



Livestock Farming

Under Climate Change Conditions

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About this book

This book is intended for livestock farmers, as well as others who are wanting to learn about livestock farming. It is not intended to be a comprehensive livestock farming manual, but is rather aimed at giving some guidance on how to plan for livestock farming under changing environmental conditions.

Farming with livestock can be challenging, especially when farming in arid areas. This handbook is primarily informed by the experience of farmers in the South African winter rainfall area.

While we took great care to compile this handbook, we cannot be held liable for any of the information contained in this book or any impact the use of this information may have in practice.

We are interested in your feedback. Please let us know if you have any comments or additions and we are keen to include this in any future editions of this publication.

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Select a breed and a flock that is suited to your farming environment and local climatic conditions

Starting a flock

Here are some guiding questions when establishing a productive flock of sheep:

- What kind of production are you looking for on your farm?
- Do you have enough grazing available on the farm to support a flock year-round?
- How will you manage the flock in the different seasons of the year?
- How will you respond to predicted weather variability and climate extremes?

Once you have answered these questions, it might be a good idea to visit a farm that produces the type of sheep that you are interested in. This will also allow you to ask lots of questions related to management, fertility, heat tolerance and susceptibility to diseases occurring in the area.

When visiting the farm, you can check the following:

- Are the animals doing well under the local conditions?
- Are the sheep suitable for your type of farming?
- Will you manage the sheep in a similar way?

A good start....

When you are purchasing a new flock, keep in mind to carefully select your breeding animals. Purchasing some quality animals when starting a flock will be a good investment for your business.



Appropriate infrastructure is important when planning for farming under climate extremes

Infrastructure

Farmers require different types of water infrastructure, equipment and other resources. If you want to evaluate what you will need for your farming enterprise, make sure you track actual and potential cost of the necessary improvement.

Question to ask:

- What do I have?
- What do I need (and what do I really do need that for?)
- How will I get what I really need?
- How much will it cost?
- Will this infrastructure be sufficient to deal with observed and forecast weather extremes?

Water Supply

Healthy livestock require regular access to potable water. The shorter the distance that sheep have to move each day to get to water, the better their condition will be and the less trampling there will be of the veld.

Different water resources include streams, rivers, lakes, wetlands, springs, wells and as well any means of conveying the water to different areas within your farm. As a farmer you should be familiar with the location, seasonality and quantity of the water sources on your farm. Consider what the water needs will be for your enterprise. Livestock farmers should have a reliable and portable source of water for their livestock to drink.

You need to determine whatever the water is used for:

Is there enough water for livestock and household use?

Is the existing means of bringing water from its water source to where you need it adequate? Or do you need to install pipelines? How will water resources be affected by climate change?

Keep in mind that all pipelines and structures will need to be appropriately sized to fit their purpose. If the water pipes are too small you will not be able to provide enough water to your livestock to meet their needs.



Good farm records are an invaluable management tool and can help you understand climate change and its impacts on your farm

Record keeping

Keeping records of livestock production is useful for monitoring the success of farming activities and to inform future veld management decisions. Essential farm records include production and financial records. Record keeping should be simple, yet effective for the purpose it is intended for – to learn from experience and improve farm management. Keeping records without assessing/comparing results is of no use. If farm records are compared across years and amongst farmers they can be a useful tool to stimulate peer learning and overall improvement of veld management.

Record keeping is important for monitoring the health of your flock and to assess farm productivity. Production record keeping should keep track of the overall health, age and performance of the flock. To keep accurate records of the flock condition, individual animals need to be marked and monitored over successive years.

Other important aspects to keep track of include aspects of production such as fertility and rearing success. It is useful to keep records of basic flock condition, as well as production records. Monthly entries should be made to record the flock's age, size, physiological status, condition and productivity, as well as issues that arise concerning the health of the animals.

Recording and tracking your veld condition is also valuable as the health of your sheep depend directly on the condition of the grazing available to them.

Record keeping can help you understand how climate extremes and certain weather patterns affect your farming practice and livelihood. These records are also useful when planning for livestock farming in a changing climate.



Sheep in good health and condition are more resilient to weather extremes

Sheep health

Managing a productive farming enterprise takes careful planning and effective resource use. Several aspects need to be considered to maintaining a healthy, productive flock. One of the important aspects to consider for long-term sustainability is effective veld management. If your veld is in a poor condition you cannot expect to have a productive flock. To keep your sheep healthy you need to provide them with the basic nutrition and water requirements, as well as being aware of possible diseases and injuries they may sustain. Sheep under stress, whether from lack of nutrition or due to extreme weather conditions, are more susceptible to disease and other hazards (e.g. being targeted as prey by wild animals). The health and productivity of your flock is largely dependent on the grazing resources available. Various factors influence the productivity and grazing capacity of an area. The veld type of a grazing camp, as well as its previous degree of utilization by livestock, will determine the type of plants present and so to determine an areas grazing capacity.

To manage a productive sheep enterprise a farmer needs to manage his/her resources (including flock age, size, genetics, grazing, water, etc) in such a way that the inputs are kept at a minimum while optimizing on the return. For a flock to be productive it is important to ensure your animals are of a good breed and in good condition so that you can grow and improve your flock over time. Producing animals of high quality and good health will bring higher returns.

