



Department of
Primary Industries and
Regional Development

Protect
Grow
Innovate

Western Australian Sheep Producer Survey 2022

September 2023



Contents

- Contents 2**
- Executive Summary 4**
- 1. Background to the producer survey 6**
 - 1.1 Purpose..... 6
 - 1.2 Methodology..... 6
- 2. Enterprise and production..... 9**
 - Key findings 9
 - 2.1 Enterprise type and size 10
 - 2.2 Dominant mating type 14
- 3. Breeding strategies and behaviours..... 15**
 - Key findings 15
 - 3.1 Breeding or selling rams 16
 - 3.2 Stud selection..... 17
 - 3.3 Ram selection 19
 - 3.4 Knowledge of Australian Sheep Breeding Values 21
 - 3.5 Sale of rams and use of Australia Sheep Breeding Values 22
- 4. Labour saving devices..... 23**
 - Key findings 23
 - 4.1 Labour saving technologies 24
 - 4.2 Other labour-saving devices 25
 - 4.3 New technologies 26
 - 4.4 NLIS and electronic identification 27
- 5. Reproduction and welfare 28**
 - Key findings 28
 - 5.1 Reproduction and marking rates..... 29
 - 5.2 Time of lambing 33
 - 5.3 Pregnancy scanning..... 36
 - 5.4 Management of ewe nutrition 39
 - 5.5 Mulesing, marking and pain relief practices 42

6. Lamb turn-off	47
Key findings	47
7. Sustainability	51
Key findings	51
7.1 Pastures and marginal land	52
7.2 Reducing greenhouse gas emissions	58
8. References	61
Appendix 1: Survey questions	62

Acknowledgements

Survey design: Katherine Davies, Janet Conte and Mandy Curnow, DPIRD

Survey administration: Ipsos Australia

Statistical analysis: Anne Jones, Nourish Organic and Ag Consulting

Statistical analysis advice: Andrew van Burgel, DPIRD

Report: Janet Conte and Katherine Davies, DPIRD

Editing: Jeana Pritchard, DPIRD

Executive Summary

The Western Australian Sheep Producer Survey is conducted to gather information on sheep enterprises and producer practices. It has now been conducted four times, in 2011, 2014, 2018 and 2022 with large random samples of sheep producers in the Medium Rainfall Zone (MRZ) and Cereal Sheep Zone (CSZ).

Some questions were included in all four surveys providing a chance to examine trends over time. Many of the results have remained stable over time giving some confidence that significant changes in survey responses are reflecting trends in the broader population of WA sheep producers. Below are key findings from the surveys.

Findings that have remained stable over time:

- The proportion of respondents who have wool enterprises, prime lamb or dual enterprises (both wool and prime lamb) has not changed significantly between 2011 and 2022, despite a reduction in average flock size. The proportion of all sheep in the survey in these different enterprises has also been consistent.
- In relation to ram breeding, the majority (80%) of respondents continue to 'run a commercial flock and buy rams' and around a quarter 'breed rams for their own commercial flock' as opposed to 'breed rams for sale' or 'trade sheep only' (more than one response was allowed).
- Management of nutrition based on pregnancy scanning status between 2011 and 2022 was at the same level although there were significant changes in the interim.
- The proportion of lambs turned off to slaughter and live export in 2018 and 2022 were very similar, 70% and 30% respectively in 2018 and 79% and 21% in 2022.
- The most popular method for selling lambs has been through an agent (40% in 2018 and around half in 2022) as opposed to: direct to an abattoir, processor or exporter; through a saleyard; online auction; or direct to other producers or feedlotter. The least popular method has consistently been through online auction.

Trends over time:

- The average flock size of respondents has consistently decreased, in both the MRZ and CSZ, from 2011 to 2022 (4,720 to 4,032).
- There was a significant decrease in the average flock size of prime lamb producers from 2018 to 2022 (4,048 to 2,190).
- Significant increase in the proportion of respondents who were prime lamb producers from 2018 to 2022 which was driven by the CSZ (7% to 13%).
- Increasingly, producers select rams based on 'look, data and some genetics' or 'primarily on genetics' (41% in 2011 to 54% in 2022) as opposed to just visual traits.
- Significant increase in use of some labour-saving devices: electronic identification; sheep handler; remote water tank sensor and pump controller; and an individual data management system.
- Significant increase over time in 'considering using' walk over weighing, automatic jetting machine, sheep handler and remote water tank sensor and pump controller.

- The practice of scanning for litter size continued to increase, to 27% of respondents in the 2022 survey, in both zones, with a corresponding increase in the proportion of the ewe flock that was scanned for litter size from 2018 to 2022 (29% to 36%).
- Significant increase in monitoring of ewe condition using a 'visual assessment and occasionally condition scoring' from 24% in 2011 to 39% in 2022.
- The rate of Merino mulesing has increased, with 82% of producers mulesing in the 2022 survey and 84% of all Merino lambs being mulesed.
- The use of pain relief in mulesing of Merino lambs has increased significantly from just over half in 2011 to 90% in 2022.
- Increase in average marking rates of Merino lambs and meat and maternal lambs between 2011 and 2022, up to 96% for Merinos and 100% for cross bred lambs.
- In the 2022 survey, the overall peak lambing time was April to June. In the MRZ, peak timing was May and June and in the CSZ there was a dip in May for cross-bred lambs with a peak of second lambing in May. The peak for second lambing was in June for Merinos and July for meat lambs.

Larger producers:

- More likely to scan for litter size.
- More likely to have a good or detailed understanding of Australian Sheep Breeding Values and less likely to have never heard of them.
- Largest quartile based on flock size had higher stocking rates than any other quartile (not in MRZ).
- Largest quartile ran 56% of the sheep owned by respondents (66% in the MRZ).
- Larger Merino producers were more likely to mules (86 to 88% of larger producers).

Differences between zones in the 2022 survey:

- Stocking rates (calculated based on the total number of sheep for all respondents) were significantly higher in the MRZ than the CSZ (2.98 and 0.81 sheep/ha respectively).
- The average flock size was larger in the MRZ than the CSZ (4,493 ha and 3,663 ha respectively).
- The average grazing area was larger in the CSZ (1,550 ha compared to 778 ha in the MRZ).

Sustainability:

- New questions were added to the 2022 survey on feed gaps, pasture improvement, marginal land and producers' management strategies and reducing greenhouse gas emissions.
- The primary feed gap was in late autumn – early winter (72% of respondents) for all enterprise types (wool, lamb and dual enterprises).
- Half of the respondents had sown new pastures in 2021 with the majority sowing a mix (primarily a ryegrass mix).
- The majority of respondents considered a portion of their land to be marginal, on average 17% of their farm with a large range of management strategies reported.
- The main practices used to reduce greenhouse gas emissions were: pasture renovation and protection of native bush, waterways and wetlands.

1. Background to the producer survey

1.1 Purpose

The WA Sheep Producer Survey has been conducted four times, in 2011, 2014, 2018 and 2022, with the aim of documenting sheep producers' practices (DAFWA 2013; DAFWA, 2015; DPIRD, 2019). Sample sizes in the previous survey were 369, 368 and 389 for the 2011, 2014 and 2018 surveys respectively. The four surveys now provide an opportunity to analyse any trends in practices over time for those questions asked in multiple surveys.

Survey questions are related to general demographics, breeding, reproduction, use of labour-saving devices, pasture and husbandry practices.

1.2 Methodology

The 2022 survey targeted registered sheep producers operating within the Cereal Sheep Zone (CSZ) and Medium Rainfall Zone (MRZ). Questions were asked at the very start of the survey to determine whether respondents were in the target sample of producers with 500 or more sheep.

- Have you had 500 or more sheep on your property at any time over the last year (2021)?
- Would you have regularly had more than 500 sheep on your property over the past five years?

Those with less than 500 sheep were thanked for their time.

The MRZ includes the south-west, from Perth in the north to Albany in the south and has a six-month growing season. The CSZ extends from Geraldton in the north-west to Esperance in the south-east and has a five-month growing season (Figure 1).

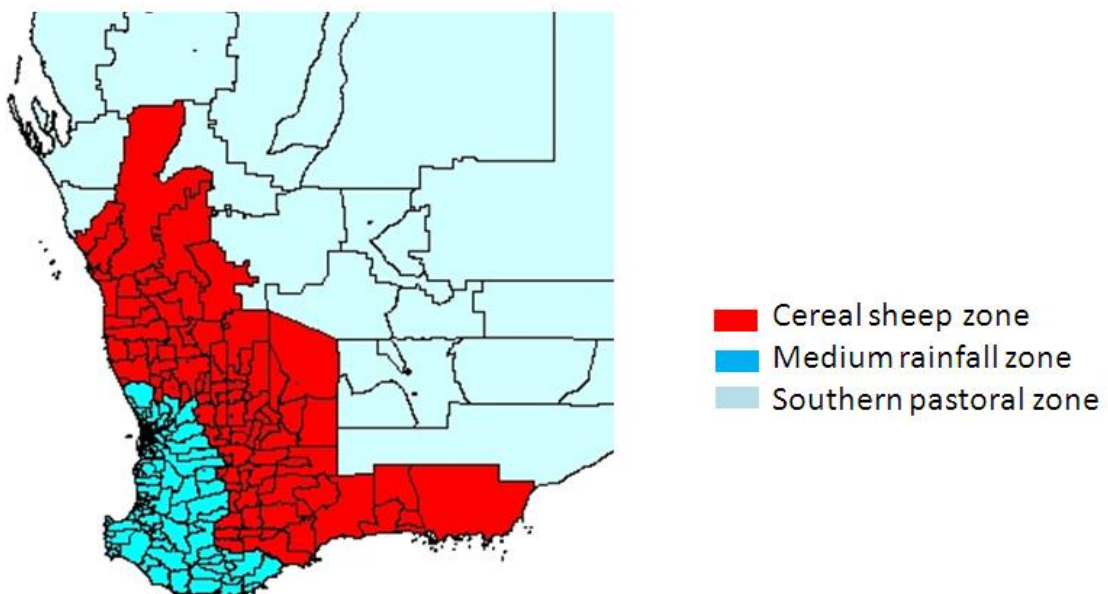


Figure 1 - Production zones as defined and used by the Sheep CRC and Department of Primary Industries and Regional Development (DPIRD)

For this first time, the survey was conducted both by telephone and online. Initial telephone surveying proved time consuming with a very low response rate, and most surveys were completed online (379 online respondents and 69 telephone respondents).

Sampling to select properties meeting the two criteria was based on size of properties (as an estimate of number of sheep) and post codes (for the two zones). Names were randomly selected from the list to contact by telephone and initial questions were asked about number of sheep and location of the property. Telephone surveys were conducted by the market research company IPSOS Australia. The online survey was emailed to all properties on the contact list, with an open survey link advertised more widely. Please refer to Appendix 1 for a full list of survey questions.

Data was collected for Merino meat and maternal enterprises. South African Meat Merino (SAMM) and Dohne sheep were included as Merino.

The survey respondents represented 10% of WA sheep producers (Table 1) and their sheep represented 14% of the WA sheep flock (Table 2). The respondents from each zone were split in the same proportion as the most recent Australian Bureau of Statistics census data (ABS, 2021), with 56% in the CSZ and 44% in the MRZ. Despite the random sampling and significant sample size, reporting of results is cautious and refers to respondents rather than generalising the results to the broader population of WA sheep producers in the CSZ and MRZ.

Zone	2022 Survey N respondents	2022 Survey % respondents	2021 ABS N businesses	2021 ABS % businesses
CSZ	253	56	2,390	56
MRZ	195	44	1,852	44
Total	448		4,242	

Table 1 – Representativeness of survey respondents

Zone	2022 Survey N sheep	2022 Survey % sheep	2021 ABS N sheep	2021 ABS % sheep
CSZ	890,185	50	6,841,204	54
MRZ	871,717	50	5,745,936	46
Total	1,761,901		12,587,140	

Table 2 – Representativeness of the sheep covered in the survey

Age and gender

As shown in Table 3, most respondents to the survey were male (82%). The largest group of male respondents (27%) were in the 55-64 age bracket followed by males aged 65+ years (20%). This equates to almost half (47%) of the respondents to the survey being male over the age of 55. The split between male and female respondents is very similar to the 2018 survey. The proportion of females recorded in this survey would not likely represent the proportion of women involved in sheep enterprises as many are partners or co-managers of sheep enterprises. The survey did not ask for the respondent's status in the enterprise.

Age group	Male %	Female %	Did not answer %	Total
<25 years	0%	0%	0%	1%
25 - 34	3%	1%	1%	5%
35 - 44	15%	3%	1%	19%
45 - 54	16%	4%	1%	21%
55 - 64	27%	3%	2%	32%
65+ years	20%	1%	0%	22%
Total	82%	12%	5%	100%

Table 3 – Age and gender of survey respondents

Analysis

Where responses differ based on enterprise type or zone the responses will be shown separately rather than for the sample as a whole. The symbol N is used to show the total number of respondents to a question and n to indicate the frequency of the response. Significance levels are $p < 0.05$ for both T-tests and chi-square tests and superscript letters are used to show significant differences (a and b; c and d; etc). Questions are listed in bold at the start of each section.

2. Enterprise and production

Key findings

- The average flock size of respondents has consistently decreased from 2011 to 2022 (from 4,720 to 4,032) and in both zones.
- In the 2022 survey, the average flock size in the MRZ was 4,493 and in the CSZ, 3,663.
- The decrease in the CSZ was not as large as in the MRZ and the median in the CSZ has remained at approximately 3,000.
- There was a significant and large decrease in the average flock size for respondents who were prime lamb producers from 2018 to 2022 (from 4,048 to 2,190). Over the same period, the decrease in average flock size for wool and dual enterprises was not significant.
- The proportion of respondents who have wool enterprises, prime lamb enterprises or dual enterprises (both wool and prime lamb) has remained fairly stable from 2011 to 2022.
- However, there was a significant increase from 2018 to 2022 in the proportion of prime lamb producers, driven by a significant increase in the CSZ (7% to 13%).
- The largest quartile of producers (based on flock size) ran 56% of the sheep (in the MRZ 66%).
- Stocking rates (calculated based on the total number of sheep for all respondents) were significantly higher in the MRZ than the CSZ (2.98 and 0.81 sheep/ha, respectively).
- The average grazed area was 1,209 ha in the 2022 survey (778 for MRZ and 1,550 for CSZ; a significant difference).
- Dual enterprises in the CSZ had the largest average grazed area (1,668 ha).
- The majority of producers ran Merinos (73% in the MRZ and 81% in the CSZ); approximately half of the producers ran cross-bred lambs (58% in the MRZ and 40% in the CSZ); and approximately a third of producers ran meat lambs (30% in the MRZ and 24% in the CSZ).

2.1 Enterprise type and size

What was the total number of sheep on the property at 30th June 2021, including ewes, wethers, rams and lambs?

What is the total winter grazed area, in hectares, that you allocate for sheep production, including all leased land?

What is the total area, in hectares, of stubbles grazed by sheep?

What is the primary purpose of your sheep enterprise? (Wool production; prime lamb; wool production and prime lamb production or 'dual').

There was a significant increase in the proportion of prime lamb producers from 2018 to 2022, from 10% to 14% (Table 4) driven by an increase in prime lamb producers in the CSZ (7% to 13%). There was also a significant decrease in the proportion of dual enterprise producers in the CSZ over the same period (67% to 56%).

Zone		2011			2014			2018			2022		
		Wool	Prime lamb	Dual	Wool	Prime lamb	Dual	Wool	Prime lamb	Dual	Wool	Prime lamb	Dual
MRZ	n	38	20	75	39	22	75	49	23	106	43	30	122
	%	29%	15%	56%	29%	16%	55%	28%	13%	60%	22%	15%	63%
CSZ	n	67	20	149	85	22	135	55	15	141	77	34	142
	%	28%	8%	63%	35%	9%	56%	26%	7% ^c	67% ^e	30%	13% ^d	56% ^f
Total	n	105	40	224	124	44	210	104	38	247	120	64	264
	%	28%	11%	61%	33%	12%	56%	27%	10% ^a	63%	27%	14% ^b	59%

Table 4 – Enterprise type by zone for the 2011, 2014, 2018 and 2022 WA sheep producer surveys

The average flock size for 2022 survey respondents was larger than WA sheep producers in the 2021 ABS Agricultural Census. The average MRZ flock size in the 2022 survey was 4,493 compared to 3,102 in the Census and the average CSZ flock size was 3,663 compared to 2,862 in the Census (ABS, 2021). This may be due to the different sampling (ABS used Estimated Value of Agricultural Operations above \$40,000 whereas this survey sampled producers with a flock size of >500).

