final report

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Stocktake of the Australian sheep flock

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Acronyms and Abbreviations used:

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ABS	Australian Bureau of Statistics
AWI	Australian Wool Innovation
AWTA	Australian Wool Testing Authority
DAFWA	Department of Agriculture and Food, Western Australia
MLA	Meat and Livestock Australia
Mo	Merino
OB	Other breed.
SD	Statistical Division
SLA	Statistical local area
SRP	RD&E Priorities and Investment Plan for Sheep Reproduction (Sheep Reproduction Plan)
SM&W	Sheep meat and wool

Definitions used:

Flock	Unless explicitly reported for a region (e.g. 'Australian flock' or 'Victorian flock'), 'flock' is used to denote all the sheep and lambs on a farm. Hence farm flock size refers to the total number of sheep including lambs held by a single sheep business on a specific farm, and 'flocks of less than 2000' are all the farm flocks that each have less than 2000 sheep and lambs. Increase in marking rate Marking rate is the number of lambs marked as a percentage of ewes joined. Where a per cent increase in marking rate is reported, the per cent increase is the relative increase, not an absolute increase. That is, a 10% increase from a current marking rate of 80% gives a rate of 88%, not 90%.
NSW*	Values denoted as NSW* (or New South Wales*) include data for the Australian Capital Territory (ACT).
Other breed	Other breed includes all non-Merino breeds including Merino crosses. Throughout this report the use of the term "other breed" is adopted to remain consistent with its use by ABS.
Population	'Population' or 'sheep population' refers to the total number of sheep including lambs in a region.

Acknowledgement:

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Abstract

A desktop study and analysis of the most recent ABS data was undertaken to provide a detailed description of the demographics of the Australian sheep population and to evaluate what changes would be required to lift marking rate by 10% as targeted by the RD&E Priorities and Investment Plan for Sheep Reproduction. This required extracting additional information from ABS data to be used in models to estimate how many extra lambs and sheep would be turned-off for a range of strategies, and how many farms would need to be targeted to achieve a 10% increase in marking rate.

The report presents flock demographic data including number of sheep and lambs, number of breeding ewes, number of Merino ewes, number of businesses by farm flock size, and the split of farms into those that only produce pure-bred Merino lambs, those that only produce other breed (not pure-bred Merino) lambs, those that produce both Merino and other breed lambs, and those farms that did not produce lambs in 2010-11.

A flock turn-off model was used to estimate the relative importance of the key inputs (number of breeding ewes, per cent of breeding ewes that are Merino, per cent of ewes joined, per cent of Merino ewes joined to Merino rams) that maximise turn-off, and how changes in those inputs alter turn-off, both in quantity and type of sheep. Compared to the current flock, the optimised flock that delivers the same total turn off, sells more wether lambs and so has fewer adult wethers, and joins more of the ewes to other breed rams. As a result the optimised flock is smaller, and lambs make up a greater proportion of turn-off. Alternatively, if the overall flock size were maintained, the optimal composition and management regime would result in a significantly greater total turn-off.

Please note: copies of the Excel flock models can be obtained from MLA by emailing info@mla.com.au quoting the project code.

Executive summary

Over the last two decades, the Australian sheep industry has changed from a wool oriented industry to a dual product sheep meat and wool industry. The increased emphasis on lamb production has led to a rise in the relative importance of reproductive performance. The RD&E Priorities and Investment Plan for Sheep Reproduction (Sheep Reproduction Plan, SRP) targets lifting reproductive performance by 10 per cent in the five years to 2016-17.

This is an industry wide target, and not a specific target for individual farm flocks. With limited resources, it is not possible to deliver a full extension service to every sheep business to help achieve this goal, nor would they all take up the initiative. Thus the challenge of evaluating how to achieve a 10% increase in marking rate lies in identifying how many producers will adopt the necessary changes, what marking rate they are currently reporting and what increase they need to achieve.

By segmenting the potential audience by region, current marking rate, farm flock size and breed mix, it is possible to evaluate the overall increase in marking rate that would be achieved from different levels of increase in marking rate within individual segments.

This project was undertaken as a desktop study to provide a detailed description (or segmentation) of the demographics of the Australian sheep population, and to evaluate what changes would be required to lift marking rate by 10% over five years. To do so it extracted additional information from the ABS census and survey data, and used this data to model how many extra lambs and sheep would be turned-off for a range of scenarios (e.g. constant sheep population, constant number of breeding ewes, flock composition that maximises lamb turn-off).

With increased and/or more efficient turn-off as the key outcome of increasing marking rate, a national flock demographic model was adapted to enable various reproduction outcomes and flock compositions to be evaluated, and to estimate the actual and potential turn-off capacity of the flock.

The key findings from this study include:

Sheep demographics …

- At the 30th June 2011, there were 72.9 million sheep and lambs run by 42,100 farms (businesses) in the target sheep regions of Australia.[1]
- Breeding ewes account for 57% of the sheep population, up from 41% in 1991.
- The demographics of the Australian sheep industry are such that a large proportion of all sheep farms only run a small proportion of all sheep, and vice versa.
    - Of the 42,100 farms, 72% accounted for 27% of the total flock (flocks of 2,000 or less).

[1] The target sheep regions included in this study are based on ABS statistical divisions and exclude some mainly metropolitan or tropical regions with few sheep. See section 7.3 for the full list of included and excluded regions. For all of Australia, there were 73.1 million sheep and lambs and 43,800 farms. Thus the target regions account for 99.7% of the sheep and lambs and 96.1% of the farms (ABS catalogue 7121.0).

    - Similarly, of the 38,900 farms with breeding ewes 70% of farms accounted for 28% of all breeding ewes.
- Merino ewes make up 72% of all breeding ewes, though the proportion for individual states ranges from 61% (Victoria) to 84% (Western Australia).
- 65% of Merino ewes are usually joined to Merino rams (i.e. 47% of all joinings in Australia are Merino ewes x Merino rams).
- Of the ewes mated in 2011, 23% were on farms that exclusively produced pure-bred Merino lambs, and 36% were on farms that only produced other (non-Merino) breed lambs. The remaining 41% of ewes were on farms that produced both pure-bred Merino lambs and other breed lambs. These ewes were split 24% for pure-bred Merino lambs and 17% for other breed lambs.
- Of the farms producing lambs, 20% produced pure-bred Merino lambs only, 24% produced other breed lambs only and the remaining 56% of farms produced both pure-bred Merino lambs and other breed lambs.
- The ratio of ewes mated in 2010-11 to the opening number of breeding ewes was 88%. 13% of the sheep businesses, carrying 4% of all sheep and lambs, did not mate ewes in 2011 – a combination of farms that only ran wethers , farms specialising in finishing lambs and farms that chose not to join ewes in that period.

Existing marking rates …

- Marking rates for all breeds of ewes, and all crosses, ranged from 80% in 2006-07 (drought year) to 90% in 2011-12. For pure-bred Merino lambs in 2010-11 and 2011-12, marking rates were 8-9% lower than for all ewes.
- Corresponding data for 2010-11 and 2011-12 from ABS and MLA/AWI sheep meat and wool surveys estimated:
    - Average marking rate for pure-bred Merino lambs – 80%
    - Average marking rate for Merino cross-bred lambs – 88%
    - Average marking rate for other breed lambs – 98% (excludes Merino and first-cross Merino lambs)
- Averaged across the five collection periods (2005-06, 2006-07, 2008-09, 2010-11 and 2011-12), and for all breeds of lamb produced:
    - 38% of all breeding ewes were on farms that have a marking rate of less than 80%, and
    - 6% of all breeding ewes were on farms that have a marking rate of over 120%.
- Averaged across 2010-11 and 2011-12:
    - 43% of Merino ewes mated to Merino rams were on farms with pure-bred Merino lamb marking rates of less than 80%, and
    - 2% of Merino ewes mated to Merino rams were on farms with pure-bred Merino lamb marking rates over 120%.

Increasing marking rates – what businesses (farms) need to target for improvement

With the aim to increase marking rate of the Australian flock by 10%[2] within 5 years, a range of strategies were evaluated, based on the demographics of the flock. These include …

- **Strategy – all the same:** Simplistically, all farms increase marking rate by 10% within 5 years, or half of all farms increase by 20% (assuming those farms hold half of the ewes).
- **Strategy – focus on big farms:** Half of all farms with more than 2000 sheep and lambs (5,661 farms) would have to increase their marking rate by 28%.
- **Strategy – ignore small farms:** Half of all farms with more than 1000 sheep and lambs (9,615 farms) would have to increase their marking rate by 23%.
- **Strategy – improve lowest performers the most:** Two thirds of all the farms with over 1000 sheep and lambs (11,796 farms) would have to achieve:
    - Farms that now mark between 50% and 70% need to increase by 25% (1,432 farms);
    - Farms now marking between 70% and 100% need to increase by 20% (6,456 farms);
    - Farms now marking between 100% and 120% need to increase by 15% (3,011 farms);
    - Farms now marking between 120% and 130% need to increase by 10% (511 farms); and
    - Farms now marking between 130% and 150% need to increase by 5% (386 farms).

Increasing turn-off – what flock segments to target for improvement

- The national flock model was used to rank the inputs that had the greatest impact on lamb and sheep turn-off at steady state; i.e. composition and flock size remains constant between years. The following list presents, **in order**, those changes to inputs that had the greatest impact on sheep and lamb turn-off:
    - Increase the proportion of all ewes that are joined;
    - Increase the proportion of ewes in the flock (at the expense of adult wethers);
    - Increase the proportion of other breed ewes and decrease Merino ewes;
    - Of the Merino ewes mated, reduce matings with Merino rams to the minimum required to exactly match the number of replacement ewe lambs required;
- The national flock model was used to explore flock composition strategies that maximise turn-off. The findings were:

[2] The required increase in marking rate noted for each strategy is the relative increase, not an absolute increase. That is, a 10% increase from a current marking rate of 80% gives a rate of 88%, not 90%.

  - If the total flock size was constrained, then ewe numbers would need to be increased to balance the composition and increase total turn-off of lambs;
  - If the total ewe number was constrained, then wether numbers would need to be reduced by selling them as lambs, to balance the composition and reduce the overall size of the flock;
  - Increasing the proportion of other breed lambs produced, by reducing the number of Merino ewes and or reducing the number of Merino ewes mated to Merino rams, increases lamb turn-off (as more lambs are produced) and reduces sheep turn-off (fewer carry-over wethers); and
  - Reducing the number of adult wethers (e.g. for wool production) increased total turn-off.
- A comparison is made between the current composition of the national flock and the optimum composition for the same turn-off and with the same proportion of Merino ewes (67%). This comparison shows a decrease in the proportion, and in the absolute number, of wethers, and an increase in the proportion of breeding ewes could achieve the same total turn-off. The total flock size would be lower as excess wether lambs are sold as lambs rather being grown into adults. This would result in trade-off where more lambs are processed leaving fewer sheep available for live export and/or mutton production.

A detailed sheep demographic profile is provided for Australia, each state and each of the 32 regions (see Appendix 7).

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1 Background

Over the last two decades, the Australian sheep industry has changed from a wool oriented industry (1991-92 gross value of production from wool was $2.98 billion and from sheep and lambs was $0.46 billion) to a dual product industry (2011-12 GVAP for wool of $2.73 billion and for sheep and lambs of $2.90 billion) (www.abs.gov.au).

The increased emphasis on lamb production has driven an increase in the breeding ewe proportion of the flock and a rise in the importance of reproductive performance. The RD&E Priorities and Investment Plan for Sheep Reproduction (Sheep Reproduction Plan, SRP) targets lifting reproductive performance by 10 per cent in five years.

It is important to note the 10% increase in reproductive performance being sought is a productivity or efficiency gain, not just an increase in production or turn-off. An increase in the number of breeding ewes would achieve the latter, albeit quite a different challenge to the focus of this study.

This is an industry wide target, and not a specific target for individual farm flocks. For a variety of reasons, not every sheep business will realise "a 10% increase in marking rate"[3]. These reasons include:

- Flocks that are currently achieving very high rates have less options for increasing marking rate,
- Flocks with lower than average marking rates may be able to achieve increases well above the 10% industry target, and
- Due to many other constraints or priorities, not every sheep producer will be willing or able to make the necessary changes to management to increase marking rate.

Further, with limited resources, it is not possible to deliver a full extension service to every sheep business to seek achievement of this target, nor would they all take up the initiative. Thus the challenge of evaluating how to achieve a 10% increase in marking rate lies in identifying how many producers will need to adopt the necessary changes, what marking rate they are currently reporting and what increase will they need to achieve.

By segmenting the potential audience by region, current marking rate, farm flock size and breed mix, it is possible to evaluate the overall increase in marking rate that would be achieved from different levels of increase in marking rate within individual segments. For example, the segmentation could be used to estimate the impact on overall marking rate, if 50% of sheep farms with flocks of more than 4000 sheep were to increase their current marking rate by 15%, or 20%.

This project was undertaken as a desktop study to provide a detailed description (or segmentation) of the demographics of the Australian sheep population, and to evaluate what changes would be required to lift marking rate by 10% over five years. To do so it extracted additional information from the ABS census and survey data, and used this data to model how many extra lambs and sheep would be turned-off for a range of scenarios (constant sheep population, constant number of breeding

[3] Throughout this report, where a per cent increase in marking rate is reported, the per cent increase is the relative increase, not an absolute increase. That is, a 10% increase from a current marking rate of 80% gives a rate of 88%, not 90%.

ewes, flock composition that maximises lamb turn-off). The modelling component also draws on data from the MLA/AWI sheep meat and wool surveys.

A national flock demographic model was adapted to enable various reproduction outcomes and flock compositions to be evaluated, and to estimate actual and potential turn-off capacity of the flock.

This project delivers a detailed description of the sheep industry (flock sizes and distribution, reproductive performance, potential capacity) to provide base-line data at the commencement of the Sheep Reproduction Plan. This detailed description:

a) builds understanding of the opportunity for improved reproductive performance, and thus assists in identifying where RD&E resources should be allocated, and
b) provides baseline data to support assessment of the achievements of the SRP at the completion of the initial five years.

2 Project objectives

Using data from the ABS and other sources, the objectives of the project[4] were:

1. To provide, for census year 2011, a detailed description of the demographics of the Australian sheep flock including the number and location (state, region) of farms, the number of sheep, the distribution of flock sizes, the split of the sheep population by breed and sex, and the distribution of reported flock marking rates.
2. By analysing this data and creating appropriate models, identify:
    a. Target groups of producers, defined by their region, farm flock size, current reported marking rate and breeds of ewes, and determine how much improvement in marking rate is required to achieve the SRP target. This process will also determine how many producers will need to be targeted; and

[4] In preparing the final report, the original objectives of this project (as per the contract, and repeated below) have been re-written to both clarify and simplify them. In the author's opinion, the scope remains the same.

1. To provide a detailed description of the sheep industry to allow segmentation that supports allocation of resources to the most appropriate groups. This includes a detailed breakdown of the sheep industry (number of farms, number of sheep, number of breeding ewes) in 2011 (last census year) by region and by flock size.
2. To highlight the opportunity for improvement of reproductive performance by describing the frequency distribution (spread) of actual marking rates. This includes a detailed breakdown of the distribution of marking rates by region, by breed (merino versus all) and by year. The distribution will be used to quantify how much improvement is required, and where it might be targeted, to achieve the SRP target of a ten per cent increase in marking rate over five years.
3. To build a framework and to quantify the potential turn-off of the national flock at the existing reproductive rate, and at an improved reproductive rate, for both current and optimal flock composition and breed mix.

b. The potential turn-off of both lambs and sheep for both the current and the optimal flock composition (mix of breeding ewes, wethers and lambs) and breed mix.

3 Methodology

The project had two components.

The first component involved analysis of industry data obtained from the Australian Bureau of Statistics (ABS) and included both their agricultural census and survey collections. These reports included data on:

- the number of sheep, number of breeding ewes, and number of farm businesses categorised by farm flock size, and region;
- the number of ewes mated to Merino rams, the number mated to other breed rams, and the number of farms mating ewes to Merino rams, other breeds of rams, or to both, by region along with the number of lambs marked; and
- the distribution of marking rates for all breeding ewes and for ewes mated to Merino rams by region and collection year.

The second component of the project involved modelling the reproductive performance of the flock to estimate production potential, and to evaluate the likely impact of a range of interventions (such as altering flock composition, changing ram type) aimed at improving reproductive performance and flock efficiency.

3.1 Analysis of industry data

The ABS was contracted to prepare four customised reports using their agricultural census and survey data. The customised reports were designed to provide more detail than is delivered in the standard reports available from abs.gov.au.

A list of the sheep data collected in each census (2005-06, 2010-11) and survey (2006-07, 2007-08, 2009-10, 2011-12) is shown in the appendix (see Table 26).

For each customised report, a set of categories and a set of variables were specified. For all combinations of the categories, totals for the variables were requested.

Categories define how the raw data, the individual observations, are to be grouped. They include geographic categories (e.g. states, statistical divisions), farm flock sizes (e.g. up to 1000 sheep and lambs per farm, 1000-2000 sheep and lambs per farm), marking rate categories (less than 50% lambs marked to ewes mated), 50% to 60%, 60% to 70%, etc…). Farms (or farm businesses) can also be categorised into those that marked Merino lambs, other breed lambs, both Merino and other breed lambs, and those that didn't mark lambs. A full description of the categories specified and the basis for their selection is given in the appendix (see section 7.1).

Variables are the measures recorded on the census or survey form and include the number of sheep and lambs on the farm at census date, the number of breeding ewes (one year and older), the number of lambs marked in the collection period, number of ewes run with rams to produce those lambs, and the number of Merino lambs marked in the collection period.

The four reports requested of ABS are outlined below and are fully specified in the appendix (see section 7.2).

3.1.1 Report 1 – Number of sheep, breeding ewes and businesses

Report 1 provides a breakdown of the national sheep population by region, and by flock size as at 30th June 2011. It includes the variables - number of sheep and lambs, number of breeding ewes and number of Merino breeding ewes on farms, and the number of businesses (farms) - categorised by farm flock size and region.

See Appendix 1, section 7.2.1 for full details of the request.

3.1.2 Report 2 – Number of sheep businesses mating ewes and marking lambs by breed

This report provides a categorisation of sheep businesses into those that marked Merino lambs, those that marked other breed (not pure Merino) lambs, those that marked both Merino and other breed lambs and those that did not mark lambs in 2010-11.

The report provides the total number of sheep and lambs, and the total number of lambs marked and ewes mated, both Merino and other breed, for all combinations of lamb marking, and for all regions.

See Appendix 1, section 7.2.2 for full details of the request.

3.1.3 Report 3 – Marking rate distribution – all ewes mated

This analysis provides, by region and farm flock size, the distribution of businesses by marking rate category for all ewes mated. It identifies the number of businesses (farms), the number of ewes mated and the number of lambs marked in each combination of marking rate, flock size and region categories.

This analysis includes all ewes mated irrespective of ram breed. Each collection year, 2005-06, 2006-07, 2008-09, 2010-11, and 2011-12, was reported separately.

See Appendix 1, section 7.2.3.1 for full details of the request.

3.1.4 Report 4 – Marking rate distribution – ewes mated to Merino rams

This analysis provides, by region and farm flock size, the distribution of businesses by marking rate category for ewes mated to Merino rams. It identifies the number of businesses (farms), the number of ewes mated to Merino rams and the number of Merino lambs marked in each combination of marking rate, flock size and region categories.

Data for Merino lambs marked and ewes mated to produce those lambs were available for 2010-11 and 2011-12.

See Appendix 1, section 7.2.3.2 for full details of the request.

3.2 Evaluating options for increasing lambs marked

The data sets collected for this project make it feasible to evaluate the impact of efforts that target an increase in lambs marked:

- in individual regions,
- in small, small/medium, medium and/or large farm flocks,
- by farms of different current marking rate levels (often associated by breed), or
- any combination of the above.

A marking rate calculator was developed using 2010-11 data for the number of ewes mated, the number of lambs marked and the number of businesses (farms), all by marking rate category and region. The 2010-11 data was used as it coincides with the start of the SRP.

The marking rate calculator estimates the number of additional lambs that will be marked, and the number of farms that would be targeted, for a user-specified increase in marking rate and a user-specified adoption rate. The user specifies the per cent increase in lambs marked and the per cent of farms that achieve the increase (adoption rate), for each flock size category (Table 29) and each marking rate category (Table 30) within the selected region or group of regions.

The marking rate calculator is described more fully in Section 8, Appendix 2.

User inputs are the expected increase in lambs marked by the farms targeted and the proportion of the farms in the target group that achieve the increase. This table is provided for farms with small flocks (<1000 sheep and lambs), farms with small/medium sized flocks (1001-2000 sheep and lambs), farms with medium flocks (2001-4000 sheep and lambs) and farms with large flocks (>4000 sheep and lambs).

The outputs of this calculator are the number of additional lambs marked, the number of businesses involved, and the current and target average marking rates. This calculator was used to evaluate five scenarios (see section 5.1) with the results reported in Appendix 2 (see Section 8).

3.3 Demographic modelling of reproductive potential

A simple flock demographic model was developed as a tool to estimate potential turn-off (sales/culling) of lambs and sheep, and hence the impact of changing reproductive performance.

The model calculates turn-off for a flock at steady state – that is, both the size and composition of the flock is the same at the end of the year as they were at the start of the year.

The model can be applied to Australia, to any individual state, or to the aggregate of a user defined set of states.

The model is briefly described below and in detail in Appendix 3.

3.3.1 Model inputs

Baseline (or initial) estimates for all inputs are provided from published sources (ABS, MLA/AWI sheep meat and wool (SM&W) surveys) where available or provided as expert estimates. Changing the region changes the baseline estimates. All baseline estimates can be over-written by a user input.

The model inputs are described in detail in Appendix 3 (see section 9.1). They include:

- Region (Australia, or a state),
- Number of sheep and lambs, and number of breeding ewes,
- Per cent of breeding ewes that are joined,
- Per cent of breeding ewes that are Merino and per cent that are joined to Merino rams,
- Marking rates for pure-bred Merino lambs, cross-bred lambs and other breed lambs,
- Death, culling rates, and wether sales rates, and
- Ratio of rams to breeding ewes.

3.3.2 Order of calculation

Because the flock composition data that is available is incomplete, the flock demographic model first has to construct the composition from the known components of the composition and user inputs for sales, deaths, culling and marking rates.[5]

From the user inputs, the model first constructs the flock composition and then estimates turn-off such that closing numbers match the opening numbers.

For the flock composition, only three components are known – total sheep and lambs, total breeding ewes, and number of Merino breeding ewes. The other components of the flock composition have to be estimated using the death, sales, culling and marking rates. The key steps in constructing the flock composition are:

1. Calculate initial ewe lambs as the number required such that after deaths and sales, there are enough to carry over to replace adult ewes that die or are culled. This is calculated separately for Merino ewes and other breed ewes.
2. Calculate number of rams from the ratio of rams to breeding ewes (user input).
3. Calculate total number of wethers (lambs and adults) as total sheep minus (adult ewes + ewe lambs + rams).
4. Split total wethers into wether lambs and adult wethers so that the number of wether lambs after deaths and sales is sufficient to replace the adult wethers and rams that die on farm or are sold.

See Appendix 3 (section 9) for an example of the calculated composition.

Using the calculated flock composition, the reproductive performance inputs (marking rates, proportion ewes joined to Merino or other breed rams, etc.) and the death rates are used to calculate births and survival. Turn-off is then calculated such that the closing composition exactly matches the opening composition. Turn-off data is provided as tables for lamb and sheep disposals split into ewes and wethers, Merino and other breed.

Also reported in the output table is the actual turn-off (number of sheep and lambs slaughtered plus live exports) during 2012-13. This value is provided for context, and

[5] Sales and culling are effectively the same operation, but separate terms are used in the context of the model to represent sales of lambs and wethers (for slaughter or export), as distinct from culling of ewes (and rams) due to age or performance (e.g. ewes that failed to lamb).

is not intended to be a target value as the flock in 2012-13 was not necessarily at steady state, nationally or in individual states.

The flock turn-off model was used to estimate the values of key inputs (number of breeding ewes, per cent of breeding ewes that are Merino, per cent of ewes joined, per cent of Merino ewes joined to Merino rams) that maximise turn-off, and how changes in those inputs alter turn-off, both in quantity and class of sheep.

4 Results

4.1 Flock size

Over the two decades to 2010, the Australian flock declined from 163 million sheep and lambs in 1991 to 68 million in 2010[6], a decrease of 58% (Figure 1). Since 2010, there has been a 10% rebound to 75 million in 2012, though not in all states as Queensland and Western Australia remained below their 2010 level.

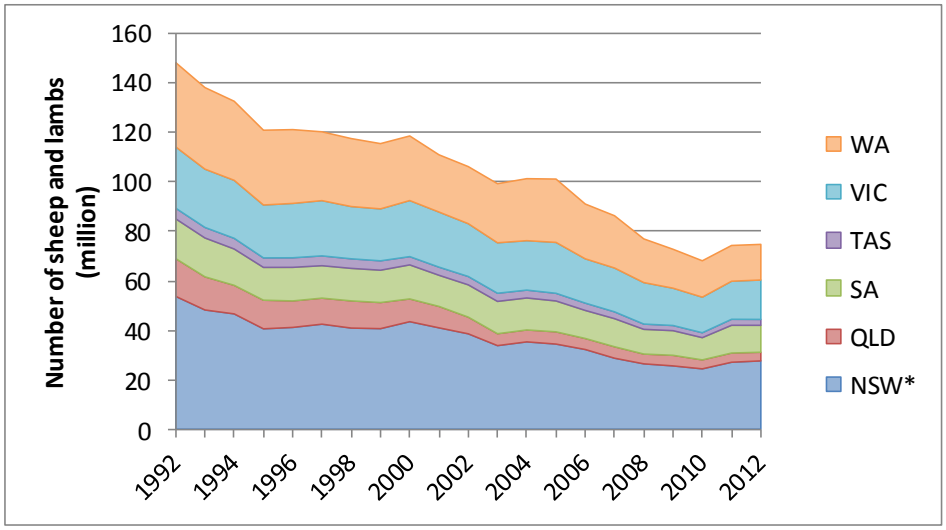


Figure 1. Change in number of sheep and lambs by state between 1992 and 2012. NSW* includes ACT. Based on ABS data.

Breeding ewe numbers (Figure 2) have undergone a similar 'absolute' decline, though their rebound started a year earlier than did the total flock number. From 67 million breeding ewes in 1991, the total dropped by 39% to 41 million in 2009, before rising 10% to 45 million in 2012. Not all states have seen a rebound with both Queensland and Western Australia recording fewer breeding ewes in 2012 than in 2009.

[6] While the ABS reported sheep and lamb number for 2010 is 68 million, industry opinion is that this figure is a low estimate with the true figure around 70.8 million (e.g. see MLA Australian Sheep Industry Projections 2012).

