animalhealth AUSTRALIA

# NSHMP

National Sheep Health Monitoring Project

# ANNUAL REPORT 2020-21

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# EXECUTIVE SUMMARY

The National Sheep Health Monitoring Project (NSHMP) operated throughout 2020-2021 in 10 abattoirs around the country. Meat inspectors inspected 8,894,159 sheep in 37,758 lines from 8,795 Property Identification Codes (PICs) for up to 20 animal health conditions.

This report contains a basic analysis of the data from the project, including summaries of the monitored conditions, thus providing a snapshot of the health of a significant proportion of the Australian sheep flock. Of the conditions monitored in the 2020-2021 financial year (FY), nephritis and bladder worm recorded the highest levels of incidence in inspected sheep throughout Australia (Table 1). All conditions with a prevalence of 0.1% or more are included in Table 1.

**Table 1. The percentage of inspected sheep that were affected by each of the listed conditions in the 2018-21 FYs.**

| | PERCENTAGE OF ANIMALS AFFECTED | | |
|---|---|---|---|
| **CONDITION** | **18/19** | **19/20** | **20/21** |
| **Arthritis** | 0.9 | 0.6 | 0.6 |
| **Bruising** | 0.4 | 0.4 | 0.4 |
| **Bladder worm** | 3.5 | 3.6 | 2.3 |
| **Cheesy gland** | 3.7 | 2.5 | 1.3 |
| **Grass seed** | 0.4 | 0.3 | 0.4 |
| **Liver fluke** | 1.1 | 0.6 | 0.5 |
| **Lungworm** | 2.3 | 0.8 | 0.2 |
| **Nephritis** | 2.4 | 2.8 | 3.0 |
| **Pneumonia** | 0.5 | 0.3 | 0.3 |
| **Pleurisy** | 2.8 | 1.8 | 1.2 |
| **Sarcocystosis** | 0.5 | 0.3 | 0.1 |
| **Sheep measles** | 1.5 | 1.3 | 1.3 |
| **Vaccination lesions** | 1.1 | 1.14 | 1.3 |

# 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 10 abattoirs participated in data collection in 2020-2021 (some part-time) and provided national coverage of the significant sheep producing regions of Australia (Table 2).

**Table 2: Location of abattoirs participating in the NSHMP July 2020 – June 2021**

| STATE | ABATTOIR |
|---|---|
| New South Wales | Cowra, Dubbo, Gundagai, Tamworth |
| South Australia | Lobethal (through the Enhanced Abattoir Surveillance Program) |
| Tasmania | Cressy |
| Victoria | Ararat, Geelong*, Brooklyn* |
| Western Australia | Narrikup |

*Abattoirs participating part-time in the project.

# NUMBER OF SHEEP INSPECTED

The total number of sheep, lines and PICs inspected in 2020-21 is slightly lower than the previous 2 years, with the number of sheep inspected being the exception with 2020-21 being slightly higher than in 2018-19. Reasons for the decline from 2019-20 are a reduced number of sheep being slaughtered as well as COVID-restrictions affecting some of the inspection occurring.

**Table 3: Total number of sheep, properties (PICs) and lines inspected in Australia over the past three FYs.**

| INSPECTED NUMBERS | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Sheep | 8,682,967 | 9,455,621 | 8,894,159 |
| PICs | 9,581 | 9,013 | 8,795 |
| Lines | 39,935 | 40,786 | 37,758 |

# SOURCE OF SHEEP

Sheep were sourced from all Australian states. Of the nearly 8.9 million sheep inspected during 2020-2021, 46% were from NSW, 12% from Western Australia, 20% from South Australia, 16% from Victoria and 4% from Tasmania. The number of sheep and lambs inspected from each state (for most diseases and conditions) is provided in Table 4.

**Table 4: Total number of sheep, properties (PICs) and lines inspected from each state over the 2020-2021 FY.**

| STATE | NO. OF SHEEP INSPECTED | NO. OF LINES INSPECTED | NO. OF PICS INSPECTED |
|---|---|---|---|
| NSW | 4,078,626 | 17,161 | 2,522 |
| Qld | 139,400 | 528 | 172 |
| SA | 1,789,267 | 8,848 | 2,698 |
| Tas | 382,269 | 2,435 | 553 |
| Vic | 1,393,279 | 5,046 | 1,401 |
| WA | 1,111,318 | 3,740 | 1,449 |
| **Total** | **8,894,159** | **37,758** | **8,795** |

# 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 inspectors.

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

# NSHMP PRODUCER FEEDBACK

All producers now have online access to feedback via the Livestock Data Link (LDL). 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. Feedback from the NSHMP is returned in some states directly to producers by the relevant Department of Primary Industries/ Agriculture.

**www.integritysystems.com.au/data--feedback/livestock-data-link**

# RESEARCH AND DEVELOPMENT ACTIVITIES UTILISING DATA

In 2020-21 the data from the NSHMP was utilised by:

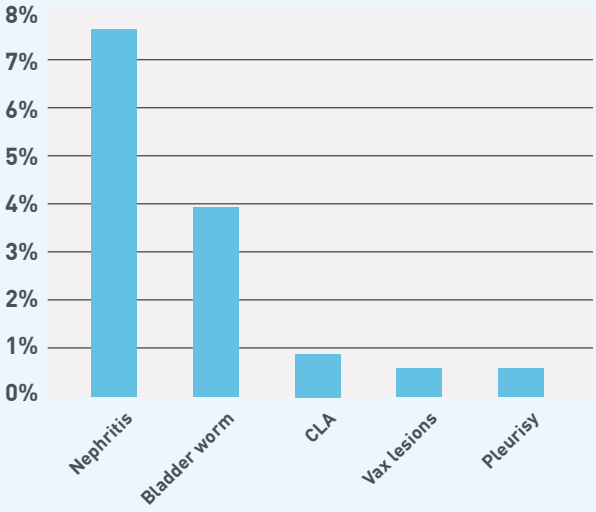
- A Sheep Health Conditions carcass impact visualisation tool was developed to showcase six conditions monitored in the NSHMP; pleurisy/pneumonia, sheep measles, grass seeds, arthritis, rib fractures and vaccination lesions. Within the tool, there are also fact sheets which include further information including how producers can prevent or manage each condition on their property. The Sheep Health Conditions – Carcass Impacts tool can be accessed through the AHA website.
- Pilot of regional quarterly reports providing a summary of the main sheep health conditions identified in a region and if the conditions have changed over time.

# ANIMAL HEALTH INFORMATION

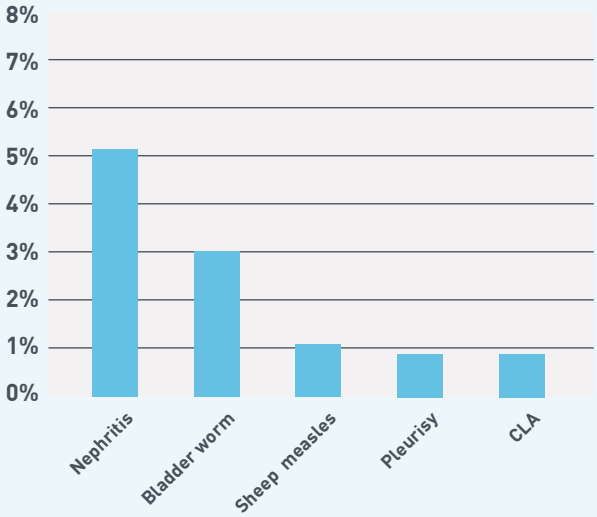
- This report contains a 'snapshot' of the health of the Australian sheep flock for the 2020-21 FY using data collected through the NSHMP. Summary data sets from previous years has been utilised for some conditions to provide a comparison.
- The data collected by the NSHMP is stored in the Endemic Disease Information System, hosted by Animal Health Australia.
- Each state department of Primary Industries/Agriculture has access to its own state data which can be used for further detailed analysis.
- Ovine Johne's disease is not included in this report, as numbers of sheep inspected for it have been significantly lower than for the other 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 in this report as all inspected animals are greater than two years (which includes some mixed age lines), and less than two years of age (mostly lamb). Analysis is at the animal level or by property identification code (PIC) level.
- The NSHMP collects information on 20 conditions:
  - » Arthritis
  - » Bladder worm
  - » Caseous lymphadenitis (CLA, cheesy gland)
  - » Dog bites
  - » Grass seeds
  - » Hydatids
  - » Knotty gut
  - » Liver fluke
  - » Pleurisy
  - » Pneumonia
  - » Sarcocytosis
  - » Sheep measles
  - » Vaccination lesions
  - » Lung worm
  - » Rib fractures
  - » Bruising
  - » Cirrhosis
  - » Nephritis
  - » Fever/septicaemia
  - » Ovine Johne's disease (only on request by the producer)

## TOP FIVE CONDITIONS FOR EACH STATE DURING 20/21

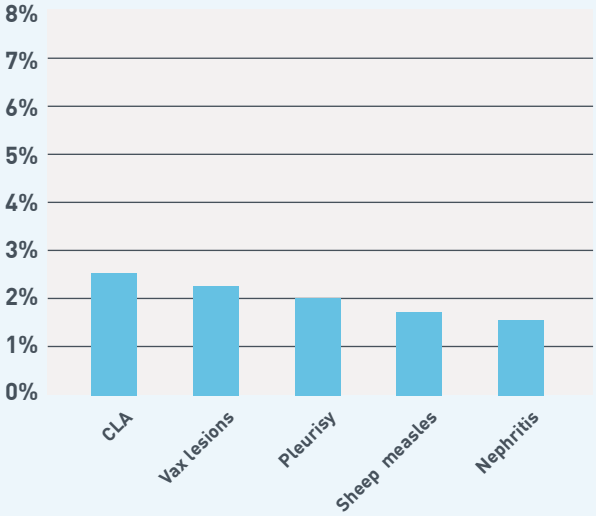
### QUEENSLAND



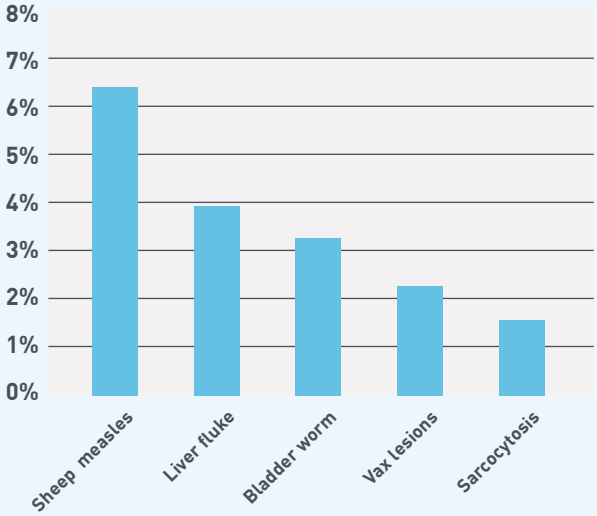

### NEW SOUTH WALES



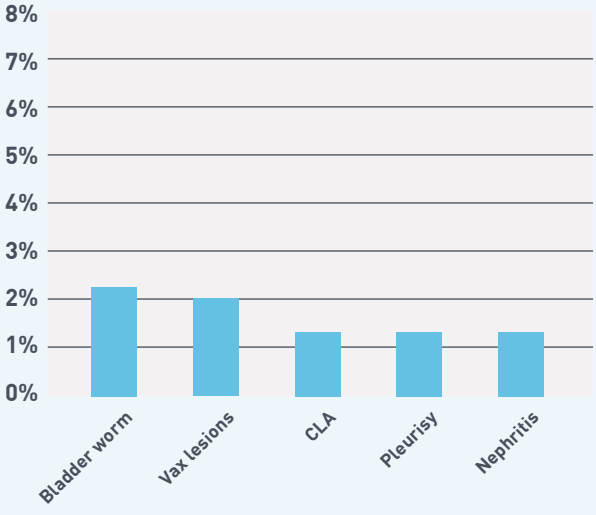

### VICTORIA




### TASMANIA




### SOUTH AUSTRALIA




### WESTERN AUSTRALIA

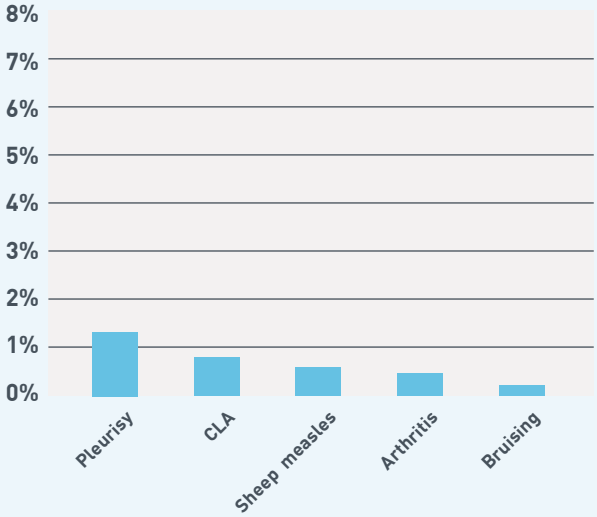



Figure 1: The five most common conditions recorded in each state during 2020-21 based on percentage of inspected sheep affected by them.

# ARTHRITIS

Arthritis in sheep is usually 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 (e.g. at lamb marking). Arthritis causes lameness and a reduced growth rate.

**Carcases affected with arthritis undergo trimming of affected joints and may possibly be condemned.**

The percentage of total animals and <2yr sheep reported to have arthritis is similar to what was seen in 2019-20 (Table 5). The percentage of PICs with at least one affected sheep appears relatively stable over time for each state.

Victoria and NSW recorded the highest percentages of affected animals at 0.8% and 0.6% respectively (Figure 3).

**Table 5: The number of sheep inspected and affected by arthritis during 2018-21.**

| | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Total animals inspected | 8,682,967 | 9,455,621 | 8,894,159 |
| Total animals affected | 77,089 = 0.9% | 60,281 = 0.6% | 51,106 = 0.6% |
| Total <2yr animals affected | 18,189 = 0.2% | 14,662 = 0.1% | 18,140 = 0.2% |

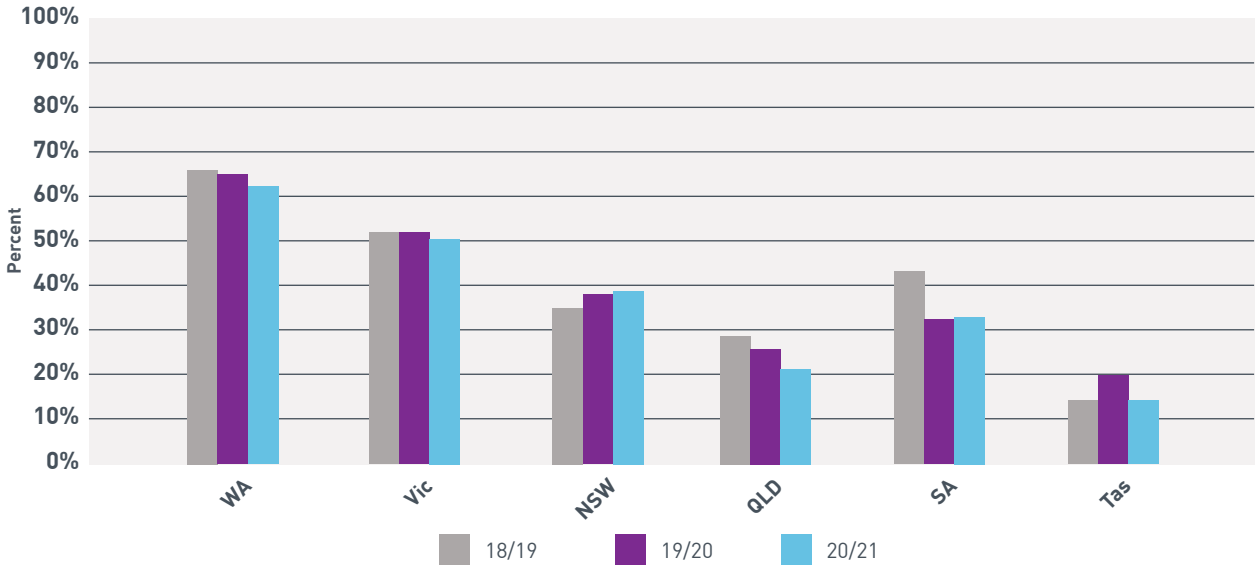



Figure 2: The percentage of PIC's inspected in each state that had at least one affected animal in 2018-21.