Zone	2011			2014			2018			2022		
	Average	%	Median	Average	%	Median	Average	%	Median	Average	%	Median
MRZ	5,829	45	4,600	5,282	43	3,250	4,835	53	3,000	4,493	50	2,600
CSZ	4,095	55	3,000	3,913	57	3,000	3,682	47	2,932	3,663	50	3,000
Total	4,720		3,500	4,402		3,000	4,210		3,000	4,032		3,000

Table 5 – Average and median number of sheep per respondent and proportion of total number of WA sheep by zone

In the MRZ, there has been an overall decline in the average and median number of sheep per respondent over the past decade, with the median reducing from 4,600 to 2,600 sheep per respondent. The number of sheep per respondent in the CSZ has remained more stable over the last decade with a slight decline in the average number of sheep per respondent, but the median has remained around 3,000 sheep per respondent. This is not reflected in the ABS Census data for WA averages; 2,590 in 2010-11, 3,075 in 2015-16 and 2,953 in 2020-21 which may again be due to the different sampling technique.

The difference in the median and average number of sheep per respondent indicates that there are a smaller number of very large sheep producers in each of the zones, increasing the average. The trend, especially in the MRZ, is toward smaller flock sizes. Figure 2 below shows the distribution of overall flock size in each zone highlighting the small number of producers with very high numbers of sheep. There were a few outliers (e.g. 2 producers from the MRZ with 30,000 or more sheep).

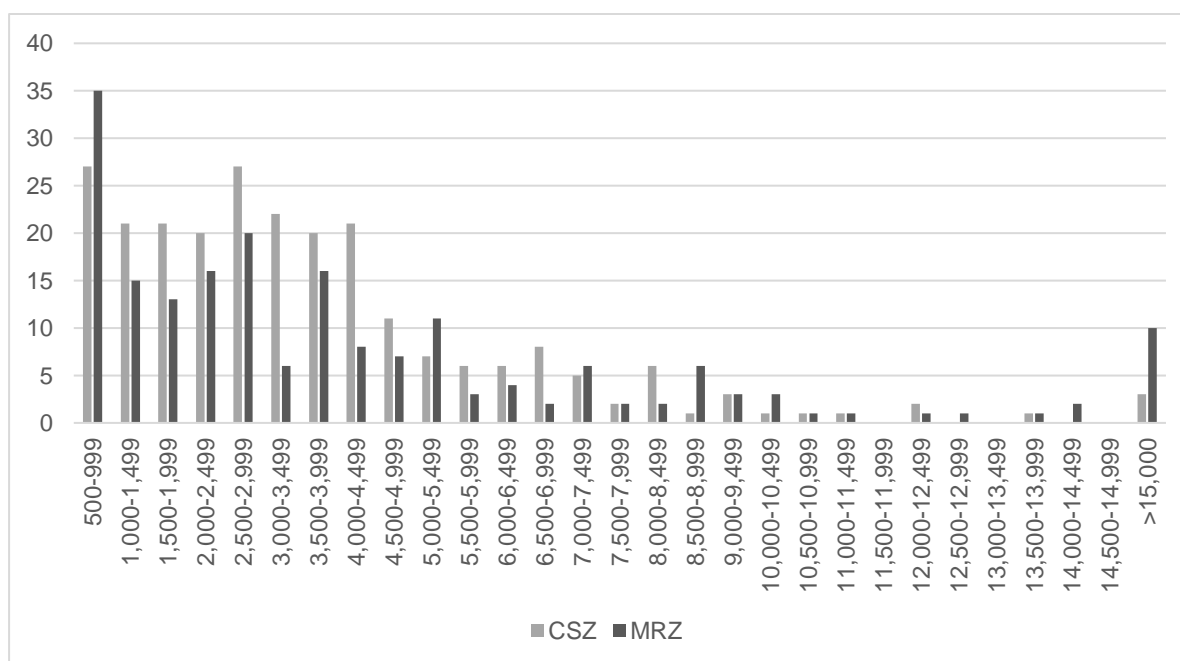


Figure 2 – Distribution of overall flock size by zone in 2022

There was a significant decrease in the average flock size for prime lamb enterprises from 2018 to 2022 (from 4,048 to 2,190) but no significant change for wool and dual enterprises (see Table 6). The proportion of sheep in the different enterprise types has remained consistent over time despite the reduction in overall numbers of sheep.

	2011			2014			2018			2022		
	Average	%	Median	Average	%	Median	Average	%	Median	Average	%	Median
Wool	4,557	27	3,973	4,517	33	3,200	4,232	27	3,000	4,028	27	3,300
Prime lamb	3,635	8	2,650	2,492	7	1,300	4,048 ^a	9	2,000	2,190 ^b	7	1,550
Dual	4,990	64	3,900	4,737	60	3,500	4,225	64	3,000	4,451	66	3,030

Table 6 – Average number and proportion of sheep by enterprise type for respondents to the 2011, 2014, 2018 and 2022 WA producer surveys

The largest 25% (quartile 4 in Figure 3) of producers by flock size ran 56% of the total number of sheep, similar to 2018 (58%). The largest quartile of MRZ producers ran 66% of the sheep, the same as 2018. The largest dual enterprise producers in the MRZ ran 73% of all dual enterprise sheep in that zone (not shown). In the CSZ, 50% of wool sheep and 46% of dual enterprise sheep were run by quartile 4 producers. Prime lambs, however, were more evenly distributed (18 to 38%) over the quartiles in both zones; different to 2018 when the largest quartile of prime lamb producers ran 57% of the sheep.

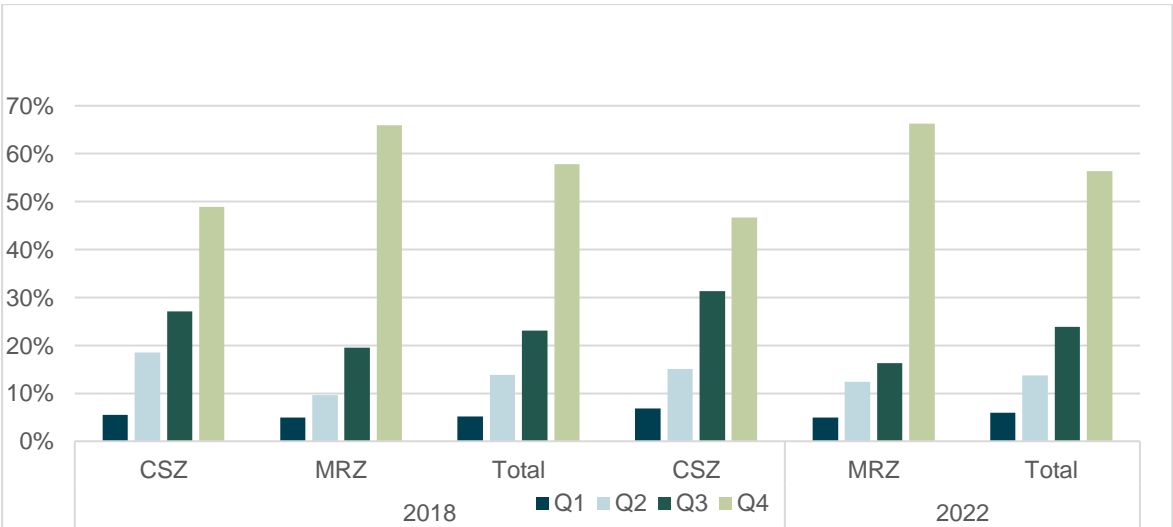


Figure 3 – Percentage of flock run by quartile and zone in 2018 and 2022

In the 2022 survey, the average grazed area was significantly larger in the CSZ than the MRZ (1,550 ha and 778 ha respectively; see Table 7). There were no significant differences between enterprise types or between the 2018 and 2022 surveys.

Zone	WA average (ha)	Wool average (ha)	Prime lamb average (ha)	Dual enterprise average (ha)
MRZ	778	745	490	859
CSZ	1,550	1,484	1,158	1,668
Total	1,209	1,215	824	1,291

Table 7 – Average number of hectares of grazed area for 2022 survey respondents by enterprise and zone

Stocking rate was calculated by dividing the total number of sheep (all respondents in each zone) by total hectares of pasture and stubble, rather than averaging stocking rates of individual respondents (see Table 8). Stocking rates were significantly higher in the MRZ.

Stocking rate (sheep/ha)	Pasture	Stubble	Combined
MRZ	5.79	6.15	2.98
CSZ	2.35	1.24	0.81

Table 8 – Stocking rate on pasture versus stubble (2022)

2.2 Dominant mating type

How many Merino ewes were mated to Merino rams in 2021 (including Dohnes and SAMMs)?

How many Merino ewes were mated to meat or maternal rams in 2021?

How many meat or maternal ewes were mated to meat or maternal rams in 2021?

As shown in Table 9, for wool producers, the vast majority of the ewes mated were Merino ewes mated to Merino sires (95%).

For prime lamb producers, 77% of the ewes mated were meat or maternal ewes mated with meat or maternal rams with 14% being cross bred (Merino ewes with meat or maternal rams).

For dual purpose producers (wool and prime lamb), 55% of their ewes were Merino ewes mated to Merino rams, 33% were Merino ewes mated with a meat or maternal ram and 9% were meat or maternal ewes with meat or maternal rams.

Enterprise type	Merino ewe to Merino ram	Merino ewe to meat or maternal ram	Meat or maternal ewes and rams
Wool	95%	3%	2%
Prime lamb	9%	14%	77%
Wool and prime lamb	58%	33%	9%

Table 9 – Proportion of ewe flock by breed of mating and enterprise type (2022)

Zone	Merino lambs		Crossbred lambs		Meat lambs	
	% producers	Av no. ewes mated	% producers	Av no. ewes mated	% producers	Av no. ewes mated
MRZ	73%	2,054	58%	1,315	30%	1,042
CSZ	81%	1,690	40%	966	24%	1,123

Table 10 – Proportion of producers and average number of ewes mated by breed (2022)

3. Breeding strategies and behaviours

Key findings

- In the 2022 survey, the majority of producers responded that they 'run a commercial flock and buy rams' (80%) with 25% breeding rams for their own commercial flock (more than one response was permitted). This has remained relatively stable over the timespan of the four surveys.
- These proportions are also similar across enterprise types (wool, prime lamb and dual enterprises).
- In relation to selection of a stud for purchasing their rams, the largest proportion of respondents (40% in 2022) have never considered going to anyone other than their regular stud breeder. This proportion was significantly higher in the CSZ than the MRZ (45% compared to 32%, respectively).
- For those who never consider another breeder, the main reasons selected were: 'I determined years ago to purchase from my regular breeder, based on performance data and have never had cause to change this decision' (41%); or 'I am confident that my stud breeder sells rams that perform well' (37%).
- In relation to ram selection strategies, there has been a trend for producers to increasingly 'choose based on look, data and some genetics' or 'primarily on genetics' (total of 41% in 2011 to 54% in 2022).
- Producers operating a prime lamb enterprise were significantly more likely than other enterprise types to 'choose rams based on how they look' and less likely to 'choose rams based on a combination of looks and performance data'.
- Approximately half of the flock represented in the 2022 survey was subject to the selection of rams being based on 'a combination of visual appeal, performance data and some genetic information'.
- In relation to knowledge of Australian Sheep Breeding Values (ASBVs), understanding has increased since 2014 with an increase from 70% of respondents having either a basic, good or detailed knowledge of ASBVs to 81% in 2022.
- In the 2022 survey, the largest quartile of producers, based on flock size, were significantly more likely to have a good or detailed understanding of ASBVs and significantly less likely to have never heard of or not understand ASBVs.
- Producers who sell larger numbers of rams (>201) were more likely to provide ASBVs than those that sell smaller numbers.
- The large majority (79%) of producers purchased rams at auction in the 2022 survey.

3.1 Breeding or selling rams

Do you: run a commercial flock and buy rams; breed for your own commercial flock; breed rams for sale; trade sheep only? (More than one option allowed)

How many rams did you buy in 2021?

The majority (80%) of respondents in the 2022 survey had a commercial flock and bought their rams (see Table 11). This proportion has remained relatively stable over the four surveys although there was a decrease in 2014 to 69%. There was no significant difference in responses between enterprise types.

Figure 4 shows the breakdown and overlap of different breeding strategies used across all enterprises in the 2022 survey.

Breeding strategy	n	%	Wool	Prime lamb	Dual
Commercial flock and buy rams	348	80%	75%	73%	83%
Breed for own commercial flock	109	25%	25%	31%	24%
Breed rams for sale	48	11%	12%	22%	8%
Trade sheep only	15	3%	4%	3%	3%
N	436		118	59	259

Table 11 – Proportion of respondents using different breeding strategies (2022)

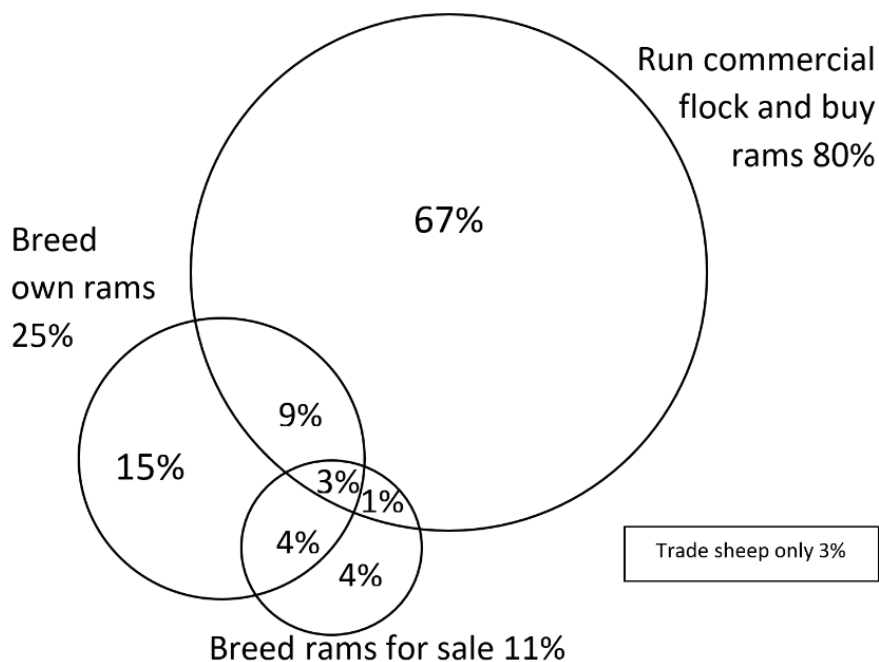


Figure 4 – Venn diagram of breeding strategies (2022)

3.2 Stud selection

Which one of the following statements best describes how you usually select your stud or ram source for your primary sheep enterprise?

- I have never considered going to anyone other than my regular stud breeder
- I choose a stud breeder based on advice from my classer, agent or consultant
- I usually go to the ram sales or shows and select a study that suits my needs
- I review wether trial data, sire evaluation data, sale reports etc and select a stud breeder that is performing well
- I use Australian Sheep Breeding Values (ASBVs) or information from Sheep Genetics and/or selection indexes to select a breeder that matches my breeding objective

Which one of the following statements describes the main reason for never considering anyone other than your regular stud breeder?

- My stud breeder is conveniently located to my property
- I have a good relationship with my stud breeder
- I am confident that my stud breeder sells rams that perform well
- I determined years ago to purchase from my regular breeder based on performance data and have never had cause to change this direction

Respondents in the CSZ were more likely to ‘never consider going to anyone other than their regular stud breeder’; in the MRZ they were more likely to use ASBVs or other genetic information to select a breeder, consistent with 2018 findings (Table 12). More producers in 2022 were likely to select a breeder based on ASBVs or other genetic data (not statistically significant). In the 2018 report 20% and 11% of producers in the MRZ and CSZ, respectively, used ASBVs and genetic information. The increase to 2022 was not statistically significant for either zone.

Method of selecting a ram source	CSZ	MRZ	2022	2018
I have never considered going to anyone other than my regular stud breeder	45% ^a	32% ^b	40%	39%
I choose a stud breeder based on advice from my classer, agent or consultant	18%	23%	20%	18%
I usually go to the ram sales or shows and select a stud that suits my needs	19%	15%	17%	22%
I review wether trial data, sire evaluation data, sales reports etc and select a stud breeder that is performing well	2%	2%	2% ^c	6% ^d
I use ASBVs or information from Sheep Genetics and/or selection indexes to select a breeder that matches my breeding objective	16% ^e	28% ^f	21% ^g	15% ^h

Table 12 – The proportion of producers that implement each stud selection strategy (2022) with breakdown by zone and comparison with 2018 data

Table 13 shows the methods of selecting a stud breeder by breed. There were no significant differences between breeds.

Method of selecting a ram source	Merino flock	Crossbred flock	Meat flock
I have never considered going to anyone other than my regular stud breeder	39%	34%	43%
I choose a stud breeder based on advice from my classer, agent or consultant	14%	20%	21%
I usually go to the ram sales or shows and select a stud that suits my needs	18%	15%	10%
I review wether trial data, sire evaluation data, sales reports etc and select a stud breeder that is performing well	2%	3%	2%
I use ASBVS or information from Sheep Genetics and/or selection indexes to select a breeder that matches my breeding objective	26%	27%	24%

Table 13 – The proportion of WA flock subject to each stud selection strategy (2022)

Those respondents that selected ‘I have never considered going to anyone other than my regular breeder’ were asked to select the main reason (Figure 5). The most frequent reasons selected were ‘I determined years ago to purchase from my regular breeder based on performance data and have never had cause to change this decision’ (41%) and ‘I am confident that my stud breeder sells rams that perform well’ (37%).

