



Training Module No 14

Theory

1. Nutrition and feeding –
Basics of nutrition, Supplementary feeding
2. Reducing kid mortalities –
Creep feeding, Enclosures, Weaning,
Goat enclosure design



Property of Abafuyi Media



Why is food important?

No matter how good your animal's immune system, if it is constantly hungry and malnourished, it will eventually become sick. This is because a malnourished animal's immune system cannot successfully fight all the different diseases trying to attack it. One or more of these diseases will eventually defeat the immune system of the hungry animal, making it weaker and more susceptible to all the other diseases waiting to attack.

It is better to have a well-fed animal so that it is generally in good condition. If it gets sick, such an animal is more likely to recover from illness than a hungry, thin one. A well-fed animal that gets sick can sometimes recover by itself without treatment.

It is therefore important that animals have enough good quality food so that they are able to maintain their immune system and to fight disease. A well-fed animal is usually a healthy animal with a strong immune system. In winter when there is not enough good quality food, animals can get sick very easily. Animals that are fed properly are also generally more productive, producing more milk, growing faster and having a shorter period between subsequent kids (preferably giving birth three times in a two year period). This is especially important to consider where there are no bushes or trees and in sourveld areas. See more about feeding goats in Section 13.4.

Basics of nutrition and feeding

Goats are mainly browsers (eat leaves off trees and bushes) although they will also graze (eat grass). They are *ruminants*. This means that they regurgitate feed and ruminate or 'chew the cud'.

In order for goats to grow well, it is necessary to develop a year round forage programme allowing for enough feed throughout the year.

Feed requirement

Maintenance requirement is the minimum feed required by an animal that is to not growing, pregnant or lactating, to keep warm, and to maintain its body weight. A mature, dry ewe (i.e. not pregnant or feeding a kid) or a mature castrate are examples of animals having maintenance requirements only.

All other physiological functions increase the feed requirement of the goat. Additional requirements above those needed for maintenance are required for growth, pregnancy, lactation and hair production. Ewes feeding twins or triplets have greater nutritional requirements than ewes feeding a single kid. Goats grazing very hilly pastures will have higher nutritional requirements than goats on level pastures of the same quality because they will use more energy while out browsing.

The feed requirements are also linked to the weight of the goat and the weather conditions (i.e. they need more feed during cold periods).

Feed components

Goats need water, protein, energy, and a range of vitamins and minerals.

Water

Access to water is essential for healthy, productive goats. One goat will drink 3 to 10 litres per day, depending on stage of lactation and environmental temperatures. Ewes that are feeding kids have very high water requirements. During hot weather all goats will have high water requirements. It is also important that the water is clean – this is especially important for kids.

Protein

Protein is required for maintenance, growth, reproduction, lactation, and hair production. Protein forms a major component of blood, anti-bodies, muscle and milk and it is therefore required to produce these. Protein deficiencies in the diet can lead to goats becoming sick and even dying. Examples of protein feeds are: acacia pods, beans, cowpeas, lucerne, soybean meal, green pastures and high protein concentrates (PROCON 33).



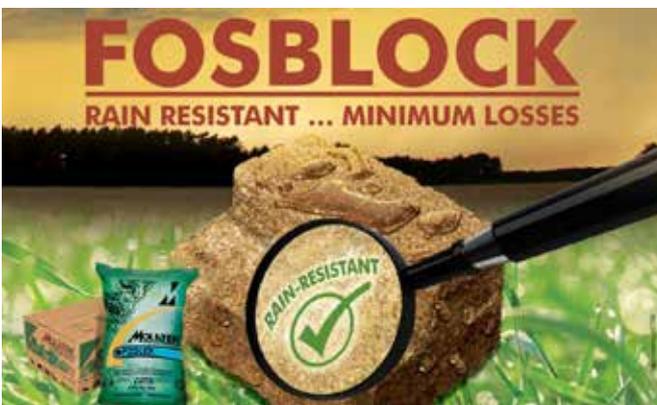
Energy

Goats also need sufficient energy in their diet to allow them to grow, reproduce and make milk. Body condition scoring (discussed in Section 4.1.3) can be used to see whether the goats are getting enough energy – or too much. Examples of energy rich feeds are: maize grain, oats, sorghum and molasses.