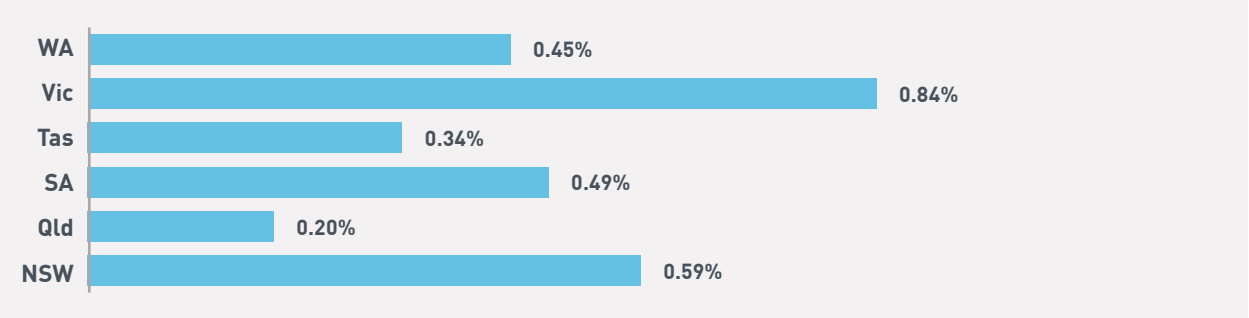



Figure 3: The percentage of animals inspected in each state that were affected in 2020-21.

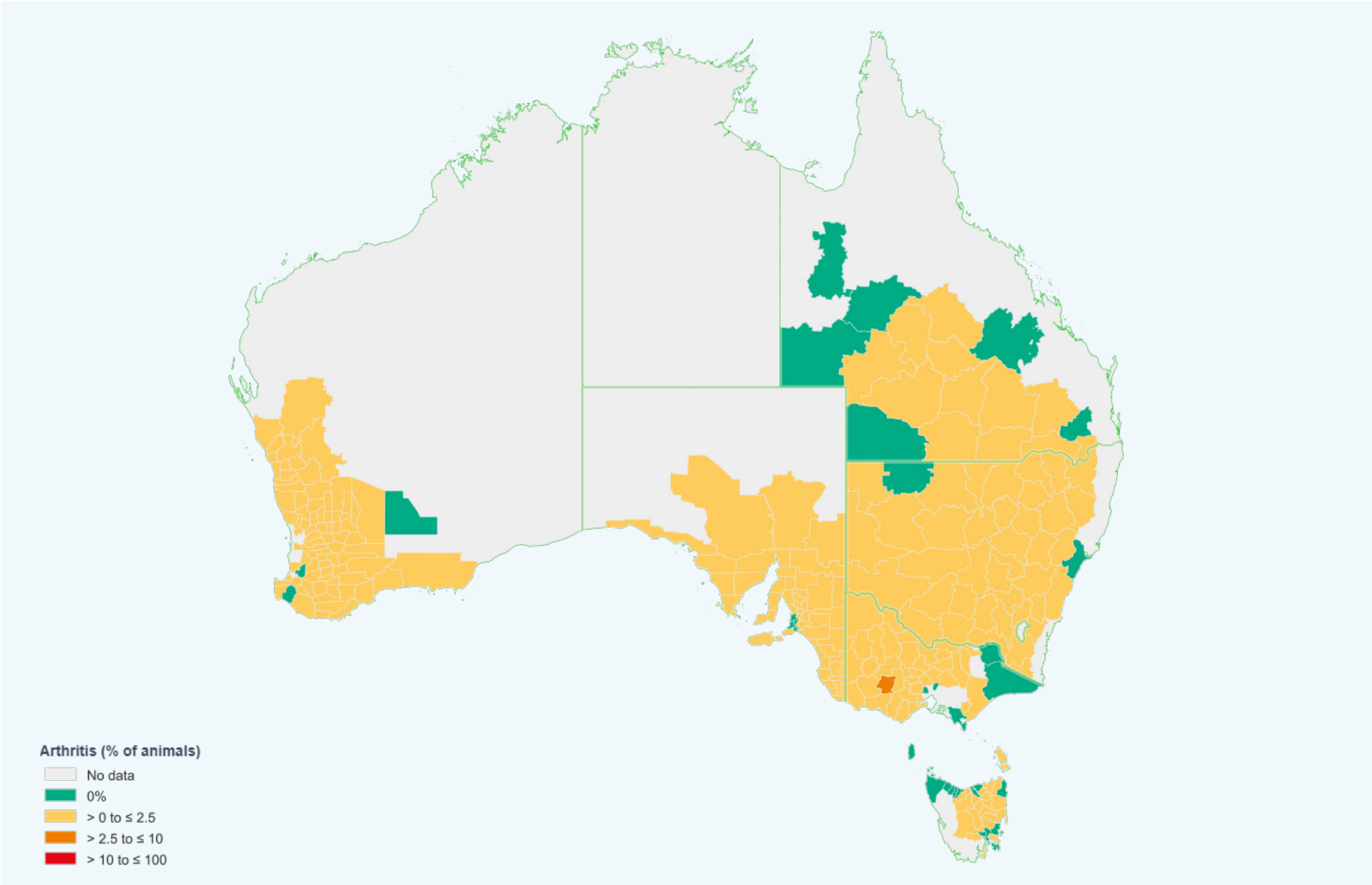



Figure 4: Percentage of sheep affected by arthritis in each LGA in 2020-21.

# BRUISING

Bruising of the muscle in sheep is caused by physical trauma, such as knocks and bumps from other sheep, during handling or during transportation. Significant levels of bruising can be an indication of poor handling techniques and impaired sheep welfare. Bruising can be avoided by practicing calm and safe handling techniques, having well designed sheep yards and not overcrowding sheep during transport.

**Bruising is caused by damage to blood vessels in the muscle, discolouring the meat and causing it to spoil. Affected muscles are trimmed from the carcass, reducing yield and downgrading the carcass.**

The percentage of total sheep and PICs by state affected by bruising has been consistent over the last three years. Bruising is generally seen in a relatively low number of animals and from a relatively small number of properties, with the highest state percentages of affected sheep reported from SA and Victoria (Figure 6).

**Table 6: The number of sheep inspected and affected by bruising during 2018-21.**

| | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Total animals inspected | 8,682,778 | 9,455,621 | 8,894,159 |
| Total animals affected | 37,421 = 0.4% | 35,528 = 0.4% | 32,977 = 0.4% |
| Total <2yr animals affected | 16,353 = 0.2% | 12,287 = 0.1% | 13,737 = 0.2% |

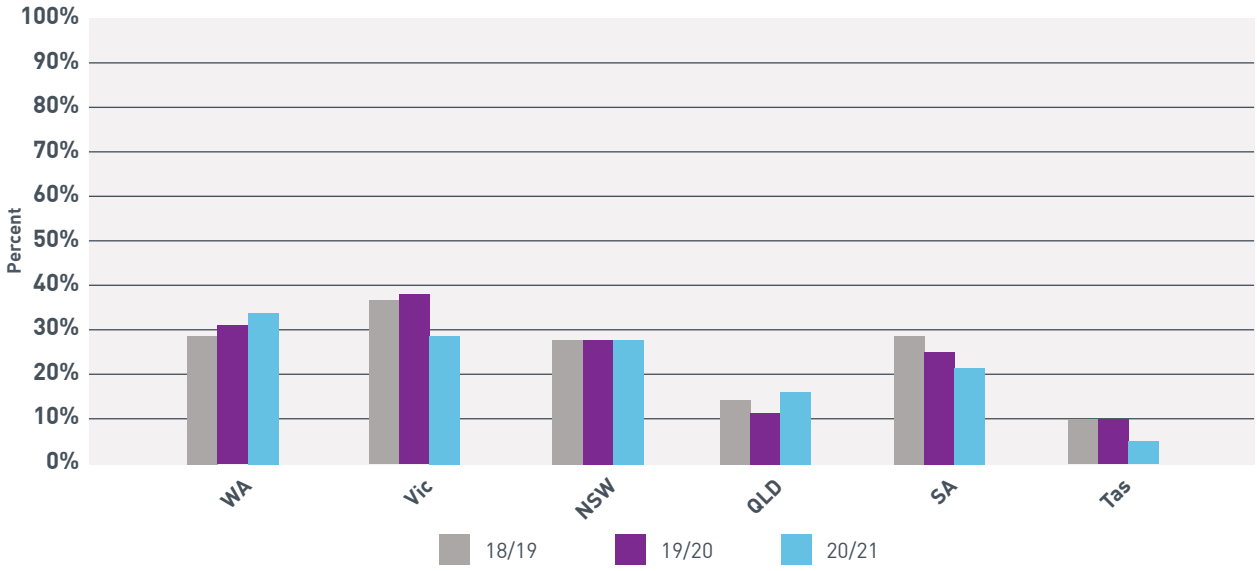



Figure 5: The percentage of PIC's inspected in each state that had at least one affected animal in 2018-21.

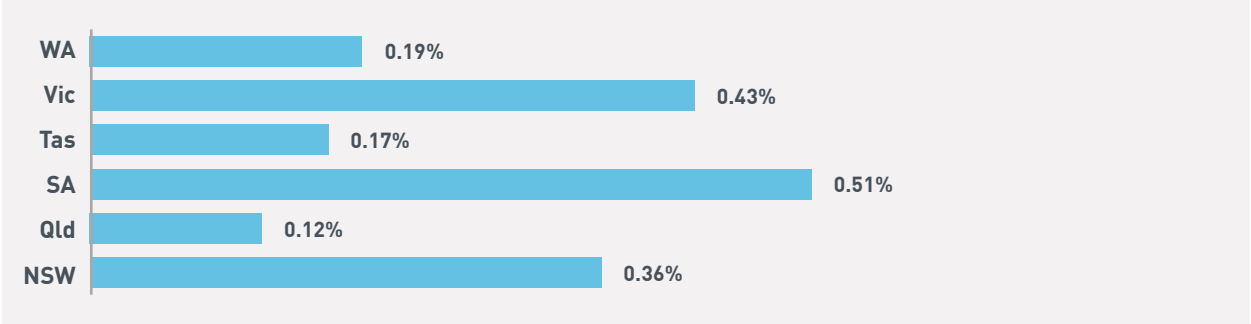



Figure 6: The percentage of animals inspected in each state that were affected in 2020-21.

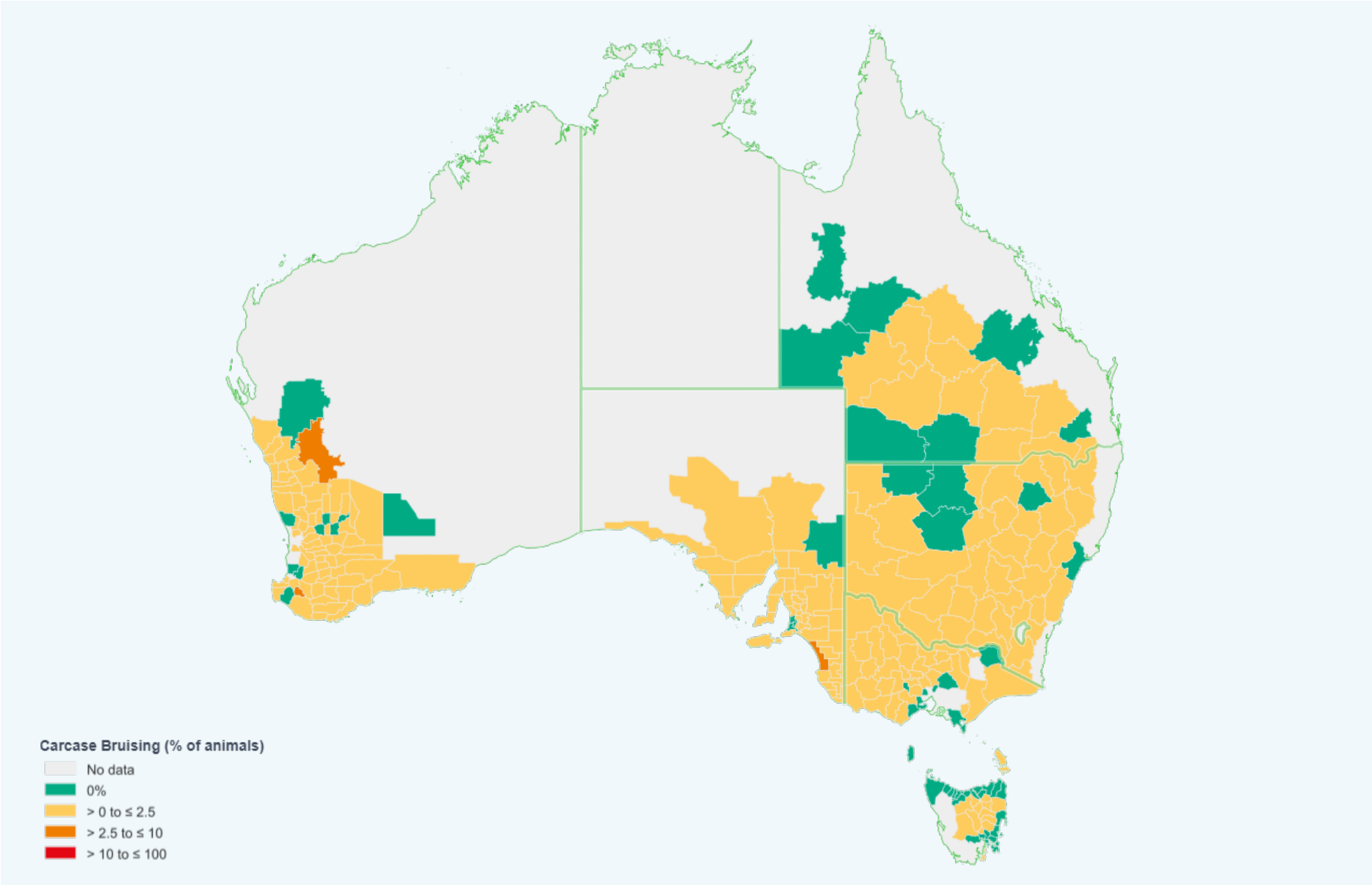



Figure 7: Percentage of sheep affected by bruising in each LGA in 2020-21.

# 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 production, but occasionally heavy infections can predispose sheep to the fatal bacterial infection, Black disease.

**Affected livers are trimmed or condemned.**

Bladder worm was the most commonly reported condition during 2019-2020, and the second most reported condition in 2020-21. Compared to previous years, the percentage of sheep affected by bladder worm was lower in 2020-21. However, QLD, Tas and NSW all had over 3% of inspected sheep affected by bladder worm (Figure 8).

