



National Sheep Health Monitoring Project (NSHMP)

Annual Report 2015 -2016

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Executive Summary

The National Sheep Health Monitoring Project (NSHMP) operated throughout 2015-2016 in 18 abattoirs around the country. Meat inspectors inspected 4,172,122 sheep in nearly 20,000 lines for up to 16 animal health conditions. In South Australia, the project is matched by the Enhanced Abattoir Surveillance Program and five extra conditions are monitored for.

The NSHMP underwent a significant review in the first half of 2016. Recommendations arising from the review for making NSHMP more efficient in 2016-2017 will be considered in August 2016 by the Sheep Health Project Steering Committee, which oversees the project.

This report contains a basic analysis of the data from the project, including 14 of the monitored conditions (two had insignificant levels of incidence), thus providing a snapshot of the health of a significant proportion of the Australian sheep flock.

Objectives of the NSHMP

- To monitor sheep for a range of significant animal health diseases and conditions which reduce productivity in the sheep value chain or can impact market access.
- To facilitate feedback to producers through state departments and the Livestock Data Link¹ (LDL) about the diseases and conditions occurring in their flock.
- To explore options for a comprehensive and cost-effective animal disease monitoring/surveillance system and post-mortem inspection service.
- To provide accurate and timely animal health information as a driver for:
 - further improvements in Australia's animal health status, and the management of human health risks
 - maximising market access
 - improving profitability
 - informing future investment into research and development (R & D)
 - enhancing productivity within the sheep value chain by improving the quality of product entering the chain and therefore reducing wastage

¹ When the Meat & Livestock Australia project commences

Location of participating abattoirs

A total of 18 abattoirs participated in data collection in 2015-2016 (some part time) and provided national coverage of the significant sheep producing regions of Australia (Table 1).

Table 1. Abattoirs participating in the NSHMP July 2015 – June 2016

State	Abattoir
New South Wales	Cootamundra, Cowra, Gundagai
Queensland	Wallangarra
South Australia	Lobethal, Murray Bridge
Tasmania	Cressy
Victoria	Ararat, Colac, Cranbourne, Geelong, Stawell, Swift Melbourne, Warrnambool
Western Australia	Beaufort River*, Esperance*, Katanning*, Narrikup

*Only until April 2016 when the project inspector in WA retired

Number of sheep inspected

The total number of sheep inspected for at least one endemic disease has significantly increased from 2014-2015 by 1,186,800 (Figure 1). The number of lines inspected has increased by 3,773 in 2015-2016 (Figure 2).

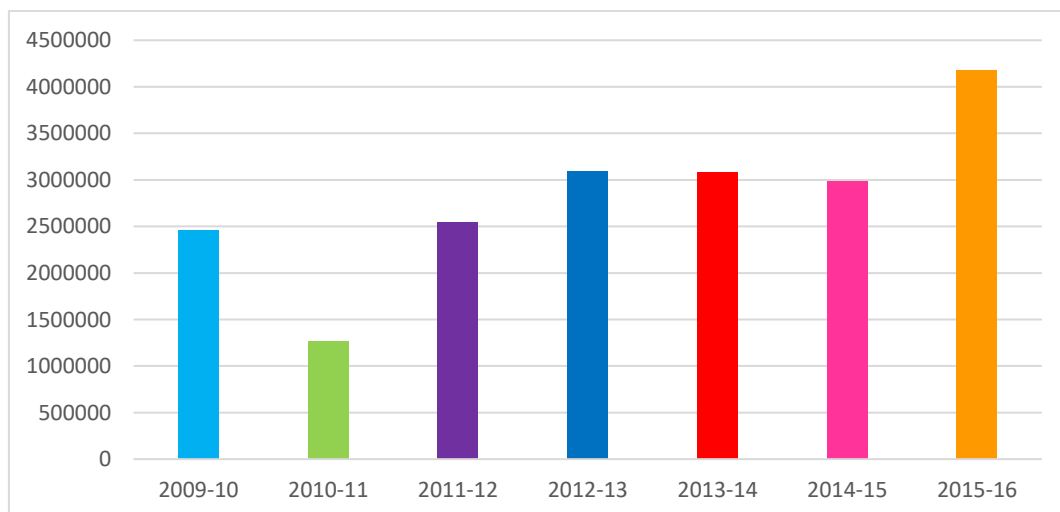


Figure 1. Total numbers of sheep inspected each financial year from 2009 to 2016.

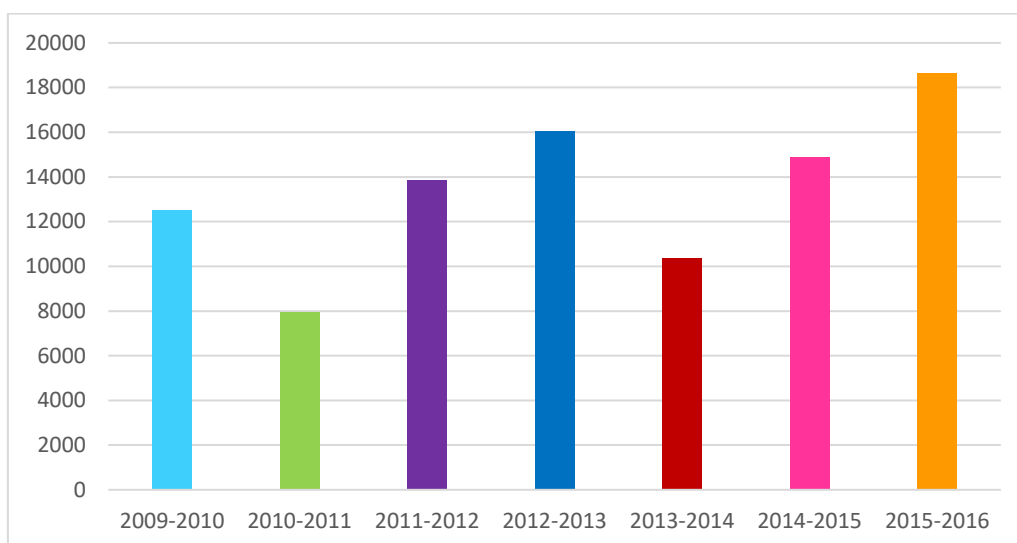


Figure 2. Total numbers of lines of sheep inspected each financial year from 2009 to 2016.

Source of sheep

Sheep were sourced from all states. The number of sheep and lambs inspected from each state (for most diseases and conditions) is provided in Table 2.

Table 2. Total number of sheep, properties (PICs) and lines inspected from each state over the 2015-2016 financial year.

State	NSW	Qld	SA	Tas	Vic	WA	Total
No. of sheep inspected	865,539	29,911	1,835,993	141,214	1,142,427	157,038	4,172,122
No. of lines inspected	3,075	109	10,470	543	5,117	537	19,851
No. of PICs inspected	1,037	68	3,226	250	1,726	361	6,668

NSHMP meat inspection

Carcasses and viscera are examined grossly by certified meat inspectors. Laboratory confirmation of conditions is not utilised, except for ovine Johne’s disease. The presence or absence of pathology consistent with diseases and conditions is recorded by NSHMP inspectors. Not all animals are examined for all conditions.

Responsibility for product disposition for market access and food safety rests with the on-plant veterinarian and company management.

NSHMP producer feedback

Feedback from the NSHMP is returned in some states directly to producers by the relevant Department of Primary Industries/Agriculture (NSW, Queensland and South Australia) (Table 3). It is expected that national reporting of animal health feedback will commence through systems including the LDL within the next twelve months.

Table 3. Producer feedback in each state for 2016.

State	NSHMP feedback to producers 2016
QLD	Monthly reporting. Wallangarra abattoir closed in May 2016. QLD producers are now reliant on interstate abattoirs
WA	OJD reporting is sent monthly. WA currently do not send producer feedback, except for OJD.
SA	SA industry funds PIRSA to undertake additional work and provision of information to producers in the Enhanced Abattoir Surveillance Program. Feedback is sent twice a week. In 2015-2016 10,000 letters were sent out to producers.
VIC	Livestock Biosecurity Network (LBN) is being funded by producer state levy system to facilitate feedback to producers in conjunction with Victorian Farmers Federation. Mail outs with abattoir reporting occurring every two months.
TAS	No feedback sent. Inspector contacts producer when high incidence of a condition is detected. Offers extension materials or contact with Government veterinarian. Positive OJD reports sent by Government veterinarian. Negative reports not sent to producers.
NSW	Reports are mailed direct to producers quarterly. On average 350 PICs are reported on each quarter, some have multiple reports in the period.

Research and development activities utilising data

In 2015-2016 the data from the NSHMP was utilised for:

- the development of a new grass seed scoring system to allow consistency in reporting of grass seed in carcasses, by the Department of Economic Development, Jobs, Transport and Resources, and MINTRAC.
- the 'Review of the Post-Mortem Inspection and Disposition Schedules of the Australian Standard 4696.' This project is being funded by Australian Meat Processors Corporation and Meat & Livestock Australia and will provide risk assessment evidence to support a review of the post-mortem procedures and dispositions in the red meat Australian Standard 4696.
- University of Melbourne student project – 'Whether there is a significant difference in the occurrence of CLA in saleyard versus non-saleyard sheep in the Eastern states of Australia.'

