



National Sheep Health Monitoring Project (NSHMP)

Annual Report 2016 -2017

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Executive Summary

The National Sheep Health Monitoring Project (NSHMP) operated throughout 2016-2017 in 15 abattoirs around the country. Meat inspectors inspected 5,316,447 sheep in over 21,000 lines for up to 16 animal health conditions. In South Australia, the project is matched by the Enhanced Abattoir Surveillance Program which allows for five extra conditions to be monitored.

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 Link (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

Location of participating abattoirs

A total of 15 abattoirs participated in data collection in 2016-2017 (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 2016 – June 2017

State	Abattoir
New South Wales	Cootamundra*, Cowra, Dubbo, Gundagai
South Australia	Lobethal, Murray Bridge
Tasmania	Cressy
Victoria	Ararat, Colac, Cranbourne, Geelong, Stawell, Swift Melbourne, Warrnambool*
Western Australia	Narrikup

*Cootamundra plant closed down in February 2017. Warrnambool plant left the NSHMP in June 2017. Currently there is no Queensland abattoir involved in the program as the Wallangarra plant closed down in May 2016.

Number of sheep inspected

The total number of sheep inspected in 2016-2017 was 5,316,447 (Figure 1). This number has significantly increased from 2015-2016 by 1,144,325.

The total number of lines inspected in 2016-2017 was 21,615 (Figure 2). This number has significantly increased from 2015-2016 by 2,964.

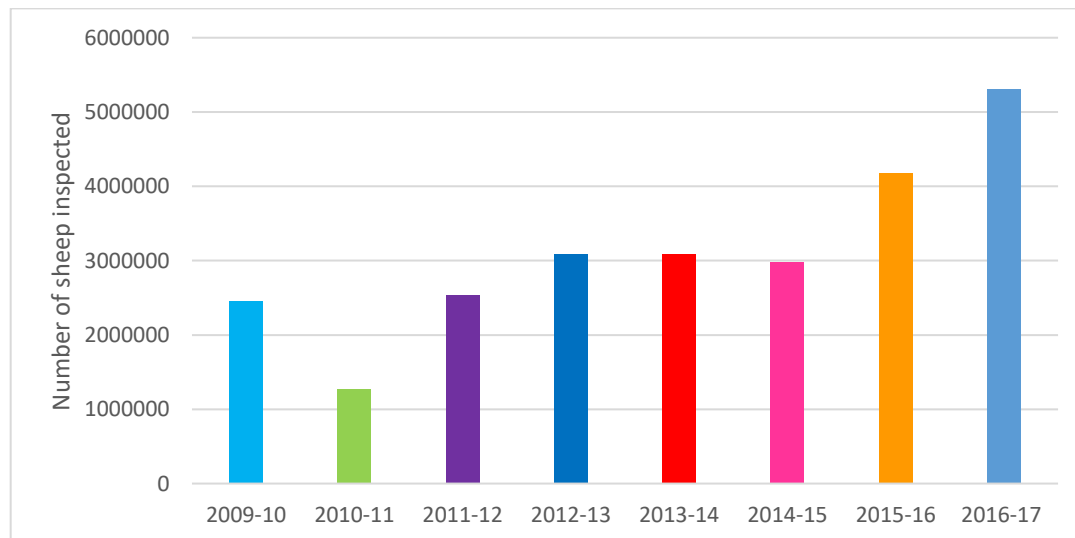


Figure 1. Total numbers of sheep inspected each financial year from 2009 to 2017.

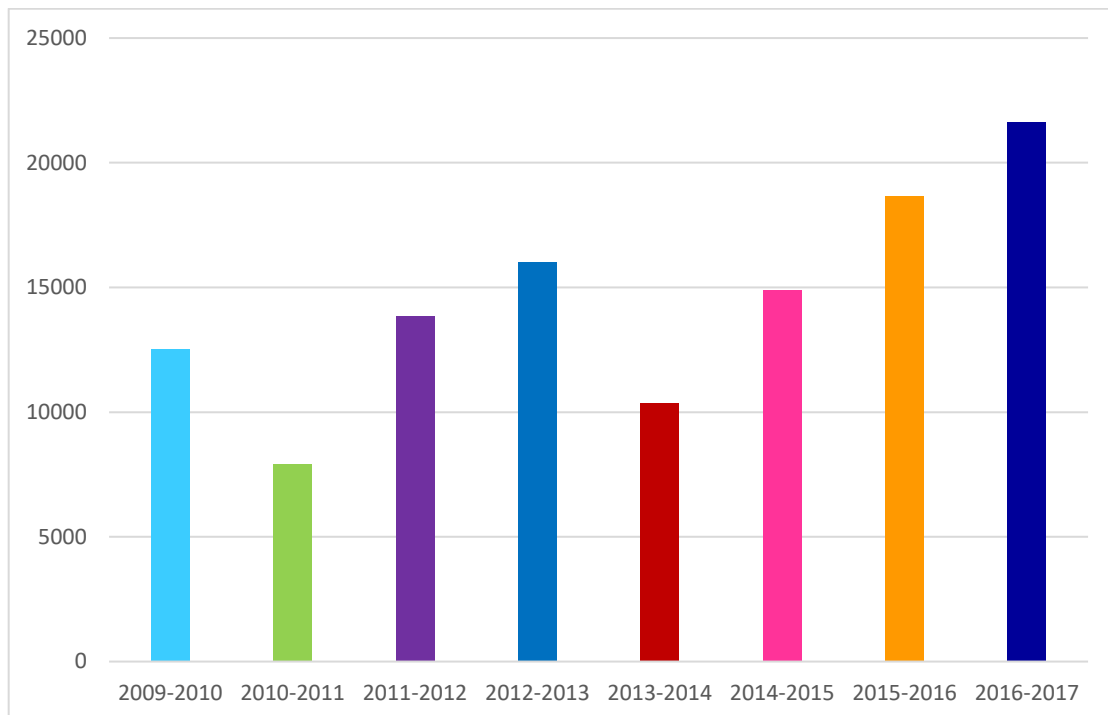


Figure 2. Total numbers of lines of sheep inspected each financial year from 2009 to 2017.

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 2016-2017 financial year.

State	NSW	Qld	SA	Tas	Vic	WA	Total
No. of sheep inspected	907,630	19,953	2,138,097	235,288	1,011,501	1,007,417	5,319,886
No. of lines inspected	3,232	65	9,514	1,583	4,120	3,114	21,628
No. of PICs inspected	859	41	2,938	502	1,286	1,432	7,058

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 (Table 3). In June 2017 the Livestock Data Link (LDL, managed by Meat & Livestock Australia) commenced, allowing streamlined access to NSHMP information online for producers. Producers can gain access to LDL by logging into the site, using their current NLIS account login. Once producers log on they have access to information about lines of sheep they have consigned to participating abattoirs, as well as prevention methods and tools to help manage any conditions affecting their flock.

Table 3. Producer feedback in each state for 2016-2017.

State	NSHMP feedback to producers 2016-2017
QLD	Feedback is sent by the Department.
WA	OJD reporting is sent monthly. WA Department currently does not send producer feedback, except for OJD.
SA	The SA sheep industry funds PIRSA to undertake additional work and the provision of information to producers in the Enhanced Abattoir Surveillance Program. Reports are sent twice a week.
VIC	Mail outs with abattoir reporting occurring every two months.
TAS	No feedback is sent by the Department, except for positive detections of OJD. Inspector contacts the producer when a high incidence of a condition is detected and offers extension materials or contact with a Government veterinarian.
NSW	Reports are mailed to producers quarterly by the Department.

Research and development activities utilising data

In 2016-2017 the data from the NSHMP was utilised by:

- Patrick Taggart for his PhD investigation of sarcocystis prevalence in SA and Tasmania.
- Greenleaf Enterprises to develop a Business Case to set a foundation for standards, systems and reporting mechanisms for abattoir monitoring (for sheep, cattle, pigs and goats).
- Herd Health to develop cost benefit analysis tools for producers to make better decisions about their on-farm control programs for diseases monitored in the NSHMP.

