



A producer's guide to sheep husbandry practices

Foreword by the President of Sheepmeat Council of Australia

Sheepmeat Council of Australia, together with Meat & Livestock Australia, have developed *A producers guide to sheep husbandry practices*. It describes best-practice techniques for a number of husbandry practices used when managing sheep. It can help producers provide good health, welfare and management outcomes for their livestock.

We recognise that there are major variations in sheep production across Australia. That means that the implementation of recommendations in the document may differ from one area to another.

A producers guide to sheep husbandry practices provides information from a range of research and on-farm experience that will enhance animal welfare and potentially improve production outcomes. It has been put together following extensive consultation with a wide range of groups, individuals, welfare organisations, industry bodies, and people with expertise in sheep husbandry.

This guide provides up-to-date information on the best animal health and welfare practices for people working in the sheep industry. Animal welfare and management on-farm can affect the long term success of farming enterprises and the sheep industry. Sheepmeat Council of Australia recommends this booklet as a practical, easy-to-follow guide on animal health and welfare practices for anyone involved in the sheep industry.



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Introduction

The aim of this booklet is to describe best-practice techniques for a number of husbandry skills required when managing sheep.

Some sheep husbandry skills have only one acceptable method, for example mouthing sheep or administering intramuscular injections. If more than one accepted practice exists, (eg identifying sheep), advice is provided on best-practice technique in reference to the current *Australian Model Code of Practice for the Welfare of Animals: The Sheep* (second edition), the proposed *Australian Animal Welfare Standards and Guidelines for Sheep* (www.animalwelfarestandards.net.au), published scientific literature and opinions of recognised experts, while adhering to the criteria listed below.

- Potential for adverse effects (eg aspiration pneumonia, bleeding, drowning, infection or transmission of disease).
- Optimal effectiveness, so the method achieves its aim.
- High standard of animal welfare, particularly the avoidance of pain, injury or distress.

- High standard of workplace health and safety, including reducing exposure to insecticide concentrates, sheep blood, urine and other body fluids, and sharp cutting tools.
- Promotion of workplace productivity, allowing large numbers of sheep to be processed efficiently, without compromising operator safety or animal welfare.

In preparing this booklet, the authors only assessed the methods available at the time (late 2012) and did not include potential options for the future. The booklet does not cover all sheep husbandry skills. Skills not covered in this booklet might be covered elsewhere, such as *Making More From Sheep* published by Meat & Livestock Australia and Australian Wool Innovation, and in sheep husbandry information published by state departments of agriculture or primary industries.

If needed, this best practice guide will be revised within five years to accommodate advances in husbandry practices and in legislative standards for good sheep welfare.



1. Mustering, yarding and handling

Key points

- Successful sheep handling depends on understanding and taking advantage of the natural behaviour of sheep.
- Sheep have excellent vision and rely on this much more than their hearing, preferring to stay within visual contact of each other.
- Sheep are highly social flock animals and readily form tight groups and follow a leader. They develop relationships and sub-groups within a flock. If given the opportunity sheep will re-sort themselves into sub-groups and return to their home paddock. Take advantage of this when handling sheep.
- Sheep learn quickly, especially when young. Take advantage of this by familiarising young sheep with yard and race configurations, by training them to a familiar routine and by using the same route to and from the yards every time.
- Good stock handling skills and well trained dogs help ensure a good outcome when handling sheep and are more important than good yards alone.
- Use the catch-and-restrain method to restrain sheep for short procedures and the catch-and-turn method to restrain sheep for longer procedures.

Successful sheep handling depends on understanding and taking advantage of the natural behaviour of sheep.

Sheep handling usually involves four key components: the sheep; humans or their substitutes (dogs or machines); facilities; and the treatments being undertaken. If all of these components are approached from the perspective of natural sheep behaviour, handling will be less stressful and safer for both sheep and their handlers.

Sheep behaviour

Vision

Sheep have a wide angle of vision up to 300 degrees depending on the length of wool on the head. Because of this wide angle of vision, they are easily frightened by people and movements outside the pen or race; solid sides to races and pens will help prevent this.

Sheep have excellent distance vision, but relatively weak eye muscles that make it difficult for them to focus quickly on close objects. Sheep have a blind spot directly below their muzzle and will slow or stop if they see changes on the ground ahead. Having handling facilities with floors of consistent materials, without grates, puddles, shadows or a change in flooring surface or texture, will allow a steady flow of sheep through the handling facilities.

Sheep are sensitive to sudden movements and to anything that has a high contrast of light and dark. Handling facilities in one consistent colour are preferable. Ensure buildings that sheep are moved into have ample natural light and take advantage of sheep's preference to move into brightly lit areas.

Sheep can recognise faces of other sheep and other animals (ie humans and dogs).

Hearing

Sheep rely much more on their sight than hearing. They are more sensitive to loud noise than humans, especially sudden high intensity sounds (engines, vehicle horns, shouting, loud dog barking) and are easily frightened by these sounds. Avoid loud noises or shouting near sheep. Dogs should be trained not to bark excessively. Use rubber stops on gates to reduce noise and avoid the clanging of hanging metal and the rattling of chains. Pipe the exhaust of pneumatic equipment away from the handling area. Low level noises such as rattles or rustling plastic can be used to move sheep; however, if sheep become excited they may not respond to these sounds.

Social behaviour

Sheep are flock animals and naturally live in highly coordinated family or bachelor groups. Lambs learn about their surroundings from close association with their mothers.

When threatened, sheep will form tight groups and move away and this can be taken advantage of during handling. Because of their flocking nature, sheep are calmer when they have body contact with other sheep.

Sheep become highly stressed when separated from their flock mates, even when they can hear each other. Sheep, particularly Merinos, develop relationships and sub-groups within a flock. Sub-groups are commonly based on breed, age and sex, with sheep using their acute vision to tell familiar from unfamiliar sheep. Handling that involves separating groups will be difficult for a handler, while keeping sub-groups together will be much easier.

Handling can disrupt the relationships between sheep, especially when there is crowding during yarding or mixing of flocks. If given the chance, sheep will re-sort themselves into their original sub-group; take advantage of this when sorting and handling sheep.

Isolation of single sheep should be avoided. Isolated sheep can become frantic and injure their handlers or themselves.

Sheep like to maintain visual contact with each other and readily follow a leader. Let sheep follow a leader at their own speed and do not rush them. Concentrate on moving the leaders rather than pushing the animals from the rear. During mustering keep the tail of the mob together and carry unfit sheep or lambs in a vehicle.

Orphan lambs (poddies) do not learn to fear the person that raised them, which can be taken advantage of during handling. As adults, poddies can be used to lead a mob, for instance to bring a mob in or through the yards.

Because sheep become used to their surroundings, they will return to their home paddock on their own after handling if given the opportunity. Take advantage of the homing behaviour of sheep during handling by providing laneways for the sheep to return to their home paddock.

Sheep move within and between their familiar paddocks on well-defined tracks. Make use of this natural instinct by taking sheep to and from the yards by the same route every time.

Sheep usually have a regular daily program of grazing and resting at set times and locations within their home paddock. Use this to locate sheep within their paddock at certain times of the day.

Introducing sheep to new paddocks can lead to problems because the sheep will be unfamiliar with the sources of water or best feed. When introduced to new paddocks sheep tend to stay at the site of introduction, so make sure this is close to water and good feed. Alternatively, sheep should be taken to the water and food source in a new paddock.

Breed

Breeds of sheep can differ in their behavioural characteristics. Merinos tend to bunch or flock together, which is an advantage during handling. They also graze in a group formation. British breeds are more independent and split into small groups or graze alone.

Sheep seek out others of the same breed. Make use of this breed preference when sorting sheep.

Sex

Sheep show some sex-dependent behaviour.

Ewes are more independent than males because the ewe-lamb bond takes precedence over the flock. Groups of wethers have more consistent leadership orders. Understanding this difference can make handling easier.

Age

In young lambs, social attachment and following behaviour is based on the ewe and as the lamb ages, social attachment becomes more focussed on the flock. Because of this, groups of lambs or ewes with young lambs may not be as easy to muster as adult groups. Ewes and lambs will become distressed if separated. Very small lambs may struggle to keep up. Muster ewe-lamb mobs gently and let the lambs rest. Carry lambs that cannot keep up.



Muster ewes with lambs at an easy walking pace.

Experience

Sheep learn quickly, especially when young. Sheep remember and try to avoid painful or frightening experiences and will seek out positive experiences, especially those with a food reward. Take advantage of the natural learning ability of sheep.

- Use gentle handling techniques. Avoid shouting and loud noises. *Do not* strike sheep with canes, pipes or sticks. *Do not* use electric prodders on sheep. *Do not* hold onto the wool while catching or restraining sheep. Use the minimum restraint needed to get the job done. Use appropriate handling devices, operated by well trained staff.
- Familiarise sheep with the yards and race configurations. Set up additional yards close to the paddocks.
- Train young sheep to a familiar routine. Use the same route to and from the yards every time.

It is not best practice to use electric prodders on sheep. Electric prodders should only be used when there are no other options available. Consider the welfare of sheep when using an electric prodder, and do not use it on genital, anal, udder or facial areas of sheep, on lambs less than three months of age, or on sheep that are unable to move away.

Stock handling skills

Good stock handling skills and well trained dogs help ensure a successful outcome when handling sheep and are more important than good yards alone.

Stock handling skills include three key skills based on the natural behaviour of sheep – observation, interpretation and action.

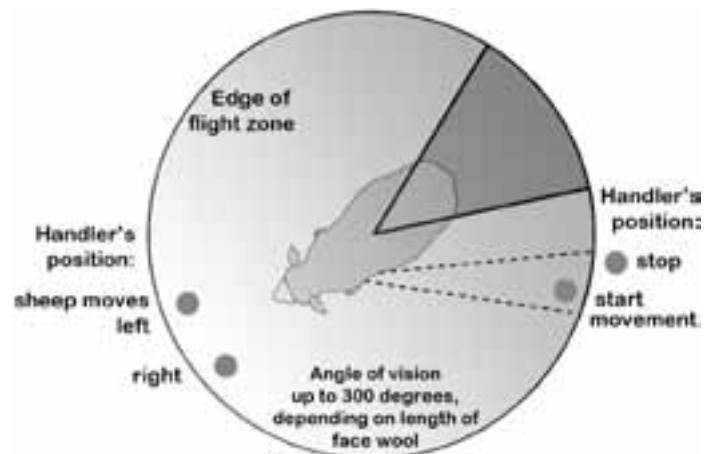
Sheep naturally prefer to avoid contact with humans or dogs, and this preference is used to move and yard sheep.

Humans come in direct contact with sheep during handling procedures, which is stressful for sheep, especially if they are overly fearful of humans because of previous rough handling or painful procedures.

Each sheep or group of sheep is surrounded by a ‘flight zone’ or personal space. If a person moves into the space, the sheep will move away, or if the person moves in too close, the sheep will move towards and past the person.

The size of the flight zone is reduced if a person approaches rapidly or from the front of the animal, and if sheep are on their own, confined or not used to human contact.

Take advantage of the flight zone when handling sheep by using two landmarks on their body. The first is just behind the shoulder; forcing from behind this point moves the sheep forward and from in front of this point moves the sheep back. The second is between the eyes, with movement to the left resulting in the sheep moving to the right and vice versa.



Take advantage of the flight zone when handling sheep by using two landmarks on their body, one just behind the shoulder and one between the eyes.

Dogs

Well trained dogs make handling sheep easier. Dogs should be trained not to bite, bark excessively or chase sheep. Using poorly trained dogs can be highly stressful for sheep. Muzzle dogs that bite.

Facilities

Equipment used to muster, yard and handle sheep includes a set of well-designed sheep yards, and temporary yards for lamb marking. Seek advice from state government departments or farm advisers when designing sheep yards.

Yard design

Features of well-designed yards include:

- pen space that is adequate for the number of sheep and their breed, size and wool length
- facilities for all sheep handling procedures, designed so sheep move through the yards the same way regardless of the handling procedure being undertaken

- curved lead-up yards
- covered race sides or strategic use of covered and uncovered sides, with covered sides that hide visual distractions that slow down sheep movement and open sides to show things that speed up sheep movement (moving sheep, exits)
- double races to allow efficient handling and loading
- a good drafting race
- good drainage of yards and lanes
- flat floors of consistent materials, without grates, puddles, shadows or a change in flooring surface or texture
- one consistent colour
- diffuse lighting with a minimum of shadows and dark areas
- wide gates
- rubber stops on gates and no loose chain ends, which may rattle and distract sheep
- a shaded work area
- fresh drinking water if sheep will be held in the yards, water points and sprinklers for settling dust and a water source for dipping or jetting
- access for dogs



Sheep sometimes crowd together in a pen and may become smothered (especially in a corner) or push on top of others, causing injury. Allow adequate space in yards (1m² per three adult sheep in forcing areas and 1m² per adult sheep in holding areas). Design pens to avoid sharp corners. Check pens regularly and unblock if crowded. Ensure small lambs are not crushed by other sheep.

Restraining sheep

- When sheep need to be restrained for short procedures, such as reading ear tags, mouthing or assessing body condition, use the catch-and-restrain method (see Figure 1).
- For procedures where sheep need to be sat up on their tail, such as foot inspecting or trimming, use the catch-and-turn method (see Figures 2–6).
- Use sheep handlers (immobilisation equipment) to increase efficiency and operator safety when working with large numbers of sheep.

Catch-and-restrain method (Figure 1)

- Catch the sheep with one hand on its rump and one hand on its muzzle.
- Keep the sheep close to your legs.
- If extra restraint is required, straddle the sheep and keep one hand under its muzzle.

Procedures for restraining individual animals



Figure 1: Use the catch-and-restrain method for short procedures, keeping one hand on the sheep's rump and another on its muzzle.

Catch-and-turn method (Figures 2–6)

- Turn the sheep's head to one side as far as possible, while pushing down on its rump.
- Pivot yourself backwards and bring the sheep with you; the sheep will go down on its rump.
- Lean the sheep back against your legs. If necessary, grip the sheep with your knees to hold it in place.
- To release the sheep, gently drop it onto its front legs. The sheep will quickly stand and walk away.



