

ANIMAL HEALTH AND WELFARE

The economic impact of OJD infection on sheep farms

Ovine Johne's disease (OJD) is an emerging problem throughout south-east Australia, particularly in southern NSW. Although the number of Australian sheep flocks currently infected is low, the disease is expected to spread widely if left uncontrolled.

To date there has been little assessment of the financial impact of OJD on infected farms in terms of sheep deaths, production losses and increased management costs. Estimates of annual mortality rates due to the disease have ranged from less than 1% of the adult flock to as high as 25%. It has also been uncertain whether the infection leads to production losses in infected sheep before the onset of obvious signs of disease.

In order to provide more accurate information on the economic impact of OJD to affected producers, Meat & Livestock Australia (MLA) funded two research projects to study this aspect of the disease. These studies have now provided the first objective data on the true impact of OJD and have quantified some of the economic losses that may be experienced by producers.



Photo courtesy of J. Larsen, Mackinnon Project

Key points

- The average death rate from OJD on the farms studied was 6.2% of the adult flock each year. This is more than double the accepted annual mortality rate of 2–3% (from all causes) for Australian sheep flocks.
- OJD-related death rates on individual properties varied widely, ranging between 2.1% to 17.5% per year, highlighting the substantial losses that can occur if the disease is allowed to progress unchecked.
- OJD infection was responsible for 69% of all sheep deaths on the farms studied.
- 'Sub-clinical' production losses, such as reduced bodyweight, may occur in the early stage of OJD, before obvious signs of wasting are seen.
- OJD infection resulted, on average, in a 6.4% reduction in expected farm gross margin. This figure includes direct costs associated with OJD, such as loss of production due to sheep deaths and the cost of vaccination to reduce disease transmission.
- The average annual economic loss due to OJD infection on farms was \$7.68 per DSE or \$65.92 per hectare. These figures represent the cost of premature sheep deaths, and lost wool and lamb production. There was substantial variation between farms, with some properties losing as much as \$244.80 per hectare. Losses due to trading restrictions and variable input costs have not been included in these figures, so the real cost of the disease may be considerably higher, depending on the market discount and enterprise.

Mortalities due to OJD

Previous estimates of the sheep mortality rate due to OJD have generally been based on the estimates of individual flock owners. In order to obtain more precise figures, twelve properties in southern NSW were studied closely over a 12-month period. These farms had been positively diagnosed with OJD, and the disease had been present in all but one flock for four years or more. Each producer estimated that the annual flock mortality rate due to OJD was at least 5%. With the exception of one property, all were self-replacing Merino enterprises running over 4,000 head of sheep. Animals over 12 months of age had not been vaccinated against the disease, either as lambs or adults.

Each farm maintained a 'flock inventory' during the study to provide an accurate record of the number of sheep that died throughout the year. Flock numbers were recorded each time the animals were handled, and all sales, purchases and slaughtering were carefully documented.

A researcher visited each property for a five-day period during each season of the year (four visits per year). During the visits, each mob over six months of age was inspected daily, and post-mortem examinations were carried out on any sheep found dead or dying. Tissue samples were collected from the intestinal tract for microscopic confirmation of the presence or absence of

OJD. This allowed the 'most likely' cause of death to be determined in 362 sheep that died during the examination periods. The results are shown in Figure 1.

OJD was responsible for 250 (69%) of deaths of sheep that were examined by post-mortem during the examination periods. The second most common cause was malnutrition. In many cases, malnutrition was accompanied by pregnancy-related disorders, such as pregnancy toxaemia, as the study was conducted during a severe drought. If nutrition had been adequate, it is estimated that OJD may have accounted for up to 78% of all sheep losses.

It is estimated that OJD caused the death of 6.2% of the total adult flock, on average, on these farms during the year. This is more than twice the accepted annual mortality rate of 2–3% (from all causes) for Australian sheep flocks. One farm lost 17.5% of their adult sheep to OJD, highlighting the substantial losses that can occur if the disease is allowed to progress unchecked.