**Table 7: The number of sheep inspected and affected by bladder worm during 2018-21.**

| | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Total animals inspected | 8,682,778 | 9,455,621 | 8,894,159 |
| Total animals affected | 301,815 = 3.5% | 343,382 = 3.6% | 206,257 = 2.3% |
| Total <2yr animals affected | 123,430 = 1.4% | 91,574 = 1.0% | 104,264 = 1.2% |

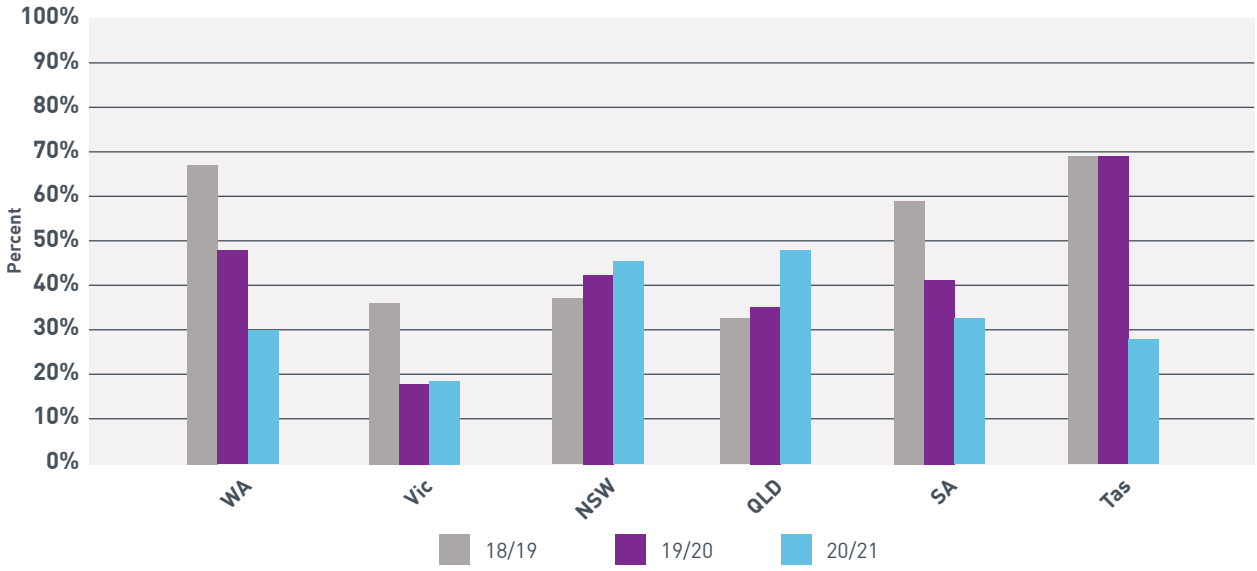



Figure 8: The percentage of PIC's inspected in each state that had at least one affected animal in 2018-21.

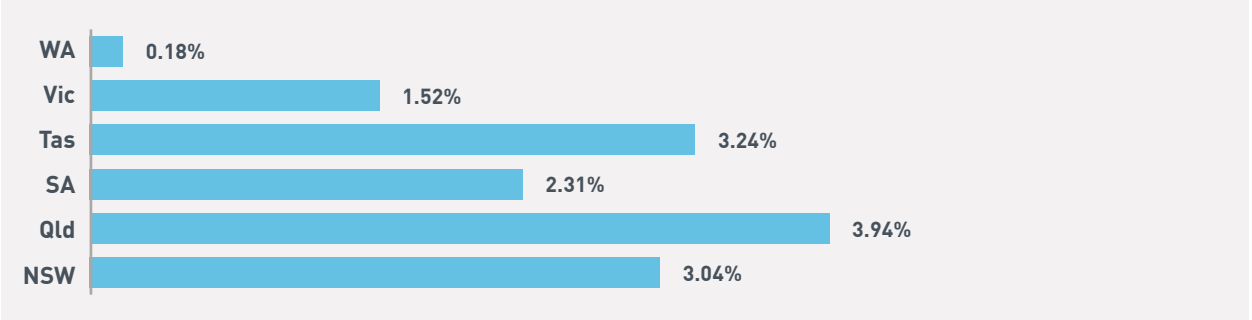



Figure 9: The percentage of animals inspected in each state that were affected in 2020-21.

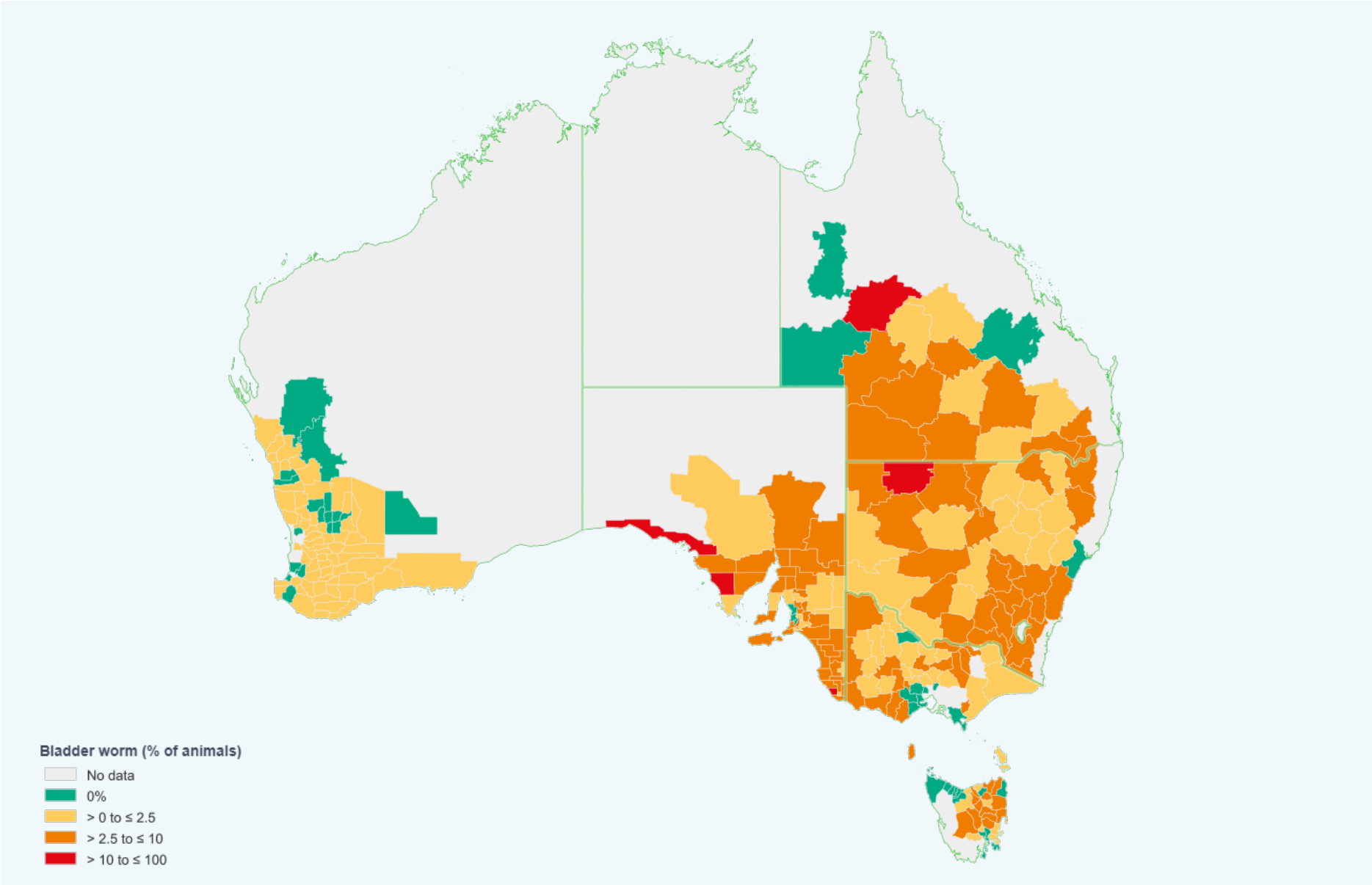



Figure 10: Percentage of sheep affected by bladder worm in in each LGA in 2020-21.

# 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".

Cheesy gland causes a decrease in wool production, wool contamination, chronic infection which causes ill thrift, emaciation and can affect reproductive performance.

**Cheesy gland can result in a decrease in carcase weight and increased carcase trimming at the abattoirs.**

The occurrence of cheesy gland has significantly declined over the past three years (Table 8). However, cheesy gland has appeared to be a relatively widespread condition in most states. For example WA had more than 50% of PICs affected, although it affects the smallest percentage of sheep compared to other states (Figure 10).

**Table 8: The number of sheep inspected and affected by cheesy gland during 2018-21.**

| | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Total animals inspected | 8,682,967 | 9,455,621 | 8,894,159 |
| Total animals affected | 323,749 = 3.7% | 238,839 = 2.5% | 111,838 = 1.3% |
| Total <2yr animals affected | 49,660 = 0.6% | 18,633 = 0.2% | 10,909 = 0.1% |

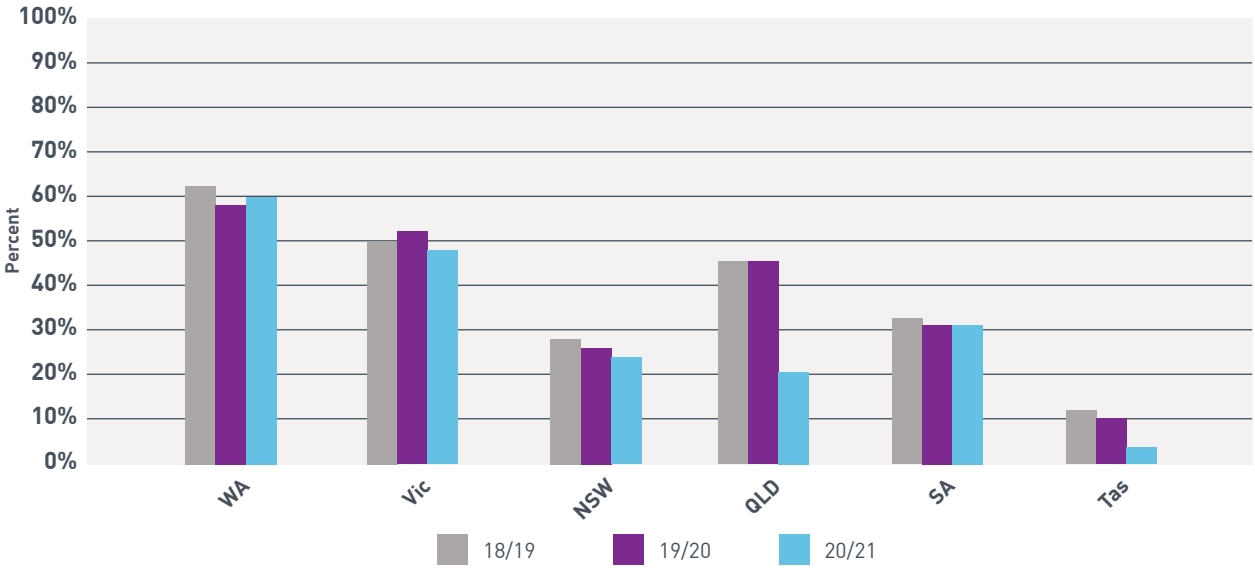



Figure 11: The percentage of PIC's inspected in each state that had at least one affected animal in 2018-21.

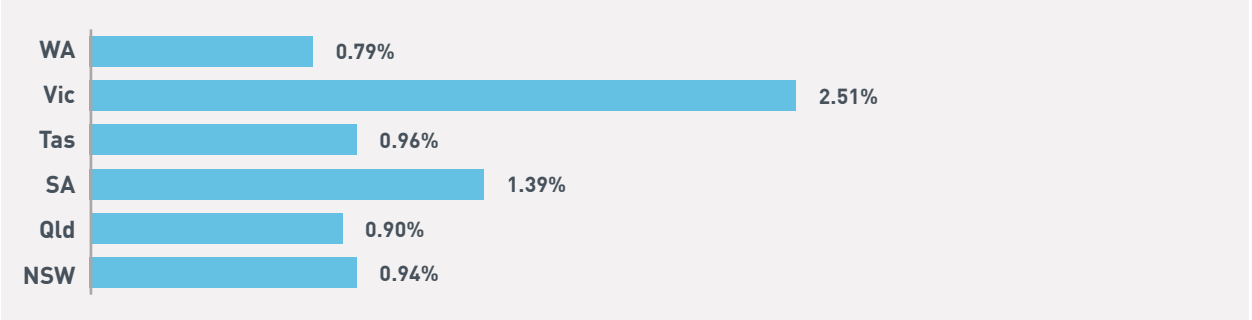



Figure 12: The percentage of animals inspected in each state that were affected in 2020-21.

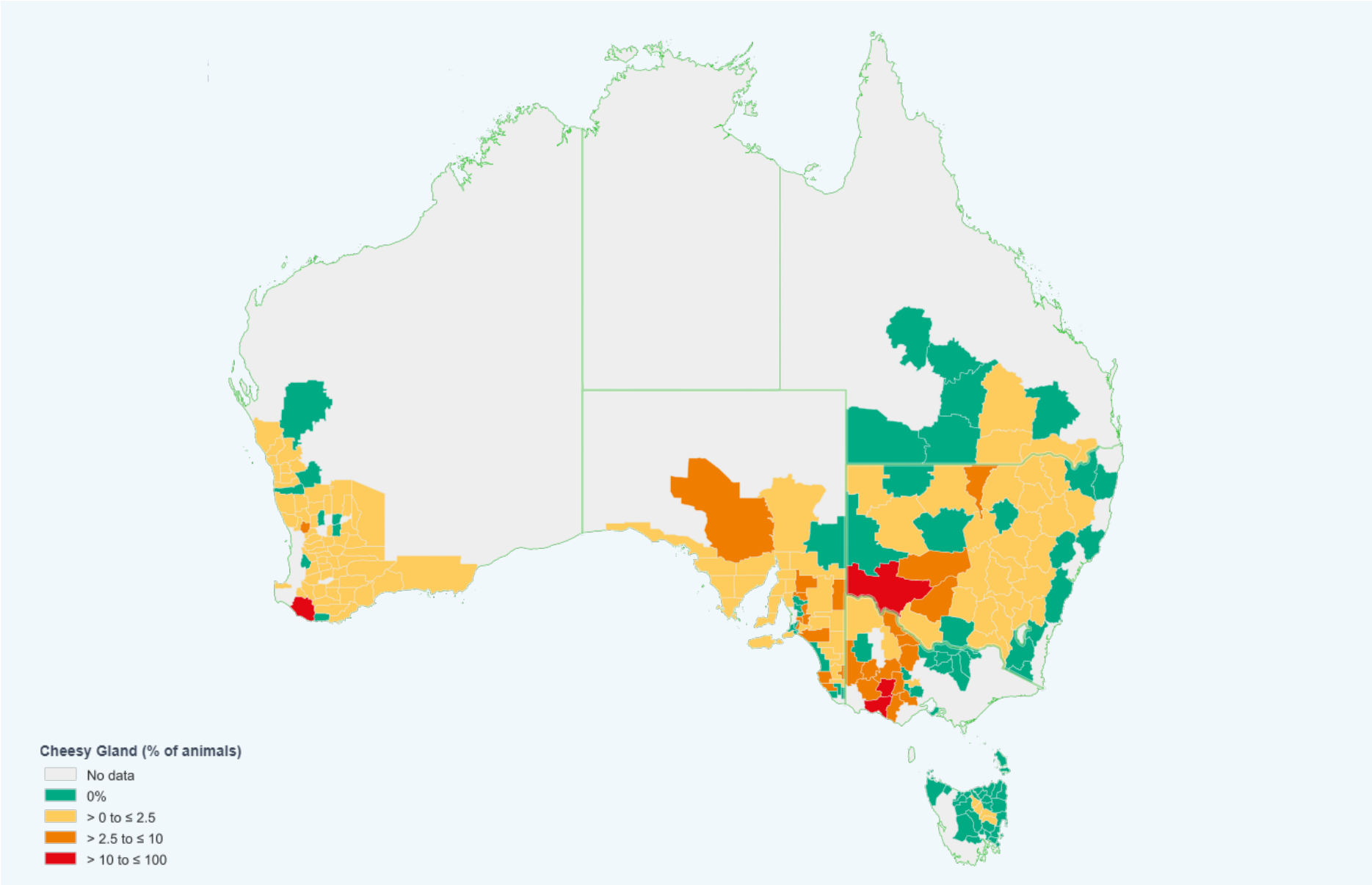



Figure 13: Percentage of sheep affected by cheesy gland in each LGA in 2020-21.

