

Best practice reference manual for wool sheep farming in South Africa





FOREWORD

In a world where consumers increasingly value products that are natural, produced with social responsibility and with environmentally friendly production standards it becomes important that the meaning of these concepts are understood. For the producer it is important to understand the meaning of words like 'organic', 'animal friendly', 'environmentally friendly' and 'social responsibility' in practice. What is acceptable and what is not. For the consumer it is important that there is a responsible 'watchdog' organisation that sets the necessary guidelines and monitors their application. For the processors and marketers this 'image of the industry' is essential to any promotion that focusses on new consumer values. This document paves the way. More so it is an combined effort by prominent role-players in the industry. It can therefore be expected that it will develop into a responsible instrument forming the basis for the further development of the sheep and wool industry.

A handwritten signature in blue ink, which appears to read 'Almero de Lange', with a horizontal line underneath.

Almero de Lange
Chairman: Wool Forum of South Africa

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1 INTRODUCTION

The National Woolgrowers Association of South Africa adopted a resolution during the 2007 congress requesting the development of a Code of Best Practice to benchmark quality raw wool production standards against international criteria. Social responsibilities supporting this are addressed.

The Best Practice Reference Manual (BPRM) for wool sheep farming provides a framework of best practice concepts for wool sheep farming in South Africa. The main objective is to ensure sustainable farming practices that incorporate animal welfare, environmental conservation, social acceptability and optimum production with reference to the appropriate legislation that apply to wool sheep producers.

This manual is part of a continuous and dynamic development process, which ultimately ensures the welfare of wool sheep and the wool sheep industry of South Africa. It will be reviewed from time to time to incorporate advances in the understanding of wool sheep physiology and behavior, technological changes in animal husbandry and their relationship to the welfare of wool sheep, as well as changes in good practice for environmental management.

The manual focuses on the responsibilities for the welfare of sheep and the environment dealing with issues such as:

- Provision of adequate nutrition for maintenance, growth and reproduction
- Prevent pain, injury and disease by good animal health practices
- Provide the environment for sheep to express natural behavior
- Protection from fear and distress
- Protection from predation
- Protection when exposed to life threatening weather conditions
- Controlled use of animal health remedies and prevention of exposure to unnecessary or illegally imposed toxins
- Natural resource protection and management
- Social/ethical responsibilities of woolgrowers

This should also be considered when dealing with any aspect that is not currently covered in the manual. Production performance, reproduction, health status, behavior and physiology are generally accepted indicators of welfare that should be assessed and considered when making decisions.

This document was compiled with input from the following institutions.

- Cape Wools
- The National Woolgrowers Association of South Africa
- Agri SA
- Provincial Department of Agriculture (Elsenburg)

- National Department of Agriculture
- The National Cleaner Production Center of South Africa
- The Livestock Health and Production Group of the South African Veterinary Association
- Cape Nature
- African Large Predator Research Unit [ALPRU]
- Woolworths
- Industry Workshop Task Team (2006)
- NSPCA (Preventing cruelty to all Animals)
- Bioiversity and Wine
- Green Choice

The involvement of all role-players in this process is imperative and their support with the development of the Manual is appreciated.

2 ANIMAL HEALTH AND WELLBEING

2.1 Management practices for Sheep

A large number of husbandry/management practices are required in any sheep farming enterprise to prevent disease and production losses. Some procedures can cause a short period of distress but the consequences of not performing them may result in far more pain and distress to the animal than the procedure itself, when it is performed at the right time and competently.

- Practices that cause pain should be applied in such a way as to minimize pain and should not be carried out if practical alternatives can be used to achieve the same results.
- Management procedures carried out on sheep should be performed by competent persons or under the direct supervision of an experienced operator.
- Relevant hygiene precautions should be undertaken.

2.1.1 Tail docking

Research has shown that tail docking greatly reduces fly strike (maggots), while having no ill effect on lamb mortality or production. However, the sheep's tail has a purpose. Sheep lift their tail when they defecate and use their tail, to some extent, to scatter their faeces. It furthermore protects the sheep's anus, external genitalia (vulva), and udder from direct sunlight and weather extremes.

A gas heated docking iron cut, sterilize and cauterize the tail stump simultaneously and is probably the most efficient method of tail docking. This should be regarded as the preferred method of tail docking. Tails can also be cut off using a knife. The simplest method

of tail docking is to apply a rubber ring (band) to the tail using an elastrator tool. Banding is a bloodless method of tail docking. The band cuts off the blood and nerve supply to the tail end below the site of application and the non viable tail end falls off in 7 to 10 days. This tail end can also be cut off a day later without any distress or pain. Just after banding the lamb will experience a relatively short period of distress. Lambs should be at least 24 hours old before bands are applied and bands should only be applied during the lamb's first week of life when the tail end is still relatively thin.

When the elastrator technique is used the risks of tetanus is higher. The lamb's dam must be vaccinated before lambing to provide the lamb with protection against tetanus through the colostrum.

The tail stump must be left long enough to cover the ewe's external genitalia and ram's anus. Tails docked shorter than this result in an increased incidence of rectal prolapses. This is because short-tail docking damages the ring muscles of the anus and nerves that supply them. Short tail docking may also contribute to the incidence of vaginal prolapses, though there is no research data to support this claim. However, New Zealand researchers found that short-docked ewes suffered higher rates of skin cancer of the external genitalia (vulva).

The practice of 'extreme' tail docking, as practiced in sheep for show compromises the welfare of the sheep and should be considered unethical by all producers. Lambs should be docked before or up to 6 weeks of age regardless of the method used. Though banded lambs are most vulnerable, immunity against tetanus is recommended for all docking methods.

2.1.2 Castration

The castration of rams is justified **ONLY IF** the animals are kept on the farm after reaching sexual maturity. Provided that the ewes are immunised for tetanus and the procedure is performed between 1 – 6 weeks of age by a competent person this can be accepted as a practical procedure for farmers. As with tail docking, there are a number of techniques that can be used to castrate ram lambs.

The use of an emasculator is advocated as the best and safest method if performed by a competent person. Alternatively an elastrator band can be placed around the neck of the lamb's scrotum. The scrotum will shrivel up and fall off in two to three weeks. As with docking, the non-viable scrotum may be cut off after a day. Both testicles must be below the placement of the band. If one testicle is missed, it will be retained in the belly cavity, resulting in a 'bucky' lamb. Castration by banding is painful to lambs but if used, it should be done preferably around 2 weeks of age, but not older than 6 weeks of age. As with banding tails, lambs should be protected against tetanus through colostrum immunity.

The testicles can surgically be removed by a competent person around 1 week of age. It

is essential that a proper aseptic technique be used when the surgical method of castration is used.

Castration is best performed before or after fly season. If the risk of blowfly strike is high the wounds must be treated with a registered product that will prevent blowflies from laying eggs or for the eggs to hatch. These lambs must then be inspected on a weekly basis until the wounds are healed.

If castration is practiced it must be done before or up to the age of six weeks. Though banded lambs are most vulnerable, immunity against tetanus is recommended for all castration methods.

2.1.3 Hoof care

Hoof Trimming - Foot growth is affected by breed of sheep, soil moisture and soil characteristics and may require regular foot paring. The paring should be kept to the minimum necessary to remove affected tissue. Proper foot-rot shears should be used. When trimming feet, avoid stressful times such as hot weather or late gestation.

2.1.4 Horn Trimming

The removal of horns from adult sheep is unacceptable as a farm practice and should only be performed by a registered veterinarian under anaesthesia. The horns of rams and some weathers may need to be cut back to avoid injury from an ingrown horn, injury to other sheep and to allow free movement through handling races. The removal of the tip of the horn in adults is acceptable if done above the 'quick' where the tissue is devoid of nerves and blood vessels.

2.1.5 Lambing

Ewes should be allowed to lamb with as little as possible interference. Lambing under grazing conditions should be supervised to ensure that ewes having difficulty when giving birth are given attention. When assistance is necessary it should be provided by a competent attendant using good standards of hygiene and accepted veterinary techniques. The flocks should be under adequate surveillance to ensure that other problems, such as pregnancy toxemia and predation, are not occurring. If the risk of bad weather at lambing is high, access to a sheltered paddock is recommended. Ewes in confinement require a clean, dry area in which to give birth.

It takes at least six hours after lambing for a ewe to recognize and bond with her lamb and twice as long for the lamb to recognize their dam. The process of bonding is even more complicated in Merino ewes with more than one lamb.

A lamb that is abandoned by its mother before six hours after birth will have very little chance of survival.

Therefore a limited breeding season, scanning to group ewes closer and in identifying

twins is advisable to improve observation and assistance during lambing.

2.1.5.1 Orphan lambs

Where stray lambs can be identified they should be given proper attention by either reuniting them with their mothers, raising them as orphans or euthanizing them in a humane way.

2.1.6 Dipping (see Management of Farm Chemicals)

2.1.7 Sheep shearing

Shearing should preferably be done by accredited shearers and it is imperative that shearers observe the industry quality standards as prescribed in the NWGA shearing manual. The shearing manual is standard issue to all trainees participating in a NWGA shearer training courses. The manual is also available at the regional offices of the NWGA.

Shearing is stressful to sheep.

- Undue handling of sheep must be avoided.
- Care should be taken not to expose shorn sheep to adverse weather conditions.
- Sheep should be returned to food and water as soon as possible after shearing.
- Where circumstances indicate, shearing cuts should be treated to prevent infection and blowfly strike.

Care should be taken to limit urine and manure contamination on wool before shearing.

In practice it is advised that sheep are kept overnight on slated flooring.

Ewes in late pregnancy should not be kept indoors overnight. This may lead to milkfever and/or pregnancy toxemia.

Lactating Ewes should not be kept indoors overnight with their lambs. This may lead to trampling of the lambs and milkfever of the ewes.

For more information obtain the Sheep Shearer Instruction Manual: NWGA Shearer Training Division, PO Box 4520, Bloemfontein. 9300

2.1.7.1 Health precautions

Prevention of disease transmission is of utmost importance during shearing.

The correct disinfection and sanitary procedures must be followed to prevent the spread

of infectious diseases by shearing equipment and shearers within a flock or between flocks.

2.1.8 Wool Classing

Wool must be classed according to the NWGA/Cape Wools Classing standards. NWGA accredited wool classers should preferably be used. Only nylon packs are permitted for the packing of wool. Only paper may be used to partition wool - should there be a need to make a split bale.

Visit www.capewools.co.za for more detail on classing standards.

2.1.9 Mules operation

This practice is not acceptable and must not be practiced in South Africa.

2.1.10 Ear Marking

Ear marking instruments should be sharp, with the cutting edges undamaged, so as to prevent tearing of the ear. The ear may be tattooed, tagged, notched or hole-punched. Electronic identification methods may also be used. Animals should be marked according to the Animals Identification Act

2.1.11 Euthanasia of sheep

Effective and humane methods of euthanasia which cause a quick and painless death must be used.

The humane destruction of animals should be performed by the following methods:-

1. Electrical immobilisation, then a cut to the throat - with a sharp knife of suitable length – ensuring that the trachea (windpipe) and both carotid arteries are cleanly severed.
2. A clean shot to the head using a fire-arm
3. In case of emergency - A sharp knife of suitable length must be used to ensure that the trachea (windpipe) and both carotid arteries are cleanly severed.

2.2 Infrastructure for Sheep

2.2.1 Shelter

Sheep require shelter from the extremes of weather. This may be as simple as a shelter-belt tree plantation, or a windbreak. Where a building is used to supply shelter, it should be designed and maintained to provide clean, well-ventilated and sanitary conditions. Adequate ventilation should be provided when animals are housed indoors to reduce the risk of pneumonia and the chilling of lambs. Sheep should have access to a well-drained area for rest and rumination.

2.2.2 Sheep handling facilities

Well designed sheep handling facilities, and the ease with which animals flow through them, have important implications for the welfare of the sheep. All races and enclosures must be free from sharp projections, corners and broken rails that may cause sheep to injure themselves. Dust must be controlled when handling sheep.

Effective and safe loading facilities must be available if sheep need to be loaded.

2.2.2.1 Specifications for an ideal yard

Table 1. Yard dimensions in centimeters (100 centimeters = 1 meter)

Facility	Range (cm)	Comments
Working Race		
Length	600 - 1,200	Open or closed-in sides.
Width (fixed sides)	52 - 64	
Height	80 - 90	Keep low if sheep are worked from outside the race.
End Gate Height	100	Sheep usually jump gates rather than sides.
Drafting Race		
Length	300 - 350	Closed-in (solid) sides.
Width	42 - 48	Can be tapered at the bottom or of variable width.
Height	80 - 90	
Fence Heights		
Perimeter Fence	100	
Internal Fence	90	
Gates		
Perimeter	300 - 400	
Internal	200 - 300	
Draft	120 - 150	Open sides (see-through).
Loading Ramp to Truck		
Width	70 - 100	Slope not steeper than 1:3.
Length	300 - 500	
Height (fixed)	120	
Height (variable)	70 - 210	

2.2.2.2 Shearing facilities

Shearing facilities should comprise of.

- Adequate overnight facilities with slated floors
- Individual slated catching pens

- Individual inspection pens
- A wooden shearing board
- Adequate lighting and fresh air
- Absence of a draft

2.3 Sheep Handling Strategy

Owners and managers should ensure that sheep are monitored on a routine basis to assess the overall health of the flock and to maintain them in sound and healthy condition. A flock health program should be developed and implemented in partnership with the flock veterinarian. The frequency and thoroughness of inspection should be related to the likelihood of risk to the welfare of the sheep in relation to food, water, protection against natural disasters and likelihood of diseases, e.g. blowfly strike. Housed sheep should be checked by an experienced stockperson at least once each day for signs of injury, changes in food and water intake, illness or distress.

The sheep grazing under more extensive conditions require variable supervision according to the density of stocking, availability of suitable feed, reliability of water supply, age, pregnancy status, climatic conditions and management practices.

2.3.1 Handling

Sheep differ from most other domesticated animals in that they have little means of defence other than butting and running away. Sheep usually attempt to run away and they may totally exhaust themselves while doing this.

Sheep are not generally aggressive towards people but some rams do butt, especially in the breeding season. Because of their small size and their absence of means of defence sheep are easily frightened and are easily hurt while attempting to escape from poor attempts at capturing them (broken limbs, bruising, torn skin and pulled wool/hair).

At all times livestock must be handled with patience and tolerance with due allowance for their natural behaviour, e.g.:

- Livestock respond easier to being driven when the drover stands behind the animal but within its field of vision.
- Sheep are flock animals and respond easier to being driven when in a group rather than singly.
- Sheep are averse to being driven in the dark.

In times when sheep need to be handled for close inspection it is essential that the catcher handle the sheep gently to reduce stress to the individual sheep and to other sheep nearby.

If drafting facilities are not available, sheep can be caught by grabbing one leg but under no circumstances should they be dragged.

