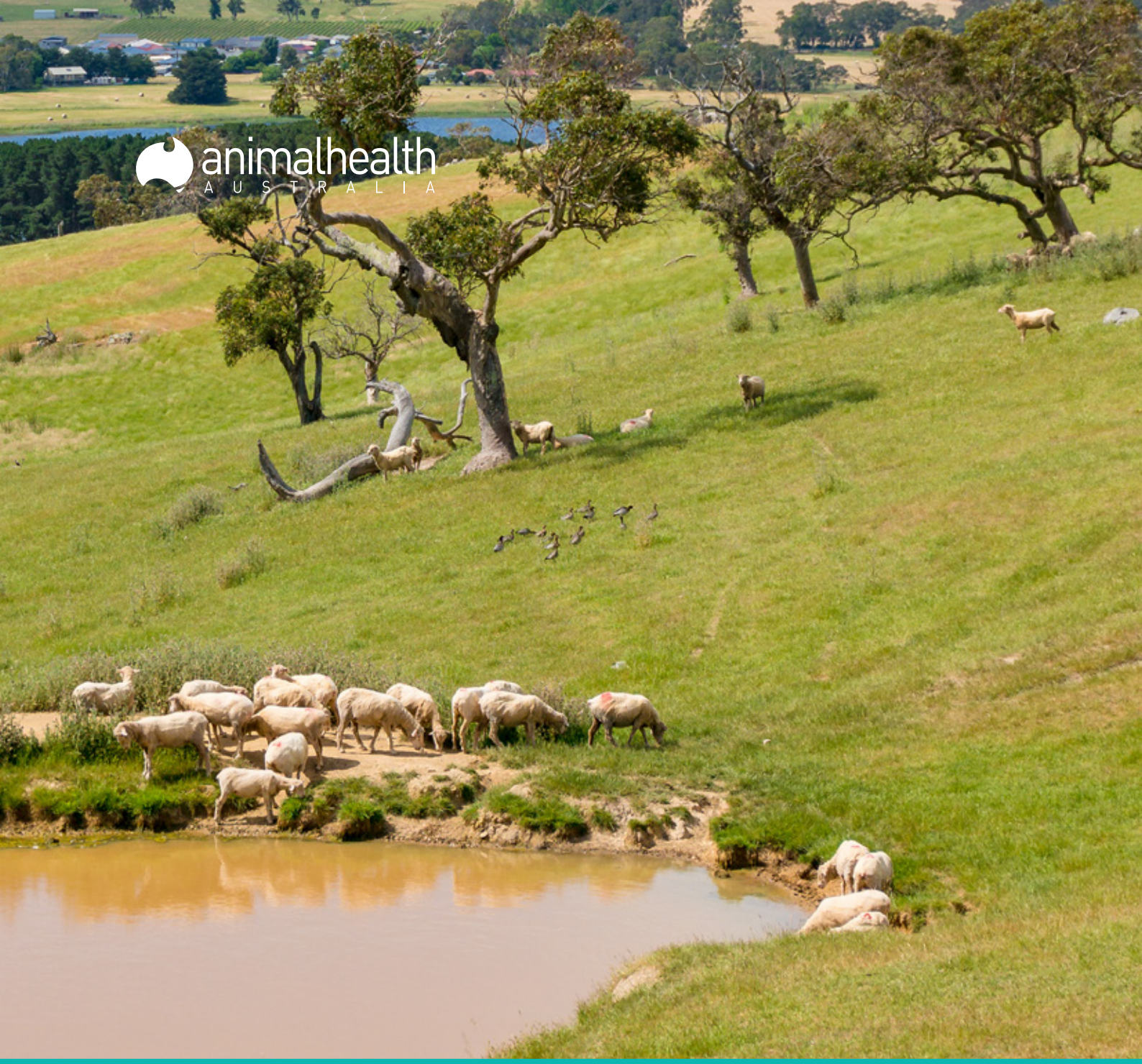


NSHMP

National Sheep Health Monitoring Project

ANNUAL REPORT 2021-22

CONTENTS

EXECUTIVE SUMMARY

The National Sheep Health Monitoring Project (NSHMP) operated throughout 2021-2022 in 10 abattoirs around the country. Meat inspectors inspected 7,758,372 sheep in 34,320 lines from 8,549 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 2021-2022 financial year (FY), bladder worm and nephritis recorded the highest levels of incidence in inspected sheep throughout Australia (Table 1).

Table 1: The percentage of inspected sheep that were affected by sixteen conditions inspected for in the 2019-22 FYs.

Table 1: The percentage of inspected sheep that were affected by sixteen conditions inspected for in the 2019-22 FYs.

	PERCENTAGE OF ANIMALS AFFECTED		
CONDITION	**19/20**	**20/21**	**21/22**
Arthritis	0.6	0.6	0.8
Bruising	0.4	0.4	0.4
Bladder worm	3.6	2.3	2.5
Cheesy gland	2.5	1.3	1.3
Dog bite	0.03	0.03	0.05
Grass seed	0.3	0.4	0.5
Hydatids	<0.01	0.01	<0.01
Knotty gut	0.2	0.09	0.1
Liver fluke	0.6	0.5	0.6
Lungworm	0.8	0.2	0.2
Nephritis	2.8	3.0	2.2
Pneumonia	0.3	0.3	0.5
Pleurisy	1.8	1.2	1.7
Sarcocystosis	0.3	0.1	0.2
Sheep measles	1.3	1.3	1.6
Vaccination lesions	1.14	1.3	1.4

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 2021-2022 (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 2021 – June 2022.

STATE	ABATTOIR
New South Wales	Cowra, Dubbo, Gundagai, Tamworth
South Australia	Lobethal (through the EASP[1] until 31 Dec 2021)
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 2021-22 is lower than the previous two years. The bulk of this decrease is due to only six months of data being received from the participating SA abattoir. The previous EAS arrangement ceased at that time, and it took some time before a new one was put in place with the abattoir and data transfer did not commence until the 2022-23 year. COVID-19 restrictions and staff resourcing in some abattoirs is also likely to have affected the number of sheep inspected.

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

INSPECTED NUMBERS	2019-2020	2020-2021	2021-2022
Sheep	9,455,621	8,894,159	7,758,372
PICs	9,013	8,795	8,536
Lines	40,786	37,758	34,320

1 Enhanced Abattoir Surveillance Program, managed by PIRSA.

SOURCE OF SHEEP

Sheep were sourced from all Australian states. Of the 7.76 million sheep inspected during 2021-2022, 52% were from NSW, 13% from Western Australia, 14% from South Australia, 13% from Victoria and 6% 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 2021-2022 FY.

STATE	NO. OF SHEEP INSPECTED	NO. OF LINES INSPECTED	NO. OF PICS INSPECTED
NSW	4,007,264	17,359	2,808
Qld	209,020	694	181
SA	1,075,134	5,494	2,190
Tas	462,381	3,131	684
Vic	999,098	3,792	1,235
WA	1,005,475	3,850	1,438
Total	**7,758,372**	**34,320**	**8,536**

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 FEEDBACK AND REPORTING

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 information on prevention methods to help manage any conditions affecting their flock. See: https://ldl.mla.com.au.

Regional quarterly reports providing a summary of the main sheep health conditions identified in a region and if the conditions have changed over time are provided to District Veterinarians and others on request.

RESEARCH AND DEVELOPMENT ACTIVITIES UTILISING DATA

In 2021-22 the data from the NSHMP was utilised by:

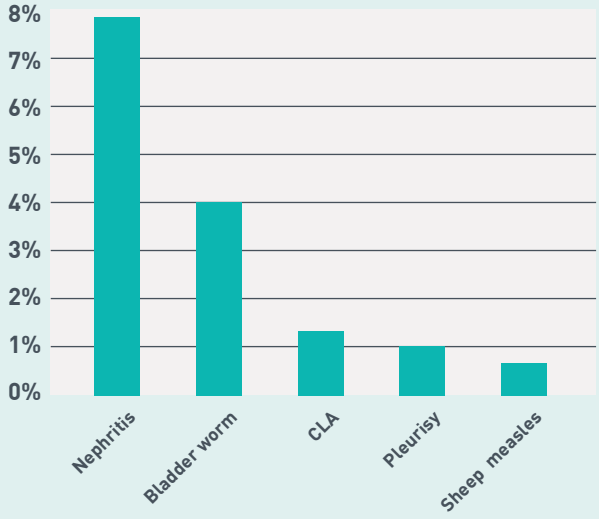
- A project conducted by Charles Sturt University on behalf of Animal Heath Australia is investigating the increase in lamb kidneys affected by nephritis at an NSW abattoir. Using data from 2018-2021, testing of affected kidneys and a producer survey, the study aims to understand the prevalence and risk factors associated with the condition, with the aim of developing recommendations for sheep producers and processors.
- An abattoir survey of ovine pneumonia pathogens in Australian sheep flocks, funded by AHA and MLA and carried out by Dr. Joan Lloyd. Twenty-four abattoir visits were completed between October 2020 and December 2021, with 1,095 samples collected from diseased ovine lungs. The samples represented 253 abattoir lots, including 182 lots of lambs and 71 lots of adult sheep. The survey identified widespread infection with *Mycoplasma ovipneumoniae*, with positive detections in 64.4% of sampled Australian abattoir lots. More information on this project is available on the Joan Lloyd Consulting website and MLA website.
- A Sheep Health Conditions - Carcass Impact visualisation tool was released at the beginning of the year 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 tool, funded by PIRSA Red Meat and Wool Program and AHA, can be accessed through the AHA website.

ANIMAL HEALTH INFORMATION

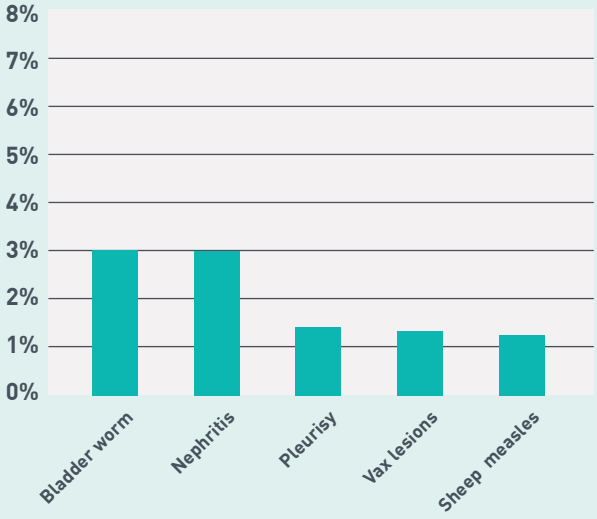
- This report contains a 'snapshot' of the health of the Australian sheep flock for the 2021-22 FY using data collected through the NSHMP. Summary data sets from previous years has been utilised for some conditions to provide a comparison.
- The data collected by the NSHMP is stored in the Endemic Disease Information System (EDIS), 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
  - » Sarcocystosis
  - » 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 21/22

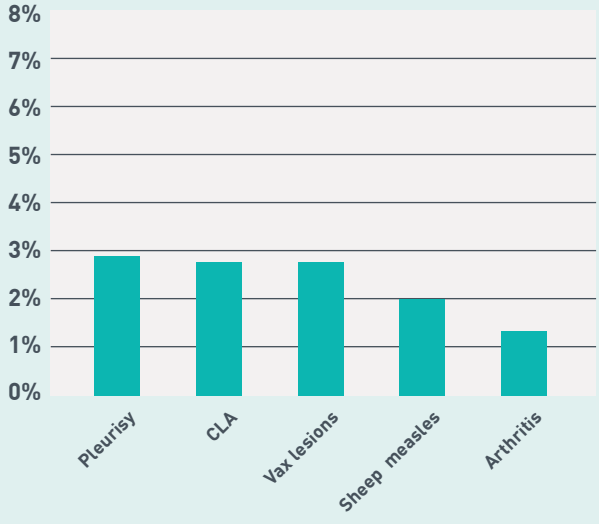
QUEENSLAND



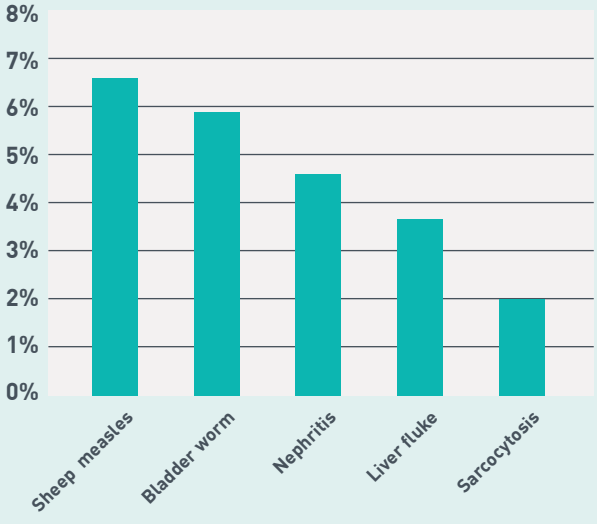
NEW SOUTH WALES



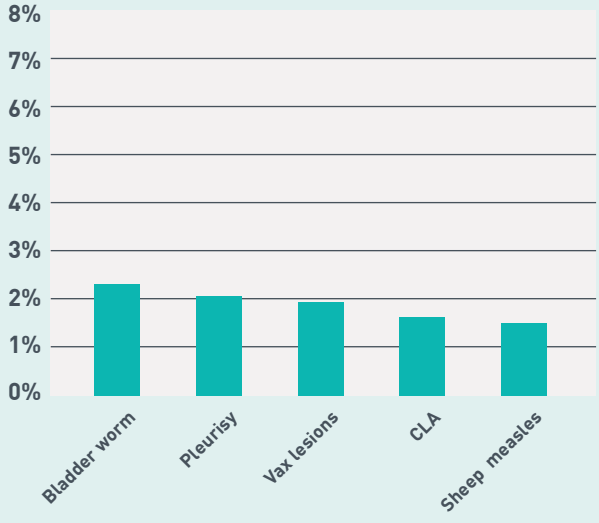
VICTORIA



TASMANIA



SOUTH AUSTRALIA



WESTERN AUSTRALIA

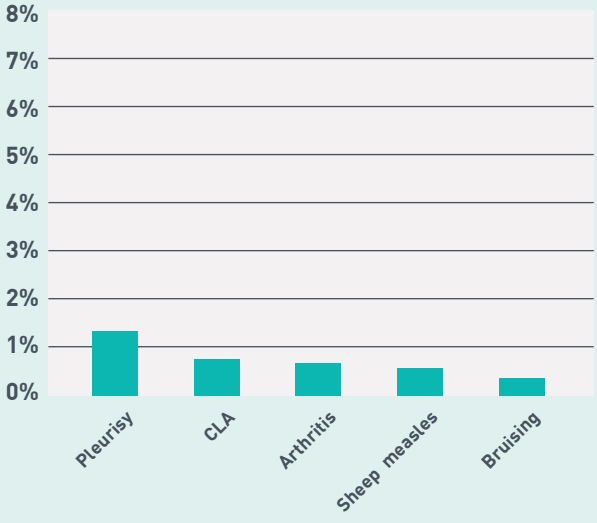


Figure 1: The five most common conditions recorded in each state during 2021-22 based on percentage of inspected sheep affected by them.