Project review

The NSHMP was reviewed in 2016 by Greenleaf Enterprises. Recommendations from the review report will be considered by the Sheep Health Project Steering Committee at their next meeting in August 2016. They include looking at more efficient data collection, better utilisation of the data and the returning of all feedback on direct lines to producers. In addition, the development of tools and information to help producers interpret and act on the feedback will lead to a more efficient value chain.

The economic modelling section of the report (Greenleaf, 2016) on the conditions monitored for in the project (using 2015 data) is available on the project webpage:

www.animalhealthaustralia.com.au/what-we-do/disease-surveillance/national-sheep-health-monitoring-program/

Animal health information

- This report contains a ‘snap shot’ of the health of the Australian sheep flock for the financial year 2015-2016 using data collected through the NSHMP. Summary data sets for previous years have been used for some conditions to provide a comparison.
- The data collected by the NSHMP is stored in the Endemic Disease Information System, hosted by Animal Health Australia on behalf of the stakeholders.
- Each state department of primary industries has access to its own state data which can be used for further detailed analysis.
- The NSHMP collects information on 16 conditions:
 - Arthritis
 - Bladder worm
 - Cancer
 - Caseous lymphadenitis (CLA, cheesy gland)
 - Dog bites
 - Grass seeds
 - Hydatids
 - Knotty gut
 - Liver fluke
 - Melanosis
 - Ovine Johne’s disease (OJD)
 - Pleurisy
 - Pneumonia
 - Sarcocytosis
 - Sheep measles
 - Vaccination lesions
- Summary information on these diseases is found in this report except for cancer and melanosis, as there were insignificant levels of both of these conditions.
- For the purpose of this analysis the information has been obtained from direct (vendor consigned) and indirect (saleyard or mixed in transportation) lines. Ages of sheep are recorded as less than two years of age, over two years of age or mixed.

Arthritis

Arthritis in sheep is caused by a bacterial infection of the joints. It usually occurs in young sheep when bacteria localise in the joints after entering the body through the umbilical cord (navel ill) or any wound. Arthritis causes lameness and a reduced growth rate. Carcasses affected with arthritis can undergo trimming of affected joints and possibly be condemned.

In 2015 arthritis cost the sheep industry an estimated \$25,586,354 (Greenleaf, 2016).

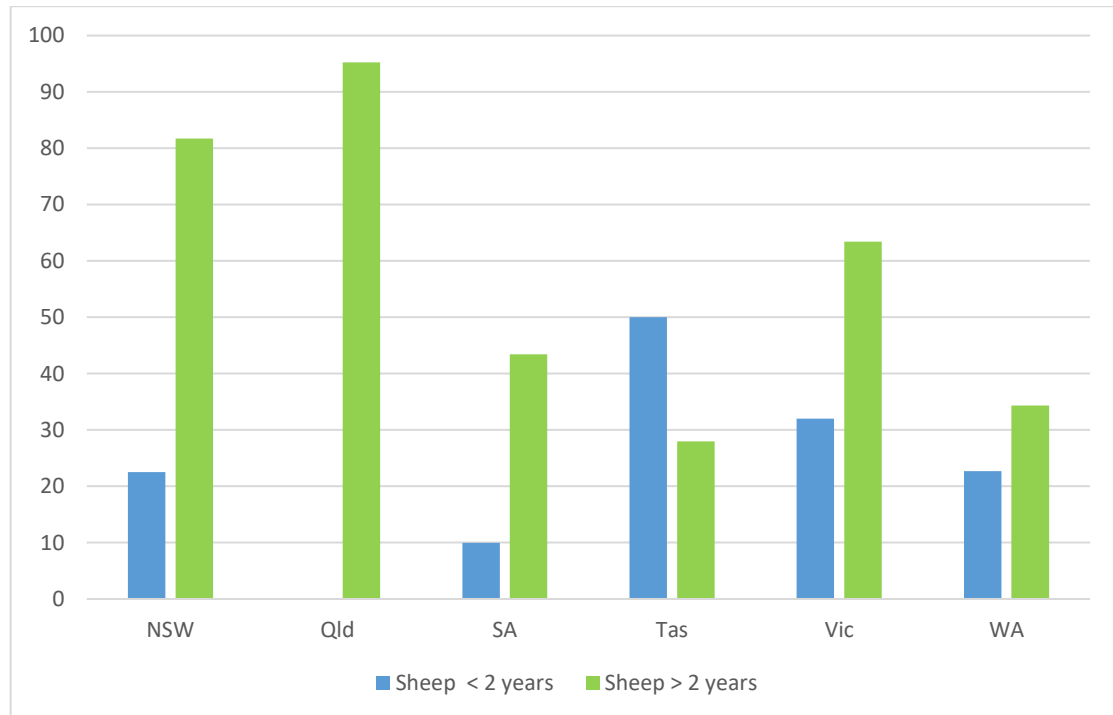


Figure 3. The percentages of inspected lines with at least one sheep infected with arthritis for each state over the 2015-2016 financial year.

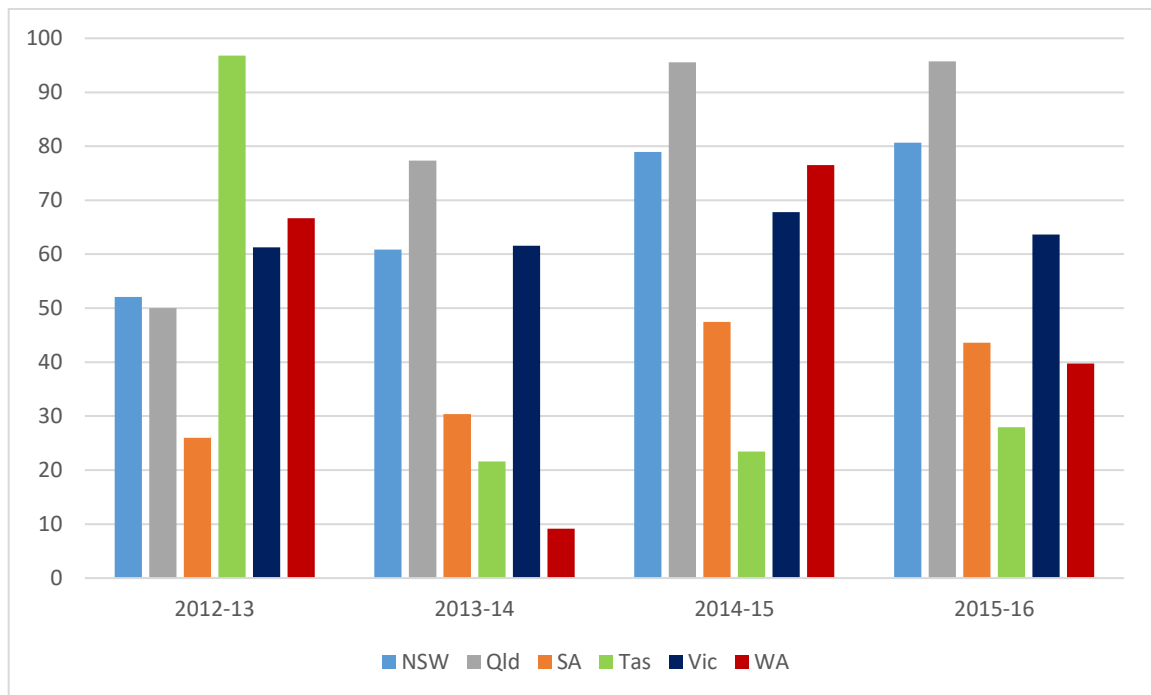


Figure 4. Percentages of inspected lines with at least one sheep over two years of age infected with arthritis for each state and each financial year from 2012 to 2016.

Bladder worm

Bladder worms are infective cysts from the dog tapeworm *Taenia hydatigena* and are found in the liver and the abdominal cavities of sheep. Bladder worm has little or no effect on sheep health or on farm production, but occasionally heavy infections can predispose sheep to the fatal bacterial infection, Black disease. Infected carcasses usually have livers trimmed or condemned.

Bladder worm cost the Australian sheep industry an estimated \$1,174,500 in 2015 (Greenleaf, 2016).

- Over the 2015 – 2016 financial year, South Australia recorded the highest percentage of infected sheep over two years of age followed by Victoria (Figure 5).

