

Final Draft Sheep General Information Manual

Directorate Genetic Resources

Sub Directorate Farm Animal Genetic Resources

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1. Conservation of farm animal genetic resources

Farm animal genetic resources (FAnGR) refer to genetic materials from farm animals (e.g. cattle, sheep, goats and poultry, etc.) that are or may be used for breeding purposes, for production of food and agriculture. These materials contain functional units of heredity that include live animals, semen, oocytes, embryos, tissues, somatic cells and DNA. FAnGR include indigenous, locally developed and exotic breeds of farm animals. However, more focus in this document will be on indigenous farm animals, particularly indigenous sheep. The reason why indigenous farm animal genetic resources are important:

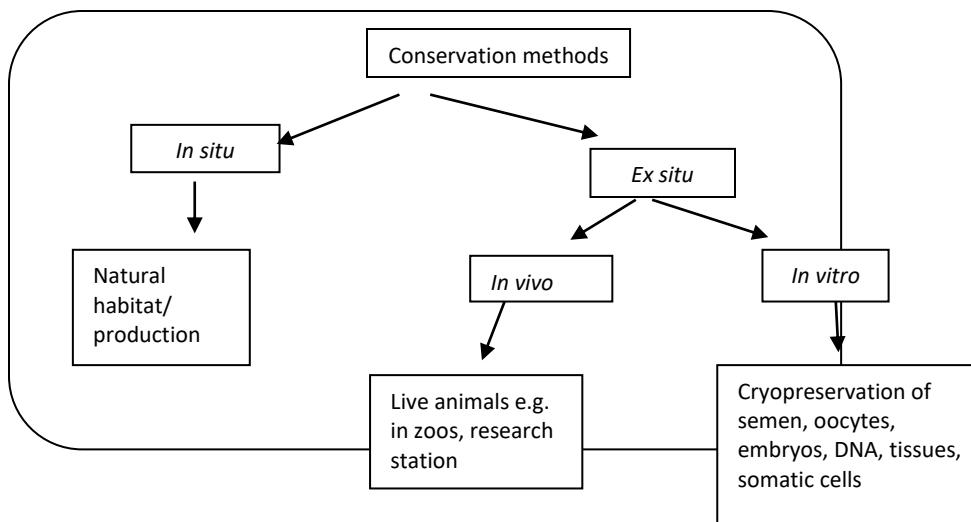
- ✓ They carry genes that enable them to adapt/tolerate harsh environments
- ✓ Can cope with thorny vegetation in drought-prone areas
- ✓ Can walk long distances,
- ✓ They are tolerant and/or resilient to diseases and parasites

However, over the years, high output producing exotic breeds received more attention than the local and adapted breeds. Due to climate change, the arid and semi-arid regions are reported to be severely affected by drought and under such conditions, indigenous animals have a competitive advantage over the exotic animals.

1.1 What is conservation of FAnGR?

It refers to action undertaken to ensure that the diversity of farm animal genetic material is maintained for contribution to food production, agricultural production and productivity through planning, strategies and policies for future purposes. Effective conservation of genetic resources is possible only if the breeds are identified and documented adequately, and there is a full participation towards conservation efforts by communities keeping the animals. There are two methods to conserve FAnGR and they are *in situ* and *ex situ* conservation methods.

The figure below summarises the two ways of conserving FAnGR



1.2 Reasons for conserving FAnGR

Reasons for conserving FAnGR as indicated in literature, vary between situations, agro-ecosystems, farming system, species, breeds, etc. and as a result, reasons for conservation include, but are not limited to the following:

- To meet present socio-economic demand (FAnGR are a source of income for poor rural communities, losing them will be detrimental to their livelihoods).
- Insurance against future changes in production circumstances.
- For cultural and historical reasons (Cultural and historical values of most communities are reflected by the type of breeds they keep, therefore, conserving them is necessary to maintain their identity.)
- Opportunities to meet future demands.
- Regenerating population after disease outbreaks.
- Rescuing rare or endangered species or breeds.
- Providing a source of genetic material for research purposes.
- Supplying germplasm for the development of new breeds.
- Maintaining indigenous livestock gene pool diversity
- To fulfil the rights of an existing genetic resource to continue to exist.

2. Sustainable use of FAnGR

2.1 What is sustainable use?

It is described as the use of the biological diversity resources in a manner and at a level that does not contribute to the long-term decline of biological diversity, thereby preserving its ability to meet the necessities and expectations of current and future generations.

- Sustainable use of FAnGR for agriculture and food production is proposed as the best strategy for maintaining their diversity.
- Achievement of sustainable use would continue to support livelihoods and minimize the long-term risk for survival of animal populations.
- The concept of sustainable use has economic, environmental and socio-cultural dimensions.
- Sustainable use of FAnGR also contributes to food security, rural development, increasing employment opportunities and improving standards of living of keepers of breeds.
- Supporting the rearing of breeds through better infrastructure, services, animal health care, marketing opportunities and other interventions would make a significant contribution to the sustainable use of FAnGR.
- Sustainable use foresees the use and improvement of breeds that possess high levels of adaptive fitness to the prevailing environment.