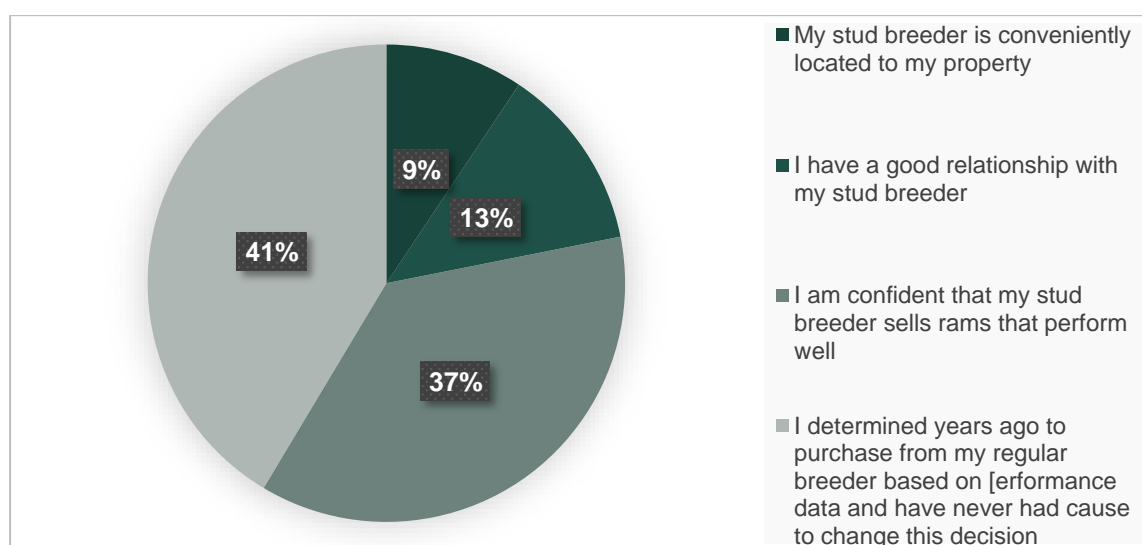


Figure 5 – Reasons for never changing stud breeders (2022)

3.3 Ram selection

Which one of the following statements best described how you select rams to buy?

- my classer or agent chooses the rams
- I choose the rams based on how they look
- I choose rams based on how they look but use some performance data such as fibre diameter, live weight or eye muscle depth
- I choose rams with a balance of visual appeal, performance data and some genetic information such as ASBVs or breeding values
- I choose rams based on genetic information such as ASBVs, breeding values or selection indexes

What percentage of your purchased rams in 2021 did you:

- buy at auction
- buy at private sale
- other (specify)?

Figure 6 shows the proportion of respondents using different ram selection strategies over the four surveys. The reduction in the proportion of respondents that chose rams mainly on looks and some data from 2018 to 2022 (36% to 26%) is significant; as is the increase in producers choosing on look, performance, and some genetics (33% to 43%). These are the only significant changes between 2018 and 2022. While the increase from 8% to 11% primarily using genetics isn't significant, the combined numbers of producers choosing on look, data and some genetics or primarily using genetics is a significant increase from 41% in 2018 to 54% in 2022.

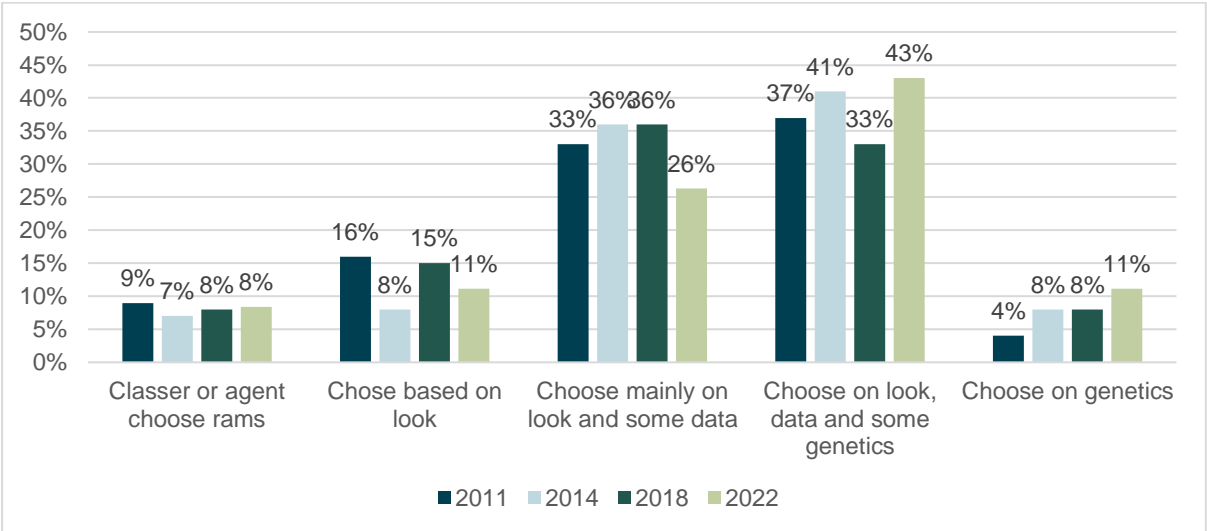


Figure 6 – Proportion of producers that implement each ram selection strategy (2022)

The 2022 data showed that respondents operating a meat enterprise were much more likely than other enterprise types to choose rams based on how they look and less likely to choose rams based on a combination of looks and performance data (Table 14). There were no other significant differences between enterprises or flock type (Table 15).

Ram selection strategies	Wool	Lamb	Dual	Total
My classer or agent chooses the rams	8%	6%	9%	8%
I choose the rams based on how they look	10%	26% ^a	9%	11%
I choose rams mainly on how they look but use some performance data such as fibre diameter, live weight or eye muscle depth	36%	9% ^b	25%	26%
I choose rams with a balance of visual appeal, performance data and some genetic information such as ASBVs or breeding values	40%	47%	43%	43%
I choose rams based on genetic information such as ASBVs, breeding values or selection indexes	6%	12%	13%	11%

Table 14 – Ram selection strategies by proportion of producers for each enterprise type (2022)

Ram selection strategies	Overall	Merino flock	Crossbred flock	Meat flock
My classer or agent chooses the rams	8%	7%	7%	2%
I choose the rams based on how they look	11%	6%	11%	20%
I choose rams mainly on how they look but use some performance data such as fibre diameter, live weight or eye muscle depth	26%	25%	20%	13%
I choose rams with a balance of visual appeal, performance data and some genetic information such as ASBVs or breeding values	43%	51%	50%	49%
I choose rams based on genetic information such as ASBVs, breeding values or selection indexes	11%	11%	13%	16%

Table 15 – The proportion of WA flock subject to each ram selection strategy (2022)

Seventy nine percent of rams were bought at auction (Table 16). This was driven by dual-enterprise producers who bought significantly more of their rams at auction than wool or prime lamb producers (84%, 55% and 54% respectively) and significantly more of their rams at auctions than private sales or other ways (84%, 14% and 2%).

Ram purchasing	Wool	Prime lamb	Dual	n	%
Rams bought at auction	55% ^a	54% ^a	84% ^{b,c}	5,926	79%
Rams bought at private sales	43%	46%	14% ^d	1,353	18%
Rams bought in other ways	2%	0%	2% ^d	175	2%
Total				7,454	

Table 16 – The number of rams bought and the proportion of rams bought using each method by enterprise type (2022)

3.4 Knowledge of Australian Sheep Breeding Values

Which one of the following statements best describes your current level of knowledge of Australian Sheep Breeding Values (ASBVs)? (2014, 2018 and 2022)

- I have never heard of ASBVs
- I have heard of ASBVs but don't understand them
- I have a basic understanding of ASBVs
- I have a good understanding of ASBVs
- I have a detailed knowledge of ASBVs

Significantly more respondents had heard of ASBVs in 2022 (92%) than in 2018 (81%), shown in Figure 7. There was a corresponding increase in the proportion of respondents that had 'a basic understanding' (up to 50% from 36% in 2018). Likewise there was an increase in the proportion of respondents that reported 'a basic understanding' or better (up to 81% from 66% in 2018). In 2014 there was an increase in the proportion that had 'heard of ASBVs but didn't understand them'. This is the first time there has been an increase in understanding of ASBVs.

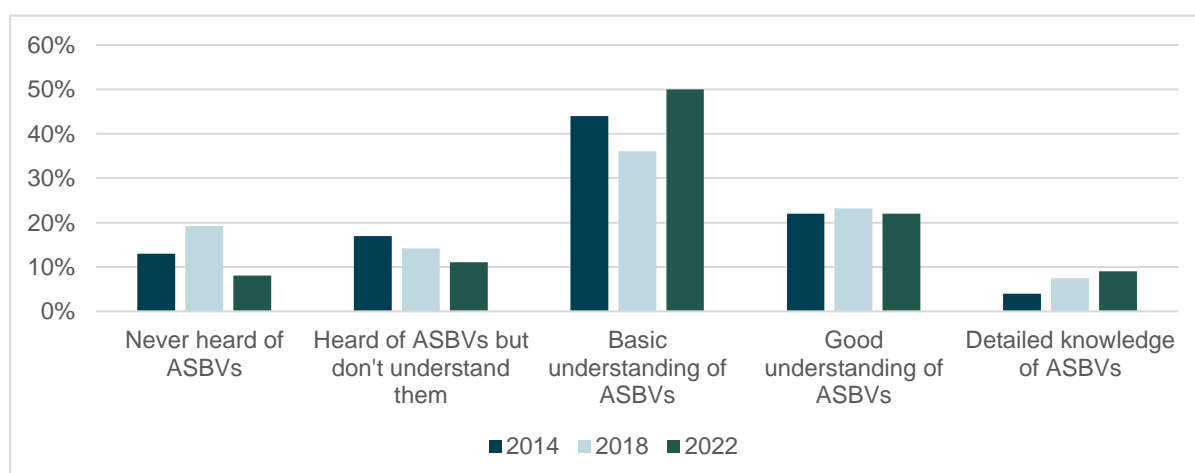


Figure 7 – Understanding of ASBVs by respondents (2014, 2018 and 2022)

Table 17 shows the knowledge levels of ASBVs by quartile. The largest producers (Q4) were significantly more likely to have a 'good' or 'detailed' knowledge of ASBVs and less likely to have 'never heard of' or 'not understand' ASBVs.

Quartile	Never heard	Don't understand	Never heard of or don't understand	Basic	Good	Detailed	Basic to detailed
1	8%	17% ^c	25% ^e	51%	20% ⁱ	4% ^k	75% ^m
2	13% ^a	12%	25%	52%	14% ⁱ	8%	75% ^m
3	5% ^b	12%	17%	57% ^g	17% ⁱ	9%	83%
4	5% ^b	5% ^d	10% ^f	41% ^h	36% ^j	14% ^l	90% ⁿ

Table 17 – Knowledge of ASBVs by quartile (2022)

3.5 Sale of rams and use of Australia Sheep Breeding Values

How many rams did you sell in 2021?

What percentage of the rams that you sold (or sold semen from) in 2021 had Australian Sheep Breeding Values (ASBVs)?

The 2022 data (Table 18) shows that dual-enterprise ram breeders sold significantly less rams per enterprise (48 on average) compared to wool and prime lamb enterprises (127 and 234 respectively). There were no significant differences between 2018 and 2022.

Enterprise type	Ram sellers n	Total rams sold n	Average rams sold n
Wool	14	1,784	127
Prime lamb	13	3,045	234
Dual	21	1,008	48
Total	48	5,837	122

Table 18 – Comparison of number and scale of ram sellers (2022)

Almost all breeders that sold rams with ASBVs sold all of their rams with ASBVs, with only one respondent selling just a proportion of their flock with ASBVs (a breeder with 400 rams sold 20% of them with ASBVs).

Table 19 shows use of ASBVs based on number of rams sold. Breeders that sold 200 or more rams were more likely to sell rams with ASBVs (68% compared to 27-31% for breeders selling fewer rams). They were also more likely than breeders that sold a small number of rams (3-50 rams) to sell all of their rams with ASBVs (63% compared to 21%). There were no significant differences between enterprise types. In the 2022 survey, 66% of ram breeders sold all their rams without ASBVs, very similar to 2018 (63%). Similarly, there was no significant change in the proportion selling 100% of their rams with ASBVs between 2018 and 2022 (26% to 32%).

Rams sold	# of ram sellers	Breeders selling all rams with ASBVs	Breeders selling no of rams with ASBVs	# of rams sold with ASBVs*	% of rams sold with ASBVs*
3-50	19	21%	79%	146	31% ^a
51-100	11	27%	73%	220	27% ^a
101-200	3	33%	67%	109	28% ^a
201-600	8	63%	25%	1,950	68% ^a
Total	41	32%	66%	2,425	53%

Table 19 – Number and proportion of producers using ASBVs and rams sold with ASBVs, grouped by volume of rams sold (2022)

*All rams (not just those from flocks where 100% of rams are sold with ASBVs)

4. Labour saving devices

Key findings

- The practices that have seen a significant increase in use over time were: electronic identification; sheep handler; remote water tank sensor and pump controller; and an individual data management system.
- There were significant increases in 'considering using' walk over weighing, automatic jetting machine, sheep handler and remote water tank sensor and pump controller.

This question was asked differently in 2022 in order to consolidate a number of questions related to the awareness and use of the technologies and labour-saving devices. Not all technologies were asked about in each survey from 2011 to 2022.

Please rate the following technologies and labour-saving devices (Not heard of; not considering using; considering using; already using; no longer using)

- **Autodrafter**
- **Electronic identification (eID)**
- **Paddock-based 'walk-over-weighing' system**
- **Pedigree matchmaker**
- **Automatic jetting machine**
- **Sheep handler**
- **Remote water tank level sensor or water point camera and pump controller**
- **Individual animal data management system such as Sapien, Koolcollect or Practical Systems Stockbook**
- **DNA testing for parentage, poll status of flock profile**
- **Drone for monitoring stock and pastures**
- **Remote sensing services for pasture management**
- **GPS collars or tags for monitoring stock movement**

The order of options was randomised.

These technologies and labour-saving devices have been divided into sections on:

- sheep handling devices;
- other labour-saving devices; and
- new technologies.

4.1 Labour saving technologies

Respondents were asked about their awareness or use of sheep technologies in the 2022 survey (Table 20). The majority of respondents were not considering using any of the sheep technologies (range between 54% and 69%). The highest percentages of use in 2022 were for autodrafter (17%) and electronic identification (14%). There has been a significant increase in the use of electronic identification up to 2022, to 14% (Table 21). There has also been a significant increase in the proportion of respondents considering walk over weighing, from 5% in 2018 to 10% in 2022.

Sheep handling devices	Not heard of	Not considering using	Considering using	Already using	No longer using
Autodrafter	3%	54%	25%	17%	1%
Electronic identification	1%	58%	27%	14%	0%
Paddock-based 'walk over weighing' system	18%	69%	10%	3%	1%
Pedigree matchmaker	35%	58%	5%	1%	1%

Table 20 – Respondents awareness/use of technologies (2022)

	2011	2014	2018	2022
Autodrafter	6%	8%	16%	17%
Electronic identification	4% ^a	4% ^a	5% ^a	14% ^b
Paddock-based 'walk over weighing' system	-	2%	3%	3%
Pedigree matchmaker	-	1%	2%	1%

Table 21 – A comparison of the proportion of respondents using technologies since 2011 (2011, 2014, 2018 and 2022)

Note: respondents were not given the option to say that they had not heard of electronic ear tags in 2018.

4.2 Other labour-saving devices

These technologies were only asked about in the 2018 and 2022 surveys. The majority of respondents were not considering using these devices except for sheep handler where 38% were already using it, 33% considering using it and 23% were not considering using it (Table 22).

While 14% of respondents reported using electronic identification (Table 20 in the previous section), 7% of respondents reported using an individual animal data management system (Table 22).

Devices	Not heard of	Not considering using	Considering using	Already using	No longer using
Automatic jetting machine	1%	53%	19%	18%	8%
Sheep handler	4%	23%	33%	38%	2%
Remote water tank sensor & pump control	2%	59%	29%	9%	0%
Individual animal data management system	26%	58%	8%	7%	1%

Table 22 – Awareness/use of labour-saving devices (2022)

Table 23 shows the proportion of respondents considering using and using these devices in 2018 and 2022. There was a significant increase in the percentage of respondents considering using these labour-saving devices except individual animal data management. There was also a significant increase in the percentage using the devices except for automatic jetting machine.

