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NSW DEPARTMENT OF
PRIMARY INDUSTRIES

Vaccination programs for sheep

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Belinda Walker, Veterinary Officer,
Gunnedah

Sheep owners can prevent the economic losses from certain diseases by using a planned vaccination program. For diseases likely to occur each year, sheep need to be vaccinated routinely. For diseases that are serious, but only occur in certain circumstances, vaccination can be a form of insurance.

This Agfact details vaccination programs available to prevent several sheep diseases. However, producers should consult their local veterinarian to ensure that a correct diagnosis has been made and to fine tune the vaccination program to suit their property management routine.

WHY VACCINATE?

Sheep are vaccinated to protect against some of the common serious infectious diseases. Vaccination stimulates the body's defence system to build immunity to a particular disease, by exposing sheep to either the live organism presented in a safe form (e.g. scabby mouth or anthrax vaccines), or to a killed or inactivated organism or part of an organism (e.g. the clostridial vaccines).

DISEASES INCLUDED IN VACCINATION PROGRAMS

Annual vaccinations

Vaccinations in an annual program require an initial dose in the first year followed by a booster dose 4 to 6 weeks later to provide maximum protection.

Clostridial (5 in 1) vaccination

The clostridial diseases enterotoxaemia (pulpy kidney), tetanus, blackleg, black disease, malignant oedema and swelled head in rams can all be prevented by vaccination. These are killed vaccines, but must be handled with care to ensure potency is maintained and to avoid contamination. Vaccines are available either as 5-in-1, which protects against all of the above, or 2-in-1, which protects against pulpy kidney and tetanus only. Clostridial vaccines that include protection against caseous lymphadenitis (cheesy gland or CLA) are preferred (see below).

Caseous lymphadenitis (cheesy gland or CLA)

This killed vaccine is only available combined with a clostridial vaccine. Vaccines available are either 6-in-1 (CLA plus 5-in-1) or 3-in-1 (CLA plus pulpy kidney and tetanus.)

Once-only vaccinations

Scabby Mouth vaccine

There are two types of this vaccine: one that is freeze dried and must be kept frozen, and another that is a liquid and, like other vaccines, must be kept refrigerated rather than frozen. Make sure you know which sort you have purchased and store it accordingly!

When handling scabby mouth vaccine, take care not to expose it to sunlight or contamination by disinfectants.

A single vaccination is protective for life. Lambs can be vaccinated from 2 days of age and are protected by about two weeks after vaccination. Because scabby mouth vaccine contains live virus, it can introduce the infection to properties if not used according to directions. It is therefore normally only used in flocks where scabby mouth is known to be a problem. When vaccination is first used on a property, it is preferable to vaccinate the whole flock, not just

lambs, otherwise vaccinated lambs can serve as a source of infection to unvaccinated stock.

Pregnant ewes should not be vaccinated within six weeks of lambing. **Never vaccinate ewes in the flank region before lambing.** Vaccination at this site may produce lesions on the udder, resulting in mastitis and an increased risk of transmitting scabby mouth to the lamb.

Scabby mouth is infectious to humans, so gloves should be worn and great care taken to avoid contaminating any skin cuts. Should an accident occur, wash the site with disinfectant immediately.

Ovine Johne's disease vaccine

Ovine Johne's disease can cause significant mortalities, especially in fine-wool merinos. Infected sheep shed large numbers of the infective bacteria in their dung which then contaminate pasture and infect other sheep. A Spanish vaccine called Gudair® Vaccine is now registered for use against this disease in Australia. Gudair® is a killed vaccine which cannot cause infection. When a single dose is given to lambs under 16 weeks of age in heavily infected flocks, mortalities and shedding are reduced by at least 90%.

All vaccinated animals must be permanently identified at the time of vaccination with a 'V' tag. A 'V' tag has a V on one side and the property identification code (PIC) on the other.

The vaccine is only effective if given to the animal before it is exposed to the Johne's bacteria. **Lambs should be vaccinated as early as possible, ideally at marking time.** Lambs vaccinated before 16 weeks of age, or older sheep vaccinated before exposure, are classed as 'approved vaccinates', with good protection from the effects of the disease and significant trading advantages.

Note: In NSW Gudair® vaccine for Ovine Johne's disease may be given to lambs under 4 weeks of age.