- It also encompasses the deployment of sound genetic principles for sustainable development of the breeds and the sustainable intensification of the production systems themselves.
- Sustainable use and genetic improvement rely on access to a wide pool of genetic resources.

3. General management of sheep

There are different types of sheep breeds in South Africa ranging from the indigenous, locally developed and to the recognised exotic sheep breeds. Sheep in South Africa are found in intensive, semi-intensive and extensive production systems. It is very important to farm with an appropriate breed type that is well-adapted to the local production environment and production system. Below are some of the sheep breed pictures for differentiation.

Indigenous sheep breeds



Damara: Adapted from www.damarasheep.co.za. For more information, contact Damara sheep Breeders' Society of SA.



Bapedi: Adapted from Mara Research Station. For more information, contact Bapedi Sheep Breeders' Society of SA.



Zulu: Adapted from Nongoma, KwaZulu Natal province



Namaqua Afrikaner: Adapted from www.gadi.agric.za.



Blinkhaar Ronderib Afrikaner: Adapted from www.gadi.agric.za.





Dorper: Adapted from www.dorpersa.co.za.
For more information, contact Dorper Breeders' Society of SA.



Meatmaster: Adapted from www.meatmastersa.co.za. For information, contact the Meatmaster Breeders' Society of SA.



Persian: Adapted from www.persiansheep.com. For more information, contact the Blackhead Persian Sheep Breeders' Society of SA.



Van Rooy: Adapted from www.vanrooyisa.co.za. For more information, contact Van Rooy sheep Breeders' Society of SA.



Afrino: Adapted from www.afrino.org.za. For more information, contact Afrino Breeders' Society of SA.



SA Mutton Merino: Adapted from www.gadi.agric.za. For more information, contact SA Mutton Merino Breeders' Society of SA.



Dohne Merino: Adapted from www.geneco.co.za ; Adapted from www.gadi.agric.za . For more information, contact Dohne Merino Breeders' Society of SA.



Dormer: Adapted from www.dormersa.com.
For more information, contact Dormer
Breeders's Society of SA.

SA Merino: Adapted from www.merinosaco.za.
For more information, contact the Merino SA.

3.1 Housing

Sheep like goats, require good housing that will protect them from harsh environmental conditions and predations. In addition, the house should have sufficient ventilation and hygiene, as well as the potential for improved feeding and breeding. Poor shelter, such as open kraals made of thorny branches or unsanitary kraals, causes disease outbreaks during wet seasons, leading to lamb losses. Furthermore, poor housing conditions such as dampness, lack of protection from the elements (e.g., cold, strong winds) and poor ventilation lead to the death of lambs due to cold stress.

All sheep must have enough floor space to lie down in a natural resting position at the same time, change their posture, turn around, and move freely around the kraal; and seek shelter, food, and water, as well as a suitable place to rest and ruminate without interruption from other sheep. The space needed varies depending on the sheep's size, the atmosphere, ventilation, and floor specifications. An example of the required space per animal in different stages is presented in Table 1 and examples of shelters are also provided.

Table 1 Required space per animal in different stages

Open front shed floor area m2 /head	
Pregnant ewe	1.4
Ewe and lamb(s)	1.5
Ram	1.0
Dry ewe	0.93
Lambs in groups	0.4

Source. www.sciencedirect.com

Examples of shelters



Carport shelter:
www.sheep101.info.



Front open shelter:
www.pinterest.com.

As indicated above, the housing should be well ventilated, provide shelter, well drained, free from sharp objects which might injure both sheep and the handlers. The housing checklist in Table 2 should be used to evaluate the sheep housing.

Table 2 Housing checklist

CRITERIA	*SCORE
Overcrowding co-efficient (area of the house' floor will be measured by tape first)	
Adequate shelter from prevailing wind and draughts	
Adequate overhead shelter from sun and rain	
Adequate ventilation for adults and lambs	
Adequate drainage	
Security against stock theft and predators	
Easy to manage, repair and clean	
Maternal behavior considered in design	
Adequate hygiene and regular cleaning of faeces	
Feed and water easily accessible to adults and lambs	

*Qualitative Score 1= very poor to 5=excellent. Adapted from Sebei (2005: 37).

3.2 Animal identification and record keeping

3.2.1 Animal identification

There are several methods of identifying animals such as ear tagging, ear notching and tattooing. However, the legally recognised method of animal identification is registered tattooing for sheep and other livestock species such as goats, pigs etc.; and brand marking for cattle. It is compulsory for livestock owners in South Africa to mark all cattle, sheep, goats and pigs with a mark allocated by the Registrar of Animal Identification, as stipulated in the Animal Identification Act No. 6 of 2002. Each livestock owner must apply for an identification mark from the Registrar of Animal Identification at the Department of Agriculture, Land Reform and Rural Development and be provided with a unique identification mark. The mark will be the one that the owner/farmer uses when tattooing (see contact details of Registrar of Animal Identification in Annexure).