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 reported to have arthritis is higher than numbers reported in 2020-21, increasing by 0.2% (Table 5). The number of animals <2 years affected by arthritis remains similar to last FY. The percentage of PICs with at least one affected sheep appears to have increased in each state, except for Tasmania. The most significant increases in affected PICs occurred in Victoria and Queensland (Figure 2).

Victoria and South Australia recorded the highest percentages of affected animals at 1.31% and 0.9% respectively (Figure 3).

Table 5: The number of sheep inspected and affected by arthritis during 2019-22.

	2019-20	2020-21	2021-22
Total animals inspected	9,455,621	8,894,159	7,758,372
Total animals affected	60,281 = 0.6%	51,106 = 0.6%	64,041 = 0.8%
Total <2yr animals affected	14,662 = 0.1%	18,140 = 0.2%	18,602 = 0.2%

Figure 2: The percentage of PIC's inspected in each state that had at least one affected animal in 2019-22.

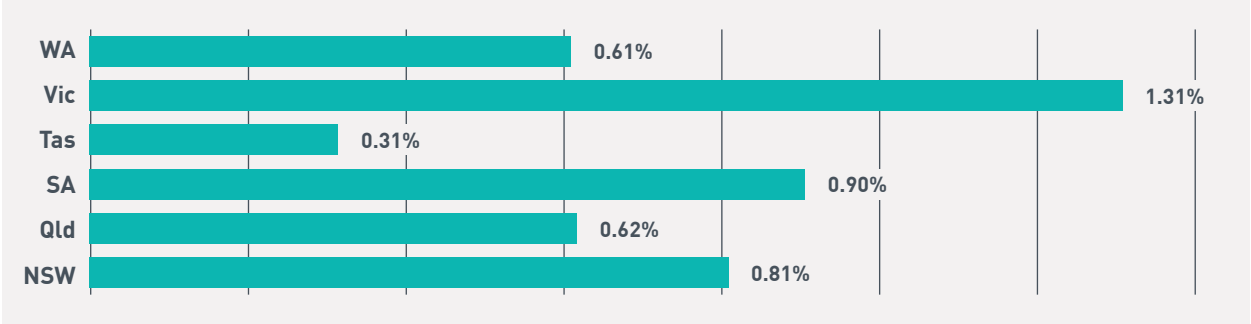


Figure 3: The percentage of animals inspected in each state that were affected in 2020-21.

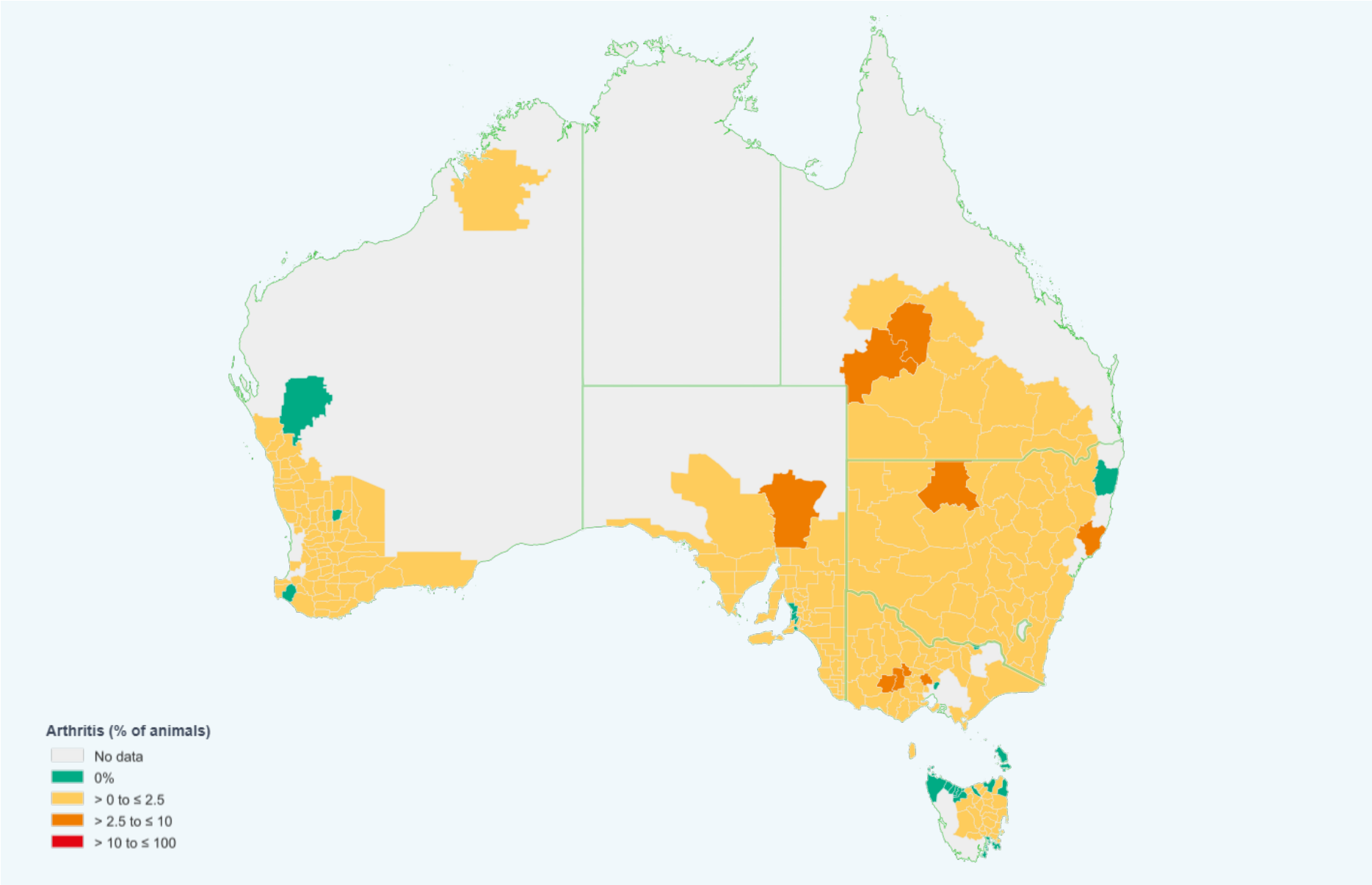


Figure 4: Percentage of sheep affected by arthritis in each LGA in 2021-22.

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 PICs reported from Western Australia and Victoria at 34% and 33%, respectively.

Table 6: The number of sheep inspected and affected by bruising during 2019-22.

	2019-20	2020-21	2021-22
Total animals inspected	9,455,621	8,894,159	7,758,372
Total animals affected	35,528 = 0.4%	32,977 = 0.4%	33,020 = 0.4%
Total <2yr animals affected	12,287 = 0.1%	13,737 = 0.2%	12,777 = 0.2%

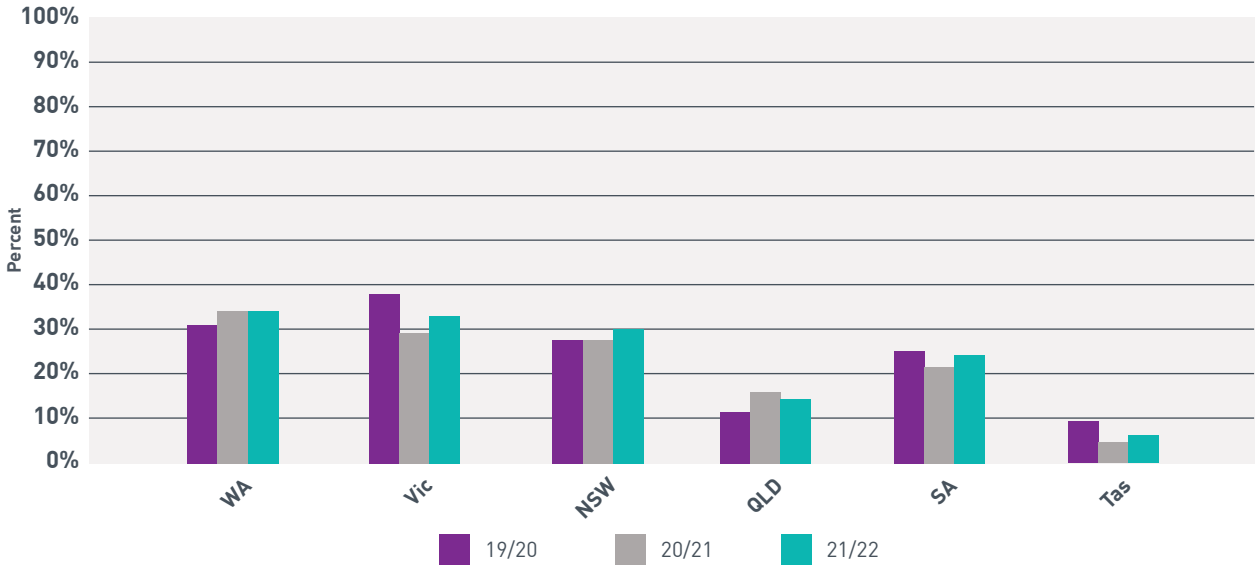


Figure 5: The percentage of PIC's inspected in each state that had at least one affected animal in 2019-22.

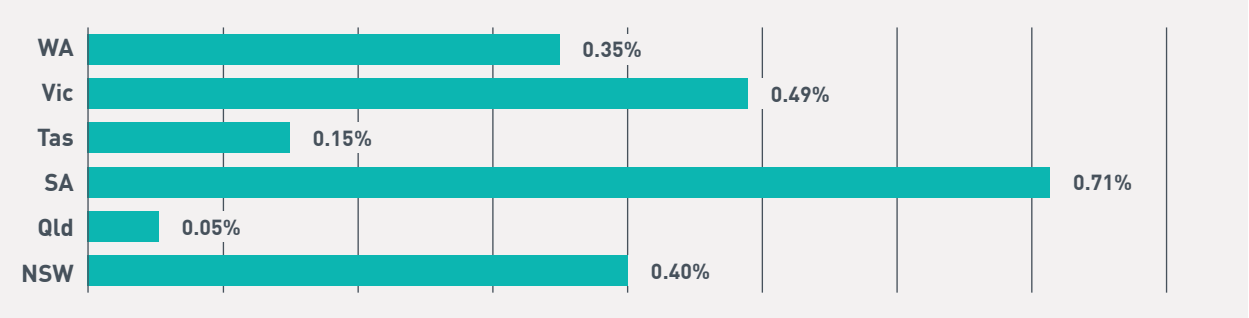


Figure 6: The percentage of animals inspected in each state that were affected in 2021-22.

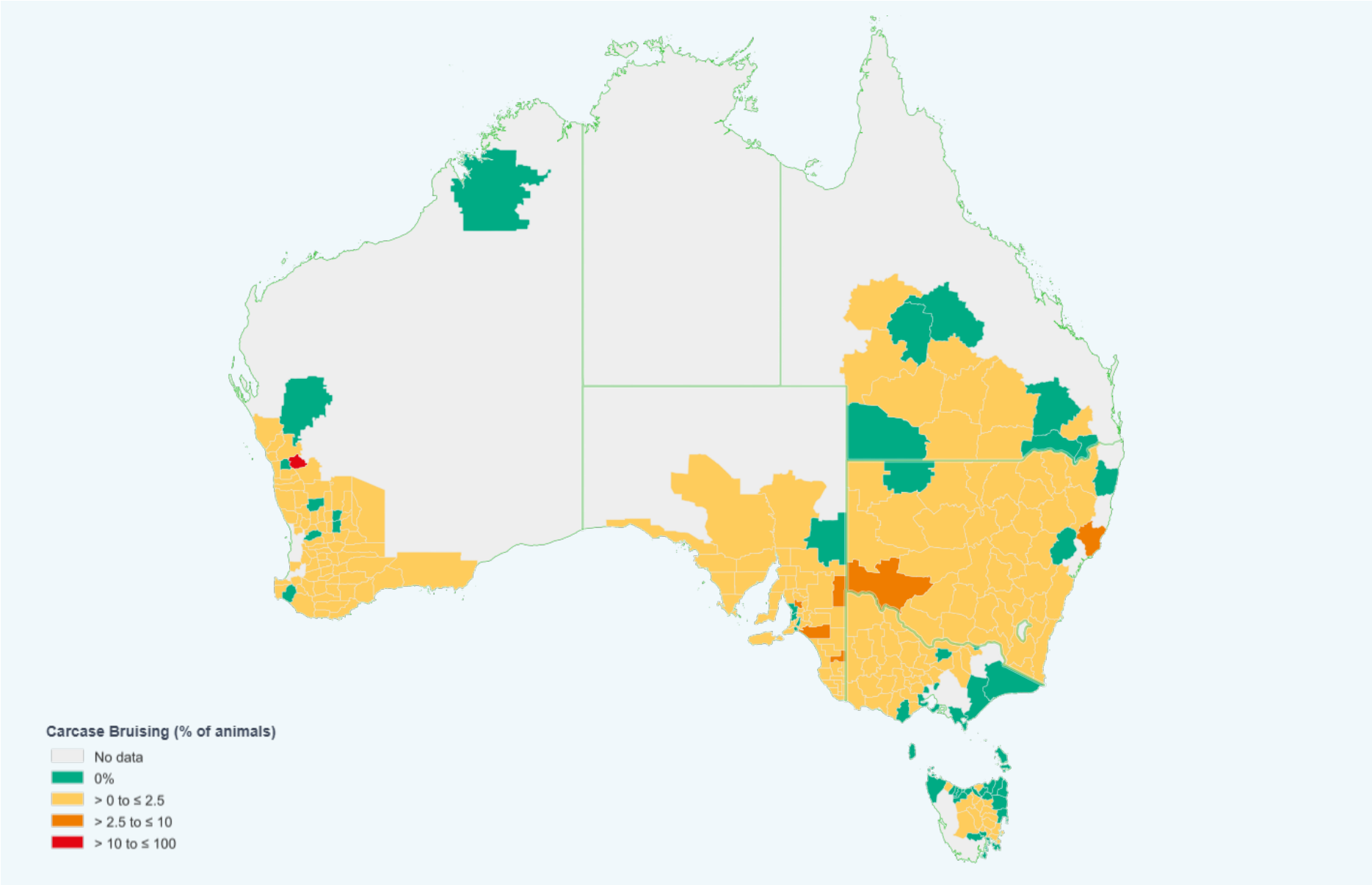


Figure 7: Percentage of sheep affected by bruising in in each LGA in 2021-22.

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.

Infected carcases usually have livers trimmed or condemned.

Bladder worm was the most commonly reported condition during 2021-22 and the second most reported condition in 2020-21. Compared to the previous year, the percentage of total sheep affected by bladder worm increased slightly by 0.2% (Table 7). Tasmania had the highest percentage of affected sheep for 2021-22 at 5.86%, followed by Queensland, New South Wales and South Australia with percentages >2% (Figure 9).

Table 7: The number of sheep inspected and affected by bladder worm during 2019-22.