Devices	Considering		Using	
	2018	2022	2018	2022
Automatic jetting machine	12% ^a	19% ^b	20%	18%
Sheep handler	26% ^c	33% ^d	28% ^e	38% ^f
Remote water tank sensor & pump control	16% ^g	29% ^h	5% ⁱ	9% ^j
Individual animal data management system	7%	8%	4% ^k	7% ^l

Table 23 – Change in proportion of respondents considering and using labour-saving devices in 2018 and 2022

4.3 New technologies

The majority of respondents in the 2022 survey were not considering using any of these devices, ranging from 63% for drone monitoring, 65% for remote pasture sensing, 74% for DNA testing to 80% for GPS collars/tags (Table 24). Drone monitoring was being considered by almost a quarter of respondents (24%) and was already being used by 9% of respondents.

	Not heard of	Not considering using	Considering using	Already using	No longer using
DNA testing	6%	74%	11%	8%	0%
Drone monitoring	2%	63%	24%	9%	2%
Remote pasture sensing	13%	65%	15%	5%	2%
GPS collars/tags	5%	80%	14%	1%	1%

Table 24 – Respondents’ awareness/use of new technologies (2022)

Only DNA testing and drone monitoring were included in both 2018 and 2022 surveys. The percentage of respondents considering using DNA testing and drone monitoring has significantly decreased since 2018 (Table 25).

Devices	Considering	
	2018	2022
DNA testing	16%	11%
Drone monitoring	39%	24%

Table 25 - Proportion of respondents considering using new technologies (2018 and 2022)

4.4 NLIS and electronic identification

Have you ever used the National Livestock Identification System to record sheep coming onto your property? (Yes; No).

Are you aware of using:

- Year of birth-coloured tags with your brand for home bred stock? (Yes; no).
- A pink ear tag with your brand in the earmark ear before moving non-home bred stock off your property? (Yes; No).

Earmarking your sheep is now optional – will you continue to earmark your sheep? (Yes; No).

These were new questions in the 2022 survey. Forty six per cent of respondents reported having used the NLIS system to record sheep coming onto their property. The majority of respondents were aware of using year of birth-coloured tags (98%) and pink ear tags (96%) (Table 26). Seventy five percent of respondents indicated that they would continue to earmark sheep now it has become optional.

Statements	Yes n	Yes %
Aware of using year of birth-coloured tags with your brand for home-bred stock (N=443)	434	98
Aware of using a pink ear tag with your brand in the earmark ear before moving non-home bred stock off your property (N=446)	429	96
Earmarking is now optional – will you continue to earmark your sheep? (N=447)	334	75

Table 26 – Responses on ear tags and earmarking

How did you get started in electronic identification? Own research; Electronic identification consultant; Both

How is the individual animal data analysis performed? Own data analysis; Outsource data analysis to a consultant or specialist; Both

These were also new questions in the 2022 survey, asked only of those respondents who were already using eID (61 respondents). The majority of respondents who used eID started by doing their own research (70%) and their own individual animal data analysis (70%) as shown in Table 27.

	Self	Consultant	Both
Start in electronic identification (N=61)	70%	10%	20%
Individual animal data analysis (N=56)	70%	9%	21%

Table 27 – Use of consultants in electronic identification and individual animal data analysis

5. Reproduction and welfare

Reproductive success is an important measure for sheep producers, particularly in combination with stocking rate, to determine the number of lambs per grazed area, and for industry to understand the likely production and turn-off of lambs for breeding and slaughter. Ewe and lamb management practices are important indicators of best practice and higher lambing rates.

Key findings

- There was a consistent increase in marking rates in Merino and meat and maternal lambs between 2011 and 2022.
- In 2022, the average marking rate for Merinos was 96%, for meat lambs 110% and for crossbred lambs 100%. These are higher than the national average marking rates, 86% for Merinos and 99% for non-Merinos (MLA and AWI, 2022).
- Meat lambs in the CSZ had the highest average marking rate in 2022 (114%).
- Stocking rates were higher in the MRZ than the CSZ in the 2022 survey.
- The overall peak lambing time for the 2021 season was April to June although in the MRZ it tended towards May and June. For the CSZ, there was a dip in May for cross-bred lambs with a peak of second lambing in May. The peak of second lambing was June for Merinos and July for meat lambs.
- Thirty-nine percent of respondents reported having a second lambing date.
- Respondents that bred their own rams were more likely to have a second lambing.
- The practice of scanning for litter size continued to increase, to 27% in the 2022 survey, in both zones. There was a corresponding increase in the proportion of the ewe flock that was scanned for litter size from 2018 to 2022 (29% to 36%).
- Dual enterprises were more likely to 'only scan for pregnancy or not in bad years'; Merino enterprises were more likely to scan; and meat producers were less likely.
- Larger enterprises were more likely to scan for litter size.
- No significant differences in nutrition management on the basis of pregnancy scanning between 2011 and 2022 (although changes occurred in the interim).
- Half of the 2022 survey respondents monitored ewe condition through a 'visual assessment in the paddock' (51%), followed by 39% that did a 'visual assessment and occasionally condition scored'; a significant increase on 2011 (24%).
- The main practices used by 2022 respondents to improve lambing percentages were: 'ensured that the ewes' higher energy demands are met before and during lambing' and 'increased ewe condition at joining' (both 82% of respondents).
- The rate of Merino mulesing has increased, with 82% of producers mulesing, and 84% of all Merino lambs being mulesed.
- The use of pain relief for mulesing has increased, with 90% of Merino lambs receiving pain relief compared to just over half in 2011.
- Smaller Merino producers were less likely to mules than larger producers.
- Ninety five percent of meat lambs were not mulesed.
- One-third of meat lambs and two-thirds of Merino lambs received pain relief for tail docking/castration.
- The most popular reasons for not using pain relief were; "pain relief isn't need/doesn't work", "too expensive" and "we don't mules".

5.1 Reproduction and marking rates

In 2022 a number of questions were asked related to the marking rate, time of lambing, pregnancy scanning and management to improve reproduction. A number of these questions were repeats of questions in the 2011, 2014 and 2018 surveys.

How many Merino ewes were mated to Merino rams, to lamb in 2021 (including Dohnes and SAMMs)?

How many lambs were marked from these Merino ewes in 2021?

How many Merino ewes were mated to meat or maternal rams to lamb in 2021?

How many cross-bred lambs (from Merino ewes mated to meat or maternal rams) were marked from these ewes in 2021?

How many meat or maternal ewes were mated to meat or maternal rams to lamb in 2021?

How many lambs were marked from these meat or maternal ewes in 2021?

Marking rates were calculated on the number of lambs marked divided by the number of ewes joined rather than by asking respondents their marking rate directly.

In the 2011 and 2014 surveys the marking rates were calculated for Merino lambs, and meat and maternal lambs, rather than for three categories in 2018 which allowed rates to be calculated for: Merino lambs, crossbred lambs (Merino ewes joined to meat or maternal breed), and meat or maternal lambs.

There has been a consistent and significant increase in marking rates in both Merino and meat and maternal lambs (Table 28). The average overall marking rate for the 2022 survey was 96% for Merinos and 111% for ewes mated to meat and maternal rams. This is higher than the national average of 86% for Merinos and 99% for non-Merinos reported by a National Sheep Producer Survey (MLA & AWI, 2022).

The marking rate for Merinos and crossbred lambs in the MRZ has increased significantly since the 2018 survey, while the CSZ was stable. The CSZ did however see a significant increase in the marking rate for meat lambs over the same period.

	2011		2014		2018		2022	
	Av n ewes mated	Marking rate	Av n ewes mated	Marking rate	Av n ewes mated	Marking rate	Av n ewes mated	Marking rate
Merino	2,075	84%	1,852	90%	1,952	92%	1,843	96%
Meat & maternal	1,372	92%	1,180	95%	1,758	97%	1,081	111%

Table 28 – Average marking percentage for producers mating ewes to Merino rams and meat and maternal rams in the 2010, 2013, 2017 and 2021 seasons

The significant increases for Merino and crossbred marking rates in the MRZ has meant the marking rates for each zone are opposite to the 2018 survey. In 2018, the CSZ marking rate for Merinos and crossbreds was higher than the MRZ, whereas now it is lower. The 2018 survey also showed meat lamb marking rates in the CSZ were lower than in the MRZ, whereas now they are higher.

Zone	Merino marking rate	Merino lambs n	Crossbred marking rate	Crossbred lambs n	Meat marking rate	Meat lambs n
MRZ	96%	285,984	100%	148,908	109%	65,888
CSZ	97%	310,692	101%	87,397	109%	73,816
WA Total	96%	596,676	100%	236,305	109%	139,704

Table 29 – Marking rate by mating type and zone (calculated by total lambs by total ewes rather than by average of individual flocks)

Both the MRZ and the CSZ had a predominance of Merino lambs with roughly two thirds Merino and one third crossbred lambs. This makes sense when the breeding ewe is typically a Merino and about 66% of ewes need to be mated to a Merino sire in order for a self-replacing flock.

Figures 8 to 10 show the distribution of marking rates between different mating types. For each mating type, there is considerable variation, with very low marking rates and very high marking rates in each group. The highest lamb marking figures for Merinos were 175% and 171%, which were from producers who had mated 400 and 600 ewes, respectively. The next highest marking figures, 160% and 150%, were from producers mating over 2,000 ewes each.

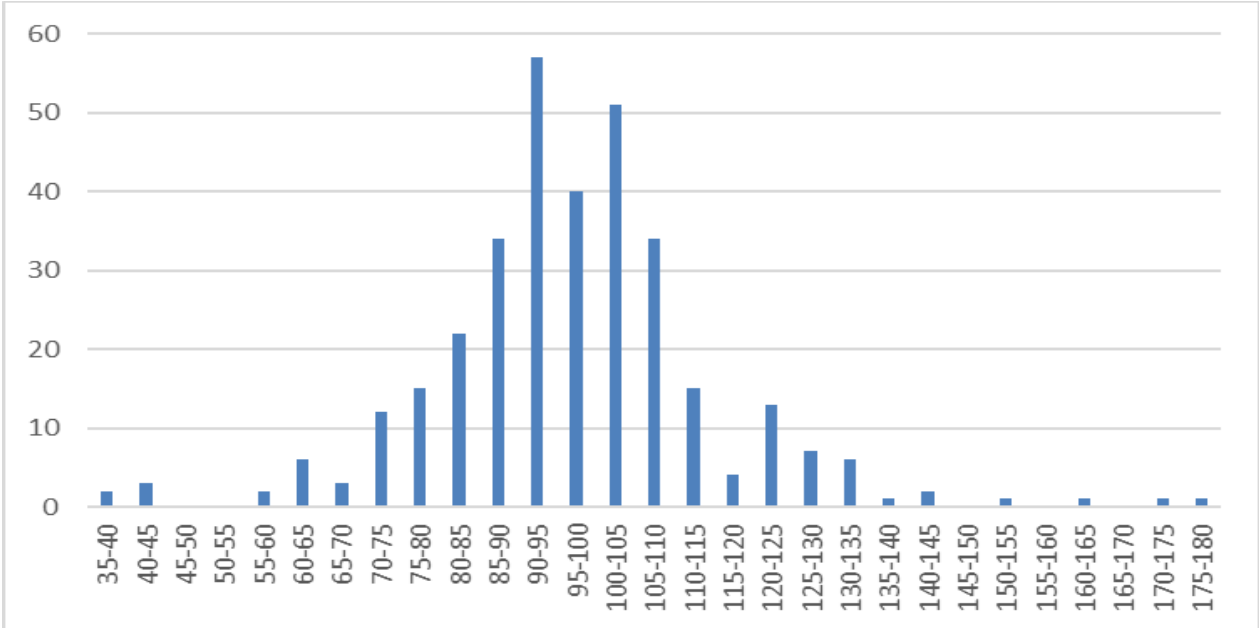


Figure 8 – Histogram of marking rates for Merino ewes mated to Merino rams grouped into ranges of 5% (2022)

The crossbred lamb marking rates showed a slightly smaller spread, while the meat and maternal marking rates show a slightly more even distribution of marking rates but were from a smaller sample size than that of the Merino and crossbred marking rates. The meat and maternal ewes also had some very high marking rates, with 170-175% being achieved by some producers mating over 1,500 ewes, while there were also producers mating 3,000 and 5,000 ewes that achieved over 150% lamb marking.

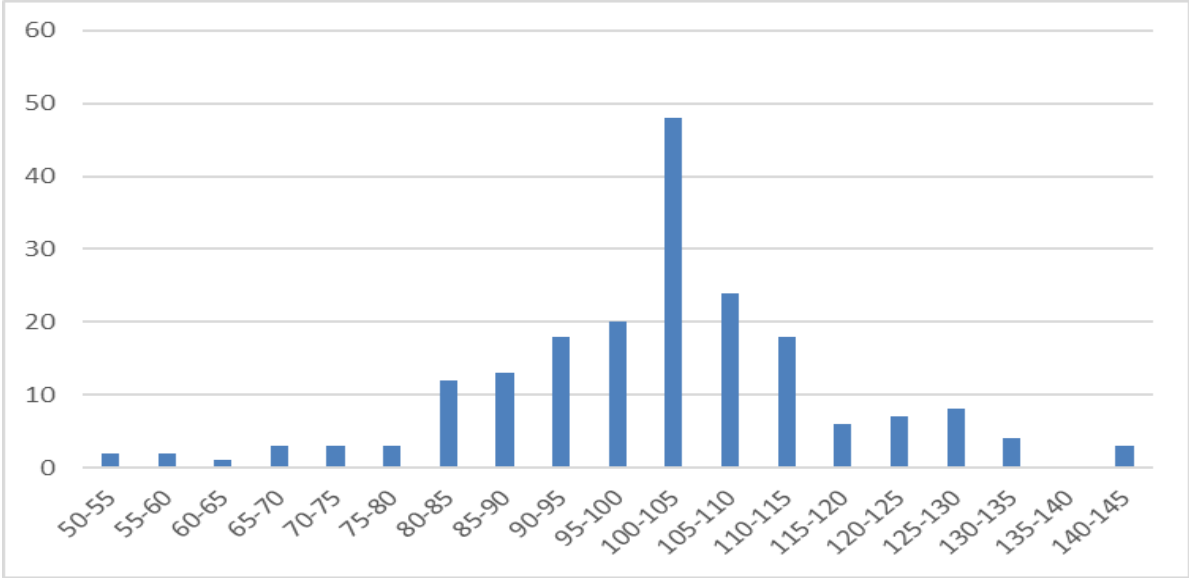


Figure 9 – Histogram of marking rates for Merino ewes mated to meat and maternal rams grouped into ranges of 5% (2022)

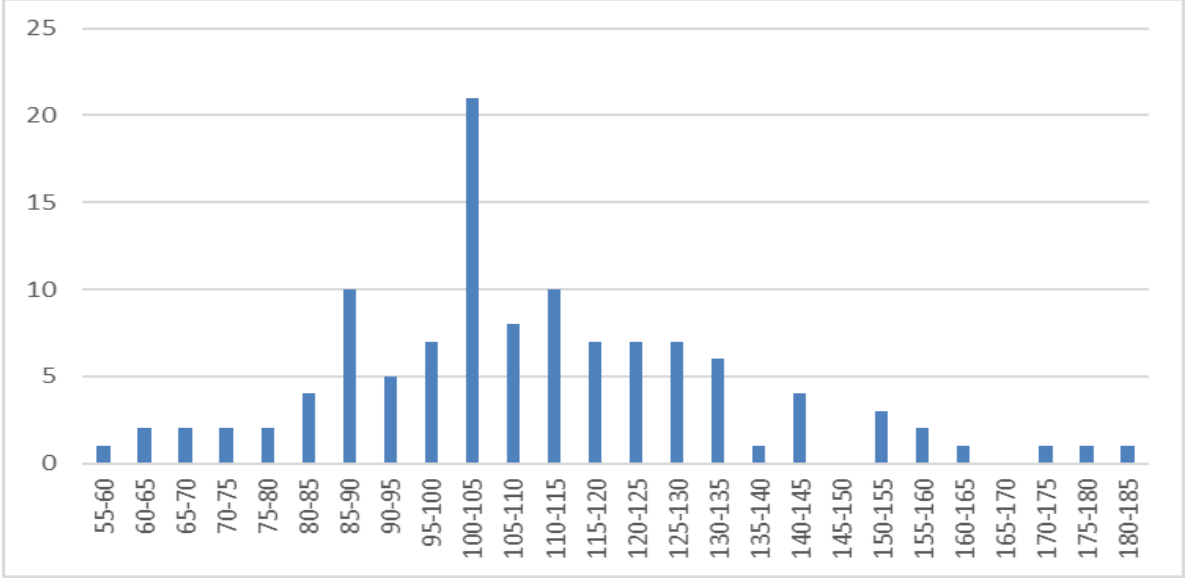


Figure 10 – Histogram of marking rates for meat and maternal ewes mated to meat and maternal rams grouped into ranges of 5% (2022)

Using the stocking rate data collected in section 2.1, there are significant differences and a positive correlation between larger flocks and the number of lambs per hectare. This is shown in Figure 11 where the smallest flocks had a lower number of ewes per hectare and lambs per hectare than the largest flocks. The largest flocks (top 25%) had significantly higher stocking rates than any other flock quartile.