Factors that affect livestock farming in the winter rainfall area of the Cape region

The vegetation of the winter rainfall region consists of a combination of Renosterveld, Fynbos and Succulent Karoo. The distribution of these three distinct veld types is determined by the topography and underlying geology (and soil type) of the region. Much of the area is semi-arid. Winter rainfall generally peaks in the colder months from May to August. Changes in weather patterns have already been observed by farmers and scientists and should also be considered: these include higher temperatures in summer, more variable rainfall and possible less overall rainfall to support veld conditions and ground water recharge.



It is important to consider different veld types and their management when assessing veld condition

Veld Condition

Assessing veld condition and making informed veld management decisions is an ongoing process. Veld management should aim to maintain and increase an areas' natural productivity. Good veld management practices improve grazing capacity and animal production. This can be achieved by avoiding overgrazing, allowing periods of rest to allow palatable species to recover, preventing soil erosion and controlling the spread of invasive plant species. The region is characterized by low, and often unpredictable rainfall and extreme temperatures. Farmers can stabilize fodder supply by maintaining veld in a good condition, and restricting livestock numbers to a conservative carrying capacity in years of above normal rainfall. This will allow for the build-up of veld reserves that can provide a buffer for seasonal and cyclical droughts.

What are veld condition assessments and why are they important?

Veld condition assessments are done to determine the condition of the veld and to determine if the grazing is either over- or underutilized. These assessments should be done on a regular basis to determine the grazing capacity of an area and inform current and future veld management decisions. It is important to apply these methods on specific veld types and on areas that are representative of the respective grazing camps.

Formal veld condition assessments have been developed by extensive research (e.g. the species composition and the key species method). For the purposes of this guide a quick visual assessment method has been compiled. This statement-based scoring system is aimed at providing an initial indication of the current veld condition, but should be used with caution as the results will be subjective. The scoring system makes use of multiple criteria, similar to one developed for the Karoo by Esler et al. 2014. It should be noted that different seasons and climatic conditions will affect the outcome of the veld condition scoring system. Decision making should be sensitive to these variations, and especially take into account long-term climatic predictions.



The number of sheep in a camp and the duration of the grazing period should be in balance with the grazing capacity

Stocking rate and grazing capacity

It is very important to select livestock that are well adapted to the veld and climatic conditions of an area, and to the style of farming and intensity of supervision that the farmer chooses and is able to apply. Animals that are not accustomed to extreme temperatures or periods of drought will struggle to survive, resulting in high livestock losses or increased expenses (e.g. purchasing additional fodder) to keep animals healthy.

Once you have selected suitable livestock the next aspect to consider is determining a sustainable stocking rate for the area to be used for grazing. Stocking rate is the number of hectares required per stocking-unit per annum or grazing season for a given area. A suitable stocking rate is determined by the grazing capacity (also known as carrying capacity) of an area. Grazing capacity refers to the number of hectares needed to sustain one Large Stock Unit (LSU) over a human generation without deterioration of the vegetation or soil. One LSU is equivalent to six Small Stock Units (SSU), for example 1 cow (LSU) = 6 sheep (SSUs).

The stocking rate and grazing capacity of an area is determined by several aspects such as the vegetation type and condition, the long-term average rainfall and the veld history. The grazing capacity can be fairly accurately determined by the long-term average annual rainfall. Poor historic management would, however, have resulted in overgrazing of palatable plant species resulting in poor veld condition. Veld in poor condition is dominated by less nutritious, unpalatable or even toxic species. In these areas the actual grazing capacity will be much lower than would be expected due to the loss of favorable fodder plants. Land degradation has already occurred in these areas, careful grazing management is needed to avoid further degradation. Steps should ideally be taken to improve the veld condition of such areas.



It is important to monitor the condition of the veld before, during and after grazing periods

Grazing management

Plants take some time to recover after grazing, and to be able to flower and produce seed. Grazing management should be effective in ensuring that the veld is sustainably utilized, overgrazing does not occur and valued plant species are able to survive and reproduce. This requires considering various factors and thoughtful planning. Depending on the infrastructure on the farm and the availability of labor, grazing intensities can be managed by determining ideal stocking densities, grazing periods, rest periods, herd composition and camp sizes. If adequate camps are not available or affordable, daily supervision of the grazing of the flock by a skilled herder can achieve the same benefits

Setting up rotational grazing systems:

Rotational grazing systems usually require that pasture land be divided up into fenced camps that are utilized in turn for grazing. The number of grazing camps should be sufficient to allow rest periods of at least 8 months each year. Grazing camps can thus be used in rotation for periods of active grazing (one to four months) and alternated with periods of rest allowing for veld recovery.

The size of the grazing camps should be determined by the grazing capacity of the veld and subsequently the size and number of herds. It is essential to incorporate a sufficient period of rest after active grazing. Rest periods should be planned and implemented according the veld condition requirements.



Ewes that graze on veld that has been rested will have plentiful milk for their lambs

Rest periods

Why are 'rest periods' important?