	2019-20	2020-21	2021-22
Total animals inspected	9,455,621	8,894,159	7,758,372
Total animals affected	343,382 = 3.6%	206,257 = 2.3%	194,063 = 2.5%
Total <2yr animals affected	91,574 = 1.0%	104,264 = 1.2%	102,011 = 1.3%

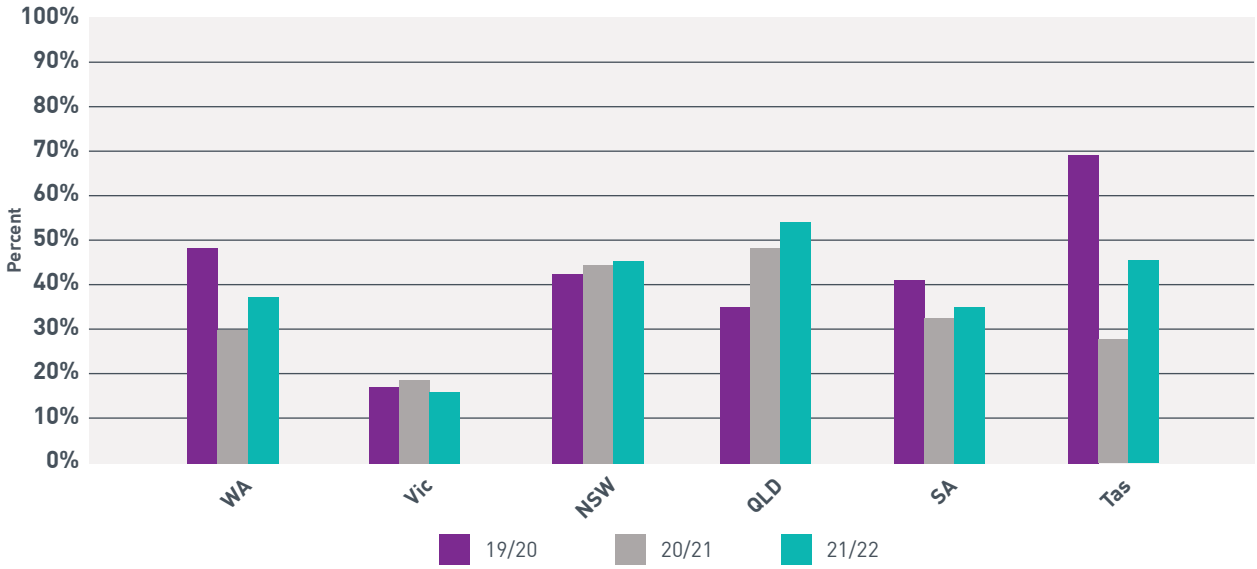


Figure 8: The percentage of PIC's inspected in each state that had at least one affected animal in 2019-22.

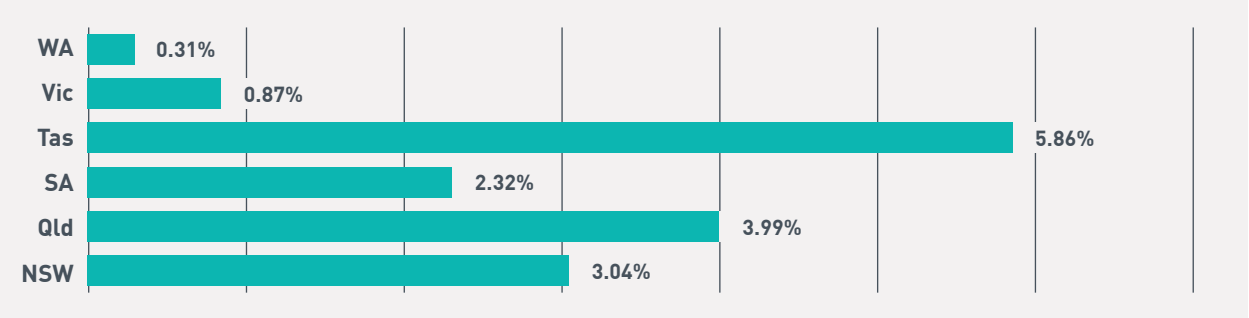


Figure 9: The percentage of animals inspected in each state that were affected in 2021-22.

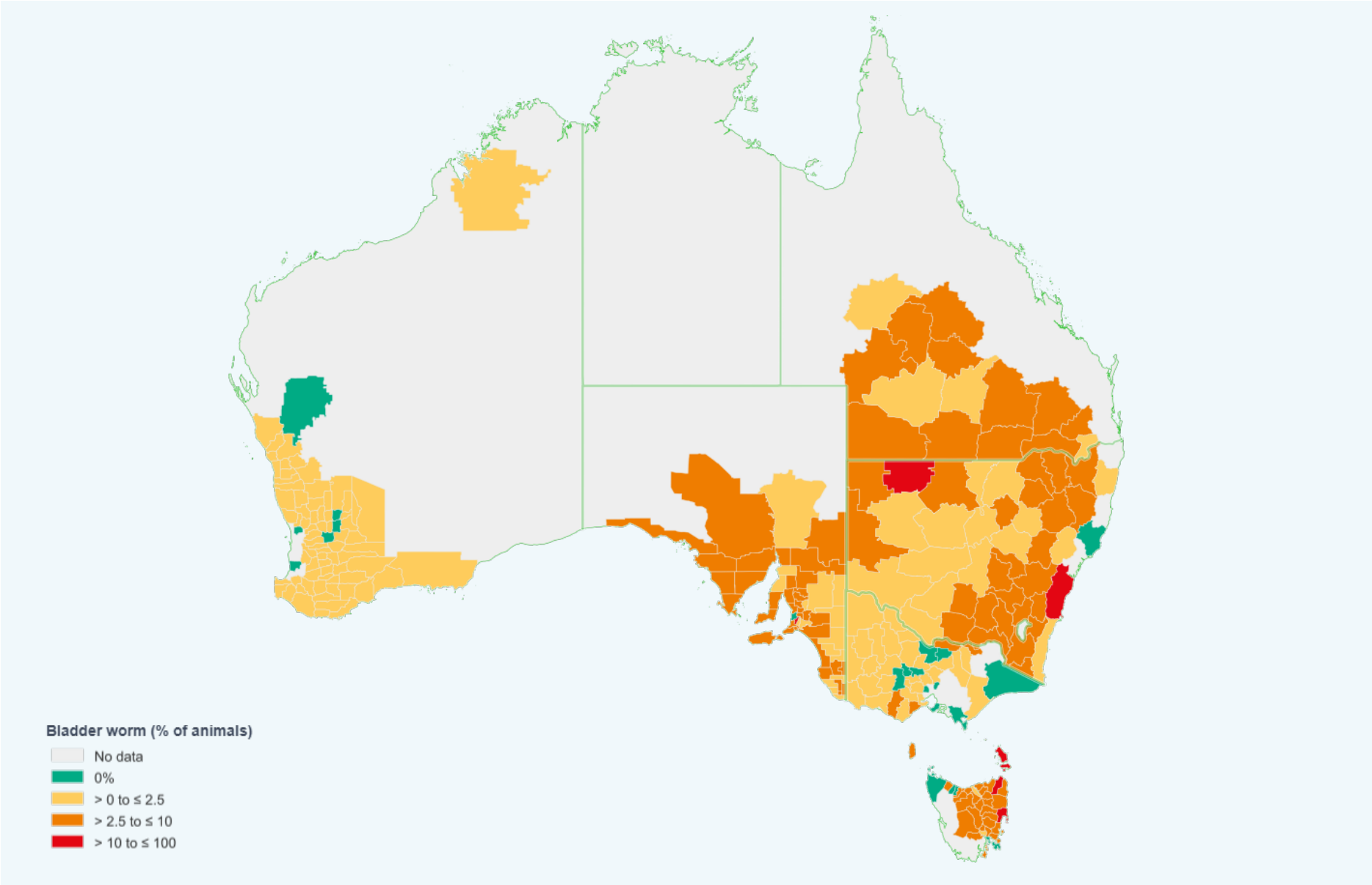


Figure 10: Percentage of sheep affected by bladder worm in in each LGA in 2021-22.

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 total number of animals affected by cheesy gland declined between 2020 and 2021 (see Table 8). However, the current occurrence of this condition in the 2021-22 period remains unchanged compared to the previous year.

Despite no significant change in the percentage of sheep affected by cheesy gland, the number of PICs with at least one occurrence of the condition has increased in all states. This suggests that cheesy gland remains a common issue, becoming more widespread in the 2021-22 period. For example, the number of PICs in Victoria with at least one affected sheep increased from 48% to 60% (Figure 11).

Table 8: The number of sheep inspected and affected by cheesy gland during 2019-22.

	2019-20	2020-21	2021-22
Total animals inspected	9,455,621	8,894,159	7,758,372
Total animals affected	238,839 = 2.5%	111,838 = 1.3%	100,670 = 1.3%
Total <2yr animals affected	18,633 = 0.2%	10,909 = 0.1%	9,834 = 0.1%

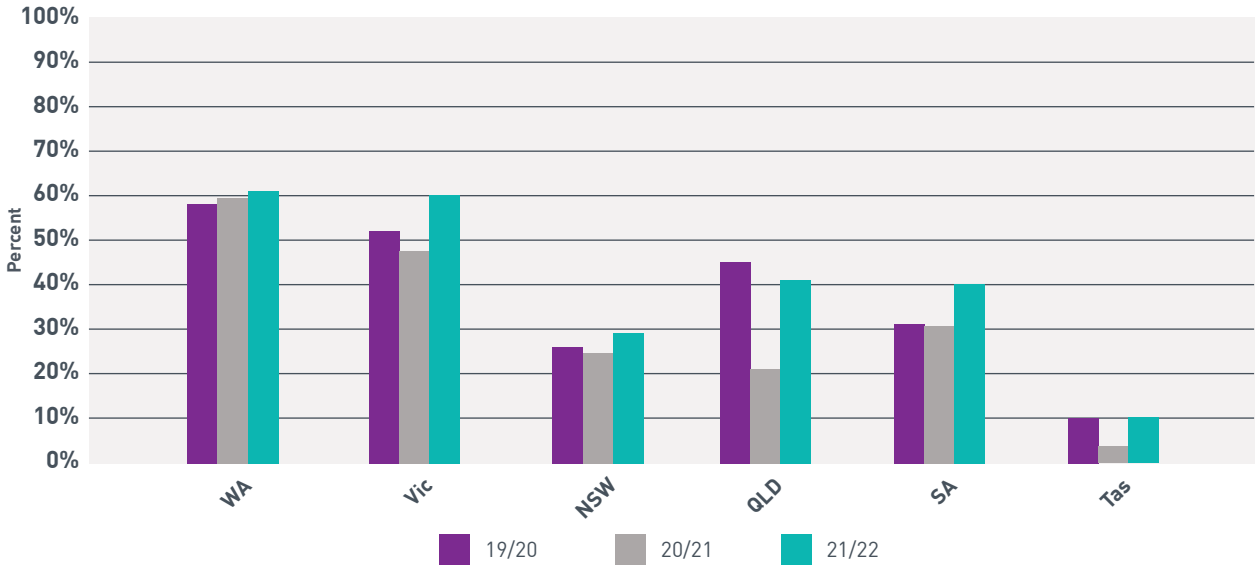


Figure 11: The percentage of PIC's inspected in each state that had at least one affected animal in 2019-22.

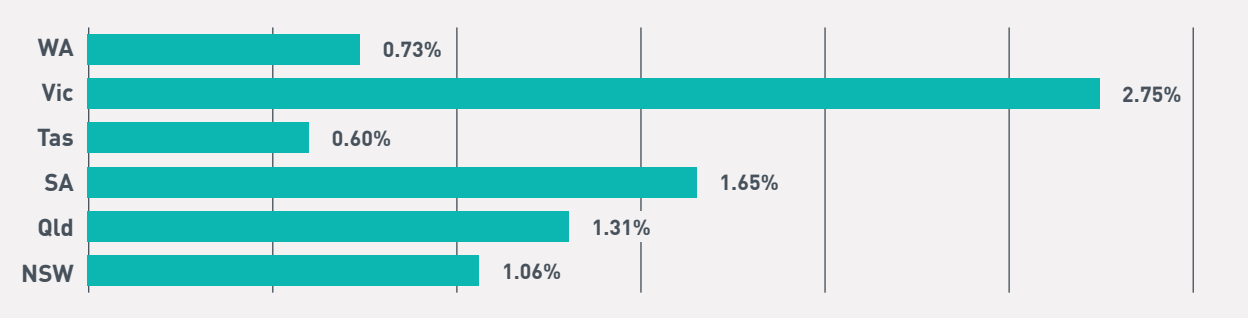


Figure 12: The percentage of animals inspected in each state that were affected in 2021-22.

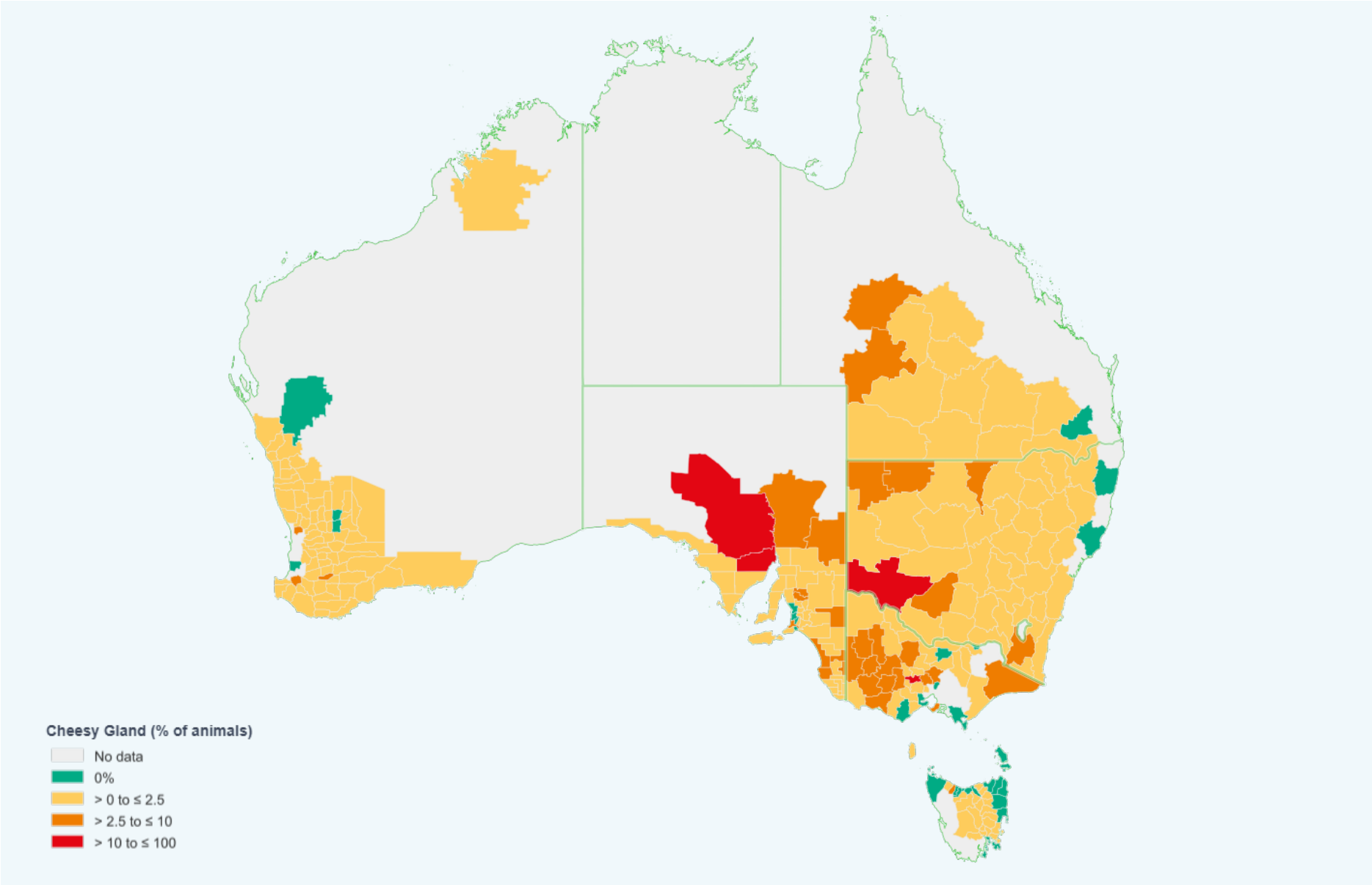


Figure 13: Percentage of sheep affected by cheesy gland in in each LGA in 2021-22.