Minerals (calcium, phosphorus, salt)

Goats also need to be given access to minerals if they are deficient in their diet. The addition of specific minerals (phosphorus for dry winter forages, selenium in deficient areas, etc) and salt (sodium chloride), preferably in granular form and offered free choice, helps prevent most mineral deficiencies and improves performance.



Various mineral supplements are available for goats

Critical feeding times

Critical periods when you need to ensure your goats are properly fed are:

- Before mating (ewes and rams)
- Late pregnancy (last 6-8 weeks) to avoid aborting and having small, weak kids – but do not overfeed or there will be kidding difficulties from large kids
- Early lactation (to make sure the ewe has enough milk for her kids)
- Feeding kids.

Supplementary feeding of goats

Making use of supplements

Supplements are available in various forms. These can be in powder form, often called licks, meal (such as PROCON 33) or blocks. It is often necessary to supplement natural veld with one of these. Supplements provide the nutrients that are deficient in (missing from) the natural vegetation. When you feed a supplement you need to make sure that the goat has access to sufficient grass, browse or hay or it will be ineffective and may even cause harm to the goat.

Make sure that you protect supplements from rain – especially if they contain urea – as this dissolves in water and can be lost or can poison the goat if it drinks the water. It is recommended not to use supplements with added urea with goats, or in areas of uncontrolled animals.

Prevent excessive intake by putting out small amounts daily or by increasing the salt content.



WARNING: Many of the recommended supplementary feeds contain urea which can be toxic in large amounts but is especially poisonous even in small amounts to horses, donkeys, chickens and goat kids. Take precautions as per labels on the bags.

Summer mineral supplement

In summer, supply a mineral supplement to goats grazing on veld as South African veld is typically phosphate (P) deficient. For example:

- Mix 50kg of P12 (phosphate lick concentrate) with 50 kg salt and feed 50g/goat/day,
- or P6 which includes salt at 100 g/goat/day,
- or a phosphate summer block.

Protein-energy-mineral supplement

In sourveld areas, the quality of the veld declines in winter and it is necessary to supply a protein and energy rich mineral supplement. The energy is required to supply the rumen microbes with sufficient energy to utilise non-protein nitrogen (urea) sources and to digest poor quality feed.

Examples of a supplement to use when there is not abundance of grass, or in the dry season when the nutritive value of veld is low, are:

- Commercial protein (winter) blocks (25kg each). Supply one block per 25 goats and at a consumption of 100 to 140 g/goat/day a block should last for 8 days.
- Molasses meals enriched with minerals and protein, e.g, **Voermol Super 18**, **Voermol Super-mol**, **Molatec Master 20** or **Molatec Background 18** at approximately 200 to 300 g/day. Therefore a 40 kg bag is sufficient for approximately 160 goats for a day.
- LS 33 (molasses liquid supplement) is a protein, energy and mineral supplement spread onto roughage diluted with equal quantities of water to aid in consumption and digestion. Recommended intakes are 60 to 100 g/goat/day. **Note: this is urea based – use with extreme caution.**

How to make an energy and protein block for supplementary feeding of goats

This section explains how to make your own block to supplement your goats' nutritional requirements. Please see Section 19.6 for complete information. These blocks are for supplemental feeding of goats. This means they must be fed to goats with other food, or to goats that are allowed to roam out in the veld for most of the day.



The goats also need to have a good supply of clean water to drink as the salt in this supplement will make them thirsty. The goats should not eat more than 4 tablespoons a day of the block, so the block must not be left with the goats as they will finish it. This block is recommended for mothers and for kids from two weeks of age.

Ingredients

These 5 ingredients will be available from your local farmers' supply shop. The brand names will change and are not important.

Please always use a 2 litre jug with measurements marked on the side, like the one in the picture.



Ingredients	Number of 2 litre jugs
Coarse salt	2
Procon 33	16
Maize meal	7
Molasses (liquid)	8
Whitewash	4
Number of blocks per mix	42

Mixing instructions

Find a cement slab or piece of ground-sheet. Mix dry ingredients together. Add molasses and mix with a spade, then break up any lumps by hand until the mix is consistent.