Tattooing is a marking technique in which a permanent mark is placed in an unobtrusive area such as on the ear of an animal. Tattooing is considered to be the safest and lawful way of identifying sheep especially when sheep are lost or stolen and are found. Sheep with white faces and ears are the ideal candidates for tattoos. Many with darker pigmentation in their ears will have their back flank tattooed. The tail surface of a sheep without or very small ears may be tattooed.

Sites for tattooing

Tattoo on ear

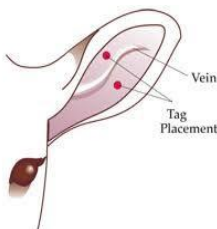
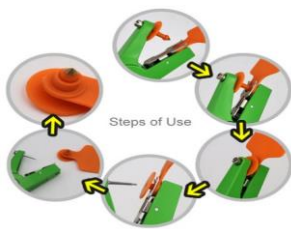


Tattoo on flank



Adapted from (van Zyl et al. 2015)

Ear tagging



Adapted from www.premier1supplies.com

Animal identification is useful for traceability, record keeping and prevention of stock theft.

3.2.2 Record keeping

Sheep production requires meticulous record-keeping. Keeping track of performance helps determine which lambs are replacements, which ewes should be retained or culled, and which rams produce the best lambs. Individual animal identification is the first step in maintaining records. Examples of records are presented in Table 3.

Table 3 Examples of basic records

Lamb record										
Lamb ID	sex	Date of birth	Doe ID	Buck ID	Birth type	Birth weight	Date of weaning	Weaning weight	Date of death	Any observed causes/symptoms of disease
Health record										
Animal ID	Date	Clinical signs	Diagnosis	Treatment plan	Duration of treatment	Dosage/Route of administration	Animal recovered (Yes or No)			
Doe and buck record										
Doe ID	Doe Date of death	Any observed causes/symptoms of disease			Buck ID	Buck Date of death	Any observed causes/symptoms of disease			
Cull record										
Animal ID	Date culled	Breed	Age	Sex	Reason for culling	Method of disposal				
Animal sale										
Animal ID	Breed	Sex	Value of lamb	Sold price	Date of sale	Buyer				

Source: DALRRD, CBCG Goat Training Manual, 2016

3.3. Feeds and Nutrition

Sheep require nutrients to maintain their body, growth, reproduction, lactation, and health, etc. Native grasses supported grazing animals well before man began to domesticate livestock. However, natural grazing is prone to seasonal nutrients deficiencies. For example, during winter season, the energy and protein are reserved for regrowth and grasses are of poor quality, while during summer and late summer, there is phosphorus (This is generally low in SA's soil) and seasonal protein deficiencies, respectively. Failure to meet nutrient requirements through grazing are corrected by supplementing deficient nutrients from other sources of feed. Supplements can be in powder form, often called licks, meal (such as HPC) or blocks. Complete ready-mix supplements are commercially available.

Newborn lambs ought to receive adequate colostrum within the first 12 to 18 hours but no later than 24 hours after birth. Colostrum is the milk produced by the ewe for up to 24 hours after birth. It has important nutritional value for the newborn lamb. Colostrum comprises essential antibodies that protect the newborn lambs from diseases and provides newborn lambs with energy to maintain the body temperature particularly when the lambs are born during cold season.

Water is also important part of animal nutrition. And clean and cool drinking water should be made available to animals at all times.

NB: Animal Nutritionist and Agricultural Advisors/ Extension Officers specialising in feeds and nutrition must be consulted at all times.

3.4 Breeding and selection

Breeding is the purposeful mating of male and female animals to improve certain characteristics in the progeny and it must be goal-driven. Breeding is done by pure breeding or crossbreeding.

Selection is the process whereby certain individuals are chosen for use as breeding animals for a certain period. Selection is an important decision that a farmer takes, because the effect of selected animals remains in the herd or flock for many years. Animals are selected from the new lamb crop for breeding purpose. Selection is done through:

- Natural selection – adaptation and survival
- Artificial selection – by man
 - ✓ Visual appraisal/appearance
 - ✓ Pedigree recorded information
 - ✓ Performance recorded information
 - ✓ Combination of the above

3.4.1 Breeding objectives and selection criteria

Before planning any breeding programme, breeding objectives have to be defined. Breeding objectives refers to decisions as to which traits the livestock keeper wants to improve, maintain or introduce in their herds or flocks. The breeding objectives are achieved through selection criteria. The selection criteria refer to the traits actually used in the selection of an animal. The traits of greatest economic importance must be identified. Most of these traits are heritable i.e. can be transferred from one generation to other during breeding.