Rest periods in different seasons promote veld recovery and improve veld productivity. A spring rest allows for nutrient recycling (from leaves to the soil), flowering and seed set and the establishment of seedlings. A winter rest period promotes plant growth and allows for plants to replenish storage reserves. Full season rest periods allow for overall recovery across the whole spectrum of the plant's life-cycle. A full season rest is good for restoring degraded sweetveld. Spring and winter rest periods are especially important after first rains to allow for seed-set and seedlings to establish.

Because sheep will always choose to graze on the most palatable plants first, over a long period of grazing in the same area they will 'selectively graze' these plants to death. If the veld is continuously grazed and not rested for a longer period the desired palatable species not be able to regenerate because their seed banks will be exhausted and there will be no possibility of new seedlings to 're-stock' the veld. After a period of resting the veld, animals should not be returned to the veld while it is still immature or in its early re-growth phase; this could lead to serious damage to veld condition. Allow rested camps to fully recover before subjecting them to grazing pressure once more. Avoid grazing camps in the same season in consecutive years, rather allow for rest periods in alternating seasons.

Other aspects to consider regarding grazing and veld management:

- Do not overgraze (or overstock) veld, this will lead to long-term land degradation and lowered grazing capacity
- Time lambing to coincide with the rain season when pasture and water are more readily available
- Reclaim land of areas previously overgrazed or scarred by soil erosion (land restoration)
- Consider stocking with animals with different feeding/grazing habits to achieve better pasture utilization.
- If possible rotate grazing with animals of different feeding habits (e.g. alternate sheep, goats and cattle)



A healthy ecosystem will provide sound grazing and shelter for sheep

Managing and restoring the land

If veld is overgrazed, it will show signs of degradation such as loss of palatable species, exposed soil surfaces and formation of gullies. Rainfall will run off the land before it has properly soaked in, and the land will dry out sooner after rain, depriving plants of the moisture that they need to be productive. In drought times there will not be enough grazing to sustain livestock. Here are a few tips on how to prevent and manage land degradation.

Grazing the veld hard for a short period of time, preferably in a different season each year, and then resting it so that plants can regrow, recover and re-establish in bare areas is the best way to prevent land degradation. Erosion gullies should be dammed with permeable structures that allow soil to accumulate behind them and water to soak into the soil to feed plants and replenish the ground water table. Where sheet erosion is taking place, intervention may be needed to prevent further degradation and promote re-establishment of native plants.

For more practical guidance on rehabilitation of soil erosion see www.avontuur.org.za/wp-content/uploads/2016/01/SW-Conservation-Manual.pdf.

Veld management under drought conditions

During periods of drought it is particularly important to manage the veld carefully to limit long-term losses resulting from over-utilization, and even permanent degradation of grazing land. When it is becoming clear that drought conditions are setting in, it is important to reduce livestock before it loses condition and animals start to die. This will bring a better return and also reduce the grazing pressure on the veld. Feed supplements can be provided strategically, but this should not be done instead of reducing stock numbers. Conserve the available grazing for the best breeding stock that you will need to rebuild the flock after the drought.

Once the rains return and the veld starts to regrow, be careful to not overstock the farm. The veld should be allowed to fully recover after a drought before increasing the numbers of stock once more.



Good water resources are essential to livestock farming and intact veld improves groundwater recharge

Water requirements

Livestock water requirements vary depending on the size of the animal, suitability to arid regions, seasonality and the climatic conditions of the area. Small livestock units, like sheep and goats, optimally require 7 liters of water per day. Small-scale farmers have told us that their sheep manage with only 5 liters per day. Water requirements increase under high protein or salt diets and during periods of high temperatures and drought. Ewes that are lambing or producing milk for lambs also need more water. Water requirements of different breeds of sheep will differ, and those less adapted to arid regions will require more water.

Under extreme heat conditions it is especially important to ensure that animals have easy access to clean drinking water. Provide animals with adequate clean water of a good quality on a daily basis. Even if sheep can survive with less frequent access to water, it will cost in terms of their condition. Very thirsty animals should not be allowed to drink large quantities of water at once, as this can result in water intoxication (especially in young animals).

The size of watering points should be suitable for the size of the flock. Ensure that all animals in the flock can get to the water point within a relatively short period of time. If smaller, weaker animals are not able to access the water because the trough is too small they will further lose condition.

Water quality is very important and should be checked on a regular basis. This is especially relevant in areas with high temperatures. Water quality should be within suitable limits regarding the concentration of salts and other minerals to maintain sheep health.

When you are assessing your water requirements, consider that climate change might result in more erratic rainfall, more extreme rainfall events, fast run off rates and more extreme drought conditions.



A balanced diet will ensure a healthy resilient animal

Nutrition

Sheep obtain their nutritional requirements from the pastures they graze and through supplementary feed. A balanced sheep diet should include components for energy (fats & carbohydrates), protein, vitamins, minerals and water. The specific nutritional needs of a sheep vary and are dependent on the age, size and physiological status of the animal. Larger animals, for example, will need more nutrients than smaller animals. Pregnant and lactating ewes have higher protein requirements.

Supplementary feed

Additional fodder or licks can be provided strategically where the nutrient content of grazing is insufficient to maintain sheep condition and health. Supplementary feed should, however, not be used as an alternative for effective veld management. Supplementary feed is especially important under drought conditions so as to address nutritional shortcomings in the available grazing and to avoid over-utilization of veld. Dry licks can be used to address specific nutrient shortcomings in available veld during different seasons by supplementing the requirement of important nutrients and elements such as nitrogen, phosphorus, and sulfur. A phosphorus lick for sheep should provide 4 g phosphorus/animal/day intake.