# GRASS SEEDS

Grass seeds embedded in the carcase from a number of grass varieties including 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 lead to trimming of the carcase and a decrease in meat and skin value.**

The number of sheep carcasses affected by grass seeds slightly increased in the 2020-21 financial year but remained low. Figure 14 shows that grass seed lesions impact a very small portion of PICs across all states at 10% or less in the 2020-21 year. Sheep from SA and NSW were the most impacted by grass seed lesions, affecting between 0.4-0.7% of sheep (Table 9).

**Table 9: The number of sheep inspected and affected by grass seeds during 2018-21.**

| | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Total animals inspected | 8,682,111 | 9,455,621 | 8,894,159 |
| Total animals affected | 30,795 = 0.4% | 25,932 = 0.3% | 32,941 = 0.4% |
| Total <2yr animals affected | 19,783 = 0.2% | 20,197 = 0.2% | 26,144 = 0.3% |

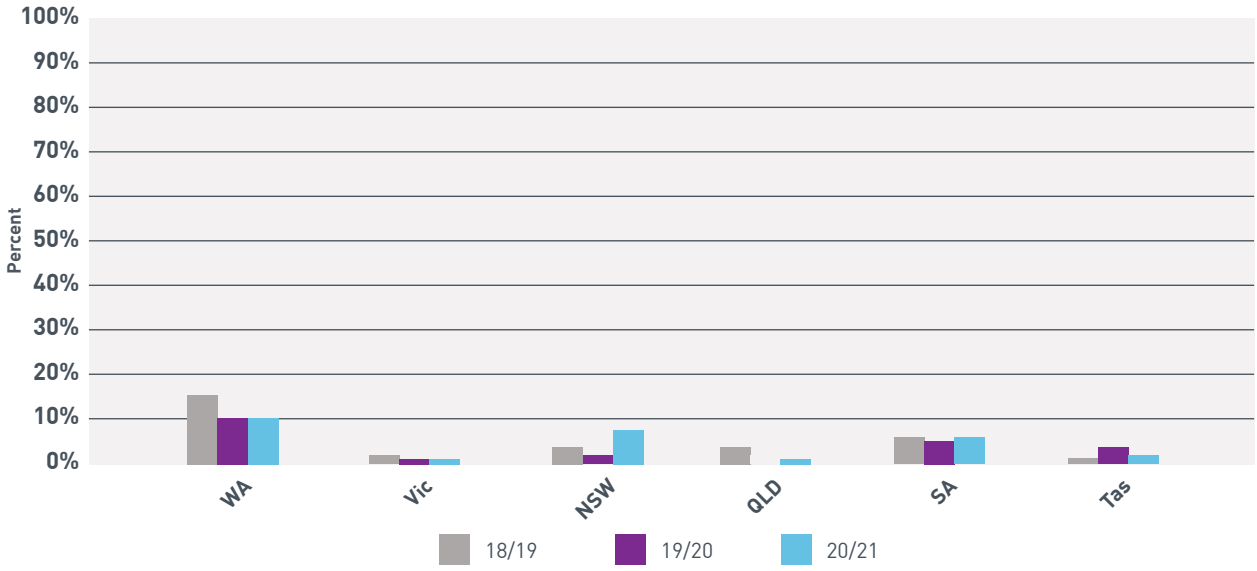



Figure 14: The percentage of PIC's inspected in each state that had at least one affected animal in 2018-21.

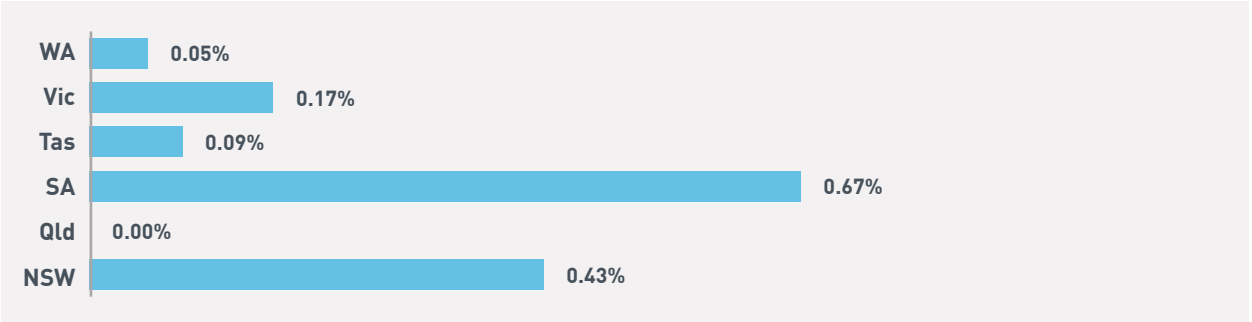



Figure 15: The percentage of animals inspected in each state that were affected in 2020-21.

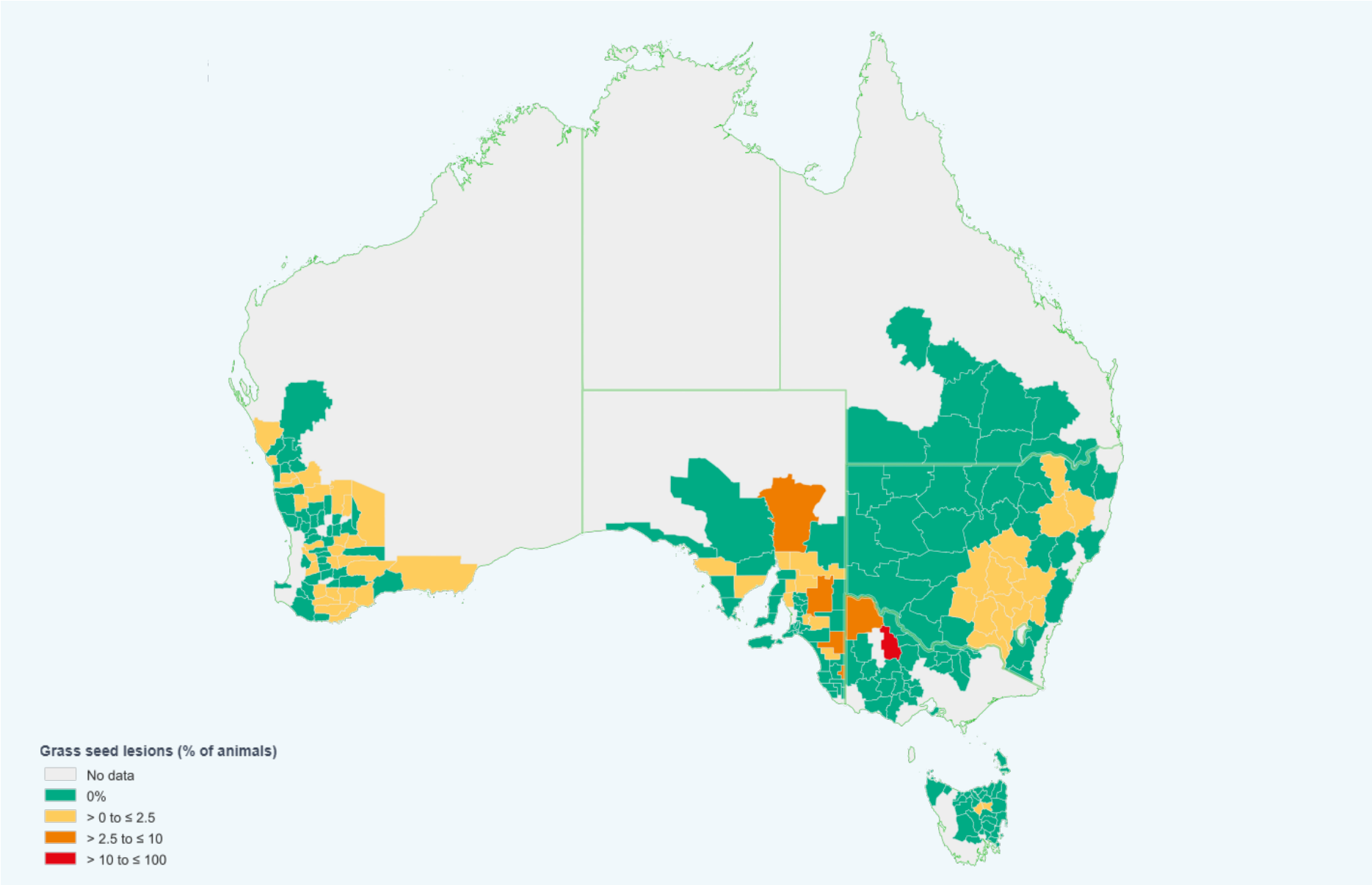



Figure 16: Percentage of sheep affected by grass seeds in each LGA in 2020-21.

# 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 freshwater snails are required for the liver fluke life cycle to occur.

**Affected livers are condemned at abattoirs and in some rare cases, whole carcases can be condemned.**

Liver fluke has declined overall in sheep inspected over the last three years, however, impacts on sheep <2yr has been a bit variable (Table 10). Liver fluke was not identified in WA and only a very small number of cases were identified in SA and QLD. Most cases of liver fluke were reported in Tas with approximately 25% of PICs having at least one animal affected (Figure 16).

**Table 10: The number of sheep inspected and affected by liver fluke during 2018-21.**

| | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Total animals inspected | 8,680,359 | 9,455,521 | 8,894,159 |
| Total animals affected | 96,359 = 1.1% | 60,497 = 0.6% | 47,717 = 0.5% |
| Total <2yr animals affected | 50,035 = 0.6% | 22,133 = 0.2% | 31,563 = 0.4% |

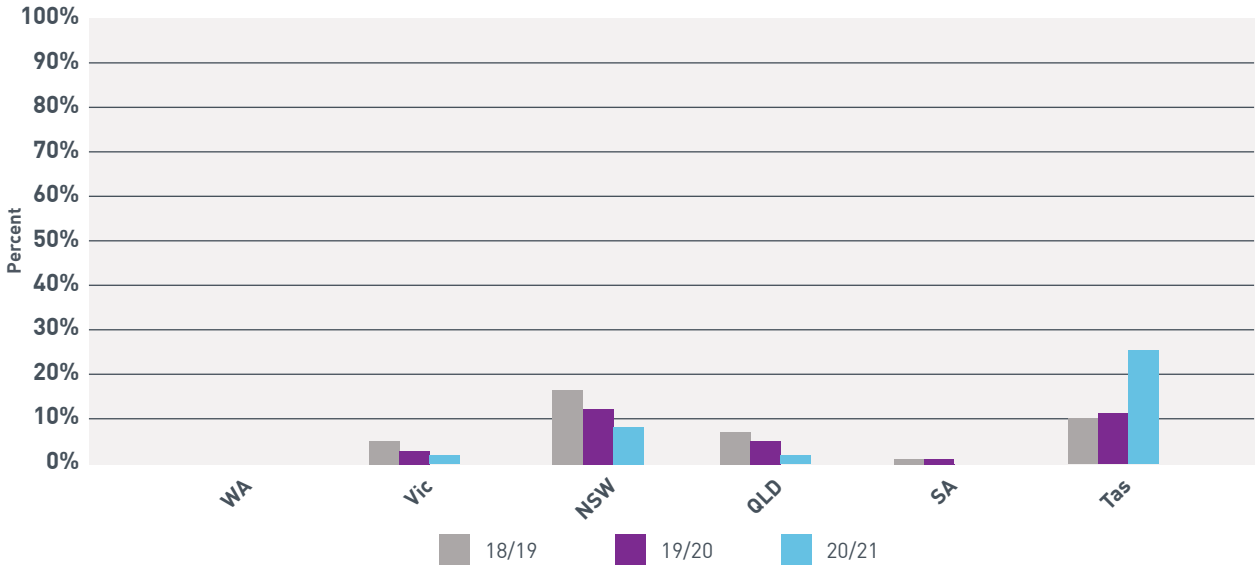



Figure 17: The percentage of PIC's inspected in each state that had at least one affected animal in 2018-21.

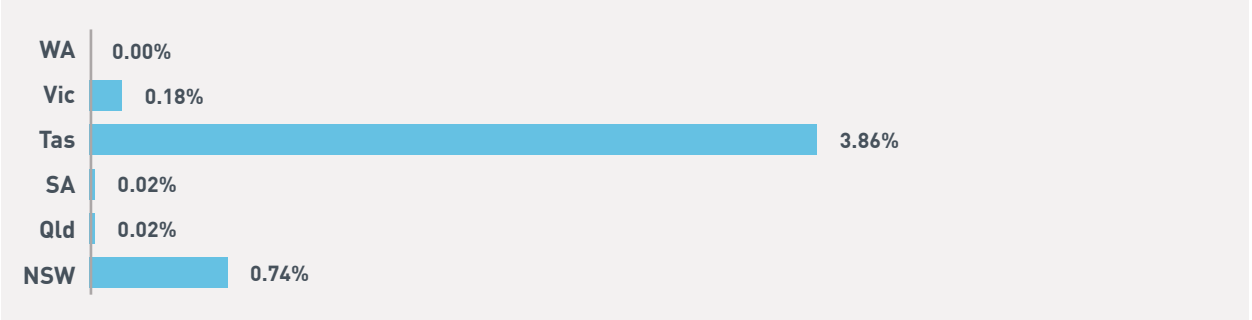



Figure 18: The percentage of animals inspected in each state that were affected in 2020-21.

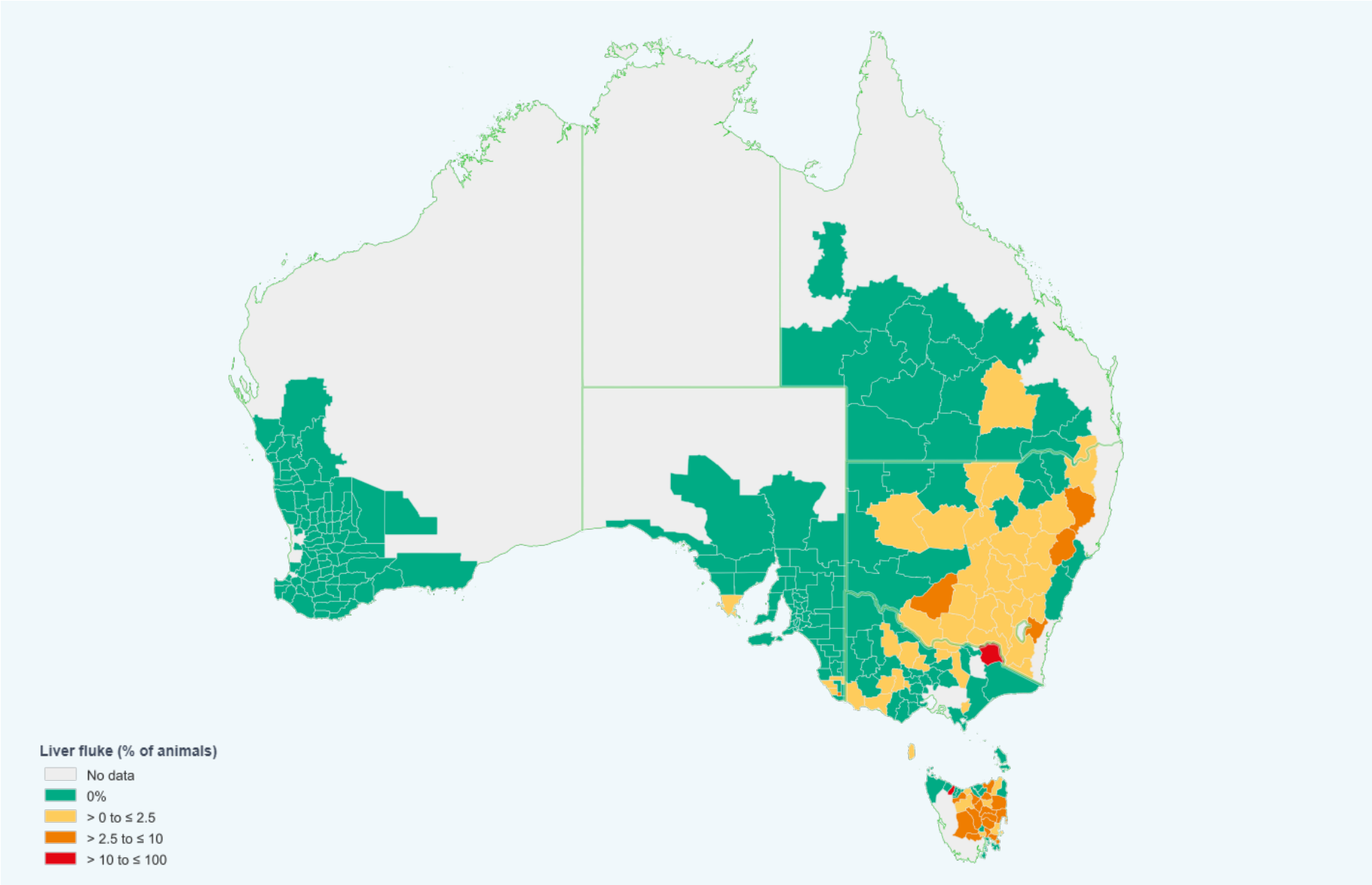



Figure 19: Percentage of sheep affected by liver fluke in each LGA in 2020-21.