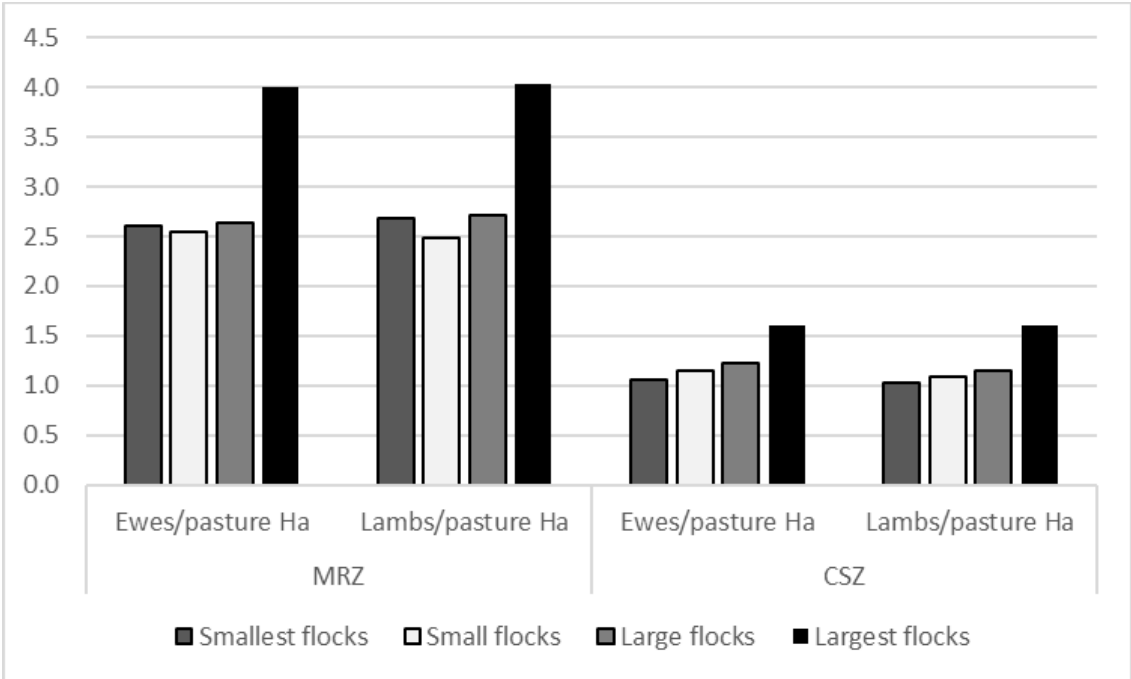


Figure 11 - The relationship between stocking rate and flock size by region

All of the values in Table 30 are higher than the ones where the values are derived from the group average. The producers with the largest flocks have higher stocking rates than other quartiles except for lambs in the MRZ where there is no significant difference between quartiles. All quartiles have significantly higher stocking rates in the MRZ than the CSZ.

Flock size	Ewes/pasture ha MRZ	Lambs/pasture ha MRZ	Ewes/pasture ha CSZ	Lambs/pasture ha CSZ
Smallest flocks	3.85	3.80	1.52	1.51
Small flocks	3.49	3.45	1.51	1.42
Large flocks	3.30	3.40	1.66	1.58
Largest flocks	4.35	4.26	1.95	1.94
All flocks	3.81	3.78	1.66	1.61

Table 30 – Stocking rates for ewes versus lambs by zone (SR calculated for individuals not the group)

5.2 Time of lambing

What was the date lambing commenced for Merino ewes mated to Merino rams, including Dohnes and SAMMs?

What was the date lambing commenced for Merino ewes mated to meat or maternal rams?

What was the date lambing commenced for meat or maternal ewes mated to meat or maternal rams?

Note: two dates were allowed in the 2022 survey.

Respondents were asked when lambing commenced in their ewe flocks. The time of lambing is a crucial decision in sheep businesses as it sets the time of highest demand for pasture utilisation and stocking rate. Some producers choose to lamb ewes onto dry pasture before the break of the season and others when reliable green feed is available. Traditionally Merino enterprises in WA lambed in May however there has been a shift over the last 40 years towards a mid-winter lambing, particularly in the wetter regions. This allows a higher stocking rate to be carried throughout the year (Young, 2011). Producers who are focussed on turning off prime lambs, whether they are crossbred or meat breeds, tend to lamb earlier to ensure higher growth rates to finish lambs before turn-off. This question was asked in the 2018 and 2022 surveys.

The histograms in Figures 12 to 14 show the proportion of lambs born in different months from the 2022 survey (based on the 2021 season). Overall, the peak lambing time was April to June. In the MRZ the peak timing was in May and June, and for the CSZ there was a dip in May for cross-bred lambs with a peak of second lambing in May (Figure 15). The peak for second lambing was in June for Merinos and July for meat lambs.

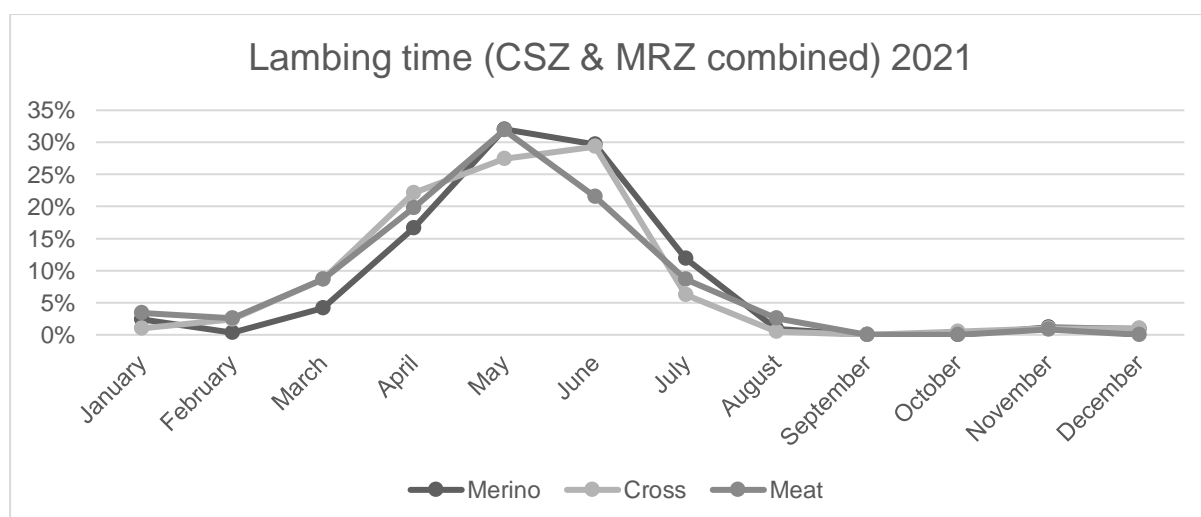


Figure 12 – The month of commencement of lambing by mating type across the CSZ and MRZ (2021 season)

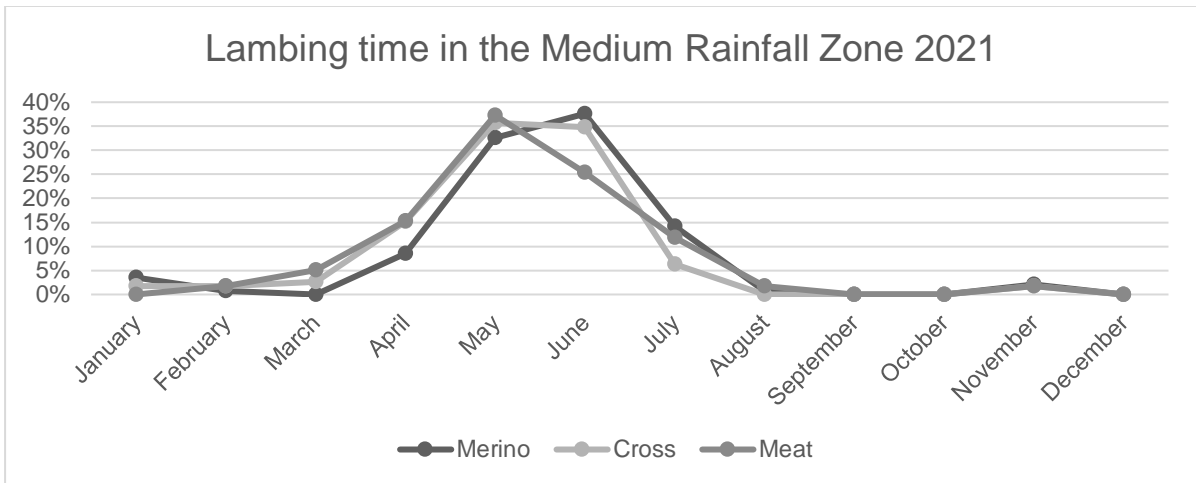


Figure 13 – The month of commencement of lambing in the Medium Rainfall Zone by mating type (2021 season)

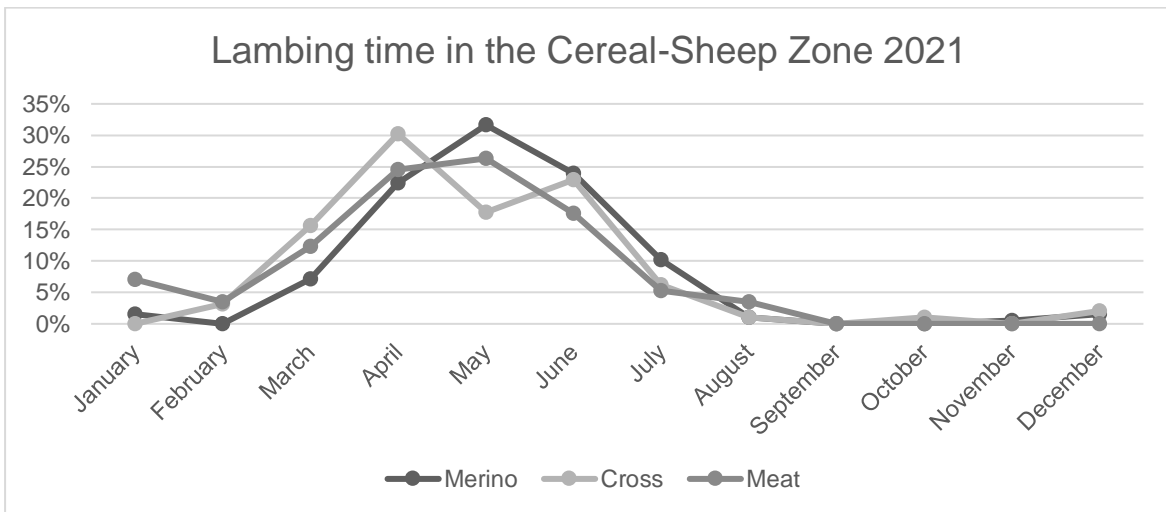


Figure 14 – The month of commencement of lambing in the Cereal-Sheep Zone by mating type (2021)

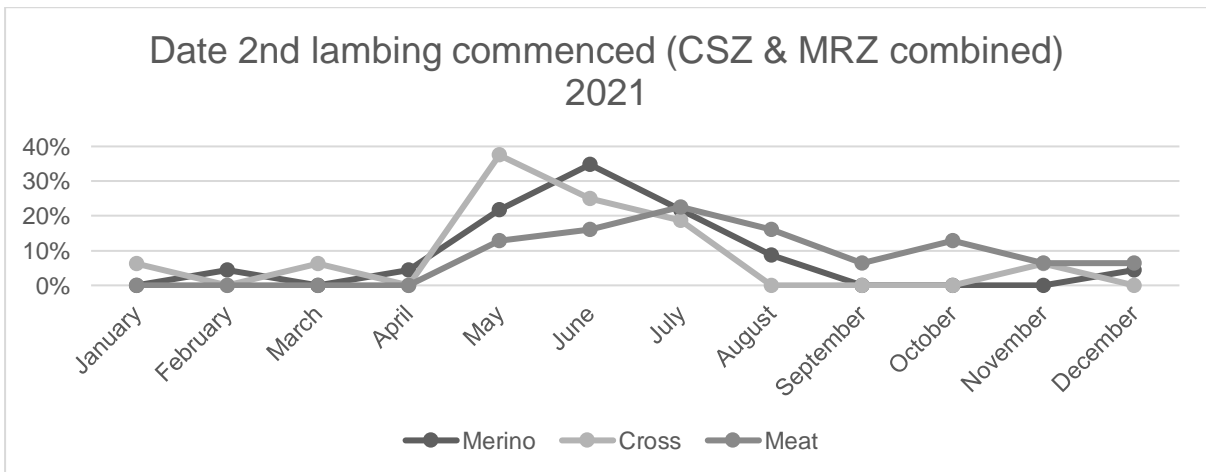


Figure 15 – Date of second lambing when applicable

Thirty-nine percent of respondents reported having a second lambing date and respondents that bred their own rams were more likely to have a second lambing date (20% that bred their own rams had a second lambing date compared to 11% of producers that didn't) (Table 31). This is driven by wool producers (17% compared to 2%) as there were no significant differences between those that bred their own rams and those that didn't within the prime lamb and dual-purpose enterprise types.

There was no significant difference between zones for any of the enterprise types.

	N	Wool producers	Prime lamb producers	Dual producers	All respondents
N		118	59	260	437
Breed (own use or sale)	128	17% ^a	46%	12%	20%
Non-breeders	309	2% ^b	34%	10%	11%
WA Total	437	7%	39%	10%	13%

Table 31 – Proportion of producers with a second lambing date – comparison of ram breeders versus non-breeders

5.3 Pregnancy scanning

Pregnancy scanning is conducted around 90 days from conception and is done with an ultrasound scanner. Producers can choose to scan for:

- pregnant or not, sometimes called wet and dry scanning, which predicts pregnancy status (ewes pregnant per ewes joined)
- multiple foetuses to determine litter size – reported as reproductive rate (number of foetuses per ewe joined).

Scanning for litter size is considered best practice as it allows producers to know the potential lambing rate and the relative feed requirements of the pregnant ewe for accurate feed budgeting.

This question was repeated in the 2014, 2018 and 2022 surveys.

Which one of the following statements best describes how you use pregnancy scanning to manage the nutrition of ewe flocks, do you:

- **Choose not to pregnancy scan**
- **Only scan in bad years on some sheep**
- **Scan ewes only for pregnancy status (pregnant or not)**
- **Scan ewes to detect litter size**

Scanning for litter size, as found in previous surveys, continues to increase, with the largest significant increase (10%) occurring in the last four years (Figure 16). There was a corresponding significant increase in the proportion of the total ewe flock scanned for litter size from 29% in 2018 to 36% in 2022 (Table 32). There were no significant changes in the proportion of respondents that don't scan, don't scan in bad years or scan for pregnancy status between 2011 and 2022.

Almost half (49%) of the 2022 respondents routinely scanned their sheep either for pregnancy or litter size (Figure 16) which equates to 60% of the total ewe flock (Table 32).

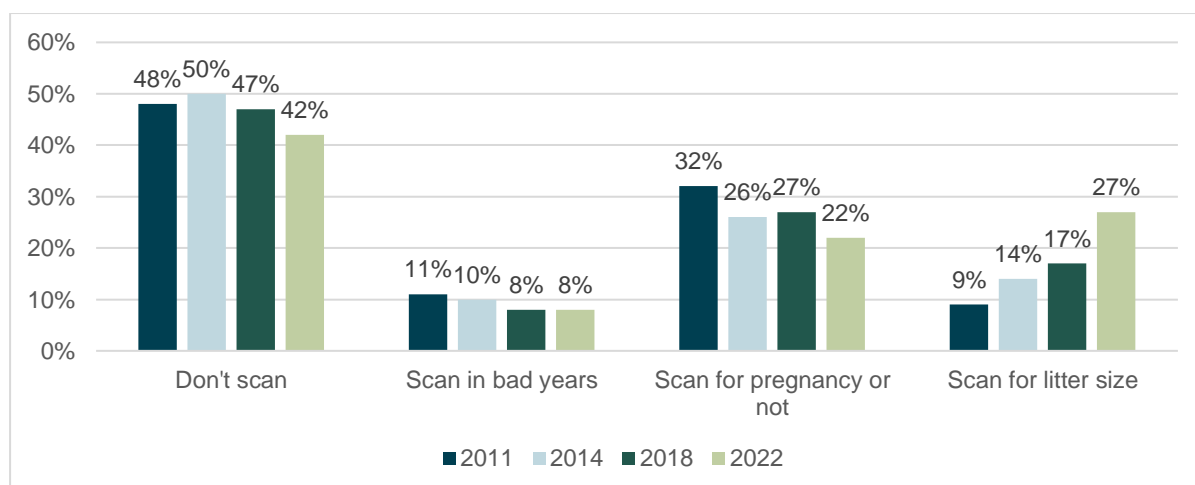


Figure 16 – Pregnancy scanning practices of respondents (2011, 2014, 2018 and 2022)

Cross-bred sheep producers were significantly more likely to ‘scan for pregnancy status’ or ‘scan in bad years’ compared to Merino or meat producers. While Merino producers were more likely to ‘scan for litter size’, meat producers were more likely to not scan at all (Table 32), contrasting with 2018 where meat producers were the most likely to scan (Figure 18).