If carrying is necessary, sheep should not be lifted by their wool. Sheep should be moved quietly through yards with the minimum forcing by dog or person and care should be taken with gates to avoid injury to sheep. Precautions should be taken to prevent smothering of closely yarded sheep. Lambs and weaners are at particular risk. The use of dogs and goading devices for handling sheep should be limited to the minimum needed to complete the procedures. The South African wool industry does not condone the use of electrical prodders as an on-farm practice on sheep.

2.3.2 Movement on the Hoof

Sheep must be driven in a calm manner at a relaxed pace, natural to that animal, and not faster than the pace of the slowest animal. Climatic conditions and evenness of terrain will be determining factors in distances and time of movement.

- Under hot conditions animals must be allowed to rest frequently and sufficient suitable fresh water should be provided.
- Under favourable conditions sheep should not be driven in excess of 10km without allowing 1 hour rest. Fresh water must then be available to all sheep.

No animal on the hoof shall be moved in excess of the following distances:

- 20 Kilometres during the first day and 15 kilometres during each subsequent day over a journey of more than one day's duration.

Animals must be watered and fed immediately on reaching their night camp or final destination, with sufficient food of a quality and of a type compatible to their needs. No sick, injured, disabled or heavily gravid animals shall be moved on the hoof. Contingency plans must be in place to move by vehicle any animal that becomes exhausted, lame or otherwise unable to keep up with the flock.

2.4 Health and Disease management strategy

2.4.1 General

- All medicines must be used in the prescribed manner when treating sheep.
- A current list of medicine used is recommended.
- The label instructions must be followed strictly to ensure successful administration and to avoid risks to sheep, workers, consumers and the environment.
- Individuals handling and applying medicines must be trained and able to demonstrate appropriate competence and knowledge.
- The use of hormonal growth promoters should be limited.
- Medicines past their expiry date and used medicine containers must be disposed of in a manner agreed to with the attending veterinarian that will not result in subsequent misuse.

2.4.2 Medicine Storage

- Medicines must be stored in accordance with the label instructions in a sound, secure, locked and well lit location, away from other materials. The same apply for medicines that require refrigeration.
- Emergency information and facilities must be available to workers to deal with accidents (e.g. eyewash, plenty of clean water).
- Medicines must be stored in their original containers.

2.4.3 Injecting sheep

The equipment must be sterile at the start of the procedure. An 18-gauge needle is suitable; it should always be handled on the hub and not on the sterile shaft. The shaft should always be slid under the skin until the hub rests against the skin. The skin of the sheep must be dry and the injection site clear of visible dirt.

For intramuscular injections a safe site is found by dividing the distance between the hip bone and the seat bone and then positioning the injection in the middle of the foremost half and on the line between the two bones. The needle is pressed through the skin and into the muscle but not deep enough to strike underlying bone. The plunger of the syringe must be drawn back in an attempt to suck blood into the syringe. If no blood is seen at the tip of the syringe it can be assumed that the needle is not in a blood vessel and the drug for intramuscular injection can be injected.

2.4.4 Dosing

Dosing guns must be calibrated regularly. When administering remedies, carefully place the nozzle of the gun through the side of the mouth until resting on the back of the sheep's tongue. Deposit the drench slowly. If the head is bent backwards too far the drench may flow into the lungs.

2.4.5 Disease and Pest control

Sick, injured or diseased sheep should be given prompt and appropriate treatment or must be humanely slaughtered. Preventative measures should be used for sheep diseases that are common in a district. Sheep remedies should be administered in strict accordance with the manufacturer's instructions and veterinary prescription medicine must be used as prescribed by the veterinarian.

2.4.5.1 Additional Strategies for Internal Parasite Control

- Provide good nutrition and minimize stress. Research has shown that sheep provided with high-protein rations are more resistant to parasites. Combine high-protein plants and those high in tannins, such as birdsfoot trefoil.
- Use the deworming products that are allowed strategically. The use of faecal samples before and after deworming to measure a product's effectiveness is recommended.

- To prevent infection rotate pastures and avoid over-grazing.
- Use cultivated annual pastures for rearing lambs.
- Graze cattle on pastures after the sheep.
- Time lambing to avoid exposing lambs to warm, wet weather that promotes high levels of infectious larvae.
- Move lambs to clean pasture at five to six weeks of age, when they begin to eat significant amounts of forage. Use forward creep grazing so lambs have clean pastures before their dams. Avoid grazing young lambs on contaminated pasture. Also, avoid grazing lambs on the same perennial pasture two years in a row.
- Make sure pastures are well drained as eggs and larvae develop faster and disperse quicker in wet pastures. Graze when dew or rain has dried off forage. Also, monitor growing conditions that contribute to parasite development. Be prepared to move lambs and deworm if necessary.
- Breed for resistance. There is enough variation among individual sheep in a flock to select for this trait. Local studies show that the use of worm-resistant rams on non-resistant ewes increased growth rates in lambs. Select ewes that stay in good body condition due to lower worm loads. Cull ewes that are persistently thin and/or infected with parasites.

2.4.6 Shearing shed hygiene

- Dead animals should not be skinned in the shed
- Sick animals should not be housed in a shearing shed
- Skin and pelt should not be treated, dried or stored in a shearing shed
- Before shearing commences the entire shearing shed should be cleaned and disinfected with a 3-5% formaline solution. At this stage the shed should be closed for 24 hours after which it should be opened for the fumes to escape. This should be done within 14 days prior to commencing of shearing
- After completion of shearing all wool should be classed, packed and removed from the shed and shearing equipment should be disinfected.
- Shearing equipment should be disinfected at regular intervals during shearing to stop the spread of disease.
- Shearers should start each day with a clean pair of trousers and all clothes including footwear should regularly be cleaned and disinfected.
- Care should be taken that young sheep are shorn first in order to prevent disease transmission from older animals.

2.4.7 Controlled and notifiable Diseases

2.4.7.1 Johne's disease (*Mycobacterium paratuberculosis*)

Signs are wasting, recurring ill thrift and diarrhea – have a veterinarian confirm disease

Control methods for producers living in OJD prevalent areas

Management practices:

For properties allegedly free from OJD

- Only buy stock from low risk properties (closed properties and properties that repeatedly tests negative)
- When the status is unknown, take care to buy inoculated stock wherever possible.

For Contaminated properties

- Slaughter stock that loses weight unexpectedly as soon as possible.
- Inoculate all breeding animals at the age of six weeks.
- Try not to feed stock on the ground, use feeding troughs. A bacterium is carried by faeces.
- Do not allow ewes to lamb on old established pastures. Lamb on cultivated pastures developed since the previous season.
- Do not keep thin and sick animals in the 'ram camp.' This is where the most expensive stock on the farm is kept and exposure of such stock should be avoided.
- Only buy stock from low risk properties

For producers that farms outside OJD prevalent areas:

Uncontaminated farms

- Should you experience a repeated occurrence of wasting sheep a post mortem should be done immediately by a veterinarian
- Only buy stock from low risk properties (closed properties and properties that repeatedly tested negative)
- Request a OJD declaration from the seller

Contaminated farms

Follow procedures as with properties in OJD prevalent areas

2.4.7.2 Scab – *Psoroptes communis ovis*

Any suspect condition should be reported to the closest State Veterinarian who will deal with the outbreak according to state regulations. Preventative treatment for sheep scab must be done before any movement of sheep between properties.

2.4.8 Other (not notifiable)

2.4.8.1 Sheep Lice - *Bovicola ovis*

Infestation starts from contact with infested sheep and good management are required to avoid this problem.

A dipping declaration by the previous owner should be part of any purchase documentation. Alternatively, purchase stock must be kept in quarantine until treated for both scab and lice as a preventative measure. Monitor all sheep for lice infestation – Lice are most prevalent in wintertime.

When infected

- (i) Dip all sheep, including lambs with a registered product.
- (ii) When dipping is not possible, treat all sheep, including lambs with a registered pour-on.
- (iii) Notify your neighbours and your nearest veterinarian

2.4.8.2 Blowfly Management

A blowfly attack and the associated infestation of sheep with maggots can be considered a disease and should be managed accordingly. An integrated blowfly management strategy is essential.

Be aware of conditions favorable for blowfly attacks and plan your control measures accordingly.

- 1. Blowfly traps (Luci Traps). These will reduce the blowfly population in the environment. Be sure to have them activated before the start of the fly season.
- 2. Crutching. This will reduce the incidence of fly strike by 99%. This protection will only last for at least 2 months.
- 3. Doramectin injections will give limited protection for up to 2 to 3 weeks.
- 4. Treat all susceptible sheep with an insect growth regulator as soon as conditions indicate a blowfly population explosion.
- 5. None of the above measures will result in 100% prevention of blowfly strike and the monitoring of sheep is still required. Affected sheep should be treated immediately with a registered product.

2.5 Sheep Feeding Strategy

2.5.1 Feed

Sheep should have access to feed which is nutritionally adequate to maintain health and meet the appropriate physiological requirements for growth, pregnancy, lactation and to withstand cold exposure.

In all systems of management, continual assessment should be made of the needs of the sheep in relation to the amount, quality and continuity of feed supply. In case of a full-feeding or supplementary feeding system, diets should be formulated by a professional animal nutritionist to prevent metabolic disorders and accompanied unnecessary discomfort, pain and deaths.

Sheep should be excluded, as far as possible, from toxic plants and other substances suspected of being deleterious to their health. Feed must be of good quality and free of moulds and poisonous plants and seeds. The use of animal by-products must be avoided.

2.5.2 Water

Sheep should have access to high quality water; regular assessment should be made of the quality and quantity of water supply with attention to the special needs of lactating ewes, feedlot lambs and sheep in hot weather. Watering points should be of sufficient capacity and allow safe access.

Mechanical equipment controlling the delivery of water (including windmills and bore-holes) should be inspected regularly, and frequently in hot weather, and kept in good working order. The quality of water provided should be adequate to maintain sheep health. Voluntary water consumption is 2 or 3 times dry matter consumption and it increases with high-protein and salt-containing diets.

Drinking water, which contains potentially toxic levels of salts, or other harmful substances, should be monitored and managed to minimize harmful effects. Where sufficient good quality water to maintain health cannot be provided, the sheep should be moved to other areas where an adequate supply is available. As a guide, sheep should not be deprived of water for more than 24 hours. This period should be reduced in the event of hot weather.

2.5.3 Drought

Drought is defined as a severe food and/or water shortage during prolonged periods of abnormally low rainfall. A drought is not a normal seasonal decline in the quantity and quality of food available.

Property strategies for drought management should be prepared well in advance and progressively implemented. Where drought feeding is indicated, it should be started before normal grazing feed runs out. For optimum results sheep should be fed in different age and condition groups.

Sheep being fed for survival should be observed carefully at feeding times. Weak animals may require segregation for special treatment.

Sheep should not be allowed to starve. Where minimal water and food requirements cannot be met grazing should be hired or supplemental feed given if economically viable, or the stock must be sent for slaughter to prevent suffering. Drought affected sheep are highly susceptible to stress and require careful handling and treatment.

2.6 Transport of Sheep

Transporting sheep in a vehicle is highly stressful and can result in severe injuries or death. Injuries due to poor transportation practices can have biological consequences such as rams becoming subfertile or sterile or pregnant ewes aborting. Animals on the way to the market can lose condition, be bruised or suffer catastrophic injuries.

Good transportation practice is one of the most important practices in a sheep producing enterprise. Transport of sheep should have as its main purpose the avoidance of stress on the animals. Sheep and goats must be provided with sufficient and suitable fresh food and water up to the commencement of the journey. The use of electric prodders should be limited and the recommended trucking density must be observed.

2.6.1 Vehicles to transport sheep

- Vehicles must be licensed and roadworthy
- A removal certificate must accompany stock

All such vehicles and trailers shall have: -

- A suitable non-slip floor, which should not impede the cleaning of the floor of the vehicle.
- Adequate ventilation and light whilst in motion as well as when stationary. A totally enclosed vehicle is unacceptable.
- Adequate protection from exhaust gasses. Exposure to exhaust fumes could interfere with animals' respiration or cause distress.
- Adequate provision for inspection at floor level of all the animals being transported;
- Sidewalls high enough to prevent animals from escaping or falling out of the vehicle. The sides and partitions, when used in a vehicle to separate animals carried therein, shall be of a height not lower than the shoulder joint of the largest animal being transported. The minimum height shall be 750 mm in the case of any smaller animals.
- In multi-tier vehicles, heights between decks shall be adequate, and in case of sheep not less than 1000mm, to enable the largest animals to stand naturally, freely and fully erect and to allow adequate space for the free flow of air above the animals;
- The density of animals packed into any given space shall be such as to ensure the safety and comfort of the animals during transport. The recommended floor space is 0.4 square meter per sheep.

2.6.2 Drivers Responsibilities

- In strict compliance with the requirements of the Road Traffic Ordinance.
- In possession of a valid driver's license appropriate to the class of vehicle driven.

- In possession of the appropriate documentation as well as telephone numbers to be phoned in case of emergencies or assistance being required.
- A route plan of the most suitable and shortest route to the destination, a contingency alternate route as well as a contingency plan for emergencies and the telephone numbers of the consignor, the consignee, the transporters and 24-hour emergency contact numbers.
- Knowledge of the natural behaviour of the animals being transported, e.g. visual fields, flight patterns as well as of the appropriate use of flap-sticks, boards, electric prodders as well as having knowledge of disallowed handling methods.
- Responsibility for ensuring that the load-space of the vehicle is free of any objects or equipment such as wire, webbing, spades, spare wheels, drums, tools, etc. which may cause injury to the animals being transported.
- Responsibility for ensuring that there are no rough edges, projecting plates or boards or sharp ends, bent bars etc., which may cause injury to the sheep.
- Responsibility for the correct aligning of the vehicle to the loading/off-loading platforms so as to ensure that there is no space through which an animal can fall or be trapped.
- Be alert and in a fit state to be in responsible charge of a vehicle conveying animals.
- Avoid handling a vehicle in such a manner as to cause the sheep conveyed therein to slip, fall or be injured. The vehicle shall not be driven in disregard of the safety or wellbeing of the sheep.
- Not stopping for more than 30 minutes while transporting sheep.
- Parking loaded vehicles conveying sheep only on level ground, preferably in shade in a quiet area.
- Ensuring that, barring unforeseen eventualities, delivering the consignment of livestock to its destination within the scheduled time of acceptance.
- Be aware that the faster the vehicle travels, the greater the wind-chill factor:

Wind-chill factor at various speeds and ambient temperatures-

Speed	Ambient air temperature (°C)								
km/h	25	20	15	10	5	0	-5	-10	-15
8	25	19	14	9	4	-2	-7	-12	-17
16	23	17	11	3	-2	-7	-13	-18	-24
24	21	15	8	2	-5	-11	-17	-24	-30
32	20	13	7	0	-7	-13	-20	-26	-33
40	19	12	6	-1	-8	-15	-22	-29	-35
48	18	11	4	-3	-10	-17	-24	-31	-38
56	17	10	3	-4	-12	-19	-26	-33	-40
64	16	9	2	-5	-13	-20	-28	-35	-42
72	16	8	1	-6	-14	-21	-29	-36	-44
80	15	8	0	-8	-15	-23	-30	-38	-45

- These parameters are applicable to dry animals only. The wind-chill factor is exacerbated when animals are wet. The danger of pneumonia and death is greatly increased where the animals are transported insufficiently protected in wet conditions.
- Visual observation of the sheep being transported as frequently as circumstances may permit, but not less than every two hundred kilometres to ensure that no animal is in obvious distress. Where any distress is observed, immediate measures to relieve such distress must be taken. In the case of an animal giving birth during transport, immediately take the necessary measures to ensure the protection of the mother and offspring from being trampled or otherwise injured or harassed by other animals
- In the case of an animal that becomes unfit or severely injured in the course of a journey, ensure that it is not carried for a period longer than is necessary to transport it to the nearest available place at which it can receive attention, such as a veterinary hospital or clinic or an abattoir, or auction pens, or to a Police Station for emergency humane destruction
- In the event of any breakdown of the transport vehicle, accident or injury to any animal in transit, the carrier shall contact assistance en route, i.e. the South African Police, the traffic authorities and breakdown service without delay and report the relevant details to the official in charge.
- In the case of an emergency any vehicle can be used as an ambulance and for an unfit animal to be transported with all practical speed direct to a place for veterinary treatment, or to the nearest available place at which it can be humanely killed.