# LUNGWORM

Lungworm is a condition caused by the ingestion of the lungworm, *mulleurius capillaris*, that develop in the tissue of the lungs. This species of lungworm has a lifecycle that includes snails and is different from the one that inhabits the bronchi. Lungworm has no impact on sheep health or productivity.

**At the abattoir, lungs of infected sheep are condemned.**

Lungworm has been declining in occurrence over the past three years, with just 0.2% of inspected sheep being affected (Table 11). Occurrence of lungworm appears to be almost exclusive to SA, with very small numbers appearing in sheep from Vic and NSW (Figure 20).

**Table 11: The number of sheep inspected and affected by lung worm during 2018-21.**

| | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Total animals inspected | 8,680,359 | 9,455,521 | 8,894,159 |
| Total animals affected | 200,159 = 2.3% | 76,171 = 0.8% | 16,270 = 0.2% |
| Total <2yr animals affected | 60,712 = 0.7% | 28,927 = 0.3% | 7,000 = 0.1% |

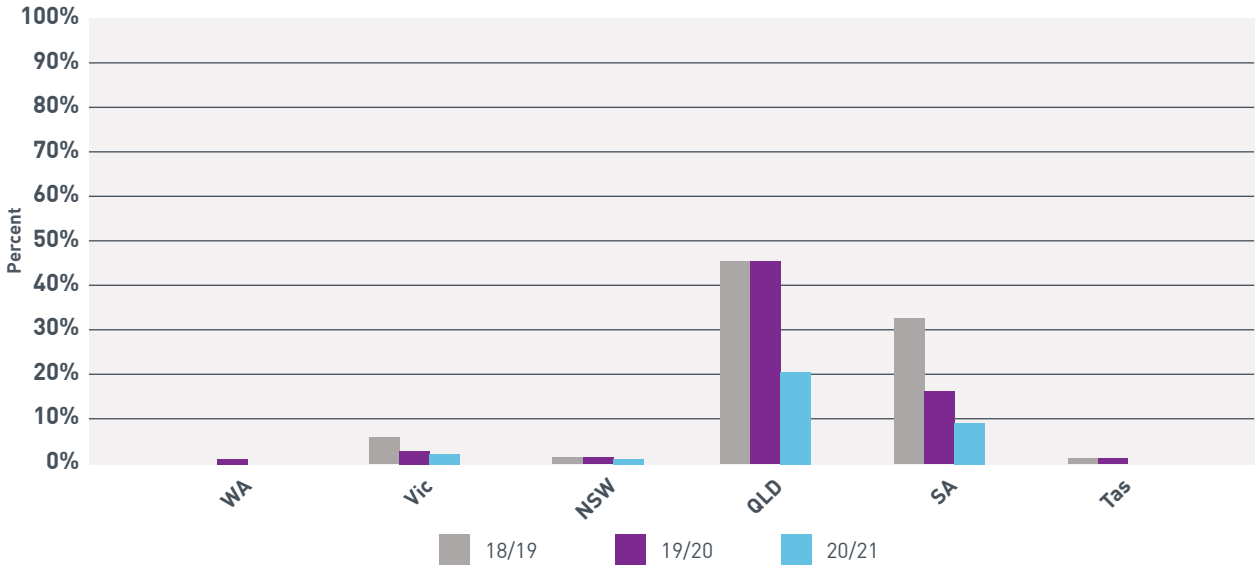



Figure 20: The percentage of PIC's inspected in each state that had at least one affected animal in 2018-21.


Figure 21: The percentage of animals inspected in each state that were affected in 2020-21.

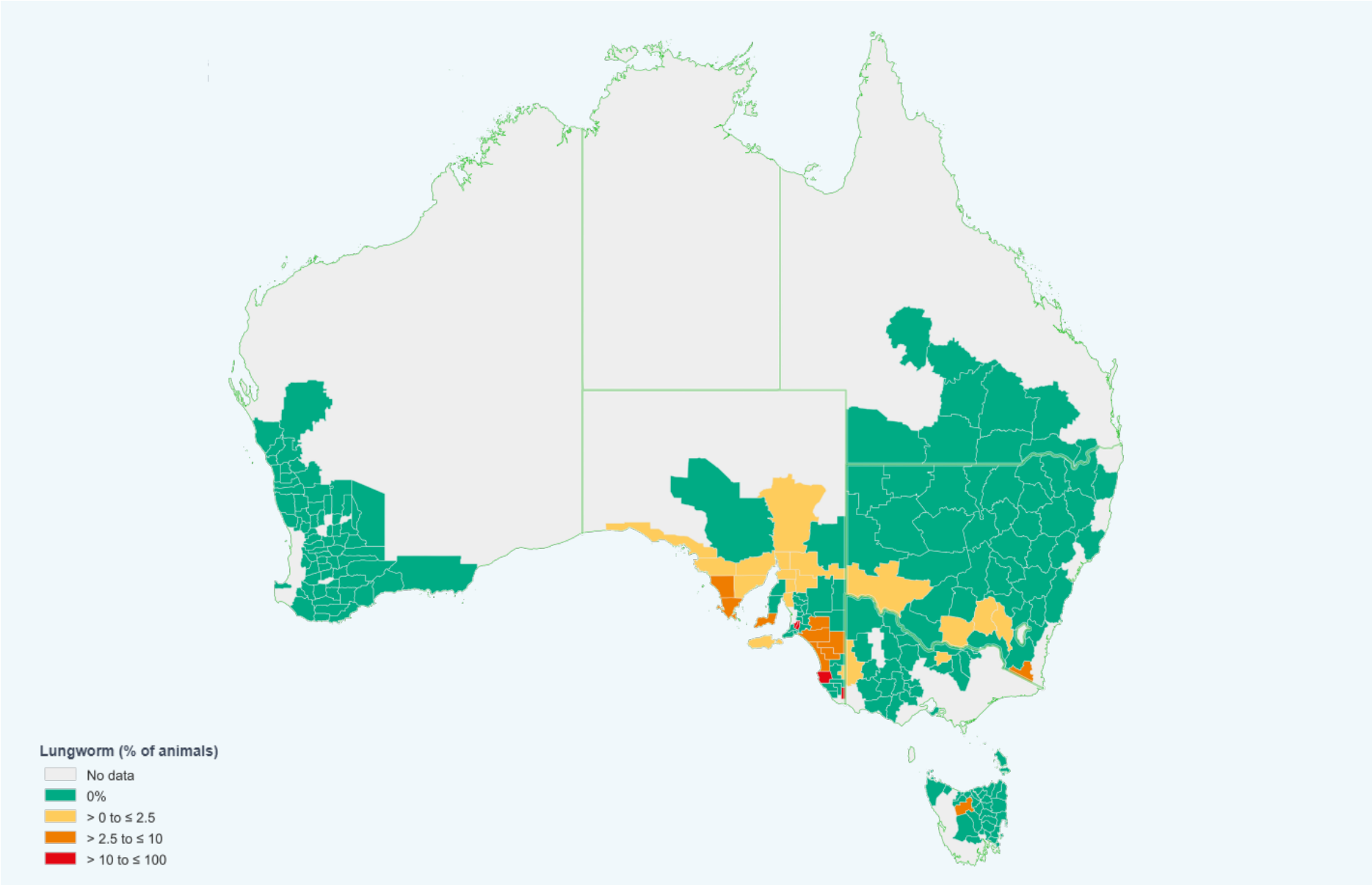



Figure 22: Percentage of sheep affected by lungworm in each LGA in 2020-21.

# NEPHRITIS

Nephritis means inflammation of the kidneys. This can be caused by different factors such as infections (viral or bacterial), plant compounds or toxins. It is more commonly reported in lambs and is not normally associated with any clinical signs, although can reduce the growth and performance of lambs.

**Affected kidneys are condemned, and in rare severe cases where kidney failure has occurred, whole carcass condemnation may occur.**

Nephritis appears to be increasing in occurrence over time in inspected sheep (Table 12). Tasmania and WA recorded the lowest percentage of affected sheep at < 0.5% and the lowest percentage of affected PICs at <5% (Figure 23). The highest percentages of affected sheep were from Qld and NSW, impacting between 5-8% of sheep from 30-50% of PICs (Figure 22). Why this is occurring is not clear and will be investigated in 2021-22.

**Table 12: The number of sheep inspected and affected by nephritis during 2018-21.**

| | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Total animals inspected | 8,680,359 | 9,455,521 | 8,894,159 |
| Total animals affected | 153,197 = 1.8% | 246,398 = 2.6% | 267,107 = 3.0% |
| Total <2yr animals affected | 146,034 = 1.7% | 234,592 = 2.5% | 261,233 = 2.9% |

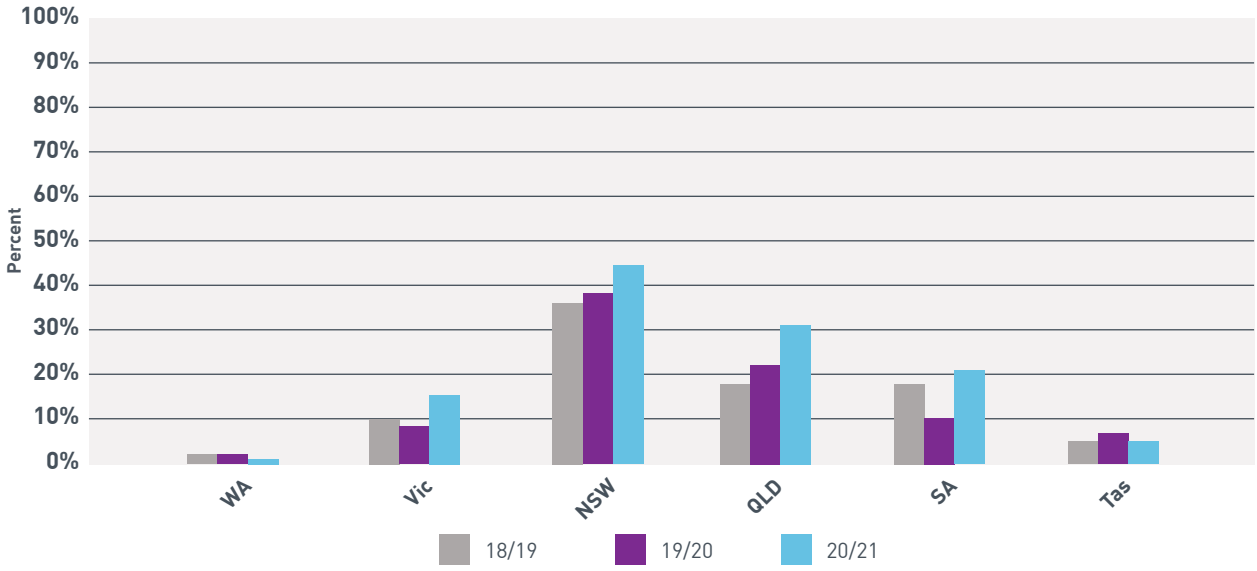



Figure 23: The percentage of PIC's inspected in each state that had at least one affected animal in 2018-21.

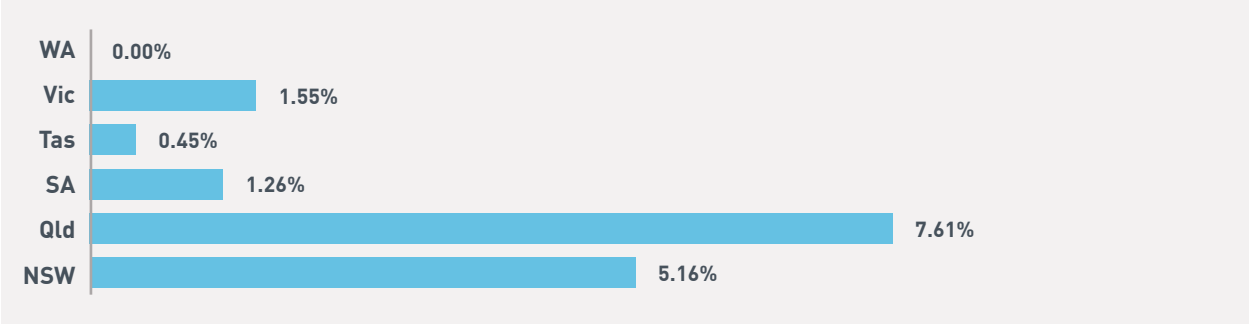



Figure 24: The percentage of animals inspected in each state that were affected in 2020-21.

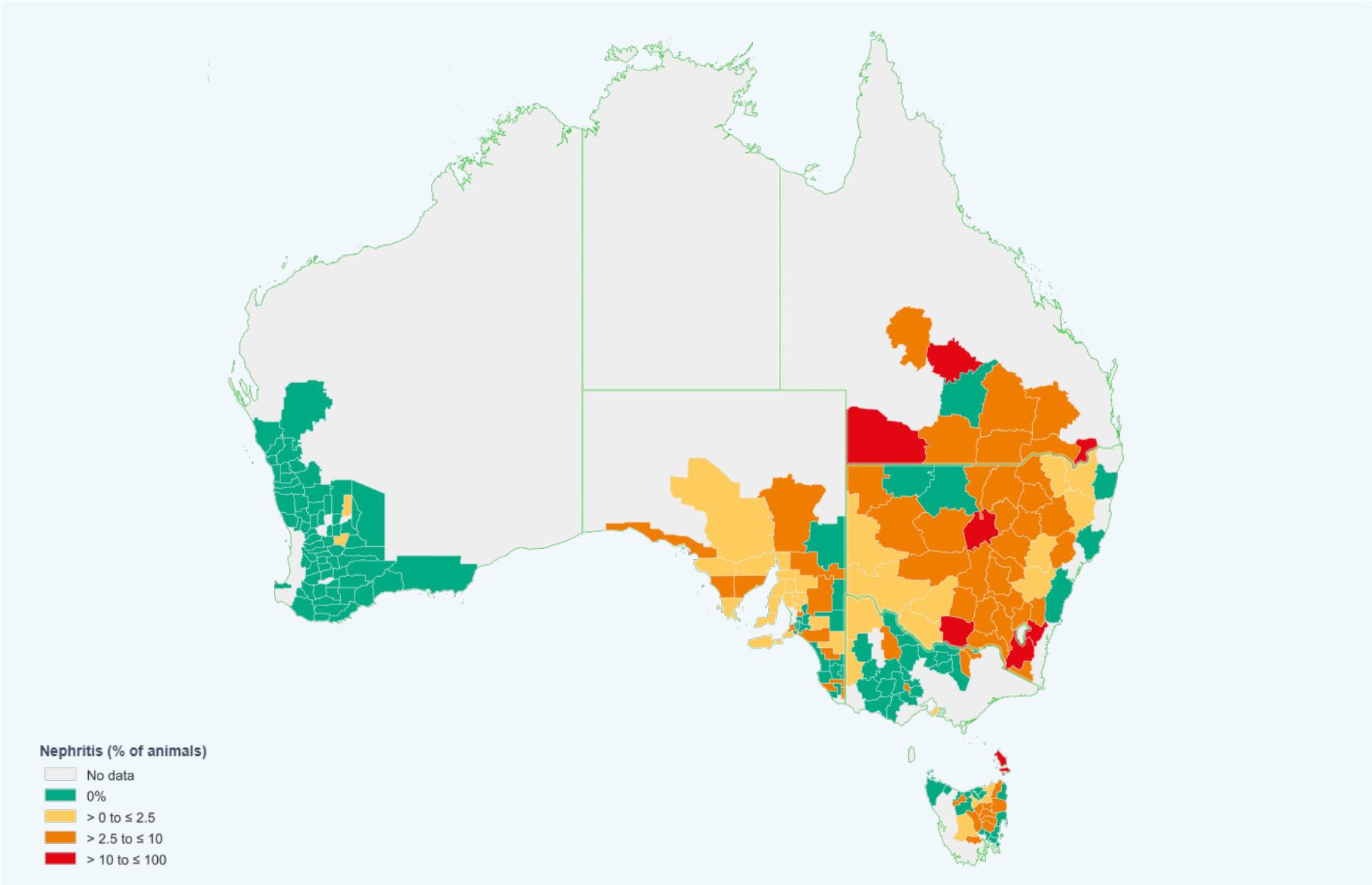



Figure 25: Percentage of sheep affected by nephritis in each LGA in 2020-21.