Table 2 Examples of breeding objectives and selection criteria

Breeding objectives	Wool production	Meat production	Reproductive rate
Selection criteria	Grease fleece weight Clean fleece weight Fiber diameter Staple length Fleece grade	Weaning weight Yearling weight 18 months' weight Growth rate	Scrotum circumference Age at puberty Age at first lambing Lambing interval Lamb survival Lamb weaned

3.4.2 Selection of breeding ram

Rams contribute more to genetic improvement in a flock as one ram can serve a number of ewes in the flock. Selection of inferior breeding ram means increase in number of poor-quality animals. Ram can be selected at weaning (3 to 4 months of age) using weaning weight and also

using post-weaning growth evaluation at 6 to 8 months of age. The ram should be replaced in the flock every two years to prevent inbreeding and to make genetic improvements in the breeding stock. The following are examples of structural characteristics that are also looked at when selecting a ram:

- Masculinity
- Standard ram vocalization
- Uniform pair of testes and a fine sheath. Testes must also be palpated to feel for any lumps or bumps in the testes or epididymis
- Large scrotum circumference
- Healthy (he must be bright and vigilant, have good body conditions and not be suffering from any diseases or conditions)

3.4.3 Selection of breeding ewe

Selection of the replacement ewes is based on weaning weight and the development of the female (average daily gains). Further selection is done when the female is ready to breed. At this stage she must show signs of oestrus and become pregnant at first mating. The final selection is made after the female has weaned her first lamb. The following are examples of structural characteristics to be considered when selecting an ewe:

- She must be feminine
- Well structured udder with two functional teats
- Large body capacity and volume (associated with ability to breed, carry and rear kids and good milk production)

Images of structural characteristics



Bright and alert sheep



Mouth with broken teeth
(considered to be bad if the sheep is really old)

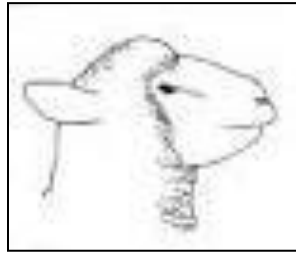


Mouth with no teeth
(considered to be bad if the sheep is really old)

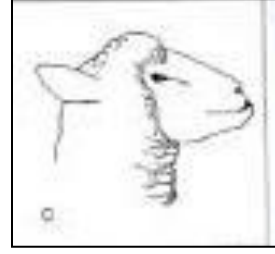
Adapted from
www.sheep101.info



Sound jaw: normal or ideal



Jaw defect: overshoot
"parrot-mouth"



Jaw defect: undershoot
"monkey mouth"

Adapted from www.slideserve.com



Sound structured udder

Well structured udder and teats

Adapted from www.sheep101.info; www.sheepimprovement.com; www.dormersa.com;
www.iledefrance.co.za



Masculine ram with uniform pair of testes in the scrotal sac



Ram with uniform pair of testes in the scrotal sac



Well structured feminine sheep

Adapted from www.dorpersa.co.za; www.iledefrance.co.za; www.sheepinfo.101

3.4.4 Selection through pedigree and performance recorded information

Any sheep farmer should keep pedigree and performance record of his or her animals. The first thing that is needed is animal identification (see 3.2.1). Performance recording allows for animals to be performance tested. Performance testing leads to more accurate selection of superior breeding stock. In South Africa, for example there is the National Small Stock Improvement Scheme that is run by the Agricultural Research Council- Animal Production Institute.

- For basic records refer to record keeping in 3.2.2

3.5.5 Culling of animals

This is the removal of animals from a breeding flock. Organized data collection and record keeping (refer to 3.3.2) are required and individual animals must be identified. Animals are culled due to several/general reasons. These reasons include:

- ✓ Low production or reproduction levels
- ✓ Unproductive animals
- ✓ Genetic defects (e.g. inverted eyelids ("turning in" of the margin of the eyelid) and cryptorchidism (one or both testicles retained in the abdomen).
- ✓ Pre-disposition to disease
- ✓ Physical problems (e.g. poor udder structure, undershot" or "overshot" jaws)
- ✓ Disease – decrease the amount of sub-clinical diseases and chronically ill animals
- ✓ Age – old, thin animals that no longer eat well

3.4.6 Breeding season

In general, the sheep production system in communal area is of free range nature and level of management is low. Mating occurs throughout the year. However, the uncontrolled breeding season results in lamb dropping throughout the year, makes management, recording and strategic feeding of ewe's impossible or difficult and it also means that a farmer needs to keep the ram in good condition all year round. The controlled breeding season is often practiced in areas for examples with adequate facilities and grazing camps [on-station (e.g. Mara Research Station); Research farm (e.g. Agricultural Research Council-Irene) and private and government farms. For example, the sheep and goat breeding season in Mara Research Station is in winter (June/July) with the lambing/kidding season coinciding with the rainy and grass growing seasons in November/December.

3.4.7 Castration of male lamb

Castration is part/one of the artificial selection methods. It is the removal or destruction of the testes, epididymis and a portion of each spermatic cord from a male. Castration is ideally done at less than three weeks of age.

Some of the importance of castrating male lamb:

- To maintain and control breeding
- To successfully carry out breed improvement
- To improve temperament because a castrated ram is usually less aggressive and easier to manage.
- For improvement of carcass composition and weight development.