Using the block maker

Oil surfaces with cooking oil so the block doesn't stick to these surfaces. Add mixture to block maker to level shown. Stamp down the mixture with the rounded handles. Pull out block separator. Lift whole block maker off. The four blocks will need a day to dry before you move them or feed them to goats.



This block maker has been specially adapted to make goat blocks and is available from any hardware shop. (2017 price approx. R1800). Just ask for the HAKA Goat Block maker. If this maker is not available these blocks can be pressed by hand into plastic containers of appropriate size.



Home mixes

There are some feeds that you can mix at home using local materials. For example you can chop up maize stover and add **Voermol LS33**, which is a liquid supplement that contains molasses and urea, but this should not be fed to kids. Alternatively you can feed milled bean residue. If you are feeding goat kids or lactating ewes, you can add lucerne to improve the protein content.

Growing green feed for goats

You can grow green feed for your goats. Examples of perennial pastures are Napier grass planted in rows within fields or pastures, Lespedeza, lucerne or Desmodium. Annual pastures include oats. cowpeas, lucerne, soya or peanuts can be grown in summer and the leaves and stalks used as a protein supplement for winter consumption.

Root crops such as chicory, turnip, radish or fodder beet grown at the end of summer are an early winter feeding option, supplying both protein and energy. These can be harvested and fed to the goats as they come in at night, not in the kraal as they may pick up worms unless the feed is in secure feed troughs.

Stover processing

A farmer should always conserve left over crop residues or stover that may be palatable for animals so that they can be properly dried and processed to be fed to the livestock in the dry winter months. These can include maize and sorghum stalks, bean plants after threshing, sweet potato leaves, dry grass, leaves of nutritious trees, etc. These should be processed to be small enough to swallow without too much chewing and a farmer should add a supplement to them to make them sufficiently nutritious. Use a small electric or petrol hammermill to grind up the stover, or chop it by hand, and add either molasses or **Voermol LS 33** (fortified molasses) or lucerne.



Feeding problems

Certain feedstuffs can cause problems:

- Allow goats to adapt slowly to concentrates (start with 50g/day/goat and increase gradually over a week)
- Take care with legume pastures as they can cause bloat

- Sometimes goats eat poisonous plants if they are new to an area (see Section 9.6). Do not offer unlimited amounts of grains or concentrate feeds (including sorghum beer residues and rice) to goats of any age. This can result in enterotoxaemia (overeating disease), ruminal acidosis, urinary calculi, bloat, laminitis-founder, and a host of other very serious rumen-based and therefore life-threatening illnesses
- Enterotoxaemia (overeating disease) is caused by Clostridial organisms (*Clostridium perfringens* type C & D). Under normal conditions, these potential pathogens do not cause harm. However, stress (environmental, physiological or psychological) can cause the population to explode, which releases a toxin that is usually fatal to the host. Vaccines are available for its prevention (e.g. **Multivax P**). See Section 9 on eating disorders.

Maximise veld use

Carrying capacity

The carrying capacity of veld is the amount of livestock it can carry, which is based on the amount of food that it produces. High rainfall areas with good vegetation cover and good types of grasses produce the most grass and can feed the most animals. Some grasses are said to be 'unpalatable' because animals do not eat them. Sometimes it is because they have a bad taste, sometimes it is because they are too tough to bite off and animals' teeth will wear on them. Examples of these grasses are the Ngongoni (*Aristida junciformis*) and uMtshiki species (such as *Sporobolus africanus* and *Eragrostis plana*).

Since goats graze as well as browse, you need to consider the amount of grass and trees available. Trees that have leaves below 1.5 metres are available to the goats – otherwise you will have to cut the branches for the goats. You also need to consider whether the trees are palatable for goats (i.e. will goats eat them) and whether they lose their leaves during winter.

There are ways to calculate how many goats and other animals can be kept on a given area of land. If you keep more than this number of animals they will not do well and you will also damage the veld.