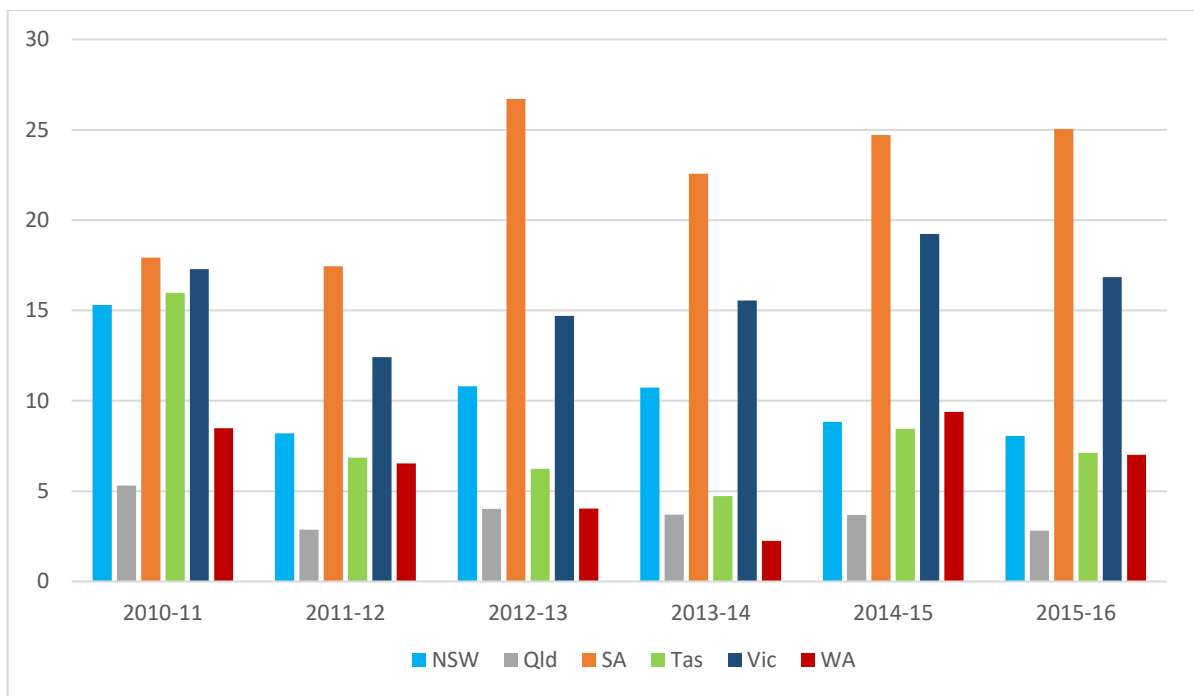


Figure 5. The overall percentages of inspected sheep over two years of age infected with bladder worm for each state and each financial year from 2010 to 2016.

Cheesy Gland

Cheesy gland (or caseous lymphadenitis – CLA) is a bacterial disease that results in the formation of lymph node abscesses throughout the body. Most commonly these abscesses are superficial but they can also be found in the lungs, liver, spleen and kidneys. The abscesses are initially puss filled which over time dries and becomes “cheesy” progressing to multi-layered capsules resembling “onion rings”.

CLA causes a decrease in wool production, wool contamination, chronic infection which causes ill thrift, emaciation and can affect reproductive performance. CLA can result in a decrease in carcase weight and increased carcase trimming at the abattoirs. In 2015 CLA cost the Australian sheep industry an estimated \$21,637,553 (Greenleaf, 2016).

- Over the 2015-2016 financial year the incidence of CLA detected in Western Australia has decreased significantly when compared to the 2014-2015 financial year (Figure 6).
- The incidence of CLA in New South Wales, Victoria, South Australia and Queensland has remained relatively consistent over the last four years (Figure 6).
- Queensland had the highest percentage of inspected lines that contain at least one infected animal over the 2015-2016 financial year for sheep over two years of age (Figure 7).

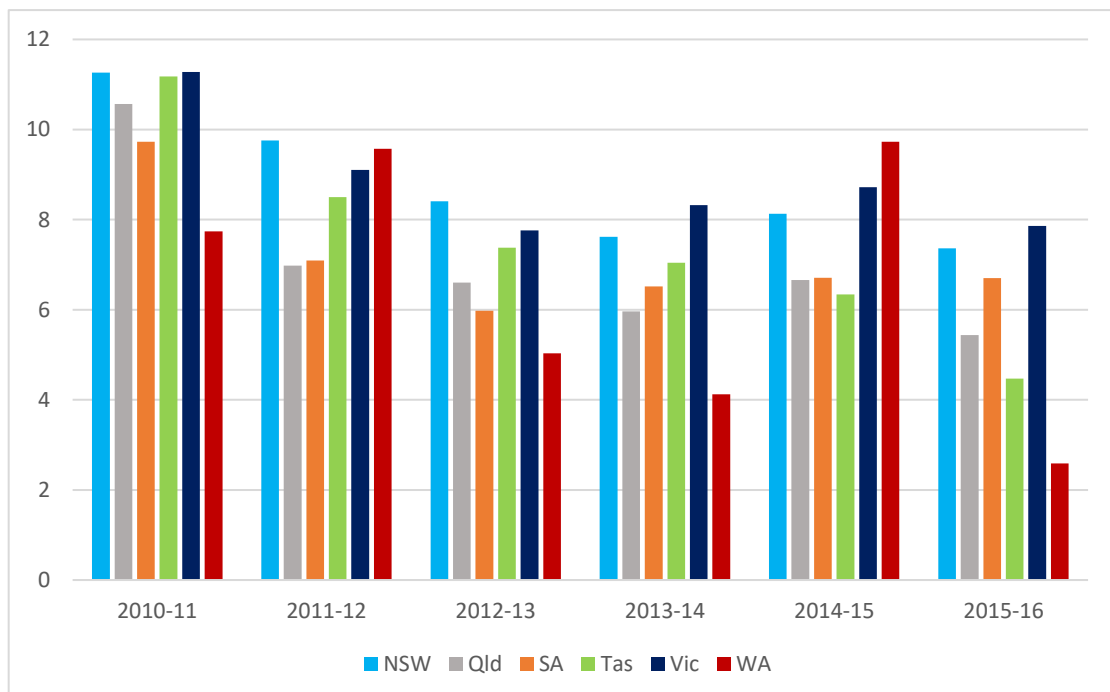


Figure 6. Overall percentages of inspected sheep infected with CLA for each state and each financial year from 2009 to 2016.

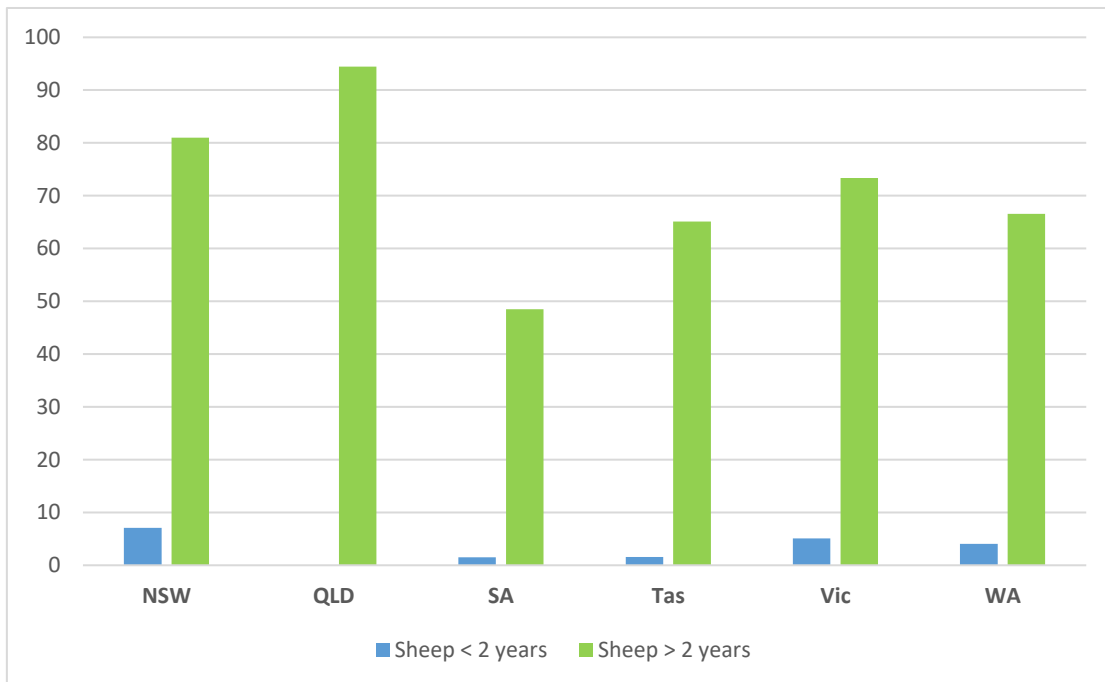


Figure 7. Percentages of inspected lines with at least one sheep infected with CLA for each state over the 2015-2016 financial year.

Dog bites

Dog bites occur as a result of un-muzzled or incorrectly muzzled dogs with access to sheep, either in the paddock, yards or during transport. Abattoirs require dogs to be muzzled at all times. Dog bites usually occur in the hind quarters, but also can occur on the face or along the back. The *Australian Animal Welfare Standards and Guidelines for Sheep* states: ‘A person in charge of a dog that habitually bites sheep must ensure the dog is muzzled while working sheep’.

Carcases of sheep with dog bites are usually trimmed to the nearest joint which may be the entire hind leg, resulting in a significant reduction in dressed weight. Occasionally whole carcasses are condemned when wounds are infected and the animal is showing evidence of septicaemia (blood poisoning).

In 2015 the cost of dog bites to the Australian sheep industry was an estimated \$85,512 (Greenleaf, 2016).

- In 2015-2016 dog bites were most common in sheep over two years of age (Figure 8). Victoria recorded the highest percentage of inspected lines with at least one affected animal followed by New South Wales.
- Overall the percentage of affected animals is very low (Figure 9).