For more information see 'OJD: the vaccine' on the NSW DPI website, www.dpi.nsw.gov.au/reader/ojd

Strategic vaccinations

Anthrax vaccine

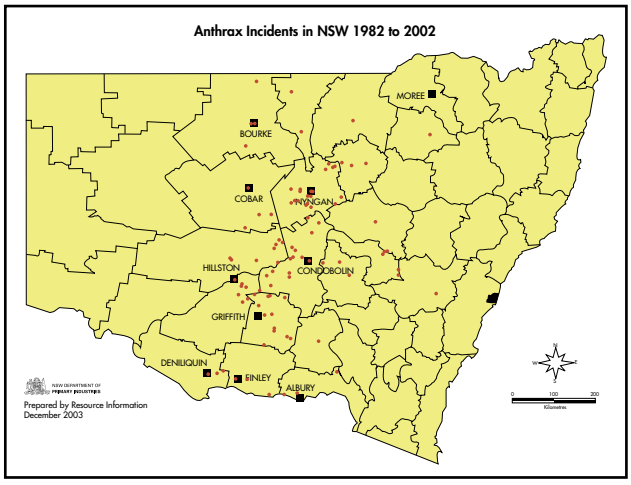
This is a modified live vaccine sold in Australia under special permit from the National Registration Authority (NRA). The NRA requires that a copy of the permit is provided to all those using the vaccine.

Anthrax vaccine is normally only used on properties where the disease has occurred previously. Its use is a regulatory requirement immediately after the disease is diagnosed and is recommended annually thereafter.

The area in western NSW where the disease has occurred is sometimes referred to as the 'anthrax belt,' although this can be misleading as boundaries may change. Locations where the disease has occurred between 1982 and 2002 are shown on the map below.

Sheep are normally vaccinated against anthrax in mid to late spring. The maximum protection period lasts about 9 months.

Anthrax is infectious to humans. Although the vaccine is claimed not to cause disease in humans, if accidental self inoculation occurs, disinfect the site and seek medical advice immediately.



DISCLAIMER

The information contained in this publication is based on knowledge and understanding at the time of writing (March 2005.) However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of New South Wales Department of Primary Industries or the user's independent adviser.

ALWAYS READ THE LABEL

Users of agricultural or veterinary chemical products *must always* read the label and any permit, before using the product, and strictly comply with the directions on the label and the conditions of any permit. Users are not absolved from compliance with the directions on the label or the conditions of the permit by reason of any statement made or not made in this publication.

Vaccines containing selenium

Some vaccines include selenium to prevent selenium deficiency and white muscle disease. Before using such vaccines, check that they contain the right dose of selenium, i.e., a *lamb* or *adult* dose. If lambs are given an adult dose of selenium it could poison them. If pregnant ewes are given a lamb dose this is insufficient to protect their lambs against white muscle disease.

These vaccines are likely to be beneficial in areas where selenium deficiency has been recorded, such as in Tablelands areas.

Vaccines containing anthelmintics

If using a vaccine combined with an anthelmintic, always ensure that the anthelmintic is used at the correct dose and that it is effective against the worms on your property. The wrong product, or the wrong dose, could poison young stock or increase resistance to anthelmintics — already a widespread problem. Products combining a vaccine with an anthelmintic include Nilvax® (containing levamisole) and Eweguard® and Weanerguard® (containing moxidectin).

Table 1. Recommended vaccination programs

Program	Sheep class	Vaccination time
Clostridial diseases and cheesy gland *Ideally this vaccination also needs to be within 6 months of shearing, but not at shearing, especially if cheesy gland is known to be a problem. For further information on the timing of vaccination for optimal control of cheesy gland see Agfact A3.9.21 *Caseous lymphadenitis (cheesy gland) in sheep*.	Ewes	Annually, 4 to 6 weeks pre-lambing.
	Wethers	First dose at marking, second dose 4 to 6 weeks later or at weaning.
	Lambs	If the sheep have not previously been vaccinated or if the vaccination status is unknown,treat them with 2 doses of vaccine, 4 to 6 weeks apart.
	Introduced sheep	If the previous vaccination program is known then it should be continued, adapting the timing to fit in with flock management.
Scabby mouth	Lambs, if required due to the animal's history.	Single dose at marking. Check lambs 3 to 4 weeks after vaccination. if there has not been a good 'take' (as evidenced by scabs at the site of injection) revaccination may be necessary.
Ovine Johne's disease	Lambs under 16 weeks of age or older sheep prior to exposure.	Single dose in lambs under 16 weeks, ideally at marking, or in older sheep a single dose prior to exposure. All vaccinates must be identified at time of vaccination by a NFIS ear tag with 'V' symbol.
Anthrax	All animals on properties where the disease has occured previously.	Single dose, preferably pre-lambing in ewes. Single dose is a regulatory requirement immediately after diagnosis of anthrax. Thereafter, annual boosters in mid/late spring are recommended.
	Introduced sheep	On introduction, if there is a history of anthrax on the property.
Costs, including labour and extra mustering, must be considered and balanced against the risk of disease. Vaccination can be regarded as an insurance policy. Many owners will prefer the peace of minid of knowing that a mob of sheep is immune to a particular disease.		