Male lambs are castrated using:



Rubber ring and elastator:
www.sheep101.info



Knife:www.bainbridgevet.com.au



Burdizzo/ emasculator:
www.amazon.com

Note: It is important to let an experienced animal health practitioner show you how to do castration correctly before you do it yourself (see contact details of animal health practitioner in Annexure, however we are aware that there are animal health practitioners based at Provincial Departments of Agriculture). Incorrect castration can lead to welfare issues, infection and even the death of the animal.

3.5 Sheep health management

3.5.1 Common problems or diseases

There are a number of common problems and diseases that affect sheep. Common problems and diseases are listed in Table 3 and 4 but are not limited to those listed in the tables. This implies that this section does not cover all diseases and problems affecting sheep.

Table 3 Common diseases affecting sheep

Common diseases	Symptoms	Prevention/control	Treatment
<p>Heartwater: This is a tickborne disease. The organisms that cause heartwater are called <i>Ehrlichia ruminantium</i>. The organisms are transmitted by Bont ticks, which are mainly found in hot, dry bush areas. Heartwater can result in death within 24 hours, but some cases survive two to five days.</p>	<p>High temperature and nervous signs which include 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. The dead animal's post mortem will show excessive fluid in the heart sac, lungs, chest cavity and abdominal cavity.</p>	<p>To prevent heartwater, use indigenous breeds that are used to the area. 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 sheep, dipping about once a month may be necessary. For vaccination, animal health practitioners must be consulted.</p>	<p>Consult an animal health practitioner to confirm if symptoms are due to heartwater.</p> <p>Treat the animal early before nervous symptoms show.</p> <p>Use oxytetracyclines products.</p>
Common diseases	Symptoms	Prevention/control	Treatment

<p>Pulpy kidney: (Enterotoxaemia) This disease is caused by bacteria that often exist within the animal's intestine but only causes disease symptoms under certain circumstances such as a change of grazing, exhaustion, sudden dietary changes and dosing with dewormers.</p>	<p>Symptoms are sudden and may include exhaustion, paralysis and a loss of consciousness, laboured breathing, salivation and diarrhoea, nervous symptoms with convulsions accompanied by salivation, grinding of teeth and muscle twitches, death. The carcass decomposes quickly and post mortem may show 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, decomposed and may contain large amounts of blood.</p>	<p>Effective vaccines are available. It is advisable to vaccinate at least 3 weeks before <i>deworming</i> animals</p>	<p>Treatment is usually too late due to the sudden appearance of symptoms and sudden death. Focus on prevention (vaccination).</p>
<p>Tetanus: This is a fatal disease that occurs as a result of a wound becoming infected by bacterium, <i>Clostridium tetani</i>.</p>	<p>Stiffness, paralysis (muscle spasms, falls down and lies on its side with its legs stretched out stiffly and head bent backwards), third eyelid prolapsed across the eye, death.</p>	<p>Proper wound management is vital. Use of vaccine as prevention. Animal health practitioner consultation is very necessary to properly manage wounds and to ensure that male sheep are being castrated correctly.</p>	<p>Treatment is seldom successful once clinical signs are seen. Focus on prevention (vaccination).</p>
<p>Blue tongue: This disease is caused by a virus that is transmitted by midges, which are mostly found in warm and wet conditions</p>	<p>Fever and/or high temperature, tongue and gum ulcers, blue tongue; excessive salivation, and nasal discharge and swelling of lips, tongue, and jaw; inflammation of the coronary band (above the hoof) and lameness; weakness, diarrhoea, pneumonia.</p>	<p>Use of midge repellent, keeping animals indoors or on higher ground early in the morning and late in the afternoon to avoid midges. Vaccination is available - consult animal health practitioners.</p>	<p>Animals with blue tongue disease are more susceptible to pneumonia (the secondary pneumonia might require treatment. Use oxytetracyclines products only if indicated by an animal health practitioner. Bluetongue is a Notifiable animal disease and must be reported to either an animal health</p>

			technician or a state veterinarian.
Common diseases	Symptoms	Prevention/control	Treatment
Infectious pneumonia: This disease is caused by bacteria/ viruses and is likely to occur when animals are under stress and in dirty pens or kraals.	Fever, lack of appetite, difficulty breathing, coughing, loss of condition and discharge from the nose. The dead animal shows firm and/or red patchy lungs.	Keep pens or kraals clean Reduction of stress Vaccination for some agents is possible Consult with animal health practitioners.	Use of an appropriate antibiotic if required and anti-inflammatory products. Ideally consult with animal health practitioners before treating to help identify the cause.
Mastitis: It is a bacterial infection of the udder. The udder can be infected through poor hygiene or injuries to the udder/teats.	The udder is swollen, hard and hot to touch, producing either a brownish watery fluid or watery milk containing white or yellow clots or pus.	Hygiene is very important. Consult with animal health practitioners.	Use an appropriate antibiotic, by injection or through intra-mammary directly into the udder via teats. Consult with animal health practitioners to help identify the cause.
Coccidiosis: This disease mainly affects young animals (lambs). It is caused by an organism known as coccidia. Older animals do become infected. However, due to developed immunity, clinical signs do not show. Older animals are normally the source of infection for the younger animals as they are carriers of the diseases. It attacks and destroys the mucus of the intestine which leads to animals having diarrhoea and an inflamed intestinal lining.	Short period of diarrhoea and then animals quickly dying. 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. The post mortem of a dead animal may show tiny, greyish white spots in the mucous membrane of the small intestine. Guts filled with fluid and blood.	Avoid overcrowding, dirty and/or wet pens, kraals and unclean water and contaminated feeds. Coccidiostats such as Rumensin can be fed as indicated Consult with animal health practitioners.	Where there are outbreaks, treat all females and kids with a remedy for coccidiosis. Keep the animals hydrated. Consult with animal health practitioners - Can be treated with antibiotics or ionophores.