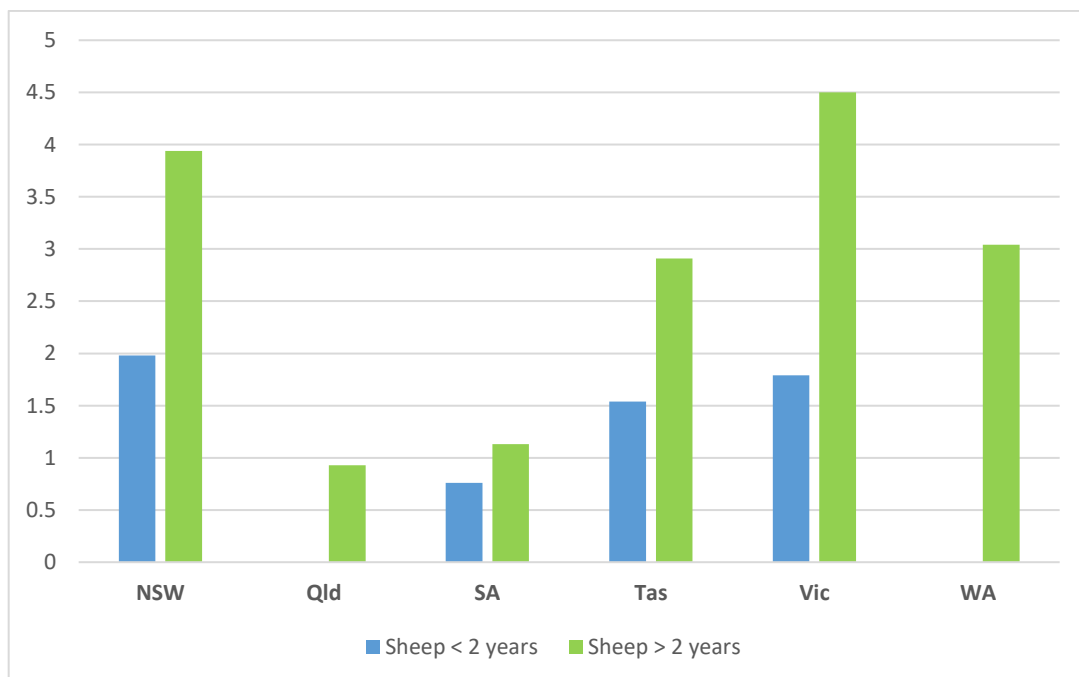


Figure 8. Percentages of inspected lines with at least one sheep affected by dog bites for each state over the 2015-2016 financial year.

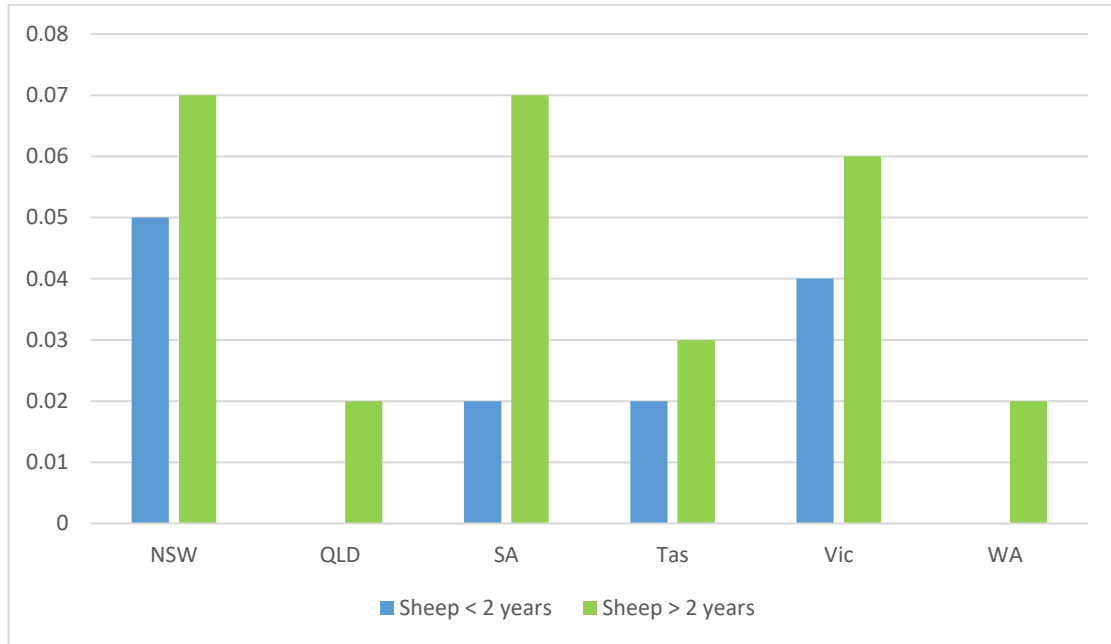


Figure 9. Overall percentages of inspected sheep affected by dog bites for each state over the 2015-2016 financial year.

Grass Seeds

Grass seeds embedded in the carcase due to spear, brome, barley, silver and Chilean needle grasses cause weaner ill thrift, infections and/or death, reduction in wool production and wool value. Grass seeds also cause trimming of the carcase and a decrease in meat and skin value. Grass seed contamination cost the sheep industry an estimated \$47,544,373 in 2015. (Greenleaf, 2016).

- Over the past two years Queensland recorded high percentages of inspected lines containing at least one grass seed affected sheep compared to other states (Figure 10).
- New South Wales had the second highest recording of grass seed lesions with Western Australia maintaining low numbers over the last six years. Figure 11 shows the percentage of affected animals by local government area (LGA), over the 2015-2016 financial year.

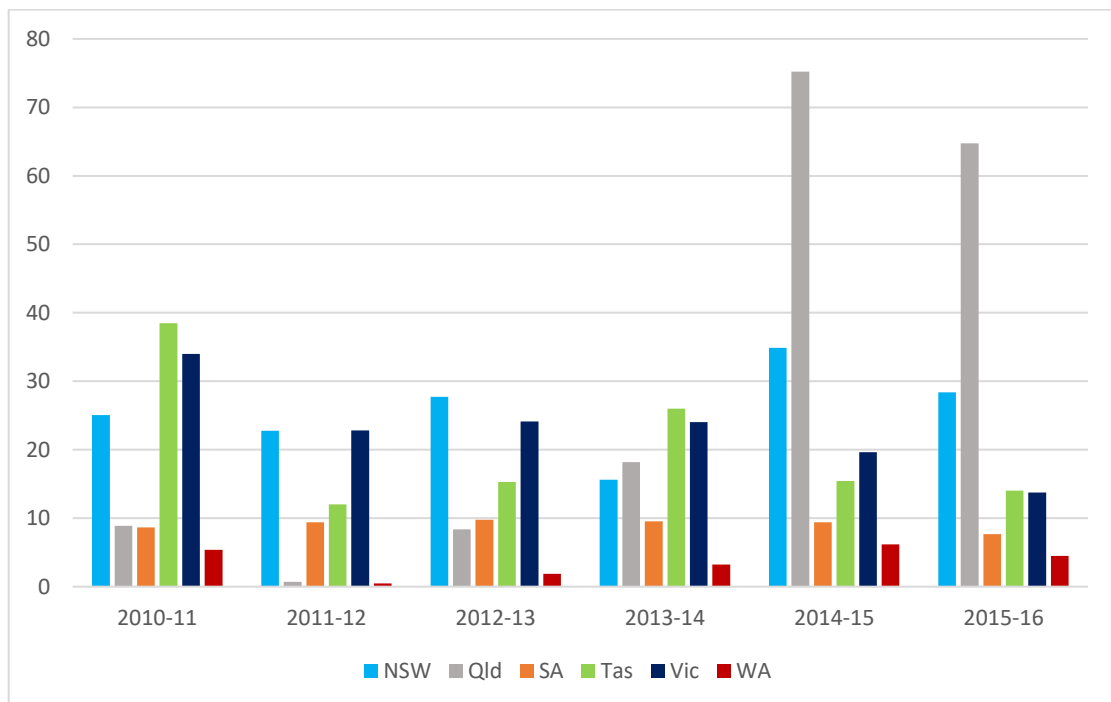


Figure 10. Percentages of inspected lines with at least one carcass affected by grass seeds for each state over the 2015-2016 financial year.