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.

The total number of sheep carcasses affected by grass seeds increased in the 2021-22 financial year, growing by 0.1% compared to the previous year. Figure 14 shows an increase in the total number of PICs affected by grass seeds in both Western Australia and New South Wales, increasing by 4% and 3% respectively.

The rise in total numbers of affected sheep may be associated with the higher-than-average summer / autumn rainfall observed in sheep producing regions across Australia, especially in New South Wales. Given the expected continuation of wet conditions during the 2022/23 period, it's possible that numbers of affected carcases may remain high or increase.

Table 9: The number of sheep inspected and affected by grass seeds during 2019-22.

	2019-20	2020-21	2021-22
Total animals inspected	9,455,621	8,894,159	7,758,372
Total animals affected	25,932 = 0.3%	32,941 = 0.4%	39,137 = 0.5%
Total <2yr animals affected	20,197 = 0.2%	26,144 = 0.3%	29,650 = 0.4%

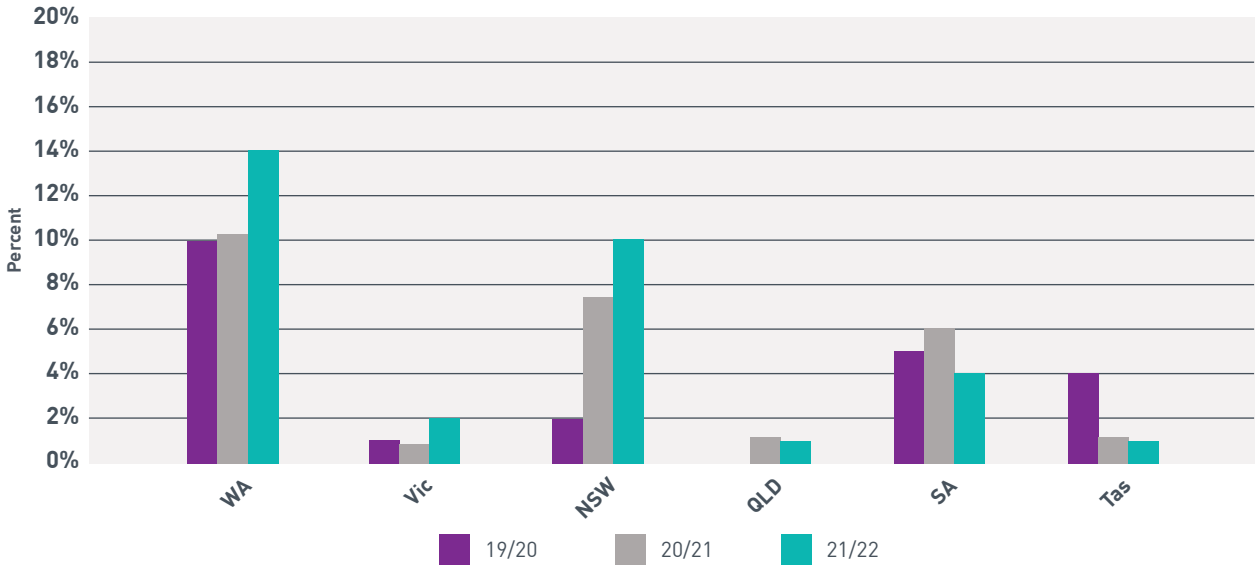


Figure 14: The percentage of PIC's inspected in each state that had at least one affected animal in 2019-22.

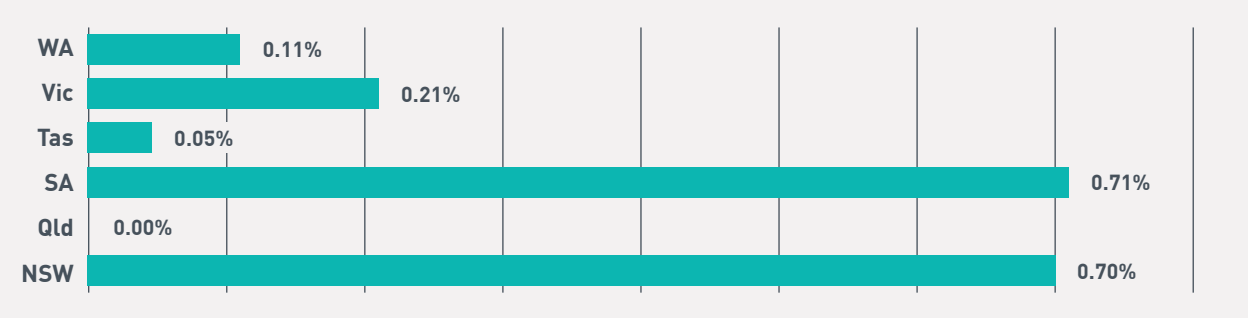


Figure 15: The percentage of animals inspected in each state that were affected in 2021-22.

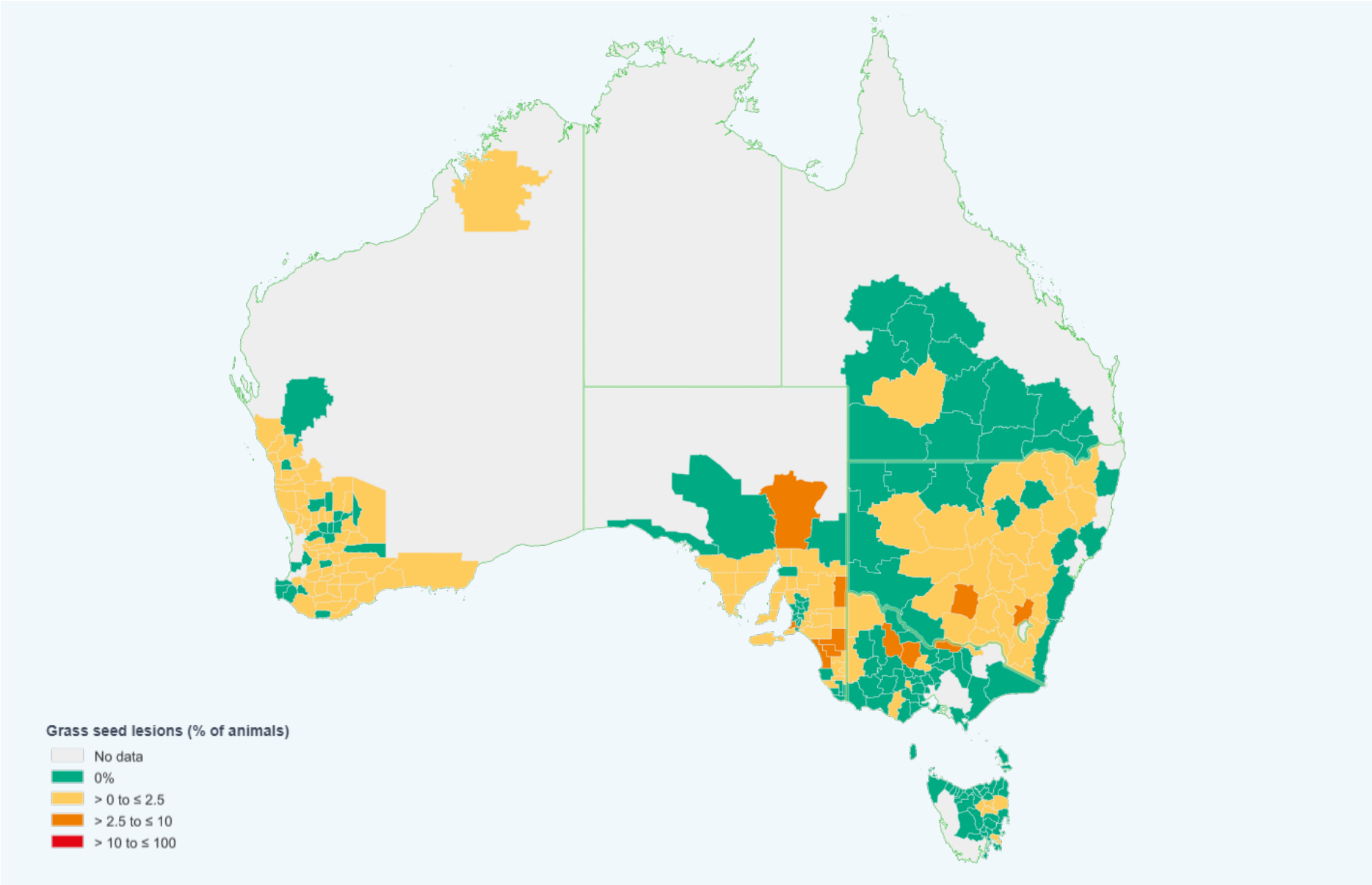


Figure 16: Percentage of sheep affected by grass seeds in each LGA in 2021-22.

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 rare cases, whole carcases can be condemned.

The percentage of liver fluke has slightly increased in sheep inspected over the last financial year. However, impacts on sheep <2yr remain stable. Liver fluke was not identified in WA and only a very small number of cases were identified in Victoria and Queensland. Most cases of liver fluke were reported in Tasmania with approximately 31% of PICs having at least one animal affected. This number has been steadily increasing since 2019, growing by 6% in the 2021/22 period. Tasmania also had the highest percentage of total infected sheep at 3.66% (Figure 18).

South Australia has the second highest percentage of affected sheep after Tasmania. 1.21% of inspected sheep in South Australia were found to have liver fluke, despite only being present on 0.4% of PICs. This suggests that the occurrence of this condition is concentrated to a small number of South Australian PICs.

Table 10: The number of sheep inspected and affected by liver fluke during 2019-22.

	2019-20	2020-21	2021-22
Total animals inspected	9,455,521	8,894,159	7,758,372
Total animals affected	60,497 = 0.6%	47,717 = 0.5%	44,130 = 0.6%
Total <2yr animals affected	22,133 = 0.2%	31,563 = 0.4%	33,936 = 0.4%

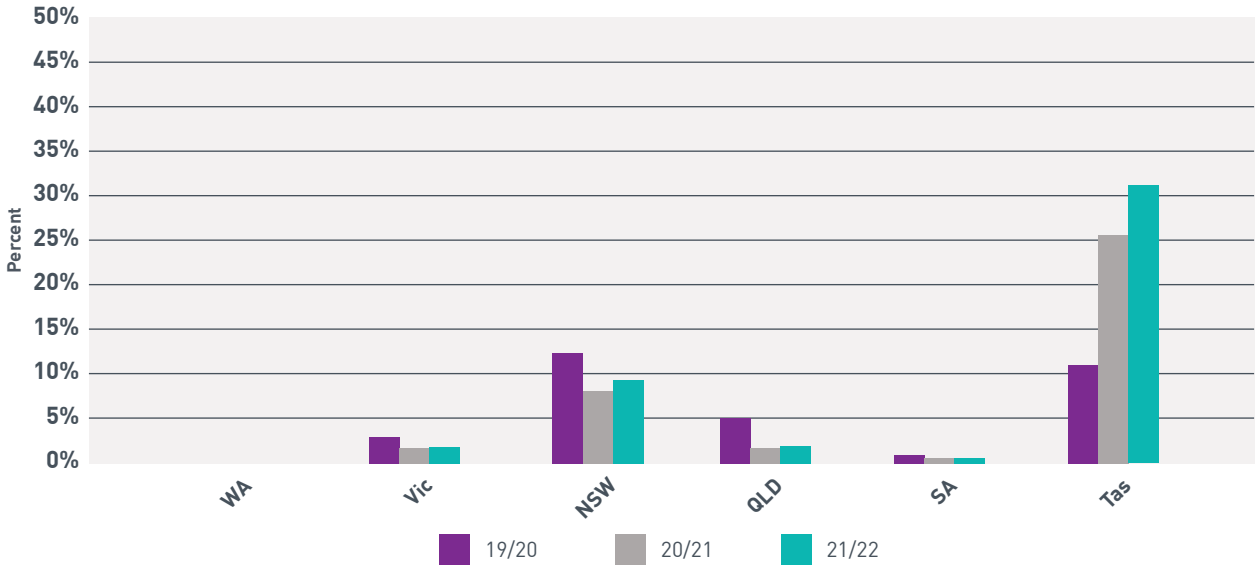


Figure 17: The percentage of PIC's inspected in each state that had at least one affected animal in 2019-22.

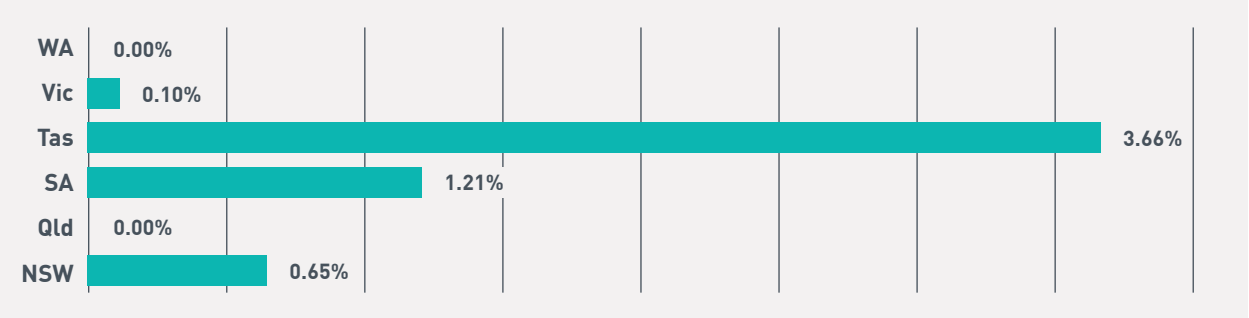


Figure 18: The percentage of animals inspected in each state that were affected in 2021-22.