# PNEUMONIA

Pneumonia in sheep is inflammation of the lungs. 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 can be seen on farm with affected lambs being on average 3 kg lighter.

**Lungs will be condemned, and any surrounding affected tissue would be trimmed** (see pleurisy).

Pneumonia levels across Australia in 2020-21 are very similar to what was recorded in 2019-2020 (Table 13) and it has been identified at low levels in all states (a maximum of 13% of PICs in any state). NSW recorded the highest levels of pneumonia at 0.5% of sheep, with all other states being less than half that level (Figure 26).

**Table 13: The number of sheep inspected and affected by pneumonia during 2018-21.**

| | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Total animals inspected | 8,680,359 | 9,455,521 | 8,894,159 |
| Total animals affected | 45,361 = 0.5% | 26,855 = 0.3% | 26,646 = 0.3% |
| Total <2yr animals affected | 25,278 = 0.4% | 23,732 = 0.3% | 24,023 = 0.3% |

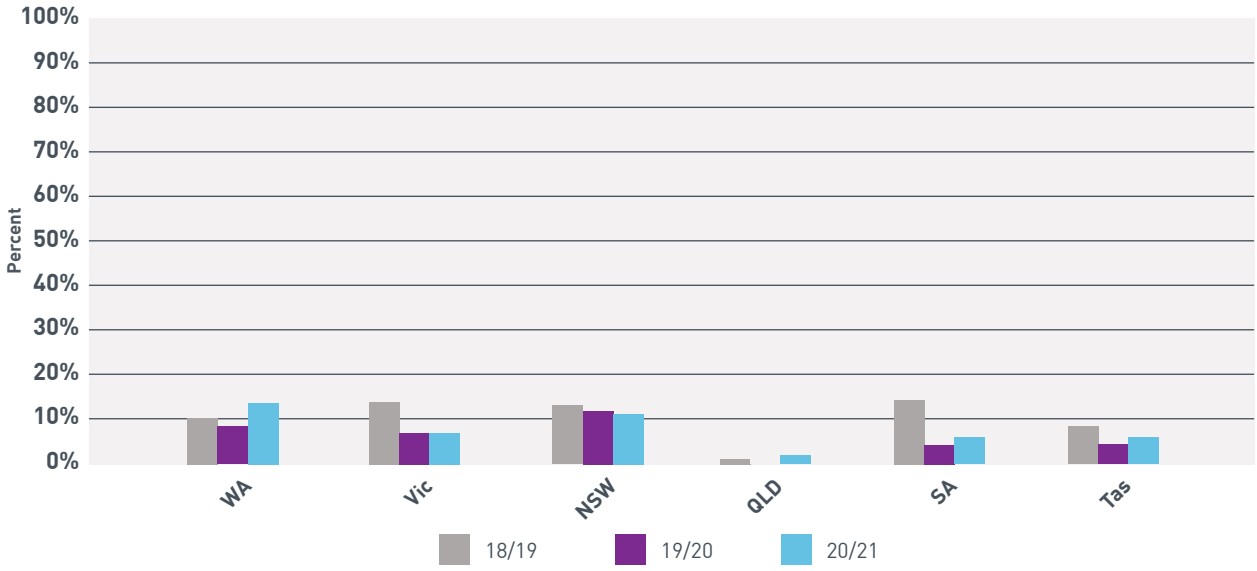



Figure 26: The percentage of PIC's inspected in each state that had at least one affected animal in 2018-21.


Figure 27: The percentage of animals inspected in each state that were affected in 2020-21.

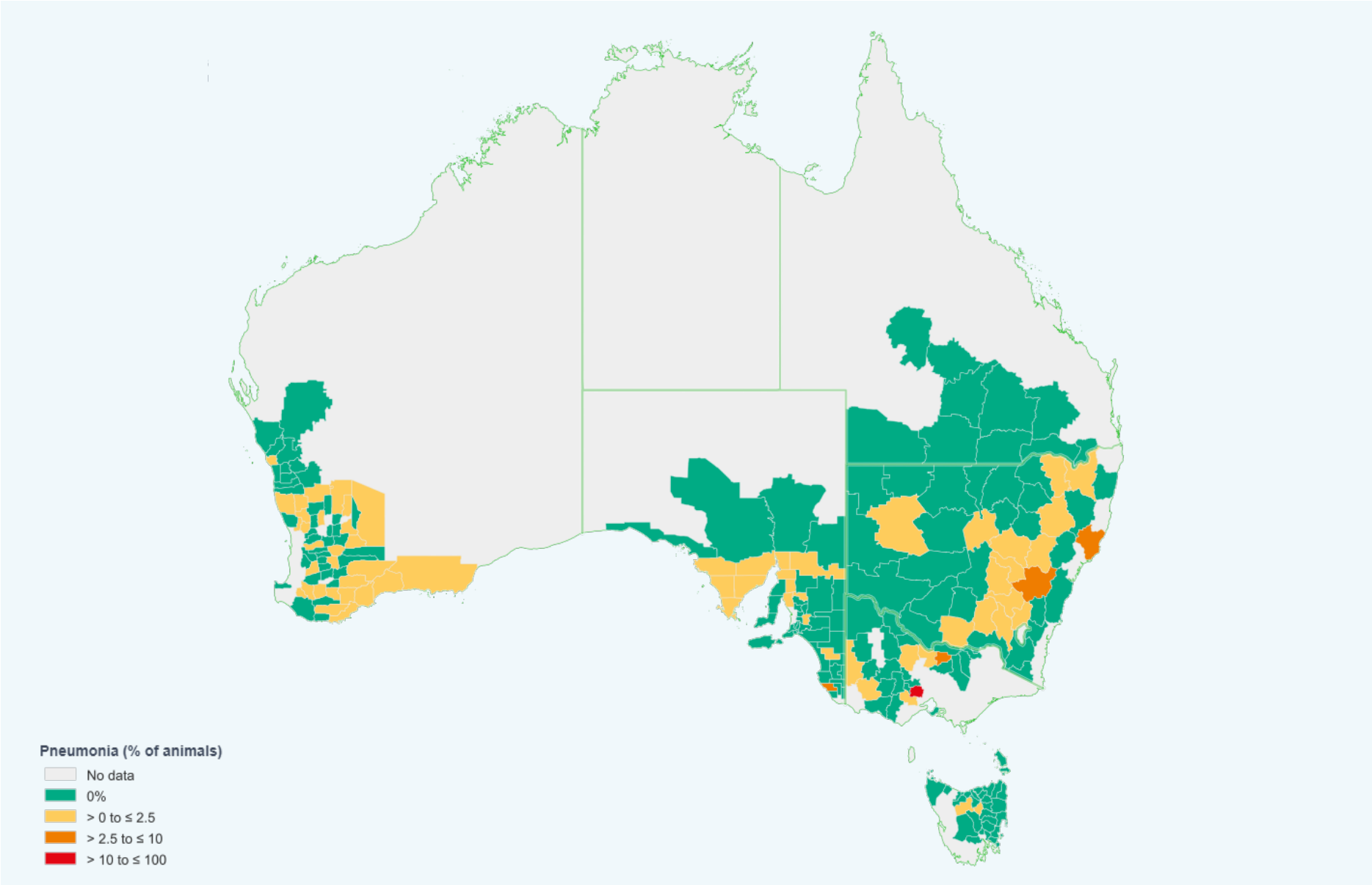



Figure 28: Percentage of sheep affected by pneumonia in each LGA in 2020-21.

# PLEURISY

In severe cases of pneumonia, infection can extend to the outer layer of the lung, the pleura, causing a disease called pleurisy. This can cause adhesion of the lungs to the chest wall as the infection spreads in the sheep.

**Affected carcasses will require additional trimming compared to pneumonia which can include damage to the valuable rib rack, significantly de-valuing the carcass.**

Pleurisy has declined slightly in the percentage of affected sheep compared to previous years (Table 14). Pleurisy was recorded from more than 40% of PICs in all states apart from QLD and Tasmania which recorded less than 30% of PICs being affected by pleurisy. Victoria recorded the greatest percentage of sheep affected by pleurisy, however all states recorded fairly low numbers of affected sheep (Figure 28).

**Table 14: The number of sheep inspected and affected by pleurisy during 2018-21.**

| | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Total animals inspected | 8,680,359 | 9,455,521 | 8,894,159 |
| Total animals affected | 242,288 = 2.8% | 168,982 = 1.8% | 109,921 = 1.2% |
| Total <2yr animals affected | 80,693 = 0.9% | 38,593 = 0.4% | 33,467 = 0.4% |

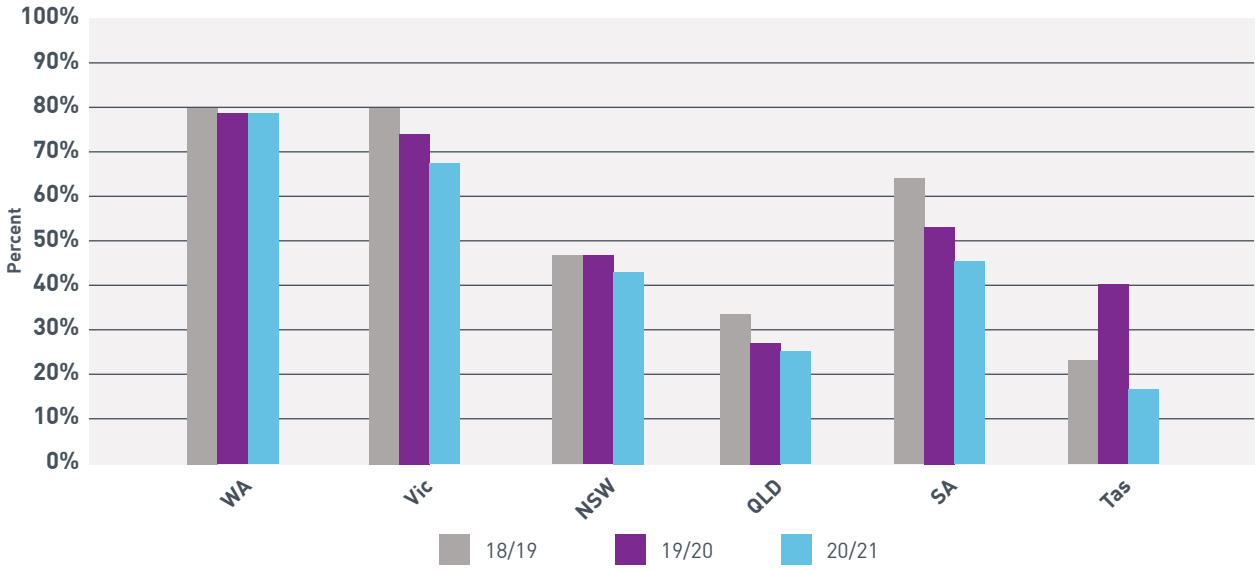



Figure 29: The percentage of PIC's inspected in each state that had at least one affected animal in 2018-21.

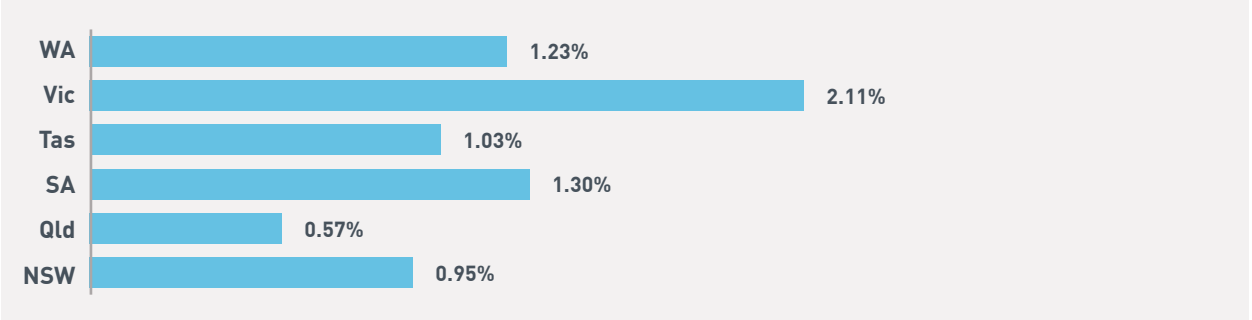



Figure 30: The percentage of animals inspected in each state that were affected in 2020-21.

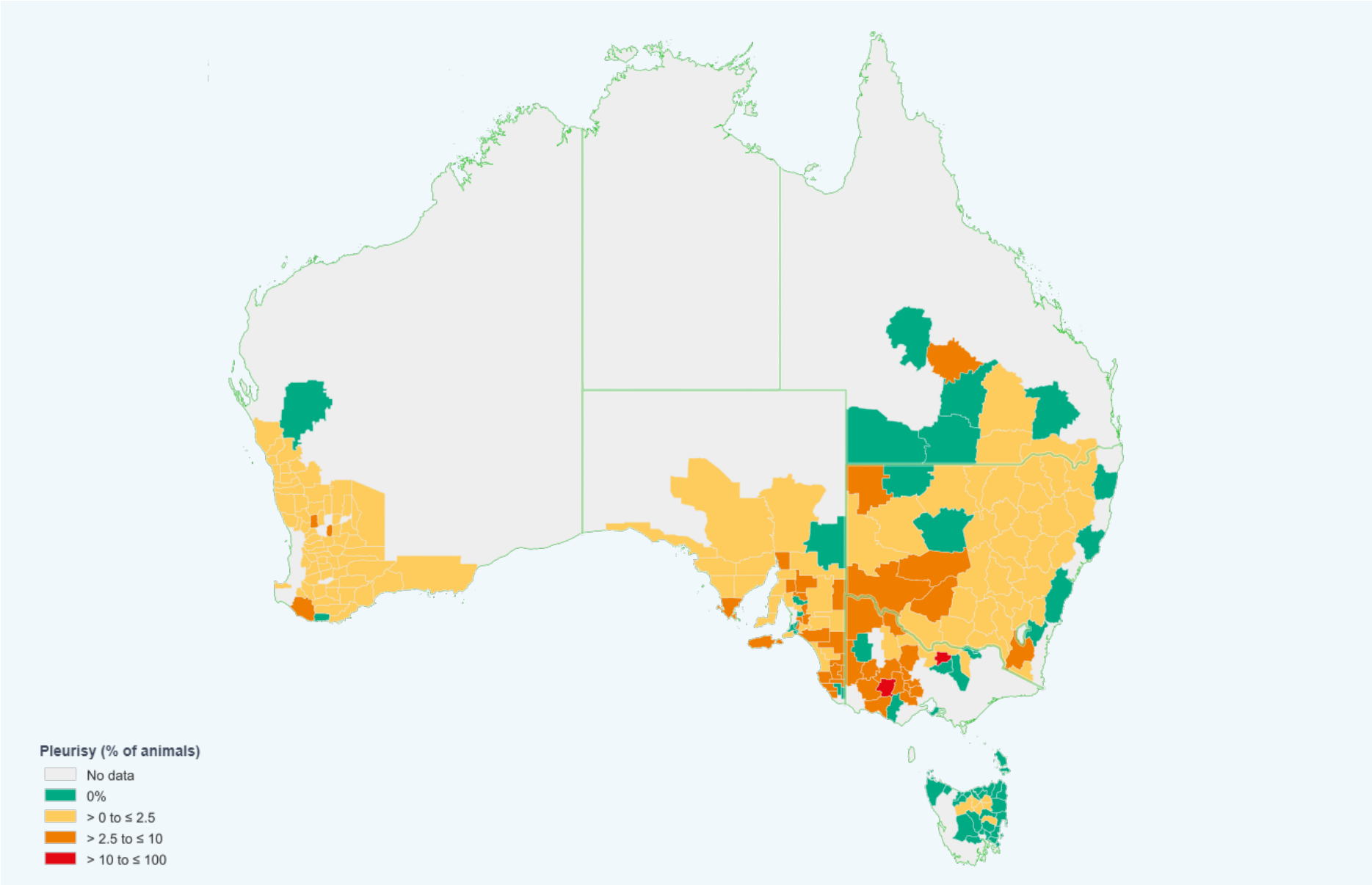



Figure 31: Percentage of sheep affected by pleurisy in each LGA in 2020-21.