Figure 2: Turn the sheep's head while pushing on its rump, and take a step backwards. Continued on page 8.

Catch-and-turn method (continued from page 7)



Figure 3: As you take a step backwards, pull the sheep to the ground.



Figure 4: Let the sheep sit on its rump, leaning against your legs, and grip it with both knees if required.



Figure 5: For the crutching position, push the sheep's head down.



Figure 6: To release the sheep, let it fall gently to the ground.

Lamb marking

Plan lamb marking in advance

- Give ewes a booster vaccine against tetanus, other clostridial diseases and cheesy gland (eg 6-in-1) 2–4 weeks before the start of lambing.
- Plan to mark lambs at 2–8 weeks of age. This should be possible in most sheep production systems in Australia with a 5–6 -week joining and lamb marking two weeks after the end of lambing.
- Ensure adequate numbers of well-trained personnel are available.
- Question whether all traditional lamb-marking procedures (eg castration, tail docking, mulesing, earmarking) are required. Consider the farming operation and its geographical location, the type of sheep run and the welfare benefits expected from the procedure. Earmarking is not required in some states; check with your state authority.
- Use new or alternative methods, treatments or practices as they become available, especially those that eliminate or significantly reduce pain, suffering and distress.
- Plan mustering well in advance, and avoid hot and windy or wet and humid weather. Plan to avoid the hottest part of the day, to minimise the time any animals will be off feed or water, to limit the time that lambs will be separated from their mothers, and to allow sufficient time before dark for all lambs to mother-up.
- Check that all equipment is clean and functioning well before the stock are mustered.
- Set up portable yards in the lambing paddock. Choose a new site each year that is well drained but close to water, away from sheep camps and on fresh clean grass. Using portable yards reduces stress from mustering, minimises disease caused by the accumulation of bacteria and other organisms in sheep yards, and hastens mothering-up after lamb marking.

- If permanent yards must be used, clean the yards by removing sheep dung and other rubbish, and thoroughly water the yards to settle the dust.
- Set up the work site to facilitate efficient work practices.
- Provide adequate amounts of disinfectant and tetanus/clostridial disease vaccine for the lambs. Sheep should have their first dose of tetanus/clostridial disease/cheesy gland vaccine at lamb marking and a booster dose at weaning, then annual booster vaccinations in subsequent years.

Maximise hygiene during lamb marking to prevent infection

- Diseases such as the anaemia caused by infection with the blood borne bacteria *Mycoplasma ovis* can be transferred between lambs at marking through poor hygiene.
- Avoid mud and dust.
- Avoid wet and humid weather.
- Avoid methods that allow the transfer of blood between animals.
- Thoroughly wash and disinfect hands at the beginning of the day and at frequent intervals. Wash in one bucket and disinfect in another. Follow label directions for diluting antiseptic.
- Soak instruments in disinfectant at the start of the day, clean between each animal and disinfect at frequent intervals. Soak instruments not being used in disinfectant. Follow the label directions for diluting the disinfectant, and replace the solution regularly if it is contaminated with blood or dirt.
- Ensure lambs are clean, not daggy.

Minimise stress on the lambs during lamb marking

- Plan and prepare.
- Work calmly, quickly and efficiently to reduce the time lambs are separated from their mothers, while allowing enough time for good technique.
- Frequently check the lambs in the holding and pick-up pens to ensure they are not crowding into corners, crushing smaller lambs.
- Lift the lambs by catching with one hand under the brisket and holding the top of one hind leg with the other hand.
- Restrain the lambs effectively, in a lamb-marking cradle or held tightly by an assistant.
- Use well-maintained, sharp equipment.
- Use appropriate pain relief products for the procedure being undertaken, if practical, cost-effective pain relief products are registered and available for use in sheep. Consult your veterinarian for information on pain relief products for use in sheep.
- Minimise the time lambs are restrained in the cradle. Gently release the lamb onto clean grass so it lands on its feet.

Minimise bleeding during lamb marking

- Hot stressed animals bleed more than cool calm ones. Let the animals settle after mustering before starting the procedure.
- Use good technique.
- When available, use methods that minimise or prevent bleeding, such as lamb marking rings for castration and a gas-heated tail docking knife.

Aftercare of lambs is important too

- Return lambs to their mothers as soon as possible, well before dark.
- If lambs have not been marked in portable yards in the lambing paddock, release ewes and lambs into a sheltered paddock with good quality feed and water. Avoid walking ewes and lambs over long distances.
- Check lambs daily, without disturbance that could cause mismothering, for 10 days after marking. Yard or catch and restrain any animals that appear abnormal. Treat any complications early.

2. Identifying sheep

Key points

- Check with state authorities about the legal requirements for identifying sheep and adhere to all requirements.
- The most common identification methods used in Australia are ear tags, earmarks, spray marks, chalk and electronic boluses.
- Sheep require a National Livestock Identification Scheme (NLIS) ear tag before leaving their property of origin. In some states, a registered earmark is also required.
- Temporary identification can be done with spray marker or raddle. To avoid clip contamination, apply to the face for short-term use, or to the forehead wool for longer-term use.
- Electronic rumen boluses have a high retention rate, are tamper-proof and can be read using radiofrequency device readers. They are not accepted in some supply chains.

Identification refers to the application of ear tags or other procedures to establish the identity of a mob or an individual sheep.

Identification determines ownership and facilitates management of sheep.

Under national legislation, NLIS ear tags must be applied to sheep before they leave their property of birth. This allows sheep to be tracked for the purpose of disease control and to maintain international market access. NLIS ear tags are also useful for data management purposes in the flock.

Each state of Australia has laws that require sheep to be identified. Contact your state department of agriculture or primary industries for details.

It is best practice to identify individual animals or mobs when carrying out management practices such as breeding, selection, feeding and treatment of pests and diseases.

Sheep treated with chemicals or veterinary medicines must be identified to demonstrate compliance with withholding periods, export slaughter intervals or wool handling intervals.

Stud or breeding sheep should be individually identified to allow assessment and selection.

For shows, sheep need to be identified to comply with the rules of competitions.

Sheep can be identified at any age, although best practice is to earmark at lamb marking.

Equipment

Equipment used to identify sheep includes:

- a cradle to restrain lambs during lamb marking, or a race, VE sheep handler or small pen for adult sheep at any time
- buckets for handwashing and disinfecting instruments
- disinfectant for instruments, properly diluted
- antiseptic for hands, properly diluted
- ear tags, chosen for their purpose and preferred features
- applicator appropriate for the ear tags
- earmarking pliers
- spray can of stock marker, a registered scourable marker in required colour
- raddle

Out-dated methods of identification

- Some older methods of identification, such as tattoos and horn branding are no longer considered best practice and should not be used.
- These methods have largely been replaced by newer, more useful methods of identifying sheep.
- Tattoos and horn brands have workplace health and safety disadvantages, as well as the potential to cause unnecessary pain or injury to the animal.
- Neither of these methods is required by law nor breed societies.

Ear tags

Sheep have sensitive ears. The type of ear tags used should have minimal effect on the animal and be clearly visible, without causing infection or bleeding, tearing the ear, creating a shearing hazard or cutting into the ear as it grows.

Metal ear tags are no longer considered best practice because they have workplace health and safety disadvantages and are associated with a high level of damage to the ear.

Flexible, plastic, self-piercing two-piece ear tags with male-female locks are the preferred ear tags for sheep, either with or without an electronic chip. These ear tags cause the least damage to the ear and are easy to place and read from a distance. With self-piercing ear tags, there is a low risk of disease transfer between animals.

Plastic, one-piece, loop ear tags are associated with a higher level of damage to the ear than flexible, plastic, two-piece tags. If plastic, one-piece, loop ear tags are used, care must be taken to ensure the tag is placed correctly so it is neither too loose nor too tight. If too loose, it will rotate and catch on things, tearing the ear. If too tight, it will cut into the edge of the ear as the animal grows. The applicator must be kept clean and the penetrating spear replaced as often as necessary to make sure it is always sharp.

Inserting an ear tag

- Dip applicator head in disinfectant solution. This helps prevent infections, aids healing and assists with applicator pin release and subsequent tag retention.
- Select a position midway between the ear veins, avoiding ridges of cartilage.



- Insert two-piece tags so they hang down from the lower edge of the ear with the number facing forward so it can be easily seen when drafting. The male part of the tag should be placed at the back of the ear.
- Insert one-piece tags at the top of the ear, halfway along the length of the ear.
- Where possible, re-use existing holes from previous ear tag application.
- Squeeze the applicator handles together in one firm motion.
- Carefully remove applicator.

Preventing infection when ear tagging

- Insert clean ear tags into clean dry ears.
- If tags are dirty, wash, soak in disinfectant and dry before use.
- Place ear tag applicators in a disinfectant solution at least once per round of cradles, and preferably between lambs if there is any likelihood of disease transmission.
- Vaccinate sheep against clostridial diseases and cheesy gland.

Earmarks

Earmarks can be used to permanently identify sheep with individual number, property and year of birth.

In some states a register of property earmarks is kept. Check with your state department of agriculture or primary industries about the requirement for earmarks, and the location and type to be used.

Problems with earmarks include pain at the time of application, bleeding, tearing of the ear and potential for disease spread.

Earmarking pliers should be well maintained and sharpened frequently so they cut cleanly in a single closing. Check the pliers several weeks before use by making a test cut on a piece of thin cardboard. If the cut is not clean, replace or get pliers serviced. Keep spare pliers in case one set goes blunt.

Earmarking pliers should be placed in a disinfectant solution at least once per round of cradles, and preferably between lambs if there is any likelihood of disease transmission.

Earmarks are not recommended unless required by state legislation.

Creating an earmark

- Clean dirty or soiled ears before marking.
- Use one hand to gently flatten and hold the ear in place.
- Apply earmark pliers to the correct section of the ear.
- Squeeze the handles together in one firm motion.
- Carefully remove pliers to avoid tearing the ear.

Temporary marks

- Sheep that need to be identified for short periods (eg after pregnancy scanning) can be marked with rattle or approved spray marker.
- Excessive use of stock marker should be avoided due to the potential for wastage of wool. Use only the smallest marks needed for identification.

Wool brands

- Branding fluid contamination will significantly reduce the price paid for wool and there is the potential for skins to be downgraded. If it can be avoided, *do not* brand sheep. If sheep need to be temporarily marked, use approved spray markers or rattle on the nose or forehead.
- Some wool quality programs prohibit the use of wool brands.
- Only registered, undiluted branding fluid should be used.
- Wool brands for property identification need to be registered in some states. Check state legislation before branding.

Applying spray marks or chalk

- Apply spray or rattle marks to the forehead or nose.
- Marks on the forehead will last longer than marks on the face and can be easily removed at skirting.
- Take care to avoid spraying marker into the sheep's eyes and nostrils.



Sheep with correctly applied ear tags and spray marker applied to the forehead wool.

Rumen boluses

Electronic rumen boluses have a high retention rate, are tamper-proof and can be read using radiofrequency device readers. When using rumen boluses, check specific instructions to determine the size of animal in which they can be inserted. Rumen boluses are not accepted in some supply chains.

3. Mouthing sheep

Key points

- Check the mouths of sheep regularly.
- Cull sheep with very worn or missing teeth.
- No production benefit has been demonstrated from teeth trimming or grinding.

Mouthing sheep refers to the checking of a sheep's permanent or temporary incisor teeth.

In sheep, incisor teeth are present in the bottom jaw, but not the upper jaw. Sheep have a hard fibrous pad on the upper jaw, instead of incisors.

Adult sheep have eight incisor teeth located at the front of the lower jaw, which are used for grazing close to the ground. Temporary incisor teeth present for the first 12 months of life are gradually replaced with permanent teeth by 28–48 months of age.

Molar teeth in the upper and lower jaws, toward the back of the mouth, are used for chewing.

Sheep are mouthed to:

- establish age
- determine the condition of teeth and the mouth
- meet market specifications (eg lambs must have temporary incisors only, hoggets must have two permanent incisors only)

The teeth of sheep can be checked at any time, whenever they are in the yards for other reasons.

When mouthing sheep, check for uneven or excessive wear of the teeth or loss of teeth. Sheep with greatly worn teeth or lost teeth should be culled because these animals will lose body condition.

Equipment

No special equipment is needed to mouth sheep. When first learning to mouth sheep, it is recommended to have on-hand a copy of the tooth pattern standards in this manual (see opposite).

Recommended method

- Restrain the sheep in a race or using the catch-and-restrain or catch-and-turn methods (described in Chapter 1 on page 7).
- Hold the sheep's head, place one hand around its muzzle and open the lips. In larger sheep, both hands may be needed to restrain the sheep's head and open the lips, placing one hand on the lower jaw and another on the upper jaw.
- Examine the incisors, noting the number of temporary and permanent teeth, the condition of the teeth and whether any incisors are missing. Compare to the tooth pattern standards.

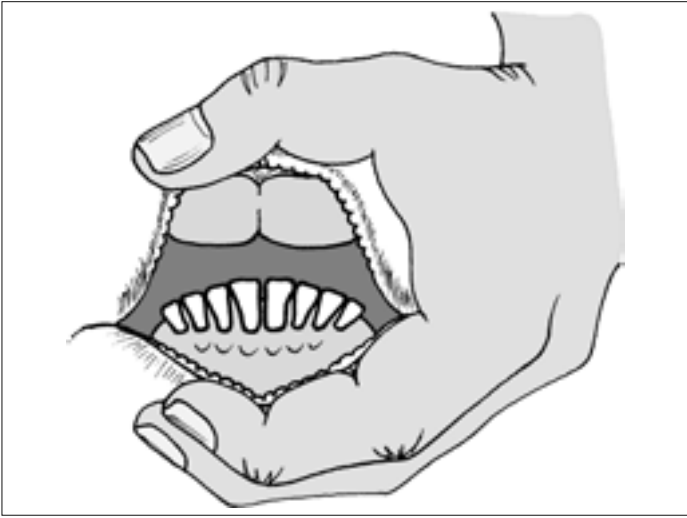
Aftercare

Special aftercare is not required.

