tips&tools
ANIMAL HEALTH AND WELFARE

The role of vaccination in the control of Ovine Johne's Disease

Ovine Johne's disease (OJD) is a serious wasting disease of sheep that can result in significant economic losses on infected farms due to sheep deaths, lost production and trading restrictions. The disease is caused by a bacteria and infected animals shed the organism in their manure, contaminating pastures and water sources, spreading the infection to other susceptible sheep.

An imported OJD vaccine called Gudair® was registered in Australia in 2002. This vaccine provides producers with a valuable management tool to assist in the control of the disease. The vaccine does not prevent OJD infection entirely; however, it significantly reduces the number of sheep that die and, very importantly, decreases the amount of bacteria passed in the dung, reducing environmental contamination and providing less opportunity for disease transmission.

Gudair is now widely used in high prevalence areas of Australia.

Key points

- Vaccination of lambs against OJD can reduce deaths by up to 90%.
- Vaccination also decreases the amount of OJD bacteria passed in dung by up to 90%. This should reduce pasture contamination and provide less opportunity for disease transmission.
- Vaccination is not 100% protective. A small percentage of vaccinated sheep may develop 'sub-clinical' infection and some will develop severe 'clinical' disease and die.
- Vaccination can be used together with grazing management strategies to reduce the impact of OJD within infected flocks.

Using the vaccine

The Gudair vaccine is registered for use in sheep from four weeks of age. It is an inactivated (killed) vaccine, so there is no risk that vaccination will introduce OJD into uninfected flocks. A single 1mL dose is given, most commonly at lamb marking. Booster doses are not required.

The vaccine must be injected subcutaneously (under the skin), high on the neck behind the ear. It is very important that animals are restrained adequately during vaccination. Young lambs should be restrained in a lamb marking cradle. Weaners, hoggets and adult sheep that are to be vaccinated in a race should be packed tight and have their heads held high to ensure the vaccine is delivered at the correct site. Vaccinated sheep must be identified with a NLIS (Sheep) tag that contains the Property Identification Code or number and the letter 'V'.

Producers should be aware that accidental self-injection with the Gudair vaccine can cause a severe and persistent reaction. Vaccinators should be trained in correct vaccination technique and safe handling of vaccination equipment. **If accidental self-injection does occur, contact a doctor as soon as possible, even if only a very small amount is injected.** For further information contact your animal health advisor or Pfizer Animal Health on 1800 814 883.

Producers should contact their local government or private veterinarian for further information on obtaining and using the vaccine. Regulations related to its use may vary between states.

® *Gudair Vaccine, trademark of CZ Veterinaria SA; distributed by Pfizer Animal Health*

Why vaccinate?

OJD infection in sheep flocks can result in significant production and trading losses. The availability of a vaccine provides an important management tool to help control the disease.

Vaccinated sheep may be used to:

- Reduce the prevalence of OJD on infected properties. Vaccination acts as a 'circuit-breaker' in the disease cycle, reducing the level of bacteria passed in the manure of infected mobs, decreasing pasture contamination and the risk of disease transmission to younger animals.
- Produce 'low-risk' or low contamination pastures to provide safer grazing for susceptible sheep, such as lambs and weaners.
- Provide a 'management barrier' around property perimeters to reduce the risk of disease spread from or to neighbouring properties.
- Provide low-risk replacement stock for infected properties.

Field trial results

The benefit of vaccinating lambs against OJD has been evaluated in a large field trial in NSW. Lambs vaccinated at one to four months of age were studied until they were four or five years old. Vaccination reduced deaths from the disease by about 90%. Vaccination also delayed the onset of shedding of OJD bacteria in the dung by 12 months and decreased the overall level of shedding by around 90%. Lower levels of OJD bacteria on pasture reduces the risk of disease transmission to subsequent lamb crops.

Despite these impressive results, producers should be aware that vaccination is not 100% effective in preventing infection. A small percentage of vaccinated sheep may develop 'sub-clinical' infection and shed bacteria in their dung without showing obvious signs of illness. Some vaccinated sheep will eventually develop severe 'clinical' disease and these animals usually shed very high numbers of bacteria before they die. It is therefore likely that an ongoing annual vaccination program, combined with grazing management strategies to reduce exposure of young, susceptible sheep to contaminated pastures, will be needed in most flocks to ensure death rates are maintained at low levels.

More recently, additional research conducted by the University of Sydney has shown that faecal shedding of the bacterium persists in many infected flocks, even after 5 years of regular vaccination. One 5-year study of 12 infected flocks found that, although shedding prevalence was significantly reduced in vaccinates compared to non-vaccinates, shedding was still detectable in 10 of 11 flocks sampled at completion of the study. Prevalence of shedding in positive flocks at the end of the study ranged from 0.1% to 1.3% of sheep.