2.6.3 Restraining of Sheep during transport

- It is inadvisable to transport any animal which is likely to become panic-

stricken or which may try to escape or may be liable to injure any other animal.

- Where the transport of any animal may cause injury to itself or any other animal, it shall be restrained in such a manner as to prevent such injury.
- Such restraining must be effected without causing that animal physical injury or deprivation of such essential needs as adequate ventilation and protection from adverse climatic conditions, noxious fumes and provided that the measures taken will not amount to cruelty to the animal.
- Sheep shall not be transported in compartments requiring their being constrained in the chest recumbent position.
- No animals shall be kept in restraint for more than 4 hours in any 24-hour period.
- No wire or bailing twine shall be used for tying the animal's legs or feet.
- To avoid strangulation or neck-break, a slipknot may not be used where animals are secured to the vehicle by horns or neck. The rope must be attached to the vehicle at the level of the animal's 'knees', so that in the event of the animal falling, the possibility of serious injury or death is reduced. The rope should be long enough to allow the animal to lie comfortably in a natural position with head upright.

2.6.4 Loading and off-loading of sheep

The use of trained 'Judas' goats to facilitate the loading, off-loading and herding of sheep is strongly advised.

For more detailed information on The Handling and Transport of Livestock visit www.nspca.co.za

3 ENVIRONMENT

3.1 Natural Resource Protection and Management

The focus of a holistic and inclusive management strategy for environmental protection is to provide for the conservation of the natural agricultural resource base by the maintenance of the production potential of land, the combating and prevention of erosion and weakening or destruction of water sources, the protection of natural vegetation and the combating of weeds and invader plants.

In South Africa, a number of supporting sub-strategies have been identified which underpin good practice environmental protection.

3.1.1 Rangeland

The prime responsibility of woolgrowers in these areas is the sustainable usage of the natural resource base. Care should be taken that a grazing strategy for the specific envi-

ronment be implemented to;

- Restore the loss of cover
- Restore the loss of species
- Address the problem of bush encroachment
- Address the problem of invasion of alien plants

To achieve this the following should be addressed

3.1.1.1 Soil management

- **Soil Erosion**
Prevent and recover soil erosion through proper management.
- **Soil Cultivation**
Use soil friendly methods to cultivate the soil to ensure the fertility of the soil over the long term and to prevent erosion.
- **Fertilization**
Maintain appropriate nutrient levels
Use products that will keep the acid level of the soil at the right level to prevent acidity.

3.1.1.2 Rangeland Management

- **Grazing capacity:** The grazing capacity of veld expressed as a specific number of hectares per large stock unit for specific areas must be determined land be observed.
- **Veld** must be utilised in alternating grazing and rest periods to ensure the sustainability of the veld over the long term. When veld shows signs of deterioration the number of animals must be suitably reduced.

3.1.1.3 Water Management

- **Control of run down.**
Minimise run-off to prevent erosion.
- **Irrigation**
Irrigate only high potential land.
- **Groundwater**
Do not exceed the potential of the resource.
Only use ground water that is suitable for irrigation.

3.1.1.4 Invading Alien Plants Management

Invasive alien species have a significant negative impact on the environment by causing direct habitat destruction, increasing the risk and intensity of wildfires, and reducing surface and sub surface water. Landowners are under legal obligation to control alien plants occurring on their properties.

3.1.1.4.1 General clearing principles

- Alien control programs are long-term management projects and a clearing plan, which includes follow up actions for rehabilitation of the cleared area, is essential. This will save time, money and significant effort.
- As a minimum, the plan should include a map showing the alien density & indicating dominant alien species in each area.
- Start clearing the lighter infested area first (with young/ immature, less dense trees) to prevent the build up of seed banks. Starting with less dense areas will also require fewer resources and have greater impact in the long term. In the case of alien species confined to rivers, it is ideal to start in the headwaters and then move downstream, thereby removing the source of re-infestation.
- Dense mature stands ideally should be left for last, as they probably won't increase in density or pose a greater threat than that posed at present.
- Collective management and planning with neighbours allows for more cost effective clearing and maintenance considering that alien's seeds are easily dispersed across boundaries by wind or in water courses.
- Biological control is cost-effective and very safe compared with the expense and risks associated with herbicide use, and can be successfully integrated in other management practises.
- Consider the role of fire in alien clearing operations. Fire with the appropriate management is a cost effective clearing method, but untimely and uncontrolled fires easily and often defeat the purpose of mechanical and bio-control clearing. Follow up after fire with manual seedling removal is essential, or in extreme cases where there is little other vegetation, herbicide spraying could be considered.
- All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing.

3.1.1.4.2 Clearing methods

- Different species require different clearing methods such as manual, chemical or biological methods or a combination of both. For example fire is a useful tool for pines, but should not be used on the Acacia species such as rooikrans and port jackson, as fire stimulates alien seed germination.
- For detail on the recommended clearing methods for each common alien species and other alien clearing advice, consult the CapeNature 'Landowner Alien Clearing Manual'.

3.1.1.4.3 Identification of alien species

Table 3 of CARA (the Conservation of Agricultural Resources Act) which lists all declared weeds and invader plants. Alien plants are divided into 3 categories based on their risk as an invader.

- Category 1 - These plants must be removed and controlled by all land us-

ers. They may no longer be planted or propagated and all trade in these species is prohibited (e.g. rooikrans, hakea)

- Category 2 – These plants pose a threat to the environment but nevertheless have commercial value. These species are only allowed to occur in demarcated areas and a landuser must obtain a water use licence as these plants consume large quantities of water (e.g. black wattle, grey poplar, pine).
- Category 3 – These plants have the potential of becoming invasive but are considered to have ornamental value. Existing plants do not have to be removed but no new plantings may occur and the plants may not be sold (e.g. jacaranda, syringa, sword fern).

For a listing of Category 1, 2 & 3 plants, refer to Appendix 4.

3.1.1.4.4 Use of herbicides for alien control

Environmental Safety: Most alien vegetation control operations are carried out in riparian situations which are regarded as environmentally-sensitive. In order to minimise the impact of the operation on the natural environment the following must be observed:

- Area contamination must be minimised by careful, accurate application with a minimum amount of herbicide to achieve good control.
- All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, product and spray mixtures.
- Equipment should be washed where there is no danger of contaminating water sources and washings carefully disposed of in a suitable site.
- To avoid damage to indigenous or other desirable vegetation, products should be selected that will have the least effect on non-target vegetation (Contact Ecoguard for advice, ph: 021-862 8457).
- Coarse droplet nozzles should be fitted to avoid drift onto neighbouring vegetation.

- For more detail on the most effective herbicide and dosage for a specific alien species, consult the Ecoguard Herbicide guide (see Appendix 5)

3.1.1.4.5 Alien grasses

Alien grasses are among the worst invaders in lowland ecosystems adjacent to farms, but are often the most difficult to detect and control. Alien grasses out-compete indigenous annuals and bulb species that make up an important part of the species diversity in renosterveld and fynbos. Alien grasses also change the fuel load of the veld causing more frequent and hotter fires, which can be detrimental to biodiversity.

Common alien grass species include: Wild oats (gewone wilde hawer); Italian ryegrass (Italiaanse rog); Quaking grass (bewertjies); Kikuyu (kikoejoe); Ripgut brome (predi-

kantsluis); and Rats Tail Fescue (wildegars).

To avoid alien grass invasion:

- To avoid dispersal of seed by animals, prevent livestock, that have grazed in areas infested by alien grasses while these species are seeding between August and November, from moving to areas that have not been invaded.
- Frequent fires favour alien grass invasion, therefore apply good fire prevention practices to natural areas (see Fire Management section below).

To control alien grasses:

- Recent research has shown that burning is not an effective means of control as this stimulates alien grasses.
- Hand clearing is also not recommended as this disturbs the soil which promotes alien grass growth
- Applying a pre-emergent, systemic herbicide has been found to be the most effective control method such as Snapshot, Gallant Super, Fusilade. Mamba & Round-up can be used for controlling Kikuyu.

Useful alien clearing contacts:

www.nda.agric.za/docs/landcare.

Working for Water: www.dwaf.gov.za/wfw.

Weedbuster Hotline: 0800 005 376, weedbuster@dwaf.gov.za.

3.1.2 Alternative Fodder Crops

- In cases where the potential of some vegetation resources are limited alternative fodder crops should be established as a priority. In doing this rangeland and cultivated pastures can play complementary roles.
- Drought tolerant crops should be established in areas conducive to seasonal, annual and long-term droughts.

3.1.3 Drought

Drought and rainfall variability are major constraints to woolgrowers. To prevent sheep losses the following practices should be considered.

3.1.3.1 Selling off of stock

The risk of damage to pastures is reduced. Improved performance of remaining stock post-drought may compensate for reduced numbers.

3.1.3.2 Production feeding

With breeding stock, the breeding cycle, natural increase and cash flow in the post-drought recovery phase are maintained. Lot-feeding protects pastures.

3.1.3.3 Maintenance Feeding

Income may be earned from production of progeny and/or wool. Restocking costs are avoided and maintenance of the breeding cycle may be possible.

3.1.4 Fire Management

Fire can be both a friend or foe with regards to biodiversity management. Just one or two inappropriate fires at the wrong time of year, too frequent, or no fire at all, can cause local extinction of many species. As a landowner, you are responsible for the prevention and management of all fires that occur on your land, in terms of the National Veld and Forest Act of 1998. You will be assisted in complying with these regulations if you and your neighbours form a Fire Protection Association (FPA).

3.1.4.1 Fire Protection Associations (FPA's)

- FPA's are voluntary associations formed by landowners to jointly prevent, predict, manage and extinguish veld fires. The main advantage of an FPA is that no presumption of negligence can be used in civil proceedings due to fire damage if you belong to an FPA, even if the fire started on your property. Furthermore, resources can be combined more effectively with other landowners to manage fires more effectively and firebreaks can be placed where best for the area as a whole, not just one property.

3.1.4.2 Fire breaks

- Every property must have a system of fire breaks in place. The breaks must be on the boundary of the property unless there is an exemption granted by the Minister or an agreement with the adjoining landowner that the firebreak be located somewhere else within an FPA.
- Firebreaks must be located strategically to control the spread of wildfires, but mainly serve as an access road from which to fight a fire. A sensible firebreak width is not wider than 10m and must not be burnt during times when there is a high fire risk
- It is often preferable to simply have a 'tracer belt' of 2/3m to allow quick access and an opportunity to use a 'backburn'.
- Owners should ensure that firebreaks are positioned and prepared in such a way as to cause the least disturbance to soil and biodiversity. The owner must transplant protected plants within a fire break if possible or position the firebreak to avoid protected plants.

3.1.4.3 General fire management principles

- Frequency: The interval between fires should be determined by the growth rate of natural existing plants and depending on the area's rainfall).
- Season: Generally, a winter or early spring is recommended for sour grass regions and summer or early Autumn for fynbos regions.

- Intensity: Intensity is influenced by the fuel load, fuel moisture, relative humidity, gradient and wind speed. The intensity can be manipulated by selecting conditions, point of ignition relative to slope and wind that will lead to the desired type of fire.
- Proportion of area burned: It is vital to maintain a mosaic of different vegetation ages within a property (a variety of approved burning practices and veld ages is the best way to maintain species diversity).

General:

- Inform property neighbours and local municipality fire officers of your intention to burn at least two weeks prior to the event.
- Ensure fire fighting equipment is maintained and in good working order before the start of each fire season.
- Keep accurate records of fire, using a map of veld age as a basis. Note the date and time of ignition, weather conditions, etc.
- Do not leave an extinguished fire unguarded for at least two days after a burn.
- Do NOT allow livestock to graze natural areas in the winter and spring, following a fire in fynbos regions. Many of the renosterveld bulbs and annuals are vulnerable to grazing pressure by domestic stock in the first 2 years after a fire.

For more information refer to:

- CapeNature's fact sheet on 'Fire Management' & 'The Landowner and Fire Protection Associations' (available for download on BWI website)
- Department of Water affairs and Forestry CD: 'Resource materials on National Veld and Forest Fire Act No 101 of 1998'.

3.1.5 Game Management in natural areas

Retention of game on private land can only be viewed as a form of conservation if correct game management ensures the condition of the natural vegetation is not detrimentally impacted. Otherwise, this is simply another form of farming.

Manage the introduction of game, ensuring that non-indigenous species and population density does not damage the remaining natural vegetation. To be able to do this, a land owner needs to know:

- The veld- and soil types of the property, as well as their location.
- Game species and their feeding habits (e.g. browsers/grass feeders)
- Carrying capacity of the various veld types at specific times of the year, to be able to calculate the numbers of a species that can be safely kept on a specific area (e.g. In the succulent Karoo veld around Ladismith and Calitzdorp, about 3.5 kudu can be kept per 100ha).
- Watering points and animal licks must be placed so as not to cause

trampling of sensitive veld (e.g. veld just recovering from burn, seasonal wetlands)

- It is strongly recommended that only game species that historically occurred in that area are kept and not 'extra-limital' species. Species which occurred historically in the area are best adapted to local conditions and will have the least impact on the natural veld.
- Regularly monitor the composition of plant communities, to be aware of the veld condition.
- Where veld condition shows signs of deterioration, it is advisable to withdraw animals from that area and the veld left to rest.

Livestock impacts in natural areas

- Renosterveld can be lightly grazed in late summer to autumn (Jan – early March). Grazing by livestock should not be allowed in the winter and spring flowering & growing seasons. Many of the renosterveld bulbs and annuals are vulnerable to grazing pressure by domestic stock in the first 2 years after a fire.