	% producers	% ewe flock	Merino x Merino %	Merino x meat %	Meat x meat %
Don't scan	42%	31%	32%	26%	40%
Scan in bad years	8%	9%	8%	13%	7%
Scan for pregnancy or not	22%	24%	23%	29%	21%
Scan for litter size	27%	36%	37%	33%	31%

Table 32 – Pregnancy scanning practices of producers by ewe mating type (2022)

The percentage of Merino producers scanning for litter size increased across both zones between 2018 and 2022, from 21% to 32% in the MRZ, and 14% to 26% in the CSZ. There was also a significant increase in the percentage of crossbred producers scanning for litter size in the MRZ over the same time, from 21% to 35%

Sheep producers in the MRZ were more likely to scan for pregnancy status or litter size than those in the CSZ (Table 33). Larger flock sizes in the MRZ also meant a higher proportion of the overall ewe flock was scanned compared to the CSZ.

	Merino ewes mated to Merino sires		Merino ewes for crossbred lambs		Meat ewes mated to meat rams	
	% of producers	% of ewe flock	% of producers	% of ewe flock	% of producers	% of ewe flock
MRZ Scan: pregnant or not	24%	26%	26%	35%	23%	23%
MRZ Scan: litter size	32%	44%	35%	34%	35%	37%
CSZ Scan: pregnant or not	19%	21%	20%	17%	22%	20%
CSZ Scan: litter size	26%	32%	26%	31%	22%	26%

Table 33 – Pregnancy scanning practices (grouped) by ewe mating type and zone (2022)

Respondents were divided into quartiles based on flock size to compare pregnancy scanning practices for different flock sizes over the four surveys, 2011, 2014, 2018 and 2022 (Figure 17). Quartile 1 are the smallest flock sizes and quartile 4 are the largest, noting that the range of flock sizes in each quartile differs in each survey.

Producers running large, quartile 4 flock sizes were significantly more likely to scan for litter size (41%) and smaller enterprises were significantly less likely to scan for litter size (19%); evident over all four surveys. Generally, as flock size increases, so does the likelihood that the producer will scan their sheep (Figure 17).

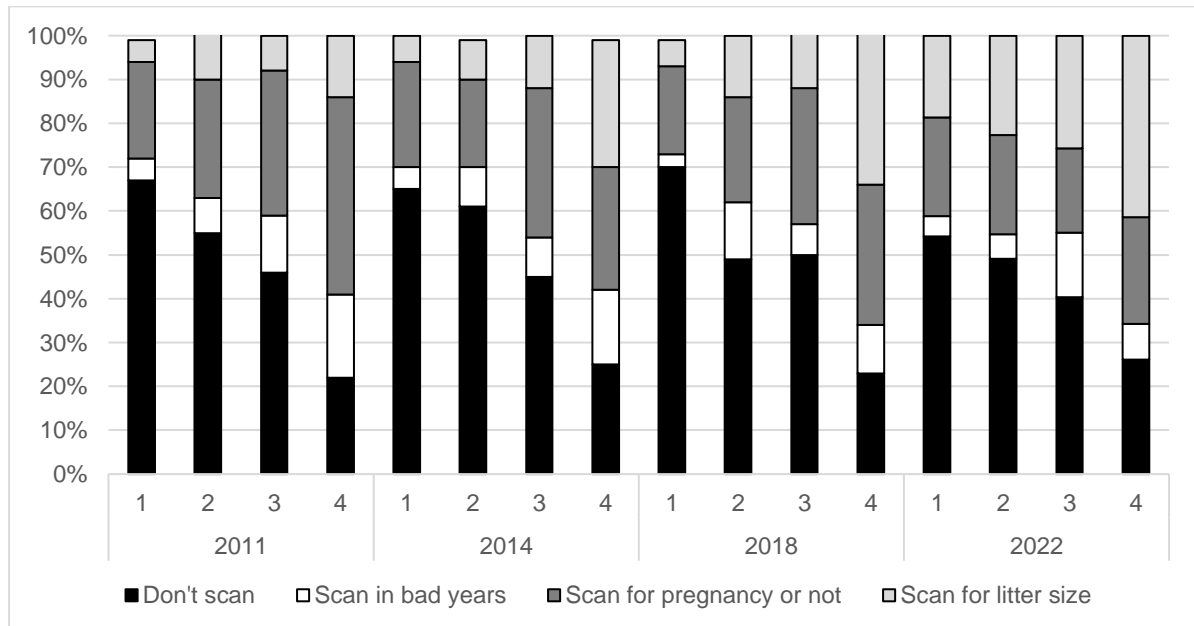


Figure 17 – Relationship between flock size and pregnancy scanning practices compared over time (2011, 2014, 2018 and 2022)

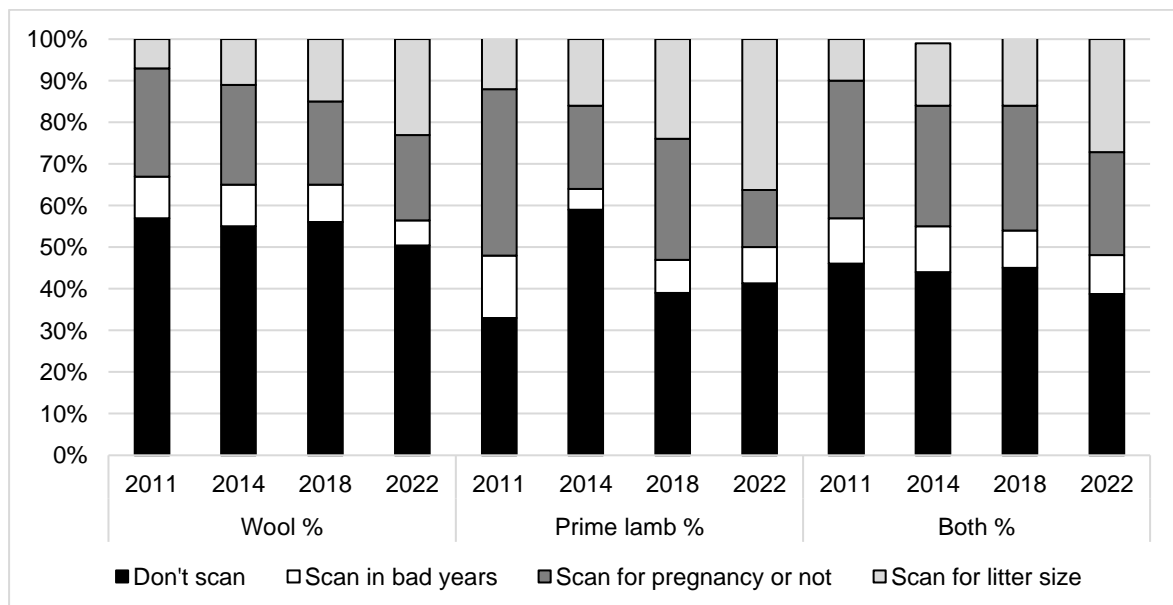


Figure 18 - Comparison of pregnancy scanning practices by enterprise type over time (2011, 2014, 2018 and 2022)

5.4 Management of ewe nutrition

Producers that responded that they either scan for pregnancy status or litter size were also asked what they did with that information. This question was asked in the 2011, 2014 and 2018 surveys.

Which one of the following statements best describes what you do with the pregnancy scanning information?

- **I don't change my nutritional management.**
- **I manage ewes according to their energy requirements as a single group.**
- **I manage dry, single and twin bearing ewes separately and according to their different energy requirements.**

There was no significant difference in practices comparing 2011 and 2022 (Table 34) although there were significant changes in the interim. There was a significant decrease in the proportion of respondents that 'manage based on flock average' from 2018 to 2022 (54% to 39%) and a significant increase in the proportion of respondents that 'manage dries/singles/multiples in groups' from 2018 to 2022 (38% to 50%). There were no significant differences between zones in the 2022 survey (not shown).

	2011 N = 152	2014 N = 151	2018 N = 172	2022 N = 214
Don't change	11%	5%	8%	11%
Manage on flock average	35%	34%	54% ^a	39% ^b
Manage groups of dries/singles/multiples	54%	61%	38% ^c	50% ^d

Table 34 – Management practices of respondents that scanned for pregnancy status or litter size

Which one of the following statements best describes how you monitor ewe condition including condition scoring, fat scoring or weighing, do you usually...

- **make regular visual assessments in the paddock**
- **visually estimate in the paddock and occasionally fat score, condition score or weigh a sample of the ewes when they are in the yards**
- **normally condition score, fat score or weigh a sample of each ewe mob and manage to average mob targets for joining/lambing/weaning**
- **condition score, fat score or weigh and draft all ewes, manage mobs according to condition to meet set targets for joining/lambing/weaning?**

Monitoring ewe condition is a key recommendation in accurate feed budgeting and improving reproduction. Best practice is to move away from just visual assessment in the paddock towards condition scoring to manage targets.

There were no significant changes to condition scoring practices between 2018 and 2022. Very few producers ‘condition score to manage targets’, however when compared to 2011 data, there has been a significant decrease in the proportion of producers relying on visual assessment in the paddock (69% to 51%), and an increase in the proportion of producers including occasional condition scoring in their monitoring (24% to 39%) (Table 35).

Method of monitoring	2011	2014	2018	2022
Visual assessment in paddock	69% ^a	58%	50%	51% ^b
Visual and occasionally score	24% ^c	33%	40%	39% ^d
Regularly condition score	4%	6%	6%	7%
Condition score to manage targets	4%	3%	5%	3%

Table 35 - Method of monitoring of ewe condition (2011, 2014, 2018 and 2022 data comparison)

In the 2022 survey, respondents in the CSZ (2%) were less likely to score to manage targets than producers in the MRZ (6%) (Figure 19).

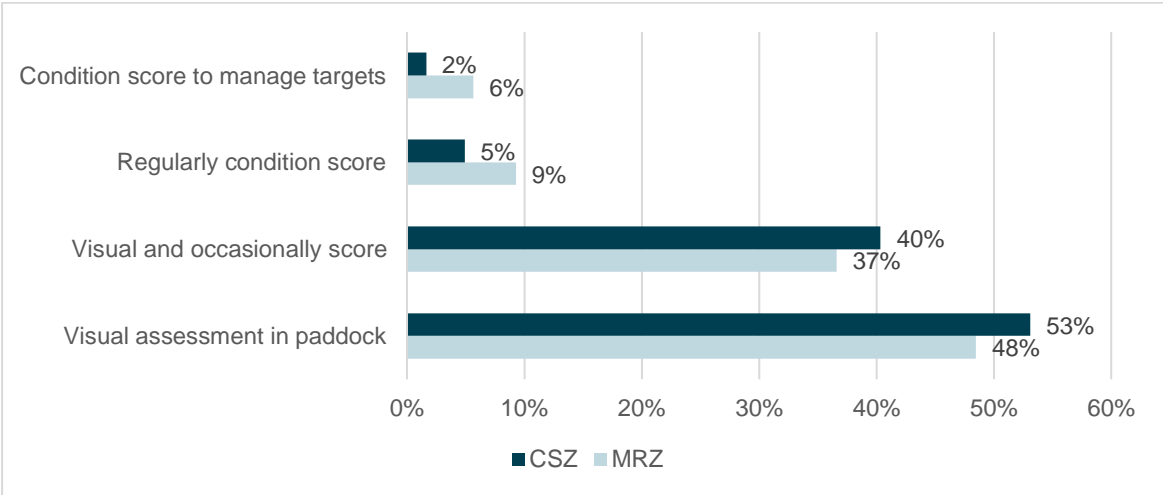


Figure 19 – Proportion by zone of respondents and practice of monitoring ewe condition

Which of the following activities have you undertaken to improve lambing percentages?

Respondents to the 2018 and 2022 surveys were asked if they had undertaken any activities to improve their lambing percentage in the five years prior. Those that had were then provided with a list of activities to select.

The most frequent responses, and the order of frequency, were the same in both 2018 and 2022 however the proportion of producers implementing them are consistently less in 2022 than in 2018 and significantly less in the top five practices.

Steps to improve lambing percentage	Yes 2018	Yes 2022
Ensured that the ewes higher energy demands are met before and during lambing	96% ^a	82% ^b
Increased ewe condition at joining	87% ^c	82% ^d
Protected lambing ewes from predators	79% ^e	58% ^f
Ram selection to improve reproduction	67% ^g	49% ^h
Wet/dry at weaning and cull non-performing ewes	63% ⁱ	44% ^j
Separated single and twin bearing ewes	31%	29%
Provided extra shelter for twin lambing ewes	30%	27%
Attend events/training programs in person or online	n/a	20%
Investigated the role of oestrogenic pastures	n/a	10%

Table 36 – Implementation of practices to improve lambing percentage

5.5 Mulesing, marking and pain relief practices

Marking practices continue to be under scrutiny by the community and consumers. Producers are transitioning from mulesing without pain relief to using pain relief during mulesing or tail docking. Questions around these practices were asked in the 2011 survey and a similar set of questions were asked again in 2018 and 2022. In 2022, the following questions were asked.

And of those Merino lambs, what percentages were;

- 1. Mulesed with pain relief**
- 2. Mulesed without pain relief**
- 3. Tail docked/castrated and not mulesed with pain relief**
- 4. Tail docked /castrated and not mulesed without pain relief**
- 5. Neither mulesed or tail docked/castrated**

The answers had to add up to 100%. These same questions were repeated for the other mating types (for crossbred lambs resulting from Merino ewes mated to meat or maternal rams; for lambs resulting from meat or maternal ewes and rams).

Mulesing

The total proportion of Merino lambs mulesed in 2022 (84%) is significantly higher than in 2018 (69%) with a corresponding decrease in the proportion of Merino lambs not mulesed (30% to 17%).

Of the Merino lambs that are mulesed, there has been a significant increase in the use of pain relief from 68% of mulesed lambs in 2018 to 90% of mulesed lambs receiving pain relief in 2022.

The proportion of meat lambs (Merino or maternal ewe mated to meat or maternal sire) being mulesed has remained very low at 4%, with almost all of them receiving pain relief.

	2011		2018		2022	
	Merino lambs	Meat lambs	Merino lambs	Meat lambs	Merino lambs	Meat lambs
Mulesed with pain relief	48%	5%	49%	5%	76%	4%
Mulesed without pain relief	40%	8%	23%	3%	8%	0%
Not mulesed or only tail docked/castrated	12%	86%	28%	92%	17%	95%

*Table 37 – Mulesing and pain relief practices by sire type **

* In 2011 lambs were categorised as either meat or Merino (crossbred lambs were included in the meat category). In 2011 1% were breech clipped.

At a producer level, there has been a significant increase in the proportion of Merino producers in the survey who practise mulesing from 71% in 2018 to 82% in 2022 (Table 38). Almost all (91%) of those that mules, do so on all their Merino lambs, which is similar to the 2018 survey.

Between 2018 and 2022, there has also been a significant increase in the proportion of Merino producers that mules using pain relief (69% to 88%), with just 12% of producers who mules not using any pain relief (Table 38).

	2018	2022
Mules with pain relief	69%	88%
Mules without pain relief	31%	12%
Total Merino producers mulesing	71%	82%

Table 38 - Proportion of Merino producers that mules with and without pain relief

There has been a general increase in the rate of Merino producers mulesing across all flock sizes, with a significant increase in the smaller producers (flocks under 2,000 head) now choosing to mules. Even with this increase, Merino producers with smaller flocks were still significantly less likely to mules overall, with only 67% mulesing, compared to 86-88% of larger producers. There has also been a significant increase in smaller producers choosing to mules 100% of their lambs since the 2018 survey. It is in the smaller flocks that we see a considerable increase in the proportion of flocks that are being mulesed with pain relief (Table 39).

Merino producers by flock size	2018		2022	
	Mulesing	100% mules*	Mulesing	100% mules*
Quartile 1 (500-2,000 sheep)	57%	78%	67%	95%
Quartile 2 (2,000-3,500 sheep)	68%	80%	86%	88%
Quartile 3 (3,500-5,500 sheep)	86%	90%	87%	90%
Quartile 4 (5,500-35,000 sheep)	73%	94%	88%	92%
Total	71%	86%	82%	91%

Table 39 – proportion of Merino producers by quartile using mulesing (% mulesing) and proportion mulesing all of their lambs (100% mulesing)

Tail docking/castration

Merino lambs were more likely to receive pain relief when tail docked and/or castrated. Seventeen percent of all Merinos lambs were tail docked/castrated (not mulesed) and of those, two-thirds received pain relief. In contrast, 95% of meat lambs were not mulesed. Of those meat lambs, just one-third of them received pain relief for tail docking and/or castration (Table 40). Just 1% of Merino lambs and 2% of meat lambs did not undergo any mulesing, castration or tail docking.