Project review

The NSHMP was reviewed in 2016 by Greenleaf Enterprises. Recommendations from the review report were considered by the Sheep Health Project Steering Committee at their meeting in August 2016. They included 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 review report provided economic modelling for conditions monitored by the project using 2015 data (Greenleaf, 2016). The economic modelling section of the report 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 2016-2017 using data collected through the NSHMP. Summary data sets from previous years has been utilised 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/Agriculture 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 insignificant levels were recoded for both 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).

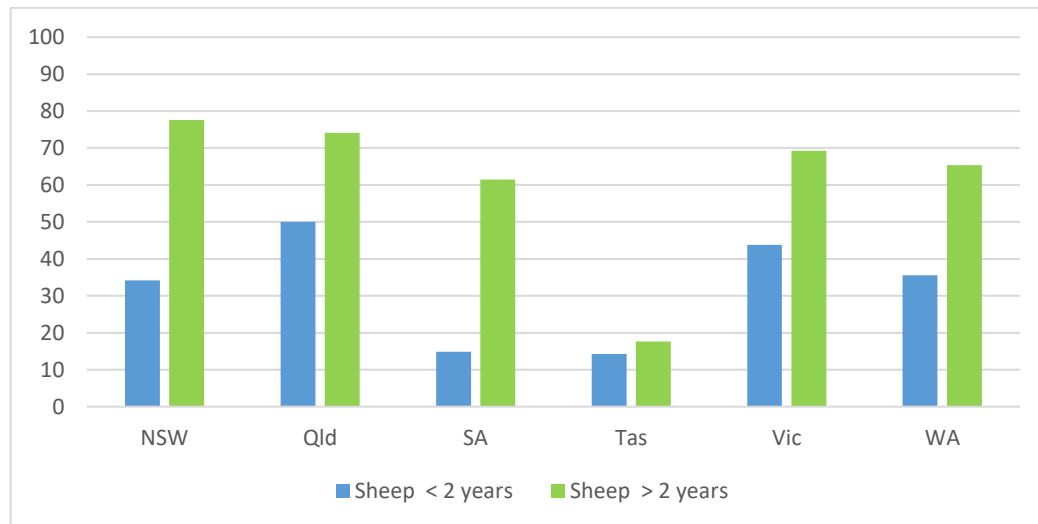


Figure 3. Percentages of inspected lines with at least one sheep infected with arthritis for each state over the 2016-2017 financial year.

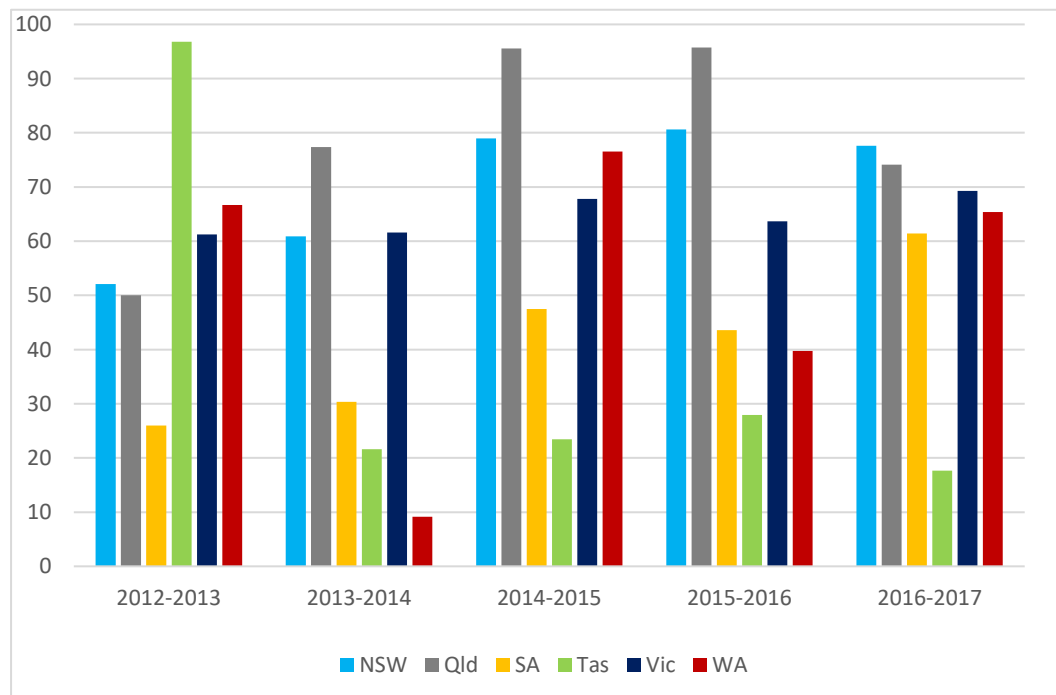


Figure 4. Percentages of inspected lines with at least one sheep over two years of age infected with arthritis for each state and each financial year from 2012 to 2017.

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 are condemned.

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

- Over the 2016 – 2017 financial year, South Australia recorded the highest percentage of infected sheep over two years of age followed by Victoria (Figure 5).

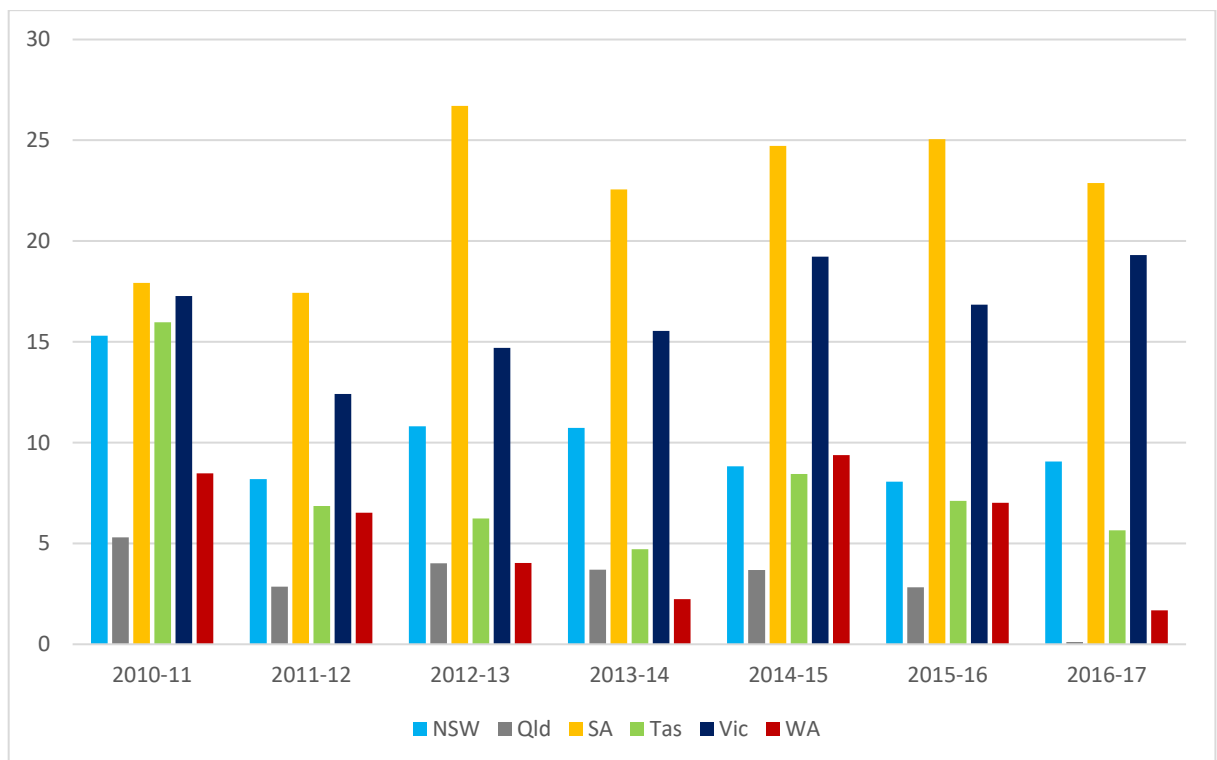


Figure 5. Overall percentages of inspected sheep over two years of age infected with bladder worm for each state and each financial year from 2010 to 2017.