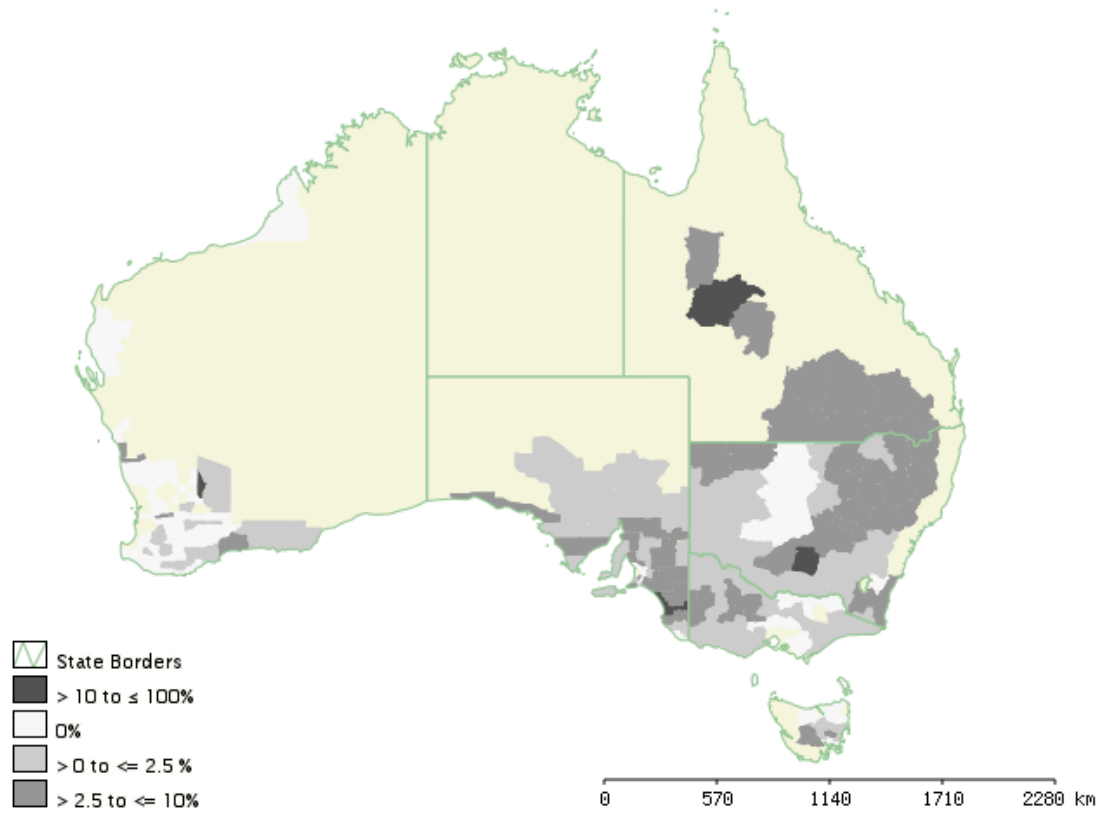


Figure 11. Grass seed lesions - percentage of affected sheep by LGA over the 2015-16 financial year.

Hydatids

Hydatids are the large cysts from the dog hydatid tapeworm (*Echinococcus granulosus*) which develop mainly in the liver and/or lungs of infected sheep. If infected, sheep organs may be condemned at the abattoir. In 2015 hydatids cost the sheep industry an estimated \$10,594 (Greenleaf, 2016).

- The percentage of sheep infected with hydatids greatly increased in New South Wales and Queensland since mid- 2014 (Figure 12).
- Queensland has recorded significant increases in the number of animals infected with hydatids. This is suspected to be due to the large wild dog population in Queensland. It should be noted however that only a small number of lines were monitored in Queensland for this condition during the year (Table 4).

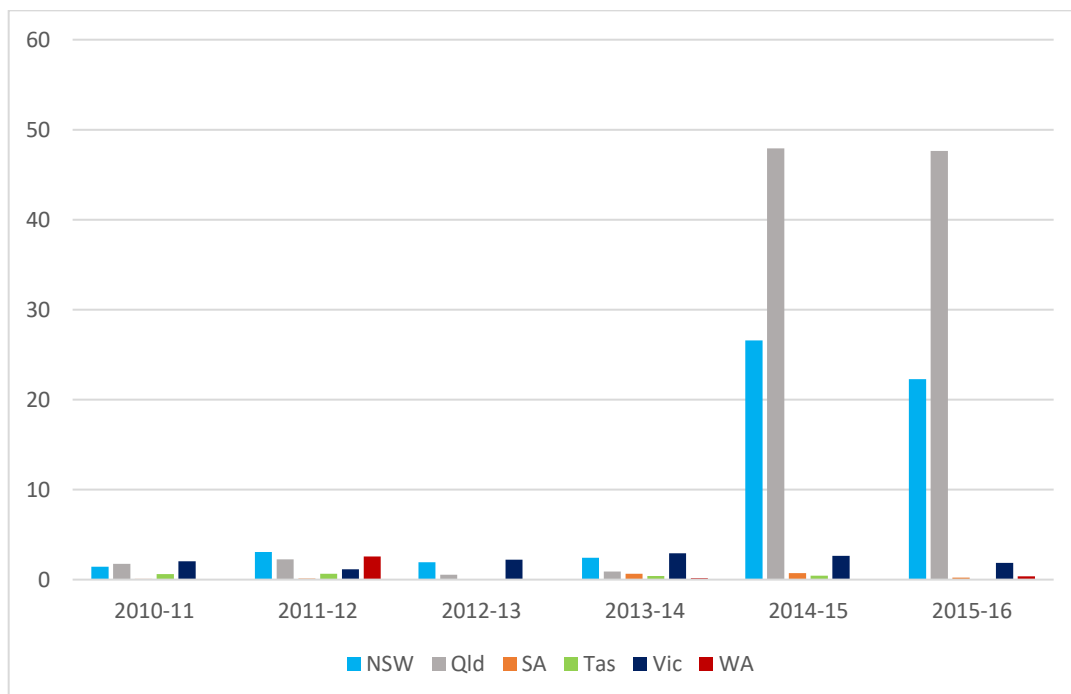


Figure 12. Percentages of inspected lines with at least one sheep infected with hydatids for each state and each financial year from 2009 to 2016.

Table 4. Number of animals inspected for hydatids over the 2015-2016 financial year.

Jurisdiction	NSW	Qld	SA	Tas	Vic	WA
No. of animals inspected	413,269	29,251	511,819	109,744	500,581	82,834
No. of lines inspected	1,369	105	2,861	404	2,205	262
No. of PICs inspected	399	65	1,648	189	769	203

Knotty gut

Knotty gut (also called pimply gut) is a condition of the intestines caused by the larval stage of the nodule worm (*Oesphagostomum columbianum*). These lesions can range from small gritty lesions 2-3mm in diameter, to pea sized cysts, rendering the affected intestines unsuitable for sausage casings. Nodule worm eggs and larvae are particularly sensitive to cold weather and drying out, so tend to only exist in areas with predominately summer rainfall.

- Over the 2015-2016 financial year, South Australia recorded much higher rates of knotty gut infection than other states, although overall, the numbers recorded for South Australia are still low (Figure 13).

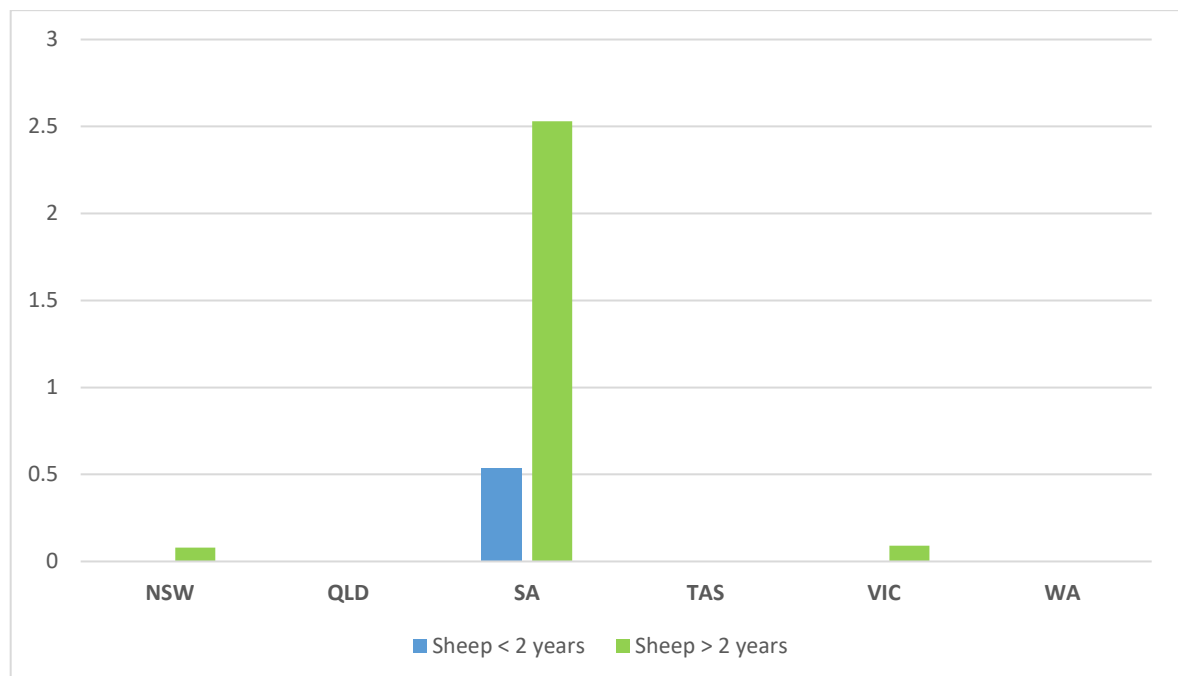


Figure 13. Percentages of inspected lines with at least one sheep infected with knotty gut for each state over the 2015-2016 financial year.

Liver fluke

Liver fluke are large, flatworm parasites that infect sheep and cattle in high rainfall areas and irrigated areas of eastern Australia. A permanent water source and specific snails are required for the liver fluke life cycle to occur. Affected livers are condemned at abattoirs and in some cases, whole carcasses can be condemned. In 2015 liver fluke cost the Australian sheep industry an estimated \$7,240,302 (Greenleaf, 2016).