WHEN TO VACCINATE

For the prevention of most diseases, the vaccination program should commence with lambs being given two doses of vaccine, ideally 4 to 6 weeks apart, usually at marking and weaning (see Table 1). These two initial doses given close together are essential to ensure the development of full immunity when using killed vaccines. (See Agnote DAI 190 – *How vaccination works*.)

Immunity to most diseases declines unless annual boosters are given. The best time to give boosters is 4 to 6 weeks before the period of greatest risk.

Some live vaccines, such as those for scabby mouth, give long-lasting protection from a single dose, but this is the exception to the rule.

Gudair® Vaccine is a killed vaccine which cannot cause infection. Only a single dose of OJD vaccine is recommended, as severe reactions may occur in animals which are revaccinated. Vaccination is best given under 16 weeks of age, ideally at marking. Animals which are vaccinated at greater than 16 weeks of age may also be protected if they are vaccinated before being exposed to the Johne's bacteria.

Pregnant ewes

To protect against clostridial diseases, vaccinate ewes 2 to 6 weeks before lambing. This will protect the ewe during the stressful period of lambing, when immunity tends to wane. It will also give immunity to the newborn lamb through antibodies in the colostrum or first milk. Vaccination with a combined clostridial and CLA vaccination is recommended.

Colostral antibody is only taken up by the lamb in the first 24 to 48 hours of life. It will normally provide protection to lambs for 6 to 8 weeks — that is, until lamb marking. After 8 weeks, this immunity starts to decline and the lamb may become susceptible to infection.

Young lambs

Vaccination of lambs at marking time will protect lambs against disease when they start to lose protection from their colostral antibody. Combined clostridial and CLA vaccination is recommended at this time. However, vaccination at marking will not protect lambs against diseases picked up at marking, for example, malignant oedema and tetanus. It normally takes about 10 days for immunity to develop after the first vaccination and protection will last only a couple of months if not followed by a booster.

Delaying lamb marking until some lambs are 3 to 4 months old can increase the risk of older (usually best) lambs succumbing to pulpy kidney.

Older lambs and weaners

Lambs to be retained beyond weaning require a booster vaccination to provide ongoing protection. The protection from vaccinating young sheep does not last as long as it does in older sheep and weaners going on to lush pasture may require boosters every 3 to 4 months to protect against pulpy kidney. If using 6-in-1 vaccine, ensure that a booster has been given within 6 months of shearing to provide adequate protection against cheesy gland.

Adult sheep

Adult sheep should be vaccinated annually, before the period of greatest risk for the particular disease against which protection is required. The need to protect lambs against clostridial disease will usually mean that ewes are vaccinated 2 to 6 weeks pre-lambing.

On the other hand, it may be more important for wethers to be protected against cheesy gland, for which the optimal vaccination time will be 4 to 6 weeks pre-shearing. Vaccination at shearing does not give adequate protection against cheesy gland. Vaccinating several months before shearing — for example, at crutching — may be preferable for wethers, unless they are on high quality pasture that presents a high risk of pulpy kidney.

HOW OFTEN SHOULD SHEEP BE VACCINATED?

Two injections of vaccine fairly close together (probably no more than 4 months apart) are usually required to stimulate adequate immunity to most diseases (See Agnote DAI 190 – *How vaccination works*). An individual animal's genetic susceptibility, growth rate, exposure to other pathogens, and so on, cause variation of the duration of protection.

The clostridial diseases and cheesy gland need at least an annual booster vaccination to maintain immunity in adult sheep. In sheep under a year old, boosters every 3 to 4 months may be required on high risk pastures to protect against pulpy kidney.

Anthrax vaccine gives protection following a single dose for 6 to 10 months. After an outbreak of anthrax, vaccination of all stock is mandatory. In high risk areas, annual vaccination is recommended. Vaccination should occur some time between late winter and mid spring to provide the greatest protection over the period of greatest risk, which is late spring and summer. On properties with no recent history of anthrax, the risks must be assessed individually. Consult your local veterinarian for advice.

Scabby mouth vaccine is unusual in that a single dose will give life-long protection. This is because living scabby mouth virus is applied to an area of skin where it causes little damage, but continues to survive and therefore maintain the animal's immunity.

HOW TO VACCINATE

Three basic rules should be followed when vaccinating:

1. Read the label on the vaccine transport package and follow the instructions exactly. Take particular care with storage, dose rate and vaccination site.
2. Check the expiry date on the vaccine and do not use the vaccine if it is out of date.
3. Handle with care.