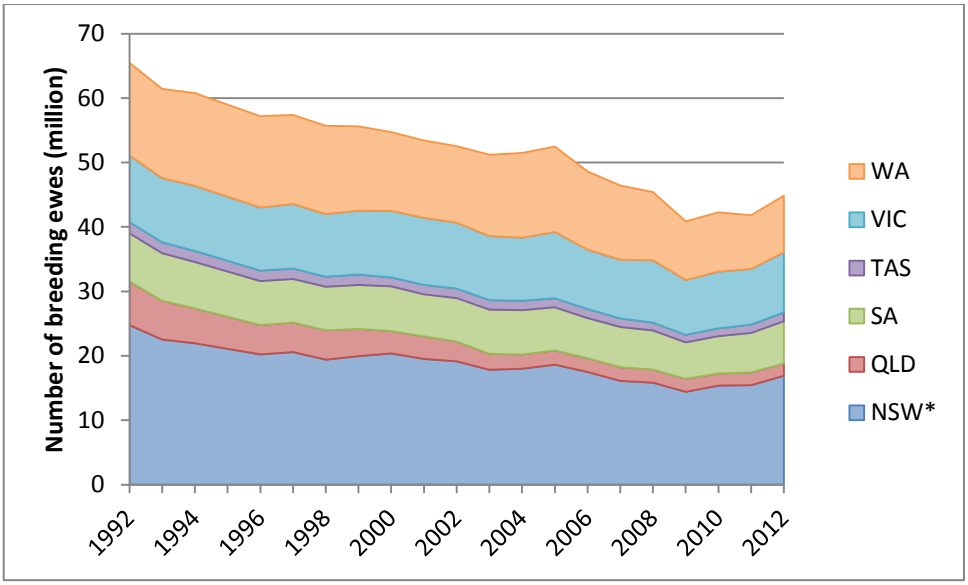


Figure 2. Change in number of breeding ewes by state between 1992 and 2012. NSW* includes ACT. Based on ABS data.

As a consequence of the slower reduction in ewe numbers compared to the total population, an increase in the breeding ewe proportion of the population is evident (Figure 3). The increased proportion of breeding ewes has largely come at the expense of wethers, and reflects industry's increased emphasis on lamb production compared to wool.

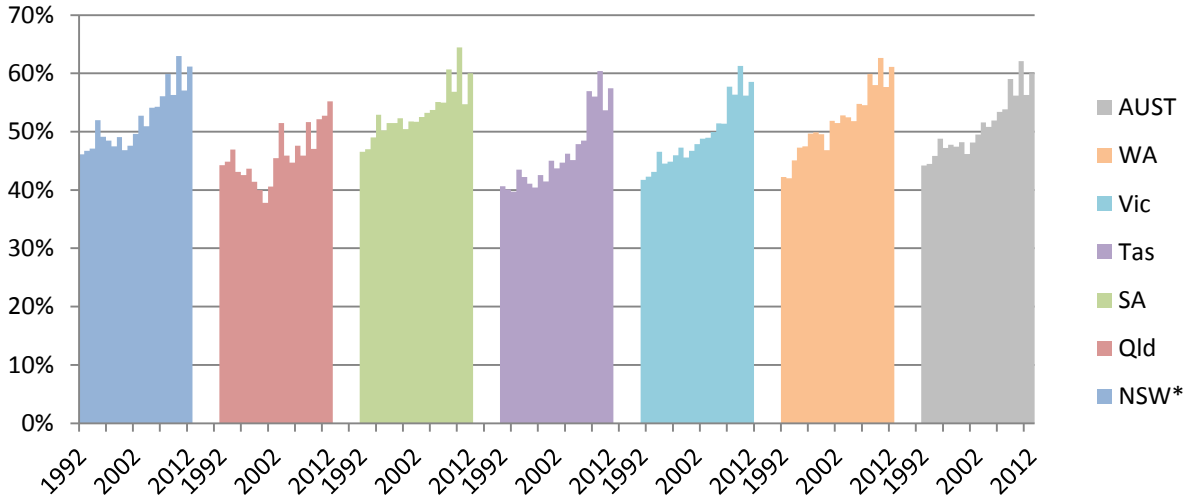


Figure 3. Per cent breeding ewes in the flock by year and state. (NSW* includes ACT.) Based on ABS data**.**

4.2 Proportion of sheep and sheep businesses by farm flock size

In 2011, the national average flock size was 1,730 sheep and lambs per farm (business). Compared to the national average, Queensland (2,450) and Western

Australia (2,320) had larger flocks, New South Wales* (1,700)[7] was close to average, and the smallest flock sizes were recorded for Victoria (1,430), Tasmania (1,530) and South Australia (1,640). Average flock size can be misleading as the distribution of flock sizes is skewed toward smaller flocks.

Data presented in Figures 8 and 9 show that there are a large number of small sheep enterprises and that the demographics of Australian sheep enterprises tends to follow the '80:20 rule'; in this case 72% of enterprises run 27% of the sheep population

Table 1 presents the cumulative per cent of sheep and lambs by farm flock size and the total number of sheep and lambs, by state. Data is from the ABS agricultural census and is for sheep and lambs on farm at 30th June 2011.

Farm flocks of 2000 head or less accounted for 27% of the national sheep population, but just 11% of the Queensland population and 18% of the Western Australian population. Large farm flocks of over 8,000 head, while accounting for 20% of the national sheep population, carried 41% of Queensland sheep and lambs, and 35% of Tasmanian sheep and lambs. (Note that both the Queensland and Tasmanian sheep populations are relatively small, each being less than 5% of the Australian population.)

Table 1. Cumulative per cent of sheep and lambs by size of farm flocks and total number of sheep and lambs (million), June 2011. Based on ABS customised report.

	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	Sheep & Lambs
NSW*	4	11	29	57	81	95	26.82
QLD	2	5	11	26	59	83	3.62
SA	4	12	32	59	81	92	11.01
TAS	6	12	21	38	65	86	2.34
VIC	5	14	33	62	84	95	15.16
WA	2	6	18	49	80	94	13.93
Australia	4	11	27	55	80	94	72.88

Example interpretation:

14% of the 15.16 million sheep and lambs in Victoria were run by businesses with 1000 or less sheep and lambs at 30th June 2011.

Across Australia, 72% of sheep businesses (farms) had farm flocks of 2000 or less sheep and lambs (Table 2). The proportion of businesses within a state with less than 2000 sheep and lambs ranged from a high of 80% in Tasmania down to a low of 58% in Western Australia.

The demographics of the Australian sheep industry (Tables 1 and 2) shows that 72% of businesses run just 27% of the total sheep and lamb population, at an average of 650 per business. Conversely, just 28% of sheep businesses (those with more than 2000 sheep and lambs) are carrying 73% of the national sheep and lamb population at an average of 4,560 per business.

[7] Throughout this report, New South Wales* or NSW* indicates that data for New South Wales includes Australian Capital Territory data.

Table 2. Cumulative per cent of businesses (sheep farms) by the size of farm flock and total number of businesses, June 2011. Based on ABS customised report.

	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	Businesses
NSW*	35	52	73	90	98	100	15,800
QLD	47	56	66	79	93	98	1,500
SA	34	53	75	91	98	100	6,700
TAS	57	70	80	89	96	99	1,500
VIC	41	58	78	92	98	100	10,600
WA	27	39	58	83	96	99	6,000
Australia	37	53	72	89	97	100	42,100

Example interpretation:

58% of the 10,600 Victorian sheep businesses were running flocks of 1000 or less sheep and lambs at 30th June 2011.

Table 3. Cumulative per cent of breeding ewes by size of farm flocks, and total number of breeding ewes (million), 2011. Based on ABS customised report.

	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	Breeding ewes
NSW*	4	11	29	58	82	95	15.41
QLD	3	5	11	27	59	84	1.95
SA	4	13	33	59	81	92	6.13
TAS	6	12	22	40	66	86	1.30
VIC	5	15	34	62	85	95	8.61
WA	2	6	19	50	81	95	8.30
Australia	4	11	28	55	80	94	41.71

Example interpretation:

15% of the 8.61 million breeding ewes in Victoria were run by businesses with 1000 or less sheep and lambs at 30th June 2011.

Table 4. Cumulative per cent of businesses with breeding ewes by the size of farm flock and total number of businesses with breeding ewes, 2011. Based on ABS customised report.

	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	Businesses
NSW*	32	49	71	89	97	100	14,600
QLD	46	54	65	78	93	98	1,300
SA	31	50	74	91	98	100	6,200
TAS	53	66	78	88	96	99	1,300
VIC	37	56	76	91	98	100	9,700
WA	24	36	56	82	96	99	5,600
Australia	33	50	70	89	97	100	38,900

Example interpretation:

56% of the 9,700 Victorian sheep businesses running breeding ewes at 30th June 2011, were running flocks of 1000 or less sheep and lambs.

Of the 42,100 businesses with sheep (Table 2), 38,900 or 92% of those businesses (Table 4) were running breeding ewes at the end of June 2011. As with total sheep and lambs, there are a large number of businesses with few breeding ewes and a few businesses with most of the ewes.

Across Australia, the 70% of farms with flocks of up to 2000 sheep and lambs (Table 4), carry just 28% of the breeding ewes (Table 3). Queensland has the largest concentration of breeding ewes in large farms with 7% of producers carrying 41% of the breeding ewes on farms with flocks of over 8000 sheep and lambs.

Merino breeding ewes, one year and older, account for 72% of all breeding ewes with the proportion in individual states ranging from 61% in Victoria to 84% in Western Australia (Table 5).

Table 5. Total number of breeding ewes (one year and older) (million) and Merino breeding ewes (one year and older) (million) by state, 2011. Based on ABS customised report.

	Breeding ewes	Merino ewes	%Merino
NSW*	15.41	11.06	72
QLD	1.95	1.56	80
SA	6.13	4.39	72
TAS	1.30	0.86	66
VIC	8.61	5.29	61
WA	8.30	6.97	84
Australia	41.71	30.13	72

As Merino ewes account for nearly three quarters of all breeding ewes, their distribution across flock size categories is, not surprisingly, similar to that of all breeding ewes. Table 6 shows that 25% of Merino ewes are run by businesses with farm flocks of 2000 or less sheep and lambs.

Table 6. Cumulative per cent of Merino breeding ewes by size of farm flocks, and total number of Merino breeding ewes (million), 2011. Based on ABS customised report.

	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	Merino ewes
NSW*	3	9	26	55	81	95	11.06
QLD	1	3	9	25	57	82	1.56
SA	4	12	33	60	81	93	4.39
TAS	4	7	16	32	61	83	0.86
VIC	4	12	30	60	83	95	5.29
WA	2	5	18	49	81	95	6.97
Australia	3	9	25	53	79	94	30.13

Example interpretation:

12% of the 5.29 million Merino breeding ewes in Victoria were run by businesses with 1000 or less sheep and lambs at 30th June 2011.

As shown for all sheep and lambs (Table 2), and for all breeding ewes (Table 4), a large proportion of all sheep businesses, including those running Merino ewes, have small farm flocks. Farm flocks of up to 2000 sheep and lambs accounted for 64% of the 28,000 businesses running Merino breeding ewes (Table 7). The farm flocks with over 8,000 sheep and lambs account for only four per cent of 28,000 businesses, but they are running 21% of all Merino breeding ewes.

Table 7. Cumulative per cent of businesses with Merino breeding ewes by the size of farm flock and total number of businesses with Merino breeding ewes, 2011. Based on ABS customised report.

	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	Businesses
NSW*	24	41	65	87	97	100	10,500
QLD	33	42	55	72	90	98	940
SA	25	45	70	89	97	99	4,800
TAS	40	53	67	81	93	98	760
VIC	28	46	69	89	97	100	6,400
WA	17	28	50	79	95	99	4,600
Australia	25	41	64	86	96	99	28,000

Example interpretation:

46% of the 6,400 Victorian sheep businesses running Merino breeding ewes at 30th June 2011, were running flocks of 1000 or less sheep and lambs.

4.3 Mix of lamb production systems

Data available from the 2010-11 ABS census was used to classify sheep businesses (farms) by the type of rams they mate to their ewes. The four categories are:

- Businesses where all ewes mated were mated to Merino rams – typical of a self-replacing wool enterprise,
- Businesses where all ewes mated were mated to other breed (non-Merino) rams – typical of a prime lamb specialist,
- Businesses where some ewes were mated to Merino rams and some to other breed rams – typical of a dual product enterprise turning off first-cross and meat breed prime lambs and producing wool, and
- Businesses that did not mate any ewes, including those that had only wethers – possibly wool enterprises running dry sheep, or finishers growing out store lambs.

Of the 37.28 million ewes mated in 2010-11, 47% were mated to produce pure-bred Merino lambs, with half of these run by businesses that only produced Merino lambs (Table 8). Of the 53% of ewes that were mated to produce other breed lambs, two thirds of them were on properties that did not produce any pure-bred Merino lambs.

Table 8. Per cent of ewes mated in each state split between businesses that only produced pure-bred Merino lambs, businesses that produced both pure-bred Merino and other breed lambs, and businesses that only produced other breed lambs. Data for 2010-11. Based on ABS customised report.

Farm type based on lamb types produced	Lamb type	Per cent of ewes mated						
		NSW	QLD	SA	TAS	VIC	WA	Australia
Merino lambs only	Merino	22	55	26	9	11	28	23
Both Merino and	Merino	24	14	20	35	22	31	24
other breed lambs	Other breed	16	9	16	24	19	19	17
Other breed lambs only	Other breed	39	22	38	32	48	22	36
Total ewes mated (million)		13.55	1.69	5.33	1.18	7.70	7.83	37.28

Example interpretation:

55% of the 1.69 million ewes mated in Queensland were run by businesses that only produced pure-bred Merino lambs.

Table 9 shows the proportion of sheep and lambs categorised by the mix of ram breeds mated to their ewes. Table 10 shows the proportion of businesses classified by the same categories.

Table 9. Per cent of sheep and lambs in each state run by businesses that only produced pure-bred Merino lambs, businesses that produced both pure-bred Merino and other breed lambs, businesses that only produced other breed lambs, and businesses that did not mate ewes. Data for 2010-11. Based on ABS customised report.

Farm type based on	Per cent of sheep and lambs						
lamb types produced	NSW	QLD	SA	TAS	VIC	WA	Australia
Merino lambs only	24	55	27	11	13	31	25
Both Merino and other breed lambs	37	19	34	57	40	46	39
Other breed lambs only	35	19	36	27	42	19	32
No ewes mated	4	6	3	5	4	4	4
Total sheep and lambs (million)	26.82	3.62	11.01	2.34	15.16	13.93	72.88

Example interpretation:

55% of the 3.62 million sheep and lambs in Queensland were run by businesses that only produced pure-bred Merino lambs.

Table 10. Per cent of businesses in each state that only produced pure-bred Merino lambs, businesses that produced both pure-bred Merino and other breed lambs, businesses that only produced other breed lambs, and businesses that did not mate ewes. Data for 2010-11. Based on ABS customised report.

Farm type based on	Per cent of businesses						
lamb types produced	NSW	QLD	SA	TAS	VIC	WA	Australia
Merino lambs only	17	30	21	8	10	27	17
Both Merino and other breed lambs	21	9	22	19	19	27	21
Other breed lambs only	49	42	44	55	57	34	48
No ewes mated	13	19	13	17	14	13	13
Total businesses with sheep and lambs	16,000	1,500	6,800	1,600	10,700	6,100	42,600

At the national level, the key points from this analysis of the distribution of farms by lamb type produced are:

- 13% of farms did not mate ewes in 2010-11. These farms were running 4% of the national flock.
- 17% of farms were only producing pure-bred Merino lambs. They accounted for 23% of all ewes mated and 25% of the national flock.
- 48% of farms were only producing other breed lambs (no pure-bred Merino lambs) from 36% of all ewes mated. Those farms account for 32% of the national flock.
- 21% of farms were producing both Merino and other breed lambs from 24% and 17% respectively, of all ewes mated. These farms carry 39% of the national flock.

4.4 Average marking rate by state, year and breed

Data on lambs marked and ewes mated to produce those lambs was collected each year between 2005-06 and 2011-12 excluding 2009-10. For pure-bred Merino lambs

marked and ewes mated to produce those Merino lambs, data was only collected for 2010-11 and 2011-12.

In census year 2010-11, marking rates averaged 89% for all ewes and 80% for Merino matings (Table 11). The difference in marking rates between 2010-11 and 2011-12 were small (3% or less) except in Queensland (4-5% decline) and for Merino matings in Victoria (6% increase), mostly likely due to changes in seasonal conditions in those states (see Appendix 5, section 11).

Table 11. Average marking rate (per cent) by state and year. Based on ABS customised report

	All ewes					Merino ewes	
State	**2005-06**	**2006-07**	**2008-09**	**2010-11**	**2011-12**	**2010-11**	**2011-12**
NSW*	79	79	85	90	90	81	82
QLD	66	60	73	70	65	68	64
SA	84	88	88	96	95	89	89
TAS	84	86	85	94	95	83	83
VIC	87	87	90	92	94	75	81
WA	83	75	80	83	85	81	84
Australia	82	80	85	89	90	80	82

Over the period for which data is presented, marking rate for all ewes appears to have increased by about 8 per cent, with greater increases in New South Wales and South Australia. A number of factors may have contributed to this increase including improved seasons (transition out of the millennium drought), better management, and improved genetics or breed mix. Though beyond the scope of this project, the inter-year variation in rainfall is illustrated in section 11 (Appendix 5) which indicates seasonal impacts were evident.

A multiple linear regression model was used to determine if there were statistically significant differences in marking rates between states and years.

Dummy variables were used to represent each state and year with NSW* (the largest state) and 2010-11 (the census year) included through the regression constant. The model was significant ($p<0.0001$) and had an R^2 of 0.90. The regression table is shown below (Table 12).

The coefficients in Table 12 show:

- The marking rate in NSW* in 2010-11 averaged 88%.
- Relative to NSW*, marking rates were significantly higher in South Australia (+6%), Victoria (+5%) and Tasmania (+4%), and lower in Queensland (-18%). The marking rate coefficient for Western Australia (-3%) was not significant ($p=0.0879$).
- Marking rates in 2005-06 (-7%), 2006-07 (-8%) and 2008-09 (-4%) were significantly lower than the marking rate for 2010-11. The 2011-12 marking rate was not significantly different to that for 2010-11.

Table 12. Regression table for model of marking rate for all ewes against state and year. Constant represents NSW, 2010-11.

Regression Table	Coefficient	Standard Error	t-Value	p-Value	Confidence Interval 95% Lower	Upper
Constant	88%	2%	53.33	< 0.0001	85%	92%
Year = 2005-06	-7%	2%	-4.30	0.0003	-11%	-4%
Year = 2006-07	-8%	2%	-5.02	< 0.0001	-12%	-5%
Year = 2008-09	-4%	2%	-2.41	0.0256	-7%	-1%
Year = 2011-12	0%	2%	-0.05	0.9644	-4%	3%
State = QLD	-18%	2%	-9.77	< 0.0001	-22%	-14%
State = SA	6%	2%	3.08	0.0059	2%	9%
State = TAS	4%	2%	2.28	0.0336	0%	8%
State = VIC	5%	2%	2.94	0.0081	2%	9%
State = WA	-3%	2%	-1.79	0.0879	-7%	1%

4.5 Marking rate distribution

The distribution of marking rates was estimated from the marking rate achieved by each business, and weighted by the number of ewes mated.

The figures in the following section plot the frequency distribution for ewes mated against marking rate categories. The tables show the cumulative distribution of ewes mated against marking rate categories. The data presented is a weighted average across all years. Tables for individual years are presented in Appendix 4 (see section 10).

4.5.1 Distribution of breeding ewes by marking rate achieved

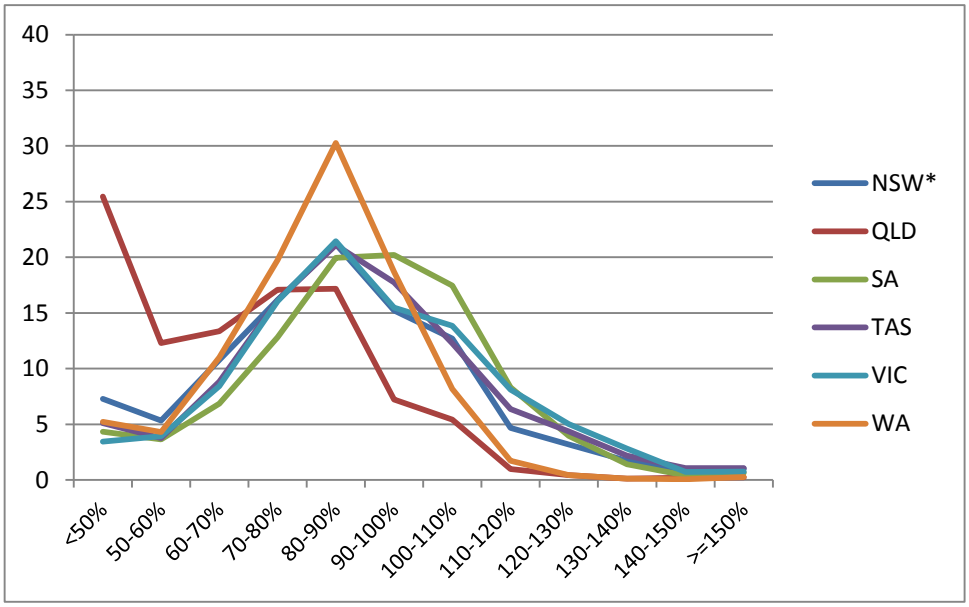


Figure 4. Percent of breeding ewes by average marking rate achieved. Data for all ewes and averaged across years 2005-06, 2006-07, 2008-09, 2010-11 and 2011-12. Based on ABS customised report.

The results of Figure 4 and Table 13 show that while marking rates for all ewes averaged across a number of seasons may be in the 80% to 90% range, there is a huge variation with marking rates on individual farms averaging from less than 50% to over 150%. Factors involved will be both breed composition and seasonal influence as evidenced by the fact that Queensland which has the highest proportion of merino ewes had the poorest marking rate (38% of farms reported an average marking rate of <60% compared to only 11% of all farms). Marking rates in Queensland are also known to be impacted by a relatively high level of predation.

Table 13. Cumulative percent of breeding ewes by average marking rate achieved, and number of ewes (million) mated. Data for all ewes and averaged across years 2005-06, 2006-07, 2008-09, 2010-11 and 2011-12. Based on ABS customised report.

	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%	Ewes
NSW*	7	13	23	40	61	76	89	93	97	98	99	14.08
QLD	25	38	51	68	85	93	98	99	99	100	100	1.67
SA	4	8	15	28	48	68	85	94	98	99	99	5.41
TAS	5	9	18	34	55	73	85	91	96	98	99	1.22
VIC	3	7	16	32	53	69	83	91	96	99	99	7.96
WA	5	10	21	40	71	89	97	99	100	100	100	8.97
AUST	6	11	21	38	61	77	89	94	97	99	99	39.30

Example interpretation:

Averaged across the five collection periods, 32% of the 7.96 million breeding ewes in Victoria were run by businesses where the average marking rate was less than 80%.

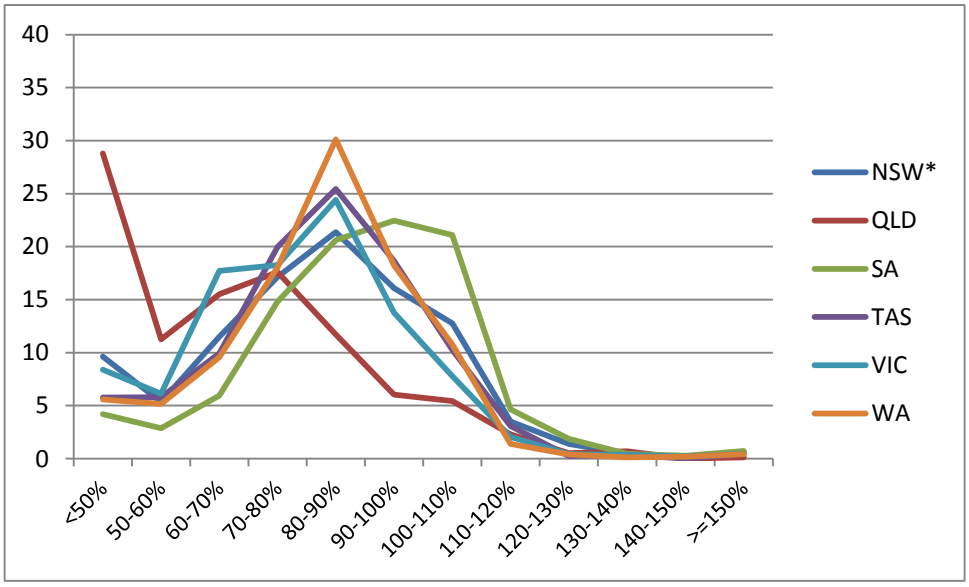


Figure 5. Percent of Merino breeding ewes by average marking rate achieved. Data for Merino ewes mated to produce pure-bred Merino lambs, and averaged across years 2010-11 and 2011-12. Based on ABS customised report.

The marking rate distribution for Merino ewes mated to Merino rams is an average of just two years (Figure 5 and Table 14). Clearly Queensland has the greatest proportion of Merino ewes run by businesses with low marking rates (73% of Merino ewes on farms marking less than 80%). It is of interest that SA has the highest proportion of ewes on farms where the average marking rate is over 90% (52% compared to 34% nationally).

Table 14. Cumulative percent of Merino breeding ewes by average marking rate achieved, and number of Merino ewes (million) mated. Data for Merino ewes mated to produce pure-bred Merino lambs, and averaged across years 2010-11 and 2011-12. Based on ABS customised report.

	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%	Ewes
NSW*	10	15	26	44	65	81	94	97	99	99	99	6.29
QLD	29	40	56	73	85	91	96	99	99	100	100	1.11
SA	4	7	13	28	48	71	92	97	99	99	99	2.44
TAS	6	12	22	41	67	86	96	99	99	100	100	0.51
VIC	8	15	32	51	75	89	96	99	99	99	100	2.62
WA	6	11	20	38	68	87	97	99	99	99	100	4.54
AUST	9	14	26	43	66	83	95	98	99	99	99	17.51

Example interpretation:

Averaged across 2010-11 and 2011-12, 51% of the 2.62 million Merino breeding ewes in Victoria were run on farms where the average marking rate of pure-bred Merino lambs was less than 80%.

4.5.2 Distribution of businesses by marking rate achieved

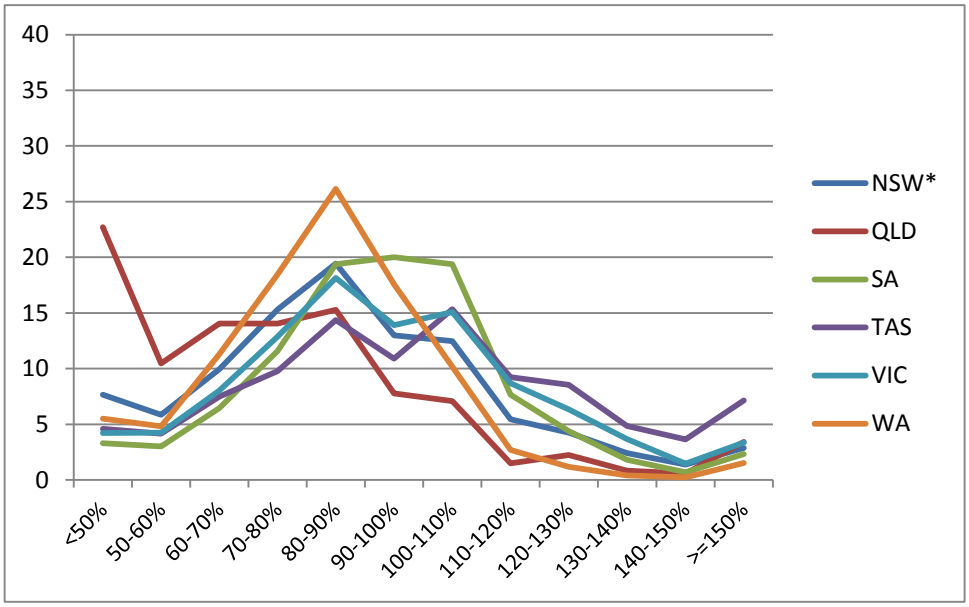


Figure 6. Percent of businesses by average marking rate achieved from all breeding ewes. Data averaged across years 2005-06, 2006-07, 2008-09, 2010-11 and 2011-12. Based on ABS customised report.