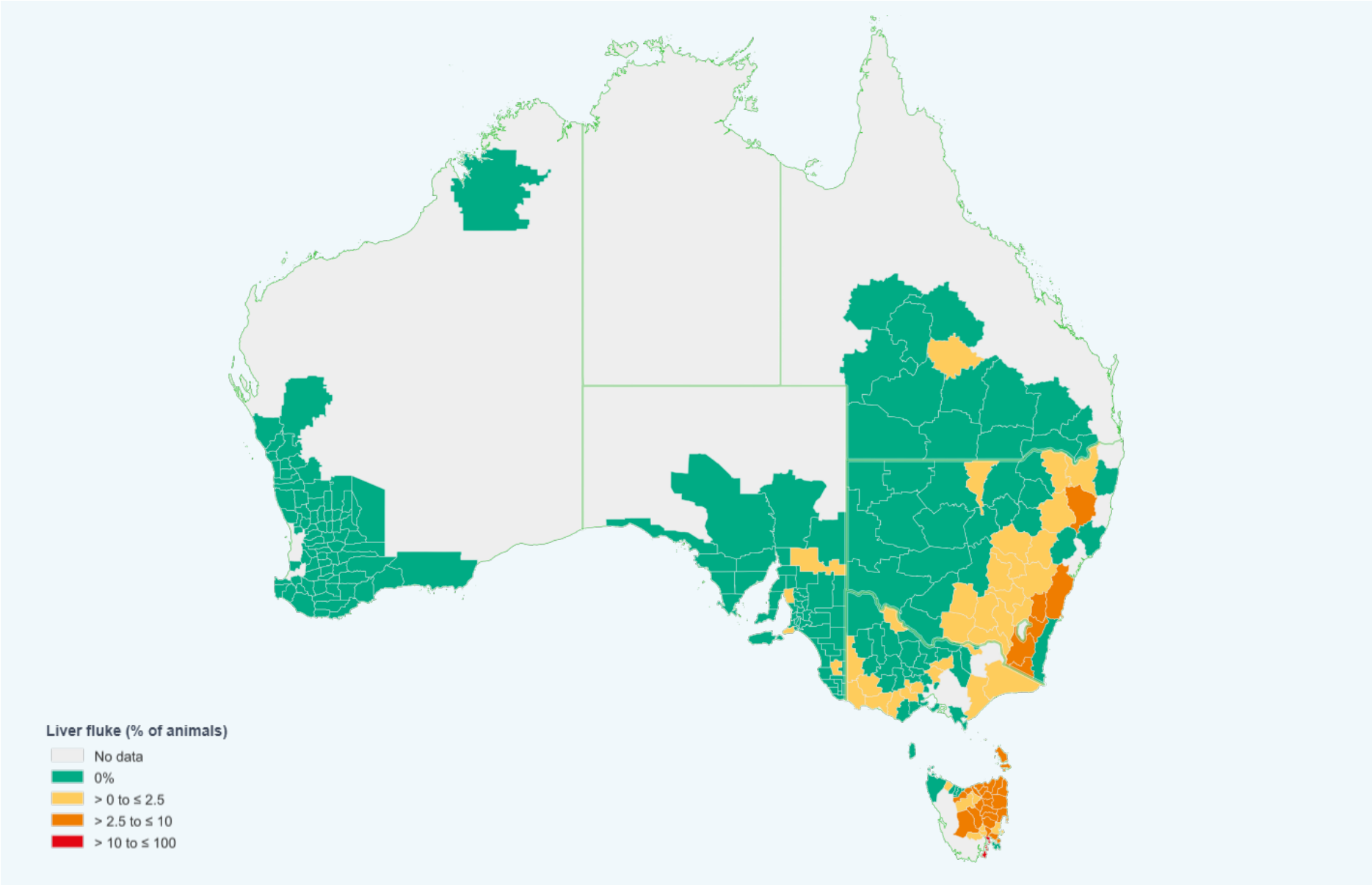


Figure 19: Percentage of sheep affected by liver fluke in each LGA in 2021-22.

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.

The total number of sheep affected by lungworm remains unchanged from the previous year at 2.0%. All states saw a decline in the number of affected properties, excluding South Australia, which saw a 1% increase, and Queensland which remains at 0. South Australia continues to be the state most extensively impacted by lungworm, as is clearly depicted in Figure 21.

Table 11: The number of sheep inspected and affected by lung worm during 2019-22.

	2019-20	2020-21	2021-22
Total animals inspected	9,455,521	8,894,159	7,758,372
Total animals affected	76,171 = 0.8%	16,270 = 0.2%	14,431 = 0.2%
Total <2yr animals affected	28,927 = 0.3%	7,000 = 0.1%	5,474 = 0.1%

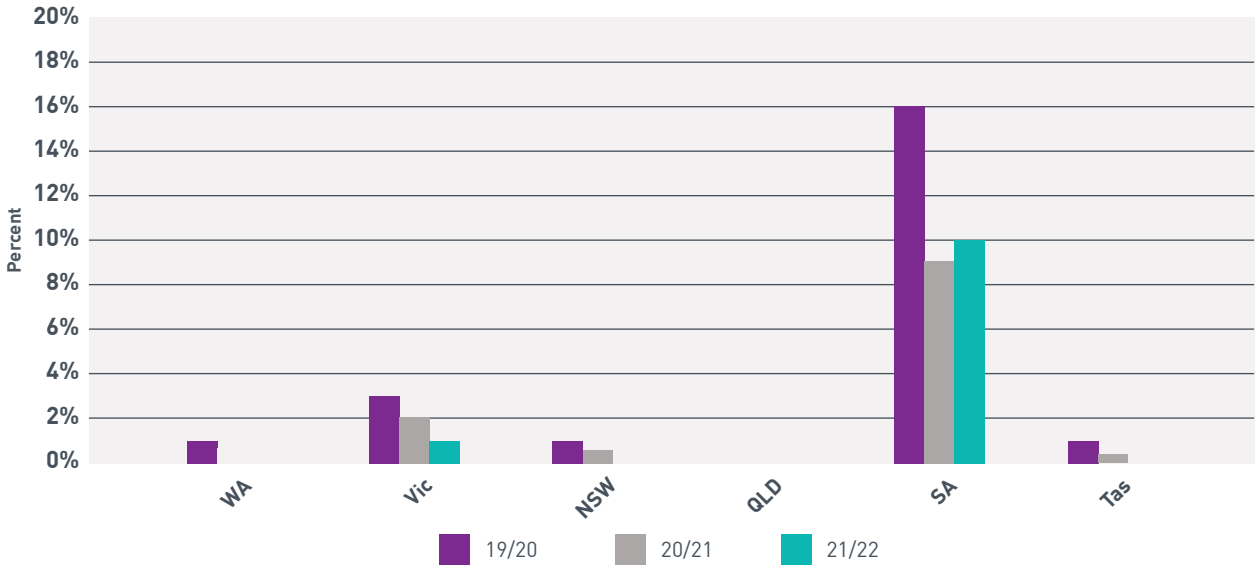


Figure 20: The percentage of PIC's inspected in each state that had at least one affected animal in 2019-22.

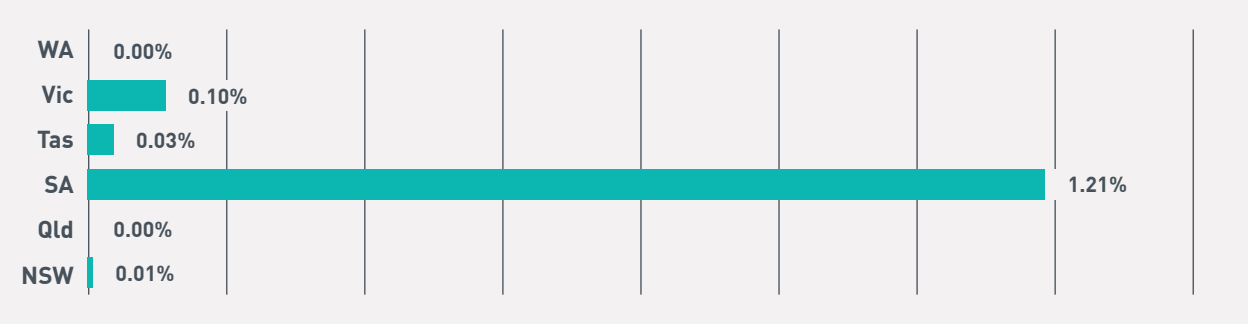


Figure 21: The percentage of animals inspected in each state that were affected in 2021-22.

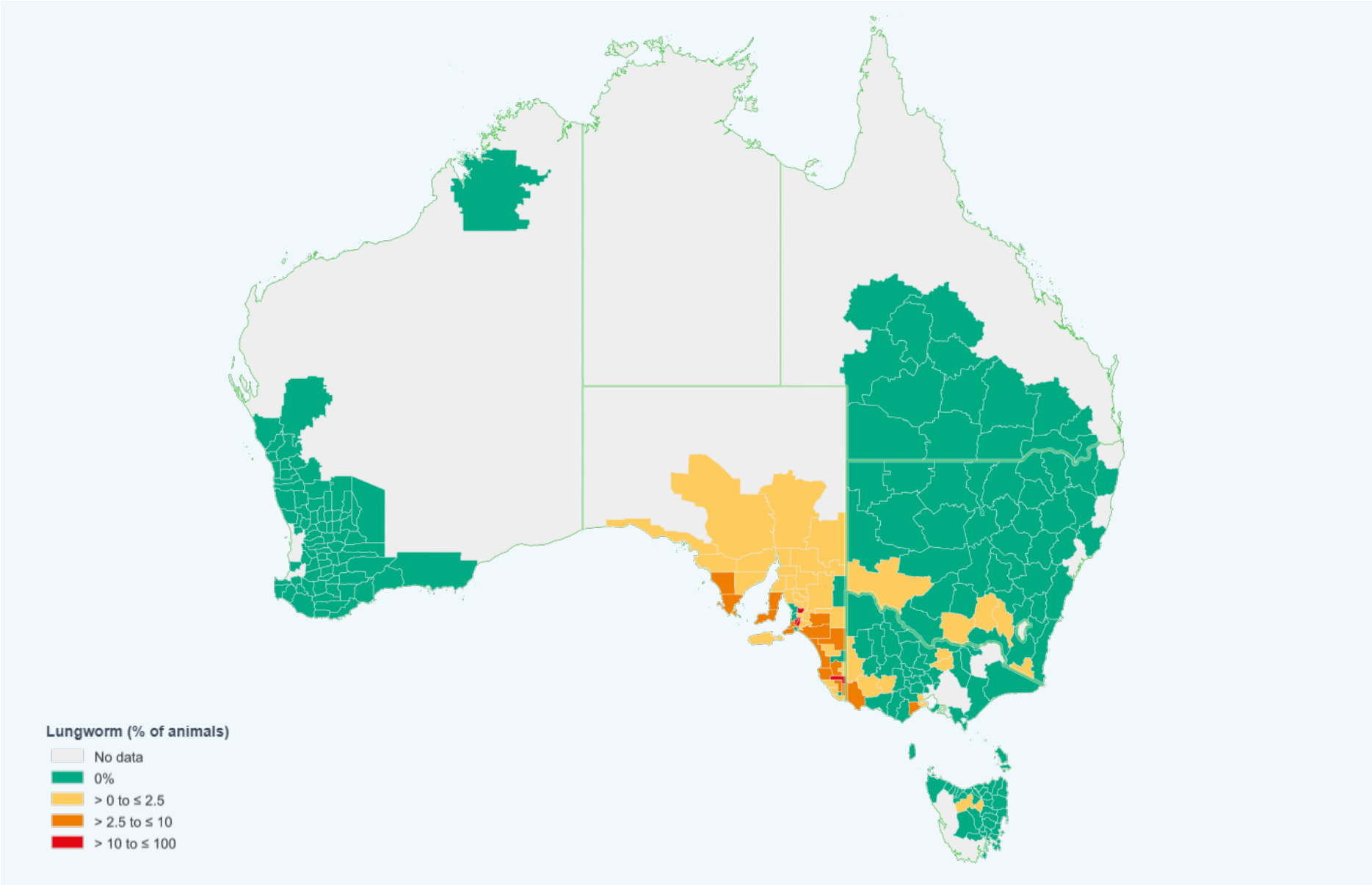


Figure 22: Percentage of sheep affected by lungworm in each LGA in 2021-22.

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 was the second most reported condition for 2021-22. The total number of sheep affected with nephritis has declined by 0.8% compared to the 2020-21 period but continues to be a condition of significance, with 2.2% of total inspected sheep affected (table 1). Tasmania saw the most dramatic change in the 2021-22 period, with the number of PICs with at least one affected animal increasing by 27%. Queensland had the highest percentage of total animals affected with 7.96% of inspected animals having the condition. This was followed by Tasmania with 4.57% of animals affected (Figure 24).

Table 12: The number of sheep inspected and affected by nephritis during 2019-22.

	2019-20	2020-21	2021-22
Total animals inspected	9,455,521	8,894,159	7,758,372
Total animals affected	246,398 = 2.6%	267,107 = 3.0%	173,038 = 2.2%
Total <2yr animals affected	234,592 = 2.5%	261,233 = 2.9%	159,948 = 2.1 %

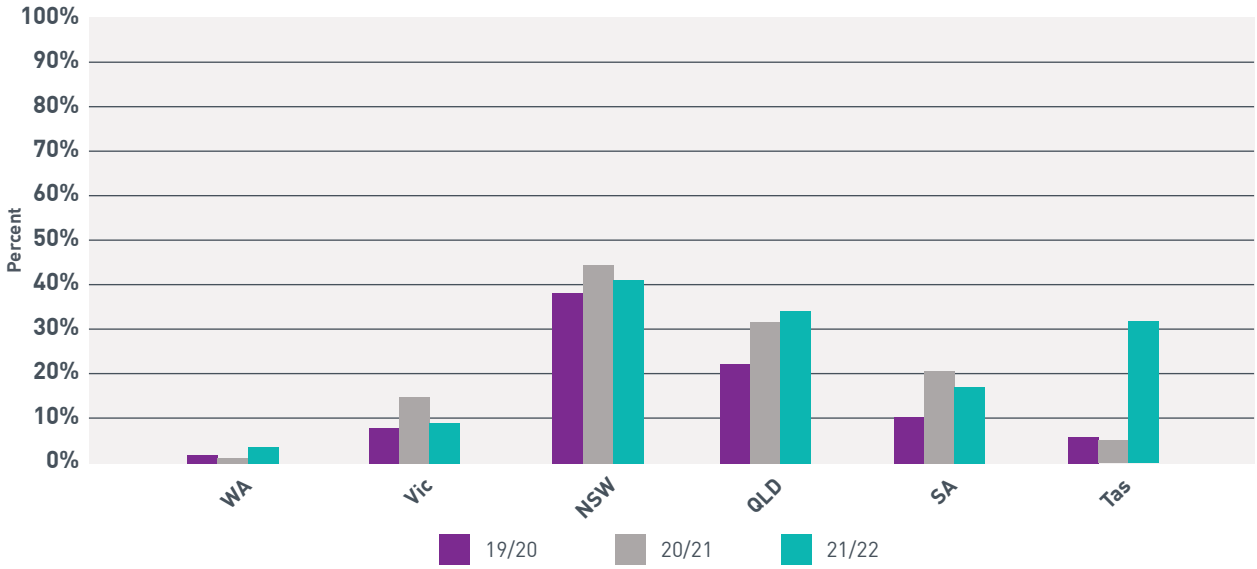


Figure 23: The percentage of PIC's inspected in each state that had at least one affected animal in 2019-22.