In a second study of 40 infected flocks which had been vaccinating lambs for five years, 33 of the 40 flocks still had detectable shedding. Four flocks had more than 2% of sheep shedding at detectable levels.

Figure 1: Deaths due to OJD

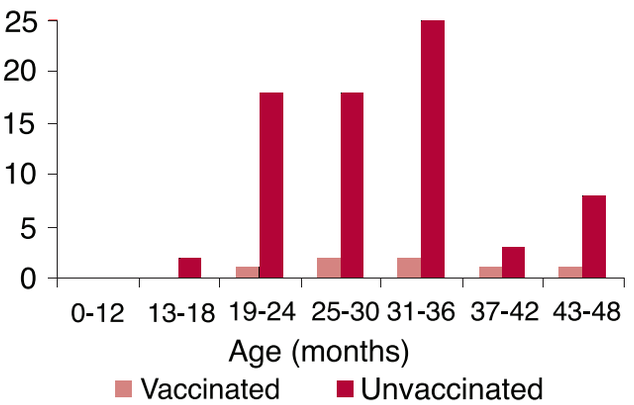


Figure 2: Percentage of sheep shedding M. a. paratuberculosis

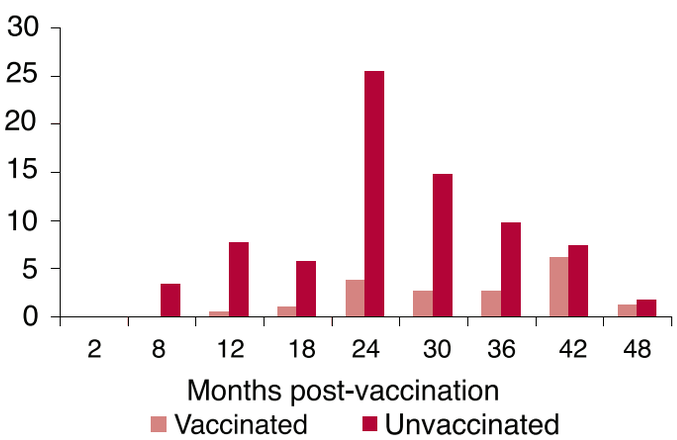


Figure 1 and Figure 2: Graphs of the most important findings from the trial, courtesy of NSW Department of Primary Industries.

Cost-effectiveness of vaccination programs

Research on 12 infected farms suggests that producers incur an average economic loss in the vicinity of $7.70 per DSE or $66 per hectare each year due to OJD. These figures (2002) are very conservative as they only consider losses due to premature sheep deaths and associated lost wool and lamb production. Financial losses due to reduced value of infected sheep sold for slaughter, reduced market and trading opportunities and variable input costs were not considered, so the real cost of the disease is likely to be considerably higher. Research also revealed substantial variation between farms, with some properties losing as much as $244 per hectare.

Figure 3: Predicted change in annual costs associated with OJD following vaccination *(Heavily infected, 2,000 ewe, self-replacing Merino flock producing 21-micron wool; annual lamb vaccination program started in Year 20 after infection first introduced into flock*

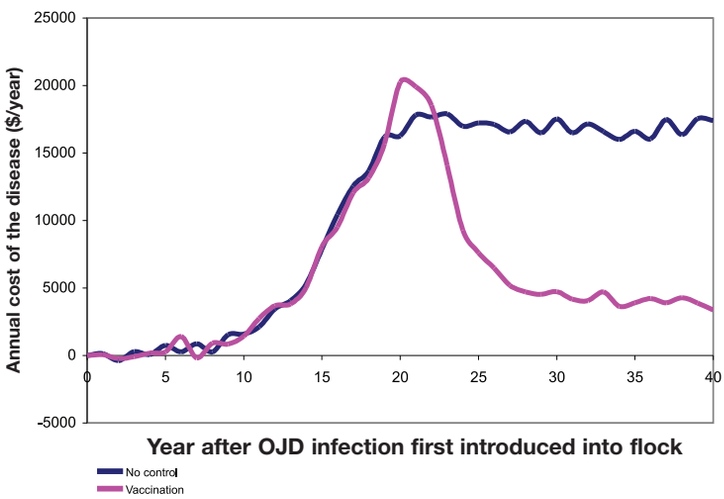
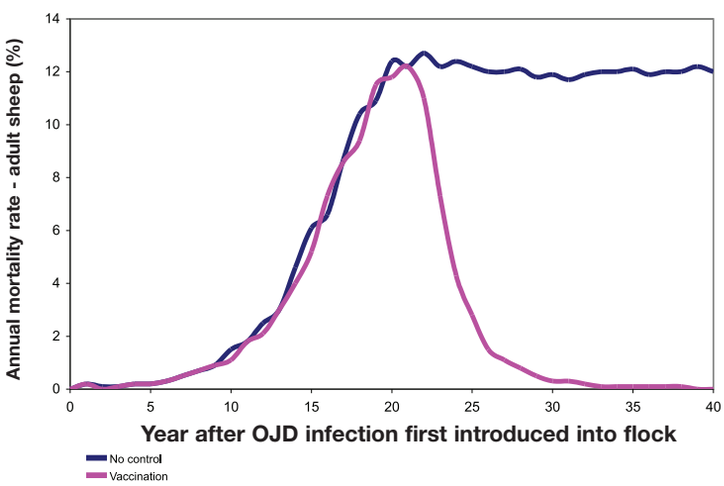


