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Goat Production Handbook



Produced by
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Department of Agriculture
and Rural Development**



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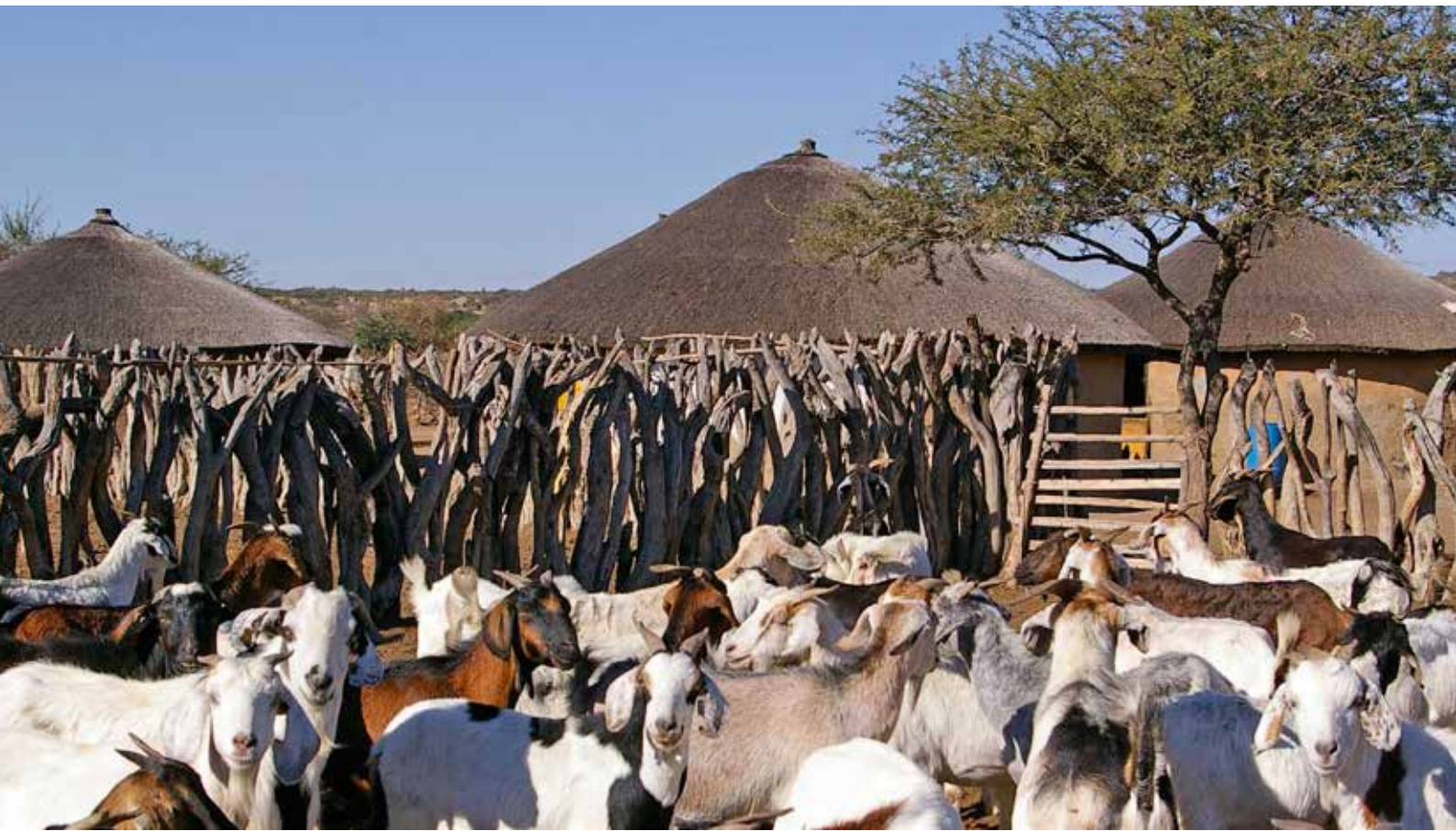
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Purpose of this book

The aim of this book is to assist owners of indigenous goats with extensive farming systems. It looks at ways to improve the productivity of their flocks. It is designed to be shared with farmers in a way that allows them to understand how to find their way through the book and how to find the information that they need. It is best if the book is part of a capacity building programme being implemented by extension officers and field workers.

There are further training materials to support training farmers on this book. They are available at www.mdukatshani.com or www.heifer.org.za. These are training modules linked to sections in the book and are in downloadable .pdf for printing or a downloadable PowerPoint presentation.

The book is divided into four parts.

Part 1 – Basics of Keeping Goats: This section covers the basics of keeping goats, including handling them properly, keeping them healthy, identifying common diseases and other health-related problems, treating sick goats properly (including basic equipment and medicines you should have on hand), and dealing with internal and external parasites.

Part 2 – Goat Commercialisation: The next section is more focused on commercialising goat production. It is for goat owners who want to invest more time and resources in managing their goats. This section covers some general management practices (including record keeping), housing and handling facilities, flock identification, nutrition and feeding, reproduction and kid rearing.

Part 3 – Marketing and Value Adding: The final section is aimed at goat owners whose main aim is to market their goats. It looks at the economics of goat production, opportunities for marketing and value-adding, proper transportation of goats and veld management.

Part 4 – Resources is a section that contains additional materials that you may find useful. This includes record sheet templates, the information to make your own goat weight belts, and sources of information (books and websites), as well as detailed economic analyses of various size herds.

This book is not for sale but is distributed as part of a training program. It is available as a free download in Zulu or English, from the two websites listed above.

PART 1

Basics of Keeping Goats



1. An introduction to goats

1.1 Different goat breeds

Goat breeds can be divided into three categories:

1. **Indigenous breeds** which have been naturally selected for adaptability to harsh environments and which are generally used for meat production, but are also important for cultural purposes.



Figure 1.1 Indigenous goats in Msinga.

2. **Meat breeds** which have been specifically bred for meat producing characteristics. Such breeds available in South Africa include Boer Goats, Savanna Goats and Kalahari Red Goats. It is generally accepted that they are more susceptible to disease than non-improved goats.



Figure 1.2 Meat goat breeds in South Africa (Boer¹, Savanna² and Kalahari Red Goats³).

1 www.kandklivestock.com/html/boer_goats.html

2 <http://dagris.ilri.cgiar.org/images/GOAT/big/SAVANNAH.JPG>

3 <http://www.nda.agric.za/docs/AAPS/Goat%20Pictures/Kalahari%20red/Kalaharired3.jpg>

- 3. Dairy breeds** which are all imported breeds and include mainly Saanen goats and Toggenburg goats. These are breeds that have been selected for milk production and are used for the production of milk and processed milk products such as cheese and yoghurt. It is generally accepted that these breeds are very susceptible to diseases and parasites.

Figure 1.3 Common dairy goat breeds in South Africa (Saanen⁴ and Toggenburg⁵).



1.2 Basic information for indigenous goats

Production norms for different goats are fairly variable. This user guide will focus on indigenous type goats and provide some information that can guide a goat farmer and allow him or her to assess the herd's performance.

- Length of gestation period (pregnancy) 150 days (approximately 5 months)
- Birth weight 2.5 kg
- Weaning weight (weight when kid stops suckling) 12-15 kg
- Mature mass of female 35-40 kg
- Mature mass of rams 45-50 kg
- Breeding age for young ewes 9 months
- Main kidding seasons (April–June) or (September–December)
- Ram/ewe ratio 1 ram to 20 ewes (5 rams for every 100 ewes)
- Lifespan (10-12 years).

1.3 Handling your goats

The main thing to consider when handling goats⁶ is to keep them calm and prevent injuries, both of which will improve the productivity of the goats. Smallish pens and handling facilities allow for easier handling of the goats than trying to work within a camp.

When handling goats, you need to understand their natural behaviour. For example:

- They prefer to move towards light than dark
- They prefer to stay with the herd than be separated, which can distress them

⁴ <http://www.teara.govt.nz/files/p16593pc.jpg>

⁵ http://www.dpi.nsw.gov.au/__data/assets/image/0010/178669/toggenburg-doe.jpg

⁶ Schoenian, S. Efficient handling of meat goats <http://www.sheepandgoat.com/articles/handling.html>

- They like to follow the leader
- They tend to move in a circle in the pen around the handler
- They are easily distracted by noise
- They can become aggressive towards each other when confined and stressed
- They prefer to move in family groups
- They can jump over gates and find escape opportunities
- Standing behind the animal's shoulder will generally encourage it to move forward. If you move quickly down next to the rear in the opposite direction to the goats, they will generally move forwards up the race
- Keep the goat upright when trimming hooves
- Try to get the goats used to being handled so that they are less stressed
- When holding a goat by the horns, hold the base of the horns and not the tips
- Work calmly and quietly with your goats.



Figure 1.4 Catching a goat correctly (above the hock) so as to not damage the leg (top picture) and holding it securely (below).

1.4 Flock identification

Obtaining an identification mark (KZN diptank mark or personal mark)

According to the Animal Identification Act, Act No.6 of 2002, all livestock must be marked or identified. While cattle are generally branded, goats are tattooed in the ear with the owner's identification mark.

Each livestock owner must have their own identification mark. This is obtained by applying to the National Department of Agriculture in Pretoria. An identification mark certificate is then issued and it carries a unique identification code for each livestock owner. This is the same mark that will also be used when tattooing your goats.

Diptanks can have an identification mark registered by the Department of Agriculture which can be used by all members belonging to the particular diptank, however problems of confirming ownership of livestock cannot be excluded. Therefore, the safest and legal way of identifying livestock is for each farmer to have their own identification mark.

Tattooing

Tattooing is a way of identifying goats. Tattooing equipment: includes tattoo pliers, tattoo characters (letters and numbers) for the pliers and tattoo ink. These can be ordered and purchased through the local farmer co-operative.

Method of tattooing:

1. Clean the inside of the ear (the ears have dirt and oil on it that will prevent the ink from filling the holes made by the tattoo pliers)
2. Apply the tattoo ink on the area to be tattooed
3. Ensure that the sequence of the tattooing characters is correct according to the certificate of registration
4. Press the tattooing pliers until holes appear on the skin and then release
5. Rub the ink into the holes
6. The excess ink can be cleaned. The characters should be easily readable as black dots in the ear.

Figure 1.5 Equipment for ear tattooing and application of the tattoo to an ear.⁷



2. Keeping your animal healthy

2.1 Why keep animals healthy?

A healthy animal is more able to resist diseases and can recover more easily when it does get sick. A sick animal costs a farmer money and time. A farmer with a sick animal has to buy medicines, syringes and needles. It is therefore better for a farmer if animals stay healthy and do not get sick.

Treatment is also more successful if it is given early, before the animal is so sick that the medicine cannot help it. This means that a farmer must be able to tell very quickly if he or she has a sick animal, what sickness it has and what he or she can do about it.

⁷ <http://www2.ca.uky.edu/agc/pubs/asc/asc130/fff00050.gif>

Goats can be kept healthy by:

- Ensuring that they have access to enough feed of the correct quality
- Ensuring they have access to clean water
- Following a vaccination programme against common diseases
- Keeping internal and external parasites under control
- Keeping sick goats separate so that disease does not spread to healthy goats
- Making sure that any goats introduced to the flock are disease-free
- Sheltering goats from adverse weather.

If a goat does get sick it needs to be treated. More importantly, it is essential to keep a record of goats that you treat because if a particular animal gets sick often, it should be culled as it is a weak individual and is not only costing you money but is also passing on its genes to the next generation.

How do I know if my goat is sick? If the goat is sick:

- It will appear dull and listless
- It may have obvious symptoms of sickness such as coughing or diarrhoea
- It may not follow the rest of the flock when they go out to feed
- It may have an abnormal temperature – either too high or too low.

2.2 Why is flock health important?

One sick animal can sometimes contaminate other healthy animals and cause them to get sick too. This can also result in the sick animal getting re-infected after it has recovered.

Sometimes when a farmer has many sick animals, or a neighbour has sick animals, it means that the amount of disease in the area is very high. It is very difficult to keep individual animals healthy when there is a lot of disease around. Farmers who are aware of common diseases in their area need to think strategically about how to combat these diseases as a community rather than trying to just keep their own animals healthy.

This is also true of parasites that cause diseases, like ticks and worms. If some animals have a lot of ticks or worms, then it is difficult to stop the ticks and worms spreading to all the animals in a herd.

So before we consider how to treat diseases, it is best to think about how to recognise healthy animals and how to keep them healthy.

2.3 What keeps animals healthy?

The immune system keeps the animal healthy. All animals and people have immune systems. The job of the immune system is to fight germs that invade the animal and could cause it to get sick. The immune system is like the animal's own army, ready at all times to fight invaders that put the animal's life at risk.

The immune system is found everywhere in the animal's body. It is made up of millions of little cells that are too small for people to see with their eyes. When germs enter the animal's body, these immune cells come from all over to attack the germs. If the cells win the battle, the animal stays healthy. If they lose the battle, the animal may get sick and need treatment. The cells are produced in the bone marrow and then spread around the body in the blood.

The immune system can recognise diseases if it has fought these diseases before. With some diseases, like contagious abortion (CA), this recognition lasts the animal's whole life. With other diseases, however, the immune system can recognise the disease when it is present often but stops being able to recognise it when the animal hasn't had it for a long time. Common diseases of this kind are those that ticks cause. This is one reason why animals often get sick in early summer when there are a lot of ticks after there have been so few in winter. Once the animal's immune system is used to the ticks again, then the animal can often fight the tick diseases.

Livestock owners who come from areas where the disease heartwater occurs must be very careful about buying animals from other areas, because if they come from areas that do not have heartwater, the animals' immune systems will not recognise the disease and cannot protect them and they will get sick and may even die.

It is also important to know that, like an army, the immune system is divided into different sections, each one of which has its own germs to fight. For example, one section fights redwater but it cannot fight heartwater. Only the heartwater section of the immune system can fight heartwater. This means that just because the immune system can recognise one disease does not mean it can recognise all diseases.

One way of getting an animal to have contact with a weakened form of the disease without killing the animal is vaccination. Some vaccinations must be given every year while others need only be given once in an animal's life. Another way for the animal to develop its immune system is through the infant animal being born with some of its mother's immune cells. Infant livestock also develop stronger immune systems if they suckle their mothers very soon after birth to drink the first milk called colostrum, which is filled with the mother's immune cells (antibodies).

Animals that do not spend too much of their energy on getting warm or staying cool are more able to recover from disease. It is therefore wise to provide sick animals with shade and shelter from wind and rain to keep the animal warm and comfortable.

2.4 Why is food important?

No matter how good your animal's immune system, if it is constantly hungry and very 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 try to feed an animal properly 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). See more about feeding goats on Page 53 Section 9.

2.5 What is the importance of good hygiene practices?

Hygiene or cleanliness is an important part of keeping your livestock and yourself healthy. Germs and organisms that cause disease and illness can spread between sick and healthy animals if you do not maintain cleanliness such as washing your hands and cleaning your equipment after treating.

2.6 Vaccination (preventative health care)

Farmers need to be aware of common diseases that affect goats in their area and then follow an appropriate vaccination programme. Vaccination is only possible for certain diseases. With these diseases, you can give the healthy animal an injection that will stop it contracting a particular disease. This is different to treating an animal once it is sick.

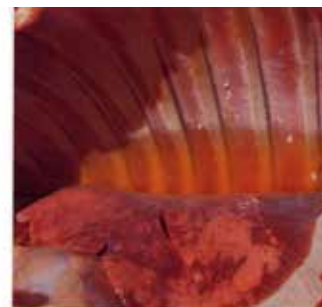
One of the key vaccines you can give a goat is **Multivax P**

- This will control pasteurella (lung infections), pulpy kidney, tetanus, black quarter
- Young goats: inject at 4-5 months and repeat at 5-6 months
- Adult goats: **Repeat annually in September (and repeat after 4 weeks).**

Other vaccinations should only be given if a problem is positively identified by a vet or animal health technician, for example: enzootic abortion, *Brucella melitensis* (also commonly called CA). Check the management calendar in Section 7 below for timing of basic vaccinations.

3. Common diseases and conditions

There are a number of common diseases that affect goats and which farmers need to know how to prevent and/or treat.