The distribution of businesses by marking rate (Figure 6 and Table 15) is similar to that recorded for breeding ewes. A third of the farms in Queensland had marking rates of less than 60%, more than double the percent of the next poorest of the other states, NSW* with 14%. Queensland (9%) and Western Australia (6%) had fewest farms with marking rates above 110% while Tasmania (33%) and Victoria (24%) had the highest proportion of farms achieving marking rates over 110%.

Table 15. Cumulative percent of businesses by average marking rate achieved from all breeding ewes, and average number of businesses. Data averaged across years 2005-06, 2006-07, 2008-09, 2010-11 and 2011-12. Based on ABS customised report.

	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%	Businesses
NSW*	8	14	23	39	58	71	84	89	93	96	97	13,850
QLD	23	33	47	61	77	84	91	93	95	96	97	1,130
SA	3	6	13	24	44	64	83	91	95	97	98	5,990
TAS	5	9	16	26	40	51	67	76	84	89	93	1,340
VIC	4	8	16	29	48	61	76	85	92	95	97	9,390
WA	6	10	22	40	66	84	94	97	98	98	98	5,600
AUST	6	11	20	35	54	69	83	89	94	96	97	37,290

Example interpretation:

Averaged across the five collection periods, 29% of the 9,390 businesses mating ewes in Victoria had an average marking rate less than 80%.

Reflecting the higher percent of ewes mated to Merino rams, Queensland and Western Australia have the least number of businesses with farm marking rates over 120%.

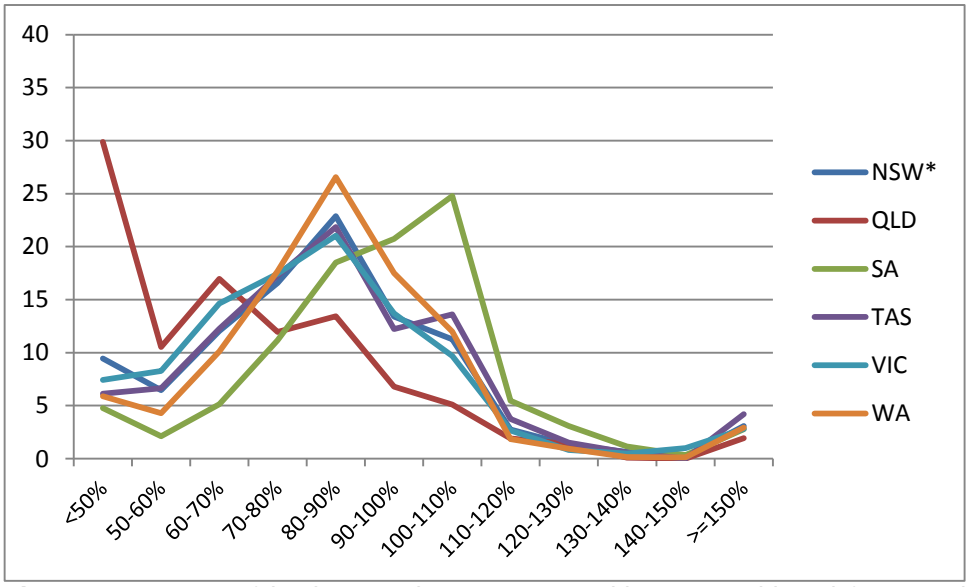


Figure 7. Percent of businesses by average marking rate achieved from Merino breeding ewes. Data for Merino ewes mated to produce pure-bred Merino lambs, and averaged across years 2010-11 and 2011-12. Based on ABS customised report.

The distribution of businesses by the marking rate of their Merino ewes is similar for NSW*, Tasmania and Victoria. These three states have a wider distribution than WA, which has a similar mid-point, and South Australia, which has a higher average marking rate.

Table 16. Cumulative percent of businesses by average marking rate achieved from Merino breeding ewes. Data for Merino ewes mated to produce pure-bred Merino lambs, averaged across years 2010-11 and 2011-12. Based on ABS customised report.

	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%	Businesses
NSW*	9	16	28	45	67	81	92	95	96	97	97	5,840
QLD	30	40	57	69	83	90	95	97	98	98	98	540
SA	5	7	12	23	42	62	87	93	96	97	97	2,770
TAS	6	13	25	42	64	76	90	94	95	96	96	410
VIC	7	16	30	48	69	83	92	95	96	96	97	3,060
WA	6	10	20	38	65	82	94	96	97	97	97	3,210
AUST	8	14	25	41	63	78	92	95	96	97	97	15,840

Example interpretation:

Averaged across the 2010-11 and 2011-12 collection periods, 48% of the 3,060 Victorian businesses mating ewes to produce pure-bred Merino lambs had an average marking rate less than 80%.

5 Modelling

5.1 Evaluation of options to increase marking rate

The marking rate calculator produced is useful for estimating how many extra lambs would be marked and how many businesses would need to be targeted to achieve a desired increase in lambs marked. The calculator is not needed for trivial scenarios (e.g. 50% of all farms achieve a 10% lift in lambs marked), but then that class of scenario is not particularly relevant to a targeted extension and adoption program.

The calculator is more useful in evaluating a targeted adoption strategy, perhaps by larger businesses (more breeding ewes), or just those that are under-performing (low current marking rates).

Three scenarios were modelled as examples of what level of increase in lambs marked might be achieved:

1. A 10% increase in lambs marked by half of the businesses with more than 2000 sheep and lambs, across all regions of Australia.
2. A 20% increase in lambs marked by half of the businesses with more than 2000 sheep and lambs, that have current marking rates between 50% and 90%, across all regions of Australia.
3. Same targets as scenario 2, but only in
    a. Victoria,
    b. Western Australia, and
    c. New South Wales – Northern region.

The results for these scenarios are summarised in the table below[8].

Table 17. Number of additional lambs marked, number of businesses targeted and change in marking rate for each of the scenarios described.

Scenario	Current lambs marked (million)	Additional lambs marked (million)	Number of businesses targeted	Original marking rate (%)	Future marking rate (%)	Per cent increase in marking rate
1	33.00	1.18	5,661	89.1	92.3	3.6%
2	33.00	1.02	2,695	89.1	91.8	3.0%
3a	7.03	0.185	554	91.9	94.3	2.6%
3b	6.49	0.298	741	83.3	87.1	4.6%
3c	1.34	0.051	167	82.8	85.9	3.7%

The detailed output for each scenario is presented in Appendix 6 (see Section 12).

[8] The scenarios presented here are examples demonstrating how the calculator works and are not intended as recommendations.

Each of the above scenarios delivers a considerably lower increase in marking rate (2.6 – 4.6%) than the SRP target of a 10% lift in 5 years[9]. Turning the problem around and estimating the lift in marking rate needed to achieve the SRP target highlights the size of the challenge (Table 18).

Table 18. Combinations of targeted increase in marking rate and proportion of farms making the change that deliver the Sheep Reproduction Plan target of a 10% increase in lambs marked over 5 years.

Target farms	**Required marking rate increase (i.e. change in average marking rate to be achieved within five years)**	**Number of farms**
All farms	10% increase in marking rate (e.g. 2% per year for five years)	36,354 farms
Farms with more than 2000 sheep and lambs	14% increase on every farm, or 28% increase on 50% of farms	11,327 farms 5,661 farms
Farms with more than 1000 sheep and lambs	11% increase on every farm, or 23% increase on 50% of farms	19,231 farms 9,615 farms
Farms with more than 1000 sheep and lambs, currently marking between 50% and 100%	19% increase on every farm, or 37% increase on 50% of farms	12,043 farms
For farms with more than 1000 sheep and lambs, increase marking rate by different amounts depending on current rate	Farms that now mark "50-70%", increase by 25%, "70-100%" farms increase by 20%, "100-120%" farms increase by 15%, "120-130%" farms increase by 10%, and "130-150%" farms increase by 5%	11,796 farms (equivalent to 66% of farms with more than 1000 sheep and lambs)

[9] This analysis does not attempt to model the increase in marking rates in each of the five years, but rather indicate the initial and future average marking rates achieved by the scenarios as outlined. The rate of increase in marking rates will depend in part on what management options are adopted – adopting the full life time ewe management guidelines could deliver a step increase in excess of 10%, whereas using improved genetic material will deliver cumulative improvements over several years.

5.2 Modelling optimum flock composition

The following analyses use the steady state flock demographic model described in section 3.3 and in detail in Appendix 3. It is important to note that the steady state nature of the model means that sales are increased or decreased to accommodate changes in reproduction and death rates so that at the end of year flock size and composition is the same as it was at the start of the year.

5.2.1 Sensitivity analysis

An analysis was conducted to identify the most significant (influential) input variables with respect to their impact on the model outputs – lamb turn-off, sheep turn-off and total turn-off. The model was initialised with the Australian baseline data (as shown in Figure 11).

The analysis ranked the impact on the model output of a 10% change in individual inputs. Each input variable was tested independently, i.e. while holding all other variables at their base value. Because of the linear nature of the model relationships, the relative impact of increasing or decreasing an input was identical. Therefore, the sensitivity analysis table (Table 19) only includes results for increases in the output variable[10].

In the sensitivity analysis table:

- The "*Base Value*" column contains the original values for each "*Input Variable*". These are the best estimates of the current value of each input variable.
- The "*Output for Base Value Input*" row (at the top of the table) shows the value of each output (*Lamb turn-off*, *Sheep turn-off* and *Total turn-off*) calculated using as inputs, the values in the "*Base Value*" column.
- The "*Input Value*" column contains the value of the input variable adjusted by 10% - increased where the output is positively correlated with the input variable, and decreased by 10% where the correlation with the input variable is negative.
- The result of changing the input by 10% is given for each *Output* as the new "*Value*" of the output, the per cent "*Change*" from the "*Output for the Base Value Inputs*", and the "Rank" of that input relative to the other inputs.

[10] Depending on whether the output variable is positively or negatively correlated with the input variable, the input value to give an increase in the output variable may be increased (e.g. marking rates) or decreased (e.g. death rates). The results presented are for those changes to the input variable that increase the output variable with the variable given a rank of one having the greatest impact.

Table 19. Sensitivity analysis of the steady state flock model for three outputs –lamb turn-off, sheep turn-off and total turn-off – based on changing each input by 10%. All output values in millions.

			Lamb turn-off			Sheep turn-off			Total turn-off		
Output for Base Value input			**21.80**			**9.49**			**31.49**		
		Input	**Output**			**Output**			**Output**		
Input Variable	**Base Value**	**Value**	**Rank**	**Value**	**Change (%)**	**Rank**	**Value**	**Change (%)**	**Rank**	**Value**	**Change (%)**
Per cent of ewes joined	88%	97%	1	24.86	14.0%	5	9.90	4.3%	1	34.96	11.0%
Number of Breeding ewes	44.9	49.3	2	23.98	10.0%	1	10.74	13.1%	2	34.94	10.9%
Marking rate - Pure bred Merino lambs	80%	88%	3	23.09	5.9%	8	9.71	2.3%	3	33.01	4.8%
Marking rate - Other breed lambs	98%	108%	4	22.94	5.2%	9	9.61	1.3%	4	32.76	4.0%
Per cent sold - Other breed wether lambs	85%	94%	5	22.58	3.6%	2	10.26	8.1%			
Marking rate - First cross lambs	89%	98%	6	22.42	2.9%	10	9.56	0.7%	5	32.19	2.2%
Per cent sold - Merino wether lambs	75%	83%	7	22.33	2.5%	3	10.01	5.5%			
Culling rate - Merino ewes	15%	14%	8	22.26	2.1%	4	9.94	4.8%			
Per cent of breeding ewes - Merino	67%	61%	9	22.23	2.0%				6	31.90	1.3%
Per cent of Merino ewes joined to Merino rams	71%	64%	10	22.03	1.0%				9	31.67	0.6%
Total sheep and lambs	74.7	67.2				6	9.79	3.1%	7	31.79	0.9%
Adult Ewes - death rate	4.0%	3.6%							8	31.68	0.6%
Other breed ewes - culling rate	15.0%	16.5%				7	9.71	2.3%			

Discussed below are the input variables that, when changed by 10%, increased one or more of the output variables by at least 5%. These are the inputs that have greatest effect on turn-off.

- The top ranked input for effect on lamb turn-off and on total turn-off was the percent of breeding ewes joined. A 10% increase from 88% to 97% resulted in a 14% increase in lamb turn-off, a 4.3% increase in sheep turn-off and a lift in total turn-off by 11%.
- The number of breeding ewes was ranked second for lamb and total turn-off and first for sheep turn-off. A 10% increase in the number of breeding ewes from 44.9 million to 49.3 million (while holding the total population constant) increased lamb turn-off by 10%, but increased sheep turn-off by 13% (see comment on total flock size below).
- The next most significant inputs are the marking rates for pure-bred Merino lambs and other breed lambs. Increasing the marking rate by 10% for pure-bred Merino lambs from 80% to 88% resulted in an increase in lamb turn-off of 5.9%. Increasing the marking rate by 10% for other breed lambs from 98% to 108% resulted in an increase in lamb turn-off of 5.2%.
- Increasing by 10%, the per cent of other breed wether lambs sold resulted in an 8.1% increase in sheep turn-off. An equivalent increase in the per cent of Merino lambs sold increased sheep turn-off by 5.5%.

Total flock size may seem like a candidate for a key input affecting total turn-off. However, as the number of breeding ewes is specified as a fixed input in the model, and not as a percent of the flock, increasing the flock size does not increase turn-off, but instead increases deaths and slightly reduces turn-off. To accommodate the larger flock size, the model coverts more wether lambs into adults and as a result fewer wether lambs can be sold and more adult wethers die on farm.

5.2.2 Optimising flock size and composition for maximum turn-off

The standard model was modified so that inputs could be varied, and constraints applied, while seeking to maximise turn-off. Total turn-off was used as the objective function (i.e. the variable to maximise) in the optimisation. The following table lists the baseline inputs used in the optimisation.

Table 20. Initial (base) values for inputs used in the optimisation. Inputs are for Australia.

Input variable	Value
Number of breeding ewes (million)	44.85
Percent of breeding ewes that are Merino	67%
Percent of ewes joined	88%
Percent of Merino ewes joined to Merino rams	71%
Marking rate – pure-bred Merino lambs	80%
Marking rate – first-cross Merino lambs	89%
Marking rate – other breed lambs	98%
Death rate – lambs	6%
Death rate – adult ewes	4%
Death rate – adult wethers	4%
Death rate – rams	8%
Adult culling rate – Merino ewes	15%
Adult culling rate – other breed ewes	15%
Culling rate – rams	20%
Percent of Merino wether lambs sold	75%
Percent of other breed wether lambs sold	85%
Rams as a per cent of breeding ewes	2.5%

Total turn-off as an objective function does not consider the relative value of lamb turn-off versus sheep (mutton) turn-off. A better objective function would be to apply a weighting to lamb and sheep according to their relative value, i.e. about two to one, lamb to sheep, based on recent prices. However, as lamb turn-off is more efficient in a demographic sense (fewer deaths between birth and turn-off) than sheep turn-off, the optimisation favours lamb over sheep. If mutton value, or the price paid for live export sheep, were to exceed the value of lamb, then the objective function should be revisited.

As each optimisation was run, extra constraints need to be applied to stop the optimisation running to impossible (e.g. negative adult wether numbers), or infinite values (e.g. number of breeding ewes). The constraints applied were:

1. Set an upper limit for the proportion of breeding ewes that can be joined. This was set at 95%, up from the baseline estimate for Australia of 88%. The figure of 88% is based on the ratio of reported ewes mated to the opening number of breeding ewes in Australia. It varies between states from 82% in Queensland to 93% in Tasmania. This limit allows for those ewes that are in an inadequate condition for joining and or are being run as dry sheep. Once this input was constrained to not exceed 95%, all subsequent optimisations chose 95%.

2. Unless either total flock size or the number of breeding ewes is held constant, the optimisation tries to keep increasing both. Setting total flock size constant, results in the number of breeding ewes increasing and the number of wethers decreasing to the minimum required to balance reproduction, sales and deaths. The resulting high number of breeding ewes results in lamb and sheep turn-off figures very much higher than current actual turn-off.

   A more intuitive solution is to hold the number of breeding ewes at current levels, and let the total flock size adjust to minimise the number of non-breeding sheep (while maximising turn-off). In the table below (Table 21), the results for Run A show the solution when the number of breeding ewes was held at the ABS value of 44.85 million and the proportion of Merino ewes was held constant at 67% (current level, approximately). In summary, total turn-off increased as (a) more ewes were mated, (b) the proportion of Merino ewes mated to Merino rams decreased, and (c) the total flock was reduced. For Run B, the optimisation reduced the number of Merino ewes to 10%, the lower end of the allowed range.

   The reduction in the total flock size is driven by the optimisation selling wether lambs rather than growing them to adults. This choice is more efficient as fewer die as adult wethers.

Table 21. Total turn-off for the baseline inputs and for optimisation runs where (Run A) both the number of breeding ewes and the proportion of Merino ewes were held constant, and (Run B) the proportion of Merino ewes was allowed to vary but was constrained to between 10% and 90%.

Input variable	Baseline	Run A	Run B
Number of breeding ewes (million)	44.85	44.85*	44.85*
Percent of breeding ewes that are Merino	67%	67%*	10%
Percent of ewes joined	88%	95%	95%
Percent of Merino ewes joined to Merino rams	71%	51%	51%
Total flock (million)	74.72	59.43	59.33
Lamb turn-off	21.80	24.79	28.17
Sheep turn-off	9.49	10.26	10.11
Total turn-off (objective function) †	31.49	35.25	38.49

* indicate that the variable was held constant for the optimisation run.

† total turn-off is larger than the sum of lamb and sheep turn-off because it includes cull rams.

3. As the model attempts to increase the proportion of breeding ewes in the flock, it also chooses to reduce the proportion of Merino ewes in favour of other breed ewes, as the other breed ewes have a higher marking rate. While in a pure “meat producing” industry this may be ideal, it is recognised that wool and hence Merino ewes will continue to be an important part of the Australian sheep industry. In order to understand the impact of constraining the mix of Merino and other breed ewes, optimisations were run with the per cent of Merino ewes held at 60%, 70%, 80% and 90%. These values include the range (61% to 84%) reported for individual states in Table 5.

Table 22. Total turn-off for the baseline inputs and for optimisation runs where the number of breeding ewes was held constant, and the proportion of Merino ewes was set at 60%, 70% , 80% or 90%.

Input variable	Baseline	Run (60%)	Run (70%)	Run (80%)	Run (90%)
Number of breeding ewes (million)	44.85	44.85*	44.85*	44.85*	44.85*
Per cent of breeding ewes that are Merino	67%	60%*	70%*	80%*	90%*
Per cent of ewes joined	88%	95%	95%	95%	95%
Per cent of Merino ewes joined to Merino rams	71%	51%	51%	51%	51%
Total flock (million)	74.72	59.41	59.45	59.47	59.49
Lamb turn-off	21.80	25.22	24.63	24.04	23.45
Sheep turn-off	9.49	10.24	10.26	10.29	10.31
Total turn-off (objective function) †	31.49	35.67	35.10	34.54	33.97

* indicate that the variable was held constant for the optimisation run.
† total turn-off is larger than the sum of lamb and sheep turn-off because it includes cull rams.

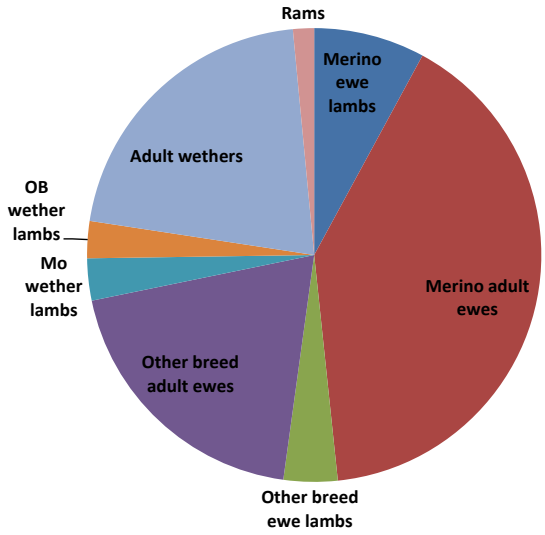
As the Merino proportion of the breeding ewes increases from 60% to 90%, lamb turn-off decreases by 7.0%, sheep turn-off increases slightly (0.7%) and total turn-off decreases by 4.8%. A small increase is also noted in the optimised total flock size.

As the marking rate entered for pure-bred Merino lambs (offspring of Merino ewes mated to Merino rams) is lower than that reported for first-cross Merino lambs and other breed lambs, the optimisation chooses to minimise the number of Merino ewes mated to Merino rams. This has the effect of driving sales of excess Merino ewe lambs to zero. The optimum solution is to mate just enough Merino ewes to Merino rams to produce sufficient Merino ewe lambs to exactly replace those Merino ewes that are culled and die on farm plus enough to cover Merino ewe lamb deaths. Thus there are no Merino ewe lambs for sale.

The figure below (Figure 8) shows the estimated current flock composition, and the composition that maximises turn-off while holding the total number of breeding ewes constant at the current level, and maintaining the proportion of Merino breeding ewes at 67%. This clearly shows how the proportion of wethers would fall leaving a higher proportion of breeding ewes.

Figure 8. The two pie charts compare (a) the estimated current flock composition, with (b) the composition that maximises turn-off while holding the total number of breeding ewes constant, and maintaining the proportion of Merino breeding ewes at 67%. Note that the composition that maximises turn-off (b) has a significantly smaller total sheep and lamb population.

(a) 74.7 million sheep and lambs



(b) 59.4 million sheep and lambs

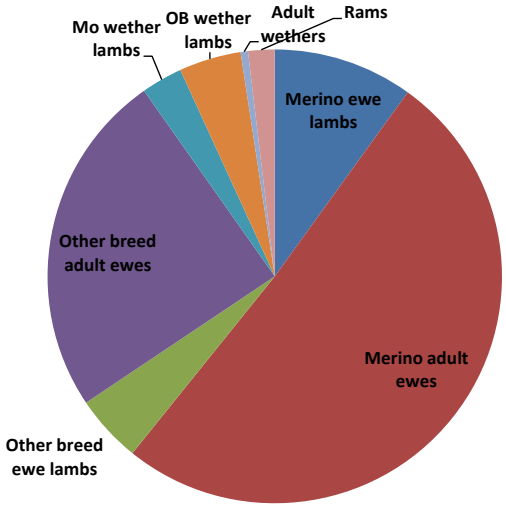


Table 23 compares the current flock composition to the composition that optimises turn-off from the same number of breeding ewes (44.85 million) and the same proportion of Merino breeding ewes (67% of all breeding ewes). The largest change is the drop in the number of adult wethers from 15.6 million to 0.3 million. Apart from maximising turn-off, there would be a significant decrease in grazing area required and large fall in wool production.

Table 23. Comparison of current flock composition with the composition that maximises turn-off while holding the total number of breeding ewes constant, and maintaining the proportion of Merino breeding ewes at 67%.

Sheep class	Current composition		Composition for maximum turn-off	
Merino ewe lambs	5.9	7.9%	5.6	9.9%
Merino adult ewes	30.2	40%	28.7	51%
Other breed ewe lambs	2.9	3.8%	2.7	4.8%
Other breed adult ewes	14.6	20%	13.9	25%
Mo wether lambs	1.7	2.3%	1.7	3.1%
OB wether lambs	2.6	3.5%	2.6	1.6%
Adult wethers	15.6	21%	0.3	0.5%
Rams	1.1	1.5%	1.1	1.9%
Total sheep and lambs	74.7	100%	56.6	100%

5.2.3 Options for extra lambs

An increase in the marking rate of all breeds of ewes by 5% would, logically, result in 5% more lambs. Industry, or individual sheep producers, may choose to quickly capture this benefit by marketing the additional lambs.

Alternatively, with a higher marking rate, a business could reduce the size of the farm flock (i.e. run fewer breeding ewes) and maintain turn-off at current levels (due to the higher marking rate). An additional advantage of a higher marking rate is that the lamb proportion of total turn-off would be higher, and lamb is generally the more valuable product.

This difference can be seen in the following table. In this comparison, the total turn-off is held constant at 35.25 million head. The percent of all ewes that are joined (95%), the percent of breeding ewes that are Merino (67%), and the percent of Merino ewes that are joined to Merino rams (51%) are all held constant.

Note that these two options are steady state solutions, and not a transition from one to the other. Each is a combination of flock demographic rates that leaves the closing flock size and composition the same as the opening flock size and composition.

At the increased marking rate, the model can reduce the number of breeding ewes carried, and so reduce the number of sheep that are culled (or die), while turning off additional lambs.

Table 24. Comparison of optimum number of ewes, number of sheep and lambs and turn-off of lambs and sheep using baseline marking rates, and all marking rates increased by 5%, where the total turn-off is held constant.

Input variable	Baseline	Increased marking rate	Difference
Per cent of breeding ewes that are Merino	67%*	67%*	
Per cent of ewes joined	95%*	95%*	
Per cent of Merino ewes joined to Merino rams	51%*	51%*	
Marking rate – pure-bred Merino lambs	80%	84%	+5%
Marking rate – first-cross Merino lambs	89%	94%	+5%
Marking rate – other breed lambs	98%	103%	+5%
Optimum number of breeding ewes (million)	44.85	42.58	-5.1%
Optimum number of sheep and lambs (million)	59.4	56.6	-4.7%
Lamb turn-off	24.79	25.13	+1.4%
Sheep turn-off	10.26	9.93	-3.2%
Total turn-off (objective function)†	35.25*	35.25*	

* indicate that the variable was held constant for the optimisation run.
† total turn-off is larger than the sum of lamb and sheep turn-off because it includes cull rams.