- There is considerable variation between states for the incidence of liver fluke (Figure 14).
- Consistent with reports from previous years, no liver fluke was reported from WA. SA continues to record a very low levels of liver fluke.

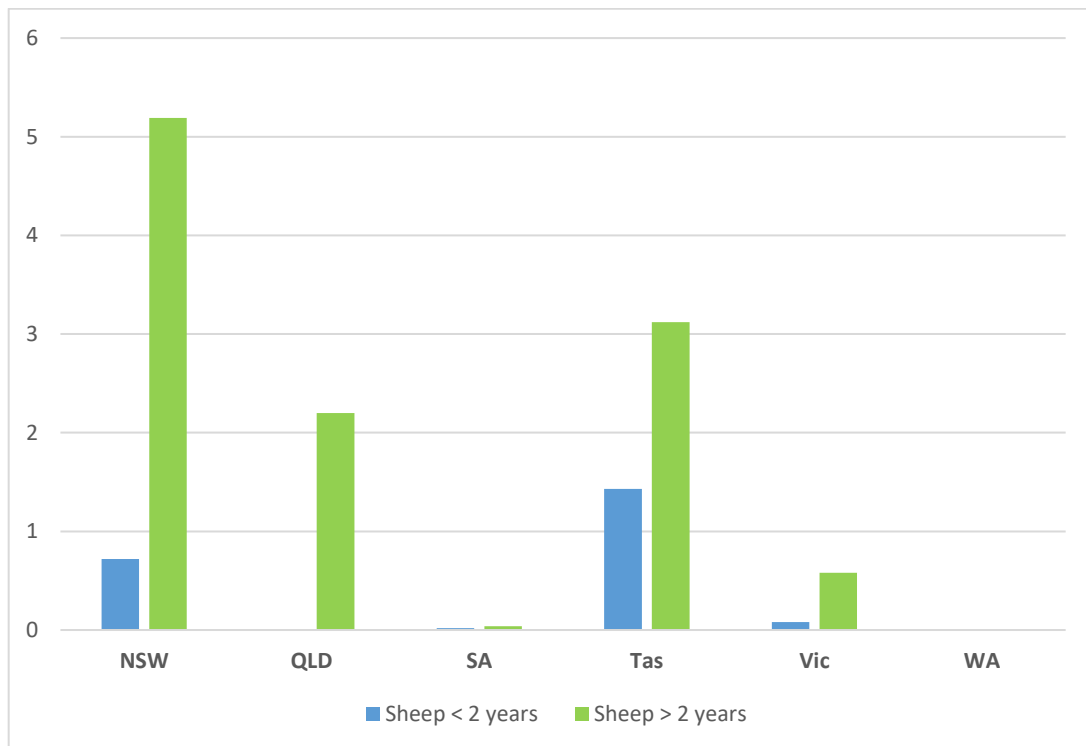


Figure 14. Overall percentages of inspected sheep infected with liver fluke for each state over the 2015-2016 financial year.

Ovine Johne’s disease

Ovine Johne’s disease (OJD) is caused by the sheep strain of the bacterium *Mycobacterium avium subsp paratuberculosis*, which leads to the intestinal wall slowly thickening, causing reduced absorption of nutrients from the intestine. This eventually leads to severe loss of condition – infected sheep can waste away and die. OJD cost the Australia sheep industry an estimated \$1,005,325 in 2015 (Greenleaf, 2016). Historical data is available on the AHA JD publications webpage.

Inspection for OJD is focused on animals over two years of age (when they are more likely to display signs) and direct lines. When an inspector suspects OJD in a direct line they will send samples to a laboratory for histopathological confirmation.

- The total number of sheep inspected for OJD in 2015-2016 was 1,169,371 (Table 5).
- Victoria recorded the highest incidence of OJD for 2015-2016 (Figure 15).

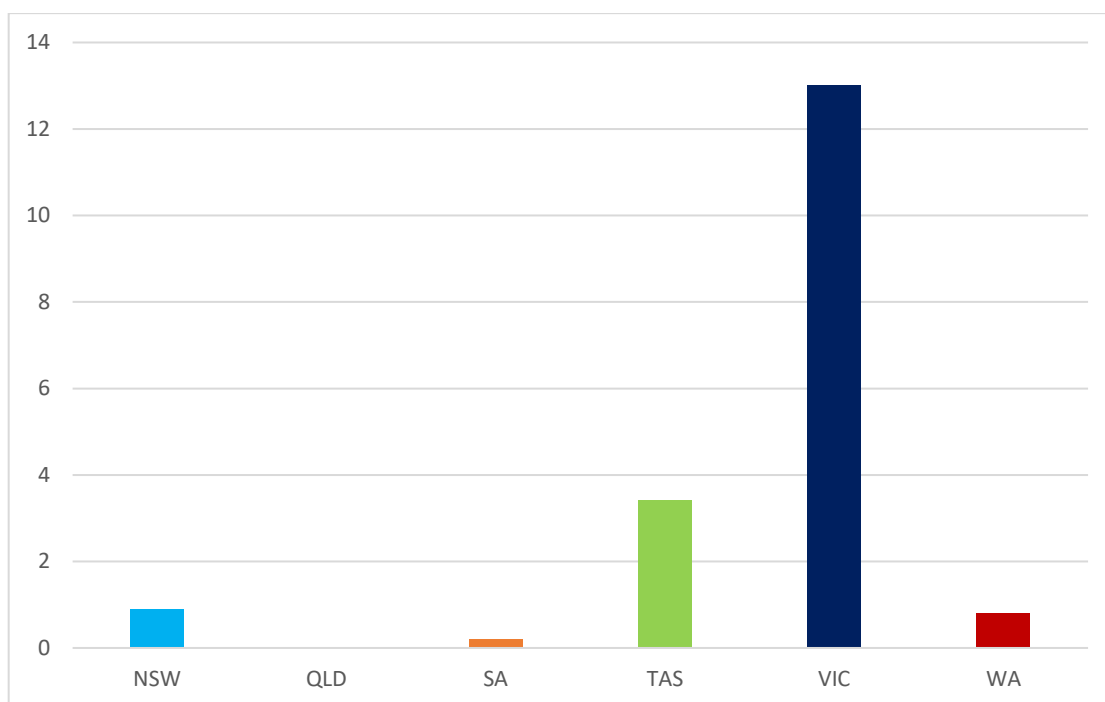


Figure 15. Overall percentage of lines of sheep infected with OJD for each state over the 2015-2016 financial year.

Table 5. Total number of sheep over two years of age (direct lines) inspected for OJD over the 2015-2016 financial year.

State	NSW	Qld	SA	Tas	Vic	WA	Total
Total no. of sheep inspected	144,307	22,682	649,243	82,931	196,768	73,440	1,169,371
No. of lines inspected	453	79	4,700	325	915	241	6,713

Pneumonia and pleurisy

Pneumonia in sheep is infection and inflammation of the lungs. In severe cases pneumonia can extend to the outer layer of the lung, the pleura, causing a disease called pleurisy. Pneumonia is initially caused by an infection with a bacterium (such as a mycoplasma) or virus, or sometimes lungworm, with secondary bacterial invasion of the damaged lungs. The disease can be limited to isolated cases or can result in outbreaks of disease typically in weaners over summer and is often called “summer pneumonia”. Production losses are seen on farm with affected lambs being on average 3 kg lighter.

Pleurisy cost the sheep industry an estimated \$4.4 million in 2015, while the cost of pneumonia was estimated at \$517,526 (Greenleaf, 2016).

- Seasonal variation in the incidence of pleurisy was observed (Figure 16). With numbers of infected sheep peaking between January and March in the summer weather.
- Percentages of infected animals with pneumonia for sheep less than two years of age peaked over October – December (Figure 17)
- Seasonal variation in the incidence of pneumonia was observed across all states except Queensland, where no pneumonia was recorded over the 2015-2016 financial year (Figure 18).