Two possible phosphorus lick mixtures (Smith, 2006):

- (1) 100 kg bone meal (67 g intake per day of mix) + 59 kg salt
- (2) 50 kg dicalcium phosphate (50 g intake per day of mix) + 50 kg salt.

Protein forms an important part of a sheep's nutritional requirements and is important to maintain the sheep's production and other physiological processes (e.g. growth rate, conception, breeding success etc.).

Consider that more extreme weather conditions including droughts, might result in less available grazing and therefore having fodder reserves will be even more crucial for the success of your farming.



Trees and shrubs provide valuable shelter in hot and cold conditions

Providing shelter

Livestock require some form of shelter where they can rest and ruminate. Shelter is also important for protection against extreme weather conditions. Most importantly, animals may need shelter from very hot sun and extreme cold and wet conditions. In veld that has plentiful trees and shrubs, sheep will usually be able to find suitable shelter in all seasons, especially if they are familiar with the area.

If sheep must be grazed in an area with inadequate natural shelter, planting of hedges or windbreaks can be a good alternative. This is a long-term strategy and will usually take some years for the trees or windbreaks to be tall enough to be effective.

In the short term, the farmer can construct simple roofed structures that also provide wind shelter from the side of the prevailing storm winds. Structures of this nature should be well drained and ventilated so that they do not get wet underfoot, or trap hot air and expose sheep to even higher temperatures. Well constructed shelters can reduce the risk of lung infections and reduce mortality of lambs, which may otherwise die of exposure to cold and wet winter conditions.

Special adaptation options for shelter for livestock can be found in the last chapter of this book.



A stressed sheep easily loses condition and is more susceptible to die in extreme weather events

Signs of stress in sheep

The body temperature of sheep must remain within narrow limits. If they get too hot or too cold, they will show signs of distress. There has to be a balance between body heat production and body heat loss. If sheep are unable to achieve this balance and cannot lose sufficient heat, their body temperatures will rise and they will become heat stressed. The main indicator of heat stress is continued panting, even the animal is standing still. If the animal's body temperature continues to rise it will eventually collapse and die.

Under normal circumstances outdoors, sheep can maintain their body temperature within a safe range, known as the thermo-neutral zone, without any problems. The sheep's fleece insulates its body, helping to maintain a constant body temperature by providing protection from the extremes of cold in winter and heat in summer.

The role of the fleece in the development of heat stress cannot be overstated. A sheep with a thick fleece is relatively immune to changes in ambient temperature due to the thick insulating layer surrounding its body. However if body heat production is suddenly increased due to muscle activity, for example when the animals being are herded from place to place, they can have difficulty in losing sufficient heat to maintain a constant body temperature and may become heat stressed.

Conversely, a sheep which has been shorn is susceptible to extreme of climatic temperature and can easily become either cold stressed or heat stressed if exposed to extreme weather conditions.

One important aspect is that sheep have access to shade during hot weather conditions. Clean, cool and fresh water is important for preventing heat stress in livestock.



Lambs are especially vulnerable to hypothermia in cold and stormy winter weather

Hypothermia

Hypothermia occurs when the body loses so much heat that it cannot function. Unless it can be reversed quickly, an animal will die from hypothermia. Newborn lambs frequently die from hypothermia during winter storms. This is especially true when many ewes produce lambs in the coldest months of the year. To maintain its body temperature, the newborn must produce as much heat as it is losing to the environment. If the lamb cannot do it, its body temperature will start to fall and if not quickly remedied, lead to death. In the autumn and winter, ewes with young lambs should always have access to suitable shelter such as shrubs, trees, kraals or roofed shelters.

Heat Loss:

A small lamb has a larger surface area in proportion to its weight. It will therefore chill faster than a larger lamb. This risk is greater for lambs born as triplets or twins.

Some of the lambs are born with a thicker coat than others. Once the lamb is dry, the heavier coat will give it more insulation, and the lamb will lose less heat than a lamb with a thinner coat.

After birth the ewe will lick the lamb dry. Lambs from maiden ewes, or the later lambs from multiple birth are most vulnerable in this regard, as the ewe may not know how to lick them dry, or be too occupied with the other lambs.

Lambs born in a drafty pen or outside with no shelter from the wind will have an accelerated heat loss.

The most dangerous combination of weather conditions is low temperatures, strong winds and driving rain, hail or sleet, as lambs will rapidly lose body heat under these conditions.



Especially in drought conditions sheep will eat poisonous plants if no other fodder is available

Lack of nutrition and poisonous plants

Nutrition is a very important factor in maintaining sheep health. For example, underfeeding can reduce placenta development, thus reducing the transfer of nutrients from the ewe to the lamb and resulting in lower lamb birth weights. Ewes should be fed to maintain good body condition in early pregnancy to ensure adequate early placental development. These effects extend into mid pregnancy. Placental development between days 30 and 90 of pregnancy is linked to lamb birth weight. If ewes lose 5 kg in the first 90 days of pregnancy, placental development and the birth weights of multiple lambs will be severely reduced.