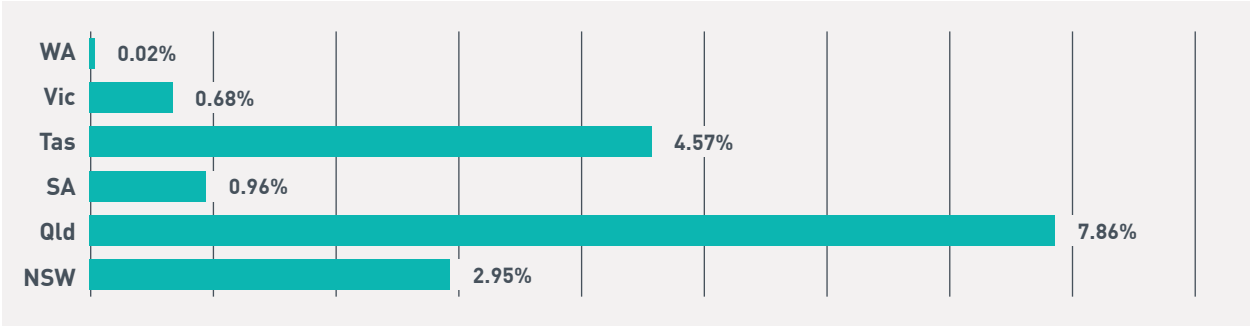


Figure 24: The percentage of animals inspected in each state that were affected in 2021-22.

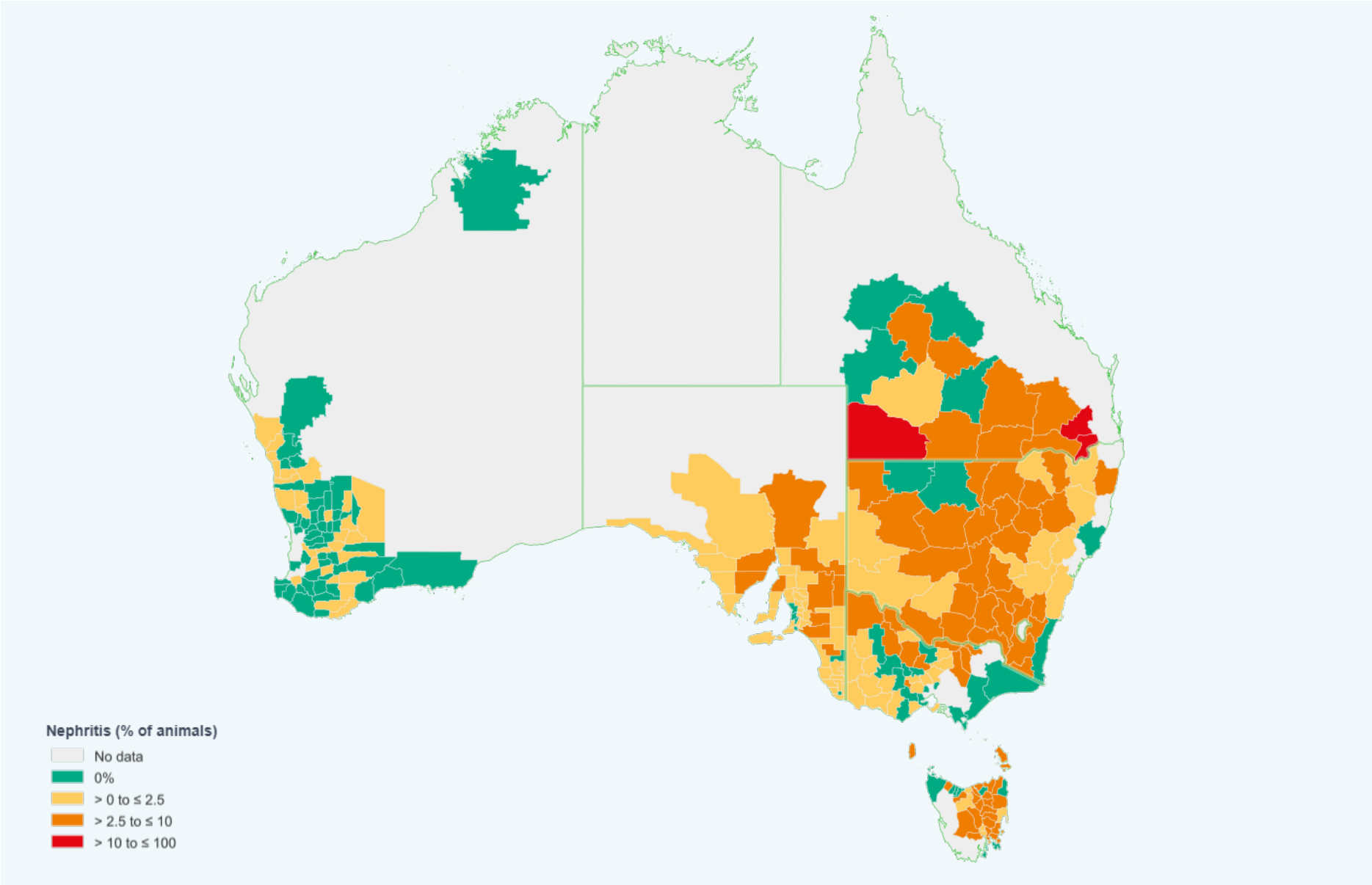


Figure 25: Percentage of sheep affected by nephritis in each LGA in 2021-22.

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.

The percentage of sheep affected by pleurisy has increased slightly compared to the previous year. Pleurisy was detected in sheep from over 80% of PICs in both Western Australia and Victoria, and over 40% of PICs in South Australia, New South Wales and Queensland. The proportion of sheep <2 years old has risen slightly to 0.5%. Victoria had the highest percentage of affected sheep at 2.89% (Figure 27).

Table 13: The number of sheep inspected and affected by pleurisy during 2019-22.

	2019-20	2020-21	2021-22
Total animals inspected	9,455,521	8,894,159	7,758,372
Total animals affected	168,982 = 1.8%	109,921 = 1.2%	129,824 = 1.7%
Total <2yr animals affected	38,593 = 0.4%	33,467 = 0.4%	40,068 = 0.5%

Figure 26: The percentage of PIC's inspected in each state that had at least one affected animal in 2021-22.

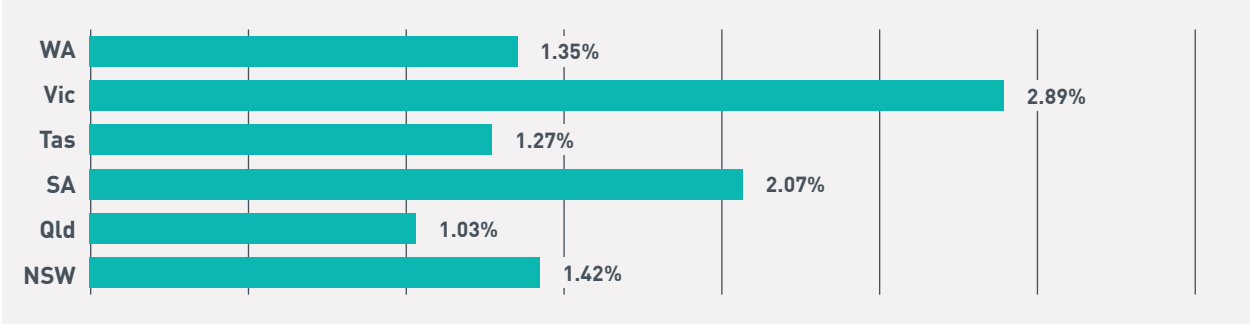


Figure 27: The percentage of animals inspected in each state that were affected in 2021-22.

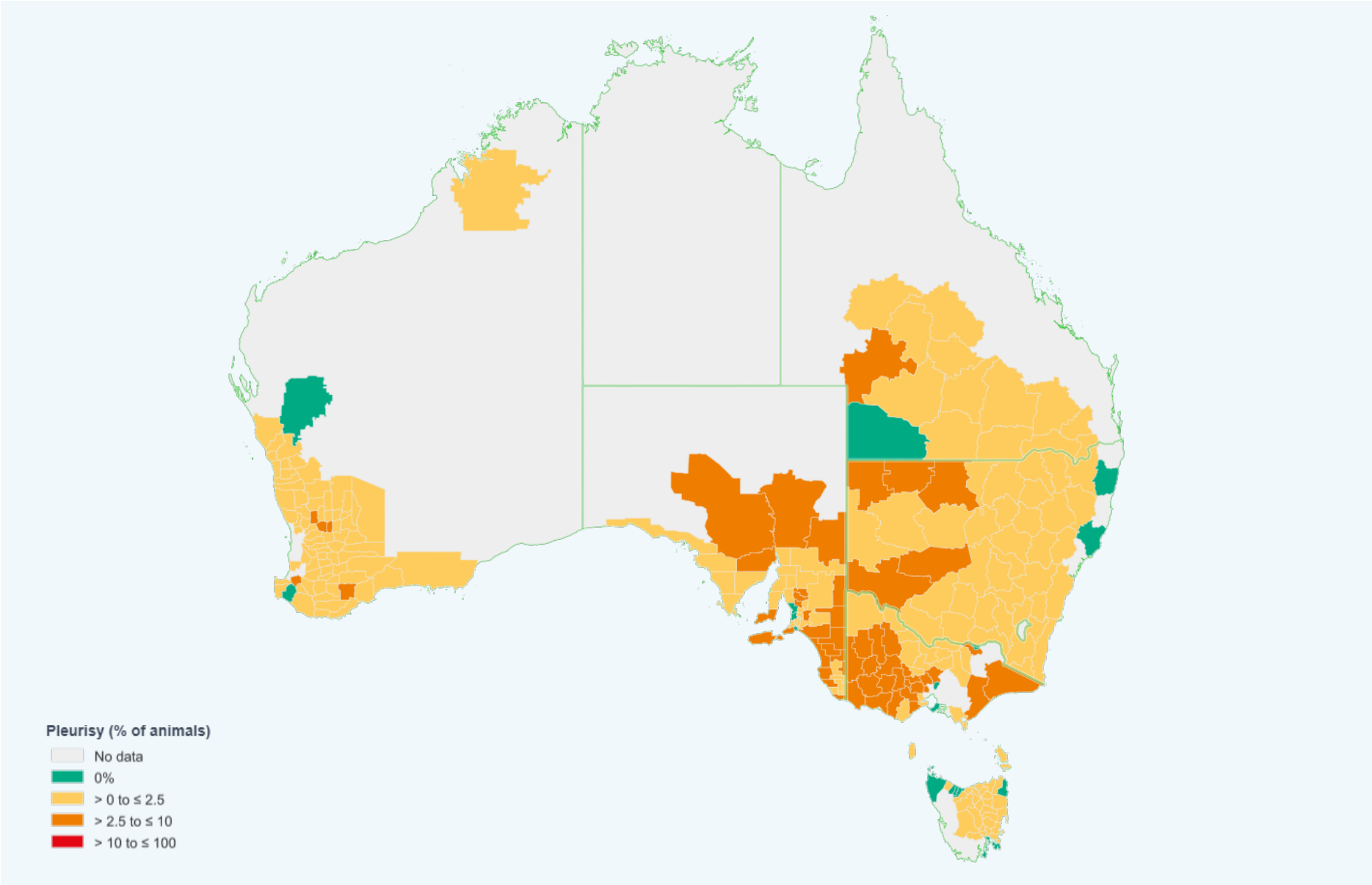


Figure 28: Percentage of sheep affected by pleurisy in each LGA in 2021-2022.

PNEUMONIA

Pneumonia in sheep is inflammation of the lungs. Pneumonia is initially caused by an infection with a bacterium (especially Mycoplasma ovipneumoniae) 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 have risen across Australia in the 2021-22 period compared with the previous year. For the second consecutive year Western Australia saw the biggest increase in affected PICs, rising to 21%. This was followed by New South Wales, with 15% of PICs affected. However, total numbers of affected animals remain relatively low compared to other conditions, with all states reporting <1% of inspected sheep having pneumonia.

Table 14: The number of sheep inspected and affected by pneumonia during 2019-22.

	2019-20	2020-21	2021-22
Total animals inspected	9,455,521	8,894,159	7,758,372
Total animals affected	26,855 = 0.3%	26,646 = 0.3%	37,814 = 0.5%
Total <2yr animals affected	23,732 = 0.3%	24,023 = 0.3%	32,874 = 0.4%

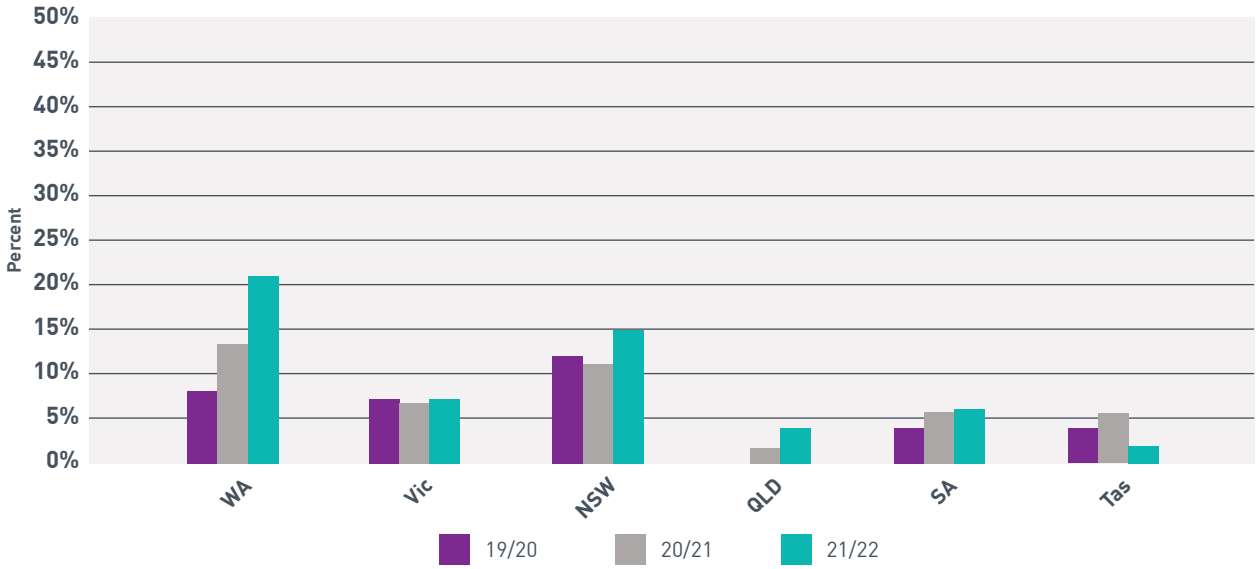


Figure 29: The percentage of PIC's inspected in each state that had at least one affected animal in 2019-22.

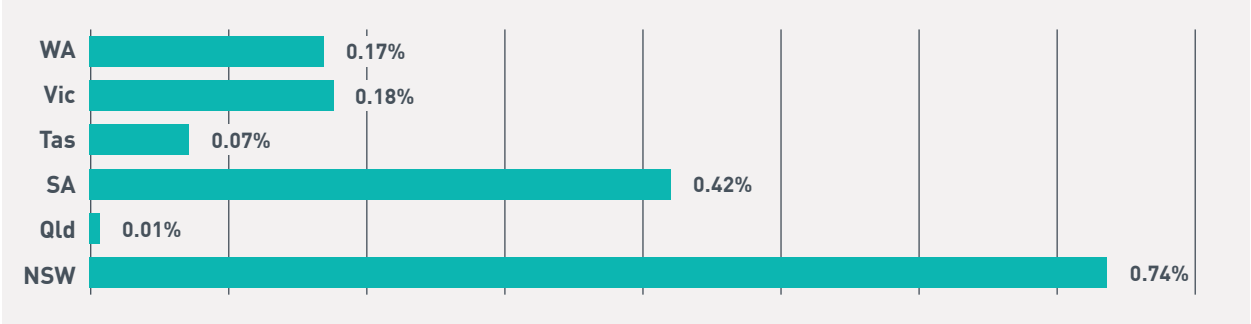


Figure 30: The percentage of animals inspected in each state that were affected in 2021-22.