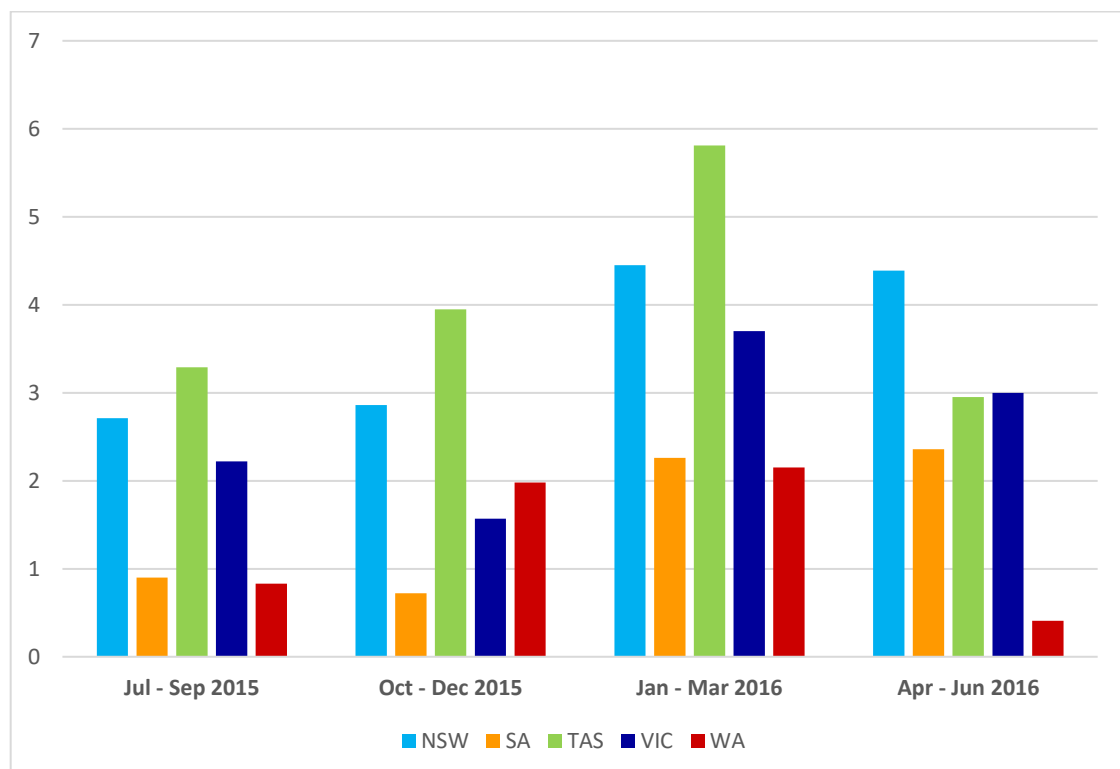


Figure 16. Overall percentages of inspected sheep with pleurisy for each state over the 2015-2016 financial year.

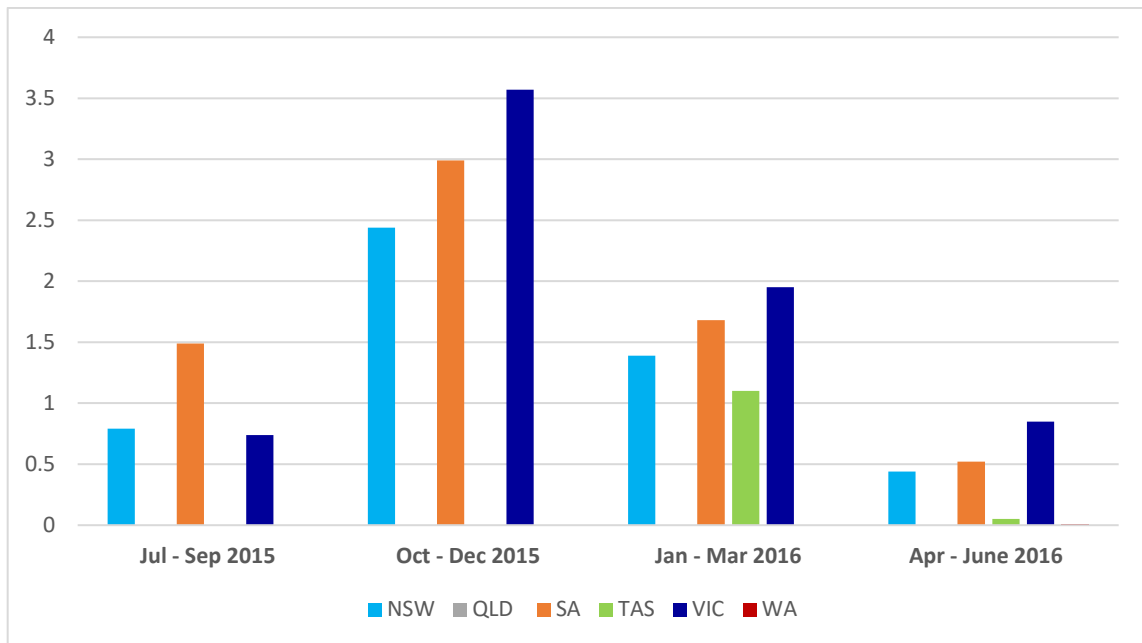


Figure 17. Overall percentages of infected sheep less than two years of age with pneumonia for each state over the 2015-2016 financial year.

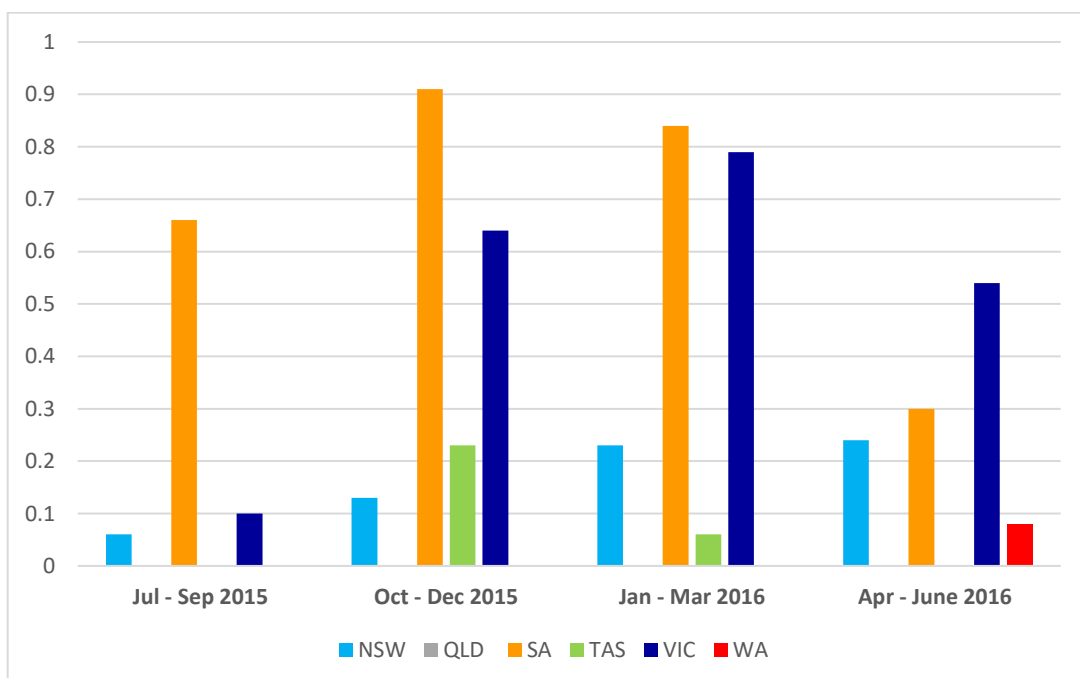


Figure 18. Overall percentages of inspected sheep over two years of age with pneumonia for each state over the 2015-2016 financial year.

Sarcocystosis

Sarcocystis is a single cell parasite with a sheep-cat life cycle. Cats become infected when they eat infected sheep meat, often through scavenging carcasses. The parasite develops in the intestines of the cat and they produce large quantities of microscopic spores in their faeces. The life cycle continues when sheep ingest these spores on pasture or feed, eventually localising and developing into cysts in the muscle. Sarcocystis has no impact on sheep health or productivity.

At the abattoirs, infected carcasses will undergo trimming while heavily infected carcasses will be condemned. In 2015 sarcocystosis cost the sheep industry an estimated \$4,902,000 (Greenleaf, 2016).

- Tasmania recorded the highest incidence of sarcocystosis in sheep over two years of age. The high levels of sarcocystis infection of sheep in is likely due to the large population of feral cats in Tasmania (Figure 19).

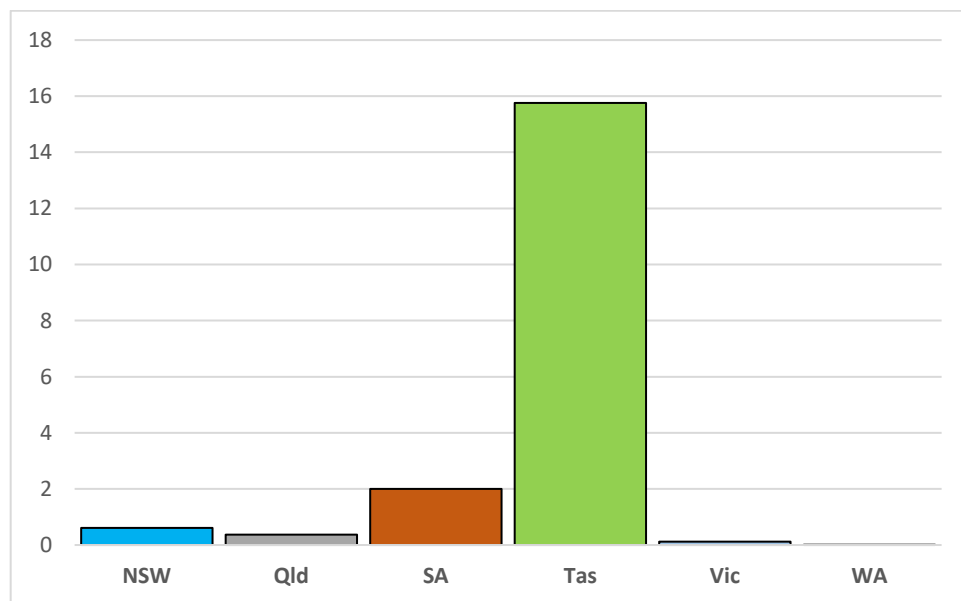


Figure 19. Overall percentages of inspected sheep over two years of age infected with sarcocystosis for each state over the 2015-2016 financial year.