6 Key findings

The key findings arising from this report taking into account current (and some previous) key statistics for the sheep industry for 2011 include:

Sheep demographics …

- At the 30th June 2011, there were 72.9 million sheep and lambs run by 42,100 farms (businesses) in the target regions.[11]
- Breeding ewes account for 56% of the sheep population, up from 41% in 1991.
- The demographics of the Australian sheep industry are such that a large proportion of all sheep farms only run a small proportion of all sheep, and vice versa
    - Of the 42,100 farms, 72% had flocks of 2000 or less, and combined, they accounted for 27% of the total flock.
    - There were 38,900 farms with breeding ewes. The 70% of those farms with flocks of 2000 or less, were carrying 28% of all breeding ewes.
- Merino ewes make up 72% of all breeding ewes, though the proportion for individual states ranges from 61% (Victoria) to 84% (Western Australia).
- But of the 72% Merino ewes, only 65% are usually joined to Merino rams (i.e. 47% of all joinings are Merino ewes x Merino rams).
- Farms that joined ewes in 2011 were classified into those that only produced Merino lambs (20% of farms, 23% of ewes), those that only produced other breed lambs (56% of farms, 36% of ewes) and those (24% of farms) that produced both Merino (24% of all ewes) and other breed lambs (17% of all ewes).
- The ratio of ewes mated in 2010-11 to the opening number of breeding ewes was 88%.
- 13% of the sheep businesses, carrying 4% of all sheep and lambs, did not mate ewes in 2011 – a combination of wether only wool farms, farms specialising in finishing lambs and farms that chose not to join ewes in that period.

Existing marking rates …

- Marking rates for all breeds of ewes, and all crosses, ranged from 80% in 2006-07 to 90% in 2011-12. For pure-bred Merino lambs in 2010-11 and 2011-12, marking rates were 8-9% lower than for all ewes.
- Corresponding average data for 2010-11 and 2011-12 estimated from ABS and MLA/AWI sheep meat and wool surveys found:
    - Average marking rate for pure-bred Merino lambs – 80%

[11] The target sheep producing regions included in this study are based on ABS statistical divisions and exclude some mainly metropolitan or tropical regions with few sheep. See section 0 for the full list of included and excluded regions. For all of Australia, there were 73.1 million sheep and lambs and 43,800 farms. Thus the target regions account for 99.7% of the sheep and lambs and 96.1% of the farms.

    - Average marking rate for Merino cross-bred lambs – 88%
    - Average marking rate for other breed lambs – 98% (excludes Merino and first-cross Merino lambs)
- Averaged across the five collection periods (2005-06, 2006-07, 2008-09, 2010-11 and 2011-12), and for all breeds of lamb produced:
    - The 38% of all breeding ewes on the 35% of farms that have a marking rate of less than 80% appear to offer the greatest opportunity for increasing marking rates.
    - Only 6% of all breeding ewes, on the 11% of farms with a marking rate of over 120%, are in the group with little opportunity for improved marking rates.
- Averaged across 2010-11 and 2011-12,
    - Compared with the results for all ewes, a greater proportion of the Merino ewes mated to Merino rams (43%) were on the 41% of farms with marking rates less than 80%.
    - Only 5% of farms carrying 2% of Merino ewes mated to Merino rams had average marking rates for pure-bred Merino lambs of over 120%.

Increasing marking rates – what businesses (farms) to target for improvement

With the aim to increase marking rate of the Australian flock by 10%[12] within 5 years, a range of strategies were available, based on the demographics of the flock. These include …

- **Strategy – all the same:** Simplistically, all farms increase marking rate by 10% within 5 years, or half of all farms increase by 20%.
- **Strategy – focus on big farms:** Half of all farms with more than 2000 sheep and lambs (5,661 farms) would have to increase their marking rate by 28%.
- **Strategy – ignore small farms:** Half of all farms with more than 1000 sheep and lambs (9,615 farms) would have to increase their marking rate by 23%.
- **Strategy – improve lowest performers the most:** Two thirds of all the farms with over 1000 sheep and lambs (11,796 farms) would have to achieve:
    - Farms that now mark between 50% and 70% need to increase by 25% (1,432 farms);
    - Farms marking between 70% and 100% need to increase by 20% (6,456 farms);
    - Farms marking between 100% and 120% need to increase by 15% (3,011 farms);
    - Farms marking between 120% and 130% need to increase by 10% (511 farms); and
    - Farms marking between 130% and 150% need to increase by 5% (386 farms).

[12] The required increase in marking rate noted for each strategy is the relative increase, not an absolute increase. That is, a 20% increase from a base marking rate of 80% gives a rate of 96%, not 100%.

Increasing turn-off – what flock segments to target for improvement

- A national flock model was used to rank the inputs that had the greatest impact on lamb and sheep turn-off at steady state i.e. composition and flock size remains constant between years. The following list presents, in order, those changes to inputs that had the greatest impact on sheep and lamb turn-off:
    - Increase the proportion of all ewes that are joined;
    - Increase the proportion of ewes in the flock (at the expense of adult wethers);
    - Increase the proportion of other breed ewes and decrease Merino ewes;
    - Of the Merino ewes mated, reduce matings with Merino rams to the minimum required to exactly match the number of replacement ewe lambs required;
- The national flock model was used to explore flock composition strategies that maximise turn-off. The findings were:
    - If the total flock size was constrained, then ewe numbers were increased to balance the composition and increase total turn-off of lambs;
    - If the total ewe number was constrained, then wether numbers are reduced by selling them as lambs, to balance the composition and reduce the overall size of the flock;
    - As the Merino proportion of breeding ewes increases, lamb turn-off decreases (lower average marking rate) and sheep turn-off increases slightly (more carry-over wethers); and
    - Retaining additional adult wethers (e.g. for wool production) reduced total turn-off.
- The current estimated flock composition and the optimal composition, for the same turn-off, and with the same proportion of Merino ewes (67%), are shown in the table below (see also the charts in Figure 8).

Table 25. Comparison of current flock composition with optimal composition that achieves the same total turn-off.

Sheep class	Current composition	Optimal composition
Merino ewe lambs	8%	10%
Merino adult ewes	40%	51%
Other breed ewe lambs	4%	5%
Other breed adult ewes	20%	25%
Mo wether lambs	2%	3%
OB wether lambs	4%	5%
Adult wethers	21%	1%
Rams	2%	2%

- If marking rates are increased by 5% across all ewes, then at the same total turn-off, lamb turn-off increases by 1.4%, sheep turn-off decreases by 3.2% and total flock size reduces by 4.7%.

7 Appendix 1 – Analysis of industry data

7.1 Analysis of industry data

7.1.1 Data available from ABS agricultural census and survey

The table below lists the sheep related variables collected by ABS in the 2005-06 and 2010-11 agricultural census and the 2006-07, 2007-08, 2008-09, 2009-10 and 2011-12 surveys. Population numbers refer to the number on farm at 30th June in the collection period, i.e. the closing number. Production variables (lambs marked, ewes mated) refer to the total during the collection period, July to June (inclusive).

Table 26. Sheep variables included in the agricultural census and surveys conducted by ABS between 2005-06 and 2011-12. Census years are highlighted.

Variable	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
Total Sheep and Lambs at 30th June	✓	✓	✓	✓	✓	✓	✓
Breeding ewes (merino + all other) - Total	✓	✓	✓	✓	✓	✓	✓
Breeding ewes 1 year and over - Merinos					✓	✓	✓
Breeding ewes 1 year and over - Other breeding ewes					✓	✓	✓
Marked lambs under 1 year	✓	✓		✓		✓	
All Other Sheep[13]	✓	✓	✓	✓		✓	✓
Proportion of Lambs Marked to Ewes Mated	✓	✓		✓		✓	✓
Total Lambs marked	✓	✓		✓	✓	✓	✓
Lambs marked - Merino lambs						✓	✓
Lambs marked - all other breeds						✓	✓
Ewes mated to produce lambs marked	✓	✓		✓		✓	✓
Ewes mated to produce lambs - To Merino rams						✓	✓
Ewes mated to produce lambs - To Other rams						✓	✓

The definition of agricultural businesses, as reported by ABS, has undergone some refinement between collections. For this project, the count of businesses can be

[13] The definition of all other sheep varies between years depending on what sheep classes are reported.

considered as the ABS estimate of businesses or farms with an estimated value of agricultural operations[14] of at least $5,000 per annum, as recorded on the ABS business register. For full details, the reader is referred to the ABS web site, www.abs.gov.au, catalogue number 7121.0.

For this report, the terms “business” or “businesses” will be used and can be read as “farm” or “farms”.

7.1.2 Flock size categories

Flock size is defined as the total number of sheep (including lambs) per business. It is reported by ABS as “Total sheep and lambs at 30th June” in the collection period.

The flock size categories in Table 27 were specified by Department of Agriculture and Food WA (DAFWA) for **a previous** customised report prepared by ABS (2006 census, Australia). The table shows the proportion of the Australian sheep population and the proportion of all businesses with sheep by flock size category.

Table 27. Proportion of the Australian sheep population and proportion of businesses (with sheep) by flock size as reported in the ABS agricultural census for 30th June 2006. Based on ABS customised report.

Flock size	Sheep	Businesses
1-250	1.1	22.4
251-500	2.2	10.9
501-750	2.9	8.9
751-1000	3.4	7.4
1001-1250	3.9	6.5
1251-1500	3.7	5.0
1501-2000	7.6	8.3
2001-4000	26.5	17.8
4001-8000	26.9	9.5
8001-16000	14.5	2.7
16001-32000	5.7	0.6
32000+	1.6	0.1

In view of the small individual contribution of each of the categories up to 1500 sheep per business, the number of categories were reduced for this project to those shown in Table 28.

[14] The measure of size was based on the ABS' Estimated Value of Agricultural Operations (EVAO) or a derived value based on Business Activity Statement (BAS) turnover if EVAO was not available.

Table 28. Definition of flock size categories and proportion of sheep and proportion of businesses from the 2005-06 agricultural census.

Flock size	Sheep	Businesses
0-500	3.3	33.4
501-1000	6.4	16.2
1001-2000	15.1	19.8
2001-4000	26.5	17.8
4001-8000	26.9	9.5
8001-16000	14.5	2.7
16000+	7.3	0.6

The marking rate analysis requested both a single average marking rate (lambs marked divided by ewes mated to produce those lambs) and distributions of the number of ewes mated, lambs marked and businesses by marking rate and flock size categories. As there are 12 marking rate categories (outlined in Table 30), the number of flock size categories was further reduced to four (Table 29).

Table 29. Flock size categories for marking rate distribution analysis

Flock size categories (number of sheep and lambs)	Classification
1-1000	Small
1001-2000	Small / Medium (or small commercial)
2001-4000	Medium (or commercial)
Over 4000	Large (or large commercial)

7.1.3 Marking rate categories

After consideration of previous surveys, marking rate categories were set in 10% steps between 50% and 150% (Table 30).

Table 30. Definition of marking rate categories

Marking rate category (lambs marked per 100 ewes mated)
Marking rate < 50
50 <= marking rate < 60
60 <= marking rate < 70
70 <= marking rate < 80
80 <= marking rate < 90
90 <= marking rate < 100
100 <= marking rate < 110
110 <= marking rate < 120
120 <= marking rate < 130
130 <= marking rate < 140
140 <= marking rate < 150
Marking rate >= 150

7.1.4 Breeding practices

The lambs marked and ewes mated data were used to categorise businesses by breeding practice. To determine the mix of businesses that do or do not mate ewes,

and those that mark Merino lambs, other breed lambs[15] or both, ABS was asked to split businesses using all combinations of the following categories:

- Lambs marked (all breeds): {zero, >zero}
- Ewes mated (total): {zero, >zero}
- Merino lambs marked: {zero, >zero}
- Ewes mated to Merino rams: {zero, >zero}
- Other breed lambs marked: {zero, >zero}
- Ewes mated to other breed rams: {zero, >zero}
- Total sheep and lambs at 30th June: {zero, >zero}

For each combination, the number of businesses, the number of sheep and lambs, and the number of breeding ewes was reported.

7.1.5 Geographical Regions

Prior to 2011, ABS released agricultural data to statistical local area (SLA, analogous to shires) level in census years (2001, 2006, 2011) and to statistical division (SD) level in the survey years.

From 2011, ABS have used high resolution 'mesh blocks' to geo-code the data recorded in their annual collections. These provide flexibility to aggregate into various defined boundaries.

Until there is a series of years with data collected in this new way, it is more useful to aggregate using familiar boundaries – states, SDs and SLAs – because of the historical context these provide. This hierarchy is the foundation of other data series including the Sheep Meat and Wool (SM&W) surveys (which evolved out of the MLA Lamb Surveys).

Table 31 lists the 32 regions chosen for this project. Based on 2011 data, most regions (26 out of 32) have in excess of a million sheep and lambs. Only one of the proposed regions, QLD-Darling Downs, has fewer than half a million sheep and lambs.

The chosen regions either correspond to those used by the SM&W surveys or can be aggregated to those boundaries with one exception. The North Western SD in Queensland (134,000 sheep) is not part of the SM&W surveys, but for this analysis, it was included with the QLD-Central West SD (1.43 million sheep).

All statistical divisions, including those excluded from the proposed list of regions, are tabulated in Table 32 at the end of this appendix, along with the number of sheep and lambs and the number of sheep businesses as reported in the 2011 agricultural census.

Statistical Divisions with few sheep have been aggregated with larger, adjacent statistical divisions where these are considered to have similar production systems, e.g. North Western (QLD) is merged with Central West. Smaller areas with low numbers of sheep and dissimilar conditions have been excluded, as was done for the SM&W surveys. These excluded areas, mostly metropolitan or tropical areas, accounted for just 0.3 per cent of the Australian flock in 2011.

[15] Other breed includes all non-Merino breeds including Merino crosses. Throughout this report the use of the term "other breed" is adopted to remain consistent with its use by ABS.

Table 31. List of the regions reported in this project and the number of sheep and lambs and the number of sheep businesses in those regions. Based on ABS data, 2010-11.

Regions	Sheep & Lambs (millions)	Businesses
NSW-Northern (including Hunter)	3.56	2,860
NSW-North Western	5.02	2,499
NSW-Central West	5.01	3,456
NSW-South Eastern (including ACT)	4.82	2,826
NSW-Murrumbidgee	3.72	2,289
NSW-Murray	3.18	1,800
NSW-Far West	1.52	241
QLD-Darling Downs	0.46	709
QLD-South West	1.59	493
QLD-Central West (including North Western)	1.56	300
SA-Outer Adelaide (including Adelaide)	1.12	1,223
SA-Yorke and Lower North	1.32	1,163
SA-Murray Lands	1.53	1,015
SA-South East	3.34	1,572
SA-Eyre	1.59	994
SA-Northern	2.11	845
TAS-Southern (including Hobart)	1.06	558
TAS-Northern (including Mersey-Lyell)	1.28	994
VIC-Barwon	0.99	762
VIC-Western District	4.47	1,844
VIC-Central Highlands	2.06	1,270
VIC-Wimmera	2.72	1,705
VIC-Mallee	0.68	822
VIC-Loddon	1.59	1,190
VIC-Goulburn	1.68	1,689
VIC-Gippsland & Ovens-Murray	0.97	1,432
WA-South West	0.72	756
WA-Lower Great Southern	3.68	1,313
WA-Upper Great Southern	3.72	1,203
WA-Midlands	3.66	1,865
WA-South Eastern	0.99	361
WA-Central	1.16	588

7.2 Customised reports requested of ABS

Each of the analyses asked of ABS requested population estimates for each of the variables listed by all combinations of the specified categories.

7.2.1 Request 1 – Number of sheep, breeding ewes and businesses

Description: This report provides a breakdown of the national sheep population by region, and by flock size as at 30th June 2011. It includes the total number of sheep and lambs, the number of breeding ewes and the number of Merino breeding ewes on farms, and the number of businesses (farms) categorised by total farm flock size and region.

Data source: ABS 2010-11 agricultural census

Variables: Number of sheep and lambs at 30th June (and number of businesses)

Number of breeding ewes, one year and over (and number of businesses)

Number of Merino breeding ewes, one year and over (and number of businesses)

Categories: Flock sizes (see Table 28)

Regions (see Table 31)

7.2.2 Request 2 – Number of sheep businesses mating ewes and marking lambs by breed

Description: This report provides a categorisation of sheep businesses into those that marked Merino lambs, those that marked other breed (not pure Merino) lambs, those that marked both Merino and other breed lambs and those that did not mark lambs in 2010-11. The report provides the total number of sheep and lambs, and the total number of lambs marked and ewes mated, both Merino and other breed, for all category combinations and for all regions.

Data source: ABS 2010-11 agricultural census

Variables: Number of sheep and lambs on holdings at 30th June (and number of businesses)

Total lambs marked (and number of businesses)

Number of Merino lambs marked (and number of businesses)

Number of other breed lambs marked (and number of businesses)

Number of ewes mated to produce lambs marked (and number of businesses)

Number of ewes mated to Merino rams (and number of businesses)

Number of ewes mated to all other breeds of rams (and number of businesses)

Categories: Lambs marked (all breeds): {zero, >zero}

Ewes mated (total): {zero, >zero}

Merino lambs marked: {zero, >zero}

Ewes mated to Merino rams: {zero, >zero}

Other breed lambs marked: {zero, >zero}

Ewes mated to other breed rams: {zero, >zero}

Total sheep and lambs at 30th June: {zero, >zero}

Regions (see Table 31)

7.2.3 Request 3 – Marking rate distributions

Customised reports were requested for each census or survey collection for which both ewes mated and lambs marked were reported. Additional analyses were requested where marking rates of ewes joined to Merino rams had been collected – 2010-11 and 2011-12.

7.2.3.1 All ewes mated

This analysis includes all ewes mated irrespective of ram breed. Each collection year was reported separately.

Description: This analysis provides, by region and flock size, the distribution of businesses by marking rate performance for all ewes mated. It identifies the number of businesses (farms), the number of ewes mated and the number of lambs marked in each combination of marking rate category, flock size and region.

Data sources: ABS 2005-06 agricultural census

ABS 2006-07 agricultural survey

ABS 2008-09 agricultural survey

ABS 2010-11 agricultural census

ABS 2011-12 agricultural survey

Variables: Number of ewes mated, all breeds (and number of businesses)

Number of lambs marked, all breeds (and number of businesses)

Categories: Flock sizes (see Table 29)

Marking rate categories (see Table 30)

Regions (see Table 31)

7.2.3.2 Ewes mated to Merino rams

Description: This analysis provides, by region and flock size, the distribution of businesses by marking rate category for ewes mated to Merino rams. It identifies the number of businesses (farms), the number of ewes mated to Merino rams and the number of Merino lambs marked in each combination of marking rate category, flock size and region.

Data sources: ABS 2010-11 agricultural census

ABS 2011-12 agricultural survey

Variables:	Number of ewes mated to Merino rams (and number of businesses)
	Number of Merino lambs marked (and number of businesses)
Categories:	Flock sizes (see Table 29)
	Marking rate categories (see Table 30)
	Regions (see Table 31)

7.3 Regional data – sheep and lambs by statistical division

The following table shows the ABS statistical divisions, both included and excluded from this study, along with the number of sheep and lambs and the percent of the national flock.

Table 32. Statistical divisions, number of sheep and lambs in 2011 and regions chosen for this project.

SD code	Statistical Division	Sheep and Lambs	Per cent of state flock	Region names allocated to regions included in this project
110	Hunter	197,356	0.7%	NSW-Northern (including Hunter)
130	Northern	3,362,593	12.5%	NSW-Northern (including Hunter)
135	North Western	5,021,368	18.7%	NSW-North Western
140	Central West	5,011,161	18.7%	NSW-Central West
150	Murrumbidgee	3,715,898	13.9%	NSW-Murrumbidgee
145	South Eastern	4,761,347	17.7%	NSW-South Eastern (including ACT)
155	Murray	3,178,874	11.9%	NSW-Murray
160	Far West	1,519,383	5.7%	NSW-Far West
105	Sydney	23,804	0.1%	<excluded area>
115	Illawarra	15,664	0.1%	<excluded area>
120	Richmond-Tweed	11,319	0.0%	<excluded area>
125	Mid-North Coast	5,929	0.0%	<excluded area>
210	Barwon	987,906	6.5%	VIC-Barwon
215	Western District	4,472,903	29.4%	VIC-Western District
220	Central Highlands	2,060,058	13.5%	VIC-Central Highlands
225	Wimmera	2,716,232	17.9%	VIC-Wimmera
230	Mallee	677,718	4.5%	VIC-Mallee
235	Loddon	1,592,121	10.5%	VIC-Loddon
240	Goulburn	1,679,769	11.0%	VIC-Goulburn
245	Ovens-Murray	295,126	1.9%	VIC-Gippsland & Ovens-Murray
250	East Gippsland	530,842	3.5%	VIC-Gippsland & Ovens-Murray
255	Gippsland	145,843	1.0%	VIC-Gippsland & Ovens-Murray
205	Melbourne	53,497	0.4%	<excluded area>
320	Darling Downs	462,452	12.7%	QLD-Darling Downs

SD code	Statistical Division	Sheep and Lambs	Per cent of state flock	Region names allocated to regions included in this project
325	South West	1,593,322	43.6%	QLD-South West
335	Central West	1,429,370	39.1%	QLD-Central West (including NW)
355	North Western	134,477	3.7%	QLD-Central West (including NW)
305	Brisbane	722	0.0%	<excluded area>
307	Gold Coast	42	0.0%	<excluded area>
309	Sunshine Coast	2,452	0.1%	<excluded area>
312	West Moreton	3,211	0.1%	<excluded area>
315	Wide Bay-Burnett	4,600	0.1%	<excluded area>
330	Fitzroy	10,251	0.3%	<excluded area>
340	Mackay	3,854	0.1%	<excluded area>
345	Northern	2,512	0.1%	<excluded area>
350	Far North	5,976	0.2%	<excluded area>
405	Adelaide	28,527	0.3%	SA-Outer Adelaide (including Adelaide)
410	Outer Adelaide	1,091,552	9.9%	SA-Outer Adelaide (including Adelaide)
415	Yorke and Lower North	1,320,497	12.0%	SA-Yorke and Lower North
420	Murray Lands	1,529,699	13.9%	SA-Murray Lands
425	South East	3,336,163	30.3%	SA-South East
430	Eyre	1,589,611	14.4%	SA-Eyre
435	Northern	2,112,493	19.2%	SA-Northern
510	South West	716,422	5.1%	WA-South West
515	Lower Great Southern	3,683,774	26.3%	WA-Lower Great Southern
520	Upper Great Southern	3,718,652	26.6%	WA-Upper Great Southern
525	Midlands	3,662,750	26.2%	WA-Midlands
530	South Eastern	990,096	7.1%	WA-South Eastern
535	Central	1,158,768	8.3%	WA-Central
505	Perth	56,950	0.4%	<excluded area>
540	Pilbara	0	0.0%	<excluded area>
545	Kimberley	12,443	0.1%	<excluded area>
605	Greater Hobart	60,975	2.6%	TAS-Southern (including Hobart)
610	Southern	1,000,854	42.7%	TAS-Southern (including Hobart)
615	Northern	1,205,974	51.4%	TAS-Northern (including Mersey-Lyell)
620	Mersey-Lyell	76,666	3.3%	TAS-Northern (including Mersey-Lyell)
705	Darwin	1,828	98.6%	<excluded area>
710	Northern Territory – Bal.	26	1.4%	<excluded area>
805	Canberra	17,410	32.2%	NSW-South Eastern (including ACT)
810	ACT - Balance	36,682	67.8%	NSW-South Eastern (including ACT)

8 Appendix 2 – Evaluating options for increasing lambs marked

A marking rate calculator was developed with current data for the number of ewes mated, the number of lambs marked and the number of businesses (farms), all by marking rate category and region.

User inputs are the expected increase in lambs marked by the farms targeted and the proportion of the farms in the target group that achieve the increase. This table is provided for farms with small flocks (up to 1000 sheep and lambs), farms with small/medium sized flocks (1001-2000 sheep and lambs), farms with medium sized flocks (2001-4000 sheep and lambs) and farms with large flocks (>4000 sheep and lambs).

An example of this table (for farms from all regions of Australia with large flocks) is shown in the figure below. The "Target increase in lambs marked" and "Target number of businesses" are the user input columns.

Australia - All breeding ewes

Flock Size >4000

Marking rate category	Ewes mated	Lambs marked (current MR - 87%)	Ewe businesses	Target increase in lambs marked	Target per cent of businesses	Target number of businesses	Lambs marked (target MR - 93%)
<50%	727,661	262,563	159	0	0	--	262,563
50-60%	669,602	366,338	171	10%	40%	68	380,992
60-70%	1,392,987	908,947	339	15%	50%	170	977,118
70-80%	2,791,144	2,103,664	716	20%	50%	358	2,314,031
80-90%	3,770,769	3,197,498	1,000	15%	50%	500	3,437,310
90-100%	2,969,010	2,802,024	816	15%	50%	408	3,012,176
100-110%	2,393,842	2,472,501	671	10%	40%	268	2,571,401
110-120%	813,657	931,998	229	5%	30%	69	945,978
120-130%	421,336	521,725	130	0	0	--	521,725
130-140%	235,380	314,042	65	0	0	--	314,042
140-150%	75,854	109,554	24	0	0	--	109,554
>=150%	106,938	326,734	92	0	0	--	326,734
Total	16,368,181	14,317,590	4,411			1,841	15,173,625
						Additional lambs marked	856,035

Figure 9. Example input table for estimating impact of increasing lambs marked by a target set of farms (businesses).

The outputs of this calculator are the number of additional lambs marked, the number of businesses involved, and the current and target average marking rates. These values are summarised in a table that aggregates data across all flock size tables.

Australia - All breeding ewes

Summary: An increase of 1.36 million lambs marked by 4,632 businesses, an increase in the marking rate from 89% to 93%.

Combined data (all flock size categories)

Marking rate category	Ewes mated	Lambs marked (current MR - 89%)	Ewe businesses	Target increase in lambs marked	Target per cent of businesses	Target number of businesses	Lambs marked (target MR - 93%)
<50%	2,000,004	652,746	2,076	--	--	--	652,746
50-60%	1,553,712	848,351	1,606	3%	11%	179	873,342
60-70%	2,915,605	1,901,784	2,699	6%	16%	426	2,007,976
70-80%	5,253,321	3,950,368	4,104	8%	20%	809	4,261,389
80-90%	7,742,155	6,565,551	6,264	6%	20%	1,236	6,944,975
90-100%	6,547,217	6,177,169	5,445	6%	19%	1,043	6,524,350
100-110%	5,867,391	6,058,325	6,355	3%	11%	720	6,225,211
110-120%	2,412,245	2,759,646	2,698	1%	8%	219	2,786,416
120-130%	1,373,214	1,701,957	1,839	--	--	--	1,701,957
130-140%	738,981	988,488	1,068	--	--	--	988,488
140-150%	303,648	436,091	561	--	--	--	436,091
>=150%	338,060	956,988	1,639	--	--	--	956,988
Total	37,045,553	32,997,466	36,354	4%	13%	**4,632**	34,359,928
						Additional lambs marked	**1,362,462**

Figure 10. Example output of marking rate calculator where the inputs in Figure 9 have been applied to both medium (2001-4000 sheep and lambs) and large flocks (over 4000 sheep and lambs).

The example output in Figure 10 is calculated with the inputs in Figure 9 applied to both the medium flocks (2001-4000 sheep and lambs) and large flocks (4000 sheep and lambs). The output table aggregates the extra lambs and target businesses across all flock sizes and produces a weighted average increase in marking rate, and the per cent of businesses targeted (out of businesses of all flock sizes).

9 Appendix 3 – Demographic modelling of reproductive potential

A simple flock demographic model was developed as a tool to estimate potential turn-off (sales/culling) of lambs and sheep, and hence the impact of changing reproductive performance.

