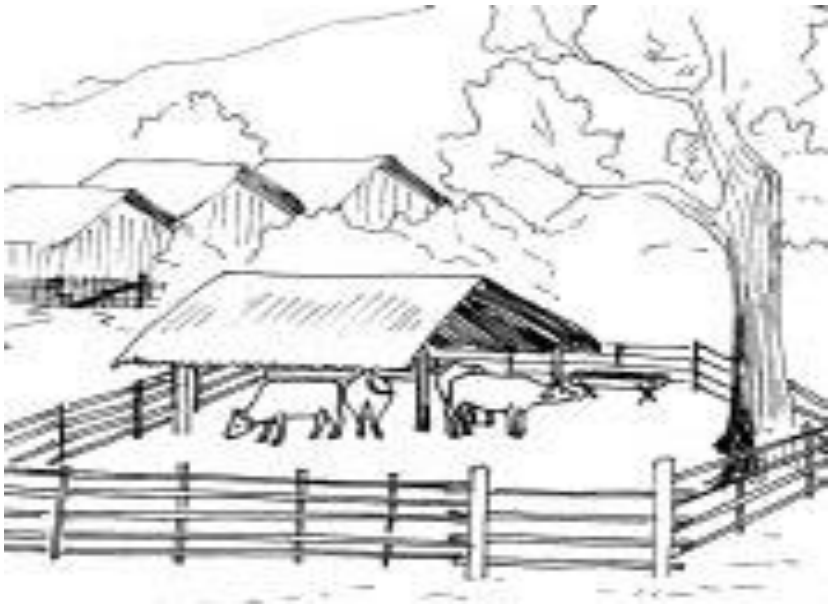

Figure 1: Feed lot Housing

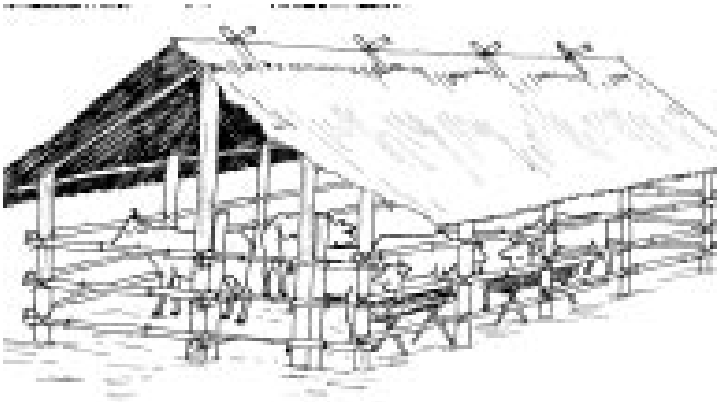

Figure 2: Stall feeding Housing

Replace stall feeding house.

2.2.1.3 Feeding

- Provide adequate roughage of high quality such as Rhode grass, Napier grass, hay, silage, maize stovers, and groundnut haulms adlibitum.
- The roughages can also be treated by adding some salt to improve intake.
- Feed maize bran 5 - 6.5kgs/day/animal or beef mash (a concentrate with 18 – 20% crude protein).
- Provide adequate clean water all the time

3.0 Marketing

Beef production under extensive can take three forms when it comes to marketing. One can be a breeder using pure breeds and producing animals that can be bought by other beef producers to be used as breeding stock. Animals can also be sold to stall feeders/feed lots to be finished. Thirdly the farmers may decide to slaughter as beef without finishing the animals

Depending on management, animals under feedlot or stall feeding are normally finished in about 50 - 150 days. A finished large framed animal will have about 500kg live weight and 350kg for the smaller breeds such as the Malawi zebu. The major buyers are abattoirs in cities of Blantyre and Lilongwe. However, farmers may also sell to local butcher men and other organizations

4.0 IMPORTANT DISEASES OF BEEF CATTLE

4.1 EAST COAST FEVER

East Coast Fever (ECF) is a tick-borne disease caused by *Theileria parva parva* carried by brown ear ticks (*Rhipicephalus appendiculatus*). Other ticks do not transmit ECF. The disease cannot be transmitted directly from one animal to another.

Clinical Signs and Post mortem Lesions

- Animal goes off food, looks dull and sick, it has a fever (of up to 42º C).
- The lymph nodes enlarge below the ear, at shoulder & flank.
- May have clear discharge from eyes (lacrimation)
- Later there is fast breathing & diarrhoea. Rapid loss of condition and corneal opacity
- Sickness lasts for about 1 week; the animal dies or slowly recovers.
- There is no red urine.