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 2016-2017 financial year the incidence of CLA detected in Tasmania has decreased significantly when compared to the 2015-2016 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 2016-2017 financial year for sheep over two years of age (Figure 7). It should be noted that only a small number of lines were monitored in Queensland for this condition during the year (Table 4).

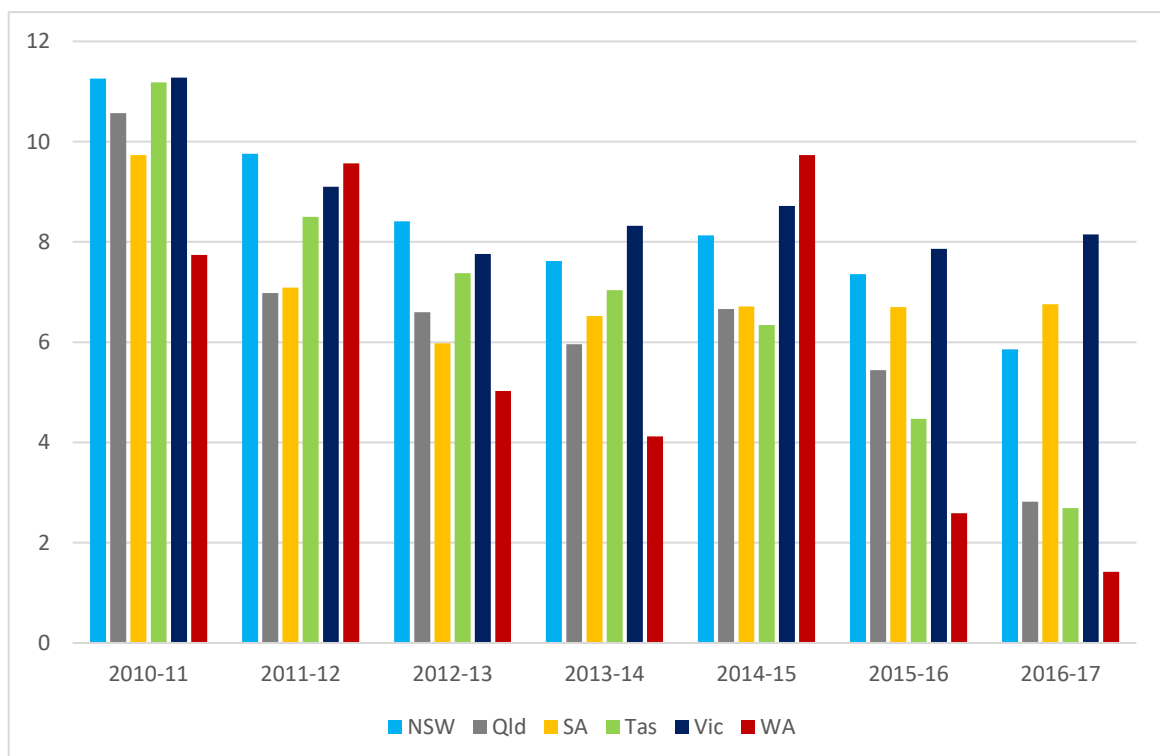


Figure 6. Overall percentages of inspected sheep infected with CLA for each state and each financial year from 2009 to 2017.

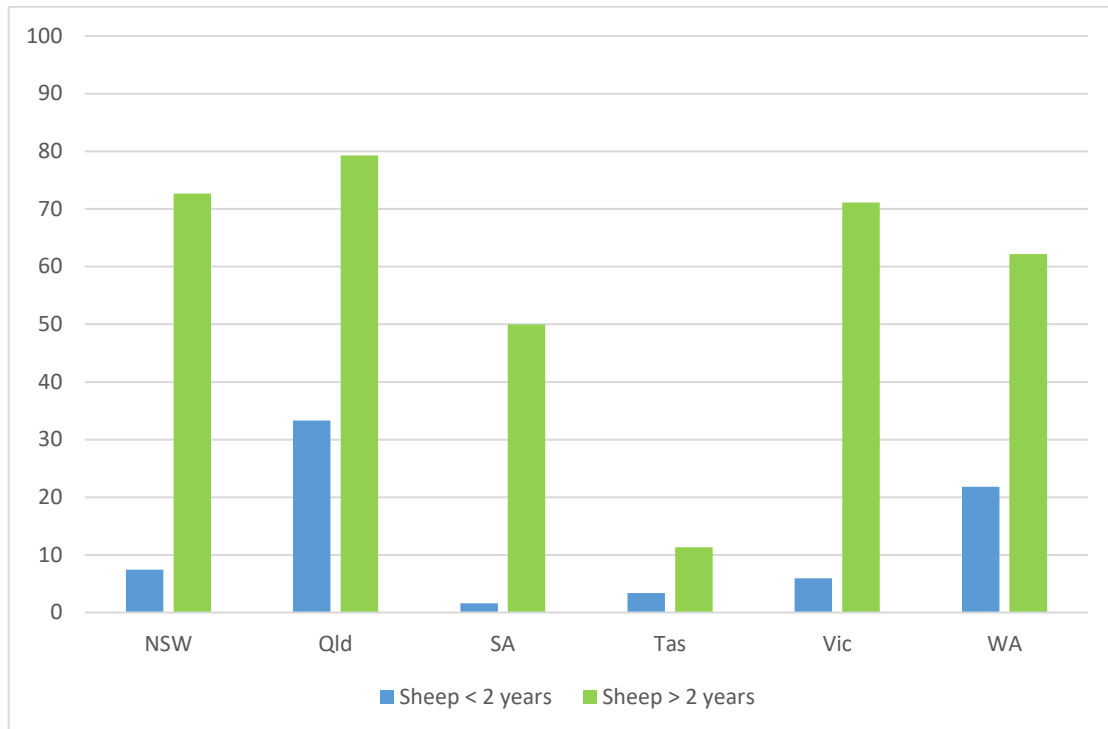


Figure 7. Percentages of inspected lines with at least one sheep infected with CLA for each state over the 2016-2017 financial year.

Table 4. Number of animals inspected for CLA over the 2016-2017 financial year

Jurisdiction	NSW	Qld	SA	Tas	Vic	WA
No. of animals inspected	349,137	18,729	611,867	94,571	384,352	501,022
No. of lines inspected	1,280	58	2,822	555	1,677	1,584
No. of PICs inspected	272	38	1,561	230	494	995

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 2016-2017 dog bites were most common in sheep over two years of age (Figure 8). Western Australia 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).