All special habitats like silcrete, ferricrete and quartz patches should be fenced off from livestock. Fencing should however allow the movement of tortoises and small antelope species

3.1.6 Waste Management

Good waste management practices can make a profound contribution towards retaining biodiversity.

General:

- Refuse management must comply with legal prescriptions and may not pollute the environment (particularly wetlands and water sources) or create a health hazard.
- Compile a waste management plan, where waste is seen as a resource, and recycled where possible.
- Visit www.fairestcape.co.za for recycle contacts for glass, metal, paper, plastics, hazardous waste, etc.
- Educate farm workers and their families on waste management and recycling.
- Minimize pesticide drift onto natural areas. Avoid aerial spraying and where possible use Integrated Pest Management (IPM) methods and avoid drift altogether.
- Minimize fertiliser runoff adjacent natural areas, and especially wetlands and rivers. This runoff favours the spread of alien plants and actively poisons many indigenous plant species and aquatic animals. The Department of Water Affairs and Forestry has issued target water quality guidelines,

which address impacts on water quality and measures pollutants in final water body (visit their website for these guidelines – www.dwaf.gov.za).

3.1.7 General

- Design and lay-out farm roads so as to minimise erosion (good maintenance is the key), and avoid sensitive ecological areas such as wetlands or rare plant populations.
- To prevent undue soil erosion, avoid ploughing slopes with a gradient steeper than 20 percent (as detailed in the Conservation of Agricultural Resources Act, 1983).
- Consult conservation experts to compile a simple conservation plan for the natural vegetation on the farm. This should include guidelines to monitor ecosystem health.
- Consider formally setting aside threatened natural areas under a Conservation Stewardship Programme to give these areas secure conservation status, and truly ensure these areas remain conserved for future generations.

3.2 Predator Control

Predators play an important role by maintaining balances in nature. They control old and sick animals while some are excellent scavengers by devouring carcasses of wildlife and other livestock.

They are territorial animals and the social behaviour of each species plays an important role in the demarcation of their territories. The injudicious removal of predators from a system results in a vacuum that causes a constant inflow of foreign animals into an area. These large numbers of foreign animals in a new habitat, desperately in need to form their own territories, will inevitably prey on easily available feed sources such as small stock.

Attempts to randomly kill predators in the protection of livestock do not provide a long-term solution. A balanced approach to improve the natural basis of prey, a good knowledge of the predator population on farms (especially of the dominant territorial animals), the protection of livestock in partnership with neighbouring farms, and taking part in a coordinated predator control initiative will in time result in less stock losses.

It is important to control predators with a well-coordinated approach by using a combination of best practices (lethal as well as non-lethal methods). Hunters must be cautious not kill a predator unless they have a strong indication that they are dealing with the real problem-causing culprit.

Methods that can be implemented to control individual damage causing predators:

- Professional hunters and stock farmers must obtain accreditation from a conservation authority.
- Preferably use non-lethal methods like natural shepherds (donkeys, dogs, Alpacas), pens, predator proof fences and livestock protection collars.
- The control measure must be legal.
- Never target the species in general, target only the culprits.
- Care must be taken that the control method for the target predator is used correctly.
- Statistics of both livestock losses and predators killed must be kept. Keep record of the predator's age, sex and stomach contents.
- Liaise and exchange data with the conservation authority that coordinates predator management.

The criteria to measure control methods

- Control methods must be cost effective and be in line with livestock losses.
- Control methods must be quick and humane to limit suffering.
- Be selective to target only the damage causing predators.
- Control methods must have the minimum effect on the species and the environment.
- Control methods must be effective – only use qualified hunters.

3.3 Pesticides for Control of Ectoparasites in Wool Sheep

Chemicals in the form of residual pesticides on greasy wool are a major threat to the environment and the image of the South African wool industry.

3.3.1 Chemical groups

There are four main types of chemicals available to control mites, lice and blowflies in South Africa.

These are:

- Organophosphates (OP)
- Insect growth regulators (IGR)
- Macrocyclic lactones (ivermectins)
- Synthetic pyrethroids (SP)

A list of Parasiticides registered and deregistered for use on sheep in South Africa (January – March 2008 - IVS) can be consulted in Appendix 1.

3.3.2 Know the risks

The different chemical groups have various degrees of relative risk relating to opera-

tor health, pest resistance and wool residues. Understanding these risks will help when deciding what, if any, chemical to use. Organophosphates (e.g. diazinon etc) pose the greatest risk to human health. Due to the high incidence of fly and lice resistance to chemical groups, the advice from chemical suppliers and veterinary authorities must be sought.

3.3.3 What you can do

The key to reducing reliance on chemicals is to use an integrated parasite management (IPM) approach to control ectoparasites. However, if you need to use chemicals, select those with minimal risk. The four main IPM elements are:

- Management options (e.g. reduce susceptibility to fly-strike and risk of lice introduction).
- Genetic improvement (e.g. increase resistance of the flock especially to flies (e.g. cull for fleece rot).
- Biological/environmental control (e.g. reduce fly populations by using fly traps such as the Luci-Trap, etc.).
- Selective use of chemicals (e.g. only treat if required).

3.3.4 Ectoparasiticide withholding periods

To limit residues, the wool withholding period (WWP) for all registered products controlling ectoparasites is two months from the last date of treatment, except for products containing Diflubenzuron for which a WWP of six months must be observed.

3.3.5 Herbicide withholding periods for sheep

The minimum number of days between the last application and grazing or harvesting of pastures must, according to the registration of products be observed.

3.3.6 Testing for chemical residue

Where applicable, tests for chemical residue must be carried out in accordance with the appropriate IWTO test method. (Currently IWTO-DTM-59-04).

3.3.7 Handling of chemicals

Chemicals need to be handled, stored and used in a responsible manner as prescribed by the occupational health and safety legislation and the latest regulations supporting this legislation.

Additional Resources:

- Drug stock and usage record (see Appendix 2)
- Checklist for storage (see Appendix 3)

4 SOCIAL RESPONSIBILITY

Woolgrowing is an economic activity which does not take place in a social/ethical vacuum and as such must be, and be seen to be, compliant with acceptable social and ethical norms and standards.

4.1 Human rights

- 4.1.1 There should be respect of the fundamental human rights as spelt out in the Bill of Rights of our Constitution .
- 4.1.2 All employers should respect the following core labour rights of the International Labour Organisation:
 - No forced labour
 - No child labour
 - Freedom of association and the effective recognition of the right to organise and bargain collectively.
 - No discrimination in respect of employment and occupation.

4.2 Basic conditions of employment

- 4.2.1 All employees, South African or foreign, should be entitled to basic conditions of employment in respect of:
 - Hours of work and the arrangement of working time.
 - Leave including annual leave, sick leave and maternity leave.
 - Rights on termination on employment including notice and severance pay.
 - The provision of certain particulars of employment such as a pay slip and certificate of service.
 - Minimum age of employment.
- 4.2.2 All farm employers should comply with the Basic Conditions of Employment Act.
- 4.2.3 A decent wage should be paid to all farm workers.
- 4.2.4 No children under 15 must be employed on farms. Children between the ages of 15 and 18 must only be employed in work that does not place at risk their well being, education, physical or mental health, or spiritual, moral or social development.
- 4.2.5 The terms and conditions of seasonal workers, workers on fixed term contracts and other forms of a typical employment should be appropriately regulated and they should receive benefits proportionate to those received by permanent workers.

4.3 Labour relations

- 4.3.1 Labour conflict on farms should be minimised by ensuring that it is well managed by the involved parties. Both employees and employers should ensure that their actions are lawful and procedural.
- 4.3.2 All farms should have an accessible and appropriate grievance and disciplinary procedure in place.

4.4 Skills development

- 4.4.1 The skills of all farm employees need to be enhanced so as to improve productivity and employability in the wool sheep farming industry.
- 4.4.2 It is recommended that SAQA registered qualifications and mentorship programs offered by the NWGA be encouraged by employers.

4.5 Occupational health and safety

- 4.5.1 The working environment on farms should be safe and healthy. This includes protection against occupational diseases and accidents. Care should be taken with the inoculation of Ref 1 as risk can result in brucellosis in people.
- 4.5.2 Farm Labour should be made aware of the contingency procedures relevant to their enterprise in the event of emergencies which pose a threat to human health, food safety or livestock health and welfare. These contingency procedures must cover the event of failure of the food and water supply
- 4.5.3 Woolgrowers should do an assessment of the risks that exist on their farms and develop a plan to minimise such risks including the adoption of preventative measures.
- 4.5.4 Labour must have access to basic first aid and medical treatment.
- 4.5.5 Labourers are entitled to compensation in the event of an occupational injury or disease. To ensure this, farm employers must register with the Compensation Fund and pay their assessments.

Resources:

- Checklist for Labour (See Appendix 6)

4.6 Social security and benefits

- 4.6.1 Workers are entitled to unemployment insurance if they become unemployed. To ensure this, farm employers must register with the Unemployment Insurance Fund and pay their contributions together with those of their employees.
- 4.6.2 Farmers should endeavour to ensure that farm workers have access to pension or provident funds, medical aid, funeral or death benefits.

- 4.6.3 Farmers whose employees live on the farm should ensure that housing and sanitation meets acceptable standards.

4.7 Productivity

- 4.7.1 Productivity improvement is the result of many factors including increased skill, greater job satisfaction, more appropriate use of technology, etc. and is the responsibility of both employer and employee.
- 4.7.2 Farm employers and employees should identify the factors that can lead to improved productivity at the workplace.
- 4.7.3 With this in mind, farm employers and employees should commit themselves to improving productivity, work ethics etc.

4.8 HIV/AIDS

- 4.8.1 Testing of employees to establish their HIV status is prohibited in terms of the Employment Equity Act.
- 4.8.2 Employers should ensure that all those living on farms should have access to a prevention programme including awareness rising, condoms and counselling.

4.9 Contract Labour

- 4.9.1 Suitable housing should be provided for contract worker like shearers. This includes;
- Sleeping facilities
 - Ablution facilities
 - Where food is not provided, adequate enclosed cooking facilities must be available.
- 4.9.2 Work Hours: It is recommended that contract workers like shearers have an eight hour five day working week. Days divided into four 2 hour working shifts. Less working hours and days will result in a loss of productivity and income for shearers.

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Appendix 1: List of Parasiticides (January – March 2008 - IVS)

List of Parasiticides registered for use on sheep in South Africa (January – March 2008 - IVS)

Deregistered, and for the past 20 years also illegal to use products

List of Parasiticides registered for use on sheep in South Africa

ECTOPARASITICIDE CHART - SHEEP				
Trade name	Reg no	Active Ingredients	Company	Species

1. Organophosphors and carbamates

Coopers Supadip	G3349	Chlorfenvinphos 30%	Afrivet	Cap,O,B
Cooperzon 30	G821	Diazinon 30%	Afrivet	Cap,O,P
Daz-Dust 2%	G421	Diazinon 2%	Bayer	B,Cap,O,E
Dazzel NF	G582	Diazinon 30%	Bayer	Cap,O,P
Disnis NF Dip	G1015	Chlorfenvinphos 9%	Bayer	B,Cap,O
PAB-NF	G961	Propetamphos 0.14%	Bayer	Cap,O
Supona 30 Cattle Dip	G1284	Chlorfenvinphos 30%	Bayer	B,Cap,O
Supona Aerosol	G411	Chlorfenvinphos 0.5%, Di-chlorophos 0.83%,Gentian Violet 0,1%	Bayer	B,Cap,O,E
Tiguvon Spot-on	G145	Fenthion 20%	Bayer	B,Cap, O,E
Zipdip	G381	Triazophos 40%	Intervet	Cap,O,P

2. Pyrethrins and pyrethroids

Blitzdip Aerosol	G1049	Cypermethrin 1%	Bayer	B, Cap, O
Bodygard Pour-on	G3424	Flumethrin 1%	Pfizer	B, Cap, O
Clout Pour-on	G1447	Deltamethrin 1%	Afrivet	B,Cap,O
Coopers Expel	G3245	Deltamethrin 0.10%, resins and oils 99.39% germicide 0.51%	Afrivet	Cap, O
Coopers Redline Pour-on	G3445	Flumethrin 1%	Afrivet	Cap, O
Coopers Zero Tick	G1029	Cyhalothrin 5%	Afrivet	B, O
Curatik Dip	G505	Cypermethrin 15%	Bayer	B,O
Cylence Liquid	G1725	Cyfluthrin 1%	Bayer	B,Cap,O
Decatix 3 Spray	G1348	Deltamethrin 2.5%	Afrivet	B,Cap, O
Delete Pour-on	G2815	Deltamethrin 0.5%, Pip-butox 2%	Intervet	B,Cap,O
Delete X5	G3279	Deltamethrin 5%	Intervet	B,Cap,O
Delkol Pour-on	G3550	Deltamethrin 1%	Intervet	B,Cap,O

Deltab Tablets for Spraying & Dipping	G2517	Deltamethrin 25%	Intervet	B,Cap,O
Drastic Dreadline Pour-On	G723	Flumethrin 1%	Bayer	B,O
Ectomin	G3313	Cypermethrin 100g/l	Novartis	B,Cap,O
Ectopor Pour-on	G3313	Cypermethrin 20g/l	Novartis	B,Cap,O
Langa-dip	G3513	Cypermethrin 20%	Elangeni	B,O
Maxipour Pour-on	G3567	Flumethrin 1%	Cipla Agrimed	B, Cap
MDB Cyperdip	G2769	Cypermethrin 15%	Ceva	B,O
Paracide	G791	Alphamethrin 7%	Pfizer	B,Cap,O
ProDip CYP 20% Liquid	G2311	Cypermethrin 20%	Virbac	B,O
Stopatik Liquid	G1431	Cypermethrin 2%, Piperonyl butoxide 8%,	Virbac	B,O
Wipe-out	G1434	Deltamethrin 0.5%	Afrivet	Cap,O

3. Formamidines

Amidip 200	G2601	Amitraz 20%	Virbac	B,Cap,O
Supatraz 25%	G3581	Amitraz 25%	Cipla Agrimed	B,Cap,O
Taktic Cattle Spray	G2535	Amitraz 12.5%	Intervet	B,Cap,O
Tactic TR Cattle dip	G2537	Amitraz 23.75%	Intervet	B,Cap,O
Triatix 125	G3189	Amitraz 12.5%	Afrivet	B,Cap,O
Triatix 250	G3190	Amitraz 25%	Afrivet	B,Cap,O
Triatix 500 TR	G3256	Amitraz 50%	Afrivet	B,Cap,O

4. Chitin synthesis inhibitors (Insect Growth Regulators - IGRs)

FleeceCare Liquid	G1743	Diflubenzuron 25%	Intervet	Cap, O
Vetrazin Pour-on	G1397	Cypromazine 100g/l	Novartis	O
Vetrazin Powder	G525	Cypromazine 500g/kg	Novartis	O
Zapp Pour-on	G2926	Triflumuron 2.5%	Bayer	Cap, O
Zapp Spray	G2335	Triflumuron 48%	Bayer	Cap,O