Treatment

- **Buparvaquone (Butalex)**

  Give 2.5mg/kg into muscle. One injection is usually enough but may need to be repeated after 48hours.

- **Parvaquone (Parvexone)**

  Give at 20mg/kg

- **Oxytetracycline**

  This is used to prevent secondary infections. It is not effective against clinical cases of ECF.

Control and Prevention of ECF

- **Local Malawi Zebu Cattle**

  Strategic dipping to control ticks is encouraged.

  Dip fortnightly in the rainy season from November to April and not at all in the dry season.

- **Exotic cattle**

- Live vaccines have been developed for ECF and locally produced in Lilongwe.
- Once vaccinated against all the diseases, dipping can be relaxed although not stopped entirely, because ticks themselves can cause production losses in exotic cattle.

- ❖ It is best to vaccinate calves.

4.2 HEARTWATER (COWDRIOSIS)

Heartwater is caused by *Ehrlichia (*formerly *Cowdria ruminantium),* transmitted by Amblyomma. Only Amblyomma ticks transmit heartwater in Malawi. Ehrlichia is transmitted when ticks are feeding. Heartwater can affect cattle, sheep and goats.

Figure 3: Showing Amblyomma tick

Clinical Signs & Post Mortem Signs

- ➢ Often found dead suddenly, with no premonitory signs.
- ➢ Other animals stop eating, develop fever & diarrhoea.
- ➢ The nervous signs develop, twitching, circling, aggression, chewing movements, progressing to collapse, fits and death.
- ➢ Most animals die unless treated very quickly. Whole khola may be wiped out.
- ➢ In goats, there is renal ischemia (lack of blood supply to kidneys) and nephrosis leading to irreversible kidney damage and death.

Control & Prevention

- ➢ Only exotic cattle and crosses need protection from heart water. Local cattle, exposed to infection early in life, become infected but don't become sick (due to endemic stability).
- ➢ An exception to this would be local cattle kept on farms with intensive tick control.

- Either prevent exposure to infection by controlling ticks or give protection by vaccination.

Treatment for Heart water

- Long Acting Tetracycline (20%). give 20mg/kg one injection into muscle
- Short Acting Tetracycline (Oxytetracycline 12.5%) and give 12mg/kg, one injection into muscle daily for 3 days.

4.3 ANAPLASMOSIS

- Anaplasmosis (Gall sickness) is a tick-borne disease caused by anaplasma species that can affect cattle, sheep and goats but it is mostly important in cattle in Malawi. Anaplasma live in red blood cells of an infected animal.

Clinical Signs

- Adult animals are affected much more severely than young animals.
- Animal goes off food, milk yield falls, it has a mild fever.
- Membranes become anaemic, then jaundiced.
- Animal losses weight and constipated
- Breathlessness, uncoordinated movements, abortion.
- No red water but urine may be brown
- Animal dies after a week or remains weak for a long time.

Control and Prevention

- Only exotic cattle crosses need protection from anaplasmosis.
- Local cattle, exposed to infection early in life, become infected but don't become sick because they develop enzootic stability.
- *An exception to this would be local cattle kept on farms which dip intensively. These animals do not get the opportunity to build up resistance to the ticks or the infection and if dipping stops then these local cattle can become sick just like exotics*.
- Either prevent exposure to infection by controlling ticks or give protection by vaccination.

Treatment for Anaplasmosis

- Long acting tetracycline (Oxytetracycline LA, 200mg/ml). Give 20mg/kg one injection into muscle.
- IMIDOCARB (Imizol, 120mg/ml). Give 2.5ml/100kg (3mg/kg), one injection into muscle or under skin.

Tick Control

- Control of ticks by spraying or dipping at least weekly or regular use of pour-ons where Anaplasmosis is confirmed.

Vaccination

- Anaplasmosis vaccine is combined with vaccines for Babesiosis.
- It is best to vaccinate calves.
- Dairy smallholders wishing to vaccinate will find it easier if organized through their bulking group.
- Farmers must pay for the vaccine.

4.4 BABESIOSIS

- Bovine babesiosis is caused by *Babesia bigemina* & *B.bovis*, carried by one host blue ticks *Rhipicephalus appendiculatus* (formerly Boophilus) which are the only important vector in Malawi.

Clinical Signs

- *B. bovis* causes more severe disease than *B. bigemina.*
- Sickness lasts for 3-7 days, death can occur any time.
- Animal stops eating, milk yield drops, it has a fever.
- It is anaemic, later may have jaundice, it has **Redwater.**
- Nervous signs may develop (**Cerebral babesiosis**).
- Animal dies or remains weak/ill for many weeks.