Sourveld versus sweetveld

Sourveld occurs in cooler, high lying, high rainfall areas that receive frost. In autumn, the quality of the grass declines as it reabsorbs nutrients into the root system (to prepare it to survive harsh conditions). In spring the grass plants produce new leaves that are highly nutritious. In winter it is necessary to supplement the sourveld with protein. This can be supplied in the form of a lick that allows the animals to utilise the poor quality grass that is available. Recovery of this veld from over-utilisation is very slow. The composition of sourveld is generally made up of short grass species.

Sweetveld retains its quality throughout the year. It is generally found in warmer, drier areas. It generally produces less grass than sourveld because of the lower rainfall, but it is good food all year. Less grass often means that the carrying capacity of sweetveld is lower than that of sourveld. This veld is very easy to damage with over-utilisation and can also be prone to bush encroachment.

Resting veld

Vegetation benefits from a full season's rest at intervals. A rest is needed for a full season so that the grass plants can replenish their root reserves. Each time a grass plant is grazed, it withdraws nutrients from its roots to allow it to produce new leaves. If the plant keeps being regrazed without having a chance to replenish its root reserves, it will lose its vigour and in the end it will die or it will be pulled out by a grazing animal.

When trees are browsed too much, a browse line is created (Figure 15.1). This is not beneficial to browsers as it does not leave any leaf matter for further consumption and therefore a correct stocking rate needs to be maintained in order to prevent this. Animals will need to be withdrawn until this is corrected.

What does this mean for the way you manage your goats?

- If you have your own area where you can limit the number of animals grazing there, find out how many animals it can feed and try not to exceed this unless you can afford to buy extra feed for them.
- Goats walk long distances looking for food if it is scarce. If you fence them into an area that does not have enough food they are unable to go and look for additional food.
- Research has shown that goats walk on average four to six kilometres a day. This means that any fencing system or enclosure should take into account this need for a very large browse area.
- Research has also shown that goat herds compete with each other for browse. What this means is that the larger the herd, the further they will need to walk to get sufficient browsing. At herd sizes of about 80+, they reach a threshold where they cannot walk any faster in the time they have and thus start going through nutritional stress because of the size of the herd.
- Make sure that your goats also have access to clean water on a daily basis.
- In communal areas it may be possible to make joint decisions to keep all animals out of a selected area for the summer period to allow the grass to grow and seed and replenish its roots. This requires that all livestock owners agree to cooperate.
- In areas where the trees are tall you may decide to cut branches to feed goats. This may need permission from the traditional leadership.

Important facts on goat grazing habits to keep in mind

- Goats walk on average 4-6 km per day. Distance increases with herd size and season.
- They spend 75% browsing and 25% grazing, even with grass available.
- They spend 8% of their browsing time standing on their back legs.
- They can survive on the green flush following the first storms, while cattle wait for proper rain leading to grass.
- Each goat grazes 2000 trees of palatable varieties with branches of 1.5 metres height per year.
- Unmanaged sweetveld bush has between 1500 and 4400 trees per hectare.

Interventions to reduce kid mortalities

The following interventions are important for minimising the number of kids that die:

- Let the goats give birth in a quiet, clean, dry place without interference from other goats
- Provide a dry, clean, weather-proof shelter for newborn kids and their mothers
- Dip navels with iodine at birth to stop bacterial infections
- Give kids a drop of iodine on the tongue to prevent deficiencies
- Make sure that the kids are dry and bond with the ewe and consume colostrum within an hour of being born
- Make sure the ewe is healthy after giving birth and has enough good milk for her kid (no mastitis, retained placenta, etc.)
- Ensure that the ewes have access to green fodder after giving birth to stimulate milk production
- Cull ewes with poor mothering abilities or bad udders when they have weaned their kid
- It is important to make sure that the lactating ewe gets enough feed so that she produces sufficient milk to support the growth of the kid
- Give kids supplemental feed from 2-3 weeks of age so that they are able to cope with their mother's poor milk production when feed is short
- Separate ewes and kids from the rest of the herd especially when in the kraal to avoid trampling, which may injure or kill kids
- Providing enclosures to separate and feed the kids is an important way of preventing kid malnutrition – see Section 15.5 and 19.4.

Castration

It is recommended to castrate male kids at 3 months of age, using a Burdizzo (see Section 11.3 for further information).