5. Macrocyclic Lactones

Crede-Mintic-Eximec	G2787	Ivermectin 1%	Experto Vet	B,O,P
Cyductin Eweguard +selenium + Vit B12	G3541	Moxidectin 0.5% combined with Ag+Sel+Vit	Bayer	O.Cap
Cyductin Eweguard	G2304	Moxidectin 0.5% combined with antigens	Bayer	O
Cyductin 0.1%, Oral Solution	G2388	Moxidectin 0.1%	Bayer	O
Cyductin Injectable	G1463	Moxidectin 1%	Bayer	B,O
Dectomax Injectable	G1726	Doramectin 1%	Pfizer	B,Cap, O, P
Ecomectin 1% Injection	G2275	Ivermectin 1%	Afrivet	B,O,P
Ecomectin Sheep Drench	G2630	Ivermectin 0.08%	Afrivet	Cap,O
Ivermax 1% Injectable	G3582	Ivermectin 1%	Cipla Agrimed	B,O,P

Ivermax Sheep drench	G3579	Ivermectin 0.08%	Cipla Agrimed	Cap,O
Ivermectin 1%	G2889	Ivermectin 1%	Ourofino	B,O
Ivomec Injection for Cattle, Sheep and Pigs	G2329	Ivermectin 1%	Merial	B,O,P
Ivomec Liquid for Sheep and Goats	G590	Ivermectin 0.08%	Merial	Cap, O
Ivomec Maximiser CR Capsules (Weaner Sheep)	G2510	Ivermectin 80mg/capsule	Merial	O
Ivomec Maximiser CR Capsules (Adult Sheep)	G2509	Ivermectin 160mg/capsule	Merial	O
Ivomec Super for Cattle and Sheep	G2629	Ivermectin 1%, Clorsulon 10%	Merial	B, O
Ivotan Injection	G2858	Ivermectin 1%	Intervet	B,O
Ivotan Oral	G3393	Ivermectin 0.08%	Intervet	O,Cap
Langa Mec	G3500	Ivermectin 1%	Elangeni	B,O,P
Noromectin Drench	G2706	Ivermectin 0.08%	Norbrook	Cap,O
Noromectin 1% Injectable	G2734	Ivermectin 1%	Norbrook	B,O
MDB IVER 1% Inj	G2805	Ivermectin 1%	Ceva	B,O,P
Paramax	G3083	Ivermectin 1%	Schering-Plough	B,O,P
Virbamec Injectable Solution	G2588	Ivermectin 1%	Virbac	B,O
Virbamec L	G3269	Ivermectin 1% Clorsulon 10%	Virbac	B,O,Cap
Verbamax LV Solution	G2782	Abamectin 0,2%	Virbac	O

Combinations

Amipor Pour-on	G2058	Chlorfenvinphos 1%, Cypermethrin 1% PBO 5%	Virbac	B, Cap, O
Blowfly Dressing	G935	Cypermethrin 0.05%, Chlorfenvinphos 1%	Bayer	O
Deca-Spot Pour-on	G3433	Deltamethrin 0.5% PBO 2.5%	Afrivet	B,Cap,O
Delete All	G2837	Amitraz 2%, Piperinyl butozide 2%, Deltamethrin 0.5%	Intervet	B, Cap, O
Langa Pour-line	G3501	Amitraz 1% Cypermethrin 1% PBO 5%	Elangeni	B,Cap,O
Tick and Maggot Oil Plus	G1494	Chlorfenvinphos 1%, Cypermethrin 0.1%, Pine Oil 4%	Bayer	B, Cap, O
Triatix Plus Pour-on	G3434	Amitraz 1.5% Deltamethrin 0.5% PBO 3%	Afrivet	B,Cap,O
Wound Aerosol NF	G955	Dichlorophen 1%, Propetamphos 0.25%, Pine Oil 2.5%	Bayer	B, O
Wound Oil	G956	Dichlorophen 1%, Propetamphos 0.25%	Bayer	B, O
Sumiplus	G1181	Chlorfenvinphos 30%, Esfenvalerate 2.2%	Bayer	B, Cap, O

Wound Sept Plus Aerosol	G1521	Cypermethrin 0.0125%, Dichlorophen 0.015%, Chlorocres 0.5%, Gentian Violet 0.15%	Virbac	B, Can, Cap, E, O, P
Zeropar	G1152	Chlorfenvinphos 30%, Al-phamethrin 3%	Bayer	B, Cap, O

Deregistered, and for the past 20 years also illegal to use products

Brand name	Reg no	Banned Toxin
x-BHC Dip	G236	Lindane
x-BHC NF Dip	G622	Lindane
Lindip 15% BHC (Lindane)	G147	Lindane
Bont-Tox Dipand Spay	G57	Camphechlor
Bromotox Dip	G1118	Camphechlor
Disnis Aerosol	G147	Camphechlor
Disnis Livestock Dip	G58	Camphechlor
Lindane "Flo" Scab Dip	G315	Lindane
Lindane "Flo" SGD	G591	Lindane
Nexa-Ban Tick Oil	G63	Camphechlor
Nexa-Ban Tick Grease	G62	Camphechlor
Nexagan Tick Dip	G52	Camphechlor
Supalin 40	G424	Lindane
Tick and Maggot oil	G795	Camphechlor
Tick Oil	G912	Camphechlor
Tixban Tick Grease	G1155	Camphechlor
Tixban Tick Oil	G1154	Camphechlor

Appendix 2: Drug stock and usage record

[illegible]

Appendix 3: Checklist for storage, handling and disposal of pesticides on farms according to SANS 10206:2005

PESTICIDE STORE

Authorisation	• Permission from local authority to erect a new store & certificate of occupancy obtained. • Certificate of occupancy obtained from local authority for existing store
Location of store	• Above 50 year flood line, preferably above 100 year flood line. • Out of reach of rock falls, falling trees and veld fires. • Preferably in separate building, at least 10 m from house, stables and stores for animal feed, fuel and flammable material. • If part of a complex, store to be totally sealed off, i.e. no free movement of air between store area and rest of building. Approved firewall if flammable products are stored. • Away from rivers, dams, boreholes & areas likely to be flooded. Spills and flooding should not contaminate water sources, crops or pastures. • Situated where it can be supervised. • Easy access for delivery or dispatch. • In case of fire: easy access for fire fighting, vegetation within 5m of building cleared.
Construction	• Walls, roof & floor should be made of non-combustible materials.
Floor	• Smooth, screeded concrete required. Soil, wood, bitumen, PVC, linoleum, unscreeded, disintegrating or cracked concrete not acceptable. • Must be impenetrable to spilt chemicals • Wall-to-floor joints must be watertight.
Walls	• Walls must be brick or concrete.
Roof	• Leak-free and insulated with non-combustible material to maintain temperature at a reasonable level. • Vents in roof will allow hot air to escape.
Doors	• Preferably steel with effective locks. • All doors must have security gates to reduce risk of forced entry. • Exit door(s) must open to the outside.

Windows	• Must allow in sufficient light to read labels, otherwise install electric light. • All windows must have burglar bars. • Window frames must be steel. • Windows must be fitted with wired glass, minimum 8 mm thickness. • Window panels maximum size 450 x 450 mm. • No windows shall be capable of being opened.
Retention of contamination	• Seal all joints in floor . • Ridge or retention wall 20 cm high at door (to prevent environmental contamination & to keep out floodwater).
Ventilation	• Natural ventilation: airbricks (min. 140 x 215 mm), provided with noncorrodible gauze wire, in at least 3 external walls, to provide min. 5 total air changes/hour. • Mechanical ventilation: switched on at all times, with capacity to change total air content min. 5 times/hour.
Lightning protection	• Protect store against lightning strike in regions where required
Run-off water	• Contaminated water from fire or clean-up of spillage must be contained and disposed of in accordance with requirements of local authority.
Security	• Only authorised and trained personnel shall have access to keys and store. • Area around store secured against unauthorized entry by a wall/fence at least 1,8 m high, with lockable gate & clear strip 1 m wide along inner perimeter.
Placement of products in store	• Only plant protection and/or animal health products in store – no feedstuffs • Herbicides and phenoxy compounds separated from other pesticides by a division made of wire mesh, metal bars or wall and with another gate/door to prevent accidental application of herbicides to crop foliage (GAP)*. • Separate, fenced & lockable area to be provided for all Danger Group I products. • Special requirements for flammable products to be met, where applicable.

Shelving	• Shelves must be non-absorbent, impervious and chemically resistant to stored products – wooden shelves covered with thick plastic or with non-combustible trays can be used. • Large containers should not be stored directly on cement floor – place on wooden pallets covered with thick plastic or on plastic pallets. • Products in solid, powder or granular form must be stored above liquid formulations (less damage during accidental leakage). • Keep open bags with powder formulations in large plastic bins with lids to contain fumes, protect against contamination and prevent unnecessary spillage onto floor (GAP)*. • All products must be stored in original containers with labels intact.
Working area	• Separate working area for weighing, measuring & mixing of chemicals. • An eye wash bottle & washbasin with running water to wash equipment without polluting the environment must be provided in the working area. • Shower facilities should be available in or near above working area.
Spillage	• Broom, spade and bucket of sand available to clean up spillage. • Large, open containers available for removal of contaminated material and to place leaking containers in.
Warning notices outside store	• Warning signs at entrance and on surrounding fence: 'Storage of Pesticides' and 'Unauthorized Entry Prohibited' in red letters (≥ 75 mm) on white background. • At entrance: No Smoking; No Naked Flames; No Fires; Position and types of fire related equipment (signs at least 290 x 290 mm).
Inside store	• All areas clearly demarcated and relevant hazard class diamonds (e.g. toxic, flammable, corrosive) displayed (size at least 250 x 250 mm). • No Smoking; No Naked Flames; No Fires (signs at least 290 x 290 mm). • Location of First Aid Station. • Position and types of fire related equipment

Responsible persons	• Person responsible for managing pesticide store (farmer/literate farm worker) must be trained in pesticide handling & understand implications of incorrect handling. • The responsible person shall check every container on delivery for correct content and to ensure that container does not leak. • The responsible person shall ensure that oldest stock is used first (label date of manufacture or mark container with date of delivery in waterproof ink).
Emergency Procedure	• Emergency telephone numbers to be available at nearest telephone: nearest poison centre, doctor, hospital, fire brigade and ambulance service. • Responsible personnel must have immediate access to a telephone and • emergency numbers, even in absence of employer. • At least one farm worker to be trained in basic first aid. Information on relevant first-aid procedures for all pesticides in the store must be available in a prominent place. • An Emergency Procedure which clearly outlines actions to be taken in an emergency must be available in the store and responsible personnel must be familiar with it.
Fire fighting	• Portable fire extinguishers (carbon dioxide, dry chemical or foam type) of minimum 9 kg or 9 L to be available . • Ratio: 1 extinguisher to every 100 m² storage, unless more deemed necessary by local fire authority. • Fire hose mounted outside store and connected to a water supply. • For stores larger 9 m³ a sprinkler system is recommended. • Fire extinguishers shall be inspected and maintained annually by a registered person (SANS 10105-1, SANS 10105-2, SANS 1475-1, SANS 1475-2).
Record keeping	• A complete and up-to-date record (inventory) of all products received, used and the balance of products in the store must be kept by the person responsible for the store. • Keep records away from storage area. A copy can also be kept in store. • Records to be available at all times for inspection by national, provincial or local authorities.

HANDLING AND APPLICATION OF PESTICIDES

Filling points	The mixing and filling area for spray tanks must be: • well away from any water sources • the floor must be non-porous (e.g. cement with damp coursing) • the floor must be bunded (retaining wall) • rinse liquid from measuring vessels must be added to the spray tank • run-off and spillage may not contaminate the ground or water sources (construct non-permeable evaporation pit, fill with stones & add lime to increase pH, or install a tank that can be emptied by Wastech).
Worker health	• For work involving exposure to pesticides, only operators who have been declared medically fit may be employed. • Operators handling pesticides should undergo annual medical examinations to test for signs of pesticide exposure. • Medical records and records of pesticide exposure must be kept for every worker exposed to pesticides. Work-exposure records must be kept for at least 30 years or be sent to regional labour representative if farming operations cease.
Training	• Every farm worker working with pesticides shall be trained in the meaning of the symbols on labels and interpretation of written instructions. • Spray operators must receive practical training in the safe handling and application of pesticides and must know the risks involved and precautions to be taken. • At least 2 members of each team of operators shall be trained in basic first aid relating to pesticide exposure.
Protective clothing & equipment	• Keep protective clothing separate from personal clothing (different lockers) • All protective garments to be thoroughly washed with soap/detergent and water after each application/spray operation before being worn again. • Contaminated protective clothing not to be removed from storage area – not to be washed at home!

Overalls	• Must be impervious to pesticide formulations. • Must give splash and droplet protection. • Must be durable, light-weight, comfortable & affordable. • Two-piece garment (jacket with hood & trousers) or one-piece garment with hood can be used. • Hood must close around gas mask. • Sleeves must close at wrists with elasticized cuffs. • Trousers must have elasticized closures around waist and ankles. • Jacket of two-piece suit should seal on the hips (e.g. Velcro). • Overalls should preferably be light in colour - contamination with pesticides visible.
Eye and face protection	• A face shield made of clear transparent material, which is impervious to solvent and pesticide vapours and which provides full face protection should be worn as indicated on the product label when preparing and applying spray mixtures. • Safety goggles are an acceptable alternative to a face shield.
Gloves	• Gloves made of nitrile rubber, PVC, neoprene and butyl rubber are suitable. • Should be light in colour (contamination with pesticides visible) and non-slippery. • Lined gloves not recommended – pesticide can accumulate in lining material. • Gloves must be long enough to cover minimum of 90 mm above the wrist. • Contaminated gloves must be washed with soap & water before being removed from hands and again after removal (inside out).
Boots	• Rubber boots, unlined and at least calf-high are to be used. Trousers shall be worn outside boots to prevent pesticide entering boots. • Boots shall be washed inside & outside at the end of each day's spraying
Head coverings	• For protection against spray drift, a cotton hat with brim can be used. • Overhead spraying: a waterproof hat and cape shall be worn. • When applying irritant powders (e.g. sulphur), a hood to cover head, neck and shoulders for total skin protection shall be worn. • Respirators should be worn when indicated. Must comply with SANS 10220
NOTE	• Tractors with closed canopies and air conditioning are recommended for maximum safety and comfort during application – improves productivity and quality of application & coverage (GAP)*.