	Merino lambs % of total	Merino lambs pain relief	Meat lambs % of total	Meat lambs pain relief
Tail docked/castrated with pain relief	10%	62%	36%	38%
Tail docked/castrated without pain relief	6%	38%	58%	62%
Not mulesed, castrated or tail docked	1%		2%	

Table 40 – Use of pain relief for Merino and meat lambs only undergoing tail docking/castration.

Pain relief

Producers across all breeds who didn't use pain relief for mulesing or tail docking and/or castration were asked:

Could you please describe why you don't use pain relief for mulesing or tail docking Merino lambs?

- **The animal does not need pain relief**
- **The pain relief options are too expensive**
- **Other (please specify)**

The questions were repeated for crossbred lambs resulting from Merino ewes mated to meat or maternal rams and for lambs resulting from meat or maternal ewes and rams. Multiple responses were allowed.

Of those not using pain relief, 26% of the responses were that that pain relief is too expensive, 31% that lambs didn't need pain relief, and 55% responded 'other' and provided a text explanation.

The text responses from most frequent to least frequent were:

- they did not mules
- pain relief is not needed/doesn't work
- lack of access to product/contractor
- plan on using it in future/considering pain relief options
- current practice is best for lambs
- believe it causes problems to the lambs/operators
- it's something more to do
- don't know
- don't want to change.

Producers of crossbred lambs were twice as likely to state that lambs don't need pain relief than Merino lamb producers (61% vs 31%).

Flystrike prevention practices

Questions were also asked about a producer's management of flystrike.

Do you use any of these preventative measures for flystrike management for any of your flock?

- **Chemical application**
- **Worm or dag management**
- **Selective breeding for flystrike resistance**
- **Nothing**

As stated previously, there was a significant increase in the rate of mulesing Merino lambs since the 2018 survey. There were also significant decreases in the use of worm and dag management and selective breeding programs for preventative flystrike management between 2018 to 2022, while the use of preventative chemicals has remained the same (Table 41).

The decrease in producers using selective breeding to prevent flystrike is consistent across both wool and dual purpose enterprises. However, the decrease in producers using worm and dag management is driven mainly by a reduction in use by dual enterprise producers.

Flystrike prevention method	2018	2022
Chemical application	84%	84%
Worm and dag management	88%	74%
Selective breeding programs	53%	37%

Table 41 – Change in the proportion of sheep producers that use methods of preventing flystrike

Merino flocks that were mulesed with pain relief were more likely to have also used preventative chemicals, undertaken worm and dag control and a selective breeding program than those that were mulesed without pain relief.

Merino flocks that were not mulesed, only tail docked/castrated, were significantly more likely to have undergone selective breeding programs for flystrike prevention than mulesed flocks (Table 42).

Across all of the marking practices, there has been a decrease in the use of preventative chemicals, worm and dag control, and selective breeding programs since 2018 with the exception of lambs not mulesed or tail docked, where the use of preventative chemicals and worm and dag control has increased.

	Lambs mulesed with pain relief	Lambs mulesed without pain relief	Lambs tail docked with pain relief	Lambs docked without pain relief	Lambs not mulesed or docked
Use preventative chemicals	87%	77%	84%	89%	93%
Undertake worm/dag control	76%	69%	78%	53%	100%
Undertake selective breeding	38%	36%	73%	70%	7%

Table 42 – Proportion of producers using and Merino lambs subject to preventative flystrike methods by marking practice (2022)

6. Lamb turn-off

Key findings

- Respondents turned off a total of 493,280 lambs to either live export or slaughter, an average of 1,068 per respondent, higher in prime lamb enterprises (1,224).
- Of these nearly half a million lambs, 79% went to slaughter and 21% to live export, compared to 70% and 30% respectively in the 2018 survey.
- The majority (74%) of lambs came from prime lamb enterprises. 76% of those that were turned off to slaughter and 67% of those that were turned off to live export came from prime lamb enterprises.
- All enterprise types send more of their lambs to slaughter than to live export, consistent with the 2018 survey.
- Half of the respondents sell through an agent and a quarter direct to an abattoir, processor or exporter.
- The peak times for turn-off in the MRZ were October to January and for the CSZ, February and March and again in October.
- Approximately half of the respondents finish their lambs on pasture, 40% on stubble or dry standing crops and 39% with grain supplementation (more than one response was allowed).

How many lambs (merino and crossbred less than 12 months old) did you turn-off in 2021?

1. Live export

2. Slaughter

The 2022 survey respondents turned off a total of 493,280 lambs to either live export or slaughter, an average of 1,068 per respondent. There was a higher turnoff of lamb into slaughter or live export from prime lamb producers (1,224) compared to dual purpose (921) and wool (682) with the average number turned off per enterprise similar across both zones (Table 43).

Of the almost half a million lambs that were turned off to slaughter and live export, 79% went to slaughter and 21% to live export. This compares to 70% to slaughter and 30% to live export in the 2018 survey.

Most lambs (74%) that were turned off to slaughter or live export came from prime lamb enterprises (76% of those that were turned off to slaughter and 67% of those turned off to live export). All enterprise types send most of their lambs to slaughter; 81% of prime lamb enterprise lambs, 86% dual enterprise lambs and 60% of wool enterprise lambs (Table 44a).

There is very little difference between zones as to turnoff market. Wool producers in the CSZ are more likely to sell to slaughter (11% of zone) than in the MRZ (4% of zone) (Table 44b). This is consistent with the 2018 survey.

	MRZ		CSZ		Total	
	No. lambs	Av/ respondent	No. lambs	Av/ respondent	No. lambs	Av/ respondent
Wool enterprises	20,480	621	43,604	715	64,084	682
Dual enterprises	30,112	912	34,333	928	64,445	921
Prime lamb enterprises	186,524	1,304	178,227	1,150	364,751	1,224
Total	237,116	1,135	256,164	1,013	493,280	1,068

Table 43 – Total number of lambs turned off, and average per respondent, to live export or slaughter in 2021 by zone and enterprise (2022)

	Slaughter		Live export		% of all lambs
	% of total lambs produced	% of slaughter lambs	% of total lambs produced	% of export lambs	
Wool	60%	10%	40%	25%	13%
Dual	86%	14%	14%	8%	13%
Prime lamb	81%	76%	19%	67%	74%

Table 44a – Proportion of lambs turned off in 2021 to slaughter and live export by enterprise type (2022)

	Slaughter		Live export	
	MRZ	CSZ	MRZ	CSZ
Wool	4%	11%	4%	6%
Dual	11%	12%	2%	2%
Prime lamb	63%	57%	16%	12%
Zone total	78%	80%	22%	20%

Table 44b – Proportion of lambs turned off in 2021 to slaughter and live export by zone and enterprise type (2022)

How did you sell the majority of your slaughter and live export lambs in 2021:

- 1. Direct to an abattoir, processor or exporter**
- 2. Through an agent**
- 3. Through the saleyard**
- 4. Online auction**
- 5. Direct to other producers or feedlotter**

Half of the 2022 survey respondents sold their lambs through an agent (approximately 40% in 2018) and the least popular method was through an online auction (3% in 2022 and 1% in 2018) as seen in Table 45.

Method of sale	Respondents (%)
Through an agent	50%
Direct to an abattoir, processor or exporter	26%
Through the saleyards	14%
Direct to producers or feedlotter	7%
Online auction	3%

Table 45 – Proportion of responses for listed methods of sale (multiple responses allowed and included)

What months do you turn-off your lambs for slaughter?

The peak times for turn-off in the MRZ were October to January and for the CSZ, February and March and again in October. In 2018, there had been no significant difference between zones in terms of turn-off time for lambs for slaughter.

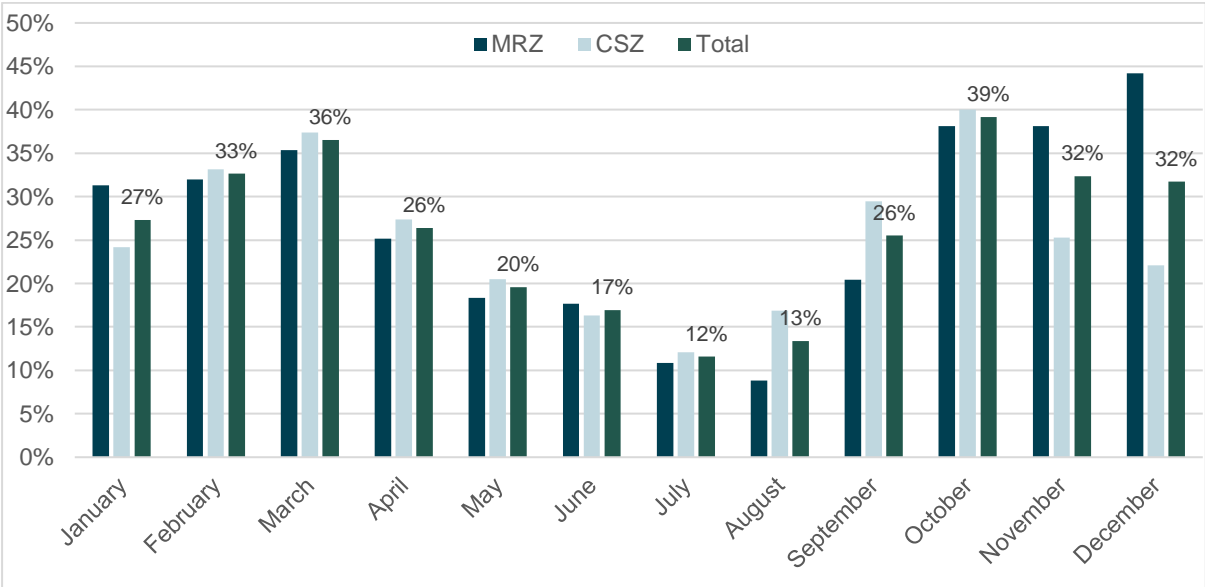


Figure 20 – Time of turnoff for slaughter by zone (2022)

How do you finish your lambs prior to sale? (Multiple responses allowed).

- 1. On stubble or standing dry crops**
- 2. In a feedlot or confined area with mixed ration**
- 3. On pasture**
- 4. With grain supplementation in the paddock**
- 5. On grazing crops**
- 6. Don't finish lambs but sell at stores**

Approximately half of the 2022 respondents finished their lambs on pasture (48%). Forty percent of respondents finished their lambs on stubble or standing dry crops and 39% with grain supplementation in the paddock (Table 46).

There was a significant difference between zones on how they finish their lambs prior to sale. The CSZ was more likely than the MRZ to use stubble or standing dry crops (49% vs 30%) and grain supplementation in the paddock (45% vs 32%) to finish lambs before sale (Table 46).

Method	MRZ	CSZ	Total
On stubble or standing dry crops	30% ^a	49% ^b	40%
In a feedlot with mixed ration	34%	30%	32%
On pasture	46%	50%	48%
With grain supplementation in paddock	32% ^c	45% ^d	39%
Grazing crops	7%	7%	7%
Don't finish / sell as stores	6%	4%	5%

Table 46 – Proportion of respondents that finished lambs by each listed method (of those that turned off lambs in 2021)

7. Sustainability

Key findings

- New questions were added to the 2022 survey related to feed gaps, marginal land and reducing greenhouse gas emissions.
- The most frequently mentioned feed gap presenting problems for respondents was the late autumn – early winter feed gap (72% of respondents). There was no difference between the two zones.
- A significantly larger proportion of wool producers than dual-purpose producers have a problem with the late autumn – early winter feed gap.
- Around half of the 2022 respondents had sown new pastures in the 2021 season, with an average of 240 ha, mainly a ryegrass mix
- Wool producers were less likely to have sown new pastures, driven by the MRZ.
- Of those who planted only one species or variety, the most frequent responses were serradella, Dalkeith sub clover, annual ryegrass or clover.
- There were 372 respondents that considered a portion of their land to be marginal, an average of 17.5% of their property and mainly due to salinity, poor/unproductive soils or trees/bush.
- For salinity, the main strategies to manage it were planting trees/revegetating and salt bush. For poor/unproductive soils, alternative pastures was the most popular response.
- The most frequent practices selected for decreasing greenhouse gas (GHG) emissions were ‘pasture renovated with legumes’, which also the largest average area, and ‘protection of native bush, waterways and wetlands’.
- Of the 308 respondents (70%) that had used approaches to increase soil carbon, more than 43% had used stubble retention.
- A quarter of respondents had used approaches to reduce carbon emissions. Open-ended responses were categorised and the most frequent categories were: reduce their use of fuel; trees/vegetation; stubble retention; and increased efficiency/productivity.
- A tenth of respondents had completed a carbon account or their farm using an online tool; 3% had completely an official carbon account for their farm; and 4% had undertaken a registered carbon farming project.

7.1 Pastures and marginal land

What are the feed gaps that present problems for your farming system?

- Late autumn – early winter
- Late spring
- Summer – early autumn
- Not applicable

Multiple responses were allowed.

This was a new question in the 2022 survey. The most frequent feed gap identified by respondents was the late autumn – early winter feed gap (Table 47). There was no significant difference between the two zones (not shown). A significantly larger proportion of wool producers than dual purpose producers identified the late autumn to early winter feed gap, and more wool producers than lamb producers identified a late spring feed gap. All other enterprise type comparisons were not significant.

	Wool	Dual	Lamb	Total
Late autumn - early winter	78% ^a	63% ^a	71%	72%
Late spring	9% ^b	5%	4% ^b	5%
Summer - early autumn	29%	27%	30%	29%
Not applicable	7%	16%	10%	10%

Table 47 – Proportion of producers expressing feed gap problems

What was the area, in hectares, of newly sown pasture in 2021?

For the 228 respondents who had sown new pastures in 2021, the average area was 240 hectares. The range was 10 to 10,000 hectares. Wool enterprises were less likely to have sown new pastures in 2021. This was driven by wool producers in the MRZ as there were no differences between enterprises in the CSZ.

Enterprise type	N	MRZ		CSZ		Total	
		Ave ha	% respond	Ave ha	% respond	Ave ha	% respond
Wool	118	82	14% ^a	284	28%	215	42%
Dual purpose	59	236	24%	164	27%	198	51%
Prime lamb	260	122	29% ^b	388	30%	256	58%
Total	437	130	24%	332	29%	240	53%

Table 48 - Proportion of respondents by enterprise having sown new pastures in 2021 and average area sown

For those respondents that had sown new pastures:

What species or varieties were sown in 2021?

The majority (152) sowed a mix of pastures while 83 respondents sowed one species or variety. The individual species/varieties are listed in Table 49 and the mixes are listed in Table 50.

Species/variety	n
Serradella	19
Dalkeith sub clover	19
Annual ryegrass	11
Clover	10
Barley	6
Vetch	5
Biserrula	4
Sub clover	3
Other	6
Total	83

Table 49 – New pasture species or varieties sown (single)

Pastures (predominant pasture listed for mixes)	Respondents n
Ryegrass mix	25
Ryegrass and clover	20
Dalkeith sub clover mix	19
Oat mix	18
Vetch mix	13
Serradella mix	13
Clover mix	9
Barley mix	9
Sub clover mix	5
Other	18
Not answered	3
Total	152

Table 50 – New pasture species or varieties sown (mixes)

What percentage of your farm do you consider to be marginal (not productive enough)?

There were 372 respondents (83%) that considered a portion of their land to be marginal. The only significant difference in Table 51 below is between wool enterprises and dual enterprises in the MRZ with dual enterprise producers reporting significantly more marginal land (20.8%) than wool producers (14.3%).

	MRZ	CSZ	Total
Wool enterprise	14.3% ^a	19.9%	17.9%
Dual enterprise	20.8% ^b	19.4%	20.0%
Lamb enterprise	15.9%	17.4%	16.7%
All enterprise types	16.2%	18.4%	17.5%

Table 51 - Average percent of farm that producers consider to be marginal – by enterprise and zone (2022)

Why do you consider it to be marginal?

Of the 372 respondents that considered a proportion of their land to be marginal, Table 52 shows the proportion of respondents for each category of response. The most frequent responses were salinity (35%), poor/unproductive soils (24%) and trees/bush (17%).

Reasons	n	%
Salinity	129	35%
Poor/unproductive soils	87	24%
Trees/bush	61	17%
Rocky	25	7%
Creek line/waterway	14	4%
Waterlogging	12	3%
Unimproved	9	2%
Steep	7	2%
Low rainfall	5	1%
Other reasons	14	4%

Table 52 – Reasons why land is considered marginal (categorised)

What strategies have you tried in order to manage it?

For each of the reasons, the main strategies are listed in Table 53 below.