The model calculates turn-off for a flock at steady state – that is, both the size and composition of the flock is the same at the end of the year as they were at the start of the year.

The model can be applied to Australia, to any individual state, or to the aggregate of a user defined set of states.

Baseline (or initial) estimates for all inputs are provided from published sources (ABS, MLA/AWI sheep meat and wool (SM&W) surveys) where available or provided as expert estimates. Changing the region changes the baseline estimates. All baseline estimates can be over-written by a user input.

9.1 Inputs

The inputs to the model are described in Table 33 below.

Table 33. Definition of inputs used by the simple flock demographic model.

Input variable	Description	Source
Region	Select a state, Australia or "user region" from a drop down list. "User region" is a subset of the states chosen by the user – see worksheet "User Regions".	User selection
Data source	Baseline (e.g. initial) values are drawn from tables of ABS or SM&W data. For inputs where no SM&W data is available, ABS data is used (if available) even if SM&W is selected. Where neither ABS or SM&W data is available, expert estimates have been provided.	User selection
Note:	*The two inputs above, Region and Data source, together determine the baseline inputs used to populate the input variables. These are based on published data.*	
Total sheep and lambs	Number of sheep and lambs at the start of the year. As the model simulates a flock at steady state, the total is also the number at the end of the year (start of following year).	ABS
Number of breeding ewes	Number of breeding ewes in the flock at the start of the year. Where ABS is chosen as the "Data source", the baseline inputs are the number of "Breeding ewes (one year and older)" which is different to (and generally larger than) the actual number of ewes reported as having been put with rams). For SM&W, the baseline values are the average of the estimated number of breeding ewes on farm as reported by the surveys conducted during 2011-12 and 2012-13.	ABS, SM&W
Per cent of breeding ewes that are Merino	Proportion of the breeding ewes that are Merino. ('other breed' ewes calculated as 100% - Merino%).	ABS, SM&W

Input variable	Description	Source
Per cent of ewes joined	Proportion of breeding ewes that are mated. Initial estimate from the ratio of ewes mated to total breeding ewes. ABS data is used even if the data source selected is SM&W. The same value is used for Merino and other breed ewes.	ABS
Per cent of Merino ewes joined to Merino rams	Proportion of the Merino ewes that are mated to produce pure-bred Merino lambs. (Per cent of Merino ewes mated to other breed rams calculated as 100% - %Merino x Merino).	ABS, SM&W
Marking rate – pure-bred Merino lambs, first-cross Merino lambs, other breed lambs	Lambs marked per 100 ewes run with rams. Separate values are used for pure-bred Merino lambs (Merino ewes x Merino rams), first-cross Merino lambs (Merino ewes x other breed rams), and 'other breed' lambs.	ABS, SM&W
Death rates	Proportion of initial number of lambs, adult ewes, adult wethers and rams that die on farm per year. Separate estimates are required for each class of sheep, but not for Merino versus other breed.	Estimated
Adult culling rates	Proportion of the initial number of Merino ewes, other breed ewes and rams that are culled per year. Separate estimates are required for each class of sheep.	Estimated
Per cent of wether lambs sold	Proportion of wether lambs that are sold as lambs. Estimates are required for Merino lambs and other breed lambs.	Estimated
Rams as a per cent of ewes	Ratio of rams to breeding ewes (as a per cent).	Estimated

An example of these inputs is given in the following figure. The user can over-write the baseline input by entering a value in the corresponding cell of the user column.

Inputs - Australia

Region	Source
Australia	ABS

	Baseline	User	Model	
Total sheep and lambs	74.72		74.72	million
Number of Breeding ewes	44.85		44.85	million
Breeding ewes by breed				
Merino	67%		67%	
Other breed	33%		33%	
Percent of ewes joined	88%		88%	
Per cent of Merino ewes joined to				
Merino rams	71%		71%	
Other breed rams	29%		29%	
Marking rate				
Pure bred Merino lambs	80%		80%	
First cross Merino lambs	89%		89%	
Other breed lambs	98%		98%	
Death rates				
Lambs	6%		6%	
Adult Ewes	4%		4%	
Adult wethers	4%		4%	
Rams	8%		8%	
Adult culling rates				
Merino ewes	15%		15%	
Other breed ewes	15%		15%	
Rams	20%		20%	
Percent of wether lambs sold				
Merino wether lambs	75%		75%	
Other breed wether lambs	85%		85%	
Rams as percent of ewes	2.5%		1.12	million

Figure 11. Example input table for the steady state flock turn-off model. Any baseline estimate can be over-ridden by enter a value in the corresponding cell of the user column.

9.2 Order of calculation

From the user inputs, the model first constructs the flock composition and then estimates turn-off such that closing numbers match the opening numbers.

For the flock composition, only two numbers are available – total sheep and lambs and total breeding ewes. The other components of the flock composition have to be estimated using the death, sales, culling and marking rates. The key steps in constructing the flock composition are:

1. Calculate initial ewe lambs as the number required such that after deaths and sales, there are enough to carry over to replace adult ewes that die or are culled. This is calculated separately for Merino ewes and other breed ewes.
2. Calculate number of rams from the ratio of rams to breeding ewes (user input).
3. Calculate total number of wethers (lambs and adults) as total sheep minus (adult ewes + ewe lambs + rams).
4. Split total wethers into wether lambs and adult wethers so that the number of wether lambs after deaths and sales is sufficient to replace the adult wethers and rams that die on farm or are sold/culled. Replacement rams are subtracted from the wether lambs that are carried forward as adults.

With the flock composition calculated, the breeding inputs (marking rates, proportion ewes joined to Merino or other breed rams, etc.) and the death rates are used to calculate births and survival. Turn-off, including both culls and sales, is then calculated such that the closing composition exactly matches the opening composition.

9.3 Model outputs

An example of the flock composition calculated using this approach based on the inputs from Figure 11 is shown in the following figure (Figure 12).

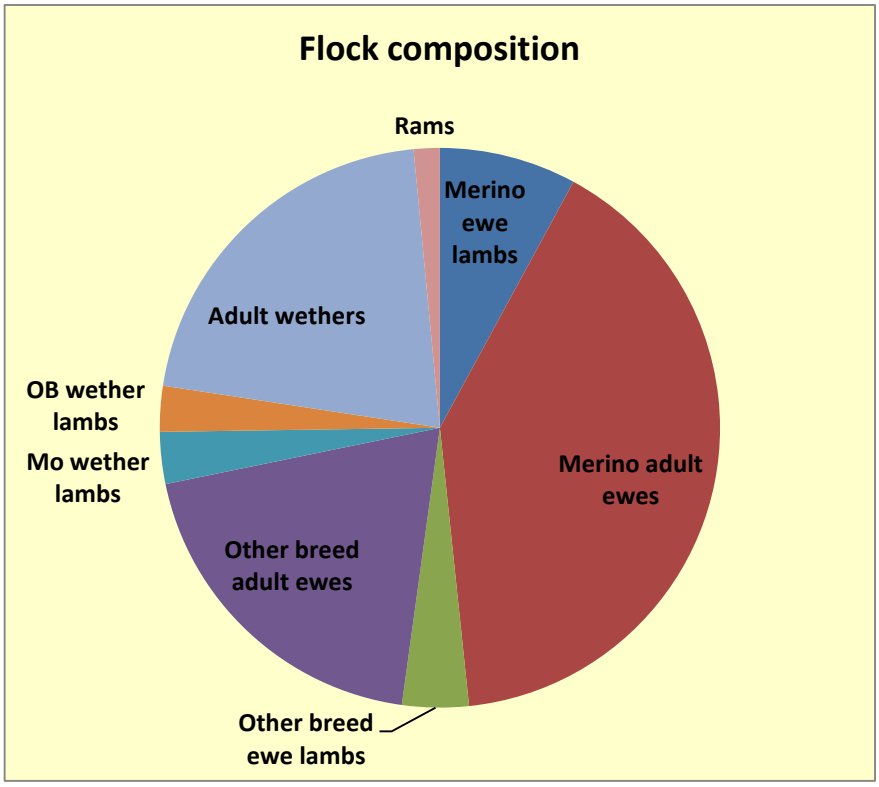


Figure 12. Example flock composition as calculated from the inputs in Figure 11.

Turn-off data is provided as tables for lamb and sheep disposals split into ewes and wethers, Merino and other breed, as shown in the example below (Figure 13).

Turn off for Australia

Summary				(millions)
Lamb turn off		Ewes	Wethers	Total
	Merino	1.674	5.348	7.022
	Other Breed	6.941	7.836	14.777
	Total	8.615	13.185	21.799
Sheep turn off		Ewes	Wethers	Total
	Merino	4.350	3.030	7.380
	Other Breed	2.109		2.109
	Total	6.458	3.030	9.489
Ram turn off				0.206
Total turn off		15.073	16.215	31.494
			Actual turn off (2012-13)	31.37

Figure 13. Example output table for the steady state flock turn-off model.

Also reported in the output table is the actual turn-off (number of sheep and lambs slaughtered plus live exports) during 2012-13. This value is provided for context, and

is not intended to be a target value as the flock in 2012-13 was not necessarily at steady state, nationally or in individual states.

The flock turn-off model was used to estimate the actual value of key inputs (number of breeding ewes, per cent of breeding ewes that are Merino, per cent of ewes joined, per cent of Merino ewes joined to Merino rams) that maximises turn-off, and how changes in those inputs alter turn-off, both in quantity and class of sheep.

10 Appendix 4 – Breeding ewes and businesses by marking rate category

10.1 Cumulative per cent of all breeding ewes by marking rate

Table 34. Cumulative per cent of breeding ewes by average marking rate achieved, and number of ewes (million) mated in 2005-06. Based on ABS customised report.

	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%	Ewes
NSW*	9	17	30	49	71	84	93	97	98	99	100	14.80
QLD	26	38	54	70	87	95	98	99	99	99	100	1.71
SA	8	14	25	39	61	79	91	96	99	99	100	5.38
TAS	6	11	23	41	63	80	90	94	97	99	99	1.27
VIC	3	8	19	39	63	77	87	93	97	99	99	8.06
WA	3	6	15	36	70	91	98	99	99	100	100	10.37

Table 35. Cumulative per cent of breeding ewes by average marking rate achieved, and number of ewes (million) mated in 2006-07. Based on ABS customised report.

	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%	Ewes
NSW*	8	16	29	46	73	86	94	96	98	99	99	14.29
QLD	31	48	64	85	98	99	99	100	100	100	100	1.51
SA	4	8	15	27	51	73	89	95	99	100	100	5.49
TAS	5	8	18	38	63	78	89	94	98	99	99	1.34
VIC	3	8	18	36	61	75	86	93	97	99	100	8.09
WA	7	14	34	56	82	95	99	100	100	100	100	10.44

Table 36. Cumulative per cent of breeding ewes by average marking rate achieved, and number of ewes (million) mated in 2008-09. Based on ABS customised report.

	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%	Ewes
NSW*	6	9	21	42	62	77	89	93	96	98	99	13.47
QLD	20	30	36	50	76	89	99	100	100	100	100	1.88
SA	5	9	15	34	51	70	85	95	98	99	99	5.10
TAS	7	13	20	38	62	77	87	92	95	97	99	1.06
VIC	2	6	14	32	55	70	81	91	96	99	99	7.87
WA	5	9	20	41	73	92	98	99	100	100	100	8.46

Table 37. Cumulative per cent of breeding ewes by average marking rate achieved, and number of ewes (million) mated in 2010-11. Based on ABS customised report.

	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%	Ewes
NSW*	6	10	18	31	51	68	84	91	95	98	99	13.47
QLD	20	30	44	68	82	90	97	98	99	99	100	1.68
SA	3	5	10	20	36	56	80	92	96	98	99	5.30
TAS	3	5	13	28	47	68	81	89	95	98	99	1.16
VIC	4	8	15	28	48	64	81	90	95	98	99	7.65
WA	5	10	18	37	66	85	97	99	99	99	100	7.79

Table 38. Cumulative per cent of breeding ewes by average marking rate achieved, and number of ewes (million) mated in 2011-12. Based on ABS customised report.

	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%	Ewes
NSW*	7	11	19	30	48	65	84	90	95	97	98	14.35
QLD	31	42	57	69	84	90	97	99	100	100	100	1.57
SA	2	5	9	18	39	60	81	91	96	98	99	5.76
TAS	5	7	15	24	41	61	79	88	95	97	98	1.27
VIC	5	7	13	24	40	58	78	86	94	98	99	8.11
WA	5	9	16	32	62	82	96	99	100	100	100	7.79

10.2 Cumulative per cent of Merino breeding ewes by marking rate

Table 39. Cumulative per cent of Merino breeding ewes by average marking rate achieved, and number of ewes (million) mated in 2010-11. Based on ABS customised report.

	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%	Ewes
NSW*	9	16	27	46	68	83	94	97	98	99	99	5.92
QLD	21	32	49	75	87	94	98	100	100	100	100	1.14
SA	4	8	16	29	51	72	92	97	98	99	99	2.34
TAS	3	13	22	44	75	88	97	99	99	100	100	0.49
VIC	10	18	35	57	83	92	98	99	99	100	100	2.46
WA	6	12	21	42	71	89	98	99	99	100	100	4.49

Table 40. Cumulative per cent of Merino breeding ewes by average marking rate achieved, and number of ewes (million) mated in 2011-12. Based on ABS customised report.

	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%	Ewes
NSW*	10	14	26	42	62	79	93	97	99	100	100	6.66
QLD	37	49	62	71	83	88	95	98	99	100	100	1.09
SA	4	6	10	27	46	70	92	96	99	99	100	2.53
TAS	8	10	21	39	59	83	95	99	99	99	99	0.53
VIC	7	11	30	44	67	86	95	98	99	99	99	2.78
WA	5	10	19	34	65	84	97	99	99	99	100	4.59

10.3 Cumulative per cent of all breeding ewe businesses by marking rate

Table 41. Cumulative per cent of businesses by average marking rate achieved, and number of businesses in 2005-06. Based on ABS customised report.

	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%	Businesses
NSW*	8	16	29	45	66	79	88	93	96	97	98	14,450
QLD	20	30	45	60	76	85	92	93	95	96	97	1,180
SA	5	9	19	32	55	74	88	93	97	98	98	6,260
TAS	6	10	18	30	45	56	69	79	87	92	95	1,410
VIC	4	9	18	34	54	68	81	89	93	96	97	9,520
WA	4	8	17	36	68	87	95	98	98	99	99	6,070

Table 42. Cumulative per cent of businesses by average marking rate achieved, and number of businesses in 2006-07. Based on ABS customised report.

	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%	Businesses
NSW*	10	18	29	45	67	80	88	92	95	97	98	13,890
QLD	32	44	56	74	85	90	91	91	97	97	97	980
SA	2	4	12	23	48	70	88	94	98	99	99	6,200
TAS	4	7	15	25	43	53	68	79	88	93	95	1,450
VIC	4	8	18	32	53	67	82	91	95	98	98	9,490
WA	8	15	33	54	76	90	97	99	99	99	99	5,940

Table 43. Cumulative per cent of businesses by average marking rate achieved, and number of businesses in 2008-09. Based on ABS customised report.

	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%	Businesses
NSW*	5	9	19	40	59	73	84	90	94	97	99	14,120
QLD	17	28	41	56	78	87	97	99	99	99	99	1,180
SA	3	6	12	28	47	67	83	92	96	98	99	6,170
TAS	7	11	18	31	43	52	67	74	82	87	93	1,300
VIC	3	6	13	29	49	63	75	84	90	95	96	10,010
WA	5	10	22	42	70	87	96	97	99	99	99	5,720

Table 44. Cumulative per cent of businesses by average marking rate achieved, and number of businesses in 2010-11. Based on ABS customised report.

	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%	Businesses
NSW*	7	12	20	31	48	62	78	85	90	94	95	13,750
QLD	21	30	42	56	68	77	87	90	92	93	94	1,200
SA	3	5	10	18	33	52	78	88	93	95	96	5,840
TAS	4	7	14	22	36	48	63	74	83	88	92	1,250
VIC	4	9	15	26	42	56	73	83	89	93	95	9,060
WA	6	11	19	36	61	78	91	94	96	96	97	5,260

Table 45. Cumulative per cent of businesses by average marking rate achieved, and number of businesses in 2011-12. Based on ABS customised report.

	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%	Businesses
NSW*	8	13	20	32	51	63	79	86	91	94	95	13,020
QLD	25	34	52	60	75	83	90	92	94	95	96	1,120
SA	3	7	11	21	37	55	79	87	92	95	95	5,470
TAS	3	8	16	22	36	47	65	73	81	86	90	1,270
VIC	6	11	18	27	40	53	71	80	89	94	96	8,880
WA	5	8	17	32	57	76	91	96	97	97	98	4,990

10.4 Cumulative per cent of Merino breeding ewe businesses by marking rate

Table 46. Cumulative per cent of businesses by average marking rate achieved from Merino ewes, and number of businesses in 2010-11. Based on ABS customised report.

	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%	Businesses
NSW*	10	18	30	47	69	82	92	95	96	97	97	5,660
QLD	24	36	50	67	80	87	94	96	96	96	96	570
SA	4	6	12	21	39	62	87	93	96	96	97	2,720
TAS	6	13	25	44	70	82	92	95	96	96	96	380
VIC	7	16	31	51	74	85	94	96	96	97	97	2,900
WA	6	12	22	41	68	85	95	97	97	97	98	3,160

Table 47. Cumulative per cent of businesses by average marking rate achieved from Merino ewes, and number of businesses in 2011-12. Based on ABS customised report.

	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%	Businesses
NSW*	9	14	26	42	66	80	92	95	96	97	97	6,030
QLD	36	45	65	72	86	92	96	97	100	100	100	520
SA	6	7	12	26	44	63	88	92	96	98	98	2,820
TAS	7	12	25	41	59	70	88	92	95	95	95	430
VIC	7	15	30	44	63	80	90	94	95	95	97	3,220
WA	5	9	19	35	61	79	93	95	96	96	97	3,260

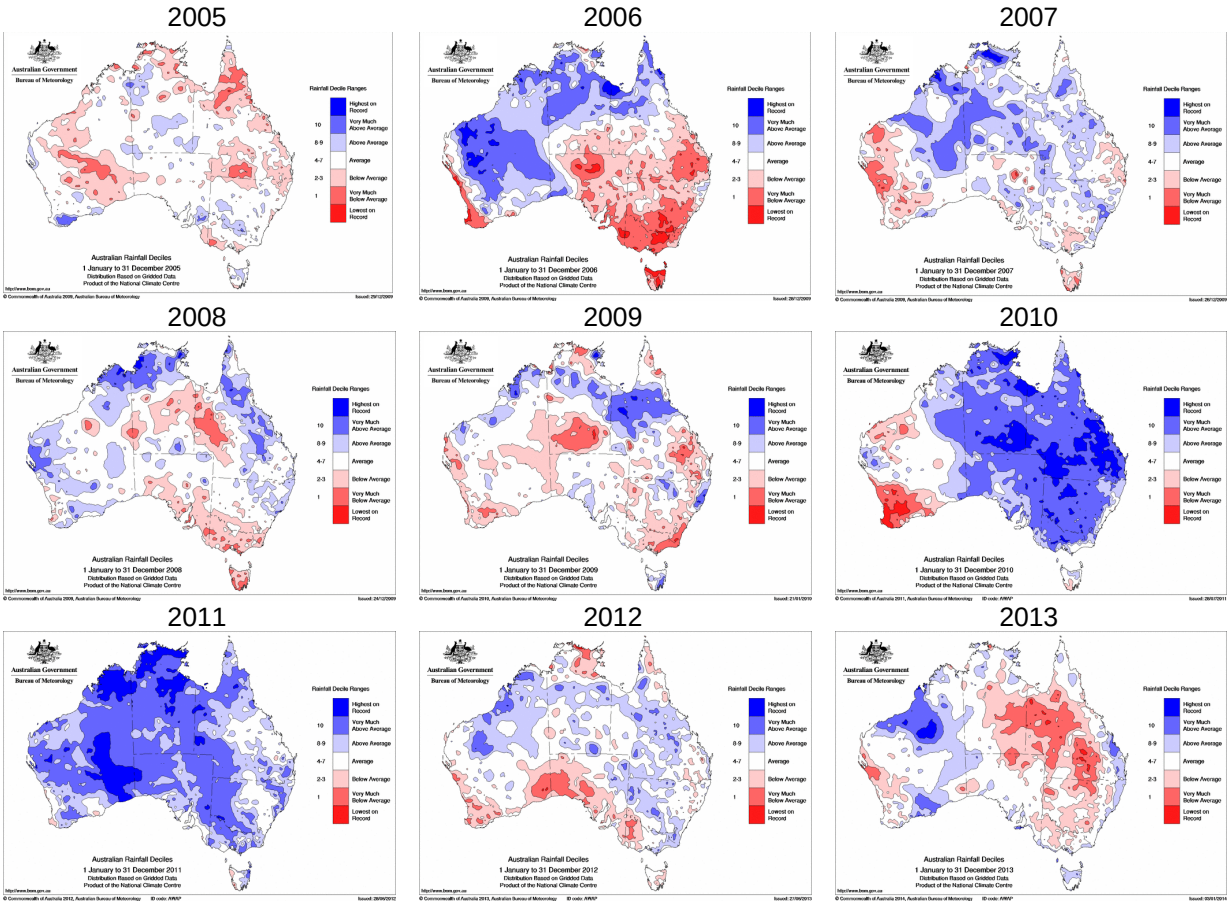
11 Appendix 5 – Rainfall deciles maps

The figure below shows rainfall decile maps produced by the Bureau of Meteorology. Areas shown in blue indicate that the rainfall for the year was above average and areas shown in red indicate that the rainfall for the year was below average.

In general, it can be expected that areas that have below average rainfall (red areas) in one year, will have below average marking rates in the following year. Conversely, areas with above average rainfall (blue areas) can be expected to achieve higher than average marking rates in the following year.

For example, the wide spread good season (wet) that was experienced across eastern Australia in 2010 would suggest better marking rates in 2010-11 and 2011-12. The situation is more complex than this as, for example, the distribution of rainfall throughout the year will also influence the condition of the ewes.

Figure 14. Maps of annual rainfall deciles across the period 2005 to 2013 showing inter-year variation in rainfall relative to average levels.



12 Appendix 6 – Example scenarios for increasing marking

The following pages contain the detailed output for each of the following scenarios.

Scenario 1 10% increase in lambs marked by half of the businesses with more than 2000 sheep and lambs, across all regions of Australia.

Scenario 2 20% increase in lambs marked by half of the businesses with more than 2000 sheep and lambs, that have current marking rates between 50% and 90%, across all regions of Australia.

Scenario 3 Same targets are scenario 2, but only in (a) Victoria, (b) Western Australia, and (c) New South Wales – Northern (including Hunter) region.

Each scenario includes tables for inputs for each flock size, and an aggregate summary table.

12.1 Scenario 1

NSW-Northern (including Hunter) - All breeding ewes

Flock Size >4000

Marking rate category	Ewes mated	Lambs marked (current MR - 82%)	Ewe businesses	Target increase in lambs marked	Target per cent of businesses	Target number of businesses	Lambs marked (target MR - 87%)
<50%	29,293	10,260	9	0	0	--	10,260
50-60%	25,604	14,067	10	20%	50%	5	15,474
60-70%	107,921	69,784	26	20%	50%	13	76,763
70-80%	168,070	125,821	49	20%	50%	25	138,403
80-90%	128,727	108,571	47	20%	50%	24	119,428
90-100%	88,516	83,267	24	0		--	83,267
100-110%	34,765	36,159	12	0	0	--	36,159
110-120%	5,778	6,454	3	0	0	--	6,454
120-130%	26,485	32,965	8	0	0	--	32,965
130-140%	9,126	12,332	2	0	0	--	12,332
140-150%	2,779	3,890	1	0	0	--	3,890
>=150%	2,117	12,147	4	0	0	--	12,147
Total	629,181	515,717	196			67	547,542
						Additional lambs marked	31,824

Flock Size 2001-4000

Marking rate category	Ewes mated	Lambs marked (current MR - 81%)	Ewe businesses	Target increase in lambs marked	Target per cent of businesses	Target number of businesses	Lambs marked (target MR - 86%)
<50%	32,956	13,179	23	0	0	--	13,179
50-60%	32,966	17,784	25	20%	50%	12	19,563
60-70%	60,767	39,557	44	20%	50%	22	43,512
70-80%	66,192	49,486	53	20%	50%	26	54,435
80-90%	104,124	87,658	80	20%	50%	40	96,424
90-100%	36,618	34,956	27	0		--	34,956
100-110%	32,221	33,609	25	0	0	--	33,609
110-120%	16,121	18,481	9	0	0	--	18,481
120-130%	14,573	18,163	12	0	0	--	18,163
130-140%	8,315	11,250	7	0	0	--	11,250
140-150%	3,967	5,672	3	0	0	--	5,672
>=150%	44	556	1	0	0	--	556
Total	408,864	330,351	309			100	349,800
						Additional lambs marked	19,449

Australia - All breeding ewes

Summary: An increase of 1.18 million lambs marked by 5,661 businesses, an increase in the marking rate from 89.1% to 92.3%.

Combined data (all flock size categories)

Marking rate category	Ewes mated	Lambs marked (current MR - 89%)	Ewe businesses	Target increase in lambs marked	Target per cent of businesses	Target number of businesses	Lambs marked (target MR - 92%)
<50%	2,000,004	652,746	2,076	3%	10%	198	674,321
50-60%	1,553,712	848,351	1,606	4%	14%	224	879,589
60-70%	2,915,605	1,901,784	2,699	4%	16%	426	1,972,579
70-80%	5,253,321	3,950,368	4,104	4%	20%	809	4,105,879
80-90%	7,742,155	6,565,551	6,264	4%	20%	1,236	6,818,500
90-100%	6,547,217	6,177,169	5,445	4%	19%	1,043	6,408,623
100-110%	5,867,391	6,058,325	6,355	3%	14%	900	6,266,932
110-120%	2,412,245	2,759,646	2,698	3%	13%	364	2,848,879
120-130%	1,373,214	1,701,957	1,839	3%	11%	207	1,754,012
130-140%	738,981	988,488	1,068	3%	9%	99	1,017,614
140-150%	303,648	436,091	561	2%	7%	40	446,765
>=150%	338,060	956,988	1,639	3%	7%	115	982,828
Total	37,045,553	32,997,466	36,354	4%	16%	5,661	34,176,521
						Additional lambs marked	1,179,055

12.2 Scenario 2

Australia - All breeding ewes

Flock Size >4000

Marking rate category	Ewes mated	Lambs marked (current MR - 87%)	Ewe businesses	Target increase in lambs marked	Target per cent of businesses	Target number of businesses	Lambs marked (target MR - 92%)
<50%	727,661	262,563	159	10%	50%	79	275,691
50-60%	669,602	366,338	171	10%	50%	85	384,655
60-70%	1,392,987	908,947	339	10%	50%	170	954,394
70-80%	2,791,144	2,103,664	716	10%	50%	358	2,208,848
80-90%	3,770,769	3,197,498	1,000	10%	50%	500	3,357,373
90-100%	2,969,010	2,802,024	816	10%	50%	408	2,942,125
100-110%	2,393,842	2,472,501	671	10%	50%	335	2,596,126
110-120%	813,657	931,998	229	10%	50%	115	978,598
120-130%	421,336	521,725	130	10%	50%	65	547,812
130-140%	235,380	314,042	65	10%	50%	32	329,744
140-150%	75,854	109,554	24	10%	50%	12	115,032
>=150%	106,938	326,734	92	10%	50%	46	343,071
Total	16,368,181	14,317,590	4,411			2,205	15,033,469
						Additional lambs marked	715,879

Flock Size 2001-4000

Marking rate category	Ewes mated	Lambs marked (current MR - 89%)	Ewe businesses	Target increase in lambs marked	Target per cent of businesses	Target number of businesses	Lambs marked (target MR - 94%)
<50%	521,065	168,923	238	10%	50%	119	177,370
50-60%	472,166	258,420	278	10%	50%	139	271,341
60-70%	776,935	506,950	511	10%	50%	256	532,298
70-80%	1,342,815	1,006,544	903	10%	50%	451	1,056,871
80-90%	2,195,006	1,861,482	1,472	10%	50%	736	1,954,556
90-100%	1,936,959	1,827,045	1,270	10%	50%	635	1,918,398
100-110%	1,645,041	1,699,633	1,131	10%	50%	565	1,784,615
110-120%	746,237	852,656	499	10%	50%	249	895,289
120-130%	419,704	519,366	283	10%	50%	142	545,335
130-140%	200,719	268,488	134	10%	50%	67	281,912
140-150%	72,924	103,928	57	10%	50%	28	109,125
>=150%	62,554	190,078	139	10%	50%	69	199,582
Total	10,392,126	9,263,514	6,914			3,456	9,726,690
						Additional lambs marked	463,176

Australia - All breeding ewes

Summary: An increase of 1.02 million lambs marked by 2,695 businesses, an increase in the marking rate from 89.1% to 91.8%.