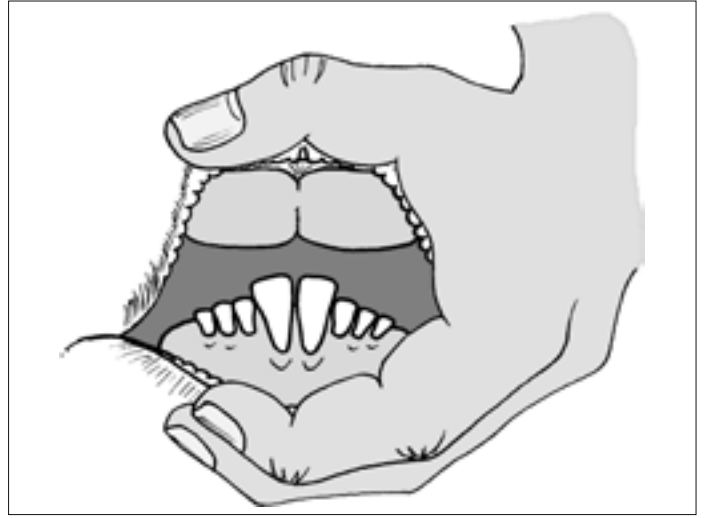
Teeth trimming or grinding

Teeth trimming and grinding are methods of changing the length of the incisor teeth in sheep by mechanical means. A production benefit from teeth trimming or grinding has not been demonstrated in Australian or international field trials and these procedures are unacceptable.

Tooth pattern standards



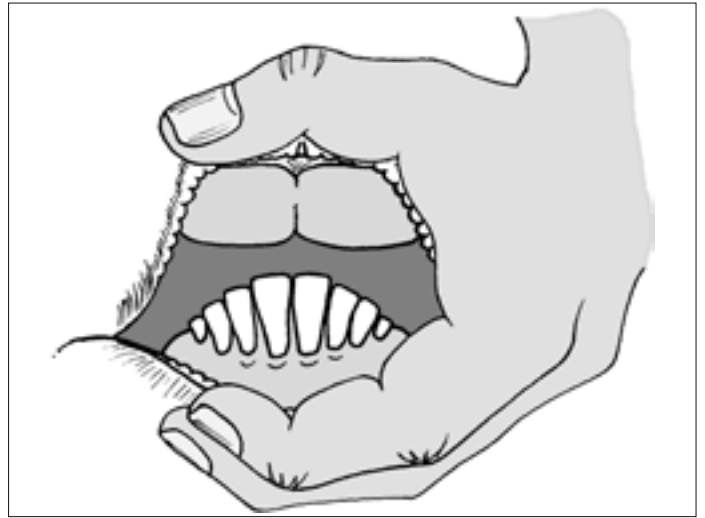
Teeth of a lamb: birth to 12 months of age.



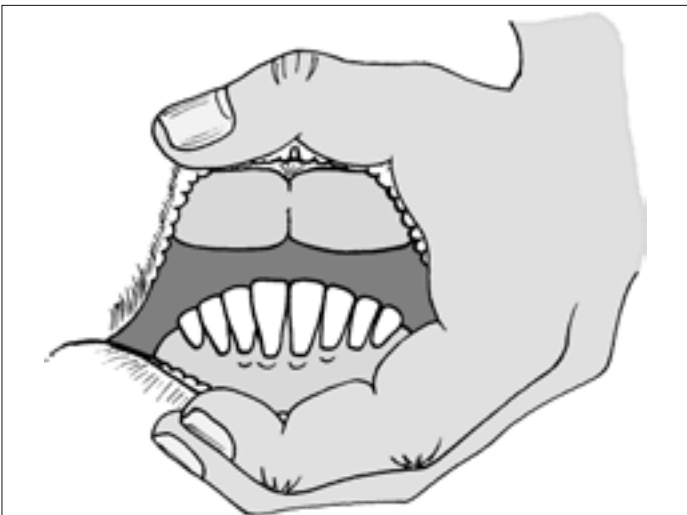
Two tooth (hogget): two adult teeth, 12–19 months of age.



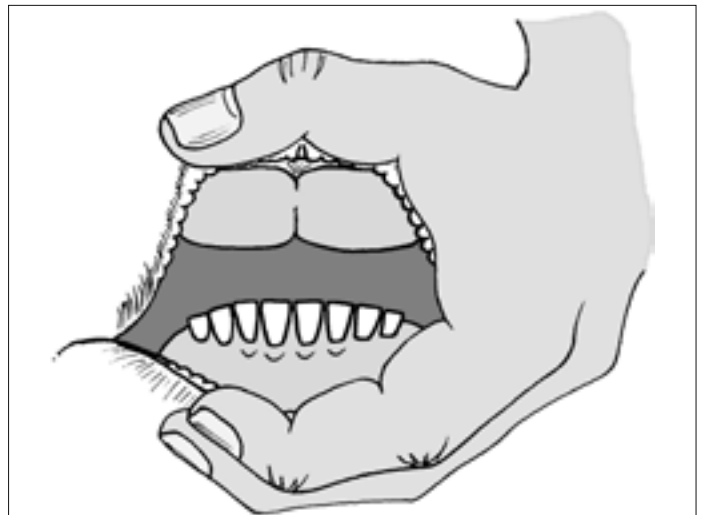
Four tooth: four adult teeth, 18–24 months of age.



Six tooth: six adult teeth, 23–36 months of age.



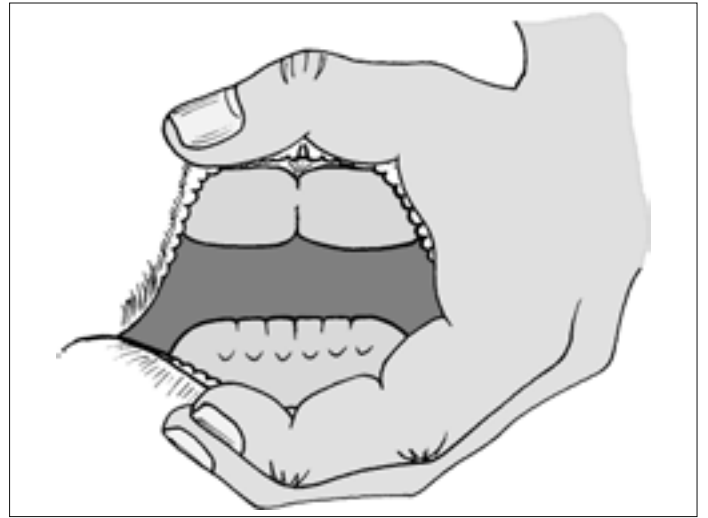
Eight tooth (full mouth): eight adult teeth, 28–48 months of age. No more teeth to erupt.



Worn adult mouth.



Broken mouth: old sheep.



Gummy mouth.

4. Collecting faecal samples for worm egg counts

Key points

- Collect faecal samples from sheep to check parasite burdens, determine the genetic merit of individuals for resistance to worms or assess the efficacy of drenches.
- For routine monitoring, fresh uncontaminated samples can be collected directly from the ground.
- For drench tests and to determine the worm egg count (WEC) for inclusion in an animal's Australian Sheep Breeding Values (ASBV), samples should be taken directly from the sheep's rectum. Care should be taken to collect samples without causing damage to the rectum. Paraffin oil can be used as a lubricant, but avoid detergents or other lubricants that may damage the rectum or contaminate the sample.
- Air should be excluded from the sample container to prevent the worm eggs from hatching.

Faecal samples are small samples of sheep dung collected to conduct WECs and larval differentiation of worms.

Samples can be taken from sheep at any time to determine their parasite burden. In particular, faecal samples can be used to decide if drenching is required or to determine the seasonal pattern of worms.

Many stud breeders take samples so the WEC can be included in a ram or ewe's ASBV. This gives an indication of the animal's genetic merit in reducing WECs in their progeny. Comparing ASBVs between sheep enables selection of sheep for better resistance to worms.

Taking samples after use of an anthelmintic (drench, capsule or injection) to check that worm egg counts are low or zero is called a 'post-drench check'. This indicates whether the drench has been effective.

To properly check the efficacy of a drench, faecal samples are taken 10–14 days after treatment and WECs are compared with either pre-drenching levels or against

an untreated control group. This procedure is called a Worm Egg Count Reduction Test (WECRT).

Regular use of WECs to monitor sheep parasites may reduce the need for drenching and help slow the onset of drench resistance.

Reasons for performing a WEC

WEC is done to:

- monitor parasite burdens
- decide if parasites are the cause of scouring, poor health or ill-thrift
- assess the genetic merit of an animal
- test drenches and determine the most effective drenches for different species of worms

Equipment

The equipment required to collect samples for a worm egg count includes:

- disposable gloves
- sealable, airtight containers (eg collection bottles, ziplock bags, sample trays)
- packaging and postal envelope to mail samples to the laboratory

Recommended method

Collecting samples for routine monitoring

- For routine monitoring, collect samples from the ground. Avoid sheep camps, which are usually contaminated with old faecal pellets.
- Hold sheep in a pen or a corner of the paddock for 10–15 minutes. After they walk away, collect fresh samples from the ground.
- Hold at least 50% more sheep in the pen or corner than the number of samples needed to ensure you obtain enough suitable samples. Only collect warm moist fresh samples (less than 15 minutes old). Take care to avoid contamination with grass, soil or rocks.

- Collect at least 10 samples, or more for larger mobs. Take samples at least 1 metre apart to ensure that different sheep are sampled.
- Remove air from the containers to prevent the worm eggs hatching. This increases the accuracy of the sample.
- Seal the containers and prepare for posting to the laboratory, along with the necessary paperwork to identify the mob and property.

Routine monitoring

- Consult a veterinarian or sheep adviser for the best times to take samples.
- Select a representative number of sheep from a mob to sample. The sheep selected should reflect the mob. For example, don't sample only the smaller or lower condition score sheep, as they may have a different worm burden from the rest of the mob.
- Take only freshly passed faeces and exclude air from the sample container. Worm eggs in the samples will hatch if exposed to warmth and air, which may give a mistakenly low worm egg count. Refrigeration of samples will affect the survival of some larvae and bias the results of the larval differentiation.

Collecting samples for drench testing and ASBVs

- Restrain sheep in a yard or race and individually identify sheep with ear tags or spray marker.
- Hold the sheep firmly against other sheep using your knee.
- Collect a sample by gently inserting a gloved finger into the sheep's rectum.
- If necessary, moisten your glove with paraffin oil, but do not use detergents or other lubricants as these may irritate the lining of the rectum or contaminate the sample.

- Remove faecal pellets and put into a container. Label the container with the sheep's number or name.
- Rinse the gloved hand between sheep.
- Seal the containers and prepare for posting to the laboratory, along with the necessary paperwork to identify the mob and property.

Collecting samples from the rectum of individual sheep

- Take the samples as soon as possible after yarding sheep. The sample size should be 5g of faeces per sheep (approximately 10 pellets).
- Exclude air from the container to prevent eggs hatching.
- If a sample cannot be collected, leave the sheep for 15 minutes before trying again (it may be difficult to obtain a sample from some sheep).

Aftercare

- Return sheep to their paddock.
- Post samples or deliver to your animal health advisor immediately after collection.

Australia Post stipulates the following requirements to comply with dangerous goods regulations.

- Three seals must exist between the faecal sample and the outside. Place the sealed sample containers into a large ziplock plastic bag with an absorbent tissue in case of accidental spills, then place the sealed bag into a plastic postal envelope.
- The parcel must pass the 'drop test', meaning the packaging must be strong enough to withstand a drop from a height of 1.2 metres. Pack the sample containers in a cardboard box or a padded postal bag.
- The outer packaging must display 'UN3373' written inside a diamond shape to signify that it contains biological materials.

5. Drenching sheep

Key points

- Use an effective product for the job and always check that the drench gun is compatible with the product. If in doubt, ask your veterinarian or animal health adviser.
- Carefully read the label before drenching and follow the instructions. Adhere to the recommended dose rate, withholding period, export slaughter interval and any precautions or contraindications.
- Calibrate the drench gun using a measuring cylinder before the start of drenching, and recheck after every 200 sheep. Weigh some sheep to set the appropriate dose for the heaviest sheep in the mob.
- Excess speed can cause sheep to be missed, spit out the drench or to be injured.
- Keep the sheep's head level (horizontal) with one hand while slipping the gun into the side of its mouth. Place the tip of the barrel over the sheep's tongue and gently depress the trigger.
- When dispensing large volume treatments, such as for metabolic diseases, stop briefly after each 10ml to check that the sheep is swallowing.

Drenching refers to administration of a liquid formulation to sheep by mouth, using a drench gun or other dispensing equipment.

Drenching is a convenient way to treat a large number of sheep in a short time, and is well tolerated by sheep.

Incorrect drenching can lead to spillage, injury, toxicity or death of the animal.

Sheep can be drenched with anthelmintics (wormers), vitamin or mineral supplements and other medicines, particularly for metabolic diseases such as pregnancy toxaemia.

Drenching for worms

Worms can reduce animal growth rates and wool growth, and cause weakness, scours, poor reproductive performance or death.

Many worm treatments are not effective due to resistant parasites. To check if a drench is effective, contact a veterinarian or animal health adviser to conduct a drench test. A veterinarian or animal health adviser can also plan a strategic drench program to reduce the risk of losses due to worms.

The WormBoss website (wormboss.com.au) provides information on worms, drenches and animal health advisers.

Workplace safety while drenching

- All personnel who treat sheep with drenches, external parasiticides or other animal health products should have the relevant knowledge, experience, skills and, where appropriate, accreditation, to safely use these products.
- Read the product label and follow all safety directions.

Equipment

Equipment used to drench sheep includes an effective method of restraining the sheep, drenching products, personal protective equipment as stated on the product label and appropriate drench guns compatible with the product being used.

Products

- Store drench products according to label directions, and strictly adhere to directions for use. Note and act on all label precautions.
- Record the batch number and expiry date, and check withholding periods and export slaughter intervals to ensure the product is suitable, particularly for sheep being sold for slaughter.
- Follow the label directions for shaking/mixing products prior to use.
- If necessary, dispense the correct amount into a backpack, using a clean funnel.