Drought or overstocking can be the main reasons why sheep start to feed on poisonous plants. Some poisonous plants are highly resistant to drought and may be the only green plants available for animals to eat. Here are some diseases that can occur as a result of sheep and goats feeding on poisonous plants:

Geeldikkop

Vermeersiekte

Cardiac glycosides (for example, tulp and slangkop)

Seneciosis

Gousiekte

Diplodiosis

Prevention

Know which poisonous plants occur in your area, and keep your livestock away from them in the seasons when they may be grazed. Keep animals in good condition with supplementary food and licks during the dry season – and always make sure they have enough water.

In extreme cases it may be necessary to eradicate some of the poisonous plants. However, good veld management should keep the populations of poisonous plants within acceptable limits.

Don't feed your animals moldy hay or hay cut from areas where poisonous plants occur.

(http://www.cmw.co.za/technical_services/files/Sheepguide04.doc)



It is important to treat injuries as soon as possible and to consult the local vet if the condition is serious

Injury

It is important to assess the injury before you decide on treatment, because if the injury is severe it is sometimes better to slaughter the sheep.

Types of injury	Treatment
Broken limbs	If the injury is very severe you can ask a local vet for assistance, but if it is a minor injury you can fix a splint to the broken limb.
Eye infection (Pink eye)	You can ask for Swavet eye powder at your local agricultural supplier (e.g. KLK or Kaap Agri) to treat the infection.
External wounds Cuts Bruises Tears	For any cuts and bruises you can ask for Swavet wound oil at your local agricultural supplier.



Increasingly mild winters could mean that the veld carries a higher load of ticks

Ticks

Dipping

Do's	Don't
Try to postpone dipping till after lambing or dip the sheep before the lambing season	Do not place ewes and lambs in the tank simultaneously
Lice can only survive on sheep: make sure all sheep are dipped	Sheep should not be driven over long distances before and after dipping
Animals should be submerged in the dipping-fluid for at least one minute	Never dip thirsty sheep
The head should be submerged at least 3 times	Do not dip recently shorn sheep: allow a period of about 14 days after shearing for shearing wounds to heal.
Start dipping early in the morning and do not continue till late in the afternoon. Sheep should get the opportunity to dry off sufficiently before the evening	Leave sheep wet from dipping in the late afternoon or evening.

Management of ticks in veld and on sheep

It is very important to prevent animals from being infested with ticks as this may lead to loss of production, poor meat and hide (skin) quality. Infestation may be controlled by the regular dipping of animals and by best agricultural practices in managing veld and grazing rotations.

http://www.nda.agric.za/docs/Infopaks/Livestok_EffectTik.pdf



It is important to understand the most common diseases in sheep, in order to prevent and treat them

Diseases in Sheep and Treatments

It is very important to know how to take care of your livestock and keep them healthy to ensure good production. In the next chapter you will find some common local diseases and treatment methods. Some of the methods explained in this section are based on the experiences of livestock monitors in the Suid Bokkeveld area of the Northern Cape. Although not scientifically proven, the monitors are convinced that these methods have been crucial to their success as livestock farmers.

It is important to bear in mind that a healthy sheep in good condition can more easily tolerate extreme weather events. An animal that is weakened by disease or in very poor conditions might die when exposed to extreme temperatures or weather events.

Disclaimer

Please note that the treatment methods explained in this manual only serve as a guide to assist you in understanding diseases in sheep. Please consult a veterinarian for more information on diseases and treatment.

<p>Name (Afrikaans) Krimpsiekte</p>	<p>English / Scientific name Kardiac Glycosides</p>
<p>Symptoms Symptoms mostly involve the nervous system, although affected animals may also show signs of acute abdominal pain. These symptoms may also be features of other diseases. Sudden death, which may occur especially in young goats, is quite common in a large number of diseases other than plant poisoning. Furthermore, certain infectious diseases, like chronic pulpy kidney may give rise to similar nervous symptoms.</p>	<p>Cause “Krimpsiekte” is caused by poisoning by toxic plants that the animals have eaten. It occurs mainly in the Little Karoo and southern fringes of the Great Karoo in South Africa, particularly during periods of drought. Nenta also known as Kandelaarsbos, is a frequent cause.</p>
<p>Prevention Transferring stock to camps free of Nenta/Kandelaarsbos Follow a system of rotational grazing management. Providing supplementary feed during droughts will ensure that the animals consume less toxic plants. Eradication of the plants may be undertaken, but is expensive and time-consuming</p>	<p>Treatment Rest and shade Supportive rumen treatment by dosing with Rumix Dosing with a homemade recipe of vinegar, brown sugar and yeast may have some limited value Providing Hypo in drinking water</p>