OJD-related deaths occurred throughout the year, with peaks seen in winter and spring. Figure 2 shows the number of deaths due to OJD in each season, compared to other causes. The OJD-related death rate was very similar in both ewes and wethers. Deaths due to OJD started at 1 year of age and peaked in the 4-year age group. After this age the number of OJD-related deaths declined (see Figure 3).

Figure 1: Most likely cause of death in 362 sheep examined by post-mortem on 12 OJD-infected farms

Most likely cause of death	Number of deaths
OJD	250
Malnutrition (with or without pregnancy-related disorders and/or parasite infestations)	70
Pregnancy + lambing related disorders	16
Post-shearing stress/pneumonia	6
Internal parasites	4
Blowfly strike	3
Chronic peritonitis/nephritis/enteritis	3
Sheath rot	3
Misadventure	3
Eye cancer	1
Photosensitisation	1
Pulpy kidney	1
OJD present but unlikely to have caused death	1
Total sheep examined	362

Figure 2: The most likely cause of sheep deaths in each examination period

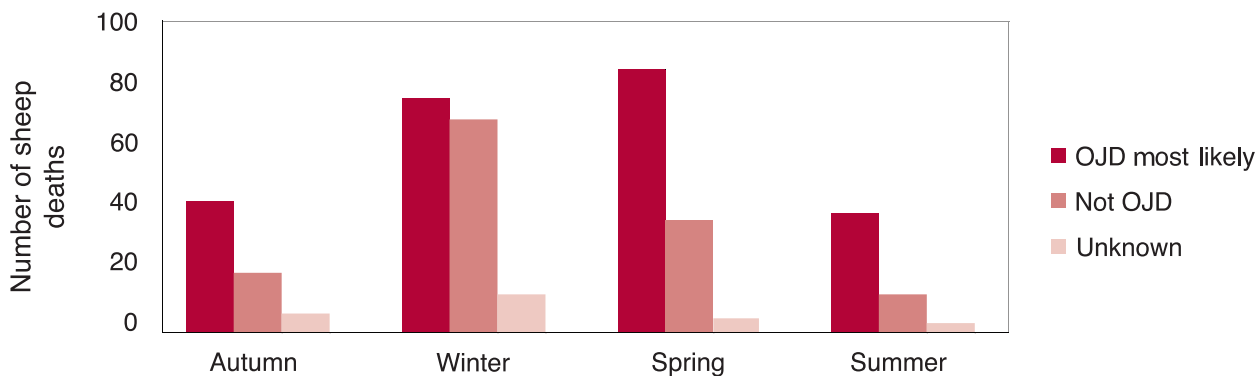
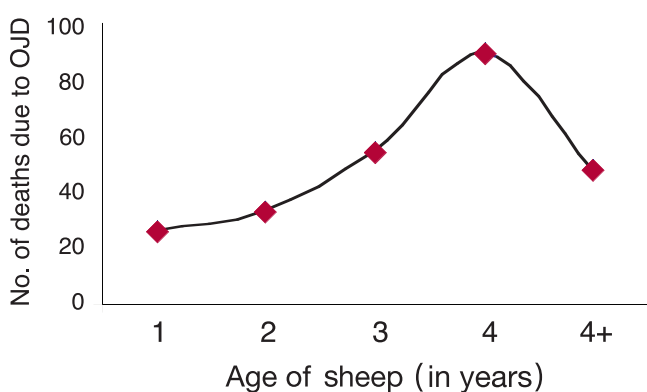


Figure 3: OJD as a cause of death in sheep of different ages



Although OJD causes substantial losses on infected farms it is important to remember that not all deaths are due to OJD. On the properties studied, 31% of deaths were due to other causes. Therefore producers should continue to maintain appropriate flock health programs to avoid losses from non-OJD related reasons, such as malnutrition and parasitism.