Precautions before drenching

- Follow all label instructions, especially where mixing is required.
- ‘Contraindications’ on the label mean that the product should not be given to specified classes of sheep.
- Past advice to hold sheep off feed and water before drenching is no longer recommended.
- Weigh a proportion of the mob (eg 10 large and 10 small sheep) to check the weight for adjusting the drench dosage. If there is a range of bodyweights, draft into ‘heavies’ and ‘lights’ to treat separately.

Drench guns

Set the drench gun at the correct dosage for the weight of sheep being drenched. Check the dosage by squirting ten doses into a measuring cylinder and reading the volume. Repeat the calibration after every 200 sheep. When finished, calculate the total amount that should have been used and check against the amount of drench remaining.

Power drench guns should be set up and compressed gas or air hoses attached as per manufacturer’s instructions.

Spare drench guns, as well as seals and springs, should be kept handy in case the gun needs servicing.

Drench gun care and servicing

Before use

- Do a pressure test to check seal and valve integrity by placing a finger over the end of the barrel and squeezing the trigger. The plunger should not depress; if it does, there is leakage or backflow. Check the piston seal and inlet and outflow valves.
- Run a finger around the length of the barrel to check for any rough edges that could cut the sheep’s mouth.

After use

- Remove plastic tubing from the backpack and drain remaining drench back into the container.
- Use 1 litre of clean warm water with a few drops of household detergent added.
- Squirt water through the gun with dose set to maximum until clean. Carefully wash the outside of the barrel and handpiece with warm water and detergent.
- Rinse thoroughly by pumping clean water through the gun. Seals may be damaged if the gun is not rinsed completely.
- Remove from water, pump dry and remove tubing.
- Lubricate by dropping a small amount of approved oil (eg vegetable oil) into the cylinder and pumping the trigger a few times to disperse it into the seals. Do not use mineral oil.



Calibrating the drench gun before use.

Recommended method

Lambs should not be drenched in the lamb-marking cradle because of the risk of aspiration (drench going down the wrong way) causing pneumonia or toxicity.

Administering small volume drenches, for example wormers

- Drenching can be done from within the race, holding each sheep firmly with the knees, or from the side of the race if the sheep are packed tightly. In a race, start at the back and work forward (optional).
- Keep the sheep's head level (horizontal) by holding one hand under its chin.
- Gently insert the barrel of the drench gun into the side of the sheep's mouth, between the front teeth and the molars. Twist the gun slightly as it is inserted to help entry.
- Slide the barrel gently backwards over the tongue until the tip rests on the back of the tongue.
- Press the plunger slowly and steadily to deliver the full dose of drench.
- Keep one hand under the sheep's chin for a moment to prevent the sheep from immediately spitting out the drench.
- Feel or listen for the sheep to grind its teeth as a sign that it has swallowed the drench.

The emphasis should be on safely and effectively dispensing the product, not speed.



When drenching, keep one hand under the sheep's chin to hold its head level (NJ Phillips Pty Limited).

Administering large volume drenches, for example to treat pregnancy toxaemia

Some preparations given to sheep for metabolic diseases, such as pregnancy toxaemia, need to be given in large volumes (50–160ml).

Large volume drenches can be given in multiple small doses via a drench gun, or by a single dose in a large dispenser.

The method is similar to that for small volume drenches (opposite), but sheep may need more time to swallow, as they are often weak at the time of treatment.

Check that the sheep is swallowing by stopping briefly after each 10ml is dispensed.

- *Do not* use force on the plunger when drenching sheep.
- If force is required, it usually means the barrel is pushed against the lining of the pharynx, where it could cause bruising or injury if forced.
- Withdraw and re-position the barrel of the drench gun and gently depress the trigger.



Drenching is a convenient way to treat a large number of sheep in a short time, and is well tolerated by sheep (MSD Animal Health).

Aftercare

Observe sheep before and after they are let out of the race, to check for abnormal signs of coughing or spluttering, convulsions, tremors, unsteadiness or stiff gait.

Toxicity is more likely with drenches containing organophosphates or levamisole, or in lambs treated with abamectin.

If toxicity is suspected, contact a veterinarian and treat as directed.

Sheep spitting out drench is a sign that the drenching technique was incorrect. Start again, ensuring that the sheep's head is level (horizontal) and that the tip of the barrel is placed over the sheep's tongue.

6. Administering capsules, pellets and boluses

Key points

- Check the mineral status of sheep before supplementation to ensure correct dosage and type of mineral used.
- Use the correct applicator for each type of capsule, pellet or bolus.
- Hold the sheep's head up when administering capsules, pellets or boluses.
- Do not force the applicator or plunger, as this can result in injury to the sheep or incorrect administration.

Capsules, pellets and boluses are solid formulations given orally to sheep, to provide long-term treatments or identification. These include:

- controlled-release capsules (eg for anthelmintics or other medications)
- solid mineral supplements (eg selenium or cobalt pellets)
- capsules that release after breakdown in the stomach (eg copper capsules)
- electronic identification boluses

Capsules, pellets and boluses are given to sheep using an applicator inserted into the mouth. They remain in the rumen and dispense medication over a prolonged period, from 100 days (for drenches) up to 3–5 years (for cobalt or selenium pellets).

Identification boluses remain active during the life of the animal.

Mineral supplementation

Mineral capsules and pellets should be given as part of a strategic nutritional or management plan, after completing appropriate diagnostic tests.

Supplementing with cobalt, copper or selenium without prior knowledge of the flock's mineral status can poison sheep.

Do not use copper supplements in sheep suffering from liver diseases, such as liver fluke or plant poisoning, or in sheep that are receiving other sources of copper, such as in-feed supplements or injections.

Some anthelmintic capsules also contain mineral supplements. If in doubt, consult a veterinarian and have blood or liver samples checked for supplementation requirements.

Take care not to use multiple products containing mineral supplements eg selenium injections and drenching with a product containing selenium can poison sheep.

Equipment

The equipment required to deliver capsules, pellets and boluses includes:

- special applicators – check with the supplier to ensure you have the correct applicator
- a race or small yard – sheep should stand while being treated.

Take care to select the correct size of product for the class of sheep being treated. For example, the standard identification bolus can only be given to sheep over 12kg, but smaller sizes are available for lambs down to 8kg. Anthelmintic capsules come in sizes for large sheep (40–80kg) or small or young sheep (20–40kg).

Check withholding periods and export slaughter intervals before giving capsules or pellets to sheep.

Recommended method

Capsules and identification boluses

- Check the product label for the application method and the size of animal that can be treated.
- Check the barrel of the applicator for sharp edges that may cut the mouths of the sheep.
- Ensure the wings of the controlled-release capsule are not damaged and that the tape is in place.
- Insert the capsule or bolus into the tip of the applicator with the domed end pointing out.
- Straddle the sheep with your legs either side of its neck, place one hand under its lower jaw and tilt the head upwards.
- Hold the sheep's head up so its lower jaw aligns with the neck.
- Gently insert the applicator over the tongue until it reaches the back of the throat. *Do not* allow the sheep to chew on the tube.
- If pressure or resistance is felt, remove and gently re-insert the applicator.
- When the applicator is correctly placed, the operator should feel the sheep's swallowing movements.
- Depress the trigger to deliver the capsule. Hold the applicator in place briefly while the animal swallows.

Pellets

- Select the appropriate applicator.
- Before use, rotate the applicator's barrel 90° to one side (to the right for right-handed use and to the left for left-handed use). Do this by loosening the handle clamp screw, twisting the barrel and tightening the screw.
- If giving a copper capsule at the same time as selenium or cobalt pellets, load the selenium or cobalt pellets into the applicator first and load the copper capsule last.
- Work from inside the race, starting from the back.
- Hold the sheep steady with one knee against its flank.



Correct positioning of the applicator when administering pellets to sheep (Diagram courtesy of MSD Animal Health).

- With one hand under the sheep's chin, stretch its head forward.
- Insert the barrel into the gap between the front teeth and the molars, half way down the lips. Position the barrel over the base of the tongue.
- Deposit the pellets in the back of the throat and let the sheep swallow. Tilt the sheep's head back slightly to help it swallow.

Aftercare

- Keep treated sheep in yards for 30 minutes after treatment.
- Observe for signs of coughing or spluttering, wheezing, breathing difficulties or distress.
- If sheep show signs of physical distress, contact a veterinarian and treat as directed.
- If electronic boluses are found coughed up in the yard, note the number and return the individual sheep for re-treatment.
- After use, applicators should be cleaned and lubricated according to manufacturer's instructions.

7. Dipping, jetting and treating with backline products

Dipping, jetting and treating with pour-on or spray-on insecticides are ways to treat or control flystrike or lice.

Flies and lice cause serious animal welfare problems, as well as economic losses for sheep producers.

Integrated pest management should be used to ensure that lice and fly problems are managed appropriately, in a way that does not lead to chemical resistance.

Use the LiceBoss decision tools to decide on the best time and choice of treatment for lice in sheep (www.liceboss.com.au).

Use the FlyBoss decision tools to decide on the best time and choice of prevention and treatment of flystrike in sheep (www.flyboss.org.au).

Operator safety when applying insecticides to sheep

- Be careful and precise when handling chemicals.
- Wherever possible, choose the product and application method that minimises operator exposure.
- Store chemicals in the original containers with an intact label in a secure location.
- Read product labels prior to opening the container, adhere to all precautions and use all the specified safety equipment. Read the Material Safety Data Sheet (MSDS).
- Record the batch number, expiry date and date of treatment.
- Have appropriate clean-up procedures and equipment and emergency procedures in place.
- Have physical barriers installed to protect operators from dip/jetting fluid splashing.
- Avoid inhaling fumes and droplets. Wear appropriate personal protective equipment as specified on the product label when handling insecticides and treated sheep.
- Wash hands, arms and face with soap and water immediately after treating sheep with insecticides.
- *Do not* eat, drink or smoke until all safety equipment has been removed and hands, arms and face have been washed thoroughly.
- Change your clothes when any chemical work is finished.
- Adhere to the wool rehandling period, the wool harvesting interval, the meat withholding period and export slaughter interval.
- Thoroughly wash, dry and store all equipment, ready for next use.
- All personnel who treat sheep with external parasiticides, drenches or other animal health products should be trained and accredited in how to safely use these products.

Fleece-shedding breeds

- Fleece-shedding breeds (eg Wiltshire Horn, Dorper) may not shed the entire fleece.
- If the thatch (wool) on the back of the sheep is not fully shed, it should be shorn. *Do not* try to remove any firmly attached wool by hand because this is painful and will damage the skin.
- Consider culling animals that do not completely shed their fleece.
- Shedding breeds can carry sheep lice, and if left untreated, can be a biosecurity risk for woolly sheep. If fleece-shedding sheep have lice, they should be treated just after they shed their fleece or after shearing.
- The thatch region of shedding breeds is also susceptible to flystrike.



Dorpers in the field.

7a. Dipping

Key points

- Sheep should be dipped 2–6 weeks off-shears for lice or 4–6 weeks off-shears for flystrike protection. Dipping works best on sheep that are cleanly shorn without remaining tufts of wool and do not have lumpy wool (dermatophilosis).
- Follow label directions for all products (mixing, topping up, replenishment, withholding periods and export slaughter intervals).
- Do not rush dipping. It is better to do an effective job once rather than a rushed job that requires re-treatment in long wool.
- Keep sheep off feed overnight, but with access to fresh water, prior to dipping.
- Plunge-dip sheep into a dip with a 9 metre swim length, dunking the head and pushing them backwards twice during the swim.
- Check the penetration of dip wash to the skin of the sheep after dipping the first few sheep, and at regular intervals throughout the day. With gloved hands, part the sheep's wool in the folds of skin behind the neck and on the brisket and write on the skin using a dry indelible pencil (eg Copperplate Red Copying 2100). A dry indelible pencil will make a line on the wet skin but will leave no colour on dry skin.
- After dipping, do not pen sheep together for more than a few minutes to prevent the spread of lumpy wool.
- Carefully dispose of leftover dip wash by pumping onto a soil-bunded area in a well-grassed paddock on deep soil that is not accessible to sheep, avoiding contamination of pastures and waterways.

Dipping is used to apply insecticides that treat or control flystrike or lice.

Sheep should be dipped for lice 2–6 weeks after shearing to allow time for shearing cuts to heal. Dipping after 6 weeks may not be fully effective, as the dip wash cannot penetrate through fleece down to the skin. For the best results, dip sheep that are clean shorn with no remaining tufts of wool and that do not have lumpy wool (dermatophilosis) or other skin problems.

For fly control, sheep should be dipped 4–6 weeks off-shears to allow sufficient wool growth to retain the chemical.

Dipping must result in the thorough wetting of sheep so the chemical can penetrate to the skin. It can be slow hard work and requires the re-mustering of sheep after shearing. A well-maintained dip must be available, as well as a source of water. Other disadvantages of dipping are that operators must work with chemical concentrates when making up the dip wash, the potential for splashing from the dip wash, the need for disposal of unused dip wash at the end of each day and the risk of spreading diseases such as lumpy wool through the dip wash. However, if done properly, plunge dipping is very effective and eradication of lice is possible.

Plunge dips

Plunge dips can be fixed or mobile, swim-type or cage-type.

Swim-type dips can be straight line or curved. Both require a 9 metre swim length with the head of the sheep dunked twice to be fully effective.

Chemical left over at the end of the day needs to be disposed of in a soil-bunded area of a well-grassed paddock on deep soil that is not accessible to sheep.

A cage dip decreases the chance of exposing operators to dip chemical, but it is an expensive machine that requires an external power supply, such as a tractor. Cage dips are efficient and can dip several thousand sheep a day safely and effectively.

Cage dipping is often conducted by contractors that are usually highly trained and experienced.

Rushing the dipping procedure may result in ineffective penetration of chemical and poor external parasite control (eg lower levels of lice kill or flystrike protection).