Note: It is important to read the product label for dosage and instructions before administering any medication, wear protective clothing when handling animals (e.g. during treatment or vaccination) and disinfect equipment that is reusable. For prevention and treatment of diseases and conditions always consult animal health technicians and veterinarians.

Controlled animal diseases in sheep:

- Any disease that is not known to occur in South Africa (e.g. Peste de Pestis Ruminants, Contagious Caprine Pleuropneumonia)
- Anthrax (zoonotic)
- Brucellosis (zoonotic)
- Foot and Mouth Disease
- Johne’s Disease
- Rabies (zoonotic)
- Rinderpest
- Tuberculosis (zoonotic)
- Sheep scab
- Skin conditions in sheep
- Bluetongue (notifiable, not controlled)
- Rift Valley Fever (notifiable, not controlled, zoonotic)
- **If any of the above conditions are suspected or confirmed, it must be reported to the local Animal Health Technician or State Veterinarian.**
- **For more information on these diseases, please visit**

<https://www.dalrrd.gov.za/Branches/Agricultural-Production-Health-Food-Safety/Animal-Health/information/pamphlets/pamphlet-main>.

Table 4 Common problems and /or conditions affecting sheep

Common problems/conditions	Symptoms	Prevention	Treatment
<p>Abortion: This is the result of a disturbance in the functioning of afterbirth (placenta) or birth of the foetus before the expected normal lambing time. This can most frequently be caused by infections (e.g. enzootic abortion or Chlamydia, brucellosis) or non-infections (e.g. starvation or malnutrition).</p>	<p>Abnormal foetus or normal foetus delivered preterm (dead).</p>	<p>Enzootic abortion: vaccination is possible.</p> <p>Starvation or malnutrition: adequate nutrition is important in avoiding unnecessary stress such as transporting heavily pregnant does. Genetic abnormalities, endocrine disturbances or chronic infection: culling is recommended</p> <p>NB: if possible, take the aborted foetus and blood samples from sheep to an animal health practitioner or veterinary laboratory as soon as possible to identify</p>	<p>Enzootic abortion: treatment is not practical and it is cost prohibitive.</p> <p>Brucellosis: It is a controlled animal disease and must be reported to either an animal health technician or a state veterinarian. It may infect humans as well (zoonotic disease).</p> <p>Rift Valley fever: It is a notifiable disease and must be reported to either an animal health technician or a state veterinarian. It may infect humans as well</p>

		the organism causing abortion. Clean your hands properly after handling aborted fetus and wear protective clothing all the time.	(zoonotic disease). Vaccines to prevent it are available.
<p>Scour or diarrhoea: This is a condition in which the droppings of animals usually become soft, watery and smelly. This condition can be a symptom of a disease. It can be caused by several factors which include but not limited to the following: coccidiosis, colibacillosis, worms, poisonous plants or sudden change of diet (high concentrates or low roughage diet).</p>	<p>The droppings of animals usually become soft, watery and smelly which can be smooth and yellow or white, whitish with lumps of thin skin in it, red or brown diarrhoea (which may indicate blood in it).</p>	<p>Worms: regular treatment will prevent diarrhoea caused by worms.</p> <p>Diet: slow introduction of diet, avoid sudden changes, avoid poor quality or excessive concentrates. Coccidiosis can be treated or prevented with antibiotics or ionophores.</p> <p>Ewes and does can be vaccinated against colibacillosis to protect their lambs/kids.</p> <p>Consult your animal health practitioner to help determine the cause of the diarrhoea.</p>	<p>It is important to give sick animals sufficient water and electrolytes to prevent them from dying of dehydration (a mix of one spoon salt, 8 spoons sugar in one litre of clean, luke-warm water). Coccidiosis can be treated with antibiotics or ionophores.</p> <p>Colibacillosis can be treated with antibiotics.</p> <p>Only when there is blood in the diarrhoea, may you consider to inject with a long acting anti-biotic or give a dose of terramycin powder mixed with water. Consult your animal health practitioner regarding treatment.</p>
Common problems/conditions	Symptoms	Prevention	Treatment
<p>Abscess: This is a swelling due to accumulated pus inside the thick wall capsule. This is caused by bacteria entering the wound or injury caused by ticks, grass seeds or thorns.</p>	<p>Hot, red swelling and painful to touch.</p> <p>Middle soft spot and falling hair when swelling is at the bursting point.</p>	<p>Tick control.</p> <p>If an animal is affected badly and gets affected more often, culling is recommended.</p> <p>Corynebacterium may be vaccinated for. Note that this organism is very contagious and may cause abscesses to spread (through equipment and facilities) within a herd.</p>	<p>Cut, open and drain the abscess when it softens. Then syringe warm (boiled and cooled) water with a lot of salt init (1 tablespoon of salt in a cup of water) or iodine into the wound.</p> <p>Spray daily with a wound aerosol. The wound must be kept opened and it must be flushed daily with warm (boiled and cooled) salt water to remove pus. Clean and disinfect the syringe after each use. The sheep can also be injected with an antibiotic if it shows other signs of illness. Consult with your animal health practitioner</p> <p>NB: Bury or burn the material used to wipe the pus to</p>