3.1 Heartwater

(Umqahqazelo emazinyaneni)

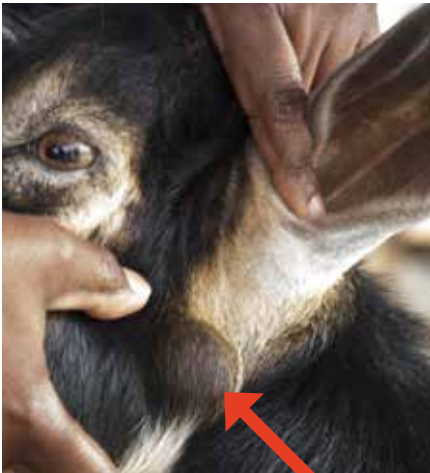



Symptoms	Prevention	Treatment
<p>The Live Animal: The organisms that cause heartwater are transmitted by Bont ticks, which are mainly found in hot, dry bush areas.</p> <p>Heartwater can result in death within 24 hours, but some cases survive 2 to 5 days.</p> <p>Affected goats have a very high temperature and show nervous signs: high stepping jerky gait, shivering, walking in circles. Later, jerky, paddling movements with the legs and the head pulled backwards when the animal goes down.</p> <p>The dead animal will have excessive fluid in the heart sac, lungs, chest cavity and abdominal cavity.</p>	<p>To prevent heartwater, try to maintain the animals' immunity by letting a small number of ticks stay on the animals all the time. However, when there are visibly many ticks on the goats, dipping about once a month may be necessary.</p> <p>Goats that have grown up in a heartwater area are more resistant to the disease</p> <p>If an animal dies of heartwater, dip it to kill the ticks on its body. The ticks are infected with heartwater and will infect other animals if they bite them.</p> <p>Vaccination against heartwater is possible but it is complicated and expensive, speak to your veterinarian about this.</p>	<p>Treat the animal early before nervous symptoms show.</p> <p>Use short-acting Terramycin for three days in a row, or new drug Doxycycline. Use an intravenous injection if you can, otherwise intramuscular.</p> <p>Dosage rates: Adult goats inject 5cc daily for 3 days (intramuscular injection). For a kid give 2.5cc daily for 3 days. Note: Dosage rates will vary depending on the make of the injection that you buy.</p> <p>Blocking: Some farmers prevent Heartwater outbreaks by treating young goats with a dose of long-acting antibiotic when they are going to be exposed to ticks. This is called blocking. You can read more about blocking in the resources section.</p>

Pictures: Top left: Vatta, A.F., Abbott, M.A., de Villiers, J.F., Gumede, S.A., Harrison, L.J.S., Krecek, R.C., Letty, B.A., Mapeyi, N. and Pearson, R.A. 2007. *Common Diseases and Conditions: Heartwater in Goatkeepers' Animal Health Care Manual*. Agricultural Research Council. ISBN-13 978-1-86849-352-4. (Website: <http://www.arc.agric.za/home.asp?pid=3974> Downloaded 19/05/11).

Top right: ARC Goatkeepers' Animal Health Care Manual


3.2 Abscesses (Amathumba)

Symptoms	Prevention	Treatment
 <p>An abscess on a goat's jaw</p> <p>An abscess is a swelling that is the result of a bacterial infection. It is hot, red and painful. It can be caused if a thorn or a tick breaks the skin and the bacteria then enter the wound.</p>	<p>Control excess ticks and general hygiene.</p>  <p>WARNING: IF AN ANIMAL HAS SEVERAL VERY BAD ABSCESES OR GETS ABSCESES OFTEN, IT SHOULD BE CULLED.</p>	<p>Open and drain the abscess when it has a yellow spot on it or when it softens. This can be done by cutting a cross over the soft spot.</p> <p>Use a boiled razor blade to cut the abscess. Then syringe warm (boiled) water with a lot of salt in it (1 tablespoon of salt in a cup of water) or iodine into the wound.</p> <p>Spray daily with a wound aerosol such as Woundsept Plus. The wound must be kept opened and it must be flushed daily with warm salt water to remove pus.</p> <p>Use gloves when handling the abscess. Bury or burn the material used to wipe the pus. This can infect other animals and people. Always boil the razor blade before using it.</p> <p>The goat can also be injected with an antibiotic to aid recovery.</p>


3.3 “Malkop” or “Draai Siekte” (Tapeworm cyst in the brain causing brain damage)

Symptoms	Prevention	Treatment
<p>This is a symptom rather than a disease in itself. Affected goats walk in circles due to permanent brain damage, they suffer and die. It is caused by tapeworm cysts in the brain.</p> <p>See Figure 4.2 which shows the life cycle.</p> <p>Animals show signs of brain damage, for example, walking in circles.</p>	<p>Goats require regular deworming to prevent such conditions. It is also very important to deworm dogs regularly, every six months and to ensure that they do not eat the brains of goats (and sheep), especially goats that die showing signs of Draai Siekte.</p>	<p>No treatment is possible once the animal shows symptoms.</p>

3.4 Scours or diarrhoea

Symptoms	Prevention	Treatment
 <p>Signs of diarrhoea</p> <p>Diarrhoea can be the symptom of a disease. There are many different causes of scours and each one can cause a different kind of runny stomach. They can include:</p> <ul style="list-style-type: none"> • Smooth, yellow diarrhoea • Smooth, white diarrhoea • Whitish diarrhoea with lumps of thin skin in it • Red or brown diarrhoea, which may mean blood in it. • Scours can be caused by a change in food source or diet. 	<p>Regular treatment for worms will prevent scours caused by worms.</p> <p>Where scours are caused by nutritional changes, feeding some sort of nutritional supplement in winter will help with prevention.</p>	<p>A good general treatment is a mix of one spoon salt, 8 spoons sugar in one litre of clean, warm water. For young animals that have not been weaned, feed this mixture twice a day instead of milk (but not for more than three days).</p> <p>Only when there is blood in the diarrhoea, do you inject with a long acting anti-biotic or give a dose of terramycin powder mixed with water.</p> <p>Hi-Tet 200 LA dosage: Intramuscular injection. 1ml/10kg livemass. Repeat after 3 days if necessary.</p> <p>Terramycin powder dosage: Mix with water and give as a drink. 1 level teaspoon powder/7kg livemass. Repeat daily for 3 to 5 days. Immodium tablets for 3-5 days: half a tablet per day</p>

3.5 Mange

Symptoms	Prevention	Treatment
 <p>Mange results in loss of hair and skin irritation.</p> <p>Signs of mange</p>	<p>Prevent the disease by dipping with a suitable dip if there are signs of mange in the area.</p>	<p>Inject infected animals with a product such as Dectomax or dip with a suitable dip such as Triatix or Dazzel.</p>

Picture: "Do your own vet work". 2009. (Website: <http://vetwork.blogspot.com/2009/02/goat-mange.html> Downloaded 19/05/11).

3.6 Coccidiosis

Coccidiosis is a disease that mainly affects kids and lambs. It is caused by an organism known as coccidia and most commonly found in communal drinking water areas.

Older animals do become infected however due to immunity they develop over time, clinical signs do not show. Older animals are normally the source of infection for the younger animals as they are carriers of the diseases.





Whitish spots on the small intestine

Symptoms	Prevention	Treatment
<p>The live animal: This disease normally affects young animals. It attacks and destroys the mucus of the intestine which leads to animals having diarrhoea and an inflamed intestinal lining.</p> <p>This is different from scours. An outbreak is characterised by a short period of diarrhoea and then animals quickly dying.</p> <p>Symptoms include:</p> <ul style="list-style-type: none"> • Diarrhoea (may be bloody or contain mucus and be brown, yellow or greenish in colour) • Dehydration • Anaemia • Lack of appetite • Loss of condition • Rectal straining (this may lead to prolapse) • A rough hair coat. <p>The dead animal: Tiny, greyish-white spots are often visible in the mucous membrane of the small intestine. Guts filled with fluid and blood.</p>	<p>Sick animals should be separated from the rest of the flock to prevent spread of the disease.</p> <p>Hygiene is important for preventing outbreaks of coccidiosis. Pens must be clean and dry. Kids should not mix with older goats and should not have access to contaminated feed and water. Coccidiostats such as Rumensin can be fed at times when disease outbreaks are common to prevent the disease.</p>	<p>Give Sulfazine 16% as a drink.</p> <p>Sulfazine 16% dosage: Initially give 14ml/10kg livemass Then give 7ml/10kg daily for two days</p> <p>Where there are outbreaks, treat all females and kids with Sulfazine.</p> <p>Other treatments: Immodium for 3-5 days (0.5 tablets per day) Vecoxan: 1ml/2.5kg livemass body weight at about 4-6 weeks of age (Treat all kids).</p> <p>The goat should also be given water with electrolytes to prevent dehydration. A good general treatment is a mixture of one spoon salt and 8 spoons sugar in one litre of clean, warm water. For young animals that have not been weaned, feed this mixture twice a day instead of milk (but not for more than three days).</p>


Picture: ARC Goatkeepers' Animal Health Care Manual

3.7 Orf

Symptoms	Prevention	Treatment
 <p>Signs of orf</p> <p>Wart-like sores on the animal's lips and nose and around the mouth of especially young lambs and kids and on the teats of their mothers.</p>	<p>Affected goats should be kept separate to prevent the spread of the disease</p> <p>Vaccination of all lambs and kids when the females have stopped lambing for the season.</p> <p>Method of vaccination: take a thick (18g) needle insert it into the vaccine. Then pierce the skin in the armpit of the animal.</p>	<p>Spray the affected areas with an iodine spray daily. Hard scabs can be softened with Vaseline or glycerine to make it easier for the animals to eat.</p>  <p>WARNING: USE GLOVES AS THE DISEASE CAN SPREAD TO THE HANDS OF HUMANS.</p>


3.8 Foot problems

3.8.1 Footrot

Symptoms	Prevention	Treatment
 <p>Signs of advanced footrot</p> <p>This is a bacterial infection that normally affects goats kept on pastures or under intensive conditions. It spreads easily between goats.</p>	<p>Prevent footrot by keeping sheds clean and by using a monthly footbath containing 10% zinc sulphate solution. The goats must be made to stand in the footbath for a period of 5 minutes.</p> <p>Keep affected goats separate from the rest of the flock to prevent spread.</p>	<p>If an animal has footrot, inject it with an antibiotic such as Terramycin to treat the footrot and apply an iodine spray to the hoofs (between the claws).</p>

Picture: http://archive.agric.wa.gov.au/PC_95014.html?s=1001


3.8.2 Excessive hoof growth

Symptoms	Prevention	Treatment
 <p>Overgrown hooves</p> <p>If goats are on pastures or in sandy areas where there are few rocks, their hooves may become overgrown.</p>	<p>Overgrown hooves need trimming.</p>	<p>If hooves are overgrown they affect the goat's ability to walk and look for food so they should be trimmed.</p> <p>Note: See section on hoof trimming below.</p>

3.8.3 Limping associated with abscesses (Ukuxhuga ibenamathumba)


Symptoms	Prevention	Treatment
<p>These are often caused by ticks or wounds from thorns between the claws of the hoof.</p>  <p>Signs of a hoof abscess</p> <p>Swelling in the foot that is hot, red and painful. Sometimes, they burst open and ooze pus.</p>	<p>Do not leave goats standing in water or mud for a long time.</p> <p>Dip the feet to kill ticks.</p> <p>Regularly check your goats' feet for ticks, especially ones that are limping.</p> <p>Clean overnight kraals/ facilities monthly.</p>	<p>Open and drain the abscess when it has a yellow spot on it or when it softens.</p> <p>Apply some dip to kill the ticks.</p> <p>Use a boiled razor blade to cut the abscess. Then syringe/ pour warm boiled water with a lot of salt in it (1 tablespoon of salt in a cup of water) or iodine into the wound.</p> <p>Spray daily with a wound aerosol such as Woundsept Plus or iodine. Keep the wound open to allow it to drain.</p> <p>Bury or burn the material used to wipe the pus. This can infect other animals and people. Always boil the razor blade before using it.</p> <p>Treat with a long-acting oxytetracycline such as Terramycin (1ml/10kg) in bad cases.</p>

3.9 Bloat

Symptoms	Prevention	Treatment
 <p>A goat with bloat</p> <p>The animal's stomach swells It becomes uncomfortable and may lie down and cannot breathe and may die.</p>	<p>Do not allow animals to graze green lucerne and clover or other plants that cause them to bloat. They must be introduced VERY slowly to green lucerne and given large quantities of hay before grazing lucerne for a short while. Maize may also cause bloat.</p> <p>Make sure there is no wire or plastic lying around where animals graze.</p>	<p>Make the goat drink cooking oil (50 ml) or bloat guard. Do not let it lie down. If it is down, get it back on its feet and make it walk around until it has burped.</p> <p>In very bad cases stab the bulging area with sharp-pointed knife to let air escape.</p>



Picture: <http://fhotd64476.yuku.com/topic/62751/Goat-help-happier-update-p4?page=2>

3.10 Mastitis (Ukufa kwemibele)

Symptoms	Prevention	Treatment
 <p>Signs of mastitis</p> <p>Mastitis is an infection of the udder.</p> <p>Udder produces either a brownish watery fluid or watery milk containing white or yellow clots or pus. The udder will look distended, and feel hard and hot to touch.</p>	<p>Good hygiene is important to prevent the spread of the disease.</p>	<p>Treat any mastitis with long-acting oxytetracycline antibiotics such as Terramycin – at a dosage of 5cc every 3rd day until healed.</p> <p>In severe cases combine the injection with a lactating cow intra-mammary antibiotic medicine. Insert the medicine up the teat canals once a day after milking out as much milk as possible. Continue until healed.</p>


Picture: <http://www.kashvet.org/oasis/wp-content/uploads/2009/02/01012009642.jpg>

3.11 Abortion

Symptoms	Prevention	Treatment
 <p>Aborted fetuses</p> <p>Abortion is the loss of a foetus at some stage in the pregnancy.</p> <p>Abortion can be due to a range of factors including:</p> <ul style="list-style-type: none"> • Diseases that specifically cause abortion – such as enzootic abortion, brucellosis (<i>Brucella melitensis</i>) • Any disease that causes a high fever (e.g. heartwater) • Poor nutrition, especially during late stages of gestation • Mineral deficiencies • Stress • Certain poisonous plants. 	<p>The best prevention is to keep mothers unstressed. Don't transport them unnecessarily. Make sure the mother has adequate nutrition.</p> <p>Dispose of aborted fetuses and placentas in such a way that they do not contaminate the environment and result in other goats also becoming sick (burn them or bury them – at least knee-deep).</p> <p>Some diseases can be vaccinated against (e.g. enzootic abortion), but it is important to find out whether this is the cause of the abortion. Blood can be drawn from goats or samples from aborted fetuses can be analysed to identify the organism responsible.</p> <p>The first step is to keep records of how many goats are aborting (as a percentage of the herd) and when they are aborting in order to try and identify the real cause of the problem (whether food or disease).</p>	<p>Generally no treatment required unless there are complications.</p>  <p>NOTE:</p> <p>Some diseases also affect people, although they do not always cause abortions in people. Use gloves when you handle aborted fetuses and placentas to avoid contact and contamination with the disease-causing organisms. For example, infection with <i>Brucella melitensis</i> causes abortion, reduced milk yield and testicular infection in goats, and Malta fever in humans. Infection has been found in goats in Northern KwaZulu-Natal. Ask your local Animal Health Technician to bleed your goats to make sure your goats do not have this serious condition. If any do, contact your local State Vet and make sure that you cull these animals immediately!</p>

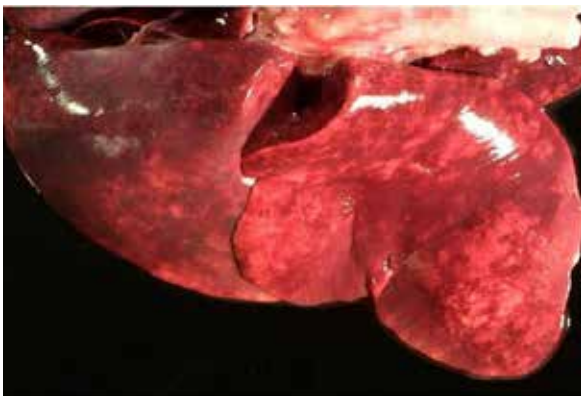
Picture: ARC Goatkeepers' Animal Health Care Manual

3.12 Tetanus


Symptoms	Prevention	Treatment
 <p>Stiff legs – symptoms of tetanus in a kid</p> <p>Tetanus is a disease that causes stiffness that leads to paralysis and then death. This fatal disease occurs as a result of a wound becoming infected by bacteria commonly found in soil and faeces. Therefore, animals are at high risk when using the elastic band method of castration as this makes a wound.</p>	<p>The disease is preventable by using the Multivax P Plus vaccine recommended in this book.</p>	<p>No treatment possible.</p>