<http://www.angoras.co.za/page/krimpsiekte>

<p>Name (Afrikaans) Bloutong</p>	<p>English / Scientific name Blue-tongue Virus</p>
<p>Symptoms In affected animals, swelling of the head and the lips might occur. The tongue of the animal appears blue The eyes will be closed, because they are sensitive to the sun Affected animals do not want to walk, because their feet are sore. Sometimes they can die suddenly</p>	<p>Cause Is caused by a virus It occurs when sheep graze near water when there are lots of midges It is spread by these small biting insects, and is therefore more common in late spring.</p>
<p>Prevention Any needles and surgical equipment used with animals suspected of having blue tongue should be considered contaminated and disposed of properly Implement insect control and prevention measures to reduce the spread of disease by the vector. This may include moving animals into barns during the vector's peak activity time (dusk until dawn). Keep sheep away from wet areas</p>	<p>Treatment No satisfactory medical treatment has been found. Animals should therefore be inoculated with the three vaccines A, B and C at three-week intervals. Antibiotics can only prevent secondary infections and are used to salvage affected sheep.</p>

www.nda.agric.za/publications
(Noad and Roy 2009; NRC 2005; Willgert et al. 2011)

<p>Name (Afrikaans) Miltsiekte</p>	<p>English / Scientific name Anthrax</p>
<p>Symptoms Abdominal pain. Bloody diarrhea. Diarrhea. Fever. Mouth sores. Nausea and vomiting (the vomit may contain blood)</p>	<p>Cause Anthrax is caused by exposure to the spores of the bacteria Bacillus anthracis that become entrenched in the host body and produce lethal poisons. It is primarily a disease of grazing animals such as cattle, sheep, goats and horses. Pigs are more resistant, as are dogs and cats.</p>
<p>Prevention Wear gloves and protective clothing when handling sheep who are infected with Anthrax, because the disease can be transmitted to humans. Good livestock and abattoir control usually means that the disease is seldom seen.</p>	<p>Treatment SUPAVAX, can be used as a vaccine. Dosage: 2ml. per injection</p>
<p>Comment This disease must be reported to the State Vet If you have used SUPAVAX, DO NOT SLAUGHTER ANIMALS FOR HUMAN CONSUMPTION WITHIN 2 WEEKS OF VACCINATION.</p>	

<http://www.health24.com/Medical/Diseases/Anthrax-20120721>

<p>Name (Afrikaans) Blou eier</p>	<p>English / Scientific name Blue udder (Mastitis)</p>
<p>Symptoms The affected udder have a red or blue to black appearance. The udder will feel warm and painful The milk is watery and may contain clots The animal will become very sick and die</p>	<p>Cause The ewes usually develop the infection as a result of the lambs introducing the pasteurilla bacteria into the teat canal during suckling. The mastitis can be very severe, causing gangrene of the udder and the ewes may even die from the infection.</p>
<p>Prevention Washing the udder is hygienic and has a stimulating effect on milk flow, and can also help with the prevention of Mastitis.</p>	<p>Treatment Ensure that the udder is regularly emptied by suckling by the lamb or by milking. The vaccines available for sheep are polyvalent bacterins, which contain most of the strains that commonly cause disease. Anti-inflammatory injections You can also buy a vaccine from Onderstepoort called "BLUE UDDER" from your local agricultural supplier (e.g. KLK or Kaap Agri) Dosage = 2ml. injected subcutaneously</p>
<p>Comment If the udder is not treated immediately the ewe might die from severe pain.</p>	

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<p>Name (Afrikaans) Domsiekte</p>	<p>English / Scientific name Pregnancy toxemia</p>
<p>Symptoms Pregnant ewes losing weight before lambing Ewes stop eating during pregnancy</p>	<p>Cause Domsiekte is a disease of pregnant ewes occurring during the last few weeks of gestation, usually within a few days before lambing. The cause of the disease has long been a mystery, but it has been shown at Onderstepoort that if fat, heavily pregnant ewes are suddenly put on to a poor diet of dry hay they contract domsiekte within a few days.</p>
<p>Prevention Good feeding management</p>	<p>Treatment Speak to a local vet for advice. Treatment of advanced cases of pregnancy toxemia is frequently unrewarding.</p>

<http://www.dsae.co.za/#!/word/2047/domsiekte,%20n>

<p>Name (Afrikaans) Brandsiekte</p>	<p>English / Scientific name Sheep-scab</p>
<p>Symptoms Look for sheep biting themselves If you inspect the sheep carefully you may feel very small lumps on the skin. Left untreated, sheep can become very thin and weak, and eventually will die.</p>	<p>Cause Brandsiekte is caused by mites – very small parasites related to ticks. They occur in all provinces, spread easily and can be fatal. Sheep-scab is thus a controlled disease. Sheep-scab is more likely to occur in autumn and winter, and infection comes from other sheep that have scab. These infected sheep pass on the mites when introduced to your flock.</p>
<p>Prevention Good fences Good neighbourly communication Treat bought sheep before introducing them to your flock, or pastures. If you take sheep to an agricultural show, quarantine them on their return and treat them. If your sheep are scratching themselves, get the cause diagnosed Current legislation states that all stock should be treated/ dipped every year. This includes goats in areas where sheep are also farmed.</p>	<p>Treatment If you suspect the presence of sheep-scab, contact your local animal technician or state vet immediately. You should also tell your neighbours so that they can treat their own sheep.</p>
<p>Comment This disease must be reported to the State Vet.</p>	