Preparing to vaccinate

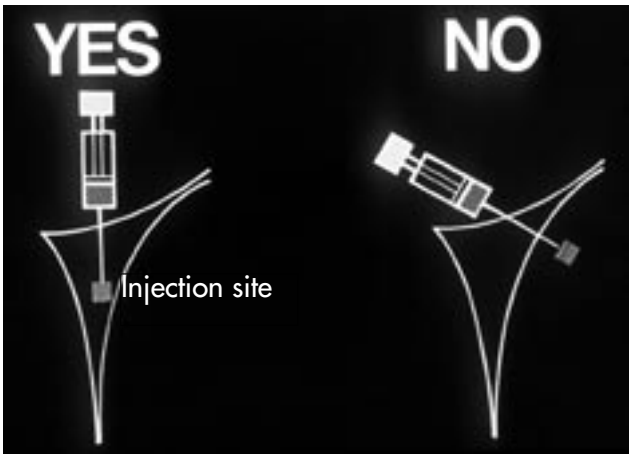
- Check the expiry date of the vaccine you intend to use before sheep are mustered, preferably at time of purchase. Dispose of any vaccine that has passed its expiry date, become contaminated or been stored at the wrong temperature, as it may have lost potency.
- Read the manufacturer's instructions provided with the vaccine.
- Have a plentiful supply of short, sharp, 18 gauge needles, 12 to 16 mm long. Longer needles are likely to break.
- Check the condition of the vaccinating gun or purchase a new disposable gun with the vaccine.
- Reusable vaccinating guns should have been cleaned and disinfected after their last use. The manufacturers' recommendations should be followed regarding care of the gun, but it is advisable to store the gun with boiled water in the barrel, so that the seals do not dry out. Depending on the time since last use, you may feel more comfortable re-sterilising before the next use.
- If you use a disinfectant, mix it at the correct concentration (not too strong). Using clean boiled water, wash all disinfectant out of syringes and needles before you use them. Any disinfectant remaining may inactivate the vaccine. (Your syringes and needles can be damaged by disinfectants, so do not leave them soaking in disinfectant between uses.)
- Note: Plastic vaccinating guns are normally regarded as disposable. Re-use is not recommended by the manufacturers.

When vaccinating

- Give the correct dose. (You can calibrate the gun using water by adjusting it to deliver the correct number of millilitres, and then checking that it is delivering the correct dose into a medicine flask or similar graduated flask. For example, you could see if 5 doses equals 10 mL.)
- Vaccinate in the recommended site to avoid carcase blemishes. The recommended site for vaccination is under the skin, on the side of the neck, just behind and below the base of the ear.



The vaccination needle should be inserted beneath a 'tent' of raised skin to ensure that the injection is not made into the muscle.



The injection site (left).

- Make sure you inject the vaccine under the skin, not into the skin or into the underlying muscle. (If the needle is within the skin or in the muscle there will be greater resistance to the introduction of the vaccine. Resistance should be minimal.)
- When working in yards, keep equipment as clean as possible to reduce the risk of infection and abscess formation at the site of injection, which may occur if needles are contaminated. Avoid putting equipment on the ground or where it can be easily knocked over. Keep the vaccine cool and out of the sun as much as is practicable.
- Change the needle frequently and discard any needles that become dirty, contaminated or blunt. Have a container handy for used needles and remember to dispose of them safely.
- Avoid handling and inoculating wet sheep, as this increases the risk of wound contamination and infection, and the spreading of other diseases such as lumpy wool (dermatophilosis).

At the completion of vaccination, clean, disinfect and rinse vaccinating equipment and store as per manufacturer's instructions.

STORE VACCINES CORRECTLY

To ensure that the vaccines retain their potency, they must be stored exactly according to directions set out on the label. All vaccines should be stored away from light.

Most killed vaccines need to be stored in the refrigerator (not the freezer) at 2°C to 8°C; but **one brand of scabby mouth** vaccine must be stored in the freezer.

Anthrax vaccine is particularly fragile and rapidly loses its potency after opening. It must be kept in the dark and refrigerated until opened. Once opened, the entire contents must be used the same day. Any vaccine left over should be burned, along with the container.

COST OF VACCINATING SHEEP

The approximate costs of vaccine per head at the time of writing are:

Vaccine	Approx. cost per head
5-in-1 (500 mL pack)	12c
(pulpy kidney, tetanus, black leg black disease, malignant oedema)	
6-in-1 (500 mL pack)	18c
(5-in-1 plus cheesy gland)	
Scabby mouth (250 dose pack)	17c
Anthrax (50 mL vial – 100 dose)	65c
Ovine Johne's disease	$1.70–1.85

FURTHER INFORMATION

Further information on vaccines and vaccination programs is available from your local NSW DPI veterinary officer or private practitioner.

For information on OJD see www.dpi.nsw.gov.au/reader/ojd

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