Picture: <http://www.flockandherd.net.au/other/reader/tetanus%20in%20goats.html>

3.13 Infectious pneumonia (Pasteurellosis)


Symptoms	Prevention	Treatment
 <p>Spots on the lungs showing pneumonia</p> <p>Live animal: The symptoms include fever, lack of appetite, rapid breathing, coughing, loss of condition and discharge from the nose.</p>	<p>A multi-component vaccine such as Multivax P can be used to prevent certain types of lung infections in sheep and goats.</p>	<p>Sick animals can be treated with an oxytetracycline antibiotic such as Terramycin or Hi-Tet.</p> <p>Hi-Tet 200 LA dosage: Intramuscular injection. 1ml/10kg livemass. Repeat after 3 days if necessary.</p>

3.14 Pulpy Kidney (Enterotoxaemia)

Symptoms	Prevention	Treatment
 <p>Kidney from an infected goat</p> <p>The live animal: This disease is caused by bacteria that often exist within the sheep's intestine but only cause disease symptoms under certain circumstances such as a change of grazing, exhaustion, sudden dietary changes and dosing with dewormers.</p> <p>The bacteria in the intestine produce a toxin (poison) which results in death.</p> <p>Symptoms vary – sometimes the goats are found dead, at other times, they either (1) appear exhausted, show paralysis and a loss of consciousness and may have laboured breathing, salivation and diarrhoea or (2) have nervous symptoms with convulsions, accompanied by salivation, grinding of teeth and muscle twitches until death.</p> <p>The dead animal: The carcass decomposes quickly and there are haemorrhages on the heart and blood under the skin in the neck region. The lungs may contain excessive amounts of blood and the heart sac may contain fluid. The kidneys may appear enlarged, dark red or pale brown and decomposed. They may contain large amounts of blood.</p>	<p>Although this disease occurs more often in sheep, it is prevented by using Multivax P Plus vaccine, which is recommended in this book.</p> <p>Alternatively vaccinate lambs with Enterotoxaemia Vaccine (including a booster injection) and then repeat vaccination annually. Give 1ml per animal as a subcutaneous injection.</p> <p>Note: <i>It is often advised that animals first be vaccinated against pulpy kidney before deworming.</i></p>	<p>Treatment is not possible – rather prevent it through vaccination.</p>


Picture: <http://www.svdhv.org/sv/far/artiklar/2013/e/595/obduktionsdiagnoser-not-och-far/>

3.15 Bluetongue

Symptoms	Prevention	Treatment
<p>This disease is of little importance to goat farmers as goats are generally more resistant to bluetongue than sheep.</p>  <p>Signs of Blue tongue</p> <p>Difficult rapid breathing as a result of pneumonia, resulting in a general bluish colour of the mucous membranes of the eye and the mouth and eventually of the tongue</p> <p>Sore joints, especially the feet and back. So bad that the animal can sometimes walk on its knees and tends to lie down a lot. Animal stops eating and the stomach stops moving. Animal becomes sensitive to sun and the ears become warm and pink.</p>	<p>It is not prevented by using the Multivax P vaccine. Bluetongue vaccine is available, but need only be used if farmers experience a problem with the disease.</p> <p>Since the disease is transmitted by midges, move sheep and goats to higher areas where there are fewer insects.</p>	<p>Treat the pneumonia with antibiotics – a long-acting Terramycin every 3 days until recovery.</p> <p>Dosage – Adult goats 5ml every 3 days injected into the muscle.</p> <p>Treat the pain with aspirin (2 tablets twice a day) or phenylbutazone injection 5ml per day into the muscle.</p> <p>Treat the stomach with Metastim or Phosamine Stimulans 5ml per day and treat the sensitivity to the sun by putting the animal into the shade.</p>

Picture: Three Rivers Veterinary Group. Blue Tongue in Sheep. (Website: http://www.threeriversvetgroup.co.uk/Blue_tongue_in_sheep.html Downloaded 19/05/11). Photo: Dr. Van Aert Marcel.

3.16 Black Quarter/Quarter Evil (Umkhonywana)

Symptoms	Prevention	Treatment
 <p>The spongy appearance of muscle in an animal with black quarter</p> <p>Black quarter is an acute infectious disease caused by <i>Clostridium</i> bacteria. It causes inflammation of the muscles, toxæmia and high mortality.</p> <p>Live animal: Fever, loss of appetite, depressed behaviour, stiff gait and reluctance to move due to lameness, gaseous bubbles in the muscles before death, sometimes nose bleeding and swelling of the head.</p> <p>Dead animal: Accumulation of fluid under the skin and in the lungs and body cavities; affected muscle is dark brown, dry and sponge like or moist. A pungent odour is noted.</p>	<p>It is spread by contaminated soil and organisms are either taken in when the animal is feeding or through wounds.</p> <p>Bury or burn the carcass to prevent the disease from spreading to other animals. The meat can also cause humans to get sick.</p> <p>It will be prevented if goats are vaccinated with Multivax P. They can also be vaccinated with Blanthrax, which also protects against anthrax.</p>	<p>Treatment is not often successful. The farmer can inject the animal with a penicillin injection, which must be obtained from a veterinarian.</p>

Picture: Grobler, WJ, *Common cattle diseases in our area*. (Website: <http://www.proteaanimalclinic.co.za/Siektes/diseases.htm#sponssiekte> Downloaded 19/05/11). Original source of photograph: Bristol Image Archives, University of Bristol, 2000.

3.17 Uncommon diseases

3.17.1 Anthrax

This disease is more common in cattle. It can affect goats but very rarely. It can affect a human that is why it is important to notify the State.



DO NOT OPEN THE CARCASS – The carcass must not be cut open or it will release germs that affect the surrounding area.



Signs of anthrax in a cow

Symptoms	Prevention	Treatment
<p>The live animal: The animal often dies suddenly, with no symptoms having been seen even a few hours before.</p> <p>The dead animal: Thick, dark blood is seen coming from the animal's nostrils and anus.</p> <p>This disease can infect people so the carcass must be buried or burnt and not eaten.</p>	<p>Animals should be vaccinated annually with Blanthrax which will protect them from both anthrax and black quarter.</p>	<p>There is not normally enough time to treat the animal so prevention is essential.</p> <div data-bbox="1058 882 1249 1052" data-label="Image"> </div> <p>DO NOT OPEN THE CARCASS – The carcass must not be cut open or it will release germs that affect the surrounding area.</p>

Picture: <http://threeriversvetgroup.co.uk/wp-content/uploads/2013/04/bluetongue-in-sheep3.jpg>


3.17.2 Rift Valley Fever and Wesselsbron Diseases

Symptoms	Prevention	Treatment
<p>These are both viral diseases transmitted by mosquitos. OUTBREAKS ARE EXTREMELY RARE!</p> <p>These diseases only occur in situations where there is standing water.</p> <p>Rift Valley Fever symptoms: young kids unlikely to show symptoms, while adults may develop a fever, vomit and show a nasal discharge, leg weakness, may abort, bloody diarrhoea. 20-30% of infected animals die.</p> <p>Wesselsbron Disease symptoms: resembles Rift Valley Fever, but mortalities are low amongst adults. Abortions and high kid mortalities are however to be expected.</p>	<p>Vaccination is possible but should only be considered in very wet years.</p>	<p>Not possible.</p>

3.17.3 Peste des petits ruminants (PPR)

Symptoms	Prevention	Treatment
<p>This disease is a potential threat to the goat sector although it is not yet encountered in South Africa.</p> <p>PPR is a viral disease of goats and sheep characterised by fever, sores in the mouth, diarrhoea, pneumonia, and sometimes death.</p>	<p>The virus is secreted in tears, nasal discharge, secretions from coughing, and in the faeces of infected animals. Water and feed troughs can also be contaminated with secretions and become additional sources of infection.</p>	<p>There are no medications available to treat the disease, but supportive treatment may decrease mortality.</p> <p>There is a PPR vaccine available from countries where it is common.</p>

3.17.4 Foot and Mouth Disease

Symptoms	Prevention	Treatment
<p>Lesions (sores) in the mouth and on the feet, salivation and lameness.</p>  <p>Sores in a goat's mouth and on a cow's hoof</p>	<p>Vaccination is only permitted by government under certain circumstances.</p>	<p>No treatment – cases must be reported immediately and affected herds/flocks slaughtered to prevent the spread of the disease.</p>

Pictures: Symptoms of Foot and mouth disease. Intervet Schering-Plough Animal Health (Website: http://www.foot-and-mouth-disease.com/Disease_and_Control/symptoms.aspx Downloaded 19/05/11). Photos: ID-Lelystad, The Netherlands.

4. Internal and external parasites

Goats can have internal parasites (inside the intestine and other organs) and external parasites that stay on the outside of the animal.

4.1 Internal parasites

Worms and flukes

Generally, these parasites cause harm either by absorbing the goat's food or by feeding on the blood or tissue of the goat. There are different types of worms, some which are easier to see (such as tapeworms) and some which are more difficult to see (such as roundworms). Roundworms (which include wireworms) cause serious losses if not properly controlled. Tapeworms cause a 'potbelly' in young animals (See Figure 21).

Another type of internal parasite is the liverfluke which is found in the goat's liver. It becomes contaminated when the goat feeds on plants growing near water bodies (vleis, marshes and standing water). Liverflukes cause symptoms similar to roundworms.



Figure 4.1 Wire worm⁸, tapeworm (segments in dung)⁹ and liver fluke¹⁰

Even if they do not make the goat sick, internal parasites reduce its productivity. If the goat has heavy infestations, it can lose condition, become anaemic (from loss of excessive amounts of blood), become listless, have a 'bottle-jaw', suffer from diarrhoea, and even die.

Some tapeworms form cysts in goats' brains which lead to mortalities. It is a tapeworm that they pick up from dogs (See diagram below). The cysts cause 'malkop or draai siekte', which has been discussed earlier in the book.

⁸ <http://www.sheepandgoat.com/HairSheepWorkshop/Images/barberpoleworm.jpg>

⁹ <http://www.sheepandgoat.com/articles/tapeworms.html>

¹⁰ http://www.hccmpw.org.uk/farming_and_industry_development/animal_health_and_welfare/liver_fluke.aspx

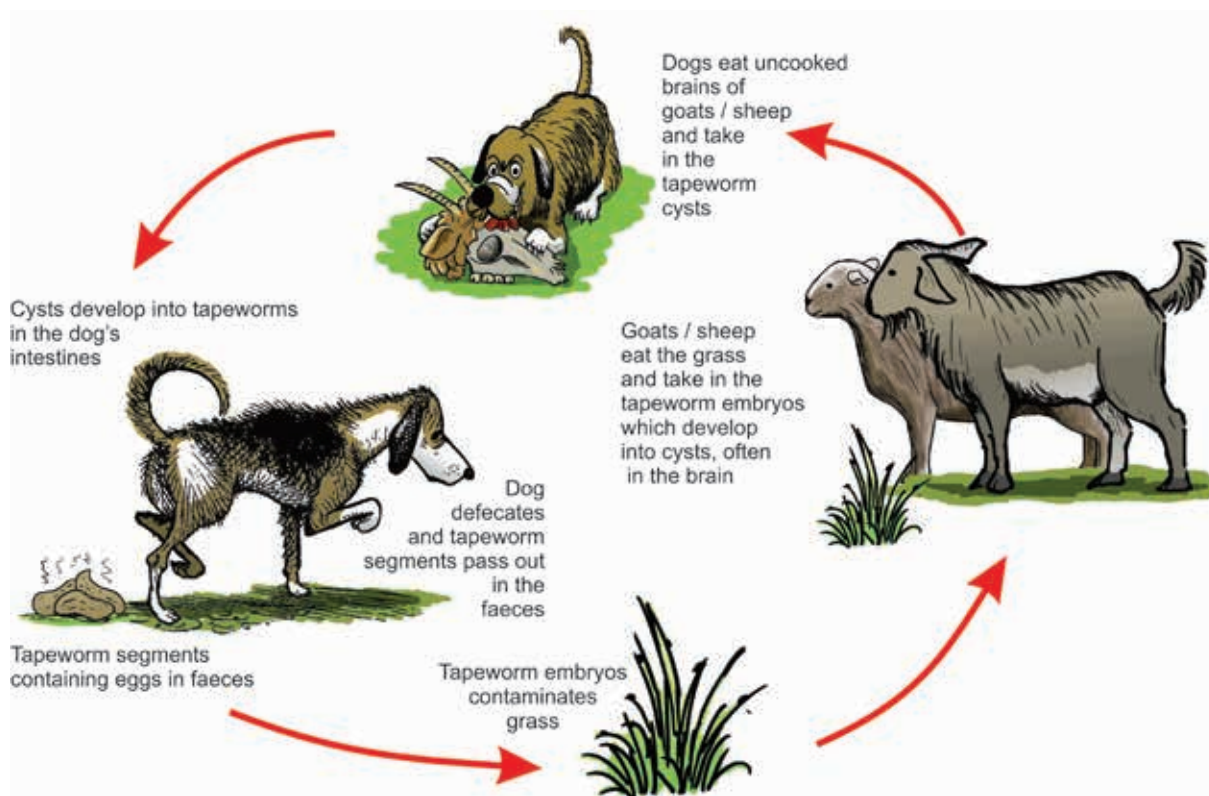


Figure 4.2 Life cycle of the dog/goat tapeworm – this condition in goats leads to malkop or draaisiekte (see Page 16 section 3.3)

Use of anthelmintics (dewormers)

Goats can be dosed with a variety of dewormers – some only kill one type of worm, while others kill a range. You should try and dose for what particular worms are affecting your goats. Resistance will build up over time so regularly change your dewormer ensuring different active ingredients.

Unless you have a particular type of worm that you are trying to treat, you should swap dewormers regularly (check that they have different active ingredients) to make sure that over time you control the different types. You also need to make sure that the product you are using is safe for goats.

It is recommended that you use a FAMACHA chart and the 5 point check system described below to control parasites in your goats. You can use a standard dosing programme based on periods of heavy infestations and dose the whole flock at certain times of year.

If it is possible, call a Technician to send a dung sample to a laboratory to determine what worms are infecting your goats. You should collect a sample directly from some goats and not from the ground. Keep them in a plastic packet in the fridge until you take them to the lab.

If you plan to slaughter the goat to eat you should also check the withdrawal period of the product (this is the recommended time period from when you dose it to when it is safe to eat the goat or drink the milk). Many medicines also have a withdrawal period.

5-point check for internal parasites

The Five-Point Check¹¹© is aimed at checking goats or sheep that could be affected by one or more major internal parasites. There are five places on the body that needs to be checked. Those places are the nose, eyes, jaw, tail and the back.

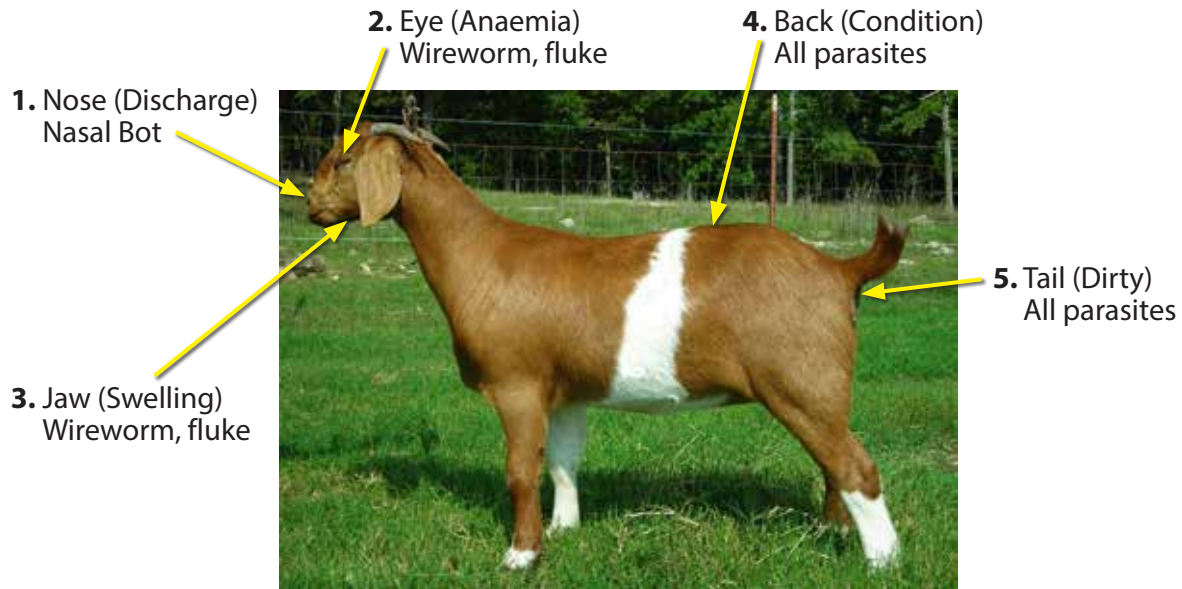


Figure 4.3 The five signs of worms

Nose: Discharges from the nose may indicate nasal bot fly (*Oestrus ovis*).