<p>Name (Afrikaans) Lamsiekte</p>	<p>English / Scientific name Botulism</p>
<p>Symptoms Animals may be partially or totally paralysed. Often the tongue is outside the mouth because of paralysis. The animal will lie down, often with the head turned to the side. An affected animal will not have an abnormal temperature.</p>	<p>Cause It is caused by a very powerful toxin (poison) produced by a bacterium (very small organism) called Clostridium botulinum. The bacteria produce the poison in rotting carcasses, as well as in moldy silage and hay. The poison is formed in the carcasses of almost all kinds of animals, such as cattle, horses, sheep, chickens, hares, rats and tortoises. The poison spreads in the flesh and bones of the carcasses and can remain in the bones for years.</p>
<p>Prevention Burn or bury all carcasses, bones or rotting material. In dry months give the animals a supplement containing phosphate and calcium. Buy this at a store or cooperative. This will stop them eating old bones and contaminated matter. Vaccinate your animals. Ask the nearest state vet about vaccination</p>	<p>Treatment There is a vaccine available called SUPAVAX which you can find at your local KLK. dosage = 2 ML subcutaneously</p>
<p>Comment Do not slaughter animals for human consumption within 2 weeks of vaccination.</p>	

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http://www.msd-animal-health.co.za/binaries/OTC_ProductGuide_LR_tcm57-176952.pdf

<p>Name (Afrikaans) Bloednier</p>	<p>English / Scientific name Pulpy Kidney - Enterotoxaemia</p>
<p>Symptoms Sudden deaths of sheep that are in good condition</p>	<p>Cause Pulpy kidney is a disease of sheep and goats caused by the bacterium <i>C.perfringens</i> type D. When sheep are exposed to a sudden improvement in their diet, the bacteria multiplies and produces a large amount of toxins. The toxins are absorbed into the bloodstream and causes acute death if the animal is not immune. Lambs are not susceptible to the disease in the first month of life.</p>
<p>Prevention A variety of vaccines are available on the market for the prevention of pulpy kidney. Some of them are in combination with other clostridia, such as tetanus, quarter-evil and swollen head. Lambs should be inoculated when they are 2-3 months old, as they do not respond to the vaccination before that age.</p>	<p>Treatment There is no antidote or specific treatment for sheep affected by pulpy kidney. A veterinarian may prescribe treatment for valuable animals but the prognosis for affected animals is poor. There is a vaccine on the market called MULTICLOS, The dosage prescribed is 3ml. injected subcutaneously.</p>
<p>Comment Animals should not be slaughtered for human consumption within 3 weeks of vaccination</p>	

http://www.msd-animal-health.co.za/binaries/OTC_ProductGuide_LR_tcm57-176952.pdf

<https://www.agric.wa.gov.au/livestock-biosecurity/pulpy-kidney-enterotoxaemia-sheep>

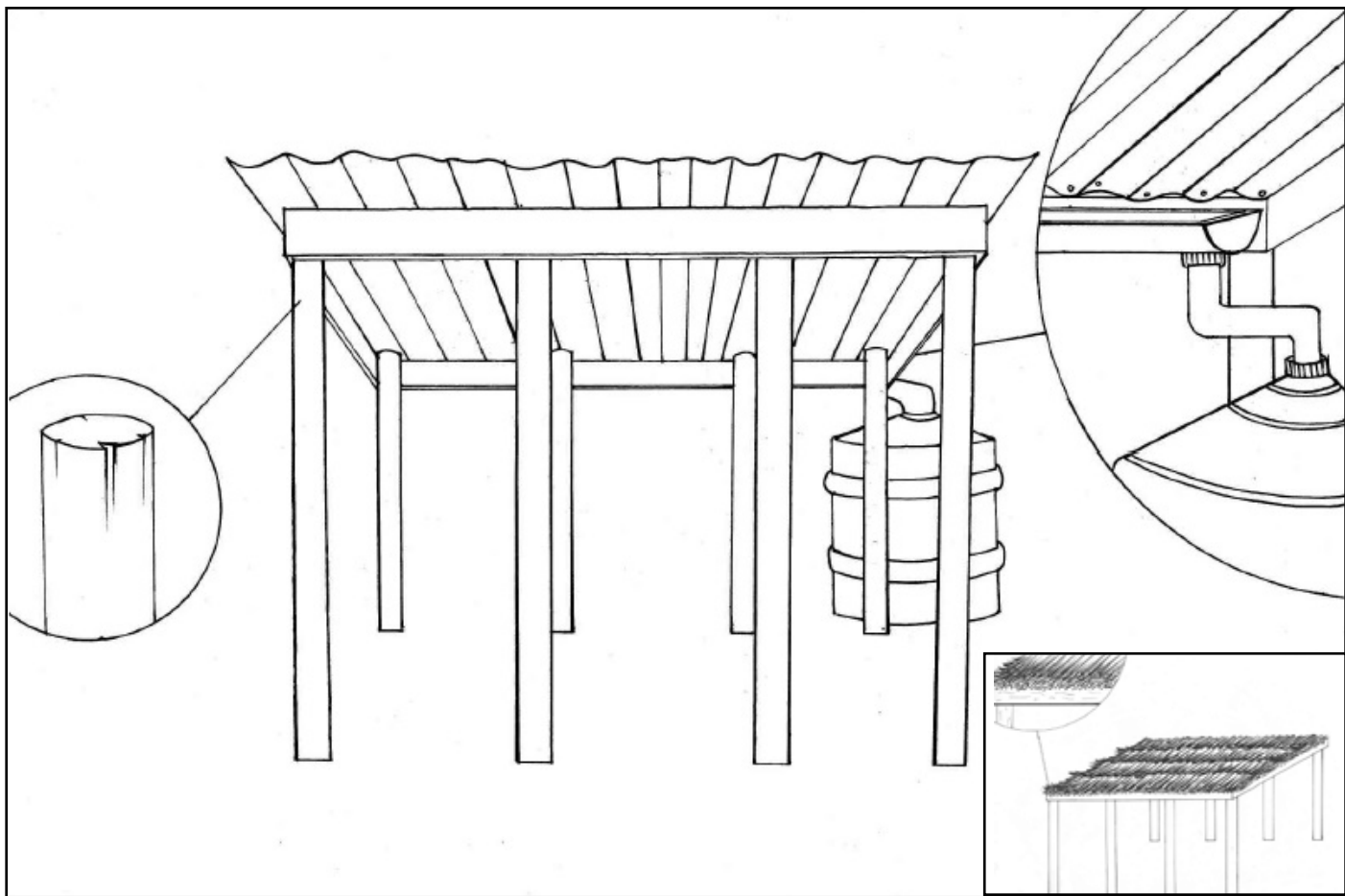
<p>Name (Afrikaans) Klem-in-die-kaak</p>	<p>English / Scientific name Tetanus</p>
<p>Symptoms Paralysed and stiff animals. Muscle tremors are observed. The animal usually dies within 3 to 4 days.</p>	<p>Cause Tetanus is caused by a bacterium. It is most likely to occur with poor management such as not disinfecting wounds and poor hygiene when performing castration or tail docking.</p>
<p>Prevention Prevention is by vaccination. Management is also important, which includes good hygiene, disinfection of wounds and treatment of wounds with wound powder and antibiotics.</p>	<p>Treatment You can vaccinate your sheep with MULTIVAX-P PLUS that you can buy from your local agricultural supplier (e.g. KLK or Kaap Agri). The dosage for sheep of all ages is 2ml per injection</p>