Control & Prevention

- Only exotic cattle and crosses need protection from babesiosis.
- Local cattle, exposed to infection early in life, become infected but don't become sick.
- An exception to this would be local cattle kept on farms which dip intensively. Either prevent exposure to infection by controlling ticks or give protection by vaccination.

Treatment for Babesiosis

- IMIDICARB (Imizol) give 1ml/100kg (2mg/kg), one injection into muscle or under skin.
- DIMINAZINE (Berenil). Dissolve 1g in 12.5ml sterile water. Give 5ml/100kg (4mg/kg). One injection into the muscle.

4.5 BLACKQUARTER

- Blackquarter (BQ), or Blackleg, is a bacterial disease caused by *Clostridium chauvoei*. The spores of this organism are found in the soil, especially where plenty of organic matter is present e.g. waterlogged areas of dambos and cultivated land.

Clinical signs

- Acute depression
- Severe lameness
- Swelling of the upper fore or hind leg
- The swelling crackles if palpated (crepitus)
- Death after a few hours of illness

Postmortem signs

Do not open the carcass. Make an incision of 4-6 inches initially

- One limb sticking out at a strange angle.
- Muscles of the affected limb swollen and full of gas.
- Muscle has dark red or black streaks in it.
- Frothy and bloody discharge from orifices.

Figure 4: Affected Hind leg, a typical sign

Preventive Measures

- Vaccinate calves over 6 months twice in the first year of life (once in May/June followed by a second dose 4-6 weeks later). Give a single booster the following year.
- In herds where BQ has killed animal and where no vaccination has been carried out previously, vaccinate older cattle too.
- Commercial herds are advised to obtain vaccine direct from a pharmacy. A prescription should be obtained from a veterinarian.
- Vaccine for smallholders should be obtained from the veterinary officers.
- Local veterinary staff should notify Area Supervisors or DAHLDOs of the number of doses required by his stock owners, in April each year.

Treatment for Black Quarter

- Penicillin is very effective however acute nature of disease makes it unsatisfactory.

- Practically, during an outbreak, take temperature and treat any animal with elevated temperature.

4.6 TRYPANOSOMOSIS (Sleeping sickness)

Three species of trypanosomes affect livestock in Malawi, namely *T. vivax*, *T. congolense* and less often *T. brucei*. The disease usually affects cattle. It occasionally affects goats and sheep.

Clinical Signs

- Fever up to 41.5 ^{o}C, which may rise and fall every few days.
- Listlessness and decreased appetite.
- Anaemia and wasting of the body muscles.
- Some animals have swollen glands.
- Abortion is quite common.

Figure 5: Wasting of body muscles

Prevention of Trypanosomosis

- Advise owners to graze cattle as far from known tsetse areas as possible.
- Check their cattle regularly for signs of Trypanosomosis.
- If they are having more than one or two cases of Trypanosomosis per month, consider using drugs to prevent infections developing.
- Inject all cattle at risk with a prophylactic drug every 2-4 months. These drugs include: Isometadium, Prothidium, Samorin, Trypamidium and Pyrithidium.

Treatment for Trypanosomosis

- Diminazine, Berenil, Trypazine, Homidium, Ethidium, Novidium

4.7 FOOT AND MOUTH DISEASE

- FMD is a highly contagious viral disease which can infect cattle, sheep, goats, pigs and other cloven-hoofed animals.

Clinical Signs

- Smacking of the lips with strands of saliva hanging down.
- Lameness or pain in the feet, shifting from one leg to the other.
- Blisters on the feet and around muzzle.

Figure 6: FMD Foot Lesions (Left) and Mouth FMD lesions (Right)

Preventive measures for FMD

Movement controls

- One of the main reasons for having movement controls is to reduce the chances of spreading FMD.
- Read your instructions on movement control and issuing movement permits, and stick to them.
- Remember that cattle, sheep, goats, buffaloes, pigs and all cloven hoofed animals can transmit FMD.
- Supervise your cattle guards and veterinary scouts regularly.
  - Ask them to keep a record of the places they visit and check this regularly.

- ❖ Develop community responsibility by talking about FMD and its control at farmers meetings.
- Maintain contact with veterinary staff on the other side of the border, and encourage them to keep you informed of suspected FMD.