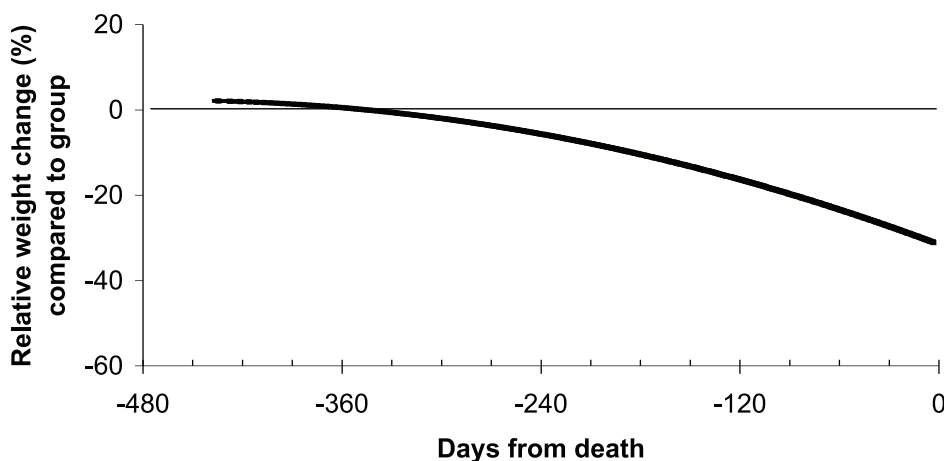
Production losses due to OJD

A second research project supported by MLA has provided new data on the effects of OJD on the productivity of Merino sheep in Australia. In this study, sheep in infected flocks were monitored from birth through to death, with measurements of bodyweight and fleece weight recorded at regular intervals.

This study showed that OJD-infected sheep may start to lose weight nearly 12 months before they die of the disease. By eight months prior to death, infected animals had lost an average of 4% of their bodyweight (about 1.5kg). From that point onwards, weight loss accelerated and by the time of death affected sheep were 32% lighter (about 12kg) than similar animals that were free of the disease. Sheep in the early stages of the disease also produced less wool than their unaffected flock mates. Further research is required to determine the economic significance of these findings.

This is the first study to identify production losses in sheep in the early, 'sub-clinical' stage of OJD.

Figure 4: Change in liveweight of sheep which died of OJD, relative to their expected weight. This is a line of best fit through all data-points available for all sheep, so some sheep are over-represented in the trendline ($R^2 = 0.38$)



The financial cost of OJD

These results now allow a more accurate estimate of the impact of OJD infection on farm profit levels. Several economic models have been used to quantify these effects.

When the effect of OJD infection on farm gross margin was calculated it was found that the disease resulted, on average, in a 6.4% reduction in expected gross margin. These calculations include direct costs associated with the disease, such as lost production due to sheep deaths, and vaccination costs to reduce disease spread within the flock.

When economic losses were calculated using the mortality information from the 12-farm mortality study, the economic loss due to OJD was found to be considerable, with an average loss of \$7.68 per dry sheep equivalent (DSE) or \$65.92 per hectare each year. These calculations considered the value of the dead sheep, and the lost wool and lamb production resulting from premature death of productive animals. There was substantial variation between farms with some properties losing as much as \$244.80 per hectare.

These figures do not include trade-related losses due to the trading restrictions imposed on infected properties. Actual losses as a result of this disease are likely to be greater than those calculated due to variable input costs that are difficult to measure.

The bottom line

These studies have confirmed that OJD infection can result in substantial death rates and economic losses on sheep properties.

It is important for producers with infected flocks to implement control strategies, such as vaccination, grazing management and selective culling, to prevent mortality rates reaching the high levels that can occur on some farms.

The results also highlight the importance of implementing management strategies to keep the disease off your property if your flock is currently OJD free.

Although OJD can be the cause of a high proportion of sheep deaths in infected flocks, it is important to remember that about one-third of deaths may still be due to other causes. Producers should continue to maintain appropriate flock health management programs to avoid losses from non-OJD related causes, such as malnutrition and parasitism.

For more information

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