www.nda.agric.za/publications

http://www.msd-animal-health.co.za/binaries/OTC_ProductGuide_LR_tcm57-176952.pdf

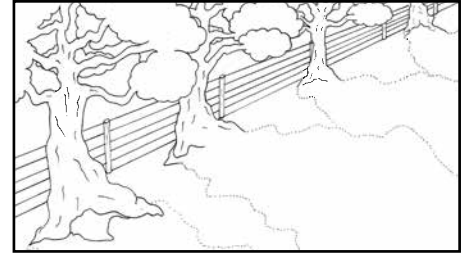
<p>Name (Afrikaans) Peestersiekte</p>	<p>English / Scientific name Pizzle rot</p>
<p>Symptoms Symptoms in rams are inflammation of the penis and sheath. This varies from small pustules and wounds on the penis to a penis that is considerably swollen and bleeds, and from which pieces of tissue fall off.</p> <p>The penis is also caked with puss. The condition is at its worst during the mating season. The penis then often hangs out. It is so sore that the ram cannot service.</p>	<p>Cause This is a contagious disease. The germ that causes pizzle rot is unknown, as is the exact way in which it is transmitted. The condition occurs mainly during the mating season. It is transmitted from ram to ewe to ram but has also been observed in young rams that have never been with a ewe. Deficiency diseases, poor nutrition and too high an intake of protein seem to aggravate the condition</p>
<p>Prevention Deficiency diseases lower resistance, and should be eliminated by proper feeding and provision of supplements. A shortage of zinc is associated with the condition. Rams should not be overfed during the mating season. All rams should be checked before the mating season and any with sores or wounds on the penis should be removed from the flock.</p>	<p>Treatment With the ram in a sitting position, the penis is pulled out and sprayed with an antibiotic aerosol. A long-term antibiotic is administered and the ram is isolated for three weeks. One treatment is sufficient. Further handling of the penis can aggravate the condition.</p>

<http://www.farmersweekly.co.za/article.aspx?id=76967&h=Dealing-with-pizzle-rot>



Adaptation options can include shelter for sheep that also allows for collection of rain water

Adaptation Options



The winter rainfall areas in South Africa have always been affected by periods of drought, heat waves, floods and other extreme weather events. Under the current conditions of global warming, the impacts of these cyclical weather events are likely to become more severe. Livestock farmers will have to protect their sheep from unprecedented events such as extreme winter storms, destructive summer thunderstorms, extreme summer heat and more severe droughts. For each farmer, and each specific farm, the optimal adaptation options will vary.

It is important to examine the following to determine possible adaptation options for your livestock farming activities:

- What sorts of changes in the weather have I experienced in the past years?
- What have the impacts been on my farm, the veld and the sheep?
- What do I expect will happen in future? And what impacts will probably occur?
- Do I have adequate access to information about the expected weather? If not, where can I get more information from?
- How can I protect my veld and my livestock against the impacts of these future weather events?

Weather monitoring can support your farming decisions, and allow you to move your livestock to areas that are less affected by extreme weather (e.g. to areas that provide shelter in extreme cold and to higher lying areas during extreme heat.)



Monitoring climate conditions and record keeping can support long term planning on your farm

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