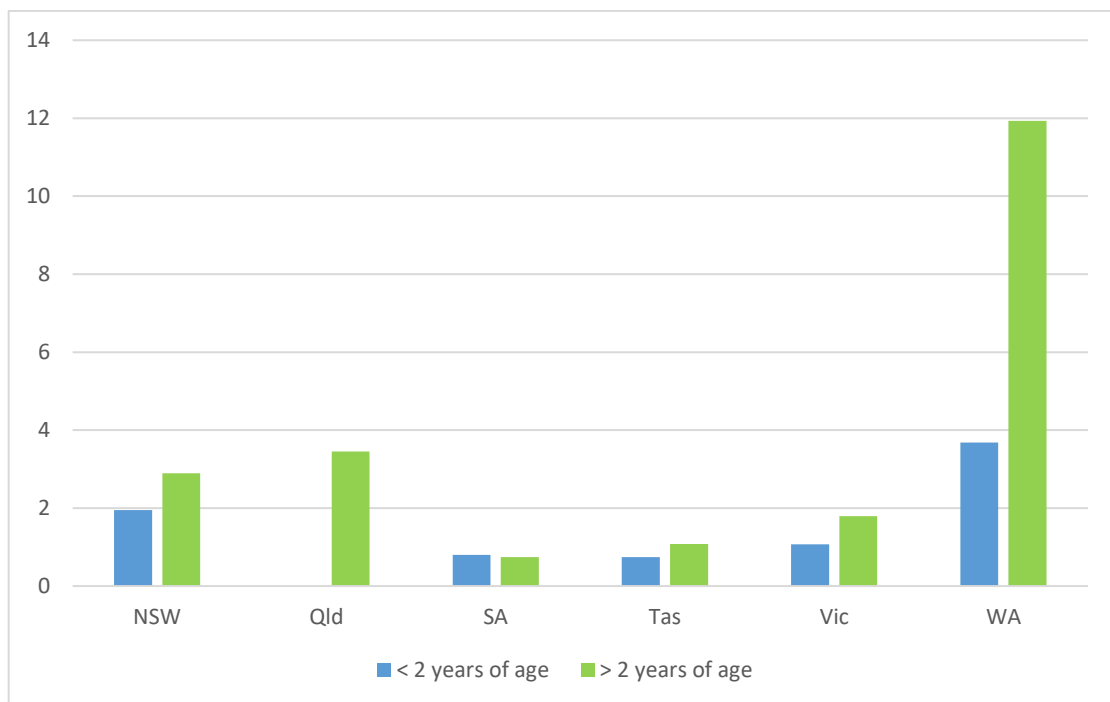


Figure 8. Percentages of inspected lines with at least one sheep affected by dog bites for each state over the 2016-2017 financial year.

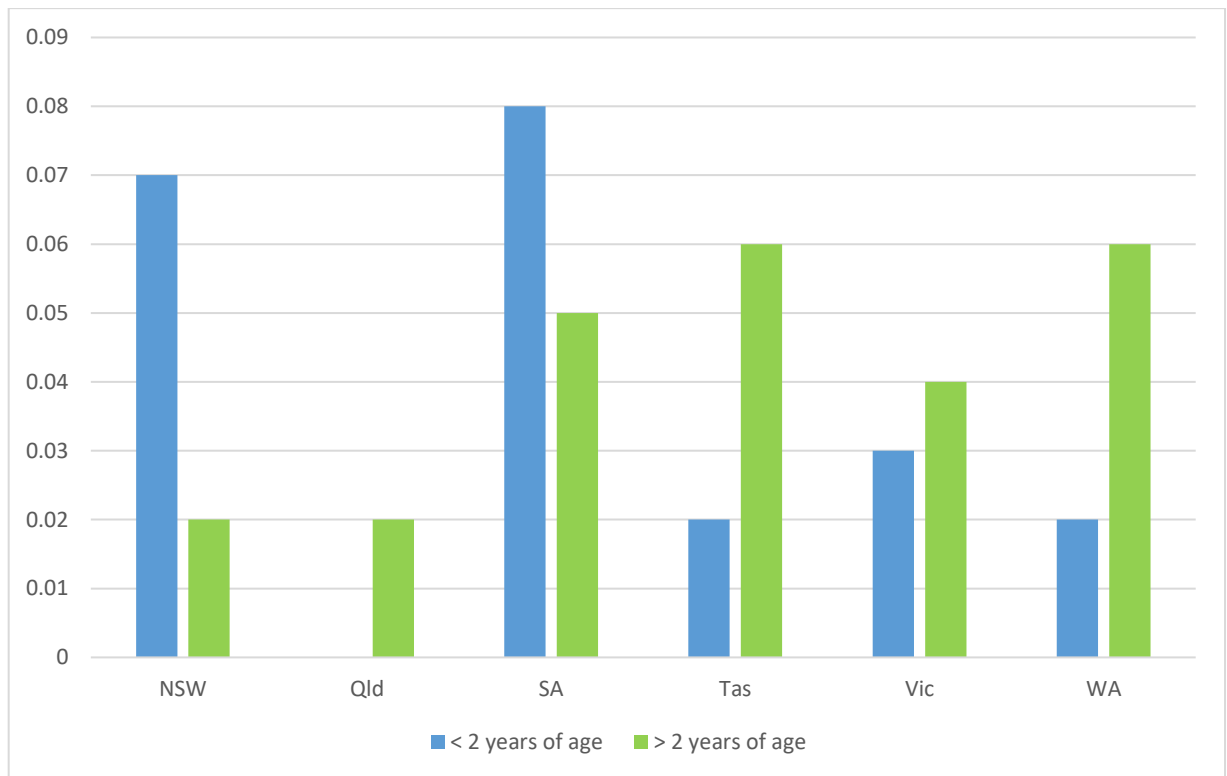


Figure 9. Overall percentages of inspected sheep affected by dog bites for each state over the 2016-2017 financial year.

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. In 2015 Grass seed contamination cost the sheep industry an estimated \$47,544,373 (Greenleaf, 2016).

- Over the 2016-2017 financial year the incidence of grass seeds detected in Queensland, New South Wales, and Tasmania has decreased significantly when compared to the 2015-2016 financial year. The incidence of grass seeds has increased in Western Australia over the 2016-2017 financial year (Figure 10).
- Overall the percentage of infected sheep is low for all states for 2016-2017. Figure 11 illustrates the percentage of affected animals by local government area (LGA) over the 2016-2017 financial year.

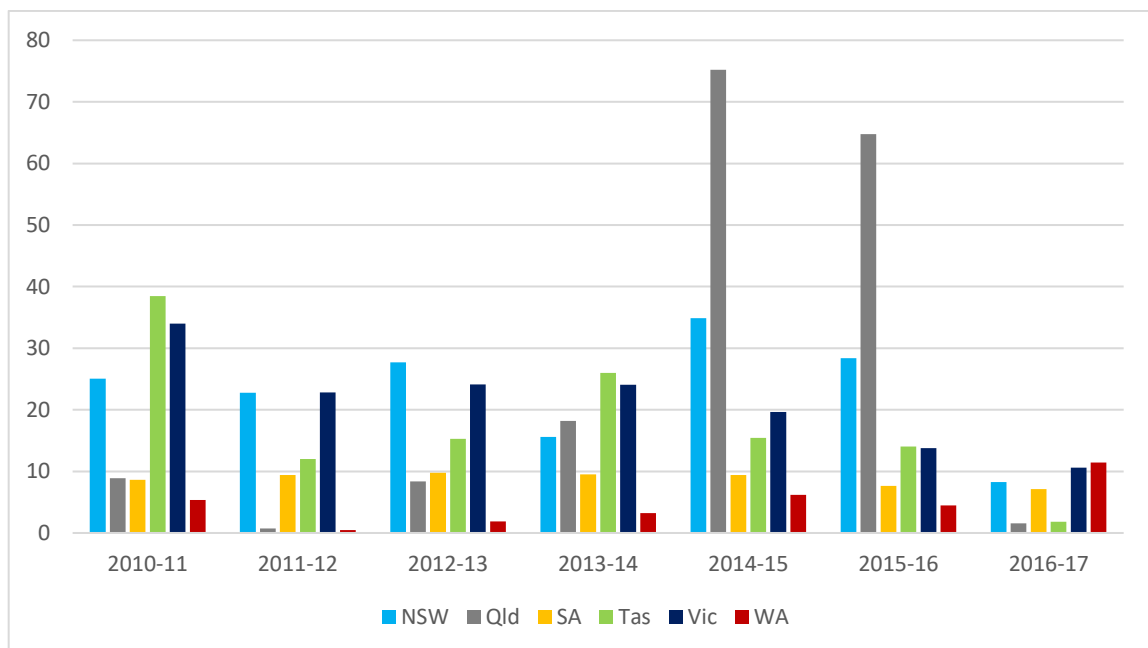


Figure 10. Percentages of inspected lines with at least one carcase affected by grass seeds for each state and each financial year from 2010 to 2017.