			prevent the spread of infection to other animals and people.
<p>Orf: This is a painful skin condition caused by a virus which only grows in the surface layers of the skin, but the virus will only cause an infection if the skin is already damaged. This condition can affect humans if they handle infected animals without protecting themselves.</p>	<p>Wart-like sores on the animal's lips and nose and, especially around the mouth of lambs and on the teats of their mothers.</p>	<p>Affected sheep should be kept separate to prevent the spread of the disease. Vaccination of all lambs when the females have stopped lambing for the season.</p>	<p>Most orf infections clear up on their own. Lubricants such as petroleum oil and glycerine or paraffin oil can be used to soften the hard scabs to make it easier for the animals to eat and the use of topical antibiotic paints, powders or aerosols can help reduce the possibility of secondary bacterial infections.</p>
<p>Bloat: It is the condition in which gas becomes trapped in the rumen due to interference of gas release following fermentation in the rumen (or occurs when rumen gas production is higher than the rate of gas elimination). Bloat may occur when an animal grazes wet lush young pastures containing legumes or if grains (concentrates) are consumed or due to blockage of the oesophagus.</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 Make sure that the lucerne is dried well and without mould before being given to animals. Animals must be introduced very slowly to wet pastures containing legumes and grains and must be given large quantities of hay. Beware of wire or plastic lying around where animals graze.</p> <p>Consult you animal health practitioner.</p>	<p>If it is the blockage of oesophagus by feed, massage the neck, keep the animal in standing position and agitate the ruminal contents mildly.</p> <p>Drench: Make the sheep drink cooking oil (50 ml) or bloat guard. Be careful that the animal doesn't choke – dose small amounts slowly. Do not let it lie down. If it is down, get it back on its feet and make it walk around until it has belched.</p> <p>If the condition does not improve, pass a small diameter rubber tube down the throat (oesophagus) and into the stomach or In severe cases stab the bulging area with sharp pointed knife to let air escape - Consult you animal health practitioner.</p>
<p>Sheep-scab: Caused by mites (<i>Psoroptes ovis</i>) living in sheep's fleeces or hair.</p>	<p>Severe itching, wool or hair loss, and crustiness of the skin. Rubbing and scratching against fence posts, nibbling and biting at their fleeces.</p>	<p>Mites - control through dipping.</p> <p>New animals must first be dipped and quarantined.</p>	<p>Registered dips or Ivomec can be used.</p> <p>Sheep scab - It is a controlled animal disease and must be reported to either an animal health technician or a state veterinarian.</p>

Note: it is important to read the label for dosage and instructions before administering any medication, wear protective clothing when handling animals (e.g., During treatment or vaccination) and disinfect reusable

equipments. For prevention and treatment of diseases and conditions always consult animal health technicians and veterinarians.

NB: Prevention is better than cure is equally applicable in animal's diseases management. Through vaccination, improved hygiene, dosing, dipping and adequate nutrition most of these diseases can be prevented. You are advised to contact local Animal Health practitioner for prevalent diseases in your area so as to design disease management program.


3.5.2 Internal parasites

Internal parasites affect sheep mostly in warm, moist climates. The most common internal parasites in sheep are stomach worms/roundworms (*Haemonchus contortus*, commonly called barber pole worm); lung worms (*Dictyocaulus* spp. or *Muellerius capillaris*); liver flukes (*Fasciola hepatica*); tape worms, and intestinal parasites, the most common of which are coccidia (*Eimeria* or *Isospora*).