# SARCOCYSTOSIS

Sarcocystis is is caused by 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. Sarcocystosis has no impact on sheep health or productivity.

**At the abattoirs, infected carcases will undergo trimming while carcases with more than five cysts will be condemned.**

The occurrence of sarcocystosis in sheep appears to have declined over time to now very low numbers (Table 15). Sarcocystosis is seen mostly in sheep from Tasmania, with all other states recording a prevalence of < 0.3% (Figure 32), and all states reporting impacted PICs to be < 20% (Figure 33).

**Table 15: The number of sheep inspected and affected by sarcocystis during 2018-21.**

| | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Total animals inspected | 8,680,359 | 9,455,521 | 8,894,159 |
| Total animals affected | 40,749 = 0.5% | 30,508 = 0.3% | 12,479 = 0.1% |
| Total <2yr animals affected | 1,126 = 0.01% | 1,114 = 0.01% | 1,068 = 0.01% |

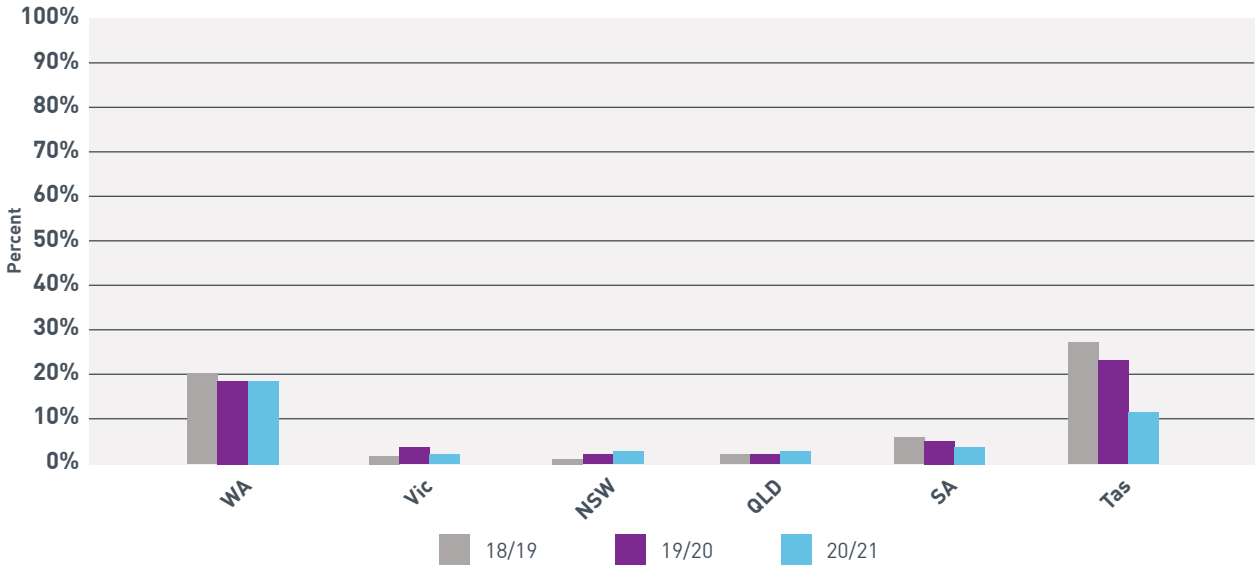



Figure 32: The percentage of PIC's inspected in each state that had at least one affected animal in 2018-21.

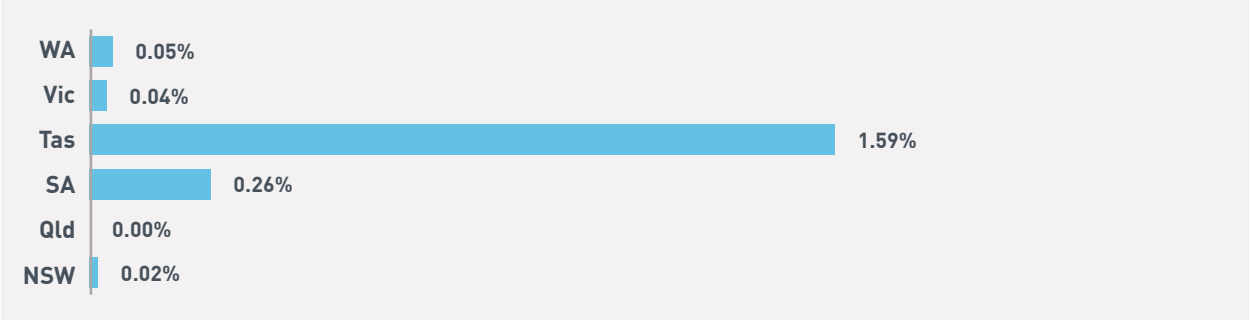



Figure 33: The percentage of animals inspected in each state that were affected in 2020-21.

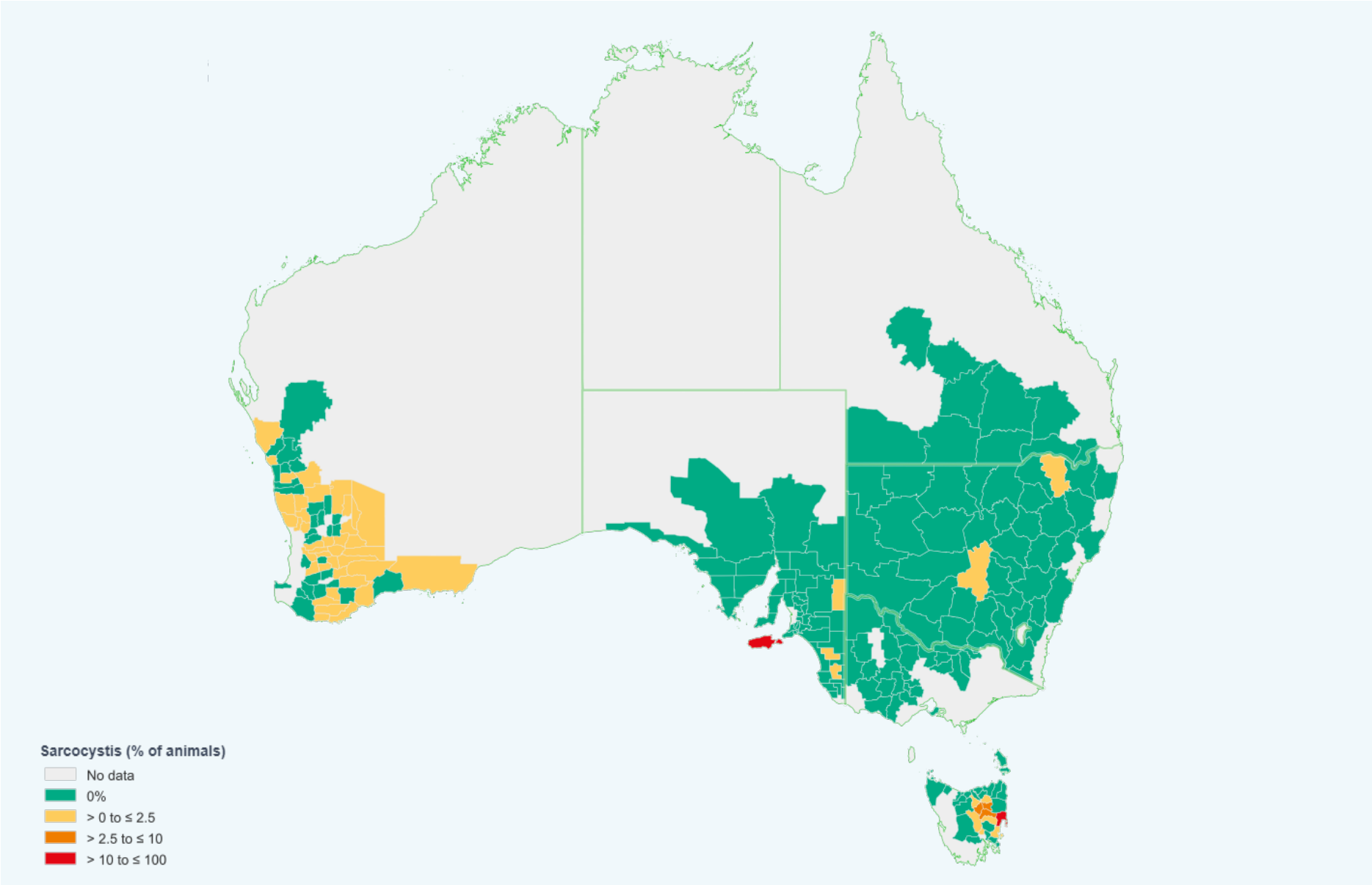



Figure 34: Percentage of sheep affected by sarcocystosis in each LGA in 2020-21.

# 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 leads to trimming, downgrading and condemnation of carcases at abattoirs.**

The occurrence of sheep measles appears to be reasonably consistent over time (Table 16), and somewhat widespread amongst PICs in Australia. Tasmania has recorded the greatest percentage of affected sheep at > 6%, with all other states recording < 2% of sheep affected (Figure 35).

**Table 16: The number of sheep inspected and affected by sheep measles during 2018-21.**

| | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Total animals inspected | 8,680,359 | 9,455,521 | 8,894,159 |
| Total animals affected | 132,378 = 1.53% | 118,778 = 1.26% | 115,857 = 1.3% |
| Total <2yr animals affected | 44,103 = 0.51% | 40,229 = 0.43% | 50,953 = 0.6% |

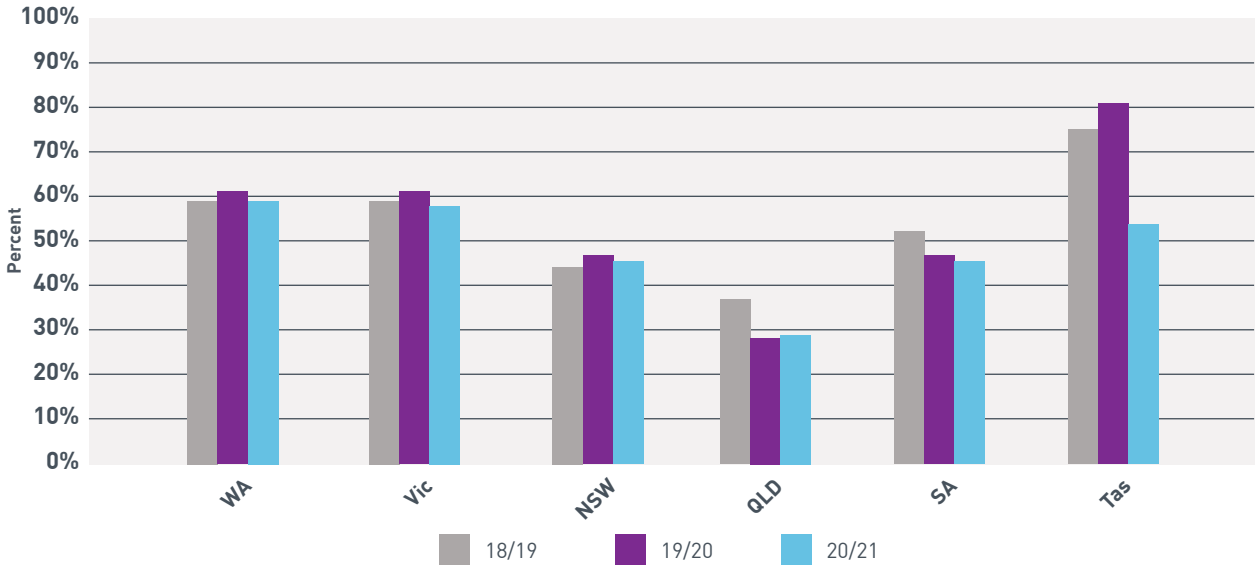



Figure 35: The percentage of PIC's inspected in each state that had at least one affected animal in 2018-21.

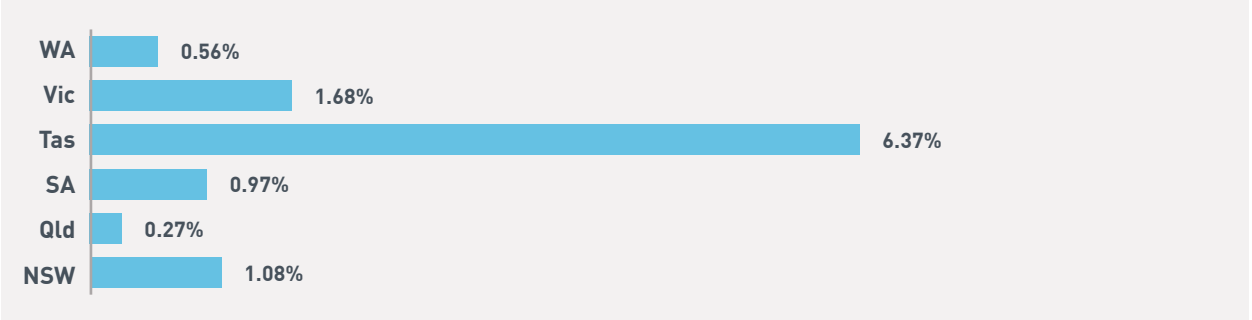



Figure 36: The percentage of animals inspected in each state that were affected in 2020-21.