Shower dips

Shower dips can effectively saturate sheep with insecticide if they are modified according to strict guidelines and operated for 12–15 minutes.

Extensive research has shown that if the shower dip is run for less than 12–15 minutes, the sheep are rarely treated sufficiently for the skin to be saturated.

Due to the slow throughput and increased risk of exposing operators to spray drift, shower dips are not recommended as best practice.

Equipment

Equipment required to dip sheep includes:

- a properly set up plunge or cage dip
- clean water (using muddy water may cause binding of some chemicals, reducing the efficacy of the dip)
- sufficient dip chemicals to complete the job
- disinfectants (eg chlorhexidine or zinc sulphate) to add to the dipwash, especially for young lambs or sheep with lumpy wool
- a measuring stick to determine dip level
- personal protective equipment (long, waterproof pants, a long-sleeved shirt, a hat, gloves, gumboots and face protection)
- a stirrer and dunking crook on a long handle (for plunge dips)
- a hydraulic device to load sheep into the dip, because sheep that have been dipped previously may be reluctant to walk into the dip

Recommended method

A week prior to dipping

- Clean out the dip and pump out any accumulated water. After cleaning, exposure to sunlight will effectively disinfect the dip.
- Clear the dip site and remove obstructions from the entry and drain pens.
- Measure or calculate the dip volume, and prepare a measuring stick to check the dip wash level during dipping.

Day prior to dipping

- Muster and hold sheep in yards overnight, off feed but with access to water to reduce fouling of the dip water. It is best to dip sheep in the morning to allow them to dry before nightfall.

Day of dipping

- Put on appropriate personal protective equipment before opening dip chemical containers.
- Charge the dip according to label directions. Pour the pre-mixed chemical along the length of the dip and thoroughly mix using a stirring device such as a paddle, hoe or pump. Do not run sheep through as stirrers.
- For plunge dips, allow sheep to jump into the dip and swim its length.
- While it is swimming, push the sheep backwards and dunk its head under twice using a long-handled dunking crook.
- A spray nozzle pointing downwards attached to the return from the draining pen could replace one dunk.
- Ensure dip concentration is correct throughout the day by replenishment and topping up. Check product label for correct procedures.
- Do not overload dips, as packing sheep tightly will not allow full penetration of dip wash to the skin.
- Check the penetration of dip wash to the skin of the sheep after dipping the first few sheep, and at regular intervals throughout the day. The skin should be tested for wetness at a few key points (eg in the folds of skin

behind the neck and on the brisket). With gloved hands, part the sheep's wool and write on the skin using a dry indelible pencil (eg Copperplate Red Copying 2100). A dry indelible pencil will make a line on the wet skin but will leave no colour on dry skin.

Care of sheep during dipping

Dipping can potentially expose sheep to disease-causing bacteria and there are risks of chemical exposure, water inhalation and drowning. To reduce these risks:

- rest sheep in pens overnight prior to dipping, with access to water but off feed
- fully vaccinate all sheep at least two weeks prior to dipping with a clostridial and cheesy gland vaccine
- *do not* dip in muddy yards
- *do not* dip sheep immediately after shearing (dip 2–6 weeks off-shears for lice or 4–6 weeks off-shears for flystrike protection) or with heavy grass seed infestation or other skin injuries. Keep dogs muzzled and make sure the yards do not have any sharp points that could cut the sheep
- *do not* dip sheep in wet or very cold, windy weather
- draft sheep into size groups to prevent smothering/drowning
- *do not* keep sheep in draining pens for more than a few minutes after dipping (to prevent the spread of lumpy wool)
- it is best practice not to use electric prodders on sheep. Electric prodders should only be used when there are no other options available. Consider the welfare of sheep when using an electric prodder, and *do not* use it on genital, anal, udder or facial areas of sheep, on lambs less than three months of age, or on sheep that are unable to move away.

Aftercare

- Observe sheep after dipping. Any sheep that show signs of toxicity or distress should be treated according to veterinary advice.
- Pump out and disinfect the dip and allow to dry out overnight. Fresh dip wash should be prepared each day.
- Dispose of leftover chemical by pumping onto soil-banded area in a well-grassed paddock on deep soil that is not accessible to sheep, avoiding contamination of pastures and waterways.



Wear appropriate personal protective equipment when handling chemical concentrates (MSD Animal Health).

7b. Jetting

Key points

- Hand jetting is a thorough but slow method of applying chemical to sheep in long wool for lice control or flystrike protection or treatment.
- Chemicals for jetting should be carefully chosen, and product labels followed to ensure correct dilution, withholding period, export slaughter interval and wool harvesting interval.
- Calculate the volume of jetting fluid required per sheep by using 0.5 litre per month of wool growth as a guide. Measure the time taken for the wand to deliver this volume, and ensure each sheep is jetted for this amount of time.
- Use an indelible pencil to check sheep are saturated to the skin, and modify timing or technique if they are not saturated.
- Automatic jetting races should not be used for long wool lice control.

Jetting is an effective way of applying insecticide for control of lice or flystrike in long wool.

Sheep can be jetted for lice at any time from six weeks after shearing, if product label directions allow.

Jetting to protect against flystrike should be done at least six weeks after shearing, based on the risk of strike, and taking account of weather and sheep factors.

Jetting is a slow physical job that cannot be rushed. Operators need to wear appropriate protective equipment, maintain thorough application technique and avoid working when fatigued. Other disadvantages of jetting include operators working with chemical concentrates and the disposal of unused jetting fluid at the end of the day.

Long wool treatments

- The most effective time to treat for lice is soon after shearing.
- Lice treatment in long wool aims to limit fleece damage until shearing, rather than eradicate lice. It is rarely possible to eradicate lice from sheep with long wool.
- If treated for lice in long wool, sheep should be treated again with an effective off-shears product (eg backline or dipping) to control lice.
- Check the wool harvesting interval on the product's label to correctly time its use.

Equipment

Equipment required to jet sheep includes:

- water and chemical for the jetting fluid
- a mixing tank
- a pump capable of delivering fluid at 700kPa
- a jetting wand (preferably equipped with pressure gauge)
- a bucket
- personal protective equipment (long waterproof pants, steel-capped gumboots, waterproof gloves, a washable hat and eye protection)
- a race with a concrete floor (preferably shaded)
- a watch or timer to monitor jetting time for each sheep

Using a fire hose to wet sheep is not acceptable. It is not an adequate substitute for jetting because it does not allow fluid to thoroughly wet the skin of all sheep. Using a fire hose will result in excess residues on some sheep and insufficient protection on others. Chemical manufacturers do not support the use of fire hoses to apply chemical to sheep.

Recommended method

- Put on appropriate personal protective equipment before opening jetting chemical containers.
- Dilute chemical concentration to recommended rate in the mixing tank.
- Turn on the pump and run for five minutes with the wand stuck in the tank to thoroughly mix chemical and fill all lines.
- Use 0.5 litres of jetting fluid per month of wool growth (as recommended on most jetting products), with a minimum 2.0 litres and a maximum 5.0 litres (eg a sheep with six months of wool growth will require 3.0 litres of jetting fluid).
- Set up jetting equipment by adjusting the jetting wand to the correct pressure (600–700kPa for adults or 280–350kPa for lambs) and directing the jet into a bucket.
- Measure the time to deliver the calculated dose of jetting fluid for the sheep. This will be the time needed to jet each sheep.
- Load the race with sheep.
- Where possible, work upwind of the wand to avoid spray drift.
- Stand behind the sheep, using your knees to hold the sheep in place.
- Push the sheep's head forward to stretch its neck and open the fleece.
- For lice control or protection against body strike, start high on the neck and draw the wand slowly down the centre of the sheep's backline, allowing the jetting fluid to pool at the trailing edge. The jetting fluid will slowly penetrate the fleece to the skin and run down the sides of the animal. If jetting fluid drips rapidly onto the floor of the race, the wand is being drawn too slowly or has insufficient downward pressure.
- If breech, poll or pizzle protection is required, use separate blows to saturate these areas.
- After jetting the first few sheep, and at regular intervals throughout the day, check the sheep to ensure jetting

fluid is dripping from the belly. Jetting wash will drip from the belly several minutes after application.

- Sheep can also be checked for saturation to the skin by using an indelible pencil to test for wetness in a few key spots (eg in the folds of skin behind the neck and on the brisket). With gloved hands, part the sheep's wool and write on the skin using a dry indelible pencil. A dry indelible pencil (eg Copperplate Red Copying 2100) will make a line on the wet skin but will leave no colour on dry skin.
- If sheep are not saturated to the skin, allow extra jetting time or modify your technique.

Automatic jetting races

- Automatic jetting races are a rapid way to treat large numbers of sheep, but they are not as effective as hand jetting at saturating sheep.
- Automatic jetting races should not be used for long wool lice control.
- A reduced period of protection against flystrike is claimed on some product labels if the product is applied using an automatic jetting race.
- Note that some products are not suitable for recirculation from the draining pen.
- Check chemical product labels for details of use with automatic jetting races.

Aftercare

- Observe sheep after jetting. Any sheep that show signs of toxicity or distress should be treated according to veterinary advice.
- Dispose of unused jetting fluid using a soil-bunded area in a well-grassed paddock on deep soil that is not accessible to sheep, avoiding contamination of pastures and waterways.

7c. Treating with backline products

Key points

- Spray-on or pour-on backline products are easily applied to sheep for off-shears or long wool lice control, for flystrike control or to protect lambs after marking and mulesing.
- Manual or powered applicators can be used to apply backline products.
- The correct applicator must be used, as well as the application volume and pattern specified on the product label.
- Check the application pattern after each race of sheep to ensure all sheep have been treated correctly. If gaps are found, apply a small amount of additional chemical to fill the gaps.

Pour-on backline and spray-on products are a fast and easy way to apply chemical to sheep for lice and fly control.

These products require low capital costs, are labour-efficient and do not expose workers to as much spray as other methods of chemical application. An additional benefit is that a source of water is not required because the products come in ready-to-use formulations that can be applied without dilution.

Compared to saturation methods, pour-on backline and spray-on treatments are less stressful to sheep and reduce the risk of post-dipping lameness, cheesy gland and other infections.

Products are available for long and short wool and for lice or fly control.

Backliners for lice work best on sheep that are clean-shorn, without any tufts or wool, scabs, crusting or lumpy wool.

Treatment of sheep in long wool for lice will not result in eradication, and sheep will need to be re-treated after shearing with an appropriate off-shears or short wool product.

When treating large numbers of sheep, operator fatigue must not compromise application technique.

Wool length

Adhere to the following definitions when using pour-on backline and spray-on products.

- ‘Off-shears’ means within 24 hours of shearing, unless specified on the label.
- ‘Short wool’ means more than two weeks but less than six weeks after shearing.
- ‘Long wool’ means more than six weeks after shearing, unless specified on the label.

If cover combs or snow combs are used, sheep are not shorn short enough for off-shears treatments to achieve full efficacy.

Equipment

Equipment to treat sheep with pour-on or spray-on backline products includes:

- chemical and correct applicator
- appropriate tubing and gas canisters (for powered application)
- personal protective equipment as specified on the product label

Recommended method

Application pattern

- Check the label carefully to ensure the correct volume is applied using the correct application pattern. Pour-on or spray-on products can have different application volumes and patterns, and incorrect application results in treatment failure. Some products are applied as a single stripe, some as two stripes side by side and others as two stripes in tandem.
- Evenly distribute the chemical from poll (or high on the neck) along the midline (or either side of the midline for parallel stripes) to the tail. This is the most important application principle.
- For flystrike prevention, apply the product to the parts of the sheep that need protection.
- Use a power applicator if stipulated on the product label.
- Calibrate the dispensing gun to deliver the recommended label dose per sheep. Deliver 10 doses into a measuring cylinder and check that the correct volume has been dispensed.

- Load sheep into the race.
- Use the dispensing gun to deliver chemical along the sheep's backline in the pattern specified on the product label.
- Apply the product so it is evenly distributed to the left and right sides of the backline.
- If some sheep have their heads down or are hidden under other sheep, stand them up before applying the product.
- Check the sheep after each race has been treated to ensure that product is being applied correctly. If gaps are found in the application pattern, apply a small amount of additional chemical to fill the gap.

Insect growth regulator chemicals used for fly prevention are not repellents, and will allow blowfly eggs to be laid and first instar fly larvae to hatch. These larvae are harmless and do not develop to the second, damaging stage if chemical has been applied correctly.



Applying a backline treatment to sheep (Photo courtesy of NJ Phillips Pty Limited).

8. Giving injections

Key points

- Give low volume (less than 5ml) subcutaneous injections high on the sheep's neck, behind the ear, and high volume ones under the skin of the chest, over the ribs.
- Give intramuscular injections in the muscles of the neck, in front of the sheep's shoulder, at a maximum of 10ml per injection site.
- Read all product labels and veterinarian's instructions before use, and take note of the withholding period, export slaughter interval, dose rate and site of injection. Record the batch number, expiry date and date of treatment.
- Use sterilised injecting guns, syringes and sharp needles. Replace needles frequently and change needles that are blunt, bent or dirty.
- Train all operators in injection technique, and how to avoid accidental self-injection and exposure to injected medicines.
- Take special care when injecting oil-based vaccines and use guarded needle vaccinating guns.
- Carefully dispose of needles and other sharps according to local government requirements.

Injections are used to deliver sterile liquid formulations of vaccines, tranquilisers, medicines and nutritional supplements to sheep.

Sheep usually receive injected drugs subcutaneously (under the skin), but some injections may be given intramuscularly (into the muscle).

Care should be taken to ensure injections are administered in the correct place, do not harm the animal or the operator, and do not cause adverse reactions or abscesses.

Read the label or seek advice from a veterinarian or animal health adviser to plan the best time for vaccination.

Sheep are sometimes treated for metabolic conditions, such as pregnancy toxæmia, with large volume subcutaneous injections (70–100ml).

Nutritional supplements or veterinary medicines should be given on the advice of a veterinarian or qualified adviser.