Ablution facilities	• Each operator shall wash or shower at the end of each spray operation or shift. • Contaminated washing water shall not be disposed of into any water source, including rivers, ground water sources and sewerage systems.
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DISPOSAL OF EMPTY CONTAINERS AND OBSOLETE PESTICIDES

Pesticides	• Obsolete or unwanted pesticide formulations must be disposed of at a registered hazardous waste landfill site.
Empty containers	• Empty containers shall be triple-rinsed and rendered unserviceable (puncture or cut up). • Containers should then be stored until removal for recycling or disposal at a hazardous waste disposal site. Ensure that the person/company removing containers is registered to dispose of containers legally. • Combustible containers may not be burned on the farm – this is illegal.

* GAP = not a legal requirement, but recommended as a good agricultural practice to enhance safe handling, application & storage.

Appendix 4: Declared Weeds and Invader Plants (Regulation 15)

Kind of plant		Type	Category	Special conditions
Botanical name	Common name			
Column 1		Column 2	Column 3	Column 4
<i>Acacia baileyana</i> F.Muell.	Bailey's wattle	Invader	3	
<i>Acacia cyclops</i> A.Cunn. ex G.Don	Red eye	Invader	2	
<i>Acacia dealbata</i> Link	Silver wattle	Weed	Category 1 plant in the Western Cape, Category 2 plant in the rest of South Africa	
<i>Acacia decurrens</i> (Wendl.) Willd.	Green wattle	Invader	2	
<i>Acacia elata</i> A.Cunn. ex Benth. (<i>A. terminalis</i> misapplied in South Africa)	Pepper tree wattle	Invader	3	
<i>Acacia implexa</i> Benth.	Screw – pod wattle	Weed	1	
<i>Acacia longifolia</i> (Andr.) Willd.	Long – leaved wattle	Weed	1	
<i>Acacia mearnsii</i> De Wild.	Black wattle	Invader	2	
<i>Acacia melanoxylon</i> R.Br.	Australian blackwood	Invader	2	
<i>Acacia paradoxa</i> DC. (= <i>A. armata</i> R.Br.)	Kangaroo wattle	Weed	1	
<i>Acacia podalyriifolia</i> A.Cunn. ex G.Don	Pearl acacia	Invader	3	
<i>Acacia pycnantha</i> Benth.	Golden wattle	Weed	1	
<i>Acacia saligna</i> (Labill.) H.L.Wendl.	Port Jackson / Port Jackson willow	Invader	2	
<i>Achyranthes aspera</i> L.	Burweed	Weed	1	
<i>Agave sisalana</i> Perrine	Sisal hemp, Sisal	Invader	2	
<i>Ageratina adenophora</i> (Spreng.) R.M.King & H.Rob. (= <i>Eupatorium adenophorum</i> Spreng.)	Crofton weed	Weed	1	
<i>Ageratina riparia</i> (Regel) R.M.King & H.Rob. (= <i>Eupatorium riparium</i> Regel)	Mistflower	Weed	1	
<i>Ageratum conyzoides</i> L.	Invading ageratum	Weed	1	
<i>Ageratum houstonianum</i> Mill Uitgesluit kultivars / Excluding cultivars	Mexican ageratum	Weed	1	
<i>Ailanthus altissima</i> (Mill.) Swingle	Tree – of – heaven	Invader	3	
<i>Albizia lebeck</i> (L.) Benth.	Lebeck tree	Weed	1	
<i>Albizia procera</i> (Roxb.) Benth.	False lebeck	Weed	1	

Kind of plant		Type	Category	Special conditions
Botanical name	Common name			
Column 1		Column 2	Column 3	Column 4
<i>Alhagi maurorum</i> Medik. (= <i>A. camelorum</i> Fisch.)	Camel thorn bush	Weed	1	
<i>Anredera cordifolia</i> (Ten.) Steenis (<i>A. baselloides</i> (Kunth) Baill. misapplied in South Africa)	Madeira vine, Bridal wreath	Weed	1	
<i>Araujia sericifera</i> Brot.	Moth catcher	Weed	1	
<i>Ardisia crenata</i> Sims (<i>Ardisia crispa</i> misapplied in South Africa)	Coralberry tree, Coral Bush	Weed	Category 1 plant only in the Northern Province, Kwa-Zulu – Natal and Mpumalanga	
<i>Argemone mexicana</i> L.	Yellow – flowered Mexican poppy	Weed	1	
<i>Argemone ochroleuca</i> Sweet subsp. <i>Ochroleuca</i> (= <i>A. subfusiformis</i> G.B.Ownbey)	White – flowered Mexican poppy	Weed	1	
<i>Arundo donax</i> L.	Giant reed, Spanish reed	Weed	1	
<i>Atriplex lindleyi</i> Moq. Subsp. <i>inflata</i> (F.Müll.) P.G.Wilson	Sponge – fruit salt-bush	Invader	3	
<i>Atriplex nummularia</i> Lindl. Subsp. <i>Nummularia</i>	Old man saltbush	Invader	2	
<i>Azolla filiculoides</i> Lam.	Azolla, Red water fern	Weed	1	
<i>Bauhinia purpurea</i> L.	Butterfly orchid tree	Invader	3	
<i>Bauhinia variegata</i> L.	Orchid tree	Invader	3	
<i>Bryophyllum delagoense</i> (Eckl. & Zeyh.) Schinz (= <i>B. tubiflorum</i> Harv.; <i>Kalanchoe tubiflora</i> Raym. – Hamet; <i>K. delagoensis</i> Eckl. & Zeyh.)	Chandelier plant	Weed	1	
<i>Caesalpinia decapetala</i> (Roth) Alston (= <i>C. sepiaria</i> Roxb.)	Mauritius thorn	Weed	1	
<i>Campuloclinium macrocephalum</i> (Less.) DC. (= <i>Eupatorium macrocephalum</i> Less.)	Pom pom weed	Weed	1	
<i>Canna indica</i> L. Uitgesluit hibriede kultivars / Excluding hybrid cultivars	Indian shot	Weed	1	

Kind of plant		Type	Category	Special conditions
Botanical name	Common name			
Column 1		Column 2	Column 3	Column 4
<i>Cardiospermum grandiflorum</i> Sw.	Balloon vine	Weed	1	
<i>Casuarina cunninghamiana</i> Miq.	Beefwood	Invader	2	Not for use in dune stabilisation
<i>Casuarina equisetifolia</i> L.	Horsetail tree	Invader	2	Not for use in dune stabilisation
<i>Cereus jamacaru</i> DC. (<i>C. peruvianus</i> misapplied in South Africa)	Queen of the Night	Weed	1	
<i>Cestrum aurantiacum</i> Lindl.	Yellow or Orange cestrum	Weed	1	
<i>Cestrum elegans</i> (Brongn.) Schtdl. (= <i>C. purpureum</i> (Lindl.) Standl.)	Crimson cestrum	Weed	1	
<i>Cestrum laevigatum</i> Schtdl.	Inkberry	Weed	1	
<i>Cestrum parqui</i> L'Hér.	Chilean cestrum	Weed	1	
<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob. (= <i>Eupatorium odoratum</i> L.)	Triffid weed, Chromolaena	Weed	1	

Kind of plant		Type	Category	Special conditions
Botanical name	Common name			
Column 1		Column 2	Column 3	Column 4
<i>Cinnamomum camphora</i> (L.) J.Presl	Camphor tree	Weed	Category 1 plant only in the Northern Province, KwaZulu – Natal and Mpumalanga	
<i>Cirsium vulgare</i> (Savi) Ten. (= <i>C. lanceolatum</i> Scop.)	Spear thistle, Scotch thistle	Weed	1	
<i>Convolvulus arvensis</i> L.	Field bindweed, Wild morning – glory	Weed	1	
<i>Cortaderia jubata</i> (Lem.) Stapf	Pampas grass	Weed	1	
<i>Cortaderia selloana</i> (Schult.) Asch. & Graebn. Excluding sterile cultivars	Pampas grass	Weed	1	
<i>Cotoneaster franchetii</i> Boiss.	Cotoneaster	Invader	3	
<i>Cotoneaster pannosus</i> Franch.	Silver – leaf cotoneaster	Invader	3	

Kind of plant		Type	Category	Special conditions
Botanical name	Common name			
Column 1		Column 2	Column 3	Column 4
<i>Cuscuta campestris</i> Yunc.	Common dodder	Weed	1	
<i>Cuscuta suaveolens</i> Ser.	Lucerne dodder	Weed	1	
<i>Cytisus monspessulanus</i> L. (= <i>C. candicans</i> (L.) DC., <i>Genista monspessulana</i> (L.) L. Johnson)	Montpellier broom	Weed	1	
<i>Cytisus scoparius</i> (L.) Link (= <i>Genista scoparia</i> (L.) Lam.)	Scotch broom	Weed	1	
<i>Datura ferox</i> L.	Large thorn apple	Weed	1	
<i>Datura innoxia</i> Mill.	Downy thorn apple	Weed	1	
<i>Datura stramonium</i> L.	Common thorn apple	Weed	1	
<i>Echinopsis spachiana</i> (Lem.) Fiedrich & Rowley (= <i>Trichocereus spachianus</i> (Lem.) Riccob.)	Torch cactus	Weed	1	
<i>Echium plantagineum</i> L. (= <i>E. lycopsis</i> L.)	Patterson's curse	Weed	1	
<i>Echium vulgare</i> L.	Blue echium	Weed	1	
<i>Egeria densa</i> Planch. (= <i>Elodea densa</i> (Planch.) Casp.)	Dense water weed	Weed	1	
<i>Eichhornia crassipes</i> (C.Mart.) Solms	Water hyacinth	Weed	1	
<i>Elodea canadensis</i> Michx.	Canadian water weed	Weed	1	
<i>Eriobotrya japonica</i> (Thunb.) Lindl.	Loquat	Invader	3	
<i>Eucalyptus camaldulensis</i> Dehnh.	Red river gum	Invader	2	
<i>Eucalyptus cladocalyx</i> F.Muell.	Sugar gum	Invader	2	
<i>Eucalyptus diversicolor</i> F.Muell.	Karri	Invader	2	
<i>Eucalyptus grandis</i> W.Hill ex Maiden (<i>E. saligna</i> Sm. (p.p.)	Saligna gum, Rose gum	Invader	2	
<i>Eucalyptus lehmannii</i> (Schauer) Benth.	Spider gum	Weed	Category 1 plant in the Western Cape, Category 2 plant in the rest of South Africa	
<i>Eucalyptus paniculata</i> Sm.	Grey ironbark	Invader	2	

Kind of plant		Type	Category	Special conditions
Botanical name	Common name			
Column 1		Column 2	Column 3	Column 4
<i>Eucalyptus sideroxylon</i> A.Cunn. ex Woolls	Black ironbark, Red ironbark	Invader	2	
<i>Eugenia uniflora</i> L.	Pitanga, Surinam cherry	Weed	Category 1 plant in the Northern Province, KwaZulu – Natal and Mpumalanga, Category 3 plant in the rest of South Africa	
<i>Gleditsia triacanthos</i> L. Excluding sterile cultivars	Honey locust, Sweet locust	Invader	2	
<i>Grevillea robusta</i> A.Cunn. ex R.Br.	Australian silky oak	Invader	3	
<i>Hakea drupacea</i> (C.F.Gaertn.) Roem. & Schult. (= <i>H. suaveolens</i> R.Br.)	Sweet hakea	Weed	1	
<i>Hakea gibbosa</i> (Sm.) Cav.	Rock hakea	Weed	1	
<i>Hakea sericea</i> Schrad. & J.C.Wendl.	Silky hakea	Weed	1	
<i>Harrisia martinii</i> (Labour.) Britton & Rose (= <i>Eriocereus martinii</i> (Labour.) Riccob.)	Moon cactus, <i>Harrisia</i> cactus	Weed	1	
<i>Hedychium coccineum</i> Sm.	Red ginger lily	Weed	1	
<i>Hedychium coronarium</i> J. König	White ginger lily	Weed	1	
<i>Hedychium flavescens</i> Roscoe	Yellow ginger lily	Weed	1	
<i>Hedychium gardnerianum</i> Ker Gawl.	Kahili ginger lily	Weed	1	
<i>Hypericum perforatum</i> L.	St. John's wort, Tipton weed	Invader	2	Controlled cultivation
<i>Ipomoea alba</i> L.	Moonflower	Weed	Category 1 plant in the Northern Province, KwaZulu – Natal and Mpumalanga, Category 3 plant in the rest of South Africa	

Kind of plant		Type	Category	Special conditions
Botanical name	Common name			
Column 1		Column 2	Column 3	Column 4
<i>Ipomoea indica</i> (Burm.f.) Merr. (= <i>I. Congesta</i> R.Br.)	Morning glory	Weed	Category 1 plant in the Northern Province, KwaZulu – Natal and Mpumalanga, Category 3 plant in the rest of South Africa	
<i>Ipomoea purpurea</i> (L.) Roth	Morning glory	Invader	3	
<i>Jacaranda mimosifolia</i> D.Don Excluding sterile cultivar 'Alba'	Jacaranda	Invader	3	
All seed producing species or seed producing hybrids of <i>Lantana</i> that are non-indigenous to Africa.	<i>Lantana</i> , Tickberry, Cherry pie	Weed	1	
<i>Lepidium draba</i> L. (= <i>Cardaria draba</i> (L.) Desv.)	Pepper – cress, Hoary cardaria, White top	Weed	1	
<i>Leptospermum laevigatum</i> (Gaertn.) F.Muell.	Australian myrtle	Weed	1	
<i>Leucaena leucocephala</i> (Lam.) de Wit (= <i>L. glauca</i> Benth.)	Leucaena	Weed	Category 1 plant in the Western Cape, Category 2 plant in the rest of South Africa	
<i>Ligustrum japonicum</i> Thunb.	Japanese wax – leaved privet	Invader	3	
<i>Ligustrum lucidum</i> Aiton	Chinese wax – leaved privet	Invader	3	Only for use as root – stock if authorised by the Executive Official in terms of regulation 15C(5)
<i>Ligustrum ovalifolium</i> Hassk.	Californian privet	Invader	3	
<i>Ligustrum sinense</i> Lour.	Chinese privet	Invader	3	
<i>Ligustrum vulgare</i> L.	Common privet	Invader	3	
<i>Lilium formosanum</i> A. Wallace (= <i>L. longiflorum</i> Thunb. var. <i>formosanum</i> Baker) (<i>L. longiflorum</i> has sometimes been misapplied to this species in South Africa)	St Joseph's lily, Trumpet lily, Formosa lily	Invader	3	