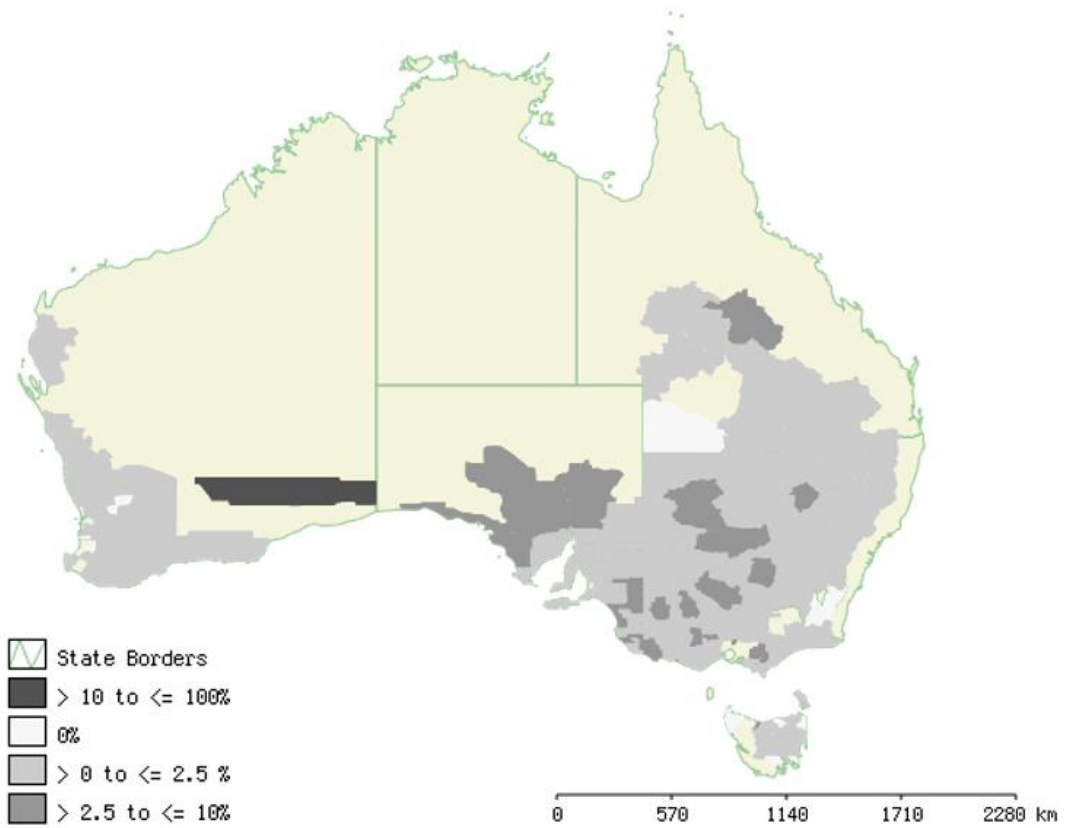


Figure 11. Grass seed lesions - percentage of affected sheep by LGA over the 2016-2017 financial year.

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.

- The percentage of sheep infected with hydatids greatly decreased in Queensland and New South Wales since the 2015 – 2016 financial year (Figure 12). It should be noted that only a small number of lines were monitored in Queensland for this condition during the year (Table 5) and the main abattoir for monitoring of Queensland sheep closed in May 2016.

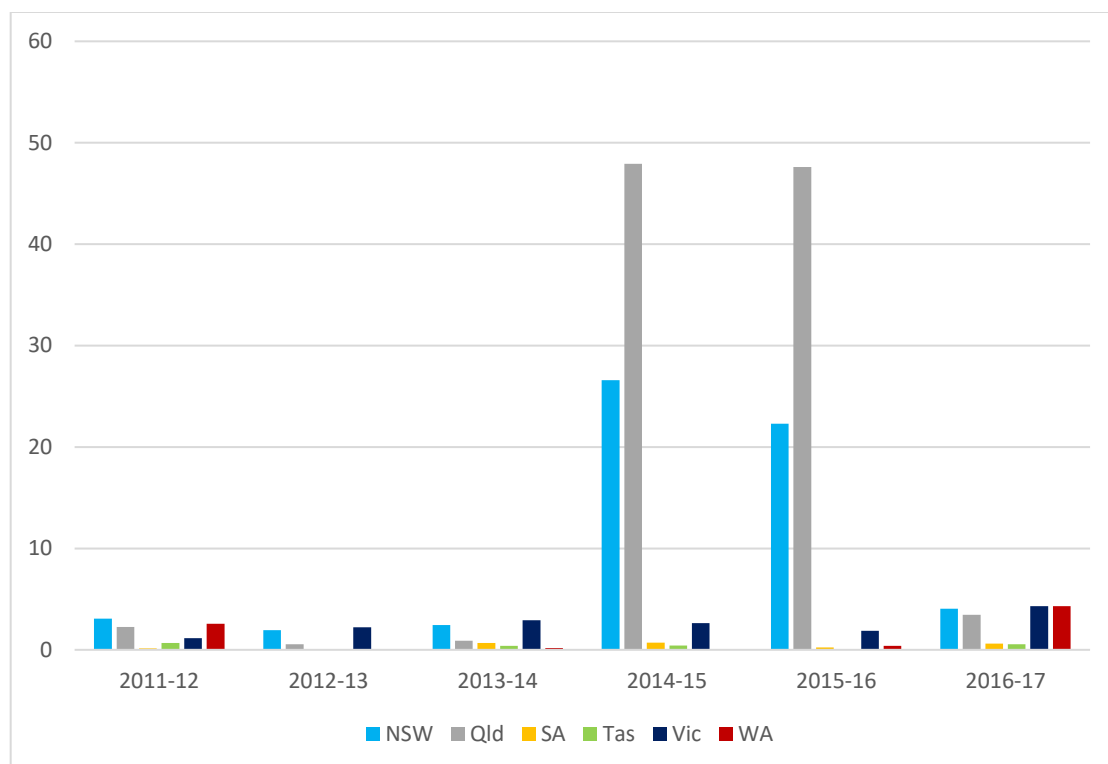


Figure 12. Percentages of inspected lines with at least one sheep infected with hydatids for each state and each financial year from 2009 to 2017.

Table 5. Number of animals inspected for hydatids over the 2016-2017 financial year.

Jurisdiction	NSW	Qld	SA	Tas	Vic	WA
No. of animals inspected	349,137	18,729	611,867	94,571	384,352	501,022
No. of lines inspected	1,280	58	2,822	555	1,677	1,584
No. of PICs inspected	272	38	1,561	230	494	995

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 2016-2017 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).