Eyes: anaemia (as determined by the use of FAMACHA©) may be due to wireworm (*Haemonchus contortus*) and other worm species that cause anaemic conditions such as hookworm. Note: See more detail below about checking for anaemia.

Jaw: A soft subcutaneous swelling below the jaw is known as the bottle jaw. This is another symptom of worm species that cause anaemia.

Back: Body condition scoring is the assessment of overall condition of the animal. If only a few in the flock show poor condition, this may show worms that suppress the animals' appetite such as bankrupt worm, brown stomach worm and conical fluke.

Tail: Parasites such as conical fluke and roundworms cause mild or severe diarrhoea. Parasites are known to be major cause of diarrhoea therefore the farmer needs to treat those with visible diarrhoea.

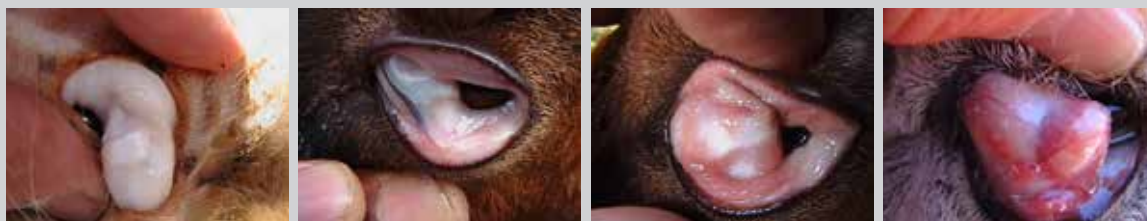
Other observations such as a pot belly, when combined with poor condition or growth rate, is usually an indication of tapeworm infestation.

¹¹ Bath, G. F., van Wyk, J.A.2009. The Five-Point Check© for targeted selective treatment of internal parasites in small ruminants. Small Ruminants Research (86) 6-13. Also available online at www.sciencedirect.com

Checking for signs of anaemia

The FAMACHA method is only suitable for controlling wire worms because it is based on assessing the level of anaemia in the goats (from looking at the inner membranes of their eyes) and then dosing those that are anaemic. If they are pale pink instead of bright pink they are said to be anaemic. The paleness is because the worms have been feeding heavily on the goat's blood.

THE FAMACHA METHOD WILL NOT PICK UP TAPEWORM.



Different levels of anaemia (from highly anaemic to no signs of anaemia).



Checking the goat's eye for signs of anaemia.

Other management interventions to control internal parasites

There are other ways to control the worm burden in your goats:

- Goats pick up worms from the grass when they are grazing (the eggs come out with the faeces and then infect the camp). You can practice rotational grazing so that there is not a build-up of worms in your camps.
- Fix troughs so that they do not leak as worms can breed in the muddy ground around the trough.

- Another key measure to control worms is to identify goats which are particularly susceptible to worms and cull them because these goats actually keep infecting other goats in the flock. If you check your goats' eyes regularly and find that a certain animal often has pale membranes, then you should not just continue to treat it for worms – you should actually sell or slaughter it.

4.2 External parasites

External parasites affecting goats are mainly ticks and mange mites. Other examples would include mosquitos and flies (especially blowflies). Some external parasites cause skin irritation and tissue damage while others also transmit diseases to the goat.

Ticks

Besides the physical damage caused by ticks, they also transmit a number of diseases. In goats the most serious tick-borne disease is heartwater. Tick borne diseases are specific to a certain type of tick. For example, heartwater is only transmitted by Bont ticks. Ticks can be controlled by insecticides that can be put on in different ways. Spraying is the most common way, or less common is either dipping the goat (in a plunge dip or with a bucket and sponge), applying a pour-on product onto the animal's back or by injecting it with a registered product (such as an ivermectin).

Remember that dips are poisonous so you should make sure that you use gloves and protective clothing to prevent skin contact as you can actually absorb the dip directly through your skin.

Figure 4.4 Goats can be sprayed with dip to control ticks.



Mange

Mange is inflammation of the skin (causing itchiness) and the loss of hair and is caused by small organisms called mites – they are too small to actually see. The same mites cause sheep scab in sheep. Dips and injectable products are available to control mange. See treatment on Page 17.

Figure 4.5 Signs of mange¹²



¹² <http://upload.wikimedia.org/wikipedia/commons/1/1b/Sarcoptic-mange-head-of-goat-2.jpg>

Fleas

These are small wingless insects that move around different hosts by means of jumping. They have well developed legs that are used for jumping considerable distances. They range between 1 mm to 8 mm in length. Fleas are normally found on dogs and cats. In that way they are passed on to domestic livestock like goats.

Fleas cause rubbing of affected areas, scratching and hair loss. They can be controlled by dipping the goats and treating the affected areas with sprays or powders such as Karbadust.



Figure 4.6 Close up of a flea¹³

Lice

There are two recognized types, the biting (red) lice and the sucking (blue) lice. The biting lice feed on dead skin while the sucking lice actually suck blood from the host. Both types cause the animal to itch and in most cases causing the animals to rub against objects.



Figure 4.7
A goat infested with lice¹⁴



Lice are normally found on the inside of the legs and around the head and neck and may result in scabby or bleeding areas, loss of hair or a dull coat. Severe cases can cause anaemia. The goats should be sprayed or dipped with remedies that kill lice (e.g. Zipdip or Deltab Backpack) and the kraal should be treated with an insecticide (they can also be dusted with Karbadust). Infected animals should be separated to prevent the lice spreading to other goats.

Figure 4.8 Karbadust – can be used for treating fleas and lice¹⁵

Nasal worm

Nasal worms are not proper worms but actually the larvae or bots of a fly. The fly lays its eggs around the nose of goats, the eggs hatch into larvae which travel up the nose into the sinuses in the goats head. Here they cause irritation, inflammation and mucus that runs out of the nose, the goat coughs and sneezes and shakes its head until it eventually gets rid of the bots that then turn into flies again.

¹³ <http://www.quickkill.co.uk/fleas>

¹⁴ <https://www.agric.wa.gov.au/livestock-parasites/sheep-lice-spread-and-detection?page=0%2C1>

¹⁵ http://www.petmasters.co.za/detail_pets.php?product_id=600137910072&productname=KARBADUST+200G



Figure 4.9 Nasal bots in the goat's nasal passages¹⁶(left) and nasal discharge due to nasal worm (right).

Fortunately, these nasal worms are easily got rid of, the most effective treatment is to treat with a remedy that contains ivermectin or closantel. Some deworming products can also be used such as Tramisol.

Sometimes the bots cause secondary infection of the sinuses or even infections that eventually spread into the lungs. These infections must be treated with **long-acting oxytetracycline products** such as Terramycin – at a dosage of 5cc every 3rd day until healed.

4.3 Poisonous plants

Animals will usually try to avoid eating poisonous plants, and will usually only be forced to eat them under certain circumstances. This happens when, for example, the veld is overgrazed, due to drought or overstocking of animals, and when the animals are hungry due to inadequate nutrition. It can also happen when the veld has been burnt, or when animals are introduced into new areas, where they are unfamiliar with which plants are poisonous in that area.

Overgrazing of veld, by overstocking, may cause the invasion and dominance of certain toxic plants such as Deadly nightshade (*Solanum* sp). Some exotic plants that are planted as garden shrubs are poisonous, for example Lantana, seen in the picture below. Lantana makes animals sensitive to the sun if they eat it (called photosensitivity). Certain plants become poisonous only under certain circumstances. For example prussic acid poisoning happens when certain young, growing plants become dry and wilted. An example of a fodder plant that produces prussic acid when young green foliage wilts is Forage Sorghum.



Figure 4.11 A sheep showing signs of photosensitization.

¹⁶ http://www.merckmanuals.com/vet/multimedia/v4740890.html?Ref=t&ItemId=v4740890&RefId=respiratory_system/respiratory_diseases_of_sheep_and_goats/sheep_nose_bot&Speed=256&Plugin=WMP&Error=



Figure 4.10 Deadly nightshade¹⁷(left), Lantana¹⁸(middle) and Forage sorghum¹⁹(right)

It is important to familiarize yourself with the poisonous plants which occur in your area, so as to try to prevent animals eating them. Prevention is better than cure, as there are very few cases where treatment is effective, and treatment is often very expensive. The following steps should be taken as far as possible, to try to minimise plant poisonings:

- Prevent overgrazing.
- Prevent overstocking.
- Monitor animals in planted pastures during danger periods (eg. Hot dry periods where young plants can wilt and become poisonous).
- Ensure animals are provided with adequate nutrition so that they do not go hungry, by providing supplementary feeding during times when the veld does not provide enough food, for example during winter and drought periods.
- Take special precautions especially at the end of winter, when animals are most hungry and there is the least amount of food available, and the time when many poisonous plants come out.
- Monitor new animals that are introduced into the area and are unfamiliar with the poisonous plants of that area.

Treatment in general:

- Dose the animal with activated charcoal, at 2 grams/kg body weight, mixed with water, preferably by stomach tube, or using a 1 or 2 litre plastic coke bottle. Make sure the charcoal does not go down the wind-pipe as this will cause a dosing pneumonia which is often fatal.
- Inject the animal with multi-B vitamin, to support the liver.
- Place the animal in a quiet shaded area, and provide plenty of water and feed, and give it time to rest and recover.

¹⁷ <http://fireflyforest.net/firefly/2005/09/01/nightshade-fruit/>

¹⁸ http://upload.wikimedia.org/wikipedia/commons/2/2f/Lantana_camara_bandera_espa%C3%B1ola.jpg

¹⁹ http://www.grainsa.co.za/upload/conservation_agriculture2015_01_01.jpg

- If the animal is poisoned with a plant causing photosensitivity, ensure it is in a cool, shaded area, and given plenty of water and soft, green feed.
- Keep the animal very quiet and rested (do not chase the animals or stress them out), as exertion can cause death.

4.4 Deaths due to eating plastic

Goats sometimes eat plastic packets that they find lying around. Sometimes it is because they are craving salt and find it in the packets, sometimes it is just because they are hungry. The plastic is not able to pass through the goat's rumen and in the end the rumen fills up with plastic which limits the amount of food the goat can eat. In the end, it normally leads to the death of the goat. Some people say that providing goats with a mineral lick will reduce the extent to which they eat plastic. Alternatively communities need to try to prevent littering with plastic.



Figure 4.12 Goats eating plastic²⁰ (left) and a dead cow showing that its rumen was full of plastic (right)²¹

²⁰ http://livingdreams.tv/wp-content/gallery/dahab-pictures/20131212-dsc_0910.jpg

²¹ <http://5gyres.org/wp-content/uploads/2014/04/image0081.jpg>

5. Basic equipment and vet kit essentials

It is important that you have easy access to the basic medicines and equipment so that you can keep your flock healthy and treat a sick animal promptly so as to prevent death.

5.1 Key equipment

The goat farmer should have access to:

- Cooler box
- Goat book
- Animal Health Book
- Burdizzo
- Ear tag applicator
- Hoof trimmers
- Tattoo applicator, ink and alphabet
- Knapsack sprayer
- Scale or weight belt
- Mask
- Gloves
- Blades
- Digital thermometer
- Antiseptic handwash
- Gauze swabs.



Figure 5.1 Key equipment for managing goats

5.2 Consumable medicines and equipment

The goat farmer should have on hand:

- Disposable syringes (5cc, 10cc)
- Large syringe for drenching/dosing (60cc)
- Non disposable syringe
- Needles (20 gauge or 22 gauge but preferably 5/8 or 1 inch length)
- Antibiotic eye powder
- Antibiotic powder (such as Terramycin powder)
- Broad spectrum dewormer for wireworms, tapeworms and flukes, (e.e Prodose Orange and Eradiworm)
- Dip – a conventional one to be mixed with water (such as Tactic)
- Wound spray with fly repellent
- Coopers Wound oil
- Tick grease
- Long acting antibiotic (such as Terramycin LA)
- Short acting antibiotic (such as oxytetracycline 120)
- Sulphur based antibiotic (such as Disulphox) for treating coccidiosis
- Injectable solution for mange, lice (such as Ivermectin)
- Iodine spray
- Iodine drops (for newborn kids)
- Copper Sulphate (for foot baths)
- Vitamins (such as Multivite).



Figure 5.2 Consumable medicines and equipment

When using disposable needles and syringes you should only use the needles once. The syringes should be boiled before reusing to kill any germs. You should also not inject more than one goat with the same needle as it can spread disease between them.

5.3 Storage of medication, expiry dates and withdrawal periods

Read the instructions that come with the product you purchase, they contain important information about using it such as dosing rates, whether it is safe for pregnant animals as well as how it should be stored.

Storage

Check storage instructions on medicine:

- Does it need to be refrigerated?
- Does it need to be kept in a cool, dark place?

Most vaccines need to be kept refrigerated – but if you keep them in a freezer, where there is ice it will kill the vaccine which will then not work.



Figure 5.3 Instructions and precautions

Expiry dates

An expiry date is the date when the product has become too old to work properly.

- When you buy a medicine or dewormer or dip – check the expiry date!
- Do not keep drugs beyond their expiry date as they will stop working properly.
- Either share products with other farmers or buy smaller quantities.



Figure 5.4 Check the expiry date

Withdrawal periods

With many drugs, you must wait for a given number of days or weeks after administering the medicine, before you slaughter the goat for meat or drink milk from the goat – this is known as the **withdrawal period** and is always given on the instruction pamphlet. If you eat the meat or drink the milk before this time, you will absorb the medicine.

6. Treating your animals correctly

The most important thing is to keep sick goats in a sheltered place with shade, clean water and some green feed. Under these circumstances, if also treated with the correct medication, they are more likely to recover.

6.1 Method of giving medication

Medication, dewormers or dips can be given via a number of different routes and it is important that you follow the instructions on the pamphlet or the advice given by the vet.

Methods of administration include:

- Application directly to a wound or onto the skin (external use)
- Injections
- Dosing or drenching (it is given via the mouth or orally).

6.2 Weighing your goat

The weight of a goat can either be accurately determined using a **scale**, or it can be estimated using a **weight belt**. The weight belt is placed around the girth of the goat and the weight is then read off the belt. This is possible because there is a known relationship between the weight of the goat and the circumference of its girth. The belt will only be accurate for the type of goat for which it has been developed.



Figure 6.1
You can use a weight belt for weighing your goat

6.3 Giving the correct dosage

With most medication, whether it is given orally or injected, it needs to be given at the correct dosage rate, which is normally according to the weight of the animal. The heavier the animal, the greater dose it requires. It is important not to underdose because firstly it will not work and secondly when you try to use it again, even at the correct dose, it will not work because the organisms that you want to kill will have become resistant to it.

You need to be able to estimate the weight of your animal so that you know how much medication to give. If you are dosing a group of animals for worms then you **calculate your dosage based on the heaviest goat in the group**. It might be better to divide your flock into animals of similar size and then calculate the dosage rate for each group separately.

6.4 Taking your goat's temperature

A thermometer is used to take an animal's temperature to see whether it is sick.

- If you are using a mercury thermometer, shake the thermometer back down to normal before starting
- Insert the thermometer into the goat's rectum and wait for 2 minutes
- Normal temperature for a goat is 38.8-40.2 °C
- If the goat has a temperature below or above this range it could be sick. (Note: Don't give antibiotics if temperature is normal)
- Wipe the thermometer with antiseptic before storing it again.



Figure 6.2 A digital thermometer²²



Figure 6.3 Taking a goat's temperature

6.5 Giving injections

In general, use a fresh needle for each animal and boil syringes for at least 10 minutes before use in order to sterilise them.

Subcutaneous injection

This is an injection that is given under the skin.

- Use a 20 gauge needle (22 gauge for kids) – 16mm or 1 inch length
- Lift loose skin and insert at an angle between skin and flesh – make sure you do not go right through the skin with the needle
- A subcutaneous injection often leaves a small lump under the skin immediately after injecting.

²² <http://www.bestvetstore.com/wp-content/uploads/Rapid-Digital-Rectal-Thermometer>.



Figure 6.4 Site for a subcutaneous injection – under the skin on the inside of the hindleg

Intramuscular injection

This is an injection that is given into the muscle.