WARNING:

If you are using rubber rings to castrate, the kid must be less than 7 days of age. Using rubber rings on older goats can lead to death.

Rearing orphans

It is important that newborn kids consume some colostrum. This first milk contains antibodies from the mother that are taken in by the kid and which protect it from disease. Kids should receive colostrum within the first hour after birth. You can give a kid colostrum from another ewe if its own mother has died or has no milk.

A replacement for colostrum (the nutritional content)

- Mix 500ml cow's milk, 1 egg beaten in milk, 1 teaspoon cooking oil.
- Give four small (150 to 200 ml each) feeds/day for the first three days (heat to body temperature).

General milk replacer

- After the first three days feeding colostrum, feed normal cow's milk three times a day from 400 ml up to 750 mm daily (i.e. 150-250 ml at each feed) for two weeks dropping to twice daily thereafter (i.e. 200-400 ml at each feed) for at least another 6 weeks.
- NOTE: YOU CAN USE UHT FULL CREAM COW'S MILK AS A MILK REPLACER.
- If normal cow's milk is not available it is possible to raise kids on a **GOOD QUALITY** milk replacer. Any milk replacer with a high fibre content on the label has vegetable products in it and is NOT good for kids.
- Incorrect mixing of milk replacers can quickly lead to a fatal bloat in the kid so it is best to try and get proper milk. If changing onto milk replacer from milk first mix the milk and milk replacer half/half for a number of days for the kid to get used to the new diet.

Note: Hygiene is very important when rearing orphans. Poor hygiene practice can spread diseases between ewes (e.g. mastitis if you are putting orphan kids onto different ewes) and kids (e.g. orf can spread if the same bottle is used for more than one kid).

Creep feeding kids

It is essential that a kid is allowed to eat solid food or the rumen will not develop properly and the kid will lose condition or even die at weaning. Kids can be introduced to solid food at about 2 weeks old. The kids need to be supplemented until they join the herd. Kids should stay at home for 3 months and should be kept in a separate camp if possible to reduce their exposure to worms. Fresh clean water is **very important** as is a schedule for vaccinating and deworming the kid. See Section 11.5.

Different creep feeds

Build an area where the kid can 'creep' away from its mother to eat and drink or give the kid feed and water when the mother goes out to graze. Creep feeding is a means of providing supplemental feed for kids that are still drinking from their mothers. It is most important at times when the ewes' milk production is low (e.g. in winter when feed is scarce) or when there are lots of twins and triplets. Positive responses to feeding young kids have been experienced in terms of improved kid growth and survival on communal rangeland in the Msinga area of KwaZulu-Natal.

There are different options for supplementing kids. The best feed would be one specially mixed and sold for growing lambs and kids (as shown in Section 13.2), called lamb creep feed. If this is not available they could be fed goat feed or even a Voermol game block. If it is not possible to buy commercial feed, kids can eat the leaves of trees as well as long as the tannin content is not too high or the tree is poisonous. Fresh cut grass or hay for roughage is also a good idea, but avoid cutting grass from areas where the adult goats have been as they may have left worms behind.

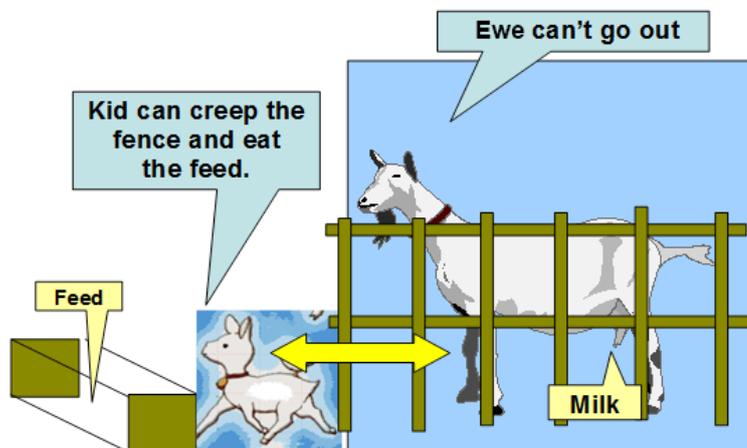
If you are feeding dry feed to the kids, it must always be fresh and palatable. When kids are young they prefer finely ground feed, but as they get older, coarser feeds are preferred, and whole grains are digested very efficiently. If you are buying commercial feed from a shop you should choose one that has crude protein (CP) content of approximately 18% and approximately 12 MJ energy (metabolisable)/kg DM. It also must not contain urea since young kids are very susceptible to urea toxicity. As the kids get older, you can use a feed that contains less protein. For example from weaning they can have a feed with 15-16% crude protein. Pelleted feeds are better because they make sure that the kids don't select the 'best' parts and leave the less desirable. When the creep feed is a concentrate, it is important to allow the kids access to good quality roughage. This will promote the development of proper rumen function.