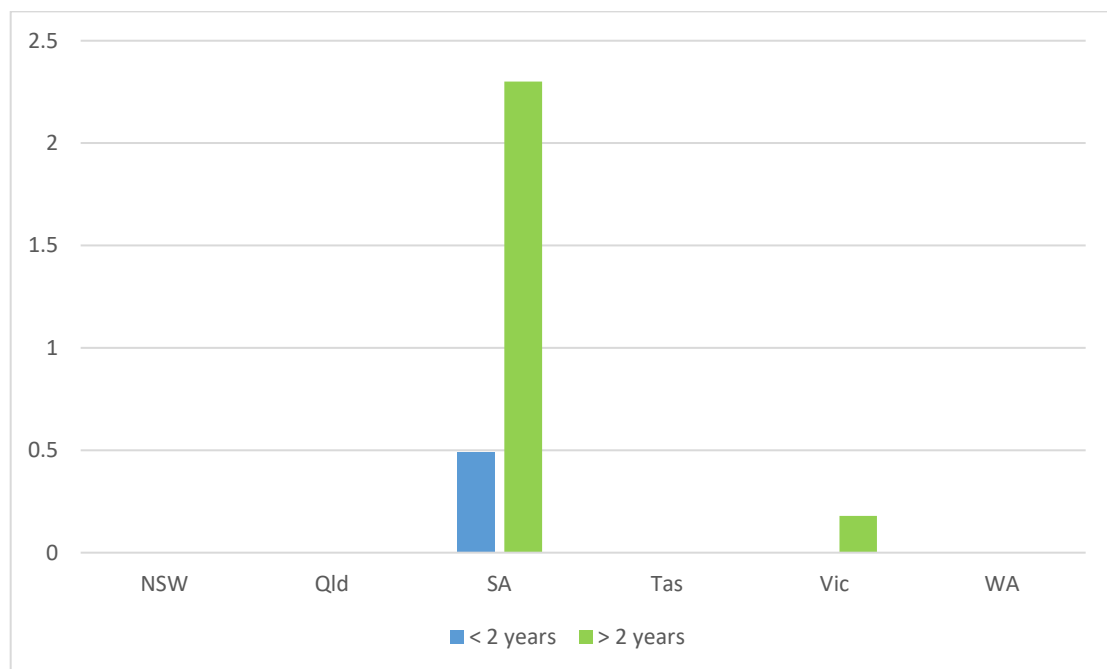


Figure 13. Percentages of inspected lines with at least one sheep infected with knotty gut for each state over the 2016-2017 financial year.

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.

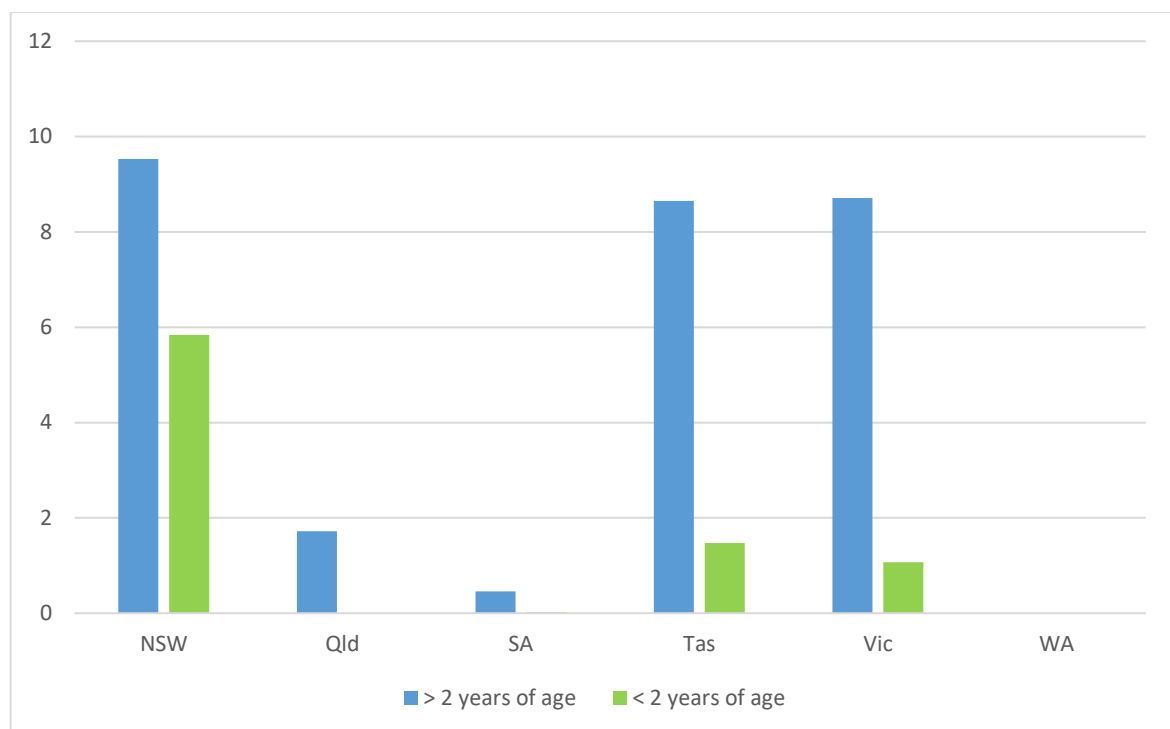


Figure 14. Percentage of inspected lines with at least one infected animal with liver fluke for each state over the 2016-2017 financial year.

Ovine Johne’s disease

Ovine Johne’s disease (OJD) is caused by 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 2016-2017 was 811,773 (Table 6).
- Victoria recorded the highest incidence of OJD for the 2016-2017 financial year (Figure 15).

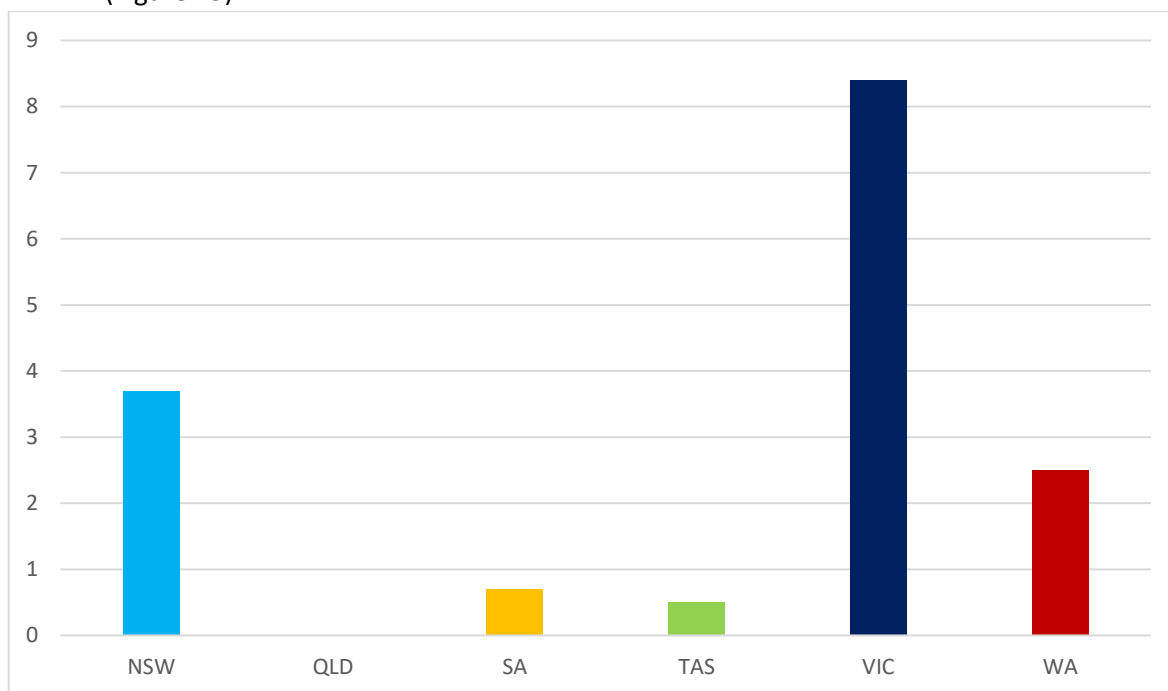


Figure 15. Overall percentage of lines of sheep infected with OJD for each state over the 2016-2017 financial year.

Table 6. Total number of sheep over two years of age (direct lines) inspected for OJD over the 2016-2017 financial year.

State	NSW	Qld	SA	Tas	Vic	WA	Total
Total no. of sheep inspected	31,231	1,351	520,509	63,341	77,439	111,902	811,773
No. of lines inspected	108	5	3,631	430	488	402	5,064

Pneumonia and pleurisy

Pneumonia in sheep is the 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 \$4,400,000 million in 2015, while the cost of pneumonia was estimated at \$517,526 (Greenleaf, 2016).

- South Australia and Victoria recorded the highest percentages of sheep older than two years of age infected with pleurisy for the 2016-2017 financial year (figure 16).
- Victoria and South Australia recorded the highest percentage of inspected lines with at least one infected animal with pneumonia for the 2016-2017 financial year (figure 17).