- Use a 20 gauge needle (22 gauge for kids).
- Inject into a heavy part of the neck or thigh
- After inserting the needle, always draw back first and make sure no blood enters the syringe (this will happen if you have hit a vein) – if there is blood, try another site.

Note: The third type of injection is called an intravenous injection and the drug is injected straight into the vein, but this is a difficult injection to give so this should not be tried by people who do not have experience.



Figure 6.5 Giving an intramuscular injection

6.6 Dosage rates for various drugs

		Hi-tet 120	Hi-tet 200 LA	Sulfazine 16%	Terramycin soluble powder
Type of animal	Weights (kg)	1ml per 15kg	1ml per 10kg	14ml/10kg	1 tsp per 7kg
New born goat kid	3	0.5 ml	0.5 ml	4 ml	0.5 teaspoon
Half grown goat	20	1.5 ml	2.0 ml	28 ml	3 teaspoons
Full grown female goat	40	2.7 ml	4.0 ml	56 ml	
Full grown male goat	60	4.0 ml	6.0 ml	84 ml	

6.7 Trimming hooves

In areas where there are not a lot of rocks, goats' hooves often get overgrown and need to be trimmed. This ensures that they can walk properly when they go looking for feed.



Figure 6.6 Lie the goat down so you can trim the hooves properly



Figure 6.7 Use hoof shears to trim off excessive hoof growth

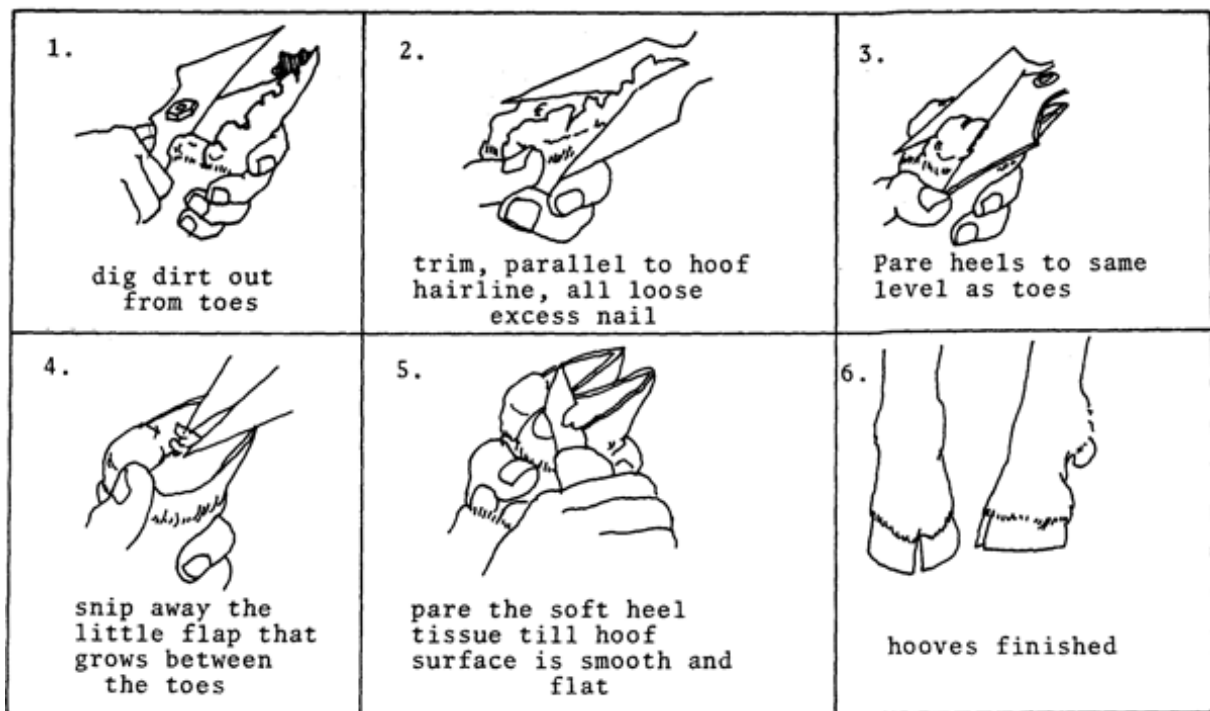


Figure 6.8 Simple guidelines for trimming hooves (Source: FAO²³).

23 <http://www.fao.org/docrep/009/ah651e/AH651E167.gif>

PART 2

Goat Commercialisation



7. General management

Some general management practices are discussed here, namely condition scoring, ear tagging and record keeping.

7.1 Condition scoring

Producers should be concerned with the body condition of their breeding animals. The term body condition refers to the body fat content of an animal. Ewes should not be allowed to become too thin or too fat. Failure in reproduction, low twinning rates and low weaning rates will result if ewes are too thin. Overly fat ewes can suffer pregnancy toxemia, but fat ewes are rarely a problem.

This is a standard way of assessing the condition of individual goats on a scale of 1–5, where 1 is very thin and 5 is obese. It is a way of telling whether your goats are getting too little feed or too much. You assess three different things:

- Backbone
- Rib cage
- Loin eye area (either side of the backbone above the tail).



Table 7.1 Condition scoring criteria

Figure 7.1 Condition scoring a goat

Score	Condition	Backbone	Rib cage	Loin eye area
1	Very thin	Stick out sharply (can even see), can feel individual vertebrae	Can feel each rib sharply	No fat covering
2	Thin	Can feel vertebrae but smooth	Smooth, need slight pressure to feel ribs	Smooth even fat cover
3	Good condition	Smooth and rounded	Smooth and well covered	Smooth even fat cover
4	Fat	Can feel with firm pressure	Cannot feel individual ribs, but can feel indent between ribs	Thick fat cover
5	Obese	Cannot feel individual vertebrae	Cannot feel individual ribs or indent between them	Fat accumulated around the tail area

A condition score of 3 for the doe is ideal at weaning, breeding and kidding.

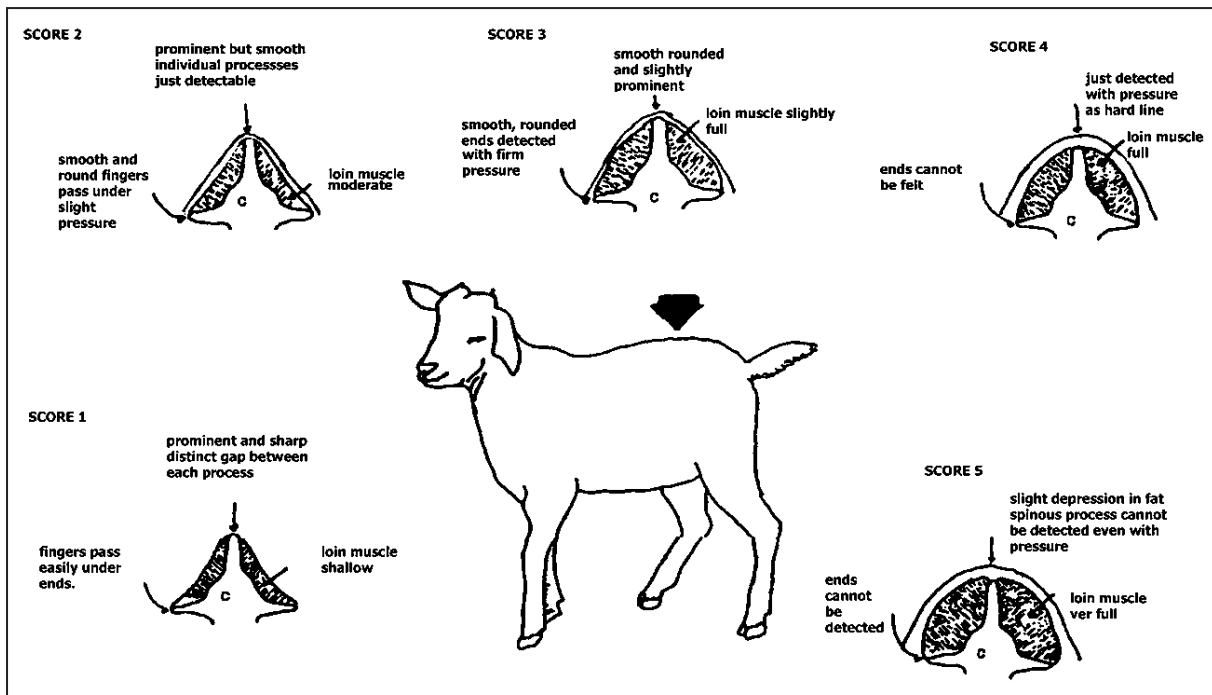


Figure 7.2 Body condition score

7.2 Ear tagging

A simple system for giving your goat's ear tag numbers:

- Decide on a letter for each year. For example: 2014 is A, 2015 is B, 2016 is C
- Then give each kid born that year a number – so A1, A2, A3, A4, etc.



Figure 7.3 Ear tag applicator²⁴

It is easy to sort goats when ewes and rams are given different coloured tags.



Figure 7.4 Metal and plastic ear tags

²⁴ <http://www.nationalband.com/6390s.jpg>

7.3 Record keeping

To be able to manage your goats, you need some basic system of record keeping. Your system should be able to give you the following information:

- The exact number of goats that you have (broken down into different age categories)
- The dates when your ewes give birth and the number of kids born
- The number of goats that die (and the age when they die and cause of death)
- The exact goats that have been treated (for what and with what)
- Who the mother of any particular kid is
- When a particular ram was brought into the herd
- The age of any particular goat (the year it was born)
- The number of goats sold, time when they were sold and prices obtained.

See examples of record sheets in the resources section (pages 90-91).

7.4 Checking age of goat

The age of goats can be determined by looking at the goats teeth:

- The first permanent incisors come through at approximately **15 months of age** – thus the goat will show **2 teeth**
- The next two incisors come through at **21-24 months of age** – thus the goat will have **4 teeth**
- The next two incisors come through at approximately **30 months of age** – thus the goat will have **6 teeth**
- The last two teeth come through at approximately **36 months of age** – thus the goat will have **8 teeth (it is said to be full-mouthed at this stage)**.



Figure 7.5 A young goat has “baby teeth” before the permanent incisors emerge (left) while an adult goat shows permanent incisors (right)

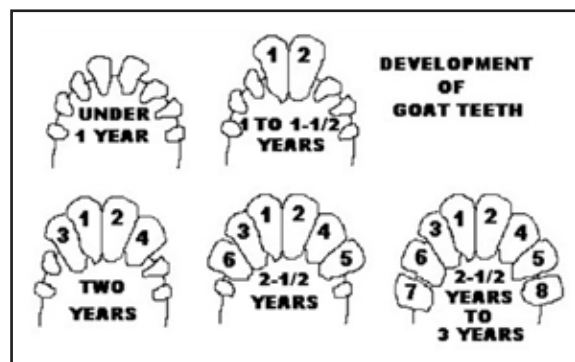


Figure 7.6 Using the teeth to determine the age of the goat²⁵

²⁵ <http://3.bp.blogspot.com/-I6x95KPxcTk/Ui4dSkF7f9I/AAAAAAAAAfc/y-8NQJ-Cb4o/s1600/age+chart+goat.jpg>

7.5 Treatment calendar (including vaccination)

This programme needs to be tried and adapted where necessary because of the unique conditions of any particular site.

1. General animal health programme according to age

AGE	TREATMENT	COMMENTS
1 day	Iodine	On tongue
3 months	Castrate	Burdizo method
4-5 months	Multivax P	
5-6 months	Multivax P	Booster

2. General animal health programme according to season

SEASON	TREATMENT	COMMENTS
Spring (September)	Multivax P	All goats and repeat after 4 weeks
Spring (Before mating)	Enzootic abortion vaccine	All females (do as maidens)
All year	Foot bath (Copper sulphate)	Monthly
All year	Check hooves	Monthly
Summer	Control ticks	As needed
All year	Do 5-point check for worms	Monthly

Source: Cedara Goats Vet Program Document

8. Housing and handling facilities

8.1 Shelter

Goats need to be confined at night for a number of reasons:

- To provide shelter from bad weather
- To prevent theft
- To prevent predation.

If animals are kraaled but are not provided with a shelter they will be exposed to the weather and will not be able to choose a place that is more protected from rain or wind. For this reason, it is important that the kraal owner provides the necessary shelter and protection. In building such a structure it is important to consider the following aspects:

- A roof to protect from rain
- Walls/sides to protect from wind
- Drainage or cement floor to prevent the ground from being too muddy after rain
- Provision of raised areas (preferably slatted to allow droppings to fall through) where goats can escape from wet, muddy conditions
- It is also important that it is possible to clean the kraal in order to prevent the build up of disease-causing bacteria and parasites in the dung and dust.



Figure 8.1 Example of goat shelter



Figure 8.2 Example of goat shelter

Managing the overnight shed

The following recommendations are made regarding management of the shed:

- Make sure that the goats are not crowded (keep to minimum density of 1m²/goat)
- Remove manure on a monthly basis and spray the house to kill fleas
- Provide feed in feeders or in hay racks to prevent trampling
- Ensure that goats have access to clean water
- Separate rams from ewes to prevent injuries and bullying
- Separate ewes with kids from other goats to prevent trampling
- Goats must not be kept in longer than necessary as it reduces the number of hours available for feeding.

8.2 Equipment for feed and water provision

Goats should be provided with some form of feeders and water troughs. The feeders should keep food off the ground so that it is not trampled and soiled by the goats. Suitable containers also need to be provided for licks. Make sure the kids can reach the water without a danger of drowning.

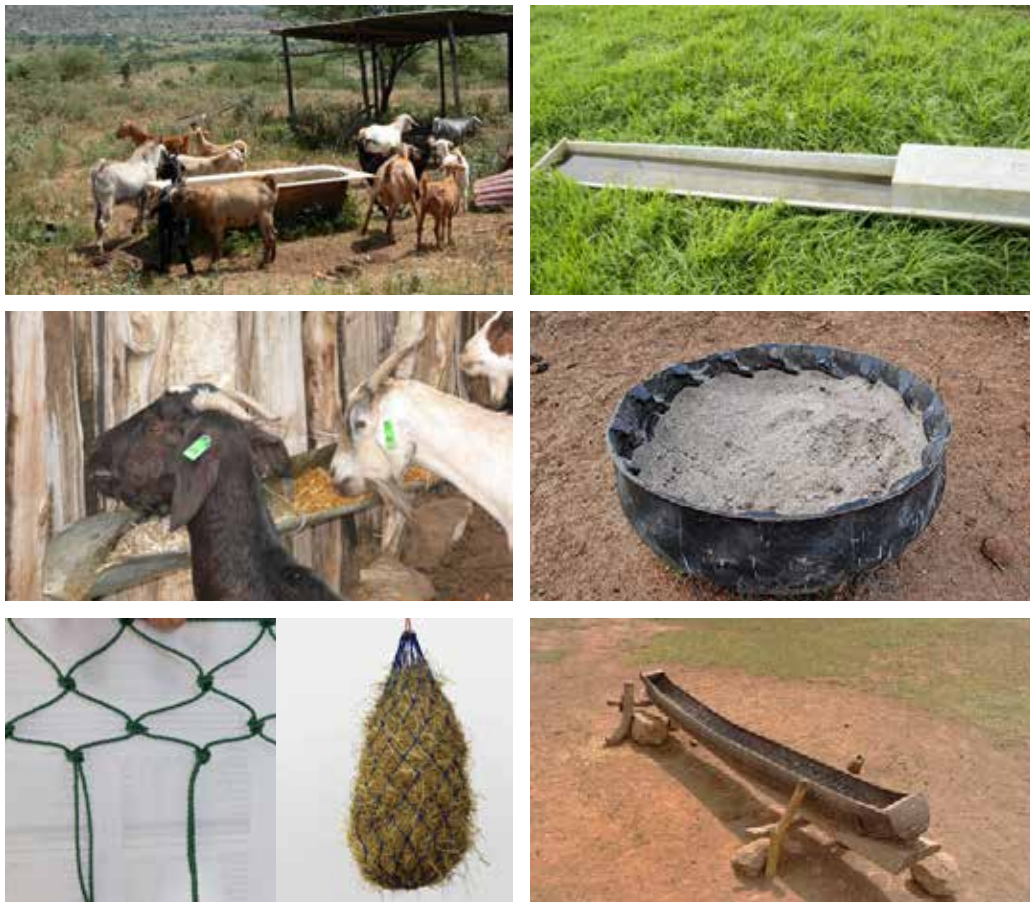


Figure 8.3
Examples of
goat feeders
and water
troughs

http://image.equestrian.com/images/pdp/zoom/860541_Green-White_v01.jpg

<http://www.afrigadget.com/2010/02/18/tractor-tyres-and-bush-buckets-in-masailand/>

8.3 Handling facilities²⁶

If you have a group of goats, it is much better to have proper handling facilities that allow for efficient handling of them without causing stress to either goat or person.

