

ANIMAL HEALTH AND WELFARE

The role of grazing management in the control of ovine Johne's disease

Ovine Johne's disease (OJD) can lead to substantial reductions in flock productivity and profitability on many affected sheep farms. The disease has proven difficult to eradicate from infected properties and eradication programs are now considered to have a low likelihood of success. As a result, affected sheep producers will need to learn to manage their flocks and properties to reduce the overall on-farm impact of the disease.

As OJD is primarily spread when sheep graze pastures contaminated with the manure of infected animals, grazing management strategies may be able to reduce the level of infection within both vaccinated and non-vaccinated flocks.

A research project funded by Meat & Livestock Australia (MLA) has investigated when young sheep become infected and whether pastures with low levels of OJD contamination can be prepared and utilised to reduce flock infection rates and sheep deaths. The susceptibility of hoggets and adult ewes to the infection was also studied.

When are young sheep infected with OJD?

Knowing when young sheep are most likely to be infected with OJD is an important step in designing management strategies to reduce exposure of susceptible animals to the disease. This should help decrease the level of OJD infection in the flock, leading to a reduction in sheep deaths and economic losses.

A group of Merino lambs was studied from birth through to three years of age. The lambs were reared in seven groups with different exposures to OJD bacteria before and after weaning. Half were born to ewes from an OJD-infected flock, while the remainder were born to OJD-free ewes. Half of each ewe flock lambed onto clean pasture, while the remainder lambed in paddocks that had been recently grazed by infected sheep. After weaning lambs were grazed on either clean or contaminated paddocks. The sheep were slaughtered at three years of age and examined to determine if they were infected with OJD. The cause of

Key points

- Lambs are susceptible to OJD infection both before and after weaning.
- Prolonged exposure to OJD-contaminated pastures appears to be a major factor leading to high infection rates within flocks.
- A small percentage of Merino sheep (from 3–6%) appear very susceptible to OJD even when pasture contamination levels are very low or exposure times short.
- Any ewe showing signs of wasting should be culled immediately, as they shed large numbers of OJD bacteria in their dung and are a source of infection for their lambs and other sheep on the property.
- Grazing management can be used to reduce infection rates and deaths from OJD and is likely to be of value in both vaccinated and non-vaccinated flocks.
- Low-contamination pastures can be prepared for lambing ewes and/or weaners in 6–12 weeks during summer and six months in other seasons.
- If low-contamination pastures are scarce they should be used as weaning paddocks rather than lambing paddocks.
- Hoggets and ewes are susceptible to infection but are less likely to develop clinical disease compared to lambs.

death was also determined for any sheep that died during the study. The research project started before the OJD vaccine was commercially available, so it was not included in the study.

Results indicate that:

- The highest level of infection is seen in lambs born into an infected ewe flock. These lambs are exposed to high levels of OJD bacteria on the pasture before weaning and some are born to, and raised by, OJD-infected ewes.

- Moving infected ewes and their lambs to clean pastures prior to weaning may reduce infection levels and deaths from OJD.
- Lambing uninfected ewes onto OJD-contaminated paddocks will result in OJD infection in lambs. The extent will be dependent on the level of contamination of the lambing paddock and whether lambs are placed on contaminated or clean paddocks after weaning.
- Weaning onto clean pastures may help to reduce the infection rate and the level of severe infection and sheep deaths in flocks with a low level of infection. However, for flocks with a high level of infection this measure alone will not provide adequate disease control.

It is important to note that no evidence was found to suggest that weaners are any less susceptible to OJD infection than lambs. Therefore any grazing management strategy must consider the OJD contamination level on both lambing and weaning pastures.

It was also found that a small percentage of Merino sheep (3–6%) appear very susceptible to OJD, becoming infected even when exposure levels are very low. It is therefore likely to be difficult to avoid an ongoing low-level of infection regardless of control strategies.



Photo courtesy of J. Larsen, Mackinnon Project

Can ewes directly infect their lambs?

Earlier research showed that ewes with obvious signs of OJD, such as severe wasting, can infect their lambs prior to birth and possibly via their milk. However this risk is believed to be very low in ewes that are not showing outward signs of the disease.

Ewes more commonly infect lambs by contaminating pastures with OJD bacteria. Infected ewes shed high levels of OJD bacteria in their dung, posing a risk of disease transmission to other sheep in the mob, as well as to their lambs. **Any ewe showing signs of wasting should be culled immediately.**



Photo courtesy of NSW Department of Primary Industries

Are hoggets and ewes susceptible to infection?

The susceptibility of weaners, hoggets and adult ewes was compared by exposing them to paddocks with either high, medium or low levels of OJD contamination.

Weaners appear most susceptible to infection and, when exposed to high levels of pasture contamination, a proportion develop severe infection leading to disease and death. Hoggets and adult ewes were also susceptible to infection, however they were less likely to develop signs of illness compared to sheep exposed as weaners.

‘Clinical’ disease was mainly seen in sheep exposed to high levels of pasture contamination, while ‘sub-clinical’ infection occurred in sheep exposed to lower levels of OJD bacteria. As pasture spelling can reduce the level of OJD bacteria by up to 90% each month, this finding supports the development of grazing strategies to reduce the proportion of individual sheep that develop clinical OJD.

The findings suggest that older sheep can graze more heavily contaminated paddocks on a farm with less risk of disease and death. Despite this, hoggets and ewes do excrete OJD bacteria in their dung, contributing to disease spread within the flock. This must be considered in the development of age-based grazing recommendations.