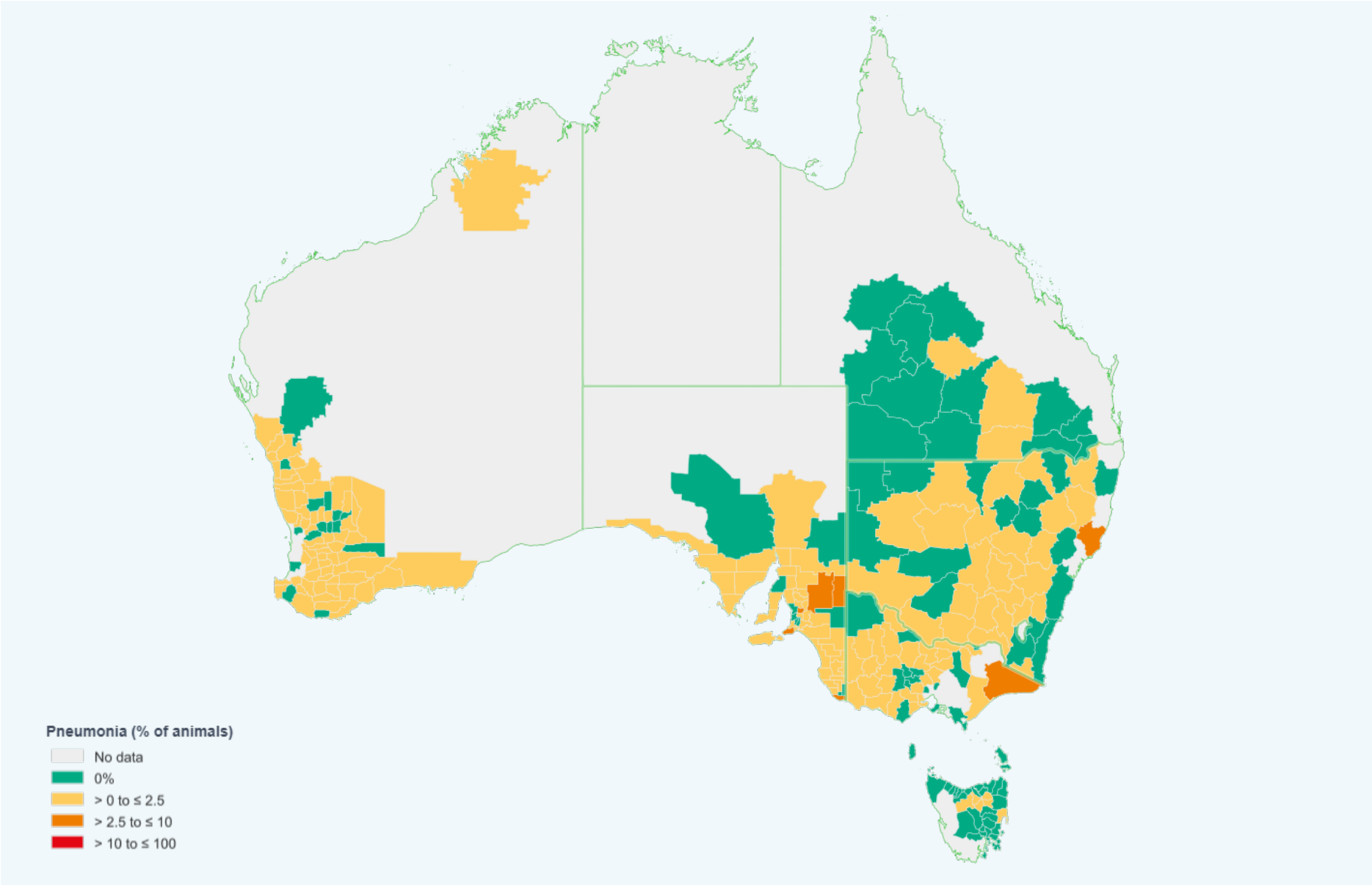


Figure 31: Percentage of sheep affected by pneumonia in each LGA in 2021-2022.

SARCOCYSTOSIS

Sarcocystosis is a disease caused by sarcocystis, 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 increased slightly during the 2021-22 period but remains at very low numbers (Table 15). The percentage of affected PICs decreased in all states except Tasmania, which saw a 6% increase for this reporting period (Figure 32). Tasmania also has the highest percentage of total animals affected, with 2% of inspected sheep affected by sarcocystosis.

Table 15: The number of sheep inspected and affected by sarcocystosis during 2019-22.

	2019-20	2020-21	2021-22
Total animals inspected	9,455,521	8,894,159	7,758,372
Total animals affected	30,508 = 0.3%	12,479 = 0.1%	15,245 =0.2%
Total <2yr animals affected	1,114 = 0.01%	1,068 = 0.01%	1,432 = 0.02%

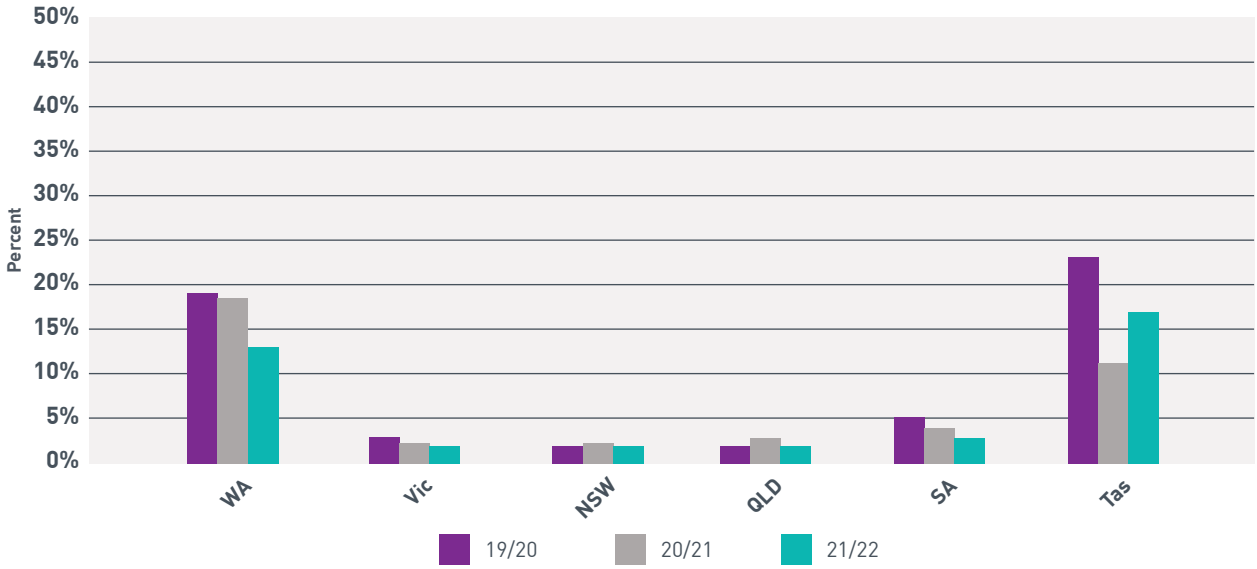


Figure 32: The percentage of PIC's inspected in each state that had at least one affected animal in 2019-22.

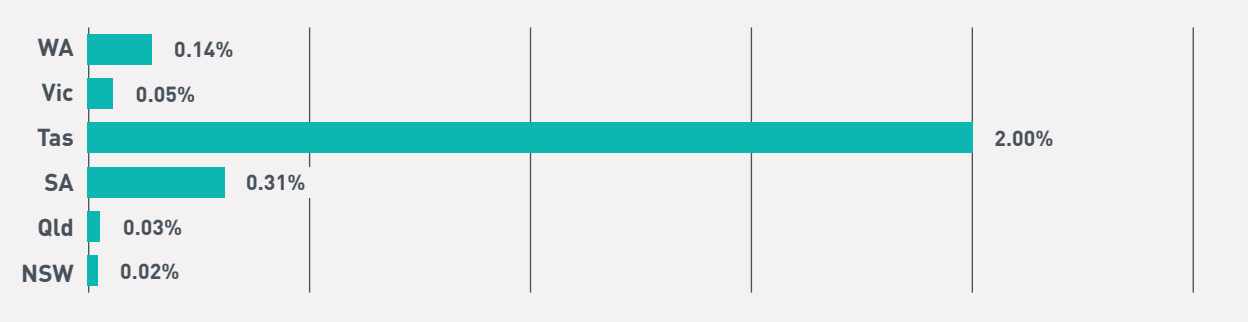


Figure 33: The percentage of animals inspected in each state that were affected in 2021-22.

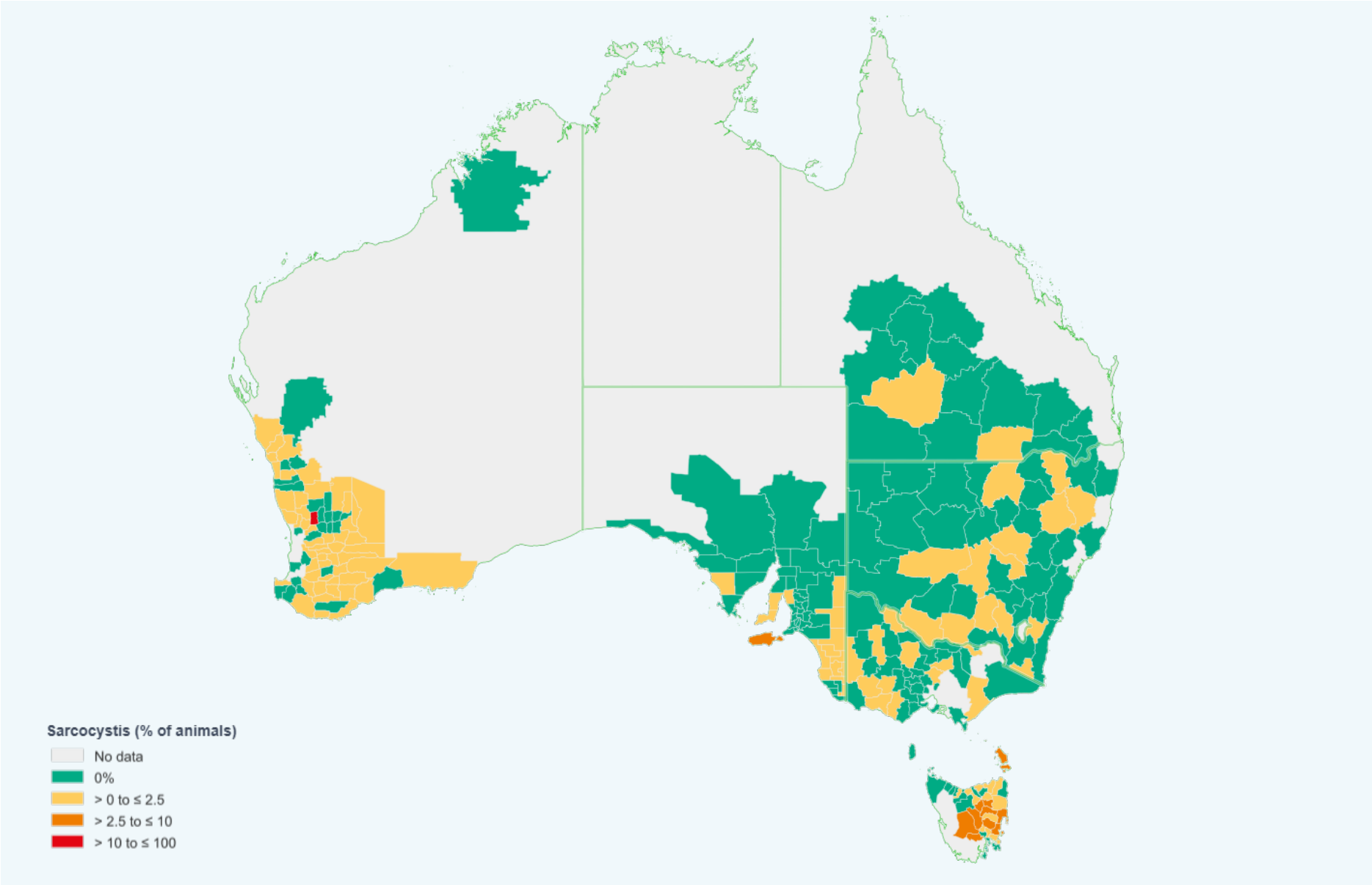


Figure 34: Percentage of sheep affected by sarcocystosis in each LGA in 2021-22.

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 number of PICs affected by sheep measles is relatively even across the states. The total number of affected sheep increased slightly during the 2021-22 period, rising from 1.3% to 1.6% (Table 16). Tasmania remains the state with the highest percentage of affected sheep at 6.56% (Figure 36). All other states recorded <2% of sheep affected.

Table 16: The number of sheep inspected and affected by sheep measles during 2019-22.

	2019-20	2020-21	2021-22
Total animals inspected	9,455,521	8,894,159	7,758,372
Total animals affected	118,778 = 1.26%	115,857 = 1.3%	120,455 = 1.6%
Total <2yr animals affected	40,229 = 0.43%	50,953 = 0.6%	50,109 = 0.6%

Figure 35: The percentage of PIC's inspected in each state that had at least one affected animal in 2019-22.

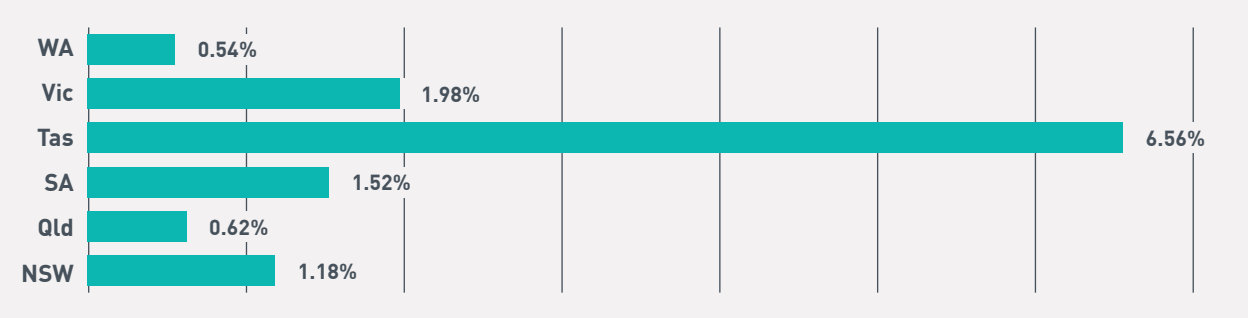


Figure 36: The percentage of animals inspected in each state that were affected in 2021-22.