Kind of plant		Type	Category	Special conditions
Botanical name	Common name			
Column 1		Column 2	Column 3	Column 4
Litsea glutinosa (Lour.) C.B.Rob. (= L. sebifera Pers.)	Indian laurel	Weed	1	
Lythrum salicaria L.	Purple loosestrife	Weed	1	
Macfadyena unguis-cati (L.) A.H.Gentry	Cat's claw creeper	Weed	1	
Melia azedarach L.	'Syringa', Persian lilac	Invader	3	
Metrosideros excelsa Sol. ex Gaertn. (= M. tomentosa A.Rich.)	New Zealand christmas tree	Invader	3	
Mimosa pigra L.	Giant sensitive plant	Invader	3	
Montanoa hibiscifolia Benth.	Tree daisy	Weed	1	
Morus alba L. Excluding cultivar 'Pendula'	White mulberry, Common mulberry	Invader	3	Only for use as root – stock if authorised by the Executive Official in terms of regulation 15C(5)
Myoporum tenuifolium G.Forst. subsp. Montanum (R.Br.) Chin- nock (= M. montanum R.Br.) (M. acuminatum misapplied in South Africa)	Manatoka	Invader	3	
Myriophyllum aquaticum (Vell.) Verdc.	Parrot's feather	Weed	1	
Myriophyllum spicatum L.	Spiked water – milfoil	Weed	1	
Nassella tenuissima (Trin.) Barkworth (= Stipa tenuissima Trin.)	White tussock	Weed	1	
Nassella trichotoma (Nees) Arech. (= Stipa trichotoma Nees)	Nassella tussock	Weed	1	
Nephrolepis exaltata (L.) Schott (= Polypodium exaltatum L.) Excluding cultivars	Sword fern	Invader	3	
Nerium oleander L. Excluding sterile, double – flow- ered cultivars	Oleander	Weed	1	
Nicotiana glauca Graham	Wild tobacco	Weed	1	
Opuntia aurantiaca Lindl.	Jointed cactus	Weed	1	

Kind of plant		Type	Category	Special conditions
Botanical name	Common name			
Column 1		Column 2	Column 3	Column 4
Opuntia exaltata A.Berger (= Austrocylindropuntia exaltata (A.Berger) Backeb.)	Long spine cactus	Weed	1	
Opuntia ficus-indica (L.) Mill. (= O. megacantha Salm-Dyck) Excluding all spineless cactus pear cultivars and selections	Mission prickly pear, Sweet prickly pear	Weed	1	
Opuntia fulgida Engelm. (O. rosea misapplied in South Africa.)	Rosea cactus	Weed	1	
Opuntia humifusa (Raf.) Raf. (O. compressa (Salisb.) J.Macbr. illegitimate)	Large flowered prickly pear, Creeping prickly pear	Weed	1	
Opuntia imbricata (Haw.) DC. (= Cylindropuntia imbricata (Haw.) Knuth)	Imbricate cactus, Imbricate prickly pear	Weed	1	
Opuntia lindheimeri Engelm. (= O. tardospina Griffiths)	Small round – leaved prickly pear	Weed	1	
Opuntia monacantha Haw. (O. vulgaris Mill. misapplied)	Cochineal prickly pear, Drooping prickly pear	Weed	1	
Opuntia spinulifera Salm-Dyck	Saucepan cactus, Large roundleaved prickly pear	Weed	1	
Opuntia stricta (Haw.) Haw. (= O. dillennii (Ker Gawl.) Haw.)	Pest pear of Australia	Weed	1	
Orobanche minor Sm.	Bremraap / Lesser broomrape, Clover broomrape	Weed	1	
Paraserianthes lophantha (Willd.) Nielsen (= Albizia lophantha (Willd.) Benth.)	Australian Albizia, Stink bean	Weed	1	
Parthenium hysterophorus L.	Parthenium	Weed	1	
Passiflora caerulea L.	Blue passion flower	Weed	1	
Passiflora mollissima (Kunth) L.H.Bailey	Banana poka, Banana-dilla	Weed	1	

Kind of plant		Type	Category	Special conditions
Botanical name	Common name			
Column 1		Column 2	Column 3	Column 4
Passiflora suberosa L.	Devil's pumpkin, Indigo berry	Weed	1	
Passiflora subpeltata Ortega	Granadina	Weed	1	
Pennisetum setaceum (Forssk.) Chiov. Excluding sterile cultivar 'Rubrum'	Fountain grass	Weed	1	
Pennisetum villosum R.Br. ex Fresen.	Feathertop	Weed	1	
Pereskia aculeata Mill.	Barbados gooseberry	Weed	1	
Phytolacca dioica L.	Belhambra / Belhambra	Invader	3	
Pinus canariensis C.Sm.	Canary den	Invader	2	
Pinus elliotti Engelm.	Slash pine	Invader	2	
Pinus halepensis Mill.	Aleppo pine	Invader	2	
Pinus patula Schltldl. & Cham.	Treurden / Patula pine	Invader	2	
Pinus pinaster Aiton	Trosden / Cluster pine	Invader	2	
Pinus radiata D.Don	Radiata pine, Monterey pine	Invader	2	
Pinus roxburghii Sarg. (= P. longifolia Roxb.)	Tjirden / Chir pine, longifolia pine	Invader	2	
Pinus taeda L.	Loblolly pine	Invader	2	
Pistia stratiotes L.	Water lettuce	Weed	1	
Pittosporum undulatum Vent.	Australian cheesewood, Sweet pittosporum	Weed	1	
Plectranthus comosus Sims (= Coleus grandis Cramer) (Plectranthus barbatus Andr. Misapplied in South Africa)	'Abyssinian' coleus, Woolly plectranthus	Invader	3	
Pontederia cordata L.	Pickerel weed	Invader	3	
Populus alba L.	White poplar	Invader	2	
Populus x canescens (Aiton) Sm.	Grey poplar, Match-wood poplar	Invader	2	
Prosopis glandulosa Torr. Var. torreyana (Benson) Johnst. en hibriede / and hybrids	Honey mesquite	Invader	2	
Prosopis velutina Wooton and hybrids	Velvet mesquite	Invader	2	
Psidium cattleianum Sabine (= P. littorale Raddi var. longipes (O.Berg) Fosb.)	Strawberry guava	Invader	3	

Kind of plant		Type	Category	Special conditions
Botanical name	Common name			
Column 1		Column 2	Column 3	Column 4
Psidium guajava L. en hibriede / and hybrids	Guava	Invader	2	
Psidium guineense Sw.	Brazilian guava	Invader	3	
Psidium x durbanensis Baijnath ined.	Durban guava	Weed	1	
Pueraria lobata (Willd.) Ohwi	Kudzu vine	Weed	1	
Pyracantha angustifolia (Franch.) C.K.Schneid. Excluding cultivars	Yellow firethorn	Invader	3	
Pyracantha crenulata (D.Don) M.Roem.	Himalayan firethorn	Invader	3	
Rhus succedanea L. (= Toxicodendron succedaneum (L.) Kuntze	Wax tree	Weed	1	
Ricinus communis L	Castor - oil plant	Invader	2	
Rivina humilis L.	Rivina, Bloodberry	Weed	1	
Robinia pseudoacacia L.	Black locust	Invader	2	Only for use as root – stock if authorised by the Executive Official in terms of regulation 15B(10)
Rorippa nasturtium – aquaticum (L.) Hayek (= Nasturtium officinale R.Br.)	Watercress	Invader	2	
Rosa rubiginosa L. (= R. eglanteria L.)	Eglantine, Sweetbriar	Invader	1	
Rubus cuneifolius Pursh and hybrid R. x proteus C.H.Stirt.	American bramble	Weed	1	
Rubus fruticosus L. agg.	European blackberry	Invader	2	
Salix babylonica L. not to be confused with the in- digenous S. mucronata Thunb. (= S. capensis, S. subserata, S. woodii)	Weeping willow	Invader	2	
Salix fragilis L. not to be confused with the indigenous S. mucronata Thunb. (= S. capensis, S. subserata, S. woodii)	Crack or brittle willow	Invader	2	
Salvinia molesta D.S.Mitch. and other species of the Family Salviniaaceae	Kariba weed	Weed	1	

Kind of plant		Type	Category	Special conditions
Botanical name	Common name			
Column 1		Column 2	Column 3	Column 4
Schinus terebinthifolius Raddi	Brazilian pepper tree	Weed	Category 1 in Kwa – Zulu Natal, Category 3 in the rest of South Africa	
Senna bicapsularis (L.) Roxb. (= Cassia bicapsularis L.)	Rambling cassia	Invader	3	
Senna didymobotrya (Fresen.) Irwin & Barneby (= Cassia didymobotrya Fresen.)	Peanut butter cassia	Invader	3	
Senna pendula (Willd.) Irwin & Barneby var. glabrata (Vogel) Irwin & Barneby (= Cassia coluteoides Collad.)		Invader	3	
Sesbania punicea (Cav.) Benth.	Red sesbania	Weed	1	
Solanum elaeagnifolium Cav.	Silver-leaf bitter apple	Weed	1	
Solanum mauritianum Scop.	Bugweed	Weed	1	
Solanum seafortianum Andr.	Potato creeper	Weed	1	
Solanum sisymbriifolium Lam.	Wild tomato, Dense - thorned bitter apple	Weed	1	
Sorghum halepense (L.) Pers.	Johnson grass, Aleppo grass	Invader	2	
Spartium junceum L.	Spanish broom	Weed	1	
Syzygium cumini (L.) Skeels	Jambolan	Invader	3	
Syzygium jambos (L.) Alston	Rose apple	Invader	3	
Tamarix chinensis Lour.	Chinese tamarisk	Weed	Category 1 plant in the Northern-, Western-, and Eastern Cape, Category 3 plant in the rest of South Africa	
Tamarix ramosissima Ledeb.	Pink tamarisk	Weed	Category 1 plant in the Northern-, Western-, and Eastern Cape, Category 3 plant in the rest of South Africa	
Tecoma stans (L.) Kunth	Yellow bells	Weed	1	
Thelechitonia trilobata (L.) H.Rob. & Cuatrec. (= Wedelia trilobata (L.) A.Hitchc.)	Singapore daisy	Weed	Category 1 in Kwa – Zulu Natal, Category 3 in the rest of South Africa	

Kind of plant		Type	Category	Special conditions
Botanical name	Common name			
Column 1		Column 2	Column 3	Column 4
Thevetia peruviana (Pers.) K.Schum. (= T. nerifolia A.Juss. ex Steud.)	Yellow oleander	Weed	1	
Tipuana tipu (Benth.) Kuntze (= T. speciosa Benth.)	Tipu tree	Invader	3	
Tithonia diversifolia (Hemsl.) A.Gray	Mexican sunflower	Weed	1	
Tithonia rotundifolia (Mill.) S.F.Blake	Red sunflower	Weed	1	
Toona ciliata M.Roem. (= Cedrela toona Rottler)	Toon tree	Invader	3	
Triplaris americana L.	Triplaris, Ant Tree	Weed	1	
Ulex europaeus L.	European gorse	Weed	1	
Xanthium spinosum L.	Spiny cocklebur	Weed	1	
Xanthium strumarium L.	Large cocklebur	Weed	1	

Appendix 5: Herbicide recommendation for the control of alien species

HERBICIDE RECOMMENDATION FOR THE CONTROL OF ALIEN SPECIES					
SPECIES		TREATMENT	HERBICIDE	DOSAGE %	DOSAGE PER ONE LITRE MIX
Botanical name	Common name				
<i>Acacia cyclops</i>	Rooikrans	Foliar spray	Confront	0.5%	1Lt Water + 5ml Confront + 5ml Actipron
		Cut stump	Confront	2.5%	1Lt Water + 25ml Confront + 5ml Actipron + 1ml EcoBlue
		Foliar spray	Garlon	0.5%	1Lt Water + 5ml Garlon + 5ml Actipron
		Cut stump	* Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Acacia dealbata</i>	Silver wattle	Cut stump	Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Cut stump	* Confront	3.0%	1Lt Water + 30ml Confront + 5ml Actipron + 1ml EcoBlue
		Foliar	Garlon	0.75%	1Lt Water + 7.5ml Garlon + 5ml Actipron
<i>Acacia decurrens</i>	Green Wattle	Cut stump	Confront	3.0%	1Lt Water + 30ml Confront + 5ml Actipron + 1ml EcoBlue
		Basal stem	Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
		Cut stump	Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Acacia longifolia</i>	Long-leaved wattle	Foliar spray	Confront	0.5%	1Lt Water + 5ml Confront + 5ml Actipron
		Cut stump	* Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Foliar spray	Garlon	0.6%	1Lt Water + 6ml Garlon + 5ml Actipron

HERBICIDE RECOMMENDATION FOR THE CONTROL OF ALIEN SPECIES					
SPECIES					
Botanical name	Common name	TREATMENT	HERBICIDE	DOSAGE %	DOSAGE PER ONE LITRE MIX
<i>Acacia mearnsii</i>	Black wattle	Foliar spray	Confront	0.5%	1Lt Water + 5ml Confront + 5ml Actipron
		Cut stump	* Confront	2.0%	1Lt Water + 20ml Confront + 5ml Actipron + 1ml EcoBlue
		Frill	* Confront	4.0%	1Lt Water + 40ml Confront + 5ml Actipron + 1ml EcoBlue
		Aerial	* Confront	2 L / Ha	
		Cut stump	Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Basal stem	Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
		Foliar spray	Garlon	0.5%	1Lt Water + 5ml Garlon + 5ml Actipron
<i>Acacia melanoxylon</i>	Australian blackwood	Foliar spray	Confront	0.7%	1Lt Water + 7ml Confront + 5ml Actipron
		Cut stump	Confront	4.0%	1Lt Water + 40ml Confront + 5ml Actipron + 1ml EcoBlue
		Foliar spray	Garlon	0.75%	1Lt Water + 7.5ml Garlon + 5ml Actipron
		Cut stump	Timbrel	6.0%	1Lt Water + 60ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Basal stem	Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
<i>Acacia pycnantha</i>	Golden wattle	Cut stump	* Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Foliar spray	* Garlon	0.5%	1Lt Water + 5ml Garlon + 5ml Actipron
<i>Acacia saligna</i>	Port Jackson	Foliar spray	Confront	0.7%	1Lt Water + 7ml Confront + 5ml Actipron
		Cut stump	Confront	2.5%	1Lt Water + 25ml Confront + 5ml Actipron + 1ml EcoBlue
		Foliar spray	Garlon	0.75%	1Lt Water + 7.5ml Garlon + 5ml Actipron
		Cut stump	Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Basal stem	Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye