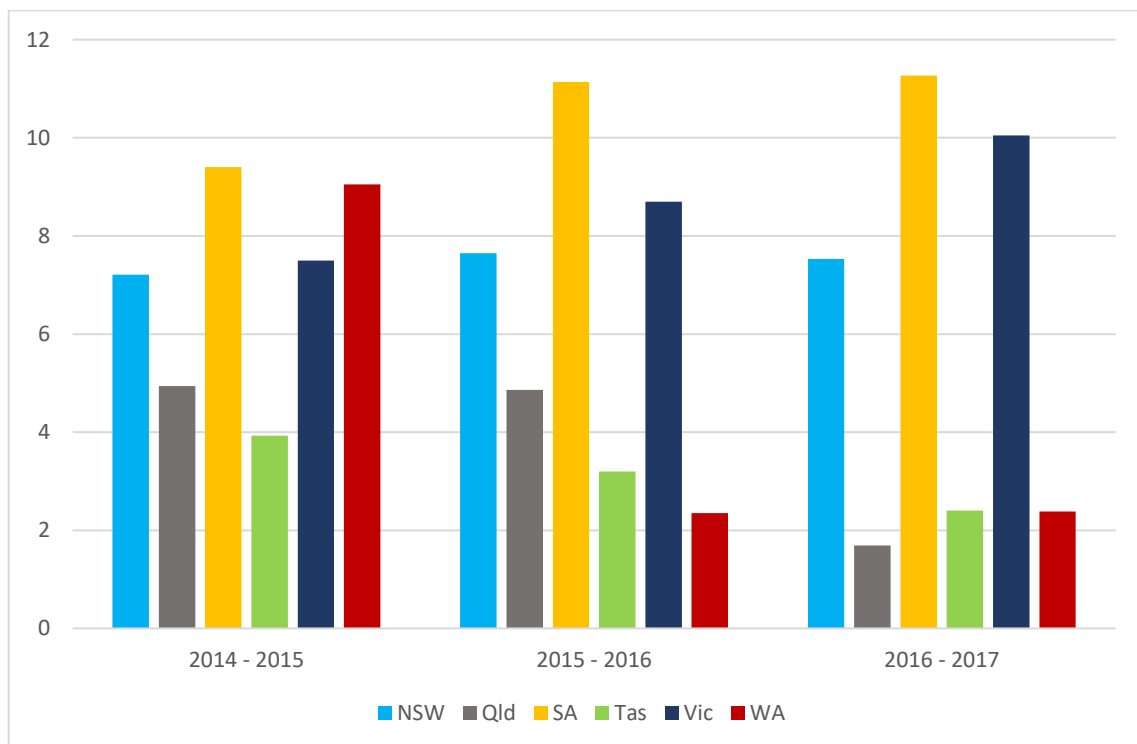


Figure 16. Overall percentages of inspected sheep with pleurisy over two years of age for each financial year from 2014 to 2017.

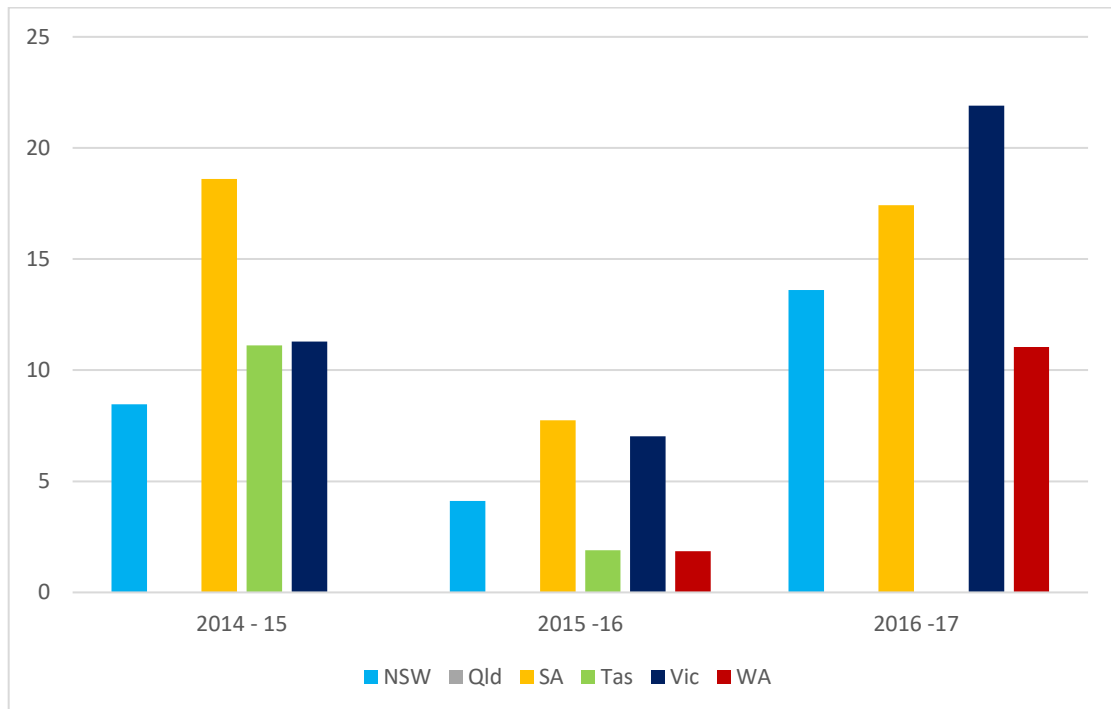


Figure 17. Percentages of inspected lines with at least one infected animal over two years of age with pneumonia for each financial year from 2014 to 2017.

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 (Figure 18). The high levels of sarcocystosis infection of sheep in is likely due to the large population of feral cats in Tasmania.

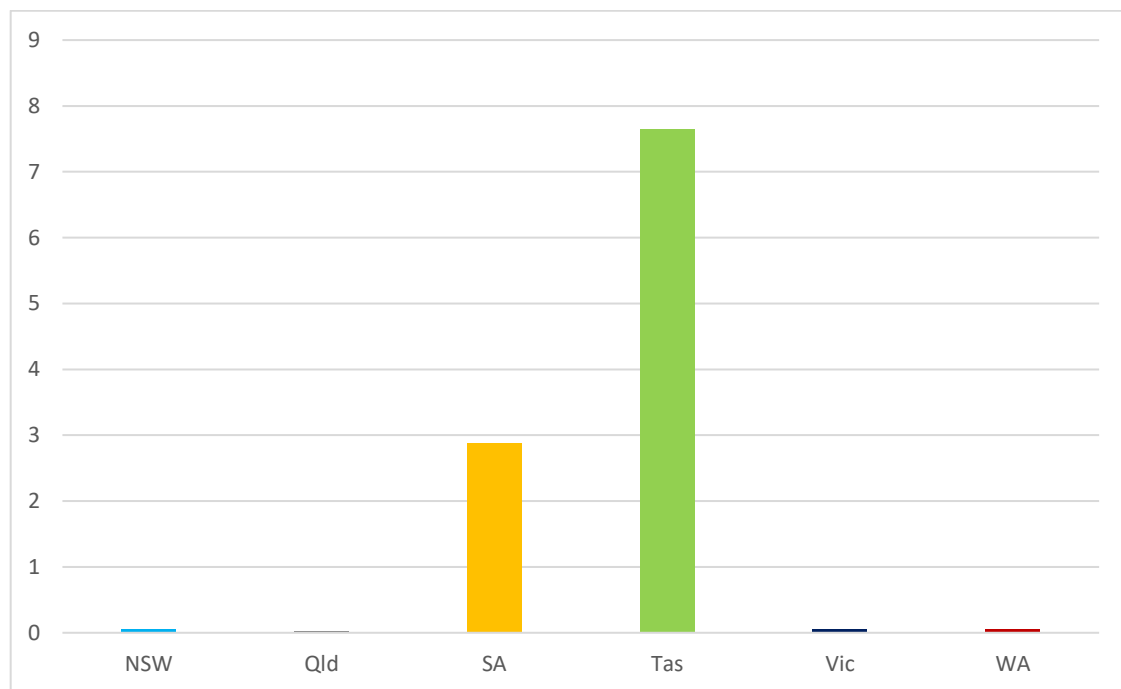


Figure 18. Overall percentages of inspected sheep over two years of age infected with sarcocystosis for each state over the 2016-2017 financial year.