Combined data (all flock size categories)

Marking rate category	Ewes mated	Lambs marked (current MR - 89%)	Ewe businesses	Target increase in lambs marked	Target per cent of businesses	Target number of businesses	Lambs marked (target MR - 92%)
<50%	2,000,004	652,746	2,076	--	--	--	652,746
50-60%	1,553,712	848,351	1,606	7%	14%	224	910,827
60-70%	2,915,605	1,901,784	2,699	7%	16%	426	2,043,373
70-80%	5,253,321	3,950,368	4,104	8%	20%	809	4,261,389
80-90%	7,742,155	6,565,551	6,264	8%	20%	1,236	7,071,449
90-100%	6,547,217	6,177,169	5,445	--	--	--	6,177,169
100-110%	5,867,391	6,058,325	6,355	--	--	--	6,058,325
110-120%	2,412,245	2,759,646	2,698	--	--	--	2,759,646
120-130%	1,373,214	1,701,957	1,839	--	--	--	1,701,957
130-140%	738,981	988,488	1,068	--	--	--	988,488
140-150%	303,648	436,091	561	--	--	--	436,091
>=150%	338,060	956,988	1,639	--	--	--	956,988
Total	37,045,553	32,997,466	36,354	3%	7%	2,695	34,018,450
						Additional lambs marked	1,020,984

12.3 Scenario 3a

Victoria - All breeding ewes

Flock Size >4000

Marking rate category	Ewes mated	Lambs marked (current MR - 90%)	Ewe businesses	Target increase in lambs marked	Target per cent of businesses	Target number of businesses	Lambs marked (target MR - 94%)
<50%	81,327	25,323	18	0	0	--	25,323
50-60%	84,766	46,972	27	20%	50%	13	51,669
60-70%	236,657	153,755	64	20%	50%	32	169,130
70-80%	433,632	326,398	140	20%	50%	70	359,038
80-90%	657,412	559,620	178	20%	50%	89	615,582
90-100%	518,527	490,719	147	0		--	490,719
100-110%	468,717	485,802	130	0	0	--	485,802
110-120%	178,745	204,725	51	0	0	--	204,725
120-130%	81,692	100,999	25	0	0	--	100,999
130-140%	78,571	104,813	20	0	0	--	104,813
140-150%	9,924	14,250	4	0	0	--	14,250
>=150%	11,129	43,347	13	0	0	--	43,347
Total	2,841,101	2,556,722	817			204	2,665,397
						Additional lambs marked	108,674

Flock Size 2001-4000

Marking rate category	Ewes mated	Lambs marked (current MR - 90%)	Ewe businesses	Target increase in lambs marked	Target per cent of businesses	Target number of businesses	Lambs marked (target MR - 94%)
<50%	89,571	22,223	35	0	0	--	22,223
50-60%	81,854	45,888	52	20%	50%	26	50,477
60-70%	149,193	97,041	103	20%	50%	52	106,745
70-80%	302,955	227,890	217	20%	50%	108	250,679
80-90%	467,145	396,685	328	20%	50%	164	436,354
90-100%	363,440	342,640	252	0		--	342,640
100-110%	320,317	329,780	225	0	0	--	329,780
110-120%	211,048	241,453	136	0	0	--	241,453
120-130%	120,001	148,458	81	0	0	--	148,458
130-140%	53,430	71,765	35	0	0	--	71,765
140-150%	20,983	29,816	16	0	0	--	29,816
>=150%	4,325	20,685	19	0	0	--	20,685
Total	2,184,262	1,974,326	1,500			350	2,051,076
						Additional lambs marked	76,750

Victoria - All breeding ewes

Summary: An increase of 185.4 thousand lambs marked by 554 businesses, an increase in the marking rate from 91.9% to 94.3%.

Combined data (all flock size categories)

Marking rate category	Ewes mated	Lambs marked (current MR - 92%)	Ewe businesses	Target increase in lambs marked	Target per cent of businesses	Target number of businesses	Lambs marked (target MR - 94%)
<50%	324,726	88,588	400	--	--	--	88,588
50-60%	266,908	147,132	373	6%	10%	39	156,418
60-70%	549,901	358,114	615	7%	14%	84	383,193
70-80%	997,475	749,881	977	7%	18%	178	805,310
80-90%	1,515,745	1,287,716	1,438	7%	18%	253	1,383,346
90-100%	1,257,059	1,186,902	1,249	--	--	--	1,186,902
100-110%	1,274,780	1,317,798	1,600	--	--	--	1,317,798
110-120%	676,498	774,581	846	--	--	--	774,581
120-130%	389,924	483,334	579	--	--	--	483,334
130-140%	249,044	333,411	358	--	--	--	333,411
140-150%	77,702	111,375	174	--	--	--	111,375
>=150%	65,397	188,272	446	--	--	--	188,272
Total	7,645,158	7,027,104	9,056	3%	6%	554	7,212,529
						Additional lambs marked	185,425

12.4 Scenario 3b

Western Australia - All breeding ewes

Flock Size >4000

Marking rate category	Ewes mated	Lambs marked (current MR - 83%)	Ewe businesses	Target increase in lambs marked	Target per cent of businesses	Target number of businesses	Lambs marked (target MR - 87%)
<50%	164,004	59,738	28	0	0	--	59,738
50-60%	180,557	98,556	36	20%	50%	18	108,412
60-70%	300,585	196,375	80	20%	50%	40	216,013
70-80%	814,442	613,775	208	20%	50%	104	675,153
80-90%	1,200,964	1,016,046	319	20%	50%	160	1,117,651
90-100%	728,061	684,534	199	0		--	684,534
100-110%	423,211	435,179	102	0	0	--	435,179
110-120%	45,755	52,096	14	0	0	--	52,096
120-130%	13,342	16,872	3	0	0	--	16,872
130-140%	4,400	5,727	1	0	0	--	5,727
140-150%	0	0	0	0	0	--	0
>=150%	8,463	26,362	10	0	0	--	26,362
Total	3,883,785	3,205,261	1,000			322	3,397,736
						Additional lambs marked	192,475

Flock Size 2001-4000

Marking rate category	Ewes mated	Lambs marked (current MR - 84%)	Ewe businesses	Target increase in lambs marked	Target per cent of businesses	Target number of businesses	Lambs marked (target MR - 88%)
<50%	127,674	46,848	55	0	0	--	46,848
50-60%	116,774	64,152	66	20%	50%	33	70,567
60-70%	212,743	139,103	128	20%	50%	64	153,013
70-80%	410,847	308,813	258	20%	50%	129	339,694
80-90%	637,949	543,026	386	20%	50%	193	597,328
90-100%	542,760	511,191	300	0		--	511,191
100-110%	257,334	264,818	155	0	0	--	264,818
110-120%	57,750	65,251	39	0	0	--	65,251
120-130%	9,540	11,641	7	0	0	--	11,641
130-140%	3,466	4,721	3	0	0	--	4,721
140-150%	3,561	5,042	2	0	0	--	5,042
>=150%	12,934	43,903	30	0	0	--	43,903
Total	2,393,333	2,008,506	1,431			419	2,114,016
						Additional lambs marked	105,509

Western Australia - All breeding ewes

Summary: An increase of 298.0 thousand lambs marked by 741 businesses, an increase in the marking rate from 83.3% to 87.1%.

Combined data (all flock size categories)

Marking rate category	Ewes mated	Lambs marked (current MR - 83%)	Ewe businesses	Target increase in lambs marked	Target per cent of businesses	Target number of businesses	Lambs marked (target MR - 87%)
<50%	412,301	146,186	296	--	--	--	146,186
50-60%	371,884	203,681	263	8%	19%	51	219,952
60-70%	643,668	420,668	455	8%	23%	104	454,216
70-80%	1,457,789	1,097,471	875	8%	27%	233	1,189,730
80-90%	2,232,916	1,893,554	1,302	8%	27%	353	2,049,462
90-100%	1,538,876	1,448,721	925	--	--	--	1,448,721
100-110%	884,046	908,951	687	--	--	--	908,951
110-120%	148,329	168,469	160	--	--	--	168,469
120-130%	39,792	49,273	71	--	--	--	49,273
130-140%	15,111	20,077	35	--	--	--	20,077
140-150%	9,394	13,366	28	--	--	--	13,366
>=150%	33,030	116,427	163	--	--	--	116,427
Total	7,787,137	6,486,843	5,259	5%	14%	741	6,784,828
						Additional lambs marked	297,985

12.5 Scenario 3c

NSW-Northern (including Hunter) - All breeding ewes

Flock Size >4000

Marking rate category	Ewes mated	Lambs marked (current MR - 82%)	Ewe businesses	Target increase in lambs marked	Target per cent of businesses	Target number of businesses	Lambs marked (target MR - 87%)
<50%	29,293	10,260	9	0	0	--	10,260
50-60%	25,604	14,067	10	20%	50%	5	15,474
60-70%	107,921	69,784	26	20%	50%	13	76,763
70-80%	168,070	125,821	49	20%	50%	25	138,403
80-90%	128,727	108,571	47	20%	50%	24	119,428
90-100%	88,516	83,267	24	0		--	83,267
100-110%	34,765	36,159	12	0	0	--	36,159
110-120%	5,778	6,454	3	0	0	--	6,454
120-130%	26,485	32,965	8	0	0	--	32,965
130-140%	9,126	12,332	2	0	0	--	12,332
140-150%	2,779	3,890	1	0	0	--	3,890
>=150%	2,117	12,147	4	0	0	--	12,147
Total	629,181	515,717	196			67	547,542
						Additional lambs marked	31,824

Flock Size 2001-4000

Marking rate category	Ewes mated	Lambs marked (current MR - 81%)	Ewe businesses	Target increase in lambs marked	Target per cent of businesses	Target number of businesses	Lambs marked (target MR - 86%)
<50%	32,956	13,179	23	0	0	--	13,179
50-60%	32,966	17,784	25	20%	50%	12	19,563
60-70%	60,767	39,557	44	20%	50%	22	43,512
70-80%	66,192	49,486	53	20%	50%	26	54,435
80-90%	104,124	87,658	80	20%	50%	40	96,424
90-100%	36,618	34,956	27	0		--	34,956
100-110%	32,221	33,609	25	0	0	--	33,609
110-120%	16,121	18,481	9	0	0	--	18,481
120-130%	14,573	18,163	12	0	0	--	18,163
130-140%	8,315	11,250	7	0	0	--	11,250
140-150%	3,967	5,672	3	0	0	--	5,672
>=150%	44	556	1	0	0	--	556
Total	408,864	330,351	309			100	349,800
						Additional lambs marked	19,449

NSW-Northern (including Hunter) - All breeding ewes

Summary: An increase of 51.3 thousand lambs marked by 167 businesses, an increase in the marking rate from 82.8% to 85.9%.

Combined data (all flock size categories)

Marking rate category	Ewes mated	Lambs marked (current MR - 83%)	Ewe businesses	Target increase in lambs marked	Target per cent of businesses	Target number of businesses	Lambs marked (target MR - 86%)
<50%	148,886	47,652	262	--	--	--	47,652
50-60%	98,369	53,579	176	6%	10%	17	56,765
60-70%	219,454	142,088	236	8%	15%	35	153,022
70-80%	313,011	234,335	304	7%	17%	51	251,866
80-90%	315,492	266,219	377	7%	17%	64	285,842
90-100%	197,140	185,552	214	--	--	--	185,552
100-110%	123,836	128,232	281	--	--	--	128,232
110-120%	53,492	61,106	108	--	--	--	61,106
120-130%	79,763	99,408	133	--	--	--	99,408
130-140%	35,851	48,150	83	--	--	--	48,150
140-150%	22,834	32,857	54	--	--	--	32,857
>=150%	15,381	44,710	125	--	--	--	44,710
Total	1,623,508	1,343,886	2,354	4%	7%	167	1,395,159
						Additional lambs marked	51,273

13 Appendix 7 – Region snapshots

This section presents a snapshot of the sheep data for 39 regions - Australia, each of the six states and the 32 regions requested of ABS. A detailed description of the layout of each snap shot is presented in the following table. The codes refer to the sections of the snapshot as identified in Figure 15 on the following page.

Code	Description
(A)	This table contains estimates of the sheep population at 30th June 2011 from the ABS census.
(B)	This table contains the corresponding number of sheep businesses at 30th June 2011 to the sheep population estimates in (A).
(C)	This chart shows the distribution of Merino ewes, other breed ewes and all other sheep (lambs, wethers, rams) by farm flock size.
(D)	This pie chart shows the split of the flock into percent Merino ewes, percent other breed ewes and percent other sheep
(E)	The main pie chart shows the split of breeding ewes between farms that only produce Merino lambs, farms that only produce other breed lambs, and farms that produce both Merino and other breed lambs. The ewes on farms that produce both types of lambs are split between those joined to produce Merino lambs and those joined to produce other breed lambs (including first Merino lambs).
(F)	This pie chart split businesses that produce lambs into those that only produce Merino lambs, those that only produce other breed lambs and those the produce both lamb types.
(G)	This table gives a cumulative distribution by flock size of sheep and lambs and businesses with sheep and lambs, and of breeding ewes and businesses with breeding ewes. The figures in the body of the table show the percent of the total that are on all farms with fewer sheep and lambs that the number in the top row. This table is easier explained by following the example interpretation provided below the table.
(H)	The five charts show a frequency distribution of the number of breeding ewes by the average marking rate of the farms they run on. These charts include aggregate results for Merino and other breed ewes. The five charts represent five collection periods. The number of ewes in each marking rate category are further split by farm flock size.
(I)	These two charts show a frequency distribution of the number of Merino ewes by the average marking rate for Merino lambs on the farm. These charts are for Merino ewes only and are for the marking rate of pre bred Merino lambs (i.e. Merino ewes mated to Merino rams). The two charts represent two collection periods. The number of ewes in each marking rate category are further split by farm flock size.
(J)	This is the farm flock size legend for the marking rate frequency distributions, (H) and (I). The farm flock size is based on the total sheep and lambs on the farm.
(K)	This table shows the average marking rate for pure-bred Merino lambs (Merino ewes mated to Merino rams) by flock size and year.
(L)	This table shows the average marking rate for all lambs (all ewes including Merino ewes) by flock size and year.
(M)	This table shows the cumulative proportion of the ewes mated and the businesses running those ewes, by marking rate categories. The data is for the 2010-11 census. The first two rows are for marking rates of all ewes. The last two rows are for marking rates of pure-bred Merino lambs. The cumulative distribution gives the proportion of all ewes (or businesses) that are on farms with marking rates less than the value in the heading row.

	This table is easier explained by following the example interpretation provided below the table.

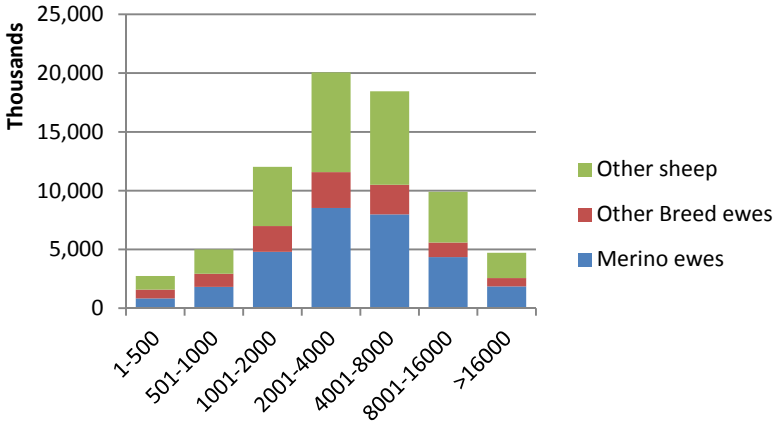
Figure 15. Legend to the description of the components of the region snapshots.

Summary for Australia

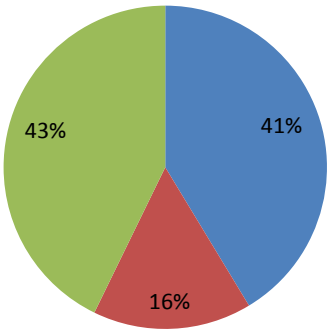
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	72,884
Breeding Ewes - total (thousand)	41,710
Breeding ewes - Merino (thousand)	30,134

Businesses at 30-Jun-2011	Total
with sheep and lambs	42,130
with breeding ewes	38,868
with Merino breeding ewes	27,985

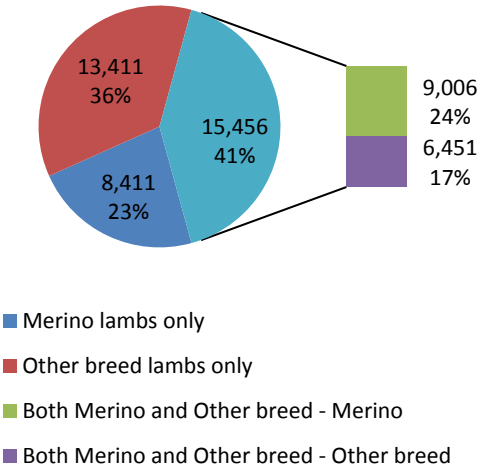
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



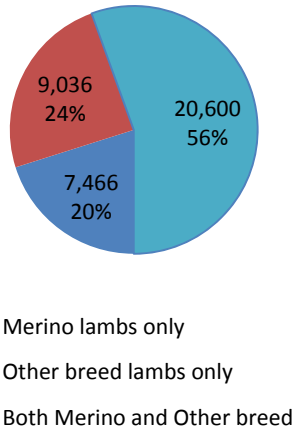
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



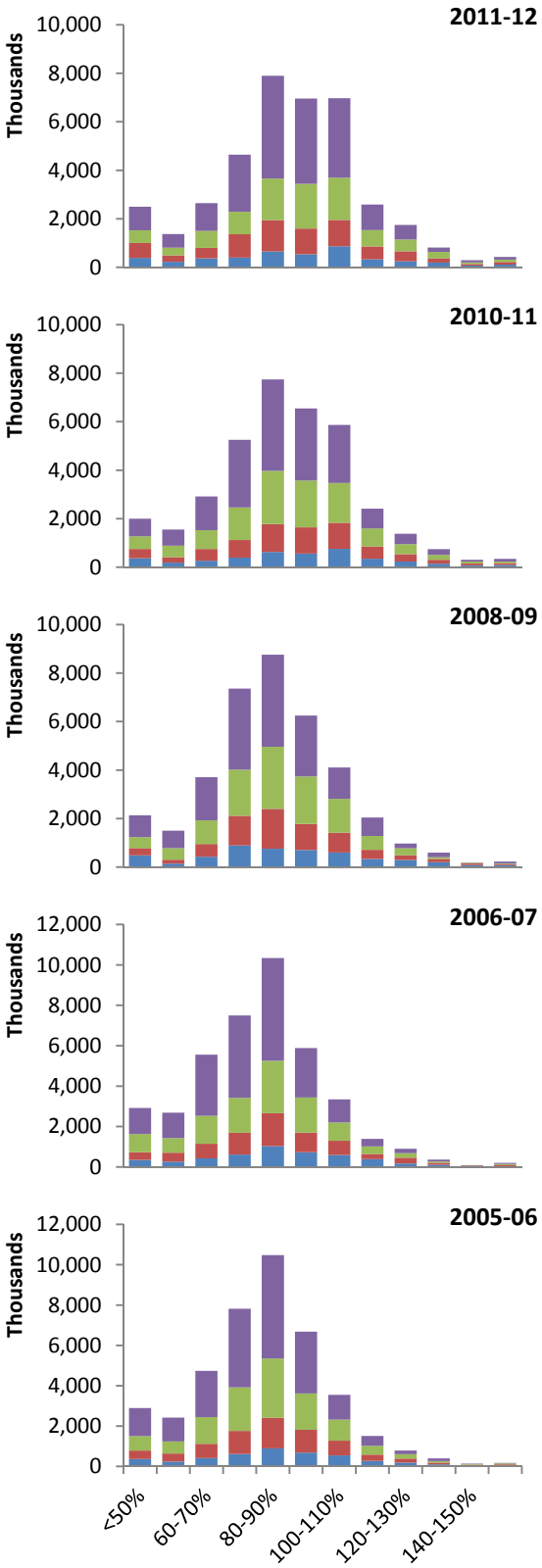
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	4	11	27	55	80	94	100
Businesses with sheep and lambs	37	53	72	89	97	100	100
Breeding ewes	4	11	28	55	80	94	100
Businesses with breeding ewes	33	50	70	89	97	100	100

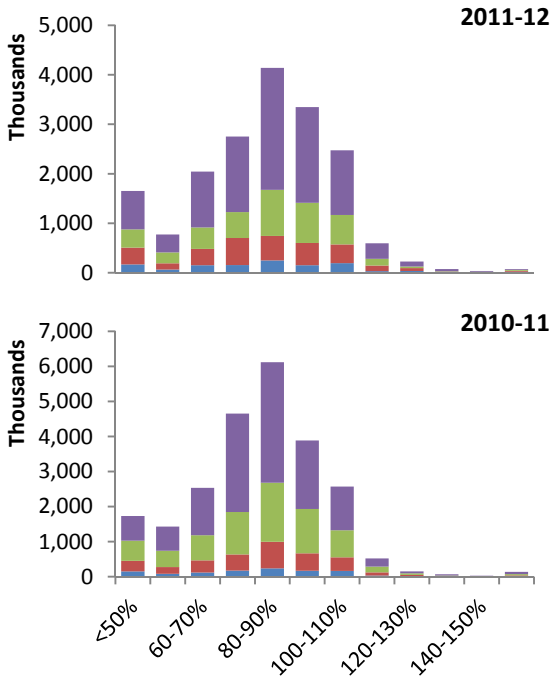
Example interpretation: *In Australia, 72% of all flocks have 2000 or less sheep and lambs, and those flocks carry 27% of the sheep and lambs in that region.*

Summary for Australia (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	81.3	81.6
1001-2000	81.7	80.5
2001-4000	81.0	82.4
over 4000	81.6	82.2
Total	81.4	82.0

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	86.1	85.9	86.2	92.0	91.8
1001-2000	84.5	83.6	86.9	91.3	89.1
2001-4000	82.3	80.3	85.8	89.1	91.1
over 4000	79.5	77.9	82.4	87.5	88.7
Total	81.8	80.4	84.7	89.1	89.7

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	5	10	17	32	53	70	86	93	96	98	99
Businesses mating ewes	6	10	18	29	46	61	79	86	91	94	95
Merino ewes mated	8	15	26	46	70	85	96	98	99	99	99
Businesses mating Merino ewes	4	8	16	27	45	60	78	86	91	94	95

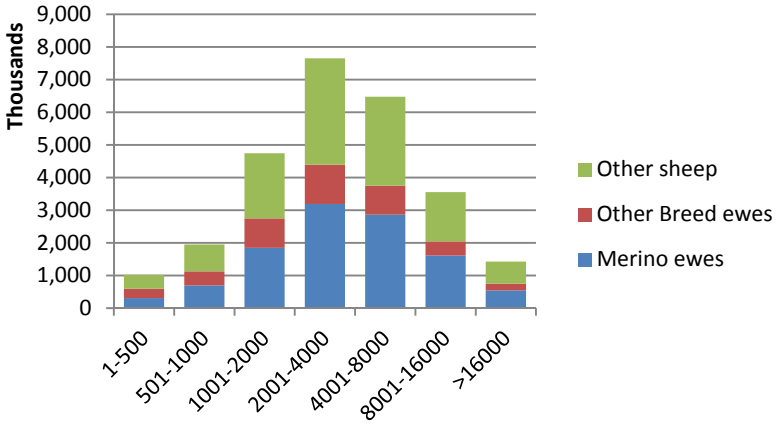
Example interpretation: *In Australia, 17% of all ewes mated were mated on the 18% of farms with an average marking rate <70%.*

Summary for New South Wales

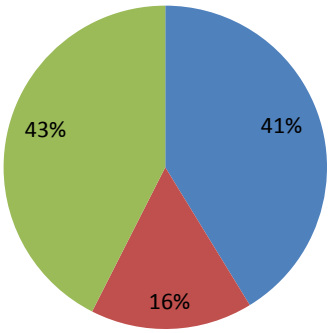
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	26,822
Breeding Ewes - total (thousand)	15,415
Breeding ewes - Merino (thousand)	11,064

Businesses at 30-Jun-2011	Total
with sheep and lambs	15,787
with breeding ewes	14,637
with Merino breeding ewes	10,475

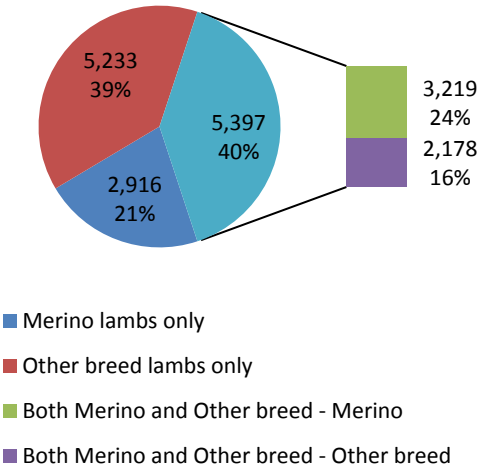
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



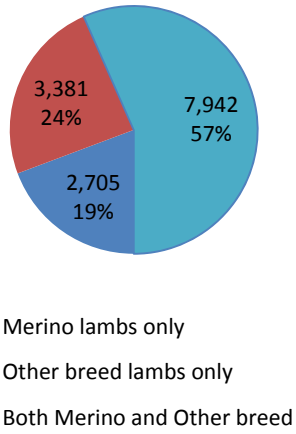
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