Grazing management strategies for OJD infected flocks

The primary aim of grazing management should be to reduce the level of exposure of lambs to OJD bacteria **both before and after weaning**. This should reduce the flock infection rate and sheep deaths over subsequent years. **Ideally, grazing management should be combined with an OJD vaccination program.**

It is difficult to avoid exposing lambs to a certain level of OJD contamination before weaning if they are born into an infected flock. The main source of contamination for lambs will be their dams and the pastures contaminated by them. Exposure can be reduced by lambing onto low-risk pastures, prompt culling of any ewes with symptoms of OJD and early weaning to separate lambs from infected ewes.

Vaccination of lambs at 4–16 weeks of age can reduce the death rate from OJD and the number of bacteria shed in dung by 90%. Benefits are likely to become more evident following vaccination of a number of successive lamb crops, particularly when ewes vaccinated as lambs begin to produce offspring.

Contamination levels in weaning paddocks are easier to control, and the research suggests that infection rates and deaths can be reduced if lambs are moved to 'safe' pasture at weaning, particularly in flocks with a low level of infection where pre-weaning contamination has been limited. A proportion of lambs infected prior to weaning are likely to recover from the disease entirely or enter a 'sub-clinical' state. This may persist indefinitely if they are not exposed to high levels of infection after weaning. In heavily infected flocks multiple strategies are likely to be necessary to achieve adequate control, including provision of low-risk pasture both before and after weaning.



Photo courtesy of J. Larsen, Mackinnon Project

Preparing low-risk pastures

Pastures with a low level of OJD contamination can be prepared for lambing ewes and weaners by removing all sheep that may be shedding the bacteria for 6–12 weeks over summer, or six months in other seasons. 'Safe' pastures will not be totally free of OJD bacteria; however, contamination is likely to be at a level where the majority of lambs will not become infected.

When preparing low risk pastures producers must also consider the worm burden on the pastures, particularly for weaners. To prepare pastures with both low worm and low OJD contamination, paddocks can be prepared by:

- grazing with adult cattle (not calves)
- grazing with dry adult sheep over two years of age that are not infected with OJD
- not grazing with any animal

If necessary, adult sheep vaccinated against OJD as lambs can also be used to prepare low-risk pastures; however, some of these animals will be shedding OJD organisms. Any sheep showing signs of wasting should be immediately culled as animals in the late stages of OJD can shed huge quantities of OJD bacteria in their dung.

In winter rainfall areas, where low contamination paddocks are required for weaners in August or September, paddocks should be prepared for six months before they are required to minimise worm egg and larval levels. In summer rainfall areas low risk pastures are usually required for lambs at weaning in mid-summer and thereafter at two-monthly intervals as weaners are moved on to clean pastures. These paddocks should be prepared for at least 6–12 weeks before they are required.

Weaned lambs should remain on safe pastures for as long as possible. Six months may be the ideal time and will allow paddocks to be prepared for the following years weaners. It is important to be aware that there may be an increased risk of parasitism in weaners if the same pastures are used repeatedly, particularly if newly weaned lambs graze the pasture for more than six months each year. Consult your local veterinarian or animal health advisor for further information and advice.

Figure 1: Grazing management strategies for OJD-infected flocks

1. Prepare low-risk paddocks for lambing ewes and/or weaners

Remove all sheep that may be shedding OJD bacteria for at least 6–12 weeks during the summer, or six months in other seasons. Ideally graze with adult cattle or adult OJD-free sheep during this time or leave paddocks ungrazed.

2. Restrict joining to as short a period as possible (ideally five weeks - two cycles)

A short joining period will ensure that weaning is not delayed by late-born lambs. Ram harnesses can be applied and the ewe flock divided into two groups based on crayon marks.

3. Remove all ewes showing signs of wasting shortly before lambing and again at marking

This will reduce pasture contamination for lambs.

4. Move the lambing flock onto low risk pasture shortly before lambing

Run the lambing flock at the lowest stocking density possible.

5. Wean lambs early onto a second low risk pasture

Weaning can occur when the youngest lambs are seven weeks old if pastures are highly nutritious. A green, legume-dominant pasture is generally satisfactory. Early weaning will separate lambs from the main source of infection (their dams and the pastures contaminated by them).

If 'safe' pasture is scarce it should be reserved for weaners rather than lambing ewes.

The bottom line

Grazing management strategies can be used to reduce the exposure of lambs to OJD infection both before and after weaning. Over time this should reduce the level of infection within the flock and the number of sheep that die from the disease. Grazing management can be used in both vaccinated and non-vaccinated flocks to improve the level of disease control.

Lambs are susceptible to infection both before and after weaning. Ewes are the main source of infection for lambs and early weaning is recommended in OJD infected flocks. All ewes showing signs of OJD should be culled immediately to reduce environmental contamination. Hoggets and adult ewes are also susceptible to infection but are less likely to develop clinical disease.

On most farms it should be possible to develop a grazing management plan to produce and utilise 'low-risk' pastures, particularly for weaners. If low-risk pastures are scarce they should be reserved for weaning rather than lambing. However, in some infected flocks, low-risk post-weaning pastures on their own may provide only limited control of OJD. Where possible, the ideal is to prepare low-risk paddocks for both lambing and weaning.



Photo courtesy of J. Larsen, Mackinnon Project

For more information

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Printed November 2005
ISBN: 1 74036 743 X
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ABN: 39 081 678 364