Reason and strategies	n
Salinity	129
Plant trees/revegetate	35
Salt bush	28
Drainage	17
Fence off	15
Salt tolerant species	9
Poor/unproductive soils	87
Alternative pastures	11
Perennials	9
Reefinate	8
Ripping	6
Liming	6
Claying	6
Light grazing	4
Serradella	3
Soil amelioration	3
Fence off	3
Fertiliser	3
Trees/bush	61
Nothing	23
Fence off	9
Grazing	6
Manage bush (prune, weed, thinning)	5
Saltbush	4
Plant trees/revegetate	4
Clearing	3
Rocky	25
Nothing	7
Fence off	4
Ripping	2
Creek line	14

Reason and strategies	n
Fence off	5
Plant trees/revegetate	3
Waterlogging	12
Nothing	3
Fence off	2
Grazing	2
Unimproved	9
Nothing	3
Improve soil	2
Steep	7
Nothing	2
Manage grazing	2
Low rainfall	5
Manage feed	3

Table 53 – Strategies to address marginal land (categorised)

7.2 Reducing greenhouse gas emissions

As this was a new series of questions in the 2022 survey, a brief introduction was given to this section:

We are trying to improve the data that goes into the National Greenhouse Gas (GHG) inventory report for WA. We believe that producers have put in place many practices that decrease GHG emissions and improve productivity on farm that aren't being captured in the Agriculture inventory unless they are a registered project under Carbon Farming, meaning all the good work agriculture is doing in reducing carbon emissions isn't reflected.

Please list the area, in hectares, for each of the following practices in the past 5 years

- **Block plantation of tress**
- **Agroforestry with trees**
- **Shrub land grazed**
- **Shrub land ungrazed**
- **Salt bush and salt tolerant species**
- **Biodiversity planting of mixed storey species**
- **Protection of native bush, waterways and wetlands**
- **Pasture renovation with legumes**

The most frequent responses for practices used to decrease GHG emissions were 'pasture renovated with legumes' (53%), 'protection of native bush', 'waterways and wetlands' (48%) and 'saltbush and salt tolerant species' (33%), shown in Table 54. Renovated pastures also had the largest average area of 541 ha, following by shrubland ungrazed (260 ha) and shrubland grazed (219 ha).

	% of respondents	Average area ha
Pasture renovated with legumes	53%	541
Protection of native bush, waterways and wetlands	48%	142
Saltbush and salt tolerant species	33%	95
Shrub land ungrazed	26%	260
Block planting of trees	23%	91
Shrub land grazed	22%	219
Biodiversity planting of mixed storey species	15%	63
Agroforestry with trees	6%	76

Table 54 – Proportion of respondents implementing practices and the average number of hectares for each practice

What approaches have you used to increase soil carbon?

Of the 448 survey respondents, 308 (69%) had used various approaches to increase soil carbon. The most frequent response was stubble retention (Table 55). Multiple responses were permitted.

Approaches	Respondents %
Stubble retention	43%
Vegetation (planting or fencing)	11%
Minimum till	9%
Keeping the ground covered	9%
Legumes	6%
Crop and pasture rotation	5%
Perennial pastures	5%
Other	12%

Table 55 – Approaches to increasing soil carbon

What approaches have you used to reduce carbon emissions? Such as biochar, oil in feedlot rations?

Of the 448 survey respondents, 115 (26%) had used various approaches to reducing carbon emissions. The most frequent categories of response were reduced use of fuel, trees/vegetation/stubble retention and increased efficiency/production (Table 56).

Approaches	%
Reduced use of fuel	17%
Trees/vegetation	15%
Stubble retention	11%
Increased efficiency/productivity	11%
Oil in feed	9%
Reduced fertiliser use	7%
Don't have a feedlot	6%
Feed additives	6%
Renewable energy	5%
Other	14%

Table 56 – Approaches to reducing carbon emissions

Have you:

- Completed a carbon account for your farm using an online tool?
- Completed an official carbon audit for your farm with an accredited accountant?
- Undertaken a registered carbon farming project?

Are you interested in finding out more on your emissions or becoming a low carbon producer? (Yes; no).

Of the 448 respondents to these questions, 11% had completed a carbon account for their farm using an online tool, 3% had completed an official carbon audit of their farm with an accredited accountant and 4% had undertaken a registered carbon farming project (Table 57).

Forty eight percent of respondents were interested in finding out more about being a low carbon producer. There was no significant difference between zones and enterprises.

Practices N = 448	Respondents
Completed a carbon account for your farm using an online tool	11%
Completed an official carbon audit for your farm with an accredited accountant	3%
Undertaken a registered carbon farming project	4%

Table 57 – Proportion of respondents that had undertaken carbon-emission related practices

8. References

Australian Bureau of Statistics (2011). 2010-11 agricultural census.

Australian Bureau of Statistics (2016). 2015-16 agricultural census.

Australian Bureau of Statistics (2021). 2020-21 agricultural census.

Department of Agriculture and Food, Western Australia (2013). Western Australian farmer survey 2011.

Department of Agriculture and Food, Western Australia (2015). Western Australian sheep producer survey 2014.

Department of Primary Industries and Regional Development (2019). Western Australian sheep producer survey 2018.

MLA & AWI (2022). Wool and sheepmeat survey report – sheepmeat.

Young, J. et al (2011) Whole-farm profit and the optimum maternal liveweight profile of Merino ewe flocks lambing in winter and spring are influenced by the effects of ewe nutrition on the progeny's survival and lifetime wool production. *Animal Production Science*, 51

Appendix 1: Survey questions

Introduction

The Department of Primary Industries and Regional Development (DPIRD), through the Livestock Research and Industry Innovation Directorate, has been working with Western Australian sheep producers, processors, exporters and service providers to address issues and create opportunities for a progressive and thriving sheep industry.

To guide future research and development programs it is important we understand how effective this work has been and what producers see as valuable. DPIRD conducted large producer surveys in WA on behalf of key national and state level projects in 2004, 2008, 2011, 2014 and 2018. These were vital in understanding producer intentions, practice change over time and shaping projects. The Department is now aiming to find out what changes have occurred in the sheep industry over the last four years.

You have been invited to complete the 2022 WA Sheep Producer survey. You are eligible to complete this survey if you are a Western Australian sheep producer with more than 500 head of sheep at any stage over the past year.

The survey should take between 20 – 25 minutes. To thank you for your participation, your name will be entered into a draw, and once the study is completed, 5 names will be randomly selected to win a \$100 fuel voucher.

All information will remain anonymous, and you will have the opportunity to receive a summary report of survey results from the Department. Previous survey results and reports can be found at www.agric.wa.gov.au/sheep/western-australian-sheep-producer-surveys.

On behalf of the Livestock Research and Industry Innovation Directorate, I would like to thank you in advance for participating in the WA Sheep Producer survey 2022.

Enterprise details

What is the postcode of your **main** sheep enterprise?

Have you had 500 or more sheep on your property at any time over the last year (2021)? Yes/No.

Would you have regularly had more than 500 sheep on your property over the past five years? Yes/No.

Thank you for your time, we are targeting producers with more than 500 head of sheep.

END SURVEY

What was the total number of sheep on the property at 30th June 2021, including ewes, wethers, rams and lambs?

What is the total winter grazed area, in hectares, that you allocate for sheep production, including all leased land?

What is the total area, in hectares, of stubbles grazed by sheep?

What is the primary purpose of your sheep enterprise? Is it ...

- Wool production
- Prime lamb production
- Wool production and prime lamb production

What are the feed gaps that present problems for your farming system?

- Late autumn – early winter
- Late spring
- Summer – early autumn
- Not applicable

What was the area, in hectares, of newly sown pasture in 2021?

What species or varieties were sown in 2021?

What percentage of your farm do you consider to be marginal? (Not productive enough)

Why do you consider it to be marginal?

What strategies have you tried in order to manage it?

Merino flock

How many **Merino** ewes were mated to **Merino** rams, to lamb in 2021 (including Dohnes and SAMMs)?

What was the date lambing commenced for Merino ewes mated to merino rams, including Dohnes and SAMM's? (Note: If two lambing commenced across two different dates, please provide both).

How many lambs were marked from these Merino ewes in 2021?

And of those Merino lambs, what percentages were...

- Mulesed with pain relief
- Mulesed without pain relief
- Tail docked/castrated and not mulesed with pain relief
- Tail docked/castrated and not mulesed without pain relief
- Neither mulesed or castrated/tail docked

Could you please describe why you don't use pain relief for mulesing or tail docking Merino lambs?

- The animal does not need pain relief
- The pain relief options are too expensive
- Other (specify)

Cross-bred flock

How many **Merino** ewes were mated to **meat or maternal** rams, to lamb in 2021?

What was the date lambing commenced for Merino ewes mated to meat or maternal rams? (Note: If two lambing commenced across two different dates, please provide both)

How many cross bred lambs (from Merino ewes mated to meat or maternal rams) were marked from these ewes in 2021?

And of those cross bred lambs (Merino ewes to meat or maternal rams), what percentages were...

- Mulesed with pain relief
- Mulesed without pain relief
- Tail docked/castrated and not mulesed with pain relief
- Tail docked/castrated and not mulesed without pain relief
- Neither mulesed or castrated/tail docked

Could you please describe why you don't use pain relief for mulesing or tail docking cross bred lambs (Merino ewes mated to meat or maternal rams)?

- The animal does not feed pain relief
- The pain relief options are too expensive
- Other (specify)

Meat/maternal flock

How many **meat or maternal** ewes were mated to **meat or maternal rams** to lamb in 2021?

What was the date lambing commenced for meat or maternal ewes mated to meat or maternal rams? (Note: If two lambing commenced across two different dates, please provide both)

How many lambs were marked from these meat or maternal ewes in 2021?

And of those cross bred lambs (Meat or maternal ewes to meat or maternal rams), what percentages were...

- Mulesed with pain relief
- Mulesed without pain relief
- Tail docked/castrated and not mulesed with pain relief
- Tail docked/castrated and not mulesed without pain relief
- Neither mulesed or castrated/tail docked

Could you please describe why you don't use pain relief for mulesing or tail docking cross bred lambs (Meat or maternal ewes to meat or maternal rams)?

- The animal does not need pain relief
- The pain relief options are too expensive
- Other (specify)

Turn-off and sales details

How many lambs (Merino and crossbred, less than 12 months old) did you turn-off in 2021?

Live export (head)

Slaughter (head)

How did you sell the majority of your slaughter and live export lambs in 2021?

- Direct to an abattoir, processor or exporter
- Through an agent
- Through the saleyard
- Online auction

What months do you turn-off your lambs for slaughter?

How do you finish your lambs prior to sale?

- On stubble or standing dry crops
- In a feedlot of confined area with mixed ration
- On pasture
- With grain supplementation in the paddock
- On grazing crops
- Don't finish lambs but sell as stores

Rams

Do you...

- Run a commercial flock and buy rams?
- Breed rams for your own commercial flock?
- Breed rams for sale?
- Trade sheep only?

How many rams did you buy in 2021?

Which ONE of the following statements best describes how you usually select your stud or ram source for your primary sheep enterprise?

- I have never considered going to anyone other than my regular stud breeder
- I choose a stud breeder based on advice from my classer, agent or consultant
- I usually go to the farm sales or shows and select a stud that suits my needs
- I review wether trial data, sire evaluation data, sale reports etc and select a stud breeder that is performing well
- I use ASBVs or information from Sheep Genetics and/or selection indexes to select a breeder that matches my breeding objective

Which ONE of the following statements describes the main reason for never considering anyone other than your regular stud breeder?

- My stud breeder is conveniently located to my property
- I have a good relationship with my stud breeder
- I am confident that my stud breeder sells rams that perform well
- I determined years ago to purchase from my regular breeder based on performance data and have never had any cause to change this decision

Which ONE of the following statements best describes how you select rams to buy?

My classer or agent chooses the rams

- I choose the rams based on how they look
- I choose rams mainly on how they look but use some performance data such as fibre diameter, live weight or eye muscle depth
- I choose rams with a balance of visual appeal, performance data and some genetic information such as ASBVs or breeding values
- I choose rams based on genetic information such as ASBVs, breeding values or selection indexes

What percentage of your purchased rams in 2021 did you

- Buy at auction
- Buy at private sale
- Other (specify)

How many rams did you sell in 2021?

What percentage of the rams that you sold (or sold semen from) in 2021 had Australian Sheep Breeding Values (ASBVs)?

Which ONE of the following statements best describes your current level of knowledge of Australian Sheep Breeding Values (ASBVs)?

- I have never heard of ASBVs
- I have heard of ASBVs but don't understand them
- I have a basic understanding of ASBVs
- I have a good understanding of ASBVs
- I have a detailed knowledge of ASBVs

Technologies and labour-saving devices

Have you ever used the National Livestock Identification System to record sheep coming onto your property? Yes/No.

Please rate the following technologies and labour-saving devices

	Not heard of	Not considering using	Considering using	Already using	No longer using
Automatic jetting machine	1	2	3	4	5
Paddock based 'Walk over weighing' system	1	2	3	4	5
Pedigree Matchmaker	1	2	3	4	5
Remote water tank level sensor or water point camera and pump controller	1	2	3	4	5
Individual animal data management system such as Sapien, Koolcollect or Practical Systems Stockbook	1	2	3	4	5
Autodrafter	1	2	3	4	5
Sheep handler	1	2	3	4	5
Electronic identification (eID)	1	2	3	4	5
DNA testing for parentage, poll status of flock profile	1	2	3	4	5
Drone for monitoring stock and pastures	1	2	3	4	5
Remote sensing services for pasture management	1	2	3	4	5
GPS collars or tags for monitoring stock movement	1	2	3	4	5

How did you get started in electronic identification?

- Own research
- EID consultant
- Both

How is the individual animal data analysis performed?

- Own data analysis
- Outsource data analysis to a consultant or specialist
- Both

Are you aware of using:

- Year of birth-coloured tags with your brand for home bred stock? Yes/No.
- A pink ear tag with your brand in the earmark ear before moving non-home bred stock off your property? Yes/No.

Earmarking your sheep is now optional – will you continue to earmark your sheep?
Yes/No.

Pregnancy Scanning

Which ONE of the following statements best describes how you use Pregnancy scanning to manage the nutrition of ewe flocks, do you...

- Choose not to use pregnancy scanning
- Only scan in bad years on some sheep
- Scan ewes only for pregnancy status (pregnant or not)
- Scan ewes to detect litter size

Which ONE of the following statements best describes what you do with the pregnancy scanning information

- I don't change my nutritional management
- I manage ewes according to their flock average energy requirements
- I manage dry, single and multiple bearing ewes separately and according to their different energy requirements

Which ONE of the following statements best describes how you monitor ewe condition including condition scoring, fat scoring or weighing, do you usually...

- Make regular visual assessments in the paddock
- Visually estimate in the paddock and occasionally fat score, condition score or weigh a sample of the ewes when they are in the yards
- Normally condition score, fat score of weigh a sample of each ewe mob and manage to average mob targets for joining/lambing/weaning
- Condition score, fat score or weigh and draft all ewes, manage mobs according to condition to meet set targets for joining/lambing/weaning

Which of the following activities have you undertaken to improve lambing percentage?

- Increased ewe condition at joining
- Separate single and twin bearing ewes
- Provided extra shelter for twin lambing ewes
- Protected lambing ewes from predators
- Ram selection to improve reproduction
- Ensured that the ewe's higher energy demands are met before and during lambing
- Wet/dry at weaning and cull non-performing ewes
- Investigated the role of oestrogenic pastures*
- Attended events/training programs in person or online (specify)
- Other (specify)
- Not applicable

Do you use any of these preventative measures for flystrike management for any of your flock?

- Chemical application
- Worm or dag management
- Selective breeding for flystrike resistance
- Nothing

Reducing greenhouse gas emissions

We are trying to improve the data that goes into the National Greenhouse Gas (GHG) Inventory report for WA. We believe that producers have put in place many practices that decrease GHG emissions and improve productivity on farm that aren't captured in the Agriculture Inventory unless they are a registered project under Carbon Farming, meaning all the good work agriculture is doing in reducing carbon emissions isn't reflected.

Please list the area, in hectares, for each of the following practices in the past 5 years

- Block plantations of trees
- Agroforestry with trees
- Shrub land grazed
- Shrub land ungrazed
- Salt bush and salt tolerant species
- Biodiversity planting of mixed storey species
- Protection of native bush, waterways and wetlands
- Pasture renovation with legumes

What approaches have you used to increase soil carbon? (Please specify)

What approaches have you used to reduce carbon emissions? Such as biochar, oil in feedlot rations (Please specify)

Have you ...

- Completed a Carbon account for your farm using an online tool? Yes/No.
- Completed an official Carbon audit for your farm with an accredited accountant? Yes/No.
- Undertaken a registered Carbon farming project? Yes/No.

Are you interested in finding out more on your emissions or becoming a low carbon producer? Yes/No.

And finally, just a few more questions about yourself.

Do you identify as...

- Male
- Female
- In another way
- Prefer not to answer

What is your age bracket?

- <25 years
- 25-34
- 35-44
- 45-54
- 55-64
- 65 + years
- Refused

Survey Close

Would you be interested in receiving a summary of results from this survey? Yes/No.

Can we please record your name, postal address and email address for the purposes of sending you the report and to go in the draw for a chance to win 1 of 5 \$100 fuel vouchers? Your name will be kept separate from your survey responses to maintain confidentiality.

Important Disclaimer

The Chief Executive Officer of the Department of Primary Industries and Regional Development and the State of Western Australia accept no liability whatsoever by reason of negligence or otherwise arising from the use or release of this information or any part of it.

Copyright © State of Western Australia (Department of Primary Industries and Regional Development), 2023.