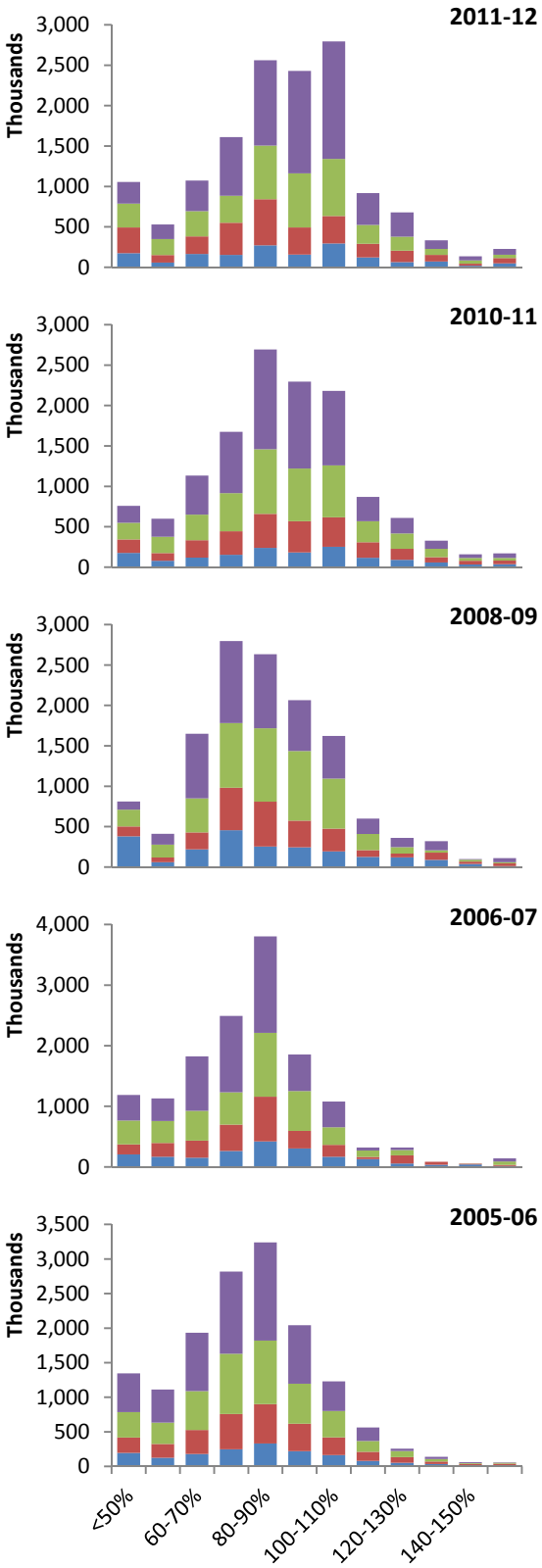
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	4	11	29	57	81	95	100
Businesses with sheep and lambs	35	52	73	90	98	100	100
Breeding ewes	4	11	29	58	82	95	100
Businesses with breeding ewes	32	49	71	89	97	100	100

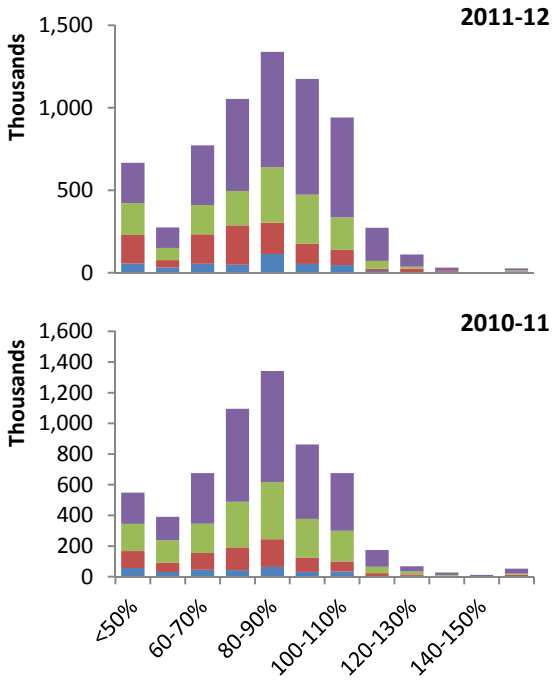
Example interpretation: *In New South Wales, 73% of all flocks have 2000 or less sheep and lambs, and those flocks carry 29% of the sheep and lambs in that region.*

Summary for New South Wales (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	75.9	79.8
1001-2000	76.7	74.5
2001-4000	78.7	79.7
over 4000	84.0	84.7
Total	81.0	81.6

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	80.9	82.1	77.7	89.5	89.8
1001-2000	82.4	81.6	86.9	91.2	86.5
2001-4000	79.7	79.3	86.2	89.4	88.9
over 4000	77.4	76.9	85.1	90.2	91.7
Total	79.4	79.1	84.6	90.1	89.7

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	6	10	18	31	51	68	84	91	95	98	99
Businesses mating ewes	7	12	20	31	48	62	78	85	90	94	95
Merino ewes mated	9	16	27	46	68	83	94	97	98	99	99
Businesses mating Merino ewes	4	9	18	29	47	61	77	84	90	93	95

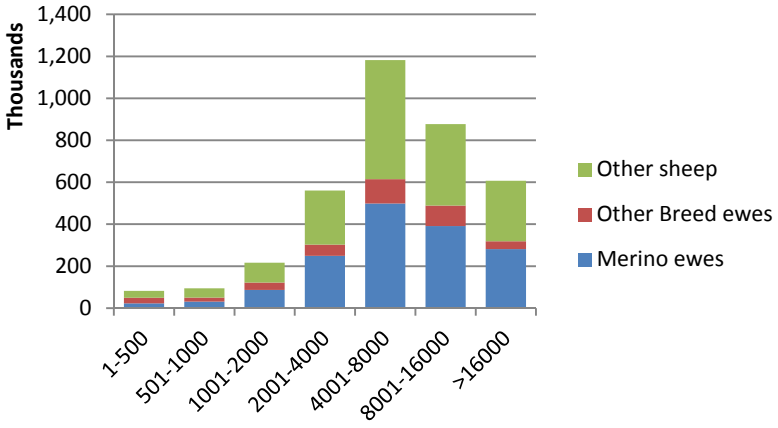
Example interpretation: *In New South Wales, 18% of all ewes mated were mated on the 20% of farms with an average marking rate <70%.*

Summary for Queensland

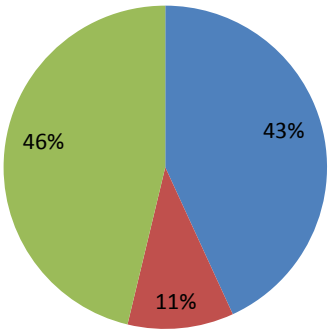
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	3,620
Breeding Ewes - total (thousand)	1,945
Breeding ewes - Merino (thousand)	1,561

Businesses at 30-Jun-2011	Total
with sheep and lambs	1,477
with breeding ewes	1,344
with Merino breeding ewes	935

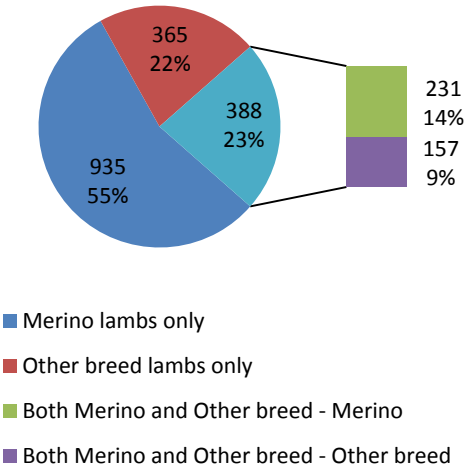
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



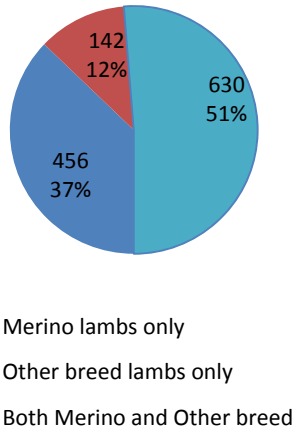
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



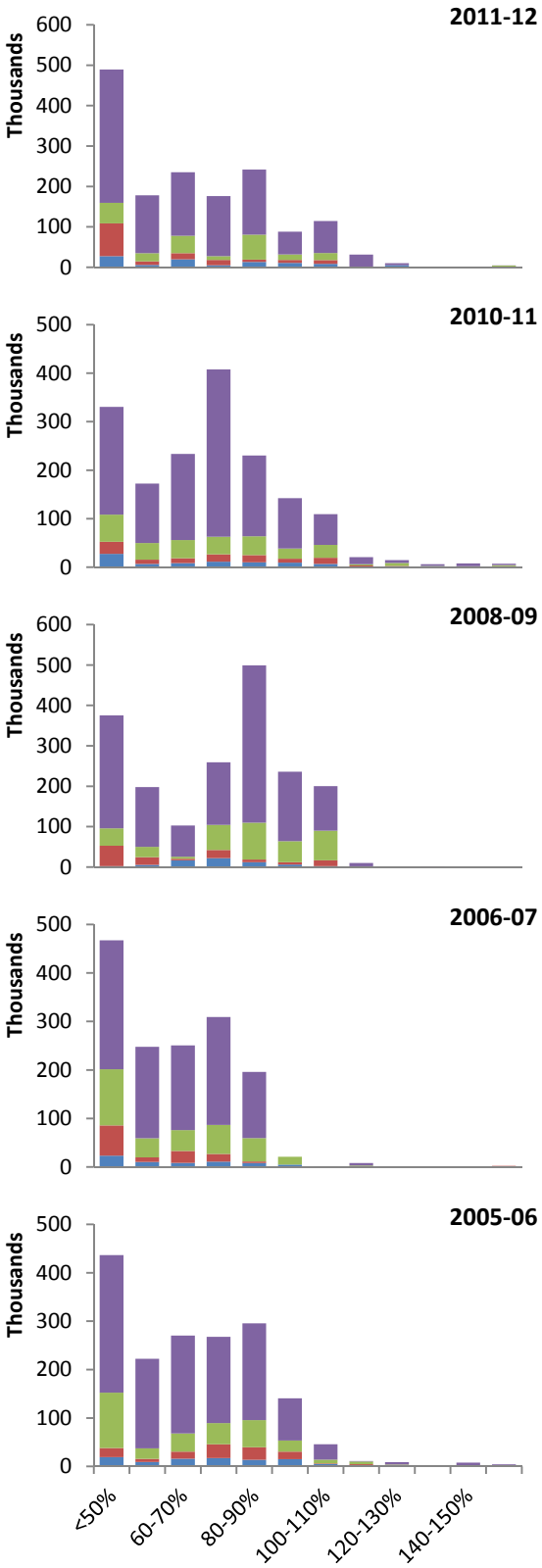
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	2	5	11	26	59	83	100
Businesses with sheep and lambs	47	56	66	79	93	98	100
Breeding ewes	3	5	11	27	59	84	100
Businesses with breeding ewes	46	54	65	78	93	98	100

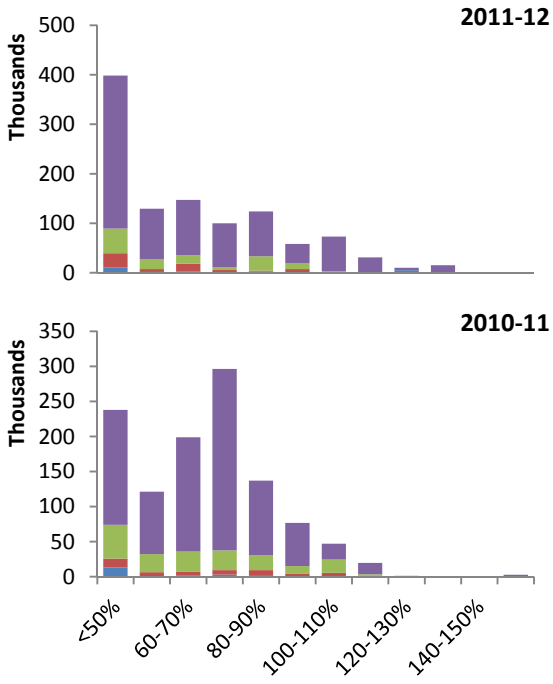
Example interpretation: *In Queensland, 66% of all flocks have 2000 or less sheep and lambs, and those flocks carry 11% of the sheep and lambs in that region.*

Summary for Queensland (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	58.5	62.5
1001-2000	68.3	47.3
2001-4000	65.4	58.5
over 4000	68.7	65.9
Total	68.0	63.8

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	71.8	58.6	73.9	69.6	70.4
1001-2000	75.8	52.7	56.4	71.9	49.2
2001-4000	58.7	61.5	79.6	70.0	68.3
over 4000	66.0	60.7	72.3	70.3	66.3
Total	65.7	60.2	72.7	70.3	65.3

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	20	30	44	68	82	90	97	98	99	99	100
Businesses mating ewes	21	30	42	56	68	77	87	90	92	93	94
Merino ewes mated	21	32	49	75	87	94	98	100	100	100	100
Businesses mating Merino ewes	13	23	36	52	65	74	86	89	91	92	93

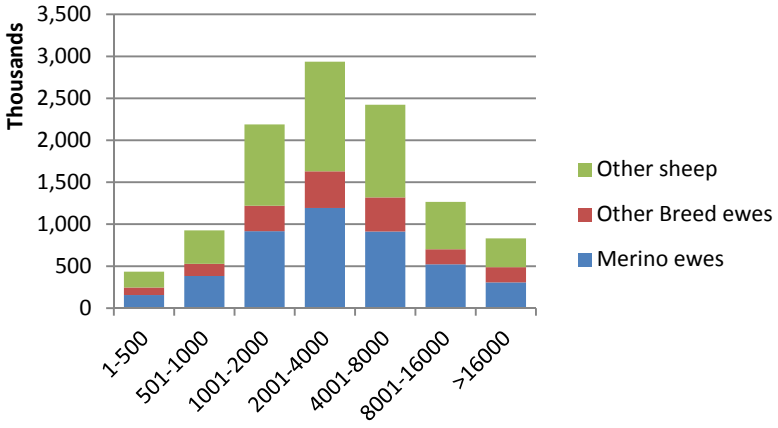
Example interpretation: *In Queensland, 44% of all ewes mated were mated on the 42% of farms with an average marking rate <70%.*

Summary for South Australia

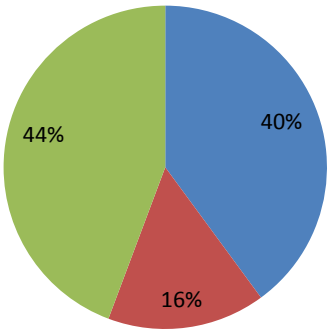
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	11,009
Breeding Ewes - total (thousand)	6,133
Breeding ewes - Merino (thousand)	4,394

Businesses at 30-Jun-2011	Total
with sheep and lambs	6,732
with breeding ewes	6,231
with Merino breeding ewes	4,822

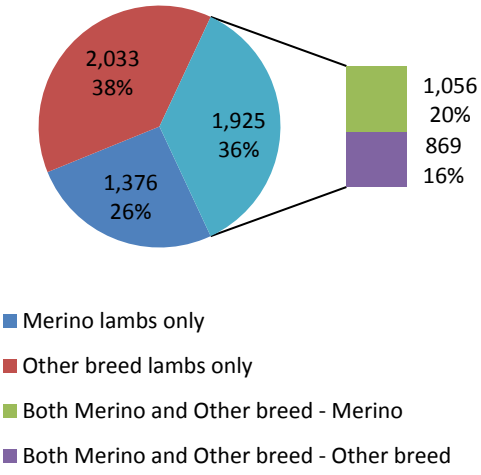
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



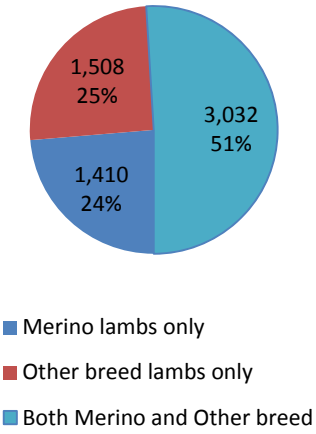
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



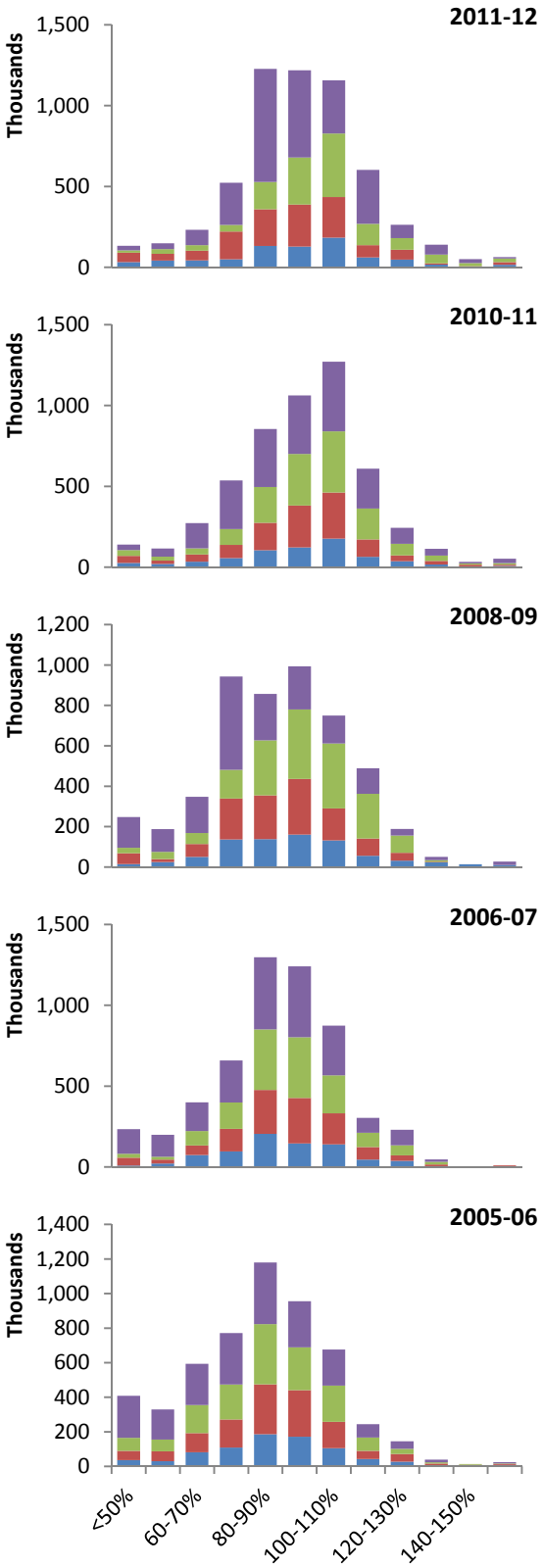
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	4	12	32	59	81	92	100
Businesses with sheep and lambs	34	53	75	91	98	100	100
Breeding ewes	4	13	33	59	81	92	100
Businesses with breeding ewes	31	50	74	91	98	100	100

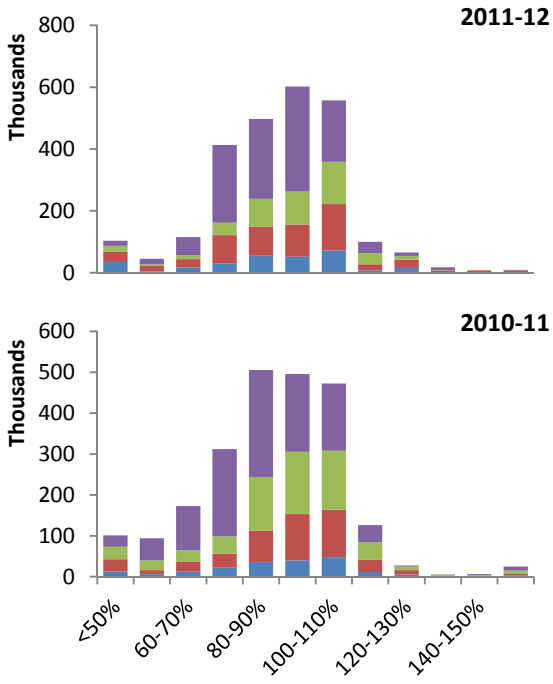
Example interpretation: *In South Australia, 75% of all flocks have 2000 or less sheep and lambs, and those flocks carry 32% of the sheep and lambs in that region.*

Summary for South Australia (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	91.2	86.0
1001-2000	90.6	89.9
2001-4000	91.1	93.9
over 4000	86.3	87.5
Total	88.8	89.0

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	88.8	89.8	92.0	96.3	95.1
1001-2000	86.7	89.8	87.6	95.0	91.6
2001-4000	85.1	90.8	94.6	97.9	100.5
over 4000	78.4	84.3	81.8	94.7	94.1
Total	83.6	87.9	88.4	95.8	95.1

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	3	5	10	20	36	56	80	92	96	98	99
Businesses mating ewes	3	5	10	18	33	52	78	88	93	95	96
Merino ewes mated	4	8	16	29	51	72	92	97	98	99	99
Businesses mating Merino ewes	2	4	9	17	32	51	77	88	92	95	96

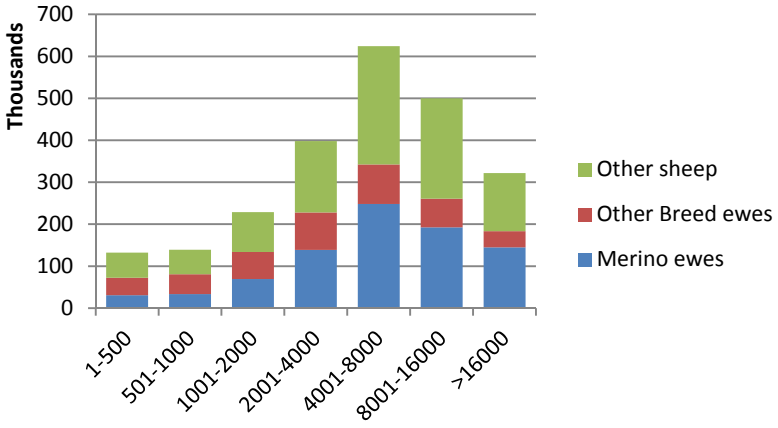
Example interpretation: *In South Australia, 10% of all ewes mated were mated on the 10% of farms with an average marking rate <70%.*

Summary for Tasmania

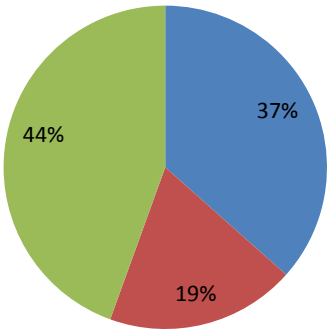
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	2,344
Breeding Ewes - total (thousand)	1,302
Breeding ewes - Merino (thousand)	857

Businesses at 30-Jun-2011	Total
with sheep and lambs	1,536
with breeding ewes	1,345
with Merino breeding ewes	755

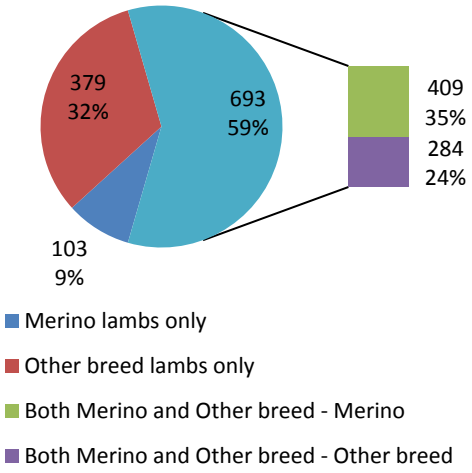
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



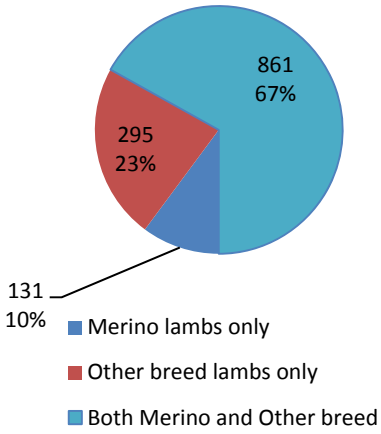
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



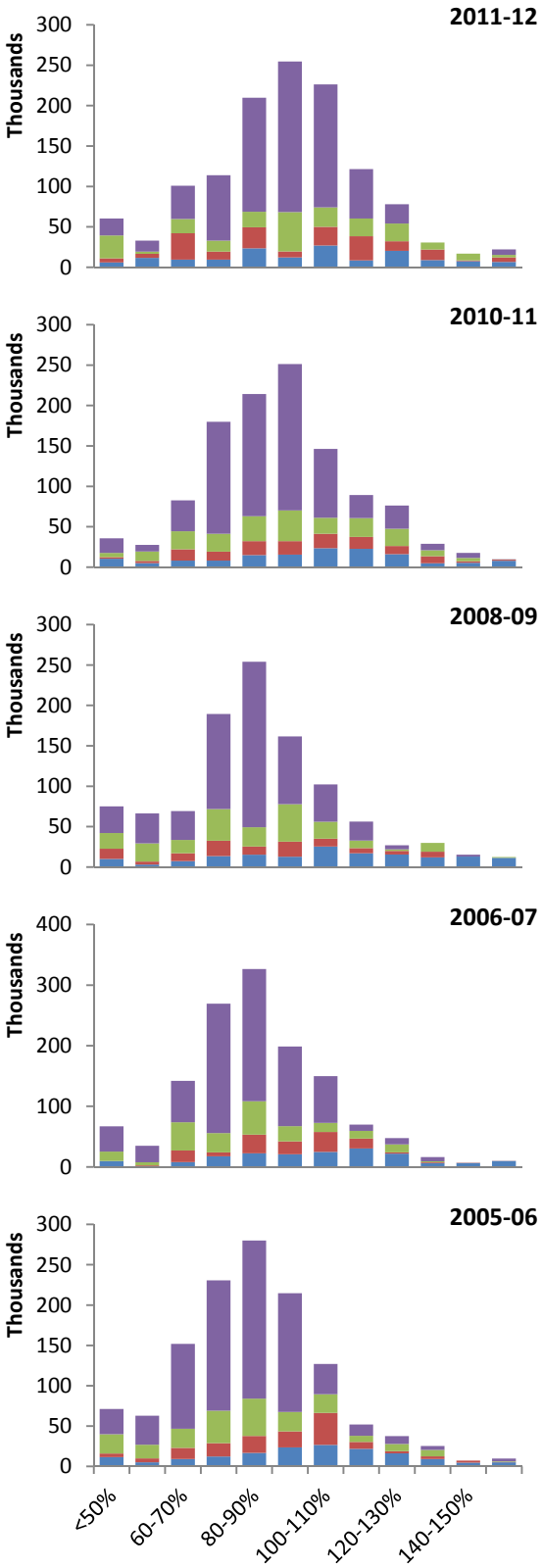
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	6	12	21	38	65	86	100
Businesses with sheep and lambs	57	70	80	89	96	99	100
Breeding ewes	6	12	22	40	66	86	100
Businesses with breeding ewes	53	66	78	88	96	99	100