HERBICIDE RECOMMENDATION FOR THE CONTROL OF ALIEN SPECIES					
SPECIES					
Botanical name	Common name	TREATMENT	HERBICIDE	DOSAGE %	DOSAGE PER ONE LITRE MIX
<i>Arundo donax</i>	Spanish reed	Foliar spray	* Mamba	10.0%	1Lt Water + 100ml Mamba
<i>Asclepias fruticosa</i>	Shrubby milk-bush	Foliar spray	Confront	0.5%	1Lt Water + 5ml Confront + 5ml Actipron
<i>Brizia, Avena, Lolium species</i>		Foliar spray	* Mamba	3.0%	1Lt Water + 30ml Mamba
<i>Casuarina equisetifolia</i>	Beefwood	Cut stump	Garlon + Diesel	1.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
			Garlon + Water	2.0%	1Lt Water + 20ml Garlon + 5ml Actipron + 1ml EcoBlue
<i>Cirsium vulgare</i>	Scotch Thistle	Foliar Spray	* Confront	0.75%	1Lt Water + 75ml Confront + 5ml Actipron
<i>Cortaderia selloana</i>	Pampas grass	Foliar spray	* Mamba	3.0%	1Lt Water + 30ml Confront + 5ml Actipron
<i>Chromolaena odorata</i>	Triffid weed	Foliar spray	Confront	0.5%	1Lt Water + 5ml Confront + 5ml Actipron
		Cut stump	Confront	2.0%	1Lt Water + 20ml Confront + 5ml Actipron + 1ml EcoBlue
		Foliar spray	Garlon	0.375%	1Lt Water + 3.75ml Garlon + 5ml Actipron
		Cut stump	Timbrel	2.0%	1Lt Water + 20ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Eragrostis curvula</i>	Weeping love grass	Foliar spray	Mamba	3.0%	1Lt Water + 30ml Mamba
<i>Eucalyptus camaldulensis</i>	Red river gum	Cut stump	* Timbrel	6.0%	1Lt Water + 60ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Foliar spray	* Garlon + Mamba	0.75 + 1.5%	1Lt Water + 7.5ml Garlon + 15ml Mamba

HERBICIDE RECOMMENDATION FOR THE CONTROL OF ALIEN SPECIES

SPECIES					
Botanical name	Common name	TREATMENT	HERBICIDE	DOSAGE %	DOSAGE PER ONE LITRE MIX
<i>Eucalyptus cladocalyx</i>	Sugar gum	Cut stump	* Timbrel	12.5%	1Lt Water + 125ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Foliar spray	* Garlon + Mamba	0.75 % + 1.5%	1Lt Water + 7.5ml Garlon + 15ml Mamba
		Foliar spray	* Confront + Mamba	1.0 % + 1.5%	1Lt Water + 10ml Confront + 15ml Mamba
		Foliar spray	* Brush-Off	10g / 15 litre	15 Lt Water + 10g Brush-Off + 100ml Mamba
<i>Eucalyptus diversicolor</i>	Karri	Cut stump	Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Cut stump	Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
		Foliar spray	* Garlon + Mamba	0.75% + 1.5%	1Lt Water + 7.5ml Garlon + 15ml Mamba
<i>Eucalyptus Grandis</i>	Blue Gum	Foliar spray	* Confront	1.25%	1Lt Water + 12.5ml Confront + 5ml Actipron
		Cut stump	* Confront	3.5%	1Lt Water + 35ml Confront + 5ml Actipron + 1ml EcoBlue
		Foliar spray	Garlon	0.75%	1Lt Water + 7.5ml Garlon + 5ml Actipron
		Cut stump	Garlon + Diesel	2.00%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
		Cut stump	Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Cut stump	Access	1.5%	1Lt Water + 15ml Access + 5ml Actipron + 1ml EcoBlue
<i>Eucalyptus lehmanii</i>	Spider gum	Cut stump	* Confront	6.0%	1Lt Water + 60ml Confront + 5ml Actipron + 1ml EcoBlue
		Frill	* Confront	6.0%	1Lt Water + 60ml Confront + 5ml Actipron + 1ml EcoBlue
		Cut stump	* Timbrel	6.0%	1Lt Water + 60ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Foliar spray	* Garlon + Mamba	0.75% + 1.5%	1Lt Water + 7.5ml Garlon + 15ml Mamba

HERBICIDE RECOMMENDATION FOR THE CONTROL OF ALIEN SPECIES					
SPECIES					
Botanical name	Common name	TREATMENT	HERBICIDE	DOSAGE %	DOSAGE PER ONE LITRE MIX
<i>Eucalyptus sideroxylon</i>	Black Iron Bark	Cut stump	Confront	12.5%	1Lt Water + 125ml Confront + 5ml Actipron + 1ml EcoBlue
<i>Fraxinus species</i>	Ash	Cut stump	* Timbrel	6.0%	1Lt Water + 60ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Impomoea indica</i>	Morning glory	Foliar spray	* Garlon	0.5%	1Lt Water + 5ml Garlon + 5ml Actipron
		Basal stem	* Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
<i>Lantana camara</i>	Lantana	Cut stump	Access	1.0%	1Lt Water + 10ml Access + 5ml Actipron + 1ml EcoBlue
		Foliar spray	Access	1.0%	1Lt Water + 10ml Access + 5ml Actipron
<i>Leptospermum laevigatum</i>	Australian myrtle	Foliar spray	* Confront	2.0%	1Lt Water + 20ml Confront + 5ml Actipron
		Foliar spray	* Garlon	1.5%	1Lt Water + 15ml Garlon + 5ml Actipron
		Cut stump	* Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Melia azedarach</i>	Syringa	Foliar spray	* Confront	0.75%	1Lt Water + 75ml Confront + 5ml Actipron
		Cut stump	* Confront	3.0%	1Lt Water + 30ml Confront + 5ml Actipron + 1ml EcoBlue
		Frill	* Confront	3.0%	1Lt Water + 30ml Confront + 5ml Actipron + 1ml EcoBlue
		Basal stem	Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
		Cut stump	Access	2.0%	1Lt Water + 20ml Access + 5ml Actipron + 1ml EcoBlue
<i>Myoporum tenuifolium</i>	Manatoka	Cut stump	* Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue

HERBICIDE RECOMMENDATION FOR THE CONTROL OF ALIEN SPECIES					
SPECIES					
Botanical name	Common name	TREATMENT	HERBICIDE	DOSAGE %	DOSAGE PER ONE LITRE MIX
<i>Opuntia ficus-indica</i>	Sweet prickly pear	Basal stem	* Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
<i>Paraserianthes lophantha</i>	Stink bean	Foliar spray	* Confront	0.25%	1Lt Water + 2.5ml Confront + 5ml Actipron
		Cut stump	* Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Pennisetum clandestinum</i>	Kikuyu	Foliar spray	* Mamba	3.0%	1Lt Water + 30ml Mamba
<i>Pinus pinaster</i>	Cluster pine	Foliar spray	* Garlon	1.0%	1Lt Water + 10ml Garlon + 5ml Actipron
<i>Populus X canescens</i>	Grey poplar	Cut stump	Timbrel	6.0%	1Lt Water + 60ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Foliar spray	* Garlon	1.5%	1Lt Water + 15ml Garlon + 5ml Actipron
<i>Pittosporum undulatum</i>	Sweet pittosporum	Cut stump	* Timbrel	6.0%	1Lt Water + 60ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Prosopis glandulosa</i>	Honey mesquite	Basal stem	Garlon + Diesel	4.0%	1Lt Diesel + 40ml Garlon + 5ml Sudan Red Dye
		Cut stump	Garlon + Diesel	4.0%	1Lt Diesel + 40ml Garlon + 5ml Sudan Red Dye
	(Apply 2 % Actipron)	Cut stump	Timbrel	5.0%	1Lt Water + 50ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Cut stump	Confront	4.0%	1Lt Water + 40ml Confront + 5ml Actipron + 1ml EcoBlue
		Foliar Spray	Confront	1.5%	1Lt Water + 15ml Confront + 5ml Actipron
<i>Quercus species</i>	English oak	Cut stump	* Timbrel	6.0%	1Lt Water + 60ml Timbrel + 5ml Actipron + 1ml EcoBlue

HERBICIDE RECOMMENDATION FOR THE CONTROL OF ALIEN SPECIES					
SPECIES					
Botanical name	Common name	TREATMENT	HERBICIDE	DOSAGE %	DOSAGE PER ONE LITRE MIX
<i>Ricinus communis</i>	Caster Oil Plant	Cut stump	Confront	2.0%	1Lt Water + 20ml Confront + 5ml Actipron + 1ml EcoBlue
<i>Robinia pseudoacacia</i>	Black locust	Basal stem	Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
		Foliar spray	Confront	2.0%	1Lt Water + 20ml Confront + 5ml Actipron
<i>Rubus cuneifolius</i>	American bramble	Foliar spray	Garlon	0.5%	1Lt Water + 5ml Garlon + 5ml Actipron
		Foliar spray	Confront	0.7%	1Lt Water + 7ml Confront + 5ml Actipron
<i>Salix fragilis</i>	Crack willow	Basal stem	*Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
		Frill	* Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Schinus terebinthifolius</i>	Brazilian pepper tree	Cut stump	Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
		Cut stump	Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Senna species</i>	Peanut butter cassia	Cut stump	* Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
		Cut stump	* Confront	3.0%	1Lt Water + 30ml Confront + 5ml Actipron + 1ml EcoBlue
<i>Sesbania punicea</i>	Red sesbania	Foliar spray	Garlon	0.5%	1Lt Water + 5ml Garlon + 5ml Actipron
		Cut stump	Garlon	1.0%	1Lt Water + 10ml Garlon + 5ml Actipron + 1ml EcoBlue
		Cut stump	Garlon + Diesel	0.5%	1Lt Diesel + 5ml Garlon + 5ml Sudan Red Dye

HERBICIDE RECOMMENDATION FOR THE CONTROL OF ALIEN SPECIES					
SPECIES					
Botanical name	Common name	TREATMENT	HERBICIDE	DOSAGE %	DOSAGE PER ONE LITRE MIX
<i>Solanum mauritianum</i>	Bugweed	Foliar spray	Garlon	0.5%	1Lt Water + 5ml Garlon + 5ml Actipron
		Foliar spray	Confront	0.6%	1Lt Water + 6ml Confront + 5ml Actipron
		Foliar spray	Starane	0.125%	1Lt Water + 1.25ml Starane + 5ml Actipron
		Basal stem	Garlon + Diesel	2.0%	1Lt Diesel + 20ml Garlon + 5ml Sudan Red Dye
		Cut stump	Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Spartium junceum</i>	Spanish broom	Cut stump	* Timbrel	3.0%	1Lt Water + 30ml Timbrel + 5ml Actipron + 1ml EcoBlue
<i>Syzigium cordatum</i>	Water berry	Cut stump	* Timbrel	6.0%	1Lt Water + 60ml Timbrel + 5ml Actipron + 1ml EcoBlue

- Apply ACTIPRON SUPER (wetter/sticker) @ 0.5% with Garlon, Timbrel, Confront and Access for better uptake and penetration.

- Apply 1 ml Ecoguard Water Soluble Dye per 1 Litre mixture.

- Apply 5 ml Sudan Red Dye per 1 Litre diesel mixture for cut-stump applications with Garlon 480 EC.

* Registration pending / Trials in progress

For more information please call: Willie Auret - 082 905 5833, wauret@ecoguard.co.za

Appendix 6: Agriculture and Forestry checklist for inspectors

Agriculture and Forestry Checklist for Inspectors

Trade Name: _____

Name of Employer: _____

Physical Address: _____ Code: _____

Postal Address: _____ Code: _____

Contact Person: _____ Designation: _____

Telephone: _____ Fax: _____

Total no. of workers: _____ Females: _____ Males: _____

Name of Inspector: _____

Regulation	Appointments	Yes	No	N/A*
Sect. 17 (1) or (6)	Health and Safety Representatives			
Sect. 19(1)	Health and Safety Committees			
GSR 3(4)	First Aider			
GMR 2	Competent person in terms of machinery			
	Documents to be kept			
GAR 4	Copy of the Act			
GSR 3 (4)(1)	First Aid Certificates			
Sect.20(2)	Health and Safety Committee minutes			
Sect. 8	Workplace risk assessment			
RHBA 8(1)	Medical surveillance records			
GAR 9 (1)	Incident register, including poisonings			
HCS 9	Air monitoring reports			
NIHLR 6(1)(a)	Assessment of potential noise exposure			
EIR 3 (2)	Electrical Certificate of Compliance			
DMR 18(5)	Testing of machines			
DMR 18(11)	Training of operators			
	Workplace hazardous materials			
HCS 3(j)	Have workers been trained in safe work procedures for each hazardous product in use?			
HCS 3(k)	Do workers know what to do in case of a spill?			
HCS 9A(2)	Is a material safety data sheet available for each controlled product?			
HCS 11(8)(a)	Are washing facilities available for workers who mix, load, and apply pesticides?			
GSR(9)	Are showers or hoses available so workers can wash immediately if they are exposed to chemicals that might hurt their eyes or skin?			
HCS 14(c)	Are substances that might harm workers marked with signs or symbols?			
HCS 15	Are chemicals stored, handled and disposed of correctly?			



labour

Department:
Labour
REPUBLIC OF SOUTH AFRICA

Regulation	Personal protective clothing and equipment	Yes	No	N/a*
HCS 11	Is the right personal protective clothing and equipment provided to workers?			
HCS 11(2)	Is the respirator the right type?			
HCS 11(2)	Is the respirator in good working order?			
HCS 11(2)	Have workers been told how to use and maintain a respirator?			
	Tools, machinery and equipment			
GMR 4(1)	Are workers operating mobile equipment properly instructed and capable?			
GSR 2(5)	Do workers using orchard ladders receive instruction first?			
GSR 13A	Are ladders inspected before each use and replaced or repaired immediately if found to be faulty?			
GMR 3(b)	Are machines guarded?			
GMR 3(a)	Are machines regularly maintained?			
EMR 6(1)	Do the machinery have emergency isolation switches?			
	First aid			
GSR 3(6)	Are signs posted that explain how to access first aid treatment?			
GSR 3(4)	Do you have designated first aid attendant/s?			
GSR 3(3)(a,b)	Does the employer have the proper first aid box and supplies for the number of workers per shift?			
	Lighting and windows			
ERW 3	Is the illumination according to legislation?			
ERW 3(4)	Do you have emergency lighting?			
ERW 4	Do you have sufficient windows in your workplace?			
	Ventilation			
ERW (5)	Is the air safe in your workplace?			
ERW 5	If a worker must enter a tank or silo, storage bin, pit or other confined space, have safe work procedures been developed and has the worker been told what to do?			
	Fire protection			
ER 9	Are risk areas isolated?			
ER 9	Do you have a fire detection system?			
ER 9	Do you have an alarm and emergency evacuation system?			
ER 9(2)	Do you have sufficient fire extinguishers			
ER 9(2)	Are they regularly serviced?			
ER 9(2)	Have staff been trained to operate the extinguishers?			
ER 9(2)	Do you have fire hose reels?			
ER 9(2)	Do you have fire hydrants?			
ER 9	Do you have an automatic fire fighting system?			
	Evacuation			
ER 9	Have procedures been established?			
ER 9	Were evacuation officers appointed?			
ER 9	Do you have a display of floor plans and escape routes?			
ER 9	Do you have a communication system to warn workers?			
ER 9(a)(b)	Are your exits unobstructed and open from inside?			
ER 9	Do you have evacuation drills conducted regularly?			
	Hygiene			
FR 5	Do you have separate work and eating areas?			
FR 7	Do you have portable drinking water?			
FR 2	Do you have hand washing facilities?			
FR 2	Are your toilets sufficient with provided privacy?			
FR 3	Do you have work clothes lockers?			
FR 9	Are the premises kept cleaned?			

* Not applicable