Hygiene

- Wash hands before handling syringes, injection guns and needles.
- Use sterilised needles and syringes (or multiple dose guns) and sterile formulations that have been stored according to the manufacturer's specifications.
- Inject into dry, clean skin to prevent complications, such as swelling or abscesses.
- Avoid injecting sheep in dusty, wet or muddy conditions.

Equipment

Equipment to inject sheep includes injecting guns, disposable syringes and needles.

Injecting guns

- Injecting guns can be new disposable guns or re-usable plastic or stainless steel guns.
- Guarded needle vaccinating guns are recommended when injecting oil-based vaccines, such as the ovine Johne's disease vaccine. Guarded vaccinators help to reduce the risk of needle stick injuries.

Injecting guns can be sterilised by washing thoroughly and suspending them in boiling water for 10 minutes. Allow the gun to dry out before use. Avoid the use of strong disinfectants.

Needles

- Short needles (0.25–0.5 inch or 6–12mm in length) for vaccines.
- 16–18 gauge needles, 1.5 inches or 37.5mm in length, for large volume injections (more than 50ml).
- Disposable syringe and disposable (plastic hub) needle for intramuscular injections (16–20 gauge disposable needles 1 inch or 25mm in length available from many rural product resellers are suitable).

- Needles that are blunt, bent or are dropped should be changed immediately. Dirty or blunt needles can cause abscesses or carcase damage.
- All needles become blunt with use, so change needles frequently during the day, before it becomes difficult to inject through the skin.
- Used needles should be disposed of carefully, preferably into a designated sharps container. An alternative is to place used needles in a container with a small opening such as a detergent bottle. Dispose of the designated sharps container in accordance with your local government requirements.
- *Do not* use drink cans or bottles to discard needles or other sharp objects as this can result in accidental injury.
- If a needle breaks off in the sheep during injection, the sheep should be permanently identified and not sold or used for meat production.

Recommended method

- Maintain cleanliness at all times.
- Read label and follow all directions.
- Record the batch number and expiry date.
- Note if injection is to be given under the skin (subcutaneous) or into the muscle (intramuscular).
- Restrain the animal. Lambs can be injected when they are in the lamb-marking cradle, in a race or held by an operator. Adult sheep can be injected in a race or small pen, in a sheep-handling device, when held by an operator or when caught and treated in a paddock. Use the catch-and-restrain method or catch-and-turn method to restrain sheep that are not being injected in a race or sheep-handling device.

Giving subcutaneous injections

Subcutaneous injections should be given high on the neck, behind the ear. The product being injected is delivered into a pocket under the skin, above the muscle layer.

Many injections result in small lumps in the skin or muscle of the animal. Injection high on the neck, behind the ear, allows for easy trimming of the carcase at

processing. The skin on this part of the neck is loose and this improves the ease of subcutaneous injection and helps to minimise carcase damage when swelling occurs. It is also less likely to be dirty, reducing the risk of contamination.

One-handed techniques using a self-tenting vaccinating gun are encouraged when giving oil-based vaccines, such as the ovine Johne's disease vaccine. However, it is very important that vaccines and other products labelled for subcutaneous use are not accidentally given intramuscularly.

To give a subcutaneous injection:

- pick up the skin between the thumb and forefinger of one hand and deliver the injection with the other, with the needle parallel to the animal's body
- *do not* push the needle through the skin tent and out the other side, or too deep (into the muscle)
- push the plunger to deliver the dose

If pressure is felt during the injection, *do not* keep pressing the plunger. This may indicate that the needle is resting in the muscle. Reposition the needle and try again.



Giving a low-volume subcutaneous injection high on the neck, behind the ear (Photo courtesy of NJ Phillips Pty Limited).

Giving large volume subcutaneous injections

Metabolic preparations, such as those used for treating pregnancy toxæmia, are usually dispensed in a soft, squeezable plastic container. The most appropriate site for injection is over the ribs. To give a large volume subcutaneous injection:

- warm the solution to body temperature by placing the container into a bucket of warm water
- disinfect the site over the ribs using methylated spirits and let it air-dry
- use a long, wide-gauge needle (eg 1.5 inches or 37.5mm in length, 16–18 gauge)
- tent the skin with one hand and insert the needle under skin with the other
- gently squeeze the container to dispense the solution under the skin

Giving intramuscular injections

Intramuscular injections are used for administering antibiotics, tranquilisers, some vitamins and some other veterinary remedies. The preferred site of injection is into the muscles of the neck. To give an intramuscular injection:

- *do not* inject more than 10ml into each injection site (use several sites for larger volume injections)
- use a new disposable needle (1 inch or 25mm in length, 18–21 gauge) with a sterile syringe or multiple dose gun
- shake the bottle well to mix contents, clean the stopper with methylated spirits and air-dry for 10 seconds
- insert the needle into the stopper, invert the bottle and withdraw the correct dose
- with the sheep well restrained, feel the injection site with one hand and insert the needle into the muscle with the other
- *do not* force the needle in hard or it may hit bone, resulting in bruising, pain and tissue damage

- check for blood in the hub of the needle before depressing the plunger (if there is, remove the needle and re-insert in a different location)

Operator safety when injecting

All injections have the potential to cause injury to operators. To minimise the risk to operators:

- ensure the animal is well restrained (lambs in the lamb-marking cradle; adult sheep and larger lambs in a race, pen or restrained in the paddock)
- *do not* let the vaccination gun swing freely, use a holster to control it
- use guarded needle vaccinators if recommended by the vaccine manufacturer and follow all label instructions
- remove used needles with pliers
- carefully dispose of used needles in a specified container
- wear disposable gloves when changing needles and connecting tubing
- rinse skin well if you come into contact with an injectable animal formulation, and consult the product label for safety instructions
- let accidental self-injection wounds bleed freely. *Do not* squeeze. Use soap and water to clean the site, wrap loosely with a bandage and quickly seek medical advice.
- take extreme care when using oil-based vaccines, such as the ovine Johne's disease vaccine, and restrain animals in a sheep-handling device
- seek immediate medical attention if you come into contact with an oil-based vaccine (skin, eyes, mouth or accidental self-injection), taking the product leaflet and packaging with you. Telephone the National Poisons Information hotline on 13 11 26 for further information.

Aftercare

- After intramuscular injections, keep a finger on the injection site and massage gently to improve delivery of solution into the tissues.
- After giving large volume injections, massage gently to move the fluid away from the injection site and assist with absorption.

Vaccines

Vaccines help protect against common diseases, such as blackleg, tetanus, pulpy kidney, cheesy gland, scabby mouth and arthritis in lambs caused by *Erysipelothrix rhusiopathiae*.

A few vaccines are single-dose treatments (eg ovine Johne's disease vaccine and scabby mouth), and a single vaccination will usually be sufficient for lifetime protection, but most vaccines require a booster to provide full immunity.

Ensure sheep complete the vaccination program for each type of vaccine or they may suffer sickness, death or production losses.

9. Horn trimming

Key points

- Where possible, use polled rams that do not require trimming. They (and their progeny) are less prone to injury and carcass damage compared to horned sheep.
- The best time to trim rams' horns is at 10–12 months of age.
- Use hydraulic shears, long-handled cutters or wire saws with handles to trim horns. Due to risk of injury and operator fatigue, wire saws should only be used on small numbers of rams, when the other options are not available.
- Do not use power tools, such as chainsaws, circular saws and angle grinders, to trim ram horns. Their use is unacceptable for the humane care of livestock.
- Trim horns half way around the first curl, midway between the ear and the eye, with the direction of cut perpendicular to the ground and parallel with the serrations on the horn.
- If bleeding occurs, apply pressure and keep the ram in the yard until the bleeding stops. Do not cut the horns of the remaining rams so short.

Horn trimming is the removal of the hard tip of rams' horns. If done correctly, this should not cause distress or injury to the ram, as the cut area does not contain nerves or blood vessels.

Rams' horns may need to be trimmed to prevent ingrown horns damaging the face and eyes, to prevent injury to other rams and handlers, to help prevent flystrike, to make rams easier to load and transport, and to stop rams catching their horns in fences, yards or trees.

Horns are best trimmed at hogget age (before 12 months of age). Trim the horn half way around the first curl, midway between the ear and the eye, with the direction of cut perpendicular to the ground and parallel with the serrations on the horn. Trimming at hogget age and in this way reduces the risk of the horns growing into the ram's face.

Trimming the horns of adult rams may result in excessive bleeding and distress to the animal, and should only be done under veterinary supervision with appropriate pain relief.



When trimming rams' horns, the cut surface should not bleed.

Polled rams

Polled rams are available in many breeds of sheep. Without horns, these rams are less prone to injure themselves and other sheep, giving them distinct advantages for animal welfare and carcass quality.

Equipment

Equipment for horn trimming includes:

- hydraulic shears
- long-handled cutters
- horn-cutting wire saws with handles

Choice of de-horning method

Hydraulic shears are the quickest method of de-horning, and cause minimal risk of injury and little operator fatigue. However, they are more expensive than other equipment.

Long-handled cutters are also fast and effective, but may contribute to operator fatigue if many rams are being trimmed.

Using wire saws with handles is a slow and physical method of de-horning, which can injure rams and operators and cause operator fatigue. They are only practical for small numbers of rams, and should only be used when the other options are not available.

Power tools are not acceptable due to the high risk of injury to operators and rams.

Recommended method

- Use two people – a handler and an operator.
- Restrain rams in a race or small pen.
- The handler restrains the ram, using the sides of the race or pen to pin the ram's body. The handler holds the horn opposite to the side being trimmed to prevent the ram's head from moving, pinning the side of the head against the rails.
- The operator places the blades of the shears or long-handled cutters around the horn at a point midway between the ear and the eye. The cut is made at an angle perpendicular to the ground, and parallel to the serrations of the horn.
- The operator should use both hands to hold the blades in position, and ensure the handler's hands are away from blades.
- For hydraulic shears, activate the switch to close the jaws of the shears.
- For long-handled cutters, squeeze the blades together in one smooth action.
- For dehorning wire, use a smooth action to cut, ensuring that the handler keeps the ram's head as still as possible throughout the process to ensure a neat cut.



Correct location and angle of cut to trim the horn tips of rams. Cutting at the correct location and angle prevents the horns growing into the face. The horns continue to grow after hogget age and re-trimming may be required.

Aftercare

- If the horns bleed, apply pressure to the cut and keep the ram in the yard until the bleeding stops. *Do not* cut the horns of the remaining rams so short.
- If flies are a potential problem, apply a flystrike preventive.

Scurs

Scurs are vestigial (small) horns that can occur in an animal that it was expected would be polled. Scurs are not attached to the skull and can grow into random shapes. They are rarely a concern in slaughter lambs, but may be a problem in rams. If trimming is required, consult a veterinarian.

10. Inspecting and paring feet

Key points

- Foot health is essential to the wellbeing of sheep.
- Sheep productivity can be severely affected by lameness.
- Knowing the normal shape of the sheep's foot and how to pare feet will help detect problems earlier.
- Promptly inspect the feet of any sheep that are lame and take appropriate action.
- Prior to purchasing sheep always inspect the feet of as many of the sheep as possible and request a fully completed National Sheep Health Statement/valid footrot vendor declaration.
- Inspect rams' feet prior to purchase, and at least eight weeks before joining. Pare to the normal shape if required.
- Over trimming feet causes bleeding and pain and can lead to the formation of toe granulomas.
- After paring, observe sheep for lameness and bleeding. Keep any lame sheep or sheep with bleeding feet in a holding paddock with feed, water and shelter until they have recovered.

Foot health is essential to the wellbeing of sheep.

Lameness can cause major losses in productivity, largely because the sheep are unable to walk to find adequate food and water. Lameness can lead to malnutrition, ill-thrift, reduced wool growth, flystrike, low reproductive performance and even death.

Conditions such as wet weather, muddy conditions, certain feeds, grass seeds, infections, poor conformation and certain 'soft' geological soil types can result in the hoof wearing unevenly, overgrowing or breaking down.

It's important to know normal foot anatomy, how to examine sheep for lameness and how to pare feet.

Veterinarians may need to be engaged to diagnose and treat foot disease, and livestock contractors can pare feet.

Infectious disease, such as footrot, should be diagnosed early so that a control program can be started before the disease spreads through the flock. In some regions of Australia, footrot is a notifiable disease.

Prior to purchasing sheep always inspect the feet of as many of the sheep as possible and request a fully completed National Sheep Health Statement/valid footrot vendor declaration.

Rams should have their feet inspected at least eight weeks before the start of joining. Pare to a normal shape if required and treat any other foot problems.

Inspect the feet of all other sheep annually or if the animal is showing signs of lameness. Avoid inspecting the feet of ewes in the 4–6 weeks leading up to the start of lambing; after this time, foot treatment may cause stress and lambing losses. It may be unnecessary to turn over ewes for inspection at this time, but any cases of lameness should be inspected to determine the cause and treat appropriately.

Signs of lameness in sheep

Sore or diseased feet can result in lameness. Signs of lameness can be obvious or very subtle. Watch for:

- weight not borne evenly on all legs
- uneven posture, even without obvious shortening of stride
- uneven stride or short steps
- head bobbing in time with the short stride and the shoulder may also drop
- excessive flicking of the head
- refusal to walk
- obvious discomfort when moving or standing
- bunny hopping or taking pressure off sore front feet by hopping on back feet (eg toe abscesses)
- carrying one leg when standing or walking
- difficulty rising
- refusal to stand

Equipment

Equipment for foot inspection and paring includes:

- a sheep-handling device (recommended for large numbers of sheep; use the catch-and-turn method described in Chapter 1 for small numbers – see page 7)
- foot-paring shears and grind stone for sharpening
- pneumatic foot shears (recommended for large numbers of sheep)

In some regions of Australia during summer, the feet of sheep can be very dry and difficult to trim. Standing sheep in a water trough for 10 minutes before paring can make trimming easier.

Recommended method

Normal anatomy of the sheep's foot

- Sheep do not usually bear weight on the soles of their feet, but rather on the wall of the claw and the bulb of the heel.
- A normal foot rests flat on the ground, and the walls of its outside claw are curved.
- A white line is visible where the wall of the claw meets the sole.
- Optimal angles are 55° for the front feet and 50° for the back feet.