Other factors to consider include:

- Kids begin to nibble at feed and hay at a very early age. Some kids may have a functional rumen and be chewing their cud by two weeks of age. Therefore, creep should be available by the time kids are 2-3 weeks old. They do not, however, begin to consume significant quantities until they are about 4 weeks old.
- Young kids will not consume stale or contaminated feed. Clean out old feed that accumulates in the troughs at least once per week. It can be fed to older animals, thus avoiding wastage.
- Kids must have access to clean water in, or close to, the creep feeder.

Feeder design

The idea is to allow kids access to feed while preventing access to ewes and older animals. Most creep feeders are constructed by placing troughs in a pen or by building a pen around a feeder in the pasture. Either way, the challenge is to design a gate or entrance through which only the kids can pass. Spacing between the vertical bars of the gate needs to be 12-15 cm.



Creep feeder design (ESGPIP, 2010)

Enclosures

Linked to the creep feeding concept is keeping the kids in a comfortable and healthy environment while the mothers are browsing. These enclosures can be built for a reasonable price and by local people. Experience has shown that with an enclosure that includes feeding and veterinary support, kid mortalities can be greatly reduced. It should be built outside the kraal to avoid dust, manure and diseases.

The enclosure should have:

- A concrete floor that is angled so that it is easy to clean
- Wire netting outside to stop other animals eating the food
- Shadecloth to stop wind and cold drafts, but also to prevent chickens eating the kid food
- Gutters on brackets and stop ends to put food and water in at an appropriate height
- A roof to stop rain and direct sunlight
- An extra shelf above the gutter to stop kids climbing into gutters.



Using the enclosure

- Kids should be put into the enclosure from 2 weeks to 3 months
- They should be supplemented with stover and supplements (blocks)
- A 2 metre by 2 metre enclosure should accommodate 10-20 kids
- With more kids the enclosure should be doubled for every 14 more kids
- Water must always be available
- Kids should be taken out of the enclosure when mothers return and allowed to suckle and browse with their mothers

- Kids should be encouraged to browse when not in the enclosure
- Orf and coccidiosis can be spread so ensure water is cleaned and changed daily
- Supplement feeding should be controlled and each kid should not be given more than a handful of food a day
- Uneaten and soiled food should be cleaned out daily.



Open troughs such as pieces of gutter or lengths of PVC pipe cut to size with ends blocked off will work, but must be cleaned and filled frequently (at least once a day). Also, kids will get in the troughs, and urinate and defecate on the feed, which will lead to wastage. Deep troughs or those with sloping bottoms can trap kids and result in suffocation. These 'feed troughs' can be attached onto the side of the creep pen and raised off the ground. You can put a board above the trough to keep their feet out of the troughs. This forces the kids to stand on their hind legs to eat and keeps the feed clean.

Precautions

Prevent disease outbreaks amongst your kids. Outbreaks of orf may occur because they are sharing the same feed and water. If this is a big problem, it may be worth vaccinating against orf with a vaccine such as **Scabivax Forte**. Hygiene is important and the pens should be disinfected regularly to control diseases such as coccidiosis. Another option is to use a commercial feed that contains medicines called coccidiostats.

Weaning

Weaning is when the kid stops suckling. It normally happens automatically at about 3 months of age. This is a stressful time for kids so a farmer should be attentive of kids going through weaning and showing signs of stress.

Goat enclosure