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 lines that had sheep infected with sheep measles on abattoir inspection. New South Wales and Queensland had a lower proportion of PICs infected with sheep measles compared to other states (Figure 19).
- The overall percentages of inspected animals infected with sheep measles over the 2016-2017 financial year was lowest in Queensland and Western Australia (Figure 20).

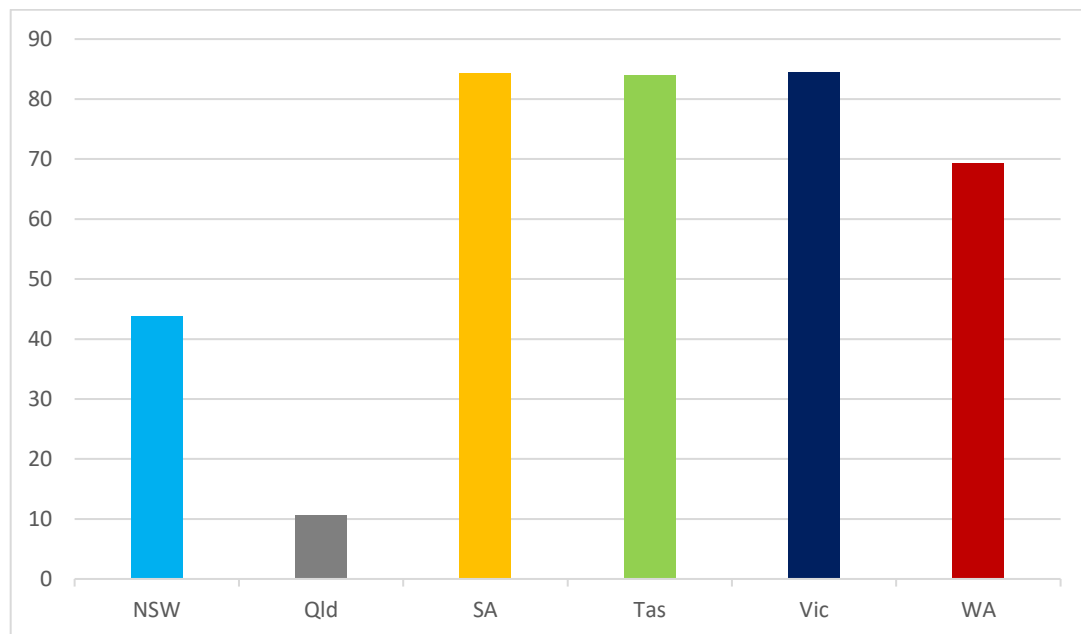


Figure 19. Percentages of inspected lines with at least one infected sheep for sheep older than two years of age for the 2016-2017 financial year.

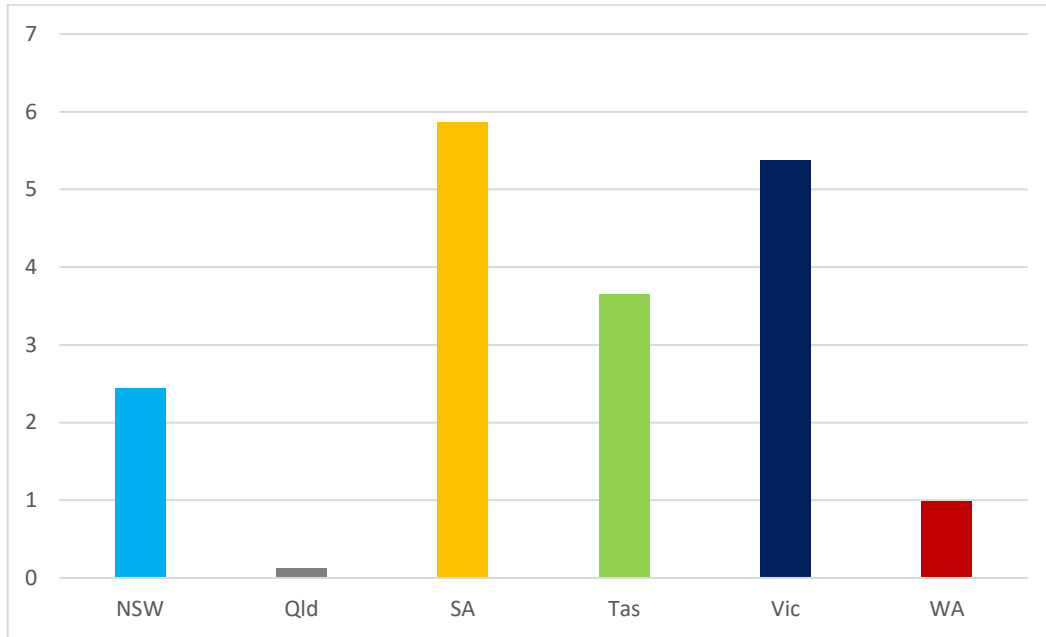


Figure 20. Overall percentages of inspected animals over two years of age infected with sheep measles for each state over the 2016-2017 financial year.

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 2016-2017 Tasmania recorded the highest percentage of sheep with vaccination lesions (Figure 21).

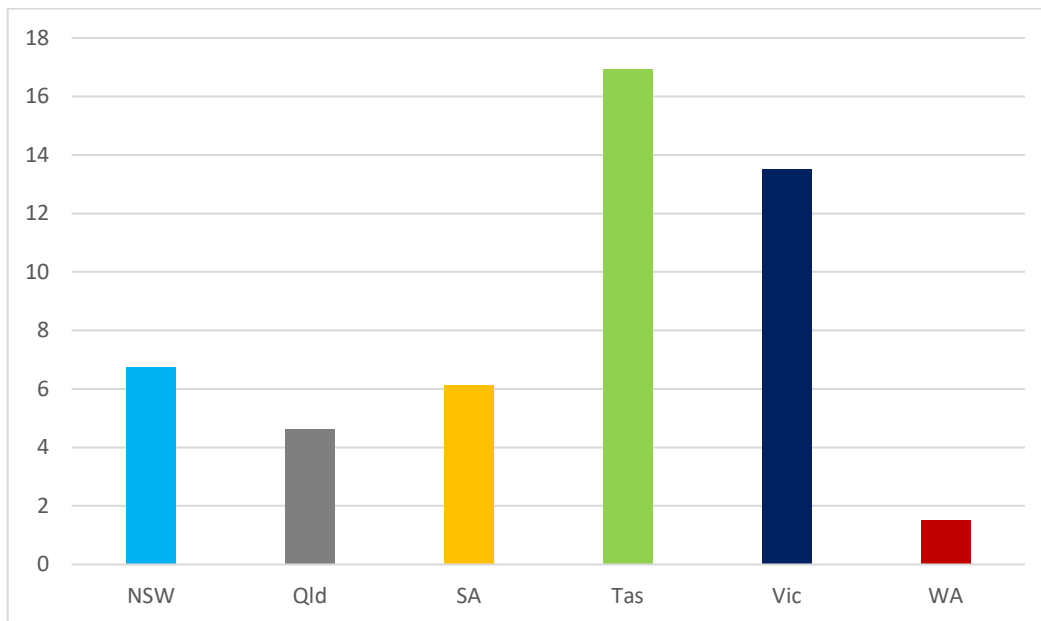


Figure 21. Percentages of inspected lines with at least one sheep with vaccination lesions for each state over the 2016-2017 financial year.

State contacts

STATE	NAME	ORGANISATION	NUMBER
QLD	Louise Mullemeister	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	Mary Carr	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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