Inspecting feet

- Use both hands to grasp the sheep's claws and turn them apart to expose the skin.
- Normal feet will have pale pink skin between the claws (coloured sheep will have dark skin).
- Inspect the feet for shape, swelling, discharge (eg pus) and odour.
- Putrid odour is an indication of infectious disease, such as footrot or foot scald.

- To inspect the sole, lift the foot with one hand above the pastern (the area between the fetlock and the hoof), and look for separation of the sole from the wall of the hoof.
- If footrot is suspected, contact a veterinarian or government livestock officer for advice on control and treatment.



This foot does not need trimming.



These feet need trimming.

Paring feet

- Always be careful not to remove too much hoof when paring. Overgrown feet may have blood vessels growing into the toe, so take care not to cause bleeding. Over trimming feet is painful for sheep and can lead to the formation of toe granulomas.
- Hold the foot with one hand above the pastern. If the toe is overgrown, remove the sharp point.
- Make a cut down the outside wall of the claw, removing excess horn to make the sidewall almost level with, but slightly longer than, the sole. The sole should sit at least 5mm below the surface of the outer horn and not directly bear weight.
- If necessary, make a third cut to trim the inside wall of the hoof from the heel, joining the first cut at the point of the toe.
- Move to the opposite claw and repeat the process, ensuring the claws are the same length.
- Large deposits of dirt or mud can be cleaned out with the point of the shears.

Poor foot conformation can cause overgrown and deformed hooves. Poor foot conformation could be inherited, so check all rams for sound feet before purchase. ASBVs are not currently available for this trait; rely on within-flock selection for good foot conformation. Visual conformation scores for foot and leg conformation are available in the Visual Sheep Scores guide at www.sheepgenetics.org.au.

Aftercare

- Observe sheep after trimming feet to ensure they can walk freely.
- Keep any sheep that are severely lame or have bleeding feet in holding paddocks with feed, water and shelter until they are fit to walk. Excessive walking will cause the bleeding to continue.
- For footrot control, administer vaccines and footbath treatments as required, as well as injectable antibiotics or other treatments prescribed by a veterinarian.

Footbaths

Footbaths are commonly used to toughen soft feet and to treat infectious causes of lameness.

Trimmed feet can more readily absorb chemicals, such as zinc sulphate that is used to toughen the feet, enabling them to better withstand wet conditions.

Because of workplace health and safety concerns and the availability of effective alternatives, formalin is no longer recommended for foot bathing.

11. Castrating

Key points

- Lambs should be castrated at 2–8 weeks of age. This should be possible in most sheep production systems in Australia that have a 5–6-week joining and lamb marking two weeks after the end of lambing.
- The best method of castrating lambs is with lamb-marking rings.
- The use of a lamb-marking knife is not considered best practice.
- The operator should be competent in the castration technique.
- It is essential that ewes are given a booster dose of tetanus or clostridial disease vaccine 2–4 weeks before the start of lambing.
- Lambs should be given their first dose of tetanus or clostridial disease vaccine at lamb marking, and a booster dose at weaning, then annual booster vaccinations in subsequent years.

Consider engaging an accredited livestock contractor to mark lambs. Accredited livestock contractors are trained and experienced in various lamb-marking procedures, including castration.

Lambs for speciality markets that will be slaughtered before 12 weeks of age should not be castrated. Lambs that will be slaughtered before the onset of puberty (at around 3–6 months of age) may also not require castration.

Lambs should be castrated at 2–8 weeks of age, when they have smaller testicles and scrotums. This means that the lambs have less sensitive tissue to be removed, resulting in smaller wounds and faster healing. Younger lambs are easier and safer to handle, meaning castration can be done faster and with less stress for lamb and

operator. This should be possible in most sheep production systems in Australia that have a 5–6-week joining interval and that mark lambs two weeks after the end of lambing.

Castrating lambs older than 12 weeks of age is not considered best practice. If the lambs are older than 12 weeks, castration may coincide with the onset of puberty, increasing the risk of complications.

Use appropriate pain relief products for the procedure being undertaken if practical, cost-effective pain relief products are registered and available for use in sheep. Consult your veterinarian for information on pain relief products for use in sheep.

Traditionally, sheep have been castrated using lamb-marking rings or a lamb-marking knife. Of these two methods, lamb-marking rings are preferred, and are used by approximately 90% of Australian sheep producers to castrate lambs. Lamb-marking rings:

- have less overall welfare impact on the lambs compared to the lamb-marking knife
- reduce the risk of bleeding
- reduce the risk of transferring blood between animals and spreading disease (eg *Mycoplasma ovis*)
- remove the workplace health and safety risk of exposure to blood and working with knives.

It is essential that ewes are given a booster dose of tetanus or clostridial disease vaccine 2–4 weeks before the start of lambing. This gives lambs disease protection via the colostrum (first milk). Give lambs their first dose of tetanus or clostridial disease vaccine at lamb marking, and a booster dose at weaning, then annual booster vaccinations in subsequent years.

Equipment

Equipment used for castrating includes:

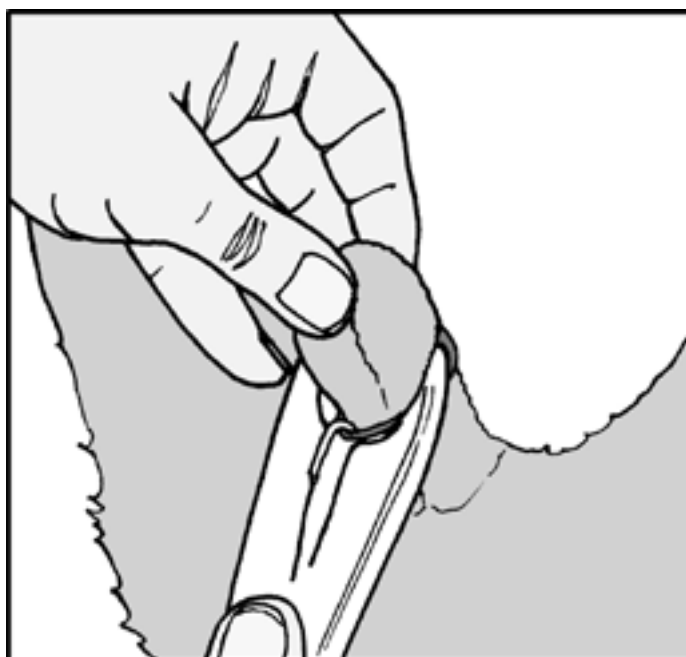
- lamb-marking rings and applicator
- buckets for handwashing and antiseptic for hand rinsing and disinfecting
- disinfectant for disinfecting the ring applicator

Recommended method

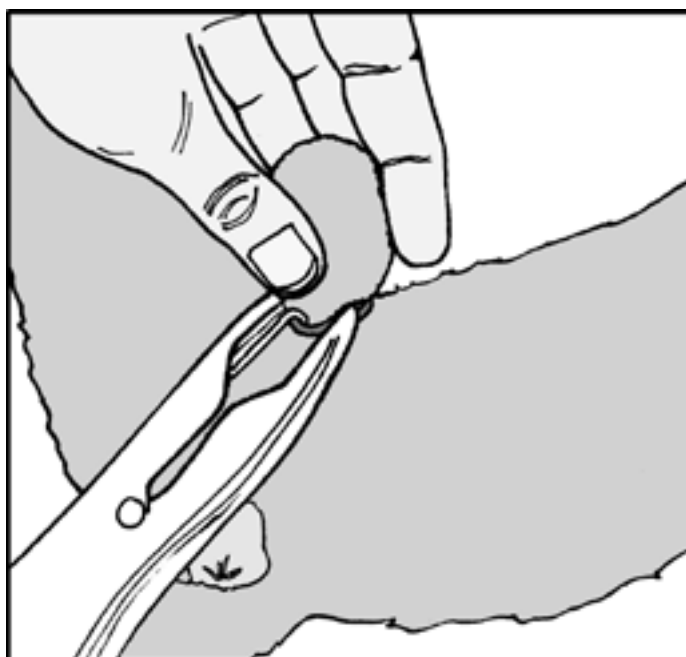
The information on lamb marking in **Chapter 1 (on pages 9–10)** should be read in conjunction with this section.

Castrating lambs using lamb marking rings

- Disinfect the ring applicator and dry before use.
- Adequately restrain the lamb in a cradle or using an assistant.
- Ensure there are no burrs, fribs or dags on the lamb's scrotum.
- It is best practice to wash and disinfect your hands before applying the ring.
- Use the ring applicator to stretch the ring so it can be placed around the scrotum, between the lamb's body and testicles. Put the ring on the applicator, checking that the ring is in the grooves on the applicator prongs, and then expand the applicator prongs and ring.
- Position the applicator and expanded ring around the scrotum, with the applicator prongs pointing toward the lamb's body.
- Pull the scrotum through the expanded ring.
- Position the expanded ring on the applicator between the lamb's body and its testicles. Check that the ring is not too high up, where it could pinch the body wall or entrap the small false teats close to where the scrotum joins the lamb's body.
- Using light pressure, push the testicles through the ring and into the scrotum.

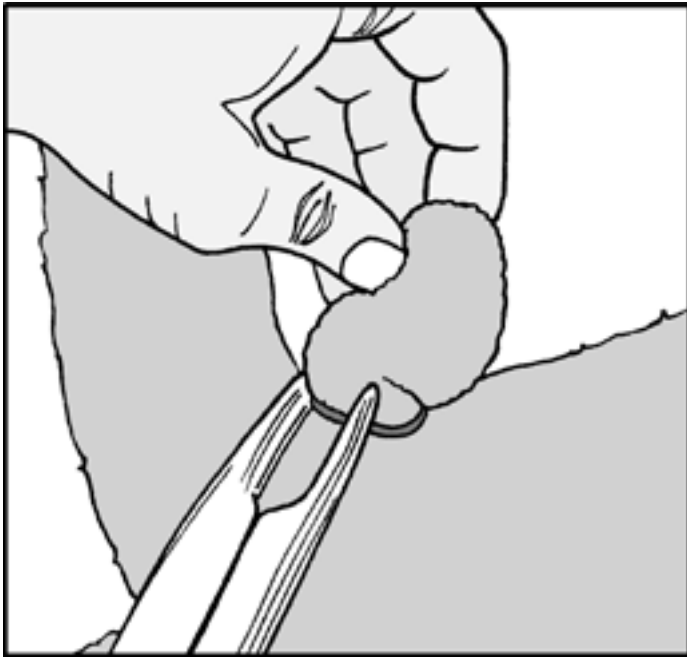


Expand the ring on the applicator with the prongs pointing toward the lamb's body, and pull the scrotum through the expanded ring.

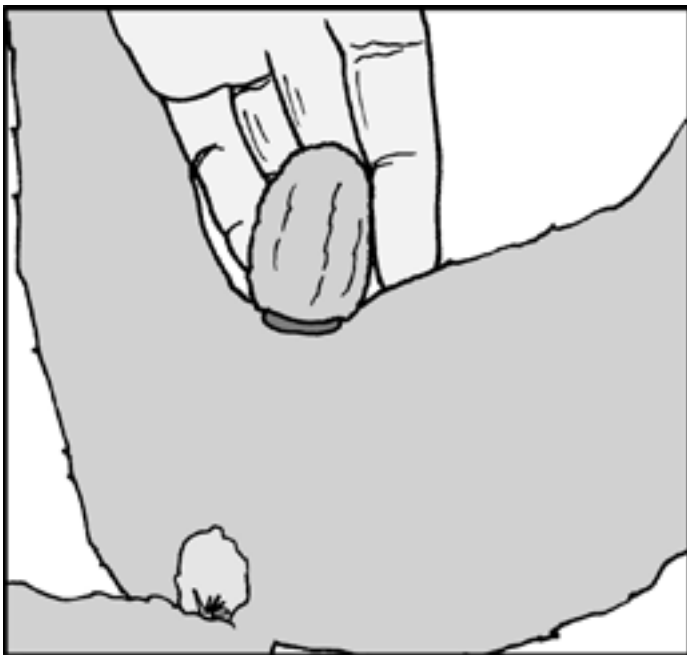


Ring in the correct position between the testicles and the lamb's body.

- Release the pressure on the applicator so the ring contracts and tightens around the scrotum.
- Gently remove the prongs of the applicator from under the ring.



Gently remove the prongs of the applicator from under the ring.



Double check that both testicles are still inside the scrotum, below the rubber ring.

- Double check that both testicles are still inside the scrotum.
- Apply a flystrike preventive, if required.

What to do when only one testicle is present

Some male lambs do not have both testicles in the scrotum.

- Releasing one of the lamb's hind legs from the cradle eases the pressure on the hind legs and sometimes helps the testicles to move down into the scrotum.
- Alternatively, return the lamb to the pick-up pen and try again later.
- If these options do not work, *do not* castrate the lamb. Identify the lamb so it can be checked a few weeks later to see if both testicles are present. If both testicles are present at that time, castrate the lamb. If not, cull the lamb as quickly as possible. A male lamb without both testicles in the scrotum should not be retained for breeding because the condition is heritable.

Aftercare

- When all lamb-marking procedures are completed, gently release the lamb onto clean grass so it lands on its feet.
- Return lambs to their mothers as soon as possible, well before dark.
- Check lambs daily, without disturbance that could cause mismothering, for 10 days after marking. Yard or catch and restrain any animals that appear abnormal, and treat any complications early.

Pizzle dropping

Pizzle dropping (severing the anterior attachment of the prepuce to the abdominal wall) is unacceptable.