Vaccination

- Malawi's policy is to vaccinate cattle in the high risk areas twice per year. This targets areas around Lengwe National Park where there are infected buffalos. A trivalent vaccine is used. This vaccine covers all the three Southern African Territory (SAT) serotypes.
- Campaigns should be held twice a year:-
    1. In March all cattle are vaccinated.
    2. In September a second vaccination is done.

Treatment

- Like any other viral disease, FMD has no treatment

4.8 LUMPY SKIN DISEASE

- LSD is caused by a pox virus transmitted by various biting insects. It only affects cattle. Insects carrying the virus are spread by the wind over long distances.

Clinical Signs

- Initially the animals have a fever (above 39˚C).
- Lumps of 0.5-5cm appear deep in the skin.
- The lumps may be numerous covering the whole body or be few.
- There is enlargement of lymph nodes.
- After a few days the skin over the lump separates from the surrounding skin, but the lump remains firmly attached.
- Occasionally a flap of skin becomes partly detached leaving a wound.
- Oedema may develop in one or more limbs, lower abdomen or brisket.
- The lumps gradually disappear after 1-2 months, leaving scars behind.
- Local animals are not as severely affected as crossbred and exotic cattle.

Figure 7: LSD affected animal showing lumps on the head

Prevention and Control

- Do not allow movement of any animal showing clinical signs of LSD.
- Veterinary staff will not allow movements out of the district, ADD or region of any cattle from an affected herd unless it is direct to slaughter.
- Vaccinate animals over 3 months old.
- Vaccinate in the dry season, before the rains start.
- One vaccination protects an animal more or less for life.
- A small proportion of animals develop a persistent lump at the inoculation site.
- It is usually harmless.

Treatment

- Lumpy Skin disease has no specific treatment. To prevent secondary infection inject long acting antibiotics. Apply Stockholm tar or antibiotic spray or powder to open wounds.

4.9 PARASITES

- Worms can cause poor growth and deaths. Good husbandry can reduce the problem greatly. Parasitic gastro-enteritis is caused by roundworms which live in the stomach or intestines. Some of them can be seen with the naked eye yet others are too small to be seen without a microscope.

- All livestock are infected with worms. A few worms are not harmful. Moderate numbers of worms make animals unproductive while heavy worm burdens kill animals.

The common problems are:-

a) Ascarids in calves from 3 weeks to about 3 months.
b) Trichostrongyles in weaners, including Haemonchus in the abomasum and several other species in the intestines.
c) Trichostrongyles in adult cattle.

Signs of worms

- Animals of any age can be affected, but it is weaners which usually suffer most. Wormy animals look unthrifty and more specifically they will show:-

  - Swollen belly
  - Bottle jaw
  - Diarrhoea
  - Rough coat
  - Anaemia

Figure 8: Emaciation due severe, chronic worm infestation

Prevention and control of Worms

- Routine deworming of animals at the beginning and at the end of the rain season.
- Move animals into new pasture every 3-4 weeks in the rainy season.
- Put weaners on pasture which has not been grazed by older animals in the past 4-6 weeks.
- Remove dung from the khola daily
- Make sure that young stock have adequate feed.
- Supply water in troughs.

Treatment

- There are many de-wormers (antihelminthics) manufactured commercially.
- The choice of drug depends on availability and current price. Calculate the cost of the drug needed to treat 10kg of body weight, and compare different products.
- In animals suffering from ASCARIDS, piperazine is often the cheapest drug, but any broad spectrum drug will do.
- Use valbazen for most endoparasites.
- If liver fluke is a problem, use a drug which is effective for both roundworms and fluke e.g. Rafoxanide, Seponver, Tramizan or Trodax.

4.10 DERMATOPHILOSIS ("Senkobo")

- It is a skin disease of cattle, sheep and goats characterized by formation of scabs on different parts of the body.

Signs of Senkobo

In the early stages there is an exudate in the skin (eczema). This dries after a few days leaving scabs. The hair over the scabs is raised. The scabs get larger over a period of months. They thicken and coalesce with each other. The areas of the skin worst affected are:-

- Udder
- Lower legs
- Scrotum
- Anus

In more severe cases, the lesions:-

- Cause mastitis if on the teats
- Prevents service if lesions are on the vagina
- Stop sucking if around the mouth, or on the teats
- Reduce fertility of male animals if on the scrotum.

Prevention and Control

- Avoid muddy kholas, the mud scalds the skin.
- Remove dung daily, to keep the flies down.
- Dip or spray regularly, to control ticks.
- Cull cases which do not improve after treatment.

Treatment

- In chronic cases, bathe the scabs with a vegetable oil or tick grease each day, until soft enough to remove. The disease will reappear if you do not remove the scabs.