Figure 4: Predicted change in annual mortality rates following vaccination *(Heavily infected flock; annul lamb vaccination program started in year 20 after infection first introduced into the flock)*



A computer simulation model has been developed to assess the cost-effectiveness of vaccinating against OJD. This model predicts that annual vaccination of lambs will provide highly effective control of the disease and should prove cost-effective within 5–8 years on heavily infected properties and within 9–10 years on farms with moderate levels of infection. Sheep deaths due to the disease are predicted to fall to negligible levels after 10–15 years of vaccination, even on heavily infected farms.

Figure 3 illustrates the expected reduction in sheep deaths following the start of an annual lamb vaccination program, while Figure 4 shows the expected reductions in direct costs associated with the disease. In this example vaccination did not start until 20 years after the infection was first introduced into the flock. If a vaccination program had started earlier it is likely that the disease would have been more easily controlled and sheep death rates would have been significantly lower.

Vaccination site lesions

Vaccination against OJD results in injection-site reactions in a large number of sheep. A firm swelling usually develops at the site of injection, followed by a nodule 7–15 days later. In a small proportion of animals the lump may be more than 5cm in diameter or develop into an abscess and burst, which may predispose to flystrike. By two months after vaccination most swellings have decreased in size, and continue to decrease over time. However 25% of lumps can still be felt up to 30 months after vaccination.

The possible economic impact of these site reactions at slaughter has been evaluated. Results indicate that reductions in carcase weight due to trimming are low and carcases are unlikely to be downgraded. Despite this producers should avoid vaccinating sheep which will be slaughtered as lambs and must follow the manufacturer's directions to administer the vaccine subcutaneously high on the neck behind the ear.

Further vaccine research

Whole flock vaccination

The effect of vaccinating adult sheep has been studied over four years in a Merino flock with a very high death rate due to OJD. Results suggest that vaccination of adult sheep, first exposed to OJD infection as lambs, does not protect against subsequent disease and death. However, vaccination at up to eight months of age may reduce the amount of bacteria that infected animals subsequently shed in their dung. This may prove beneficial in reducing pasture contamination in heavily infected flocks, however further research is needed to confirm this finding. No negative effects were seen even when infected adult sheep were vaccinated.

Long-term benefits of lamb vaccination

The longitudinal study of twelve infected flocks is continuing for another three samplings to monitor the long-term changes in faecal shedding in flocks that continue to vaccinate.

The bottom line

Vaccination is proving to be an important management tool in the control of OJD. Australian research has shown that vaccination of lambs can decrease their subsequent death rate due to the disease by up to 90%. Although some vaccinated sheep do contract the infection, the number of OJD bacteria shed in vaccinated mobs is reduced by around 90%.

Vaccination can reduce the level of pasture contamination with OJD bacteria, lowering the risk of disease transmission to subsequent lamb crops. Ideally vaccination should be combined with grazing management strategies to reduce exposure of susceptible younger sheep to infected pastures.

It is important to remember that vaccination is not 100% effective in preventing disease. It is likely that an ongoing annual vaccination program will be needed for lambs on many farms to ensure that the disease is controlled and sheep and production losses remain low.

Vaccination cannot be relied on to eliminate infection from an infected flock and some infected sheep will continue to excrete bacteris, even after many years of vaccination.

For more information

Call MLA on the producer hotline **1800 675 717** or email us at info@mla.com.au

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Revised version October 2012
ISBN 9781741919424

ABN: 39 081 678 364