Sheep measles

Sheep measles (*Cysticercus ovis*) are infective cysts from the dog tapeworm *Taenia ovis*, found in the muscles of sheep and goats. Sheep measles causes trimming, downgrading and condemnation at abattoirs. Sheep measles cost the sheep industry an estimated \$1,545,252 in 2015 (Greenleaf, 2016).

- All states recorded a large proportion of PICs that had sheep infected with sheep measles on abattoir inspection. Western Australia and Tasmania had a lower proportion of PICs infected with sheep measles compared to other states (Figure 20).
- The overall percentages of inspected animals infected with sheep measles over the 2015-2016 financial year is shown in Figure 21.

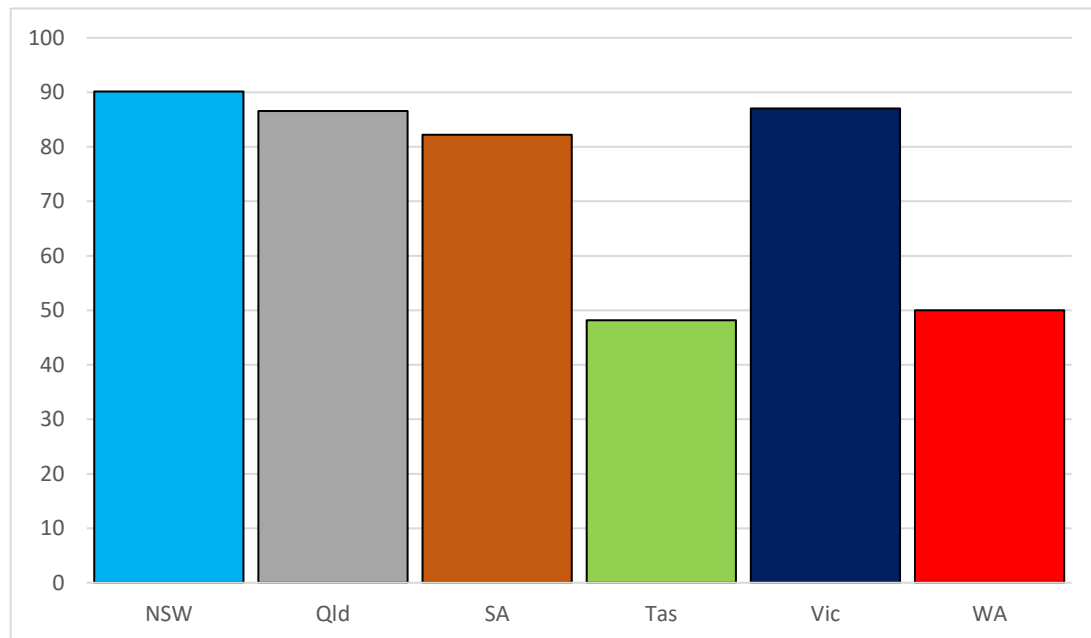


Figure 20. Percentages of PICs with at least one inspected sheep infected with sheep measles for each state over the 2015-2016 financial year.

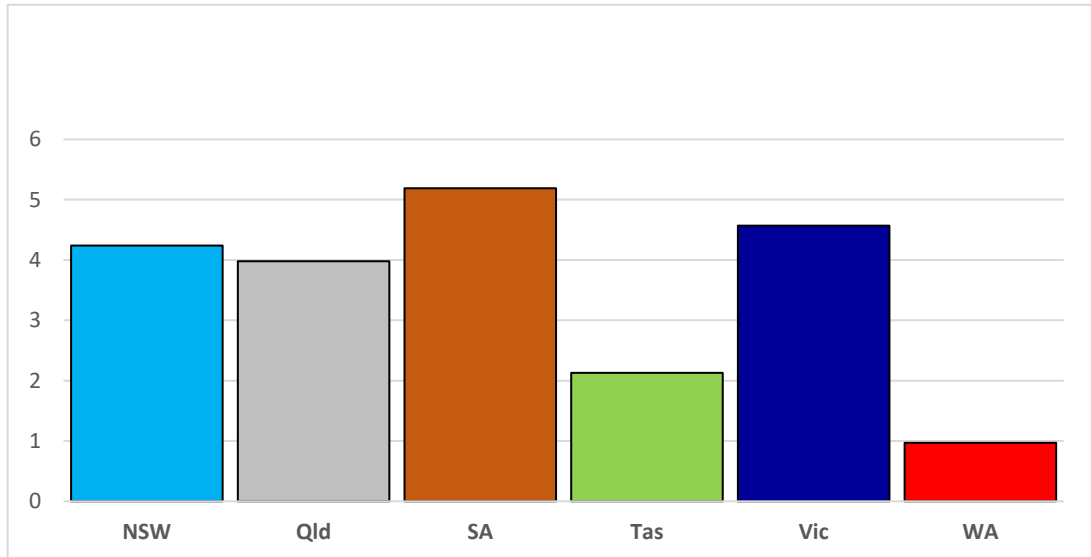


Figure 21. Overall percentages of inspected animals over two years of age infected with sheep measles for each state over the 2015-2016 financial year.

Vaccination lesions

Vaccination lesions can be caused by improper technique, poor hygiene or using a contaminated vaccine. The accidental inoculation of bacteria or dirt with the vaccine results in infection which can lead to abscess formation.

At the abattoir, vaccination lesions are trimmed from the carcass. In 2015 vaccination lesions cost the sheep industry an estimated \$1,304,102 (Greenleaf, 2016).

- In 2015-2016 Tasmania recorded the highest percentage of sheep over the two years of age with vaccination lesions (Figure 22).

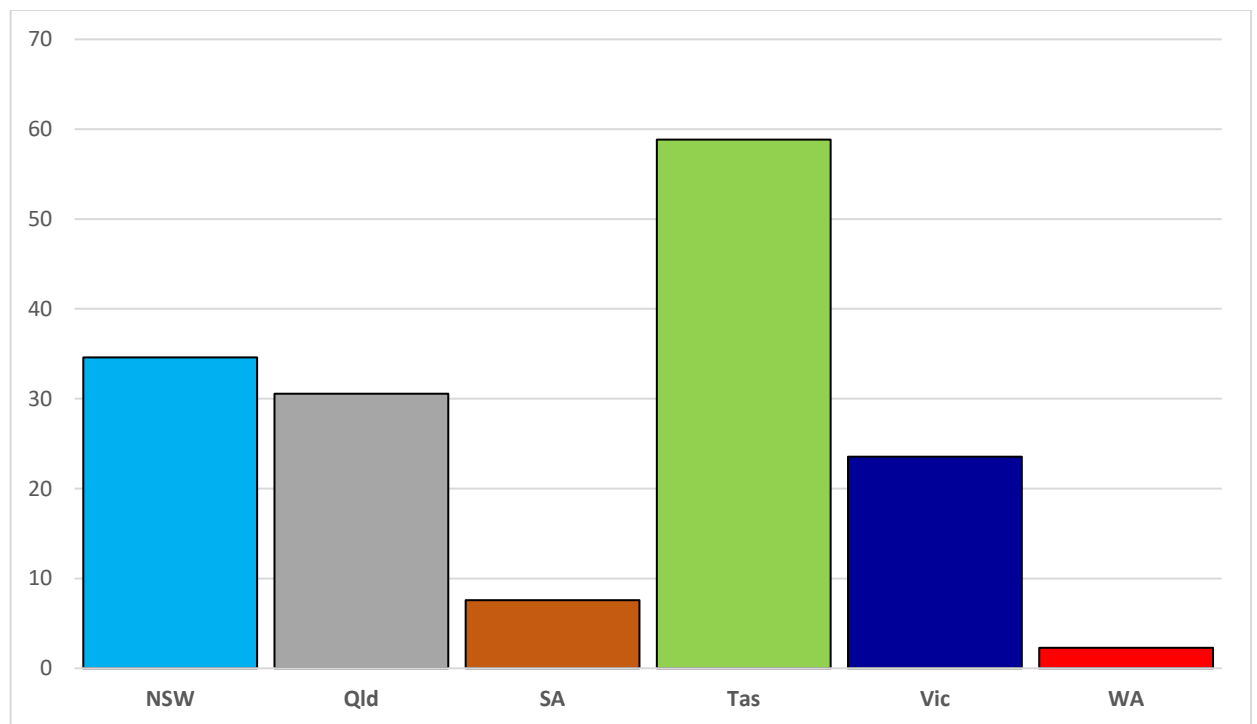


Figure 22. Percentages of inspected lines with at least one sheep over two years of age with vaccination lesions for each state over the 2015-2016 financial year.

State contacts

STATE	NAME	ORGANISATION	NUMBER
QLD	Sandra Adsett	Department of Agriculture and Fisheries	07 4688 1470
NSW	Sam Allan	NSW Department of Primary Industries	02 6763 1103
VIC	Rob Suter	Department of Economic Development, Jobs, Transport and Resources,	03 9217 4109
TAS	Rowena Bell	Department of Primary Industries, Parks, Water and Environment	03 6777 2135
SA	Celia Dickason	Department of Primary Industries and Regions, SA	08 8207 7837
WA	Anna Erickson	Department of Agriculture and Food WA	08 9881 0211



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