12. Tail docking

Key points

- The younger the lamb and the longer the tail stump left, the quicker the tail-docking wound heals.
- Lambs should be tail docked at 2–8 weeks of age. This should be possible in most sheep production systems in Australia that have a 5–6-week joining with lamb marking two weeks after the end of lambing.
- Extensive Australian field trials of unmulesed and mulesed sheep have clearly shown that the best length to dock the tails of lambs is just below the third palpable joint or through the third joint space. Female and male lambs should have their tails docked to the same length.
- Short tails deliver no advantages – they take longer to heal, are more likely to become infected during healing thereby increasing the risk of arthritis, increase the lifetime risk of flystrike, increase the risk of rectal prolapse and predispose sheep to a higher risk of vulval and anal cancers.
- The best method of docking lambs is to use a gas-heated tail-docking knife (hot knife), preferably designed to remove the woolly skin on the tip of the tail.
- Lamb marking rings do not remove the woolly skin on the tip of the tail and are more stressful for lambs.
- The lamb-marking knife is not a best practice method for docking lamb tails and is not recommended.
- The use of mulesing shears to dock tails is unacceptable practice for the humane care of livestock.
- The operator should be competent in the tail-docking technique.
- Lambs should be given their first dose of tetanus or clostridial disease vaccine at lamb marking, and a booster dose at weaning, then annual booster vaccinations in subsequent years.

The tails of sheep should only be docked when there is no alternative to improve the lifetime welfare benefit to sheep and flock management. Tail docking should not be done for cosmetic reasons.

Wool-shedding breeds and short-tailed breeds (eg Wiltshire Horn, Dorper) do not require tail docking.

Lambs should be tail docked at 2–8 weeks of age. Younger lambs have smaller tails; that means less sensitive tissue to be removed, resulting in smaller wounds and faster healing. Younger lambs are easier and safer to handle, meaning docking can be done faster and with less stress for lamb and operator. This should be possible in most sheep production systems in Australia that have a 5–6-week joining period with lamb marking two weeks after the end of lambing.

If docking is delayed until after lambs are eight weeks of age, healing is slower and the risk of infection will increase.

The best method of docking lambs is to use a gas-heated tail-docking knife, preferably designed to remove the woolly skin on the tip of the tail. The gas-heated tail-docking knife:

- has less overall welfare impact on the lambs compared to docking with lamb-marking rings, a lamb-marking knife or mulesing shears
- reduces the risk of bleeding
- reduces the risk of transferring blood between animals and spreading disease (eg *Mycoplasma ovis*)
- provides immediate, visual certainty that the job has been achieved

The best way to dock lambs is with a gas-heated tail-docking knife, preferably designed to remove the woolly skin on the tip of the tail.

Lamb-marking rings have a higher overall welfare impact on lambs than the gas-heated tail-docking knife, but less than the lamb-marking knife. The lamb-marking rings do not remove the woolly skin on the tip of the tail and there is a risk of tetanus if the ewes and lambs are not properly vaccinated.

Lamb-marking knives and mulesing shears create a higher risk of bleeding and of transferring blood and spreading diseases between animals. Using mulesing shears to tail dock lambs can result in misshapen, deviated tails. Use of the lamb-marking knife is not considered best practice for tail docking lambs and using mulesing shears is unacceptable.

The lamb-marking knife is not a best practice method for tail docking lambs and is not recommended. Using mulesing shears to tail dock lambs is an unacceptable practice for the humane care of livestock.

Use appropriate pain relief products for the procedure being undertaken, if practical, cost-effective pain relief products are registered and available for use in sheep. Consult your veterinarian for information on pain relief products for use in sheep.

Equipment

Equipment to tail dock lambs includes:

- gas-heated tail-docking knife, full gas bottle(s), connecting hoses, wire brush to clean the cutting edge of the knife, iron stand and shroud for holding the knife
- buckets for handwashing and disinfecting
- antiseptic

Safety precautions when using a gas-heated tail-docking knife

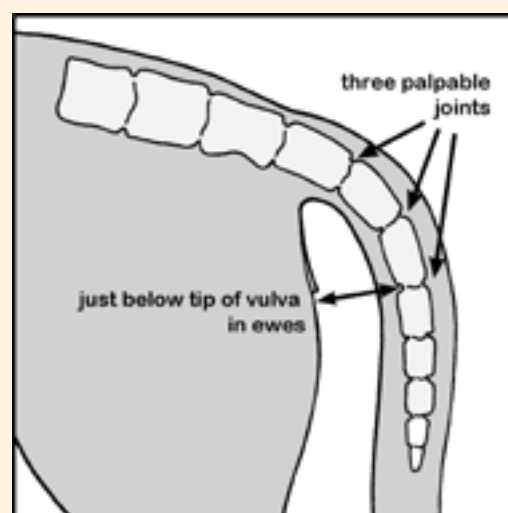
- Check that all gas fittings are tight and in good working order.
- When not in use, keep the gas-heated tail-docking knife on an iron stand surrounded by a shroud. This protects workers and lambs from accidental burns, keeps the head hot, stops wool fibres and dust from being sucked into the gas jet and, in windy conditions, stops the flame being blown out.
- When on the stand, position the gas-heated tail-docking knife with the head up, to keep the handle cool.

Recommended method

The information on lamb marking in Chapter 1 (on pages 9–10) should be read in conjunction with this section.

Recommended tail length

- Dock the tails of lambs just below the third palpable joint or through the third joint space.
- Female and male lambs and mulesed and unmulesed lambs should have their tails docked to the same length.
- In female sheep, the correct length for the tail can be checked by holding the tail against the tip of the vulva. The docked tail should extend just below the tip of the vulva.
- The healed tail should protect the anal region and vulva.
- A sheep with its tail docked shorter than the recommended length cannot lift its tail fully to defecate (or urinate, in the case of female sheep). In addition, short tails:
 - take longer to heal
 - are more likely to become infected during healing, increasing the risk of arthritis
 - increase the lifetime risk of flystrike
 - increase the risk of rectal prolapse
 - predispose sheep to a higher risk of vulval and anal cancers

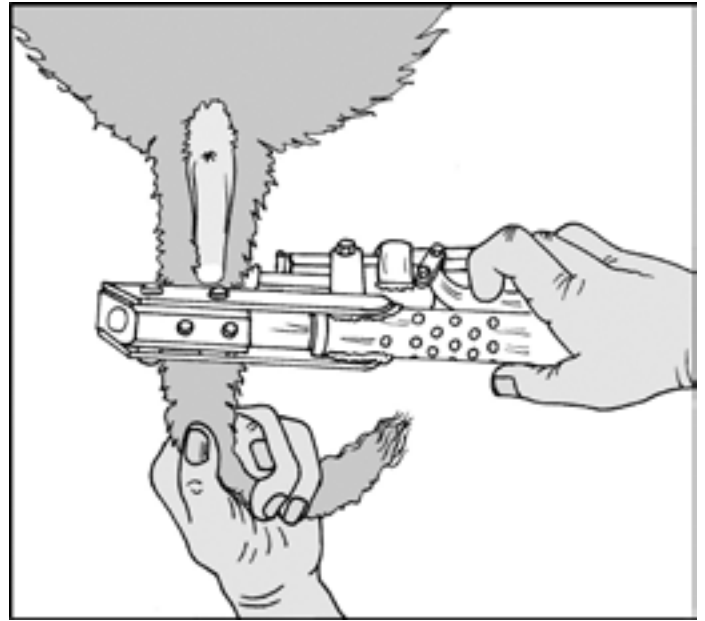


Recommended tail length.

Lambs should be given their first dose of tetanus or clostridial disease vaccine at lamb marking, and a booster dose at weaning, then annual booster vaccinations in subsequent years.

Tail docking using a gas-heated tail-docking knife

- Turn on the gas-heated tail-docking knife 10–20 minutes before docking the first lamb to heat it to the correct temperature.
- If the gas-heated tail-docking knife is too hot, it will cut off the tail too fast, without sealing the blood vessels, and can cause excessive tissue damage.
- If the gas-heated tail-docking knife is too cold, it will be more difficult to cut the tail and the blood vessels will be poorly sealed.
- Adequately restrain the lamb in a cradle or using an assistant.
- Wash and disinfect your hands.
- To find the third joint, push the skin of the tail towards the lamb's body. In ewe lambs, the position for the cut can be double-checked against the tip of vulva.
- The tail should be held straight out from the lamb's body to avoid burning the anus or vulva during the cut.
- Position the blade of the gas-heated tail-docking knife for the cut and squeeze the lever. A knife at the correct temperature will take about two seconds to cut through the tail of the average lamb.
- Apply a flystrike preventive, if required.
- Frequently clean the cutting edge of the knife with a wire brush between lambs.



Hold the tail out flat at 90° to the lamb's body to prevent burning the anus or vulva while making the cut.

Consider engaging an accredited livestock contractor to mark lambs. Accredited livestock contractors are trained and experienced in the various lamb-marking procedures, and most will have access to a gas-heated tail-docking knife designed to preferentially remove the woolly skin on the tip of the tail.

Aftercare

- When all lamb-marking procedures are completed, gently release the lamb onto clean grass so it lands on its feet.
- Return lambs to their mothers as soon as possible, well before dark.
- Check lambs daily, without disturbance that could cause mismothering, for 10 days after marking. Yard or catch and restrain any animals that appear abnormal, and treat any complications early.

13. Humane killing

Key points

- The most acceptable method of killing sheep on-farm is by shooting with a firearm or penetrating captive bolt gun into the poll of the head to destroy the brainstem.
- When shooting sheep, the brain is the only approved target organ.
- After being shot, a sheep must be immediately checked for signs consistent with death and again at least five minutes later in case it was only stunned.

When sheep must be killed, the primary consideration is preventing the animal from suffering pain and distress. Killing should be done promptly and safely by a competent person.

The method used must result in rapid loss of consciousness and death while unconscious.

The person performing the kill should have the relevant, knowledge, skills or experience to undertake humane killing of an animal, or be under the direct supervision of a person who does.

The minimum number of people should be present and other distractions should be minimised.

To prevent unnecessary distress or alarm, the sheep should be handled calmly and restrained in a race or small pen.

Equipment

Equipment for humanely killing a moribund sheep includes:

- a firearm capable of delivering at least the power of a standard 0.22-long rifle cartridge plus appropriate ammunition or,
- a penetrating captive bolt device, blank ammunition or,
- a sharp knife

Regularly clean firearms and captive bolts and maintain in optimal working condition.

Personnel using firearms or captive bolt guns should be appropriately trained. Firearms licences and registrations are required for rifles and pistols in all states, but not for captive bolt guns, except in Western Australia and Tasmania.

Recommended method

The most acceptable method of killing sheep on-farm is to shoot with a firearm or penetrating captive bolt into the brain. The poll shot gives the best results in sheep because the brainstem, which lies between the ears, is easily targeted and destroyed from this position. The brainstem must be destroyed for death to occur.

To destroy the brainstem with a poll shot, aim at the back of the head, behind the horns, so that the bullet or bolt will pass midway between the base of the ears, which is where the brainstem lies.

When using a rifle or pistol:

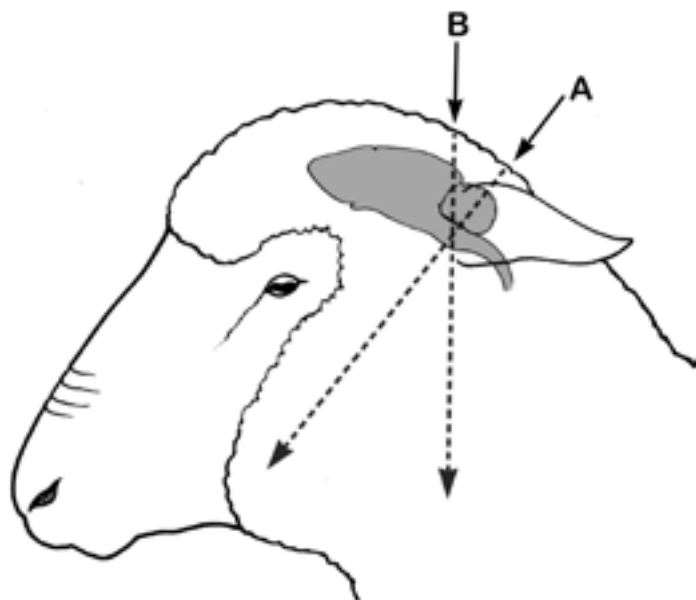
- hold the end of the barrel 10–100cm away from the poll to prevent misdirection and maximise impact
- keep any other people in attendance (or in the near vicinity) behind the firearms operator and well out of the way
- take care in concrete and steel yards to avoid ricochet of bullets

When using a captive bolt gun:

- press the muzzle firmly against the skull
- use blank rounds of a strength appropriate for the class of sheep
- only use a well maintained penetrating captive bolt gun and ammunition that has been properly stored
- be prepared to perform a second shot if there is any doubt the animal has been killed (see opposite for how to confirm death)

Blunt trauma to the brain is an acceptable method of killing lambs younger than 24 hours of age. Using a heavy blunt instrument such as a mash hammer, strike the poll of the head with sufficient force to cause the skull to cave-in. The blow should be directed at the brainstem, which lies between the ears.

Bleeding-out of sheep without pre-stunning using the neck cut with a suitable sharp knife should only be done when there is no firearm or captive bolt reasonably available.



A – Recommended position and direction of fire for the humane killing of sheep using the poll shot.

B – Straight down or crown shot that should only be used in emergencies when the poll is not accessible.

Confirming death

Immediately after a successful killing shot or blow, the animal collapses, contracts its muscles for 15 to 20 seconds and then relaxes and begins reflex kicking that can last for minutes, and is especially prolonged and vigorous in lambs.

The muscle contractions and reflex kicking are not signs of life or pain, and observers should be informed of this.

Watch the animal carefully for signs of life, which are breathing, eye movements, blinking, bleating or attempts to lift the head or stand.

If there is any doubt that an animal is dead, shoot it again, as quickly as possible. (In the case of a lamb less than 24 hours of age killed by blunt trauma, hit it again as quickly as possible). Direct the shot or blow between the ears again, but from a different angle.

Do not leave or dispose of the animal without confirming that it is dead. This is in case an animal seems dead, but is only stunned.

Perform a 'five-finger head check' of the brainstem reflexes five minutes after the shot or blow to confirm the animal is dead and not stunned. A dead animal will have:

1. no blink reflex
2. fixed dilated pupils
3. a flaccid lower jaw
4. a flaccid tongue
5. no breathing

Kneel safely behind the animal's head and check off the absence of each of these five reflexes using the fingers of one hand.



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