Handling facilities should consist of:

- A crowding pen/gathering pen that feeds into the race
- The race/crush (a passage) where you can dose or vaccinate goats
- A foot bath in the race so you can dip hooves to control footrot or ticks.



Figure 8.4

Home-made race in Mozambique (left) and foot bath (right) at Cedara Research Station



Figure 8.5 *Pens for handling and separating goats (left) and a sorting gate at the end of the race (right)*

Other useful components include:

- Sorting gates at the end of the race so you can divide the flock into different groups
- A loading ramp so you can load goats into vehicles for transportation.
- A scale for weighing
- A head gate/clamp that allows you to restrain a goat.

²⁶ See useful document: Efficient handling of meat goats – by Susan Schoenian (<http://www.sheepandgoat.com/articles/handling.html>)

9. Nutrition and feeding

9.1 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 20 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 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 (HPC).



Figure 9.1

Examples of protein sources:
 (a) Acacia pods; (b) Bean residue; (c) Green pasture ²⁷;
 (d) Lucerne; (e) High protein concentrate – Voermol Procon 33/LS 33/Korn Kandy liquid feed

Energy

Goats also need sufficient energy in their diet to allow them to grow, reproduce and make milk. Body condition scoring (discussed in section 7.1) 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.



Figure 9.2

Examples of energy sources:
 (a) Molasses; (b) Sorghum;
 (c) Root crops; (d) Maize grain; (e) Energy block

²⁷ http://pir.sa.gov.au/_data/assets/image/0011/241787/green_crop_oats_news.jpg

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. Major minerals likely to be deficient in the diet are salt (sodium chloride), calcium, phosphorous and magnesium, although selenium and iodine are deficient in the KwaZulu-Natal midlands and need to be supplemented. The minerals can be given in a block or a loose lick.



Figure 9.3 Example of sources of minerals: (a) Block; (b) Loose lick

The requirements of goats vary according to the age of the goat and whether it is pregnant or feeding a kid. Thus you need to buy the correct type of feed depending on which goats you are feeding.

Table 9.1 Nutrient requirements for meat and fibre-producing goats (Note DM= dry matter)

Nutrient	Young Goats		Ewes (40 kg)		
	Weanling (30 kg)	Yearling (15 kg)	Dry (Pregnant)	Lactating	
				Avg Milk	High Milk
Daily Feed (kg)	1.0	1.5	2.2	2.2	2.5
Energy (MJ/kg DM)	10.2	9.7	9.0	9.0	9.7
Protein, % DM	14	12	10	11	14
Calcium, % DM	0.6	0.4	0.4	0.4	0.6
Phosphorus, % DM	0.3	0.2	0.2	0.2	0.3

1 Nutrient Requirements of Goats. 1981. National Research Council.
 2 Pinkerton, F. 1989. Feeding Programs for Angora Goats. Bulletin 605. Langston University, OK.
 3 Luginbuhl, J M & Poore, MH, Nutrition of Meat Goats. http://www.cals.ncsu.edu/an_sci/extension/animal/meatgoat/MGNutr.htm

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 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).

9.2 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 HPC) 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.

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 P 6 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 Supermol, 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.

Instead of buying a commercial supplement, you can make your own block. The instructions are on the next page.

How to make an Energy and Protein Block for supplementary feeding of goats

This explains how to make your own block to supplement your goats' nutritional requirements. See page 97 in resources for details on costing and nutritional breakdown. 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. It does not contain added urea so is safe for all animals.

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 it like the one shown on the right.

This mix makes 39 blocks.



Course salt
2 jugs



Molasses
7 jugs



HPC 36%
16 jugs



Whitewash
2 jugs



Maize meal
7 jugs

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 the 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 or feed them to goats.



For specific nutritional information and other details see page 97.

Chocolate maize

The following can be mixed to produce “chocolate” maize, if the farmer has maize grain, and fed to fatten animals. The ingredients comprise hot water (25 kg), urea (11.5 kg), salt (3 kg), whole maize grain (700 kg), P12 mineral concentrate (8 kg) Limestone or CLC building lime (4 kg) and molasses powder (10 kg). The urea and salt are dissolved in hot water and evenly sprinkled onto the whole maize grain which is spread out to a depth of 15 to 25 cm. The other ingredients are mixed separately and sprinkled over the wet grain and this mixture mixed together, dried, bagged and stored. This can only be stored for a short period of time to prevent losses of urea. **ALSO REMEMBER THE POTENTIAL DANGERS OF FEEDING UREA!** In very humid areas chocolate maize is not an option because it does not dry properly. Feed the chocolate maize together with ad lib coarsely milled roughage. Introduce slowly, starting with 100 g per goat on day 1 and increase gradually for 14 days to animals to allow for adaptation by the rumen microbes and to avoid acid rums. Where male animals are being fed for more than 4 weeks, 7.5 kg ammonia chloride should be mixed into the mixture to help prevent kidney stones (urinary calculi).

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, 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 in secure feed troughs.

Conserving feed

You can cut grass or harvest leaves to give the goats during the winter months when feed is scarce. It must be dry when stored so as to not become mouldy. Goats will not eat mouldy material and it can make them sick. You may also need to process some feedstuffs (such as maize stalks) to make them acceptable to the goats. This may require chopping them up with a cane knife or hammer mill and adding something such as molasses or LS33.

Figure 9.5 Storing bean stover for winter



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 on poisoning). 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 enterotoxemia (overeating disease), ruminal acidosis, urinary calculi, bloat, laminitis-founder, and a host of other very serious rumen-based and therefore life-threatening illnesses.
- Enterotoxemia (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. One Shot Ultra 7).

10. Reproduction and kidding

Management directly affects the flock reproductive performance. Reproduction efficiency in the goat flock can be assessed by considering the following aspects:

- The interval between consecutive kiddings of a ewe (i.e. preferably less than 250 days)
- The number of kids per ewe
- The number of kids born and weaned in the flock.

Studies show that the current productivity of flocks in communal areas is low. Poor production results mainly from kid mortality. This results in a shortage of ewe kids to keep as replacements when older or unproductive goats are culled. Mortalities of kids are due to poor management (including poor nutrition), unhygienic overnight kraals/facilities, theft, poor flock hygiene (with coccidiosis as a major problem) and predators.

10.1 Breeding season

In general the goat production system found in KwaZulu-Natal is that of free ranging goats with mating occurring throughout the year but most kids being born between March and August. In a system where the rams are with ewes throughout the year, the advantage is that the ewes will take the ram as soon as they are ready for the ram. However, it results in kids dropping throughout the year, making good management, recording and strategic feeding of ewes impossible. It also means that the farmer needs to keep the ram in good condition all year round.

The challenge with kids being born in late winter or spring this is that there is a shortage of feed during late pregnancy when the growing foetus is putting heavy demands on the ewe, as well as during early lactation.

See the Resources section for more information about improved breeding seasons.

10.2 Ram management

The ram must be managed (and fed) so that he is healthy and able to work effectively during the mating season. During the breeding season, keep a ratio of 1 ram to 20 – 30 ewes. Replace rams every three years to prevent inbreeding.

Choosing a ram

It is important to ensure that the ram that you choose is bringing the correct genes into your flock. Use only the best animals for breeding. The ram contributes half of the production characteristics of each kid. It is also important to ensure that the ram is fertile. Besides reproductive soundness, it is important to make sure that the ram has sound legs and feet so that he is able to work effectively over the breeding season.

Make sure that:

- The sheath and penis are free from any abnormalities, swellings and wounds
- There are two testicles and they are roughly the same, well-formed and freely moving within the scrotum
- The testicles feel firm and cool and are without swellings or wounds
- The circumference of the scrotum is 34 cm from 18 months of age.

10.3 Ewe management

Choosing a ewe

Only keep ewes that kid every year. When buying or selecting a ewe make sure that:

- Udder is firm and well-shaped
- Teats are clear of the ground
- Teats are evenly sized and show no signs of damage
- There are no signs of pain when handling the udder
- The temperature of the udder is the same as that of under the belly
- The milk is creamy, smooth and free from clots or blood
- The vulva has no abnormal discharges or swellings.

Management before mating

It is important that ewes have access to good browse, or a good nutrition from three weeks before mating to two weeks after mating. This may require supplementation over the winter period to ensure reasonable body condition. Body condition score of approximately 3 will be ideal for the mating season. Also, minimise handling during the mating season, and for two weeks after the end of the mating season.

Ewe management during pregnancy

Gestation (or pregnancy) in goats is approximately 150 days (5 months) long. Make sure that there is sufficient feed during the *early stage* (to prevent reabsorption of the foetus) and sufficient food during the *last 6-8 weeks* of pregnancy, when the foetus is growing fast, but do not overfeed the mother as it may cause birth difficulties.

Management practices at kidding

- Avoid disturbing ewes during kidding (e.g. do not move them or handle them)
- Try to separate them from the rest of the flock
- Earmark kids, with a number related to their mothers
- Sufficient feed must be available – animals have increased needs during kidding.

Culling ewes

After weaning kids, decide which ewes to breed with the following season and which ones to cull – cull those with udder or mouth problems as they will not be able to raise another kid properly.

Raising female goats as replacements

Young ewes tend to reach puberty or sexual maturity at 5 to 9 months of age, provided they have been grown adequately and are in good condition. Try to make sure that young ewes do not mate until they are 12 months of age or their growth will be stunted. Therefore, if possible, keep weaned female kids away from the rams to prevent early mating (this may not be practical for many farmers in communal areas).

Animals with good characteristics need to be kept as replacements while those with poor characteristics should not be used for breeding and should be sold.

Generally breeding in ewes should be delayed until the animal has attained 60 to 70% of its mature body weight. For indigenous goats, mature ewes weigh on average 35 kg so should not be mated until they weigh 22 kg.

11. Kid rearing

11.1 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
- 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 a month old so that are able to cope with their mother's poor milk production when feed is short
- Separate ewes and kids from the rest of the flock especially when in the kraal to avoid trampling, which may injure or kill kids.

11.2 Castration

Castrate male kids at 3 months of age, using a Burdizzo.



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.

When using a Burdizzo, crush the cords from the two testicles separately and do them at slightly different distances from the body to ensure that there is continued blood flow to the testicles. Do not crush the "false" teats when castrating the ram.



Figure 11.1 A Burdizzo should be used to castrate male kids

11.3 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 200mls 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 COWS 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 regarding 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).

11.4 Creep feeding kids

It is essential that a kid is allowed to eat solid food or the rumen will not develop properly and it 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 flock. Kids should stay at home for 1-2 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.

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 has 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 called lamb creep feed. If this is not available they could be fed meat 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 to kid goats. 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 (metabolizable)/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 precluding 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.

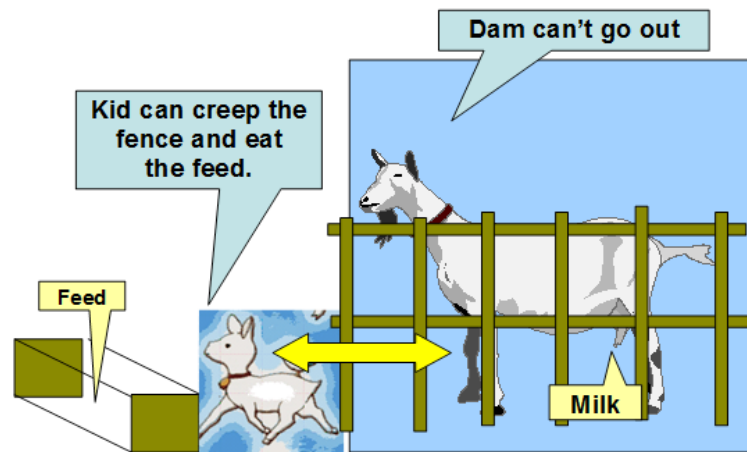


Figure 11.2 Creep feeder design (ESGPI, 2010)



Figure 11.3 Kids in a creep feeder (left) and the gate which keeps adult goats away from the feeding area (right)

Allow 20 cm of feeder space per kid. The feeding trough should be constructed with barriers on top so that contamination from kids standing or playing in the feeder is minimized.

The fence or pen in which the creep feeder is located must be more durable than a typical pasture or field fence because older goats will try hard to gain access to the creep feed.

Creep feeders should be located near water, shade or other places where goats relax during the day. Kid goats enjoy climbing. Placing stumps, cable spools or large rocks in larger creep pens or near the creep feeder may provide an additional attraction.

Management

The continuous presence of dry, fresh feed is important. Never let a creep feeder get completely empty.

Feeders should be protected from rain. Wet feed will likely mould and should therefore be removed from a creep feeder immediately.

Open troughs such as pieces of gutter or lengths of PVC pipe cut in half with ends blocked 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 underneath 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.

Grazing

Creep feed does not necessarily have to be offered in a feeder or poured out of a sack. Creep grazing is a viable option for boosting weight gain by nursing kids, using a high quality forage such as lucerne, soybeans, cowpeas, groundnuts or clovers.

Precautions

Prevent disease outbreaks amongst your kids. Outbreaks of orf may occur because they are sharing the same feed and water. 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 germs, especially to prevent outbreaks of coccidiosis. Another option is to use a commercial feed that contains medicines called coccidiostats.

11.5 Weaning

Weaning is when the kid stops drinking from its mother – it normally happens automatically at about 3 months of age (weighing approximately 20kg). Separating kids (forcing them to wean) is a very stressful time for kids, so keep feeding them supplementary feed while they get used to not drinking milk.

PART 3

Marketing and Value Adding



12. Economics of keeping goats

It is important to have an understanding of your expected costs and profit based on your system.

12.1 Different production systems

You can either keep goats under intensive conditions, for example in feedlots where you provide all their feed requirements, on pastures (semi-intensive systems) or you can keep them on natural veld under extensive conditions. Different systems have different management requirements and different costs.



Figure 12.1 Goats on pasture (a semi-intensive system)



Figure 12.2 Goats on veld – an extensive management system

12.2 Herd composition – How to make your herd more commercially viable

Once a farmer has decided to commercialise their goat flock, they will need to take control of the herd composition – how many rams, productive ewes, castrates and so on.

Management must focus on the ultimate marketing goals. For example, if you aim to sell castrated males, you should castrate all male kids early.

Breeding females should be replaced after 4 to 5 years. This means that enough maiden ewes must be kept back from sales to fill the gaps of culled females.

12.3 Understanding the costs, income and profitability of your business

It is important to understand the potential profitability of your goat business. You need to be able to answer the following questions:

- How many kids will be born each year?
- How many will survive until I can sell them?
- What price will I receive for them?
- What does it cost per year to keep my herd (feed, medicines, labour, etc.)
- What goats will I sell each year (age and gender)?

This information will allow you to start working out how much money your business is likely to make. It depends on you as an individual and how well you run your goat business. If you have lots of mortalities you will not make money. If your costs are very high you will not make a profit.

In the resources section is more information about the profitability of different goat businesses based on different numbers of goats.

13. Value adding and marketing

13.1 Selling live goats

In South Africa, goats are almost exclusively sold live for ceremonial slaughter in African homes. The majority of goats visibly sold in South Africa are imported from Namibia and sold at taxi ranks or at the side of the road. These are generally Boer goats. Large numbers of goats are sold, traded and bartered between communities, families and farmers. The highest value for indigenous goats is placed on castrates of 3 years or older. They are valued for their size mainly. It is generally very hard to find young ewes (maiden ewes) for sale. Generally speculators go around the African areas buying a couple of goats from each farmer until they have enough to make a consignment. The other important marketing time is around October when Muslims buy goats for Eid. Goat auctions have been tried by the department and have been moderately successful albeit expensive.

THE REASON FOR LIVE SALES DOMINATING THE MARKET

2014 meat prices: Beef: R31/kg; Mutton: R55/kg

Assume you have an adult goat that weighs 40kg – you would get 16 kg of meat when you slaughter it (40% dressing percentage).

If you sold it at **R40/kg** you would get **R640** for the goat.

If you sold it for **R55/kg** you would get **R880**.

BUT the average price for a **live** adult goat: **R900**.

BUT GIVEN CURRENT CONSUMER BIASES, NO ONE WILL PAY MORE FOR GOAT MEAT THAN THEY WOULD PAY FOR BEEF OR MUTTON!