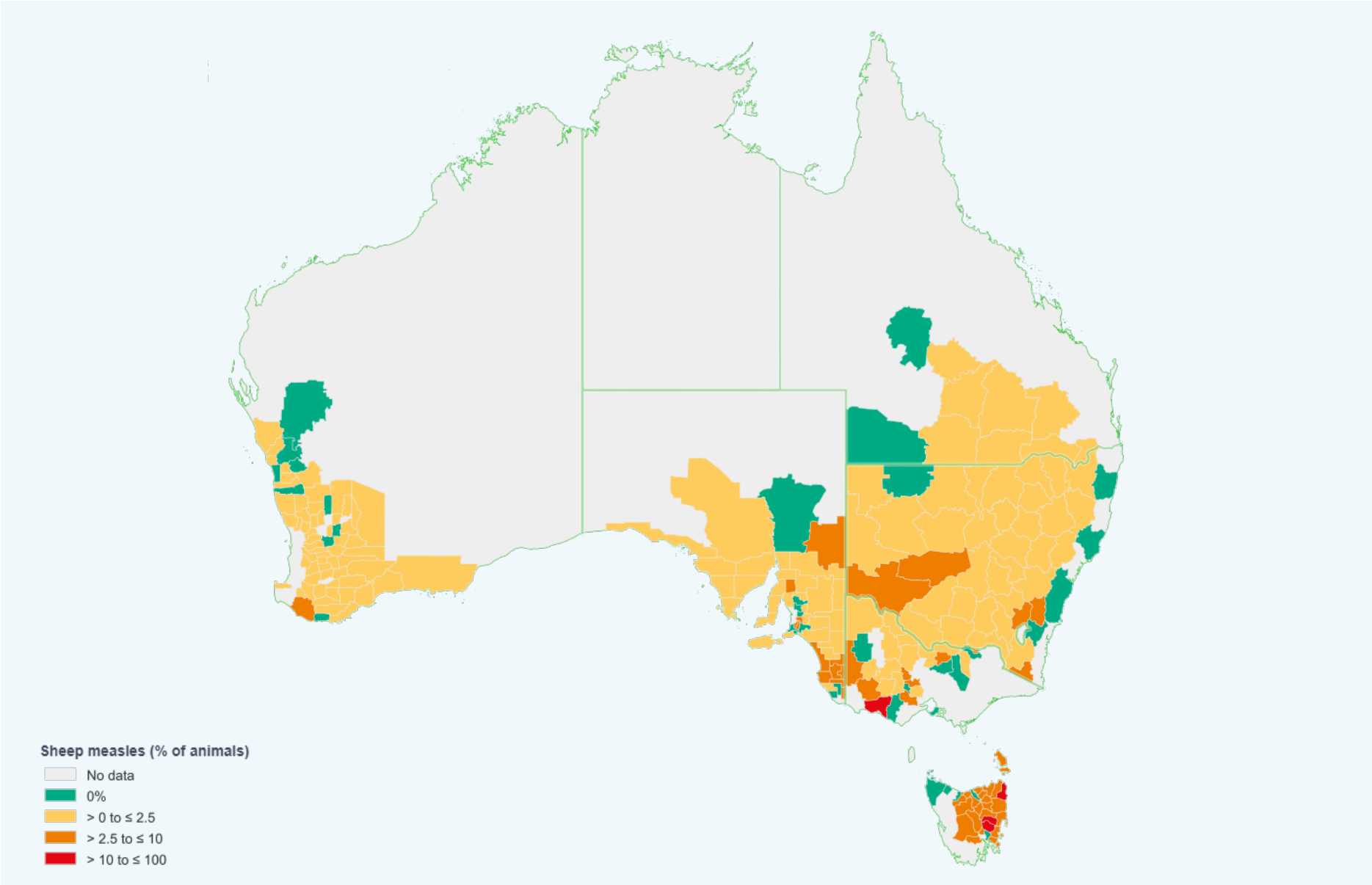



Figure 37: Percentage of sheep affected by sheep measles in each LGA in 2020-21.

# VACCINATION LESIONS

Vaccination lesions can be caused by improper technique, poor hygiene or using a contaminated vaccine. The accidental introduction 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 carcase.**

The percentage of sheep with vaccination lesions has slightly increased in 2020-21 (Table 17). Throughout Australia there are only a relatively small percentage of PICs recorded with sheep affected by vaccination lesions (Figure 37). Victoria, SA and Tasmania recorded > 2% of sheep affected by vaccination lesions, with remaining states recording < 1% of sheep affected (Figure 38).

**Table 17: The number of sheep inspected and affected by vaccination lesions during 2018-21.**

| | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Total animals inspected | 8,680,359 | 9,455,521 | 8,894,159 |
| Total animals affected | 95,661 = 1.10% | 107,437 = 1.14% | 113,805 = 1.3% |
| Total <2yr animals affected | 52,540 = 0.61% | 57,925 = 0.61% | 58,059 = 0.7% |

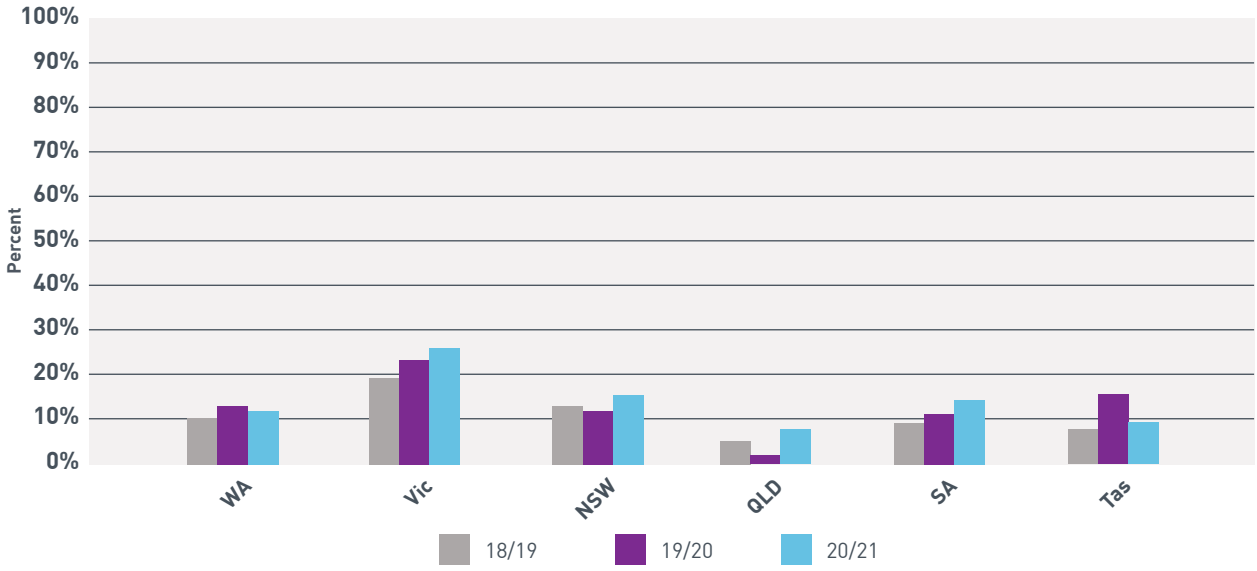



Figure 38: The percentage of PIC's inspected in each state that had at least one affected animal in 2018-21.

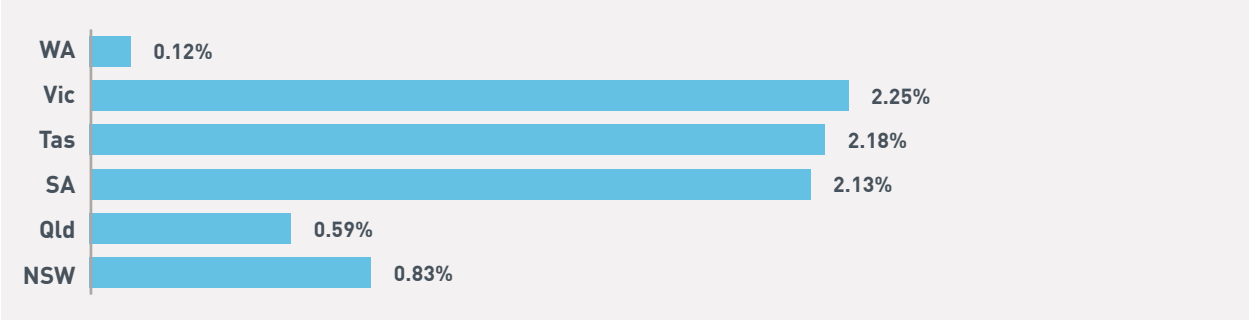



Figure 39: The percentage of animals inspected in each state that were affected in 2020-21.

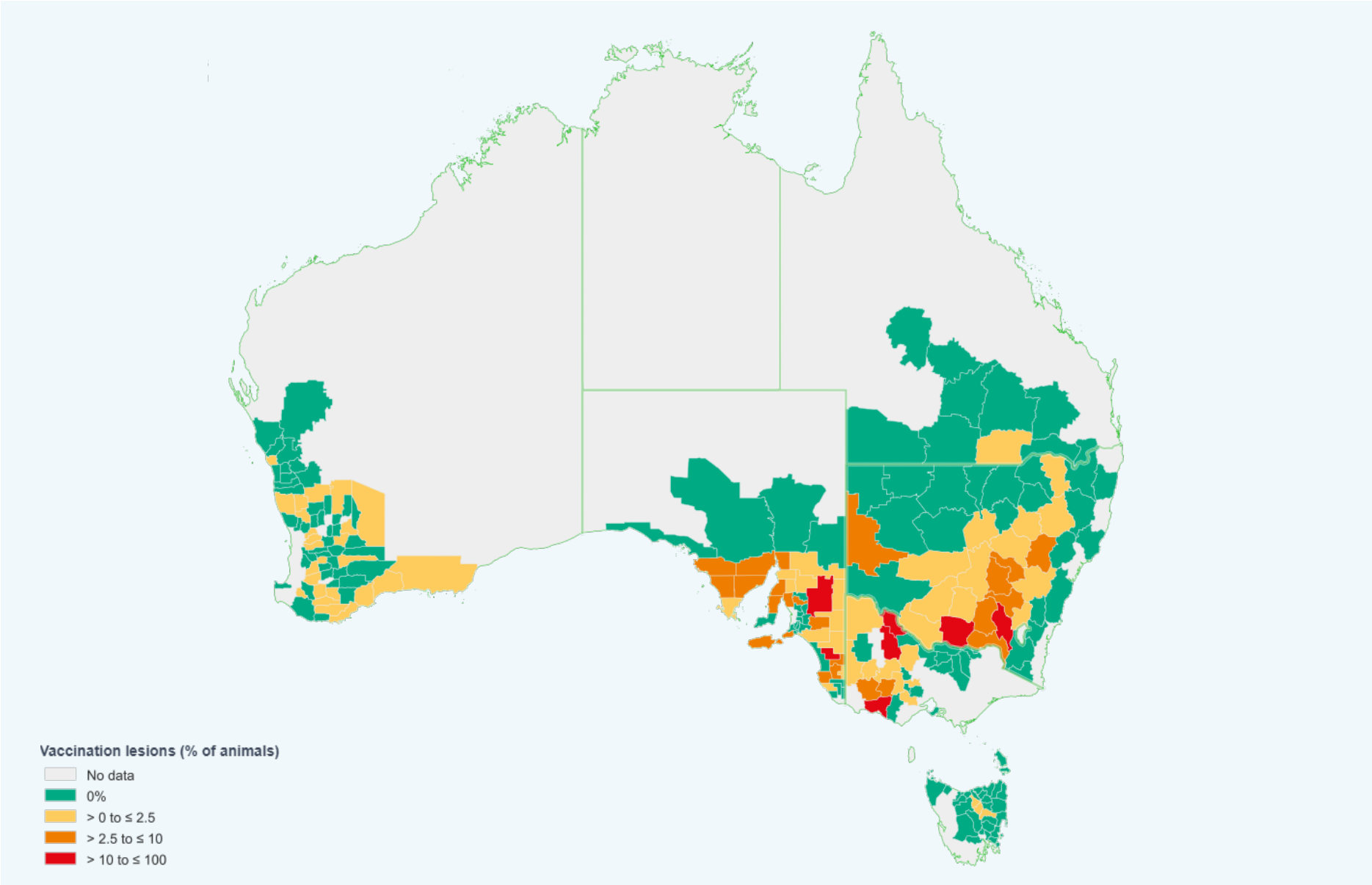



Figure 40: Percentage of sheep affected by vaccination lesions in each LGA in 2020-21.

# CONDITIONS WITH PREVELANCE < 0.1%

## Cirrhosis

Cirrhosis is the chronic damage of liver tissue as a result of other diseases and conditions such as liver fluke. Sheep affected by cirrhosis may also have lost condition or show other signs of illness.

**Affected livers are discarded at the abattoir.**

**Table 18: The number of sheep inspected and affected by cirrhosis during 2018-21.**

| | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Total animals inspected | 8,682,174 | 9,455,621 | 8,894,159 |
| Total animals affected | 25,157 = 0.3% | 29,408 = 0.3% | 4,062 = 0.05% |
| Total <2yr animals affected | 4,836 = 0.06% | 5,398 = 0.06% | 1,355 = 0.02% |

## 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 carcases are condemned when wounds are infected and the animal is showing evidence of septicaemia (blood poisoning).**

**Table 19: The number of sheep inspected and affected by dog bites during 2018-21.**

| | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Total animals inspected | 8,682,174 | 9,455,621 | 8,894,159 |
| Total animals affected | 2,781 = 0.03% | 2,571 = 0.03% | 3,045 = 0.03% |
| Total <2yr animals affected | 1,453 = 0.02% | 1,489 = 0.02% | 1,833 = 0.02% |

## Fever / Septicaemia

Fever or septicaemia are likely to be signs of other illness or infection somewhere in the sheep's body.

**As septicaemia is an infection of the body, whole carcasses will be condemned.**

**Table 20: The number of sheep inspected and affected by fever / septicaemia during 2018-21.**

| | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Total animals inspected | 8,682,174 | 9,455,621 | 8,894,159 |
| Total animals affected | 3,422 = 0.04% | 1,723 = 0.02% | 1,106 = 0.01% |
| Total <2yr animals affected | 3,100 = 0.04% | 890 = < 0.01% | 504 < 0.01% |

## 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. 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.

**Affected intestines are unsuitable for sausage casings.**

**Table 21: The number of sheep inspected and affected by knotty gut during 2018-21.**

| | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Total animals inspected | 8,682,111 | 9,455,621 | 8,894,159 |
| Total animals affected | 26,092 = 0.3% | 19,252 = 0.2% | 7,563 = 0.1% |
| Total <2yr animals affected | 5,262 = 0.06% | 6,141 = 0.06% | 2,962 = 0.03% |

## 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 will be condemned at the abattoir.

**Table 22: The number of sheep inspected and affected by hydatids during 2018-21.**

| | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Total animals inspected | 8,682,174 | 9,455,621 | 8,894,159 |
| Total animals affected | 5,315 = 0.06% | 769 = < 0.01% | 625 < 0.01% |
| Total <2yr animals affected | 2,225 = 0.03% | 411 = < 0.01% | 245 < 0.01% |

## Rib fractures

Rib fractures can be caused by a number of factors and are likely linked to reduced bone density caused by nutritional deficiencies. Most cases occur in SA. Rib fractures can also be an indication of wider animal welfare problems. Safe handling practices and good nutrition will help to prevent rib fractures.

**Affected ribs and surrounding tissue is discarded, potentially impacting some of the high value meat cuts, reducing the value of the carcass.**

**Table 23: The number of sheep inspected and affected by rib fractures during 2018-21.**

| | 2018-2019 | 2019-2020 | 2020-2021 |
|---|---|---|---|
| Total animals inspected | 8,682,174 | 9,455,621 | 8,894,159 |
| Total animals affected | 13,489 = 0.2% | 5,550 = 0.06% | 5,570 = 0.06% |
| Total <2yr animals affected | 10,424 = 0.1% | 3,504 = 0.04% | 4,358 = 0.05% |

# STATE CONTACTS

| STATE | NAME | ORGANISATION | NUMBER |
|---|---|---|---|
| New South Wales | Dr Amanda Walker | NSW Department of Primary Industries | 0439 836 673 |
| South Australia | Dr Nigel Baum | Department of Primary Industries and Regions, SA | 08 8842 6222 |
| Tasmania | Dr Marianne Hevern | Department of Primary Industries, Parks, Water and Environment | 0436 813 016 |
| Victoria | Dr Alison Lee | Department of Economic Development, Jobs, Transport and Resources | 03 5561 9927 |
| Western Australia | Dr Kristine Rayner | Department of Primary Industries and Regional Development | 08 9845 7413 |
| Queensland | Dr Louise Moore | Department of Agriculture and Fisheries | 0448 481 619 |

# INDUSTRY CONTACTS

| INDUSTRY | EMAIL |
|---|---|
| Sheep Producers Australia | admin@sheepproducers.com.au |
| WoolProducers Australia | admin@woolproducers.com.au |

AHA acknowledges the participating plants and MINTRAC for helping coordinate the data collection and upload of data to EDIS.

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