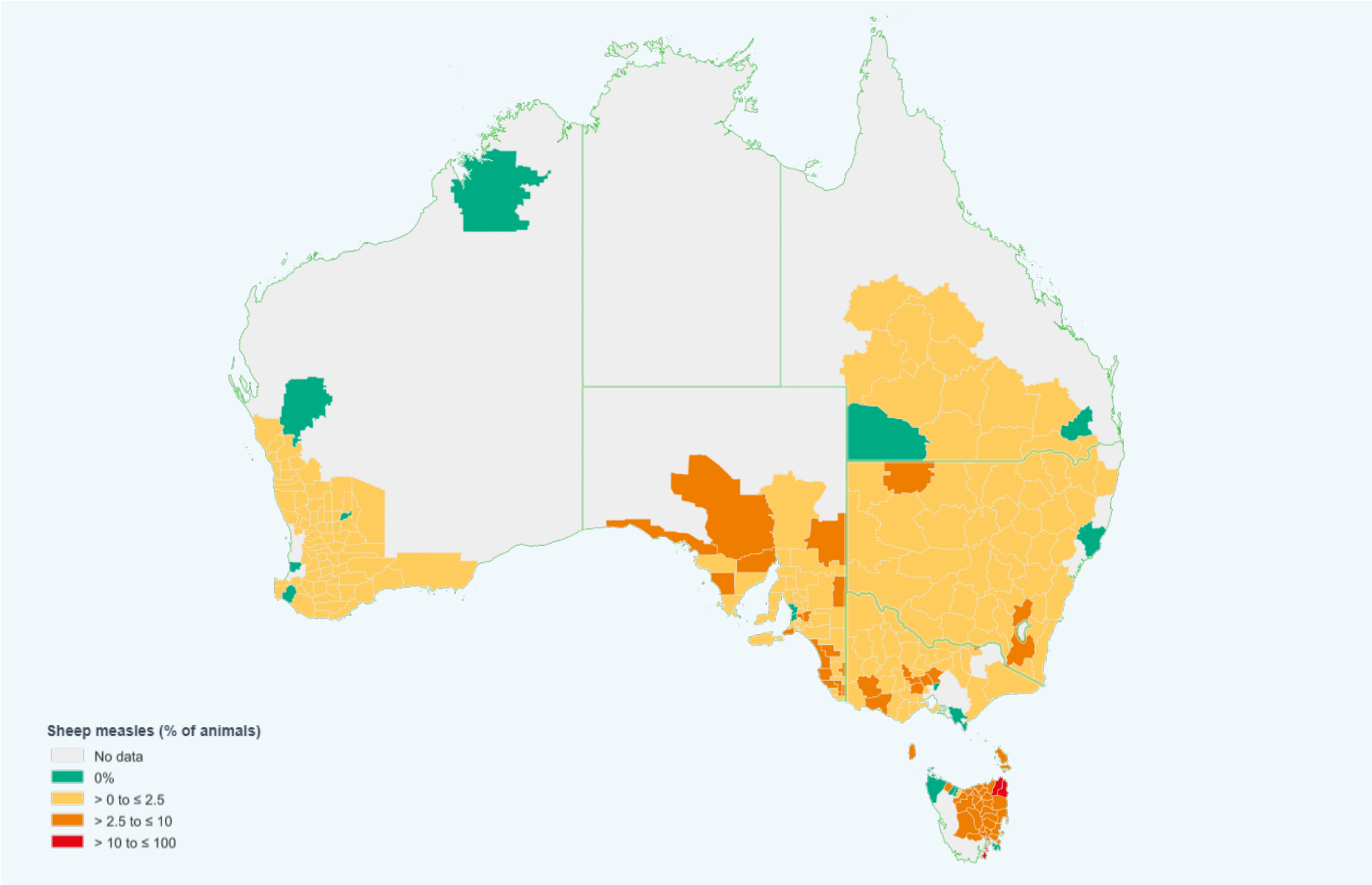


Figure 37: Percentage of sheep affected by sheep measles in each LGA in 2021-22.

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 increased slightly in 2021-22 for the third consecutive year. Vaccination lesions are found on a relatively small percentage of PICs, however this year saw a sharp increase in affected PICs in both Victoria and Western Australia (Figure 38). Victoria also had the highest percentage of animals with vaccination lesions at 2.75%, followed by South Australia, Tasmania and New South Wales, all with >1% (Figure 39).

Table 17: The number of sheep inspected and affected by vaccination lesions during 2019-22.

	2019-20	2020-21	2021-22
Total animals inspected	9,455,521	8,894,159	7,758,372
Total animals affected	107,437 = 1.14%	113,805 = 1.3%	111,319 = 1.4%
Total <2yr animals affected	57,925 = 0.61%	58,059 = 0.7%	59,109 = 0.8%

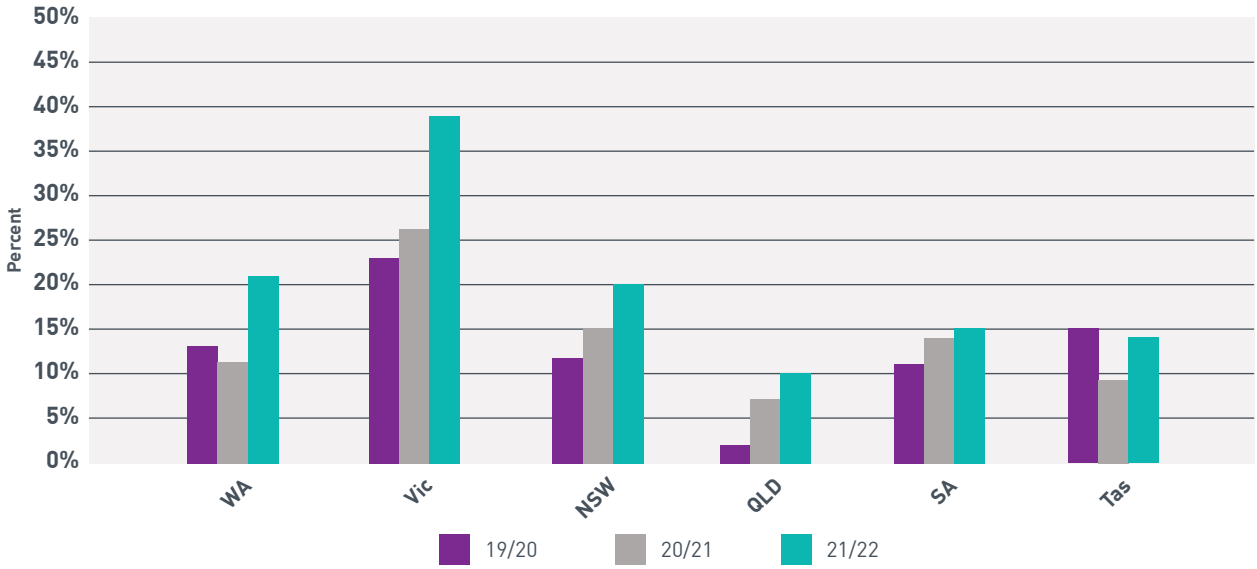


Figure 38: The percentage of PIC's inspected in each state that had at least one affected animal in 2019-22.

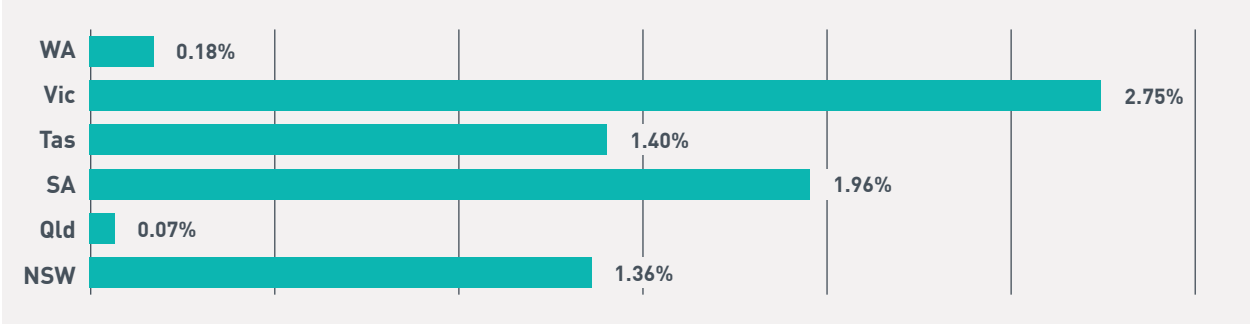


Figure 39: The percentage of animals inspected in each state that were affected in 2021-22.

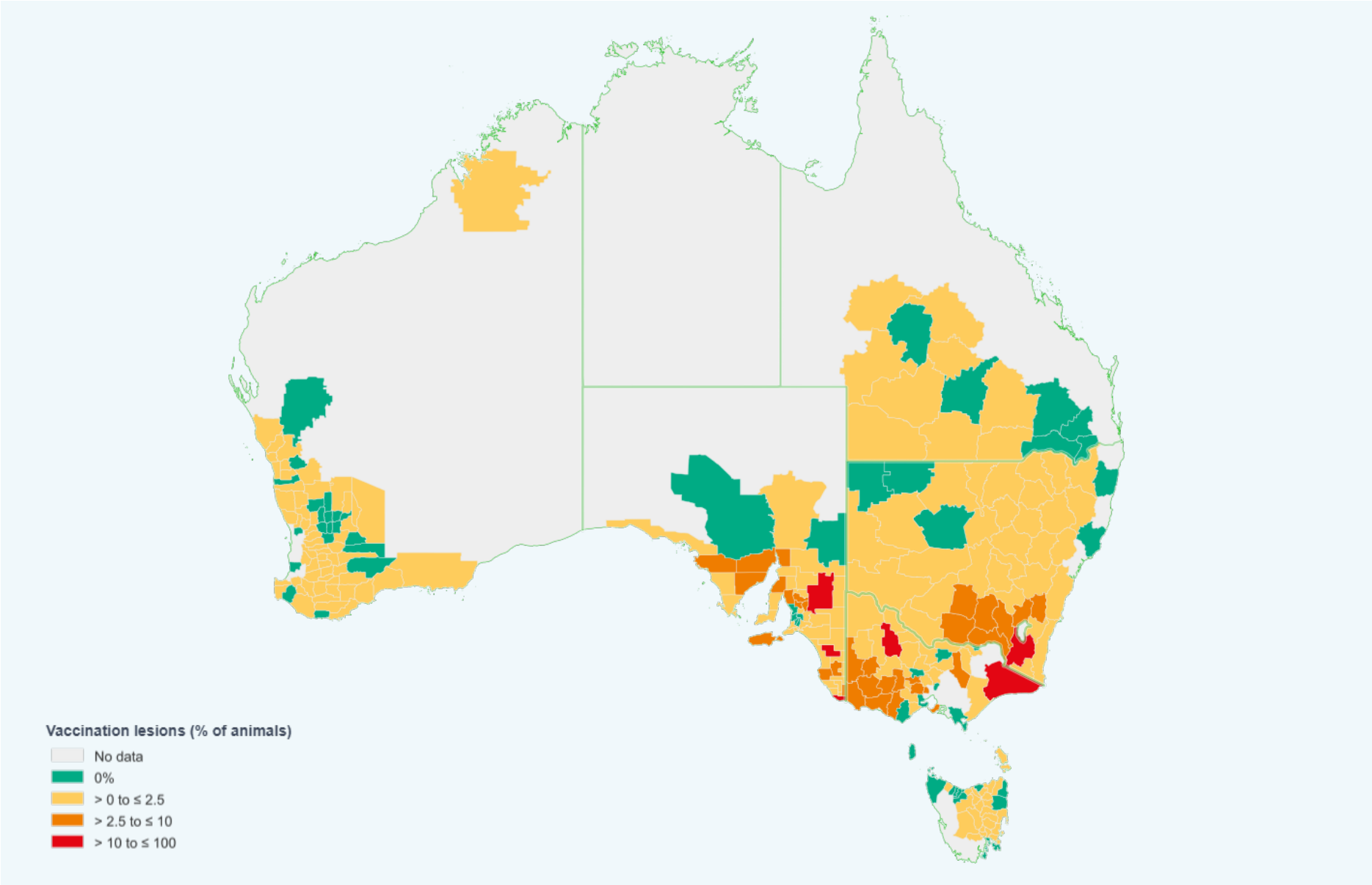


Figure 40: Percentage of sheep affected by vaccination lesions in each LGA in 2021-22.

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 2019-22.

	2019-20	2020-21	2021-22
Total animals inspected	9,455,621	8,894,159	7,758,372
Total animals affected	29,408 = 0.3%	4,062 = 0.05%	2,574 = 0.03%
Total <2yr animals affected	5,398 = 0.06%	1,355 = 0.02%	743 = 0.01%

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 2019-22.

	2019-20	2020-21	2021-22
Total animals inspected	9,455,621	8,894,159	7,758,372
Total animals affected	2,571 = 0.03%	3,045 = 0.03%	3,976 = 0.05%
Total <2yr animals affected	1,489 = 0.02%	1,833 = 0.02%	2,582 = 0.03%

Fever / Septicaemia

Fever or septicaemia are likely to be signs of other illness or infection somewhere in the 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 2019-22.

	2019-20	2020-21	2021-22
Total animals inspected	9,455,621	8,894,159	7,758,372
Total animals affected	1,723 = 0.02%	1,106 = 0.01%	1,159 = 0.01%
Total <2yr animals affected	890 = < 0.01%	504 = < 0.01%	698 = < 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 2019-22.

	2019-20	2020-21	2021-22
Total animals inspected	9,455,621	8,894,159	7,758,372
Total animals affected	19,252 = 0.2%	7,563 = 0.1%	8,165 = 0.1%
Total <2yr animals affected	6,141 = 0.06%	2,962 = 0.03%	3,200 = 0.04%

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 2019-22.

	2019-20	2020-21	2021-22
Total animals inspected	9,455,621	8,894,159	7,758,372
Total animals affected	769 = < 0.01%	625 < 0.01%	360 = < 0.01%
Total <2yr animals affected	411 = < 0.01%	245 < 0.01%	101 = <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 2019-22.

	2019-20	2020-21	2021-22
Total animals inspected	9,455,621	8,894,159	7,758,372
Total animals affected	5,550 = 0.06%	5,570 = 0.06%	7,052 = 0.1%
Total <2yr animals affected	3,504 = 0.04%	4,358 = 0.05%	5,481 = <0.01%

STATE CONTACTS

STATE	NAME	ORGANISATION	NUMBER
New South Wales	Dr Elsa Glanville	NSW Department of Primary Industries	0447 348 774
South Australia	Dr Nigel Baum	Department of Primary Industries and Regions, SA	08 8842 6222
Tasmania	Dr Fiona Pearson	Department of Natural Resources and Environment Tasmania	0436 813 016
Victoria	Dr Alison Lee	Department of Economic Development, Jobs, Transport and Resources	03 5561 9927
Western Australia	Dr Anna Erickson	Department of Primary Industries and Regional Development	0437 801 416
Queensland	Dr Lawrence Gavey	Department of Agriculture and Fisheries	0499 860 249

INDUSTRY CONTACTS

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

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animalhealth AUSTRALIA

+61 2 6232 5522
aha@animalhealthaustralia.com.au
animalhealthaustralia.com.au