Consider that during the following periods there is a high demand for live goats:

- March/April – Easter weekend
- June – Eastern Cape (Slaughter of goats for circumcision ceremonies)
- November – Muslim market
- December – Christmas market

Demand for different colours

Breeding for colours has become a popular pastime for stud breeders of indigenous goats. Currently dappled and spotted goats are popular. You can greatly increase value of goats being sold to breeders in these colours. The popularity and peculiarity of these colours is often trend driven and can change quite rapidly over time. There are also colour biases among African buyers and these should be checked and understood in each locality.



Figure 13.1 Goats with interesting colouring are of interest to stud breeders

Selling live goats in large numbers at auctions

If a number of farmers can agree to sell goats as a group, they can reach a critical mass where they can start controlling the marketing of these goats. This is usually done through an auction or sales days. Auctions can be a very useful tool to set the price for goats and sell a large number of goats at market prices within a short time.

For an auction to be successful these are points to consider:

- Communities must be mobilised because auctions need to be strategically timed to occur when buyers will need goats.
- If they are for meat goats (cull females and castrates) the best time for selling would be around November.
- If they are for breeding stock (rams and maiden ewes) the best time would be in March when they are looking their best.
- There needs to be a critical mass of goats per auction (approximately 400-600 goats). If too few, buyers won't be bothered and costs may be too high.
- There needs to be a critical mass of buyers (10-20) otherwise the prices will be low as the buyers won't compete or will buy what they need and leave early.
- At all auctions a percentage (known as the agent's fee) gets kept by the auctioneer (usually 8 %) this either gets kept to pay for the auction or gets split with the organisation (farmers' association) that organised the auction.
- Sometimes farmers who are not members of the association can present goats at the auction but these are auctioned last and as a result can sell for lower prices.
- Animals need to be tattooed with a minimum of a diptank number and optimally with the owner's personal tattoo. They must also be treated for worms and ticks before the auction and the seller must provide proof of ownership.
- Farmers need to agree on a minimum selling price beforehand with the auctioneers otherwise prices may not be acceptable to the farmer and they will lose money.
- The Livestock Anti-theft Unit must be informed of the sale and preferably be present.

- The post-auction process needs to be well organised so that farmers can get paid or take their unsold goats back home otherwise they can get mixed up.
- Advertising for the auction must be done well in advance so that buyers from further away can plan to attend.

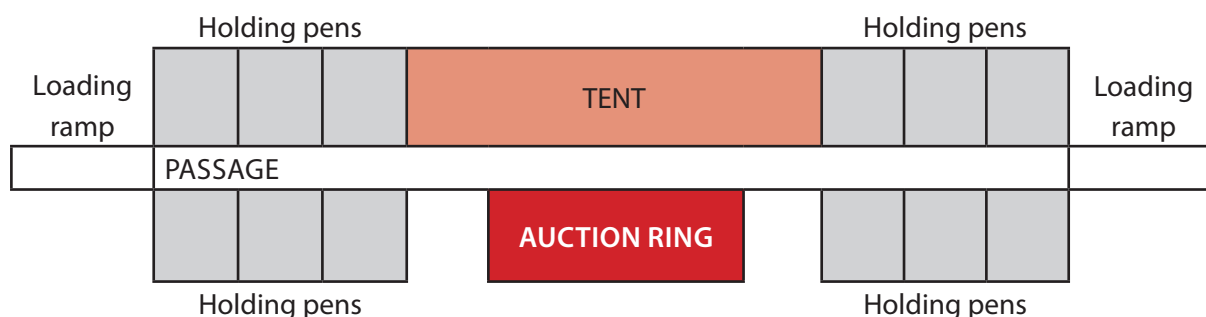


Figure 13.2 Basic infrastructure for an auction

Options for financing auctions:

- Subsidised auction – They can be paid for/subsidised externally by state or NGOs. Here an entity separate from the livestock association or farmer group carries the cost of the process and infrastructure.
- Private or industry paid auction – This is the more common type. The farmers' association or similar structure pay the auctioneer to hold the auction. In addition the auctioneers charge a fee per animal sold (often 8%). Often if a minimum number of good quality animals is guaranteed, the auctioneers will not charge the livestock association anything and will make sufficient profit from the commission charged.
 - What this means is that beyond the advertising costs listed below, with at least 400 goats sold and 8% commission collected, the auction should not cost anything more.

Items that need to be considered as costs for auctions:

- **Advertising and informing buyers** – this is done by the auctioneer through appropriate newspapers and publications. A sms system is commonly used to inform buyers who have a relationship or history with the auctioneer. Advertising in national media outlets can cost up to R50,000. A sms system is charged at cost of bulk sms which is approximately R0.35 per sms.
- **Informing sellers** – this is done by the livestock association.
- **Sale pens** – there is a need for gates that can be erected in a way that goats can be kept in separate lots and channelled to the auction arena and then kept in separate groups belonging to different buyers. Access to a loading ramp facilitates the loading of goats after the auction.
- **Staff** – to mark each goat coming in, check that ownership is legitimate and agree on conditions of sale, to hold and control the goats in lots, feed them and water them, and to separate and hold them for buyers.
- **Food and water** – for the goats.

- **Financial systems** – to allow transfers of moneys between buyers and sellers. It is preferable if sellers are paid electronically by the buyer, but options for paying with a cheque or cash may also be required. Cash liquidity is a requirement.
- **Security.**
- **Auctioneers** – to conduct the auction.
- **Transport** – to transport goats to the auction and if unsold, to transport them back home.
- **Tent and stands/seats for buyers** – Permanent structures can cut these costs.
- Auctions can cost up to R500 000 per event.

Informal roadside sales

Informal sales are an alternative to formal auctions.



Figure 13.3
Informal market point

Advantages

- There is no organising
- The seller agrees on the price with the buyer.

Disadvantages

- There is no assurance for the buyer that the goats are not stolen
- Sellers are not always informed of what their goats are worth so often a local speculator can abuse the pricing
- The health of the animal cannot be guaranteed
- Farmers often sell at times when they need money so they may be more likely to take a lower price as they need quick cash.

Regular markets regulated by farmers'/livestock associations and covering small geographic areas

This is another alternative to large, formal auctions.

Advantages

- There is control and oversight so there is less selling of stolen goats
- As it is a regular event, there are more than one buyer so competition can lead to higher prices
- Farmers can walk their goats to the market point and back
- If there are enough goats, buyers' prices will stabilise
- Associations charge a smaller commission but still get the benefit of organising it for their members
- Being regular events, the farmers can plan and manage their herds in order to produce numbers needed for household income (e.g. planned sales versus selling only when quick cash is needed)
- There is a higher level of quality assurance for the buyers
- One can begin to track supply and demand data for indigenous goats based on these regular sales which is currently not known.

Disadvantages

- There can still be speculators setting low prices
- Robberies may occur because of cash regularly being carried to buy quantities of goats
- Without infrastructure it is necessary to keep goats tethered for long periods, which is a challenge.

13.2 Sale of skins

The market for value adding for skins has been explored extensively and although there is a huge demand, the fact that people slaughter at home at different times of the year would mean that to collect and properly preserve these skins has been unviable. A local market for goat skins for making traditional leather marriage skirts, izidwaba, does exist. The skins and the finished product have high value compared to selling skins to car manufacturers, but it is a limited market – geographically and in terms of volumes required.



Figure 13.4 A woman in Msinga making an 'izidwaba'

14. Transporting goats²⁸

Marketing of goats will require transportation of them from the farm to a marketing facility. It might also be necessary to bring in goats from elsewhere at some stage. It is useful to consider what can be done to ensure that the goats travel quietly and safely without encountering any injuries or becoming ill.

The vehicle must have:

- Sides high enough to prevent jumping
- Shelter from rain and wind as goats are sensitive to cold (shade cloth on the sides will help)
- A floor that prevents slipping
- partitions to control movement of animals (if it is a large vehicle)
- No sharp edges, gaps or loose items that can cause injuries
- Sufficient ventilation while providing protection against bad weather conditions
- The driver must drive smoothly so that goats do not fall down in the vehicle.

Density of goats in the vehicle:

- Do not overcrowd goats – each goat must have at least 0.4 m² space (1 m x 0.5 m)
- Do not have too few or they will be thrown around the vehicle. It might be better to restrain a single animal in a sack (but not for more than 4 hours at a time).

Long distance travel:

- Allow all goats to have access to water and food up until loading
- A single trip must not exceed 36 hours (this means leaving at 5am on one day and arriving at the destination by 5pm the following day)
- For longer trips, goats should be rested at least every 24 hours. The rest involves removing them from the vehicle for a 12 hour period and providing them with feed and water
- Goats should be administered with Multivax P as soon as possible once a farmer knows the goat will travel to get some immunity before they go
- On the day of transport, the goats should receive a dose of long acting tetracycline.



Figure 14.1 Different vehicles used for transporting goats

²⁸ <http://www.arc.agric.za/home.asp?pid=3955> (Basic requirements and routine procedures – How do I transport my goats?)

15. How to use veld

15.1 The principles of veld management

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 animal’s 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 urea lick that allows the animals to utilise the poor quality grass that is available. Recovery of this veld from over utilization is very slow. The composition of sourveld is generally comprised of short grass species.

Sweetveld retains its quality throughout the year. It is generally found in warmer, drier areas. It is 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-utilization 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.

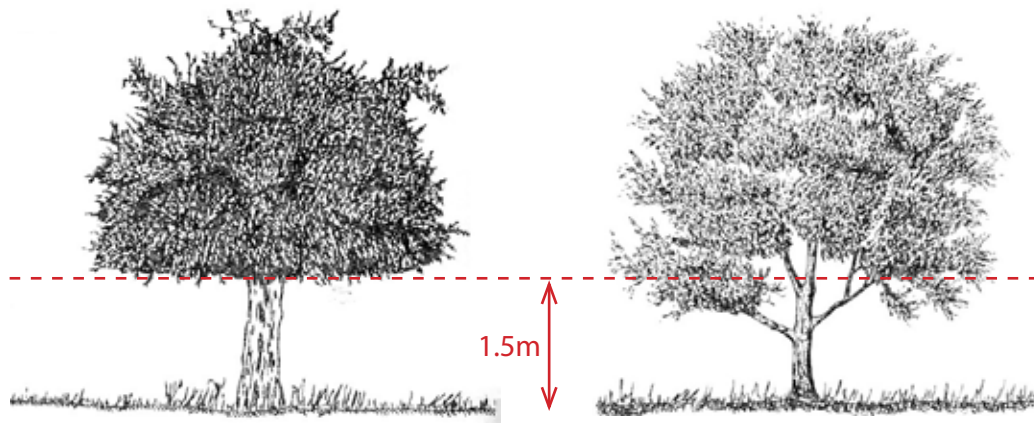


Figure 15.1 Tree showing 1.5m browse line (left) and tree without browse line (right) (taken from Camp, 1995)

Overgrazing

This is what happens when you have too many animals in a given area – it may occur during particular years that receive low rainfall. Sometimes people say that the area is “over-stocked”. It results in the grass being grazed too short continuously so that the grass either dies – leaving bare patches – or is replaced by unpalatable species that the animals won’t eat (Figure 15.3). Small trees can also be affected by being heavily and continuously grazed. A comparison between veld in good condition and poor condition is shown below (Figure 15.2 and Figure 15.3).



Figure 15.2 Example of a veld in good condition with good basal cover, grass biomass and species composition (Picture taken from Camp, 1995)



Figure 15.3 Example of a veld in poor condition: over stocking reduces basal cover and grass biomass which leads to soil erosion and animals in poor condition (Picture taken from Camp, 1995)

15.2 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.
- 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.

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PART 4

Resources



Sources of information

Books

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Improving Goat Production in the Tropics – A Manual for Development Workers – By Christie Peacock (An Oxfam/Farm-Africa Publication, ISBN 0 85598 268 3)

Merck veterinary manual www.merckvetmanual.com

Websites

www.sheepandgoat.com

www.goatworld.com

<http://goat-link.com>

www.lurext.edu/goats

www.merckmanuals.com

www.boergoats.co.za

The need to know your goat's weight

For good animal husbandry, the measurement of live body weight is absolutely essential for health management, breeding, nutrition and marketing, for example:

- To administer the proper dosage of dewormers and other medication
- To determine the wellbeing of the goat or the presence of problems
- To be able to feed animals properly
- To be able to ensure that young female animals are mated at the ideal weight
- To be able to sell animals at a specific weight.

Determining live weight

A weight belt is a specially marked tape used to measure the heart girth and convert that measurement to a fairly accurate estimate of the goat's live weight (see figure 6.1 on page 41). It provides a practical alternative solution for those farmers who do not have access to a weighing scale.

On this page is an example of a goat weight belt. The weight belt was designed by studying the correlation between live weight (measured in kg) and heart girth (measured in cm) on 1200 indigenous goats, Boer goats and crosses between indigenous and Boer goats. A farmer can make a weight belt himself using the information in this table to measure out the centimetre values on a piece of canvas or pvc (non-stretching material) and writing the corresponding weight with a permanent marker.

Girth (cm)	Weight (kg)
37.7	5
45.9	10
53	15
59.2	20
64.8	25
69.9	30
74.5	35
78.7	40
82.6	45
86.3	50
89.7	55
92.9	60
96	65
98.9	70

For more detail, read article:

De Villiers, J.F., Gcumisa, S.T., Gumede, S.A., Thusi, S.P., Dugmore, T.J., Cole, M., Du Toit, J.F., Vatta, A.F. & Stevens, C. 2009. Estimation of live body weight from the heart girth measurement in KwaZulu-Natal goats. Appl. Anim. Husb. Rural Develop, Vol 1, 1 – 8: www.sasas.co.za/aahrd/

Improved breeding system

To address management factors, it is recommended that a certain breeding season is practiced, allowing for improved, controlled management of the flock. This is only possible if you can prevent rams from mating with your ewes. If possible, it is best to limit the breeding season to a six week period so that you can manage kids as a single group. The farmer must develop a plan that best suits his/her circumstances and consider the following: When are parasites bad? When is feed limiting? When is weather bad for kids? A further advantage by kidding at a specific time/period is that it makes it easier to identify ewes/does that do not kid and raise the kids.

The optimal kidding time is from April to September when the weather is drier and the parasite burden lower. During rainy periods, parasites contribute to kid losses. A better system (if mating can be controlled) is to mate the goats in November/December so that they kid (give birth) in April/May the following year. During this period there is plenty of grass and browse and the kids can be weaned on maize residues. In some areas it has proved best for goats to give birth in November when there is forage available and the kids have a chance to grow before the start of the dry season. This would require them to mate around June-July.

Spring kidding

An autumn breeding season, leading to spring kidding depends on grazing quality and fodder flow

Advantages:

- Fertility is high
- Offspring are weaned on good quality pasture
- Young ewes are mated for the first time at 18 months in the autumn

Disadvantages:

- Kidding in September/October when dry matter availability is limited
- Internal parasites are severe during spring and summer and kids are particularly susceptible
- Cold spells during September may cause mortalities

Autumn kidding

Advantages:

- Dry matter is abundant during kidding season (May/April)
- Internal parasite infestation is lower and the young are generally healthier
- Weaned kids can be set to utilize maize crop residues which, when supplemented with a protein/nitrogen lick, can be adequate to finish them for the market

Disadvantages:

- Lower kidding rates
- The 18 month old replacement females will be mated during a period of reduced sexual activity

Blocking against heartwater

This is a method used to prevent deaths due to Heartwater. The disease has an incubation period of 14–28 days, with a mean of 18 days. If you vaccinate goats with Heartwater (i.e. infect them), and you are not able to take their temperature daily and treat them when they have a raised temperature, you can block them on day 13 after vaccination, while they are still incubating the disease and not yet showing symptoms. You inject them with a long acting oxytetracycline at the correct dose based on their weight. Alternatively: treat animals that are new to a heartwater area every 7 days for 3 weeks (i.e. day 7, day 14 and day 21 after entry to the area).