Control and treatment of internal parasites


- Use of FAMACHA chart

FAMACHA© System




Look inside eyelid





Clinical Category	Eye Lid Color	Packed Cell Volume/PCV	Treatment recommendation
1	Red	≥ 28	No
2	Red-Pink	23-27	No
3	Pink	18-22	?
4	Pink-White	13-17	Yes
5	White	≤ 12	Yes

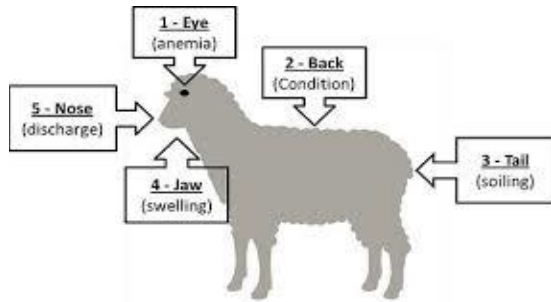


Adapted from www.sheepandgoat.com

The FAMACHA chart system can be used very effectively to select individual animals for treatment of haemonchosis. It is based on assessing the level of anaemia.

- Use of five-point check system

It is for targeted selective treatment of internal parasites and for expanding the utility of the FAMACHA© system.



Adapted from www.extension.tennessee.edu

Check point	Observation	Possibilities
1. EYE	Anaemia 1-5 (FAMACHA® card)	Barber pole worm (<i>haemonchus</i>), Liver fluke, Hook worms, Other worms and causes
2. BACK	Body condition score 1-5 (BCS card)	Brown stomach worm (<i>Teladorsagia</i>), Bankrupt worm (<i>trichostrongylus</i>), Nodular worm, Other worms and causes
3. TAIL	Faecal soiling 1-5 (Dag score card)	Brown stomach worm (<i>Teladorsagia</i>), Bankrupt worm (<i>trichostrongylus</i>), Coccidia (<i>Elmeria</i>), Nodular worm (<i>oesophagostonum</i>), Other worms and causes
4. JAW	Soft swelling "Bottle jaw" 1-5	Barber pole worm (<i>haemonchus</i>), Coccidia (<i>Elmeria</i>), Liver fluke, Hook worms, Other worms and causes
5. NOSE	Discharge 1-5	Nasal botfly, Lungworms, Pneumonia, Other causes
5. COAT	Coat condition 1-3	Barber pole worm (<i>haemonchus</i>), Brown stomach worm (<i>Teladorsagia</i>), Bankrupt worm (<i>trichostrongylus</i>), Coccidia (<i>Elmeria</i>), External parasite, Other causes

Adapted from www.sheepandgoat.com

- Faecal egg count (FEC) can also be used to monitor internal parasites infestation which helps in determining whether the sheep need deworming or not.
- Use of worm remedies
 - ✓ Several remedies are available commercially for the treatment of internal parasites.
 - ✓ It is advisable to use worm remedies that treat more than one type of internal parasites to save money.
 - ✓ Animal health technicians and/or veterinarians must be consulted all the time.
- Good management
 - ✓ Keep your animals in good condition by giving them good quality feeds (it is important to consultant animal nutritionist).

- ✓ Genetic selection of sheep that are resistant or resilient to internal parasites is very important.
- ✓ Animals that are persistently affected by parasites should be culled.
- ✓ Contaminated feeds should be avoided and good sheep housing can prevent that.
- ✓ Avoid grazing/pasturing in damp areas and during early morning and evening hours, when there is dew on the pasture.

3.5.3 External parasites

The warm and/or hot, moist climates favour the proliferation of external parasites that affect sheep. The most common external parasites affecting sheep are ticks and mange. Other external parasites include fleas, lice and nasal bot. For control of ticks, mange (mites), lice and fleas, dip, injectables and powder products are available commercially. Lice infected animals should be separated to prevent the spreading to other sheep. For nasal bot, the secondary infections must be treated with long-acting antibiotics products. The products approved for use to treat nose bots and kill all larval stages should be used. Animal health technicians and veterinarians must be consulted all the time.

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Annexure 1

Directorate	Responsible Official/s	Address	Contacts Details
Animal Registrar of Identification	Registrar	Delphen building, Corner Annie Botha Avenue and Union street, Riviera, Pretoria	Tel: (012) 319 6000 Fax: (012) 319 7551 Email: AnimalId@dalrrd.gov.za .
DALRRD, Directorate Animal Health: Disease Control	Marietta Bronkhorst	Delphen building, Corner Annie Botha Avenue and Union street, Riviera, Pretoria	Tel: (012) 319 7481 Fax (012) 329 0499 / 329 6892 Email: MariettaB@dalrrd.gov.za
DALRRD, Directorate Genetic Resources: Farm Animal Genetic Resources	Noluthando Netnou-Nkoana Director: DGR	Harvest House Building, 30 Hamilton street, Arcadia, Pretoria	Tel: 012 319 6233 Fax: 012 319 6214 Email: NoluthandoN@dalrrd.gov.za .
	Tlou Chokoe Scientist Manager: FAnGR		Tel: 012 319 6233 Fax: 012 319 6298 Email: TlouC@dalrrd.gov.za .
	Tlou Matelele Scientist Production: FAnGR		Tel: 012 319 6366 Fax: 012 319 6298 Email: TlouMa@dalrrd.gov.za
	Tumudi Mphahlele Scientist Technician: FAnGR		Tel: (012) 319 6462 Fax: 012 319 6298 Email: TumudiM@dalrrd.gov.za .