Community Animal Health Workers

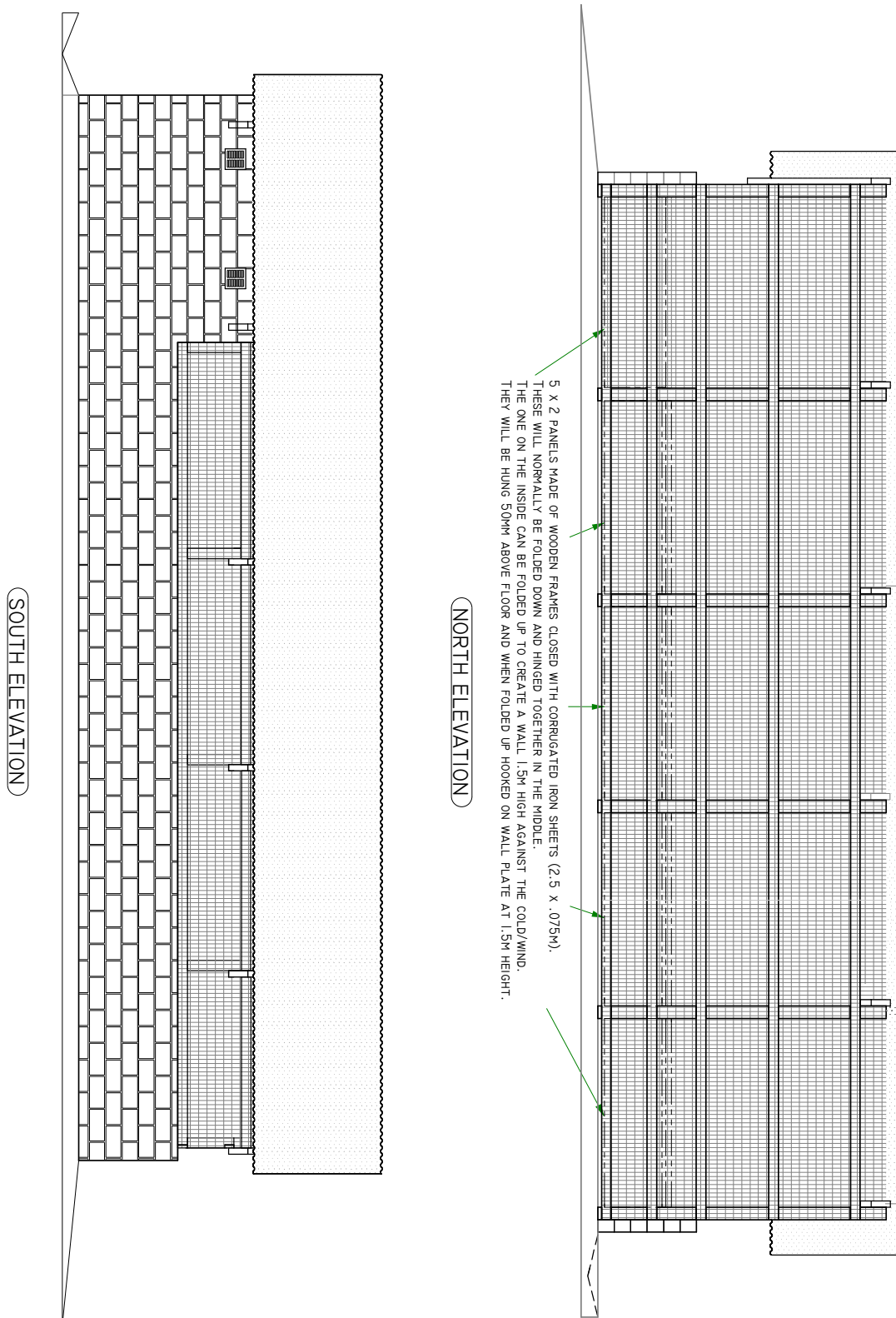
Community Animal Health Workers are young people who will support farmers in health and production support of their livestock. This will create work opportunities for young people in agriculture and help women-headed households that own livestock to improve their productivity.

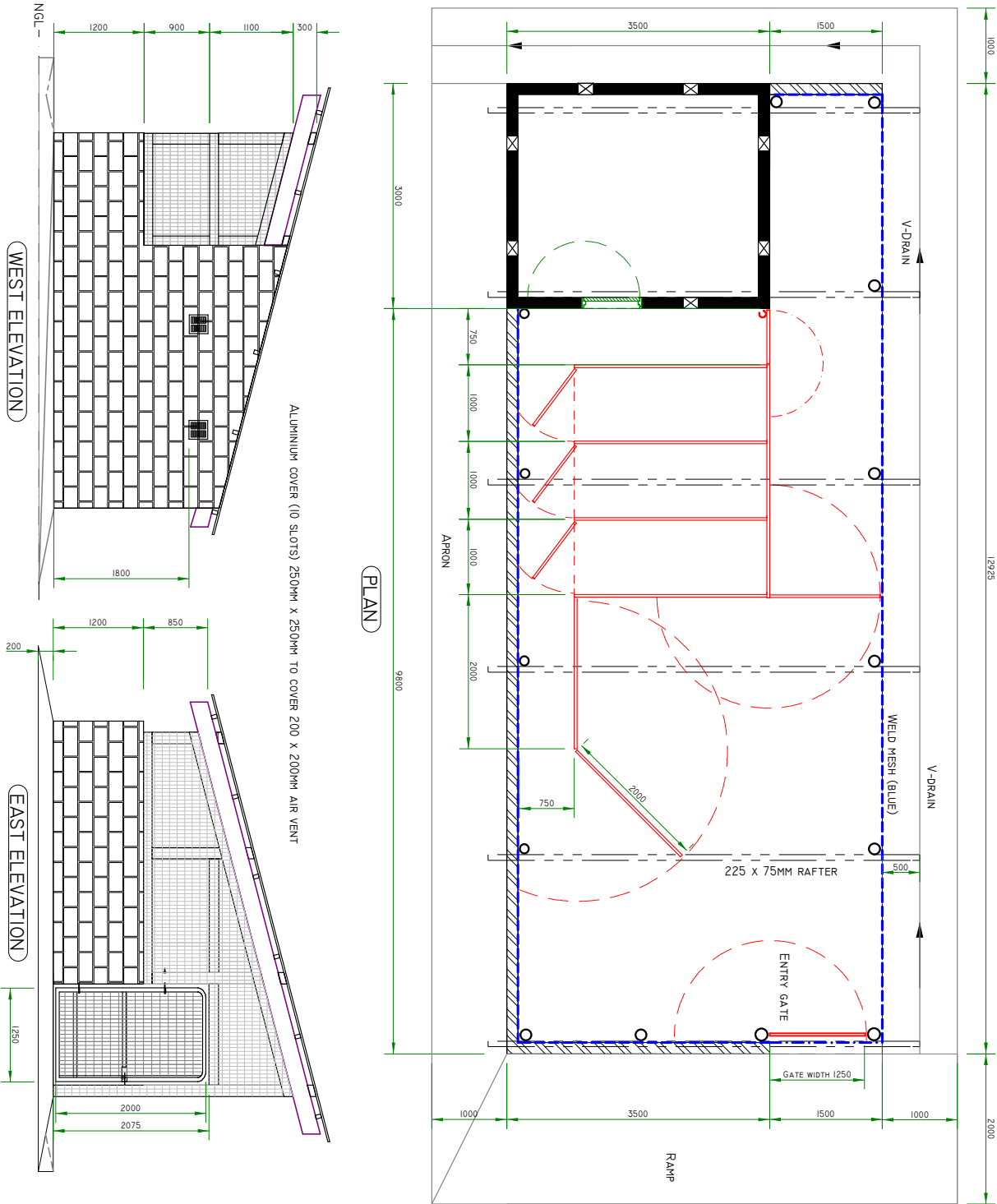
Mdukatshani is working with Heifer International, Department of Agriculture and Department of Rural Development and Land Reform in piloting this concept in Msinga as well as creating a best practice guide with lessons taken from the work to date.

See CAHW's page on www.mdukatshani.com for advice, case studies and a training program.

Alternative design for a goat shed

Here is the design for a commercial goat shed. The different drawings show different views of the shed.





Record keeping

You need to keep some records while in the field and then have more formal records / registers in the office.

Field book

A field book is a book that is used in the field to record incidents such as on a daily basis:

- Goats that have had kids (record tag number of ewe, date, no. of kids)
- Livestock deaths (including cause)
- Animals that are treated for illness or worm infestation
- Flock movements (e.g. when they are moved between camps).

Example of a field book

Date	Detail
29/04/2009	X345 dosed for worms
	Goats moved into camp 2
	X322 kidded (IM, IF)
30/04/2009	X345 dead
	X367 kidded (IM)

Office records

In the office, it is necessary to transfer information from the field book into official records that allow you to track information, select animals to breed with, etc.

You can have a flip file with plastic pockets to hold your record sheets or you can have 4 separate note books. Updating your records involves the following:

- Update the animal register (which provides details of all animals in the herd) to show any changes in the herd. You will also need to add in any kids that have been born (once they are given an ear tag). If animals have left the herd you need to indicate why.
- Update the kidding register – which provides a record of ewes that have kidded and the number of kids they produced. You can also include the kids' tag numbers in this register.
- Update the health register (goats that have been sick, goats that have been dewormed or treated). If you keep records of individual goats you will know which ones to cull.
- Update record of sales – including age, sex, price obtained, whether group or individual sale.

Examples of how you can draw up record sheets are shown below:

Animal register

Tag number	Gender	Source	Date of birth / Date acquired	Exit date and reason
X306	Ram	Purchased - Mr Smith, Colenso	24/03/2010	26/07/2009 Sold
X304	Ewe	Home bred	23/05/2013	Died heartwater

Kidding register

Date	Tag number of ewe	No & gender of kids	Observations
25/04/2014	X345	1M 1F	Kidding difficulties

Health register

Date	Tag number	Problems / symptoms	Treatment	Outcome
25/04/2009	X345	Heartwater	Injected with Terramycin	Survived

Sales records

Tag number	Date	Weight	Price	Detail
D32	24/04/2014	28kg	R950	Group of 15 sold to KwaBotha

The next record (overleaf) is one that will help you to keep track of the number of goats in your flock and the reasons for changes that have happened during the month.

MONTHLY RECORD

Date: _____ Farmer's name: _____ Village: _____

Medicinal inputs	Cost	Feed inputs	Cost	Other inputs	Cost

Diseases affecting goats	
Symptoms shown	
Treatment of disease	
How many ewes gave birth since last visit?	

	Date :	GOATS COMING IN											GOATS GOING OUT							
	Number of goats last month	Movements between age groups	Kids born	Single births	Twin births	Through damages	Through swapping	Through other means		Through other means	Sales	Slaughtered	Damages/ fines	Stolen/ missing	Deaths	Number of goats this month				
Adult ewes																				
Young ewes																				
(maidens)																				
Rams																				
Castrates																				
Female kids (Separated)																				
Male kids (Separated)																				
Female kids (Unseparated)																				
Male kids (Unseparated)																				
TOTAL																				

Other information

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Determining the profitability of the business

Examples of assumptions:

- Mortality rate in kids 20%
- Mortality rate in adults is 10%
- 20% Twinning Rate
- Goats kidding twice in 18 month period
- Kidding 50% males 50% females
- 80% of male kids will be castrated with the goal of selling at 3 years
- 20% of reproducing females will be culled every year
- 40% of female kids will be retained yearly for breeding stock
- 100% of 3 year old castrates sold each year, e.g. all of year 1 castrated kids will be sold at year 3 plus 33% of existing year 1 castrates
- Year 3 sales of 3 year old castrates will spike due to selling the ones born in Year 1 plus the remaining 33% from existing castrates in year 1
- 3 year old castrates compose 33% of castrates due to varying ages
- Bucks are sold after 5 years and replaced from young uncastrated male pool
- 40% of uncastrated males sold each year
- No male kids are sold each year
- 3 year castrates sold at R1500
- 1 year females sold at R900
- Culled older females sold at R800
- Uncastrated males sold at R1200
- Bucks sold at R1500
- Farmer is spending an average of R200 per year per goat; or 100 as specified.

Note: The money spent per goat per year (See last bullet) must cover medication, vaccinations, supplementary feeding. The amount that you spend will vary according to where you are farming and the amount of natural vegetation available for your goats.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Bucks	1	1	1	1	1	1	1
Young uncastrated males	1	1	1	1	1	0	1
Castrates	3	4	5	4	3	5	5
Reproducing Females	5	5	5	5	5	5	4
Total (not including kids)	10	11	12	11	10	10	12
Kids Male	4	4	3	3	3	3	3
Kids Female	4	4	3	3	3	3	3
Total Including kids	17	19	19	17	17	17	18

Sales																					
Bucks	0	R	-	0	R	-	0			0			2	R	3 000	0					
Young uncastrated males	0	R	480	0	R	570	1	R	612	1	R	629	1	R	632	0	R	185	0	R	391
Castrates	1	R	1 485	1	R	2 178	4	R	5 805	1	R	1 819	1	R	1 594	1	R	2 247	2	R	2 661
Culled Females	1	R	800	1	R	800	1	R	767	1	R	751	1	R	735	1	R	720	1	R	705
Kids Male	0	R	-	0	R	-	0	R	-	0	R	-	0	R	-	0	R	-	0	R	-
Kids Female (1 year old)	2	R	1 944	2	R	1 904	2	R	1 864	2	R	1 825	2	R	1 787	2	R	1 750	2	R	1 714
Total Sales	5	R	4 709	5	R	5 452	7	R	9 049	5	R	5 024	4	R	4 748	6	R	7 903	5	R	5 471

5551

[illegible]

Goat Production Handbook

Average sales per year (not including year 3)

11377

95

Herd Composition Goal of 60 Average							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Bucks	2	2	2	2	2	2	2
Young uncastrated m	10	9	8	8	7	6	7
Castrates	13	22	27	20	17	24	29
Reproducing Females	27	26	26	25	25	24	24
Total (not including kids)	60	59	63	55	52	57	61
Kids Male	19	19	19	18	18	18	17
Kids Female	19	19	19	18	18	18	17
Total Including kids	99	97	100	91	87	92	96

Sales								
Bucks	0	R -	0	R -	0	0	R 3 000	0
Young uncastrated m	4	R 4 800	4	R 4 272	3	R 3 951	3	R 3 158
Castrates	4	R 6 435	7	R 10 809	20	R 29 763	6	R 8 578
Culled Females	5	R 4 320	5	R 800	5	R 4 142	5	R 3 972
Kids Male	0	R -	0	R -	0	R -	0	R -
Kids Female (1 year old)	12	R 10 498	11	R 10 279	11	R 10 065	11	R 9 651
Total Sales	25	R 26 053	27	R 26 160	39	R 47 922	24	R 25 799

Average sales per year (not including year 3) 27870

Profit	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	
	avg R200 per goat	avg R100	avg R200	avg R100	avg R200	avg R100	avg R200	avg R100
Income	R 26 053	R 26 053	R 26 160	R 26 160	R 47 922	R 47 922	R 27 432	R 27 432
Expenses	R 19 776	R 9 888	R 19 449	R 9 724	R 20 055	R 10 027	R 18 281	R 9 140
Net Profit/Loss	6277	16165	6711	16435	27867	37895	9151	18291

Profit breakdown	g R200 per goat	avg 100						
3 year castrate	900	1 200						
1 year old female	700	800						
Culled females	-200	300						
Uncastrated males	800	1 000						

Average profit (with costs at R200 per goat) per year R 9 134
Average profit (with costs at R100 per goat) per year R 18 502

How to make your own protein-energy-mineral blocks

Recipe for goat energy blocks

Ingredient	Recipe by weight (kg)	Recipe by volume (litres)
Course salt	4 kg	4 litres
HPC (36%)	15 kg	32 litres
Maize meal	7 kg	14 litres
Molasses (liquid)	15 kg	14 litres
Whitewash	2 kg	4 litres
TOTALS	43 kg	65 litres (54 kg)
YIELD	29 blocks	39 blocks

PLEASE NOTE: These two recipes make different quantities of blocks! If the mixture is too wet, add more HPC until it crumbles.

Cost per batch/block (Yield: 29 blocks)

Ingredient	Quantity (kg)	Cost per mix	Cost per kg	Packaging size	Cost per package
Maize meal	7	31.49	R4.50	10 kg	44.99
Salt	4	4.74	R1.19	50 kg	59.28
HPC	15	110.81	R7.39	50 kg	369.36
Liquid Molasses	15	64.98	R4.33	25 kg	108.30
Whitewash	2	13.32	R6.66	25 kg	166.55
TOTALS PER BATCH	43 kg	225.35	R5.24	1.34 kg (wet)	R7.27



Goats need to be adapted to blocks to prevent disease and death!

This block is meant as a supplement and must not be fed to goats as their only source of food. **Kids can safely eat 300 g a day if adapted.** Kids: for 10 days feed 100 g per kid per day, 13 kids per block. **Mothers can safely eat 500 g a day if adapted.** Mothers: for 10 days feed 200 g per goat per day, 7 mothers per block.

	DM	CP	ME	Ca	P
As fed basis	%	g	MJ	g	g
Energy block (1 kg)	83	152	8.6	16	7
100 g		15	1	2	1
200 g		30	2	3	1
300 g		46	3	5	2
400 g		61	3	6	3
500 g		76	4	8	3
Abbreviations: DM- Dry matter; CP- Crude protein; ME- Energy; Ca- Calcium; P- Phosphorus					



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