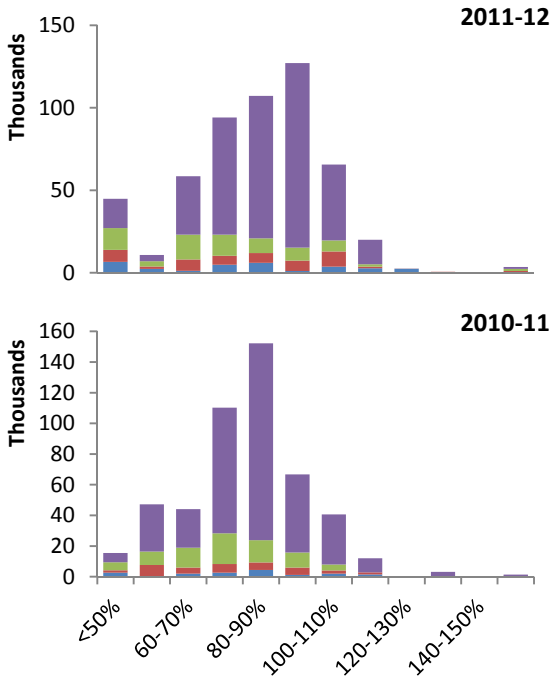
Example interpretation: *In Tasmania, 80% of all flocks have 2000 or less sheep and lambs, and those flocks carry 21% of the sheep and lambs in that region.*

Summary for Tasmania (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	81.1	73.0
1001-2000	82.1	84.2
2001-4000	76.2	70.0
over 4000	85.0	86.6
Total	83.4	83.4

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	97.3	102.0	104.7	100.3	102.2
1001-2000	90.8	91.9	83.5	98.1	96.8
2001-4000	82.0	82.3	81.3	94.1	91.3
over 4000	80.3	82.2	81.6	91.2	94.6
Total	83.9	85.8	85.1	93.5	95.2

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	3	5	13	28	47	68	81	89	95	98	99
Businesses mating ewes	4	7	14	22	36	48	63	74	83	88	92
Merino ewes mated	3	13	22	44	75	88	97	99	99	100	100
Businesses mating Merino ewes	2	5	12	21	34	47	62	74	83	88	92

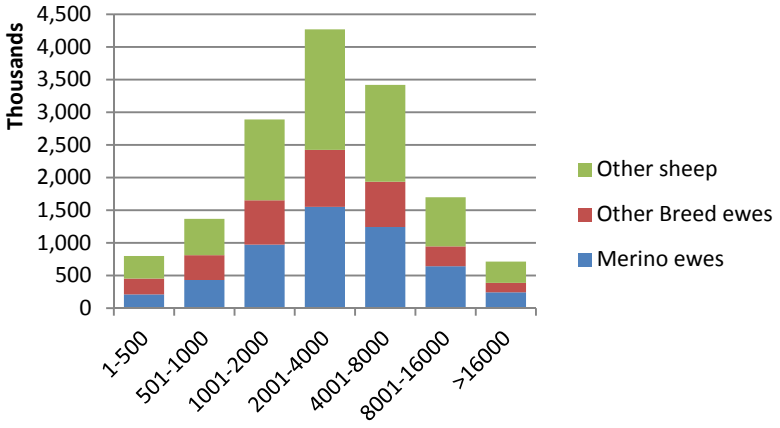
Example interpretation: *In Tasmania, 13% of all ewes mated were mated on the 14% of farms with an average marking rate <70%.*

Summary for Victoria

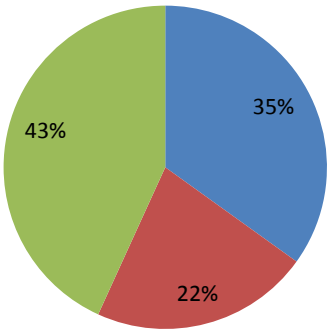
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	15,159
Breeding Ewes - total (thousand)	8,611
Breeding ewes - Merino (thousand)	5,293

Businesses at 30-Jun-2011	Total
with sheep and lambs	10,594
with breeding ewes	9,674
with Merino breeding ewes	6,405

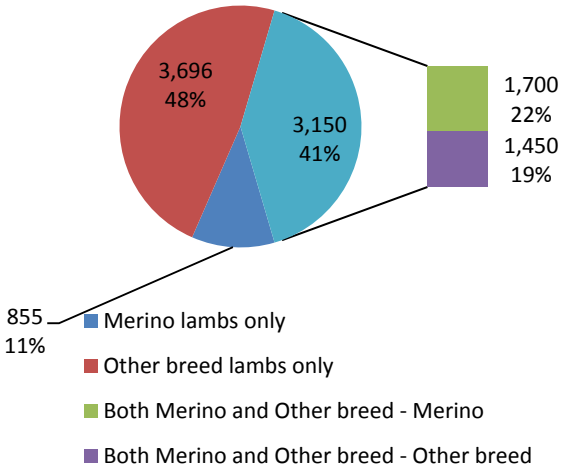
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



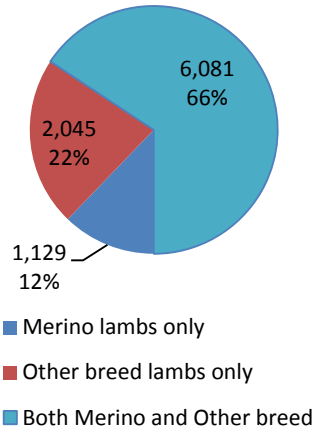
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



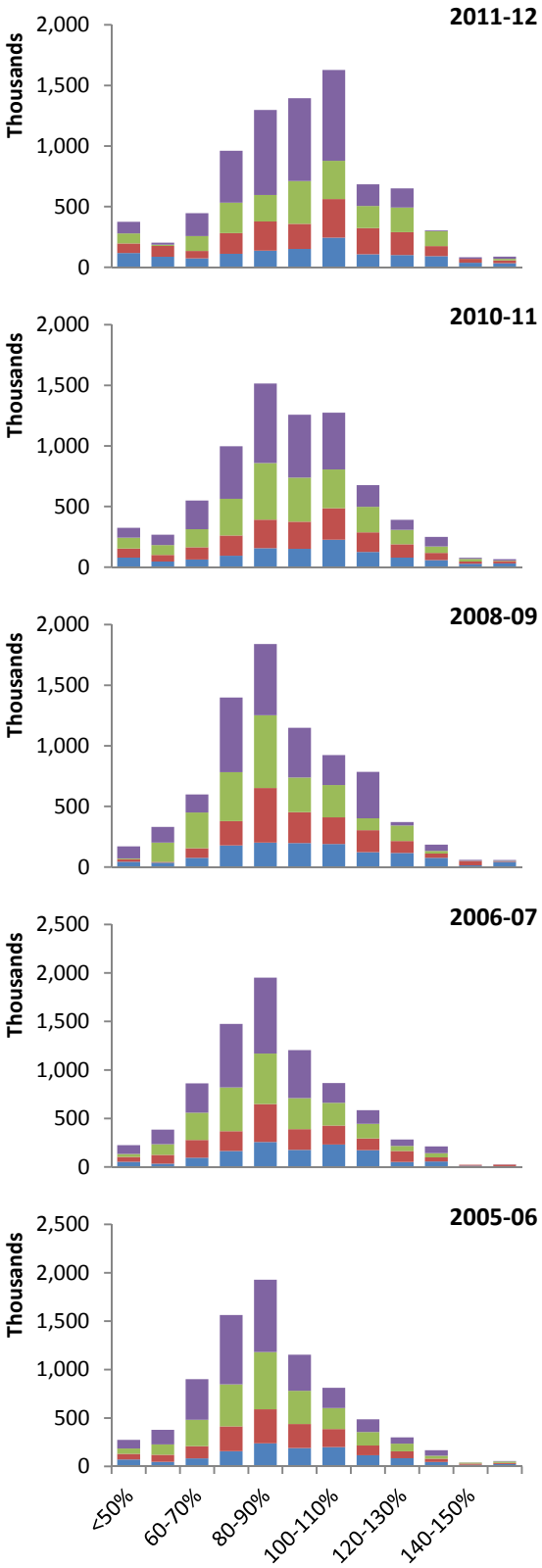
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	5	14	33	62	84	95	100
Businesses with sheep and lambs	41	58	78	92	98	100	100
Breeding ewes	5	15	34	62	85	95	100
Businesses with breeding ewes	37	56	76	91	98	100	100

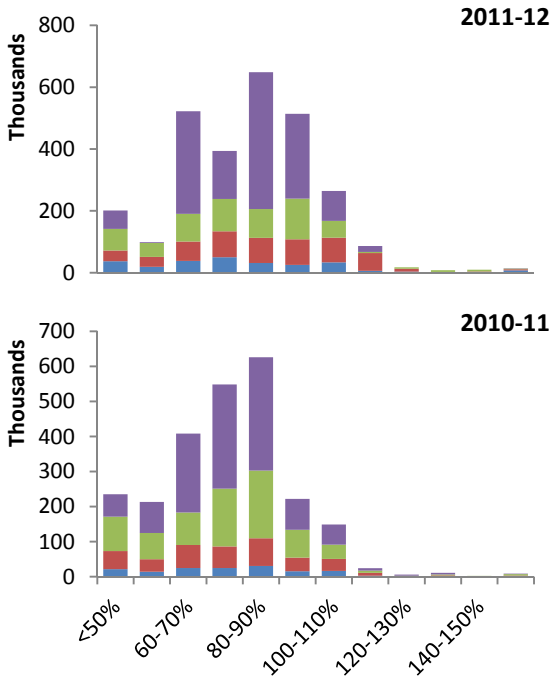
Example interpretation: *In Victoria, 78% of all flocks have 2000 or less sheep and lambs, and those flocks carry 33% of the sheep and lambs in that region.*

Summary for Victoria (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	76.4	83.2
1001-2000	74.8	84.6
2001-4000	73.7	78.9
over 4000	76.4	79.7
Total	75.3	80.8

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	92.4	92.1	97.0	96.6	94.5
1001-2000	87.9	88.4	93.7	94.3	96.6
2001-4000	87.0	85.0	86.5	90.4	96.2
over 4000	83.7	84.1	87.2	90.0	92.3
Total	86.8	86.5	89.9	91.9	94.5

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	4	8	15	28	48	64	81	90	95	98	99
Businesses mating ewes	4	9	15	26	42	56	73	83	89	93	95
Merino ewes mated	10	18	35	57	83	92	98	99	99	100	100
Businesses mating Merino ewes	2	7	14	25	41	55	73	82	89	93	95

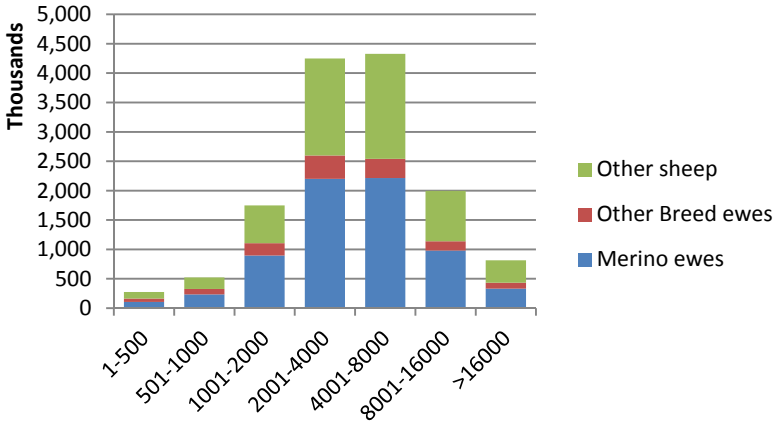
Example interpretation: *In Victoria, 15% of all ewes mated were mated on the 15% of farms with an average marking rate <70%.*

Summary for Western Australia

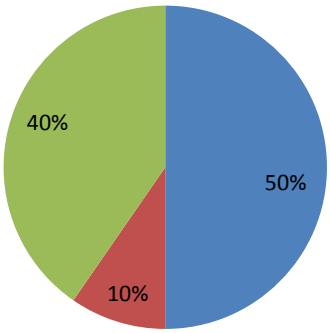
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	13,930
Breeding Ewes - total (thousand)	8,304
Breeding ewes - Merino (thousand)	6,965

Businesses at 30-Jun-2011	Total
with sheep and lambs	6,003
with breeding ewes	5,637
with Merino breeding ewes	4,593

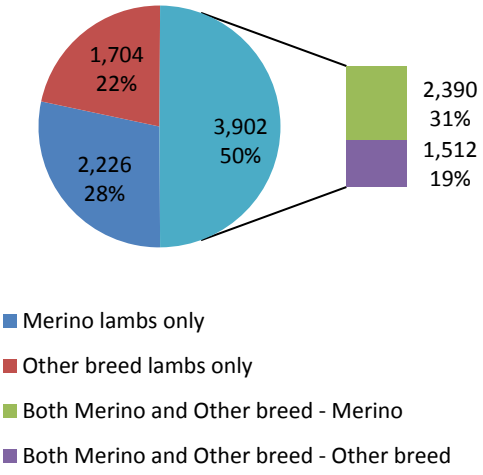
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



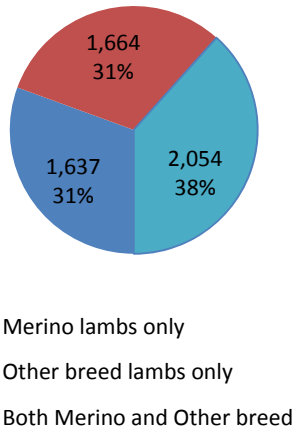
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



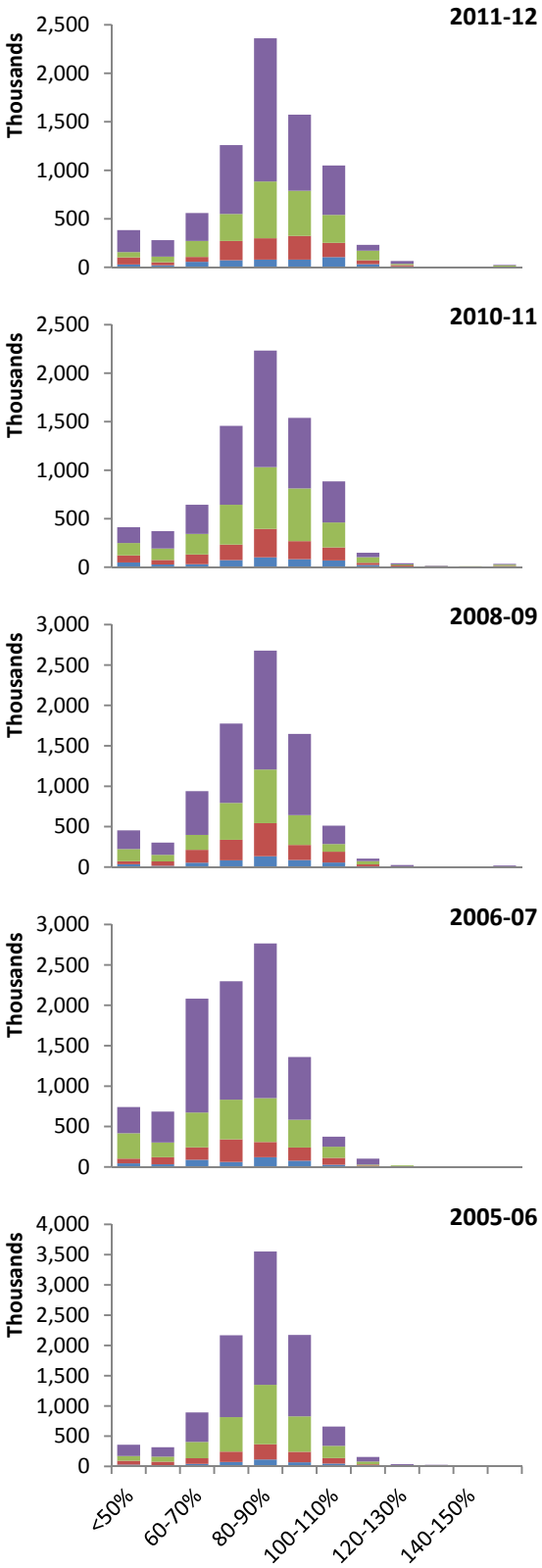
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	2	6	18	49	80	94	100
Businesses with sheep and lambs	27	39	58	83	96	99	100
Breeding ewes	2	6	19	50	81	95	100
Businesses with breeding ewes	24	36	56	82	96	99	100

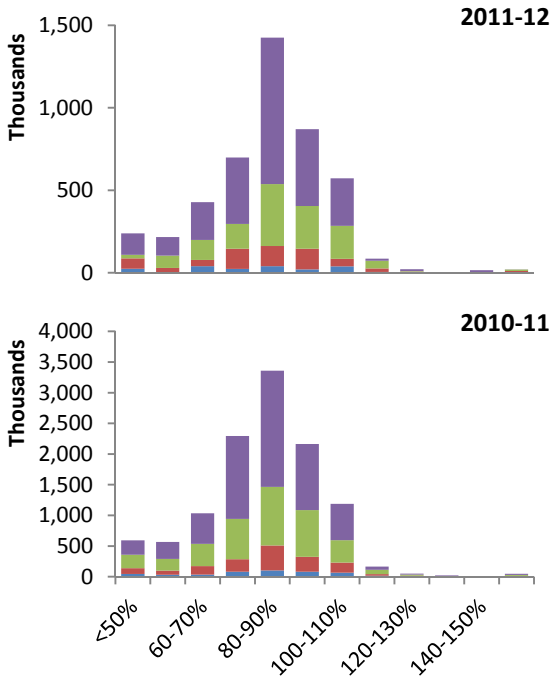
Example interpretation: *In Western Australia, 58% of all flocks have 2000 or less sheep and lambs, and those flocks carry 18% of the sheep and lambs in that region.*

Summary for Western Australia (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	83.6	80.7
1001-2000	84.0	82.1
2001-4000	82.7	86.7
over 4000	82.2	82.5
Total	82.6	83.5

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	81.5	75.6	82.0	84.1	87.5
1001-2000	82.7	76.7	80.9	84.4	85.1
2001-4000	83.5	73.7	79.3	83.9	87.2
over 4000	82.5	76.0	80.4	82.5	83.2
Total	82.8	75.5	80.3	83.3	84.8

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	5	10	18	37	66	85	97	99	99	99	100
Businesses mating ewes	6	11	19	36	61	78	91	94	96	96	97
Merino ewes mated	6	12	21	42	71	89	98	99	99	100	100
Businesses mating Merino ewes	4	9	18	35	60	78	91	94	96	96	97

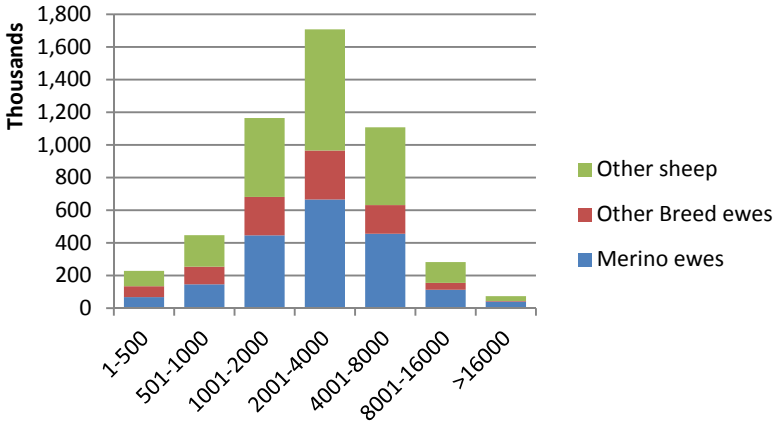
Example interpretation: *In Western Australia, 18% of all ewes mated were mated on the 19% of farms with an average marking rate <70%.*

Summary for NSW-Central West

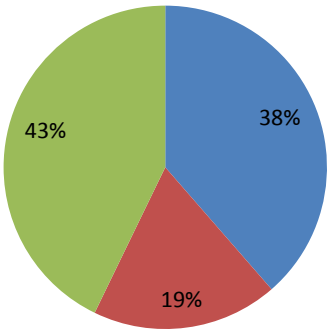
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	5,011
Breeding Ewes - total (thousand)	2,866
Breeding ewes - Merino (thousand)	1,934

Businesses at 30-Jun-2011	Total
with sheep and lambs	3,424
with breeding ewes	3,182
with Merino breeding ewes	2,212

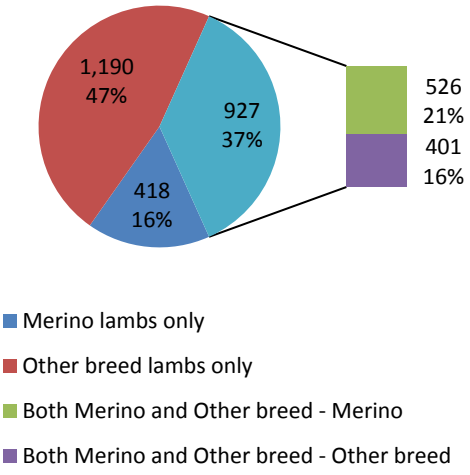
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



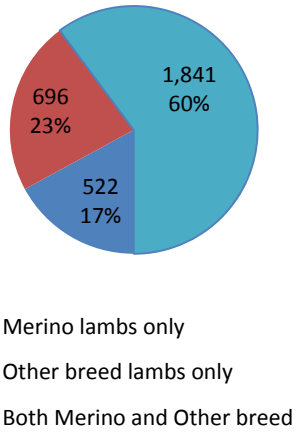
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



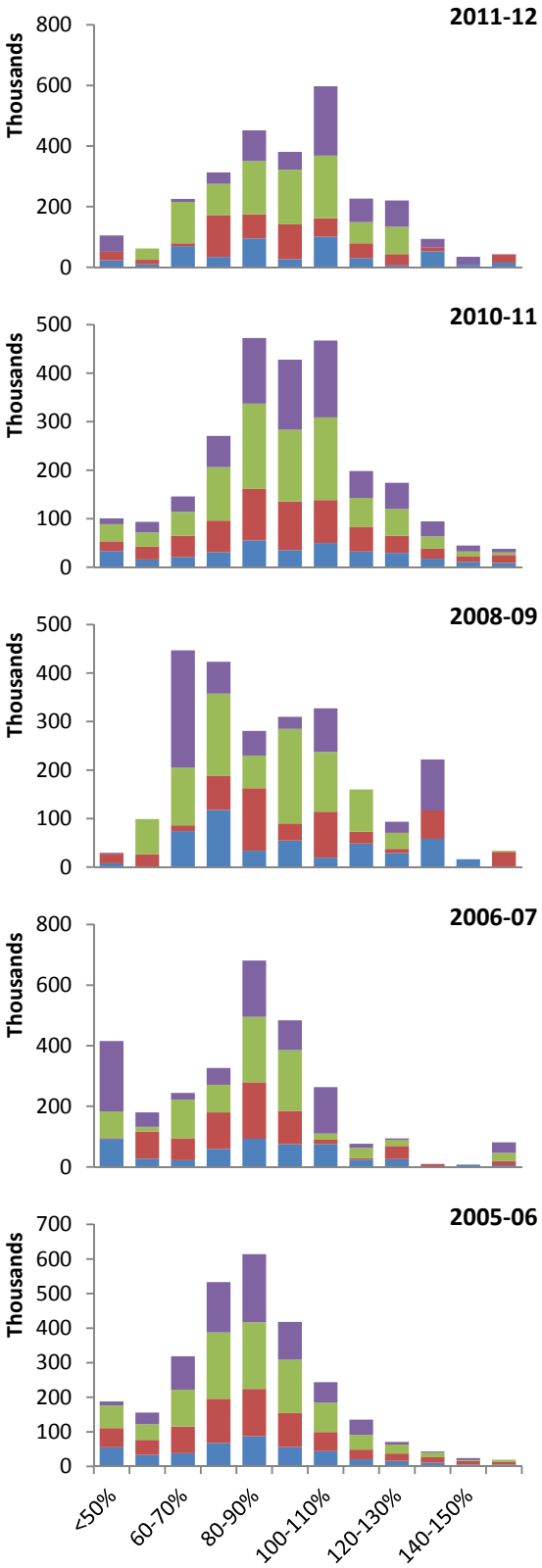
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	5	13	37	71	93	99	100
Businesses with sheep and lambs	34	51	75	93	99	100	100
Breeding ewes	5	14	37	71	93	98	100
Businesses with breeding ewes	31	49	73	92	99	100	100

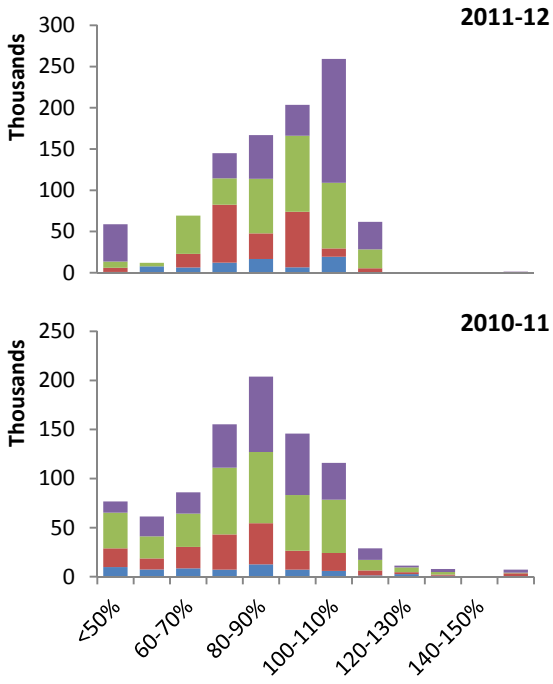
Example interpretation: *In NSW-Central West, 75% of all flocks have 2000 or less sheep and lambs, and those flocks carry 37% of the sheep and lambs in that region.*

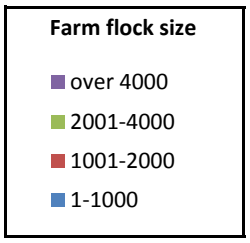
Summary for NSW-Central West (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.





Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	80.0	82.2
1001-2000	79.8	84.9
2001-4000	80.6	88.1
over 4000	85.6	90.0
Total	82.0	87.7

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	80.6	81.7	93.3	94.2	94.4
1001-2000	84.3	83.7	97.5	95.4	92.4
2001-4000	83.0	82.8	87.1	92.0	90.9
over 4000	84.4	70.9	86.3	97.7	100.2
Total	83.3	79.3	90.3	94.7	94.2

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	4	8	13	24	43	60	78	86	93	97	99
Businesses mating ewes	5	10	16	26	43	57	74	82	89	93	95
Merino ewes mated	9	15	25	42	65	81	94	97	98	99	99
Businesses mating Merino ewes	3	8	15	25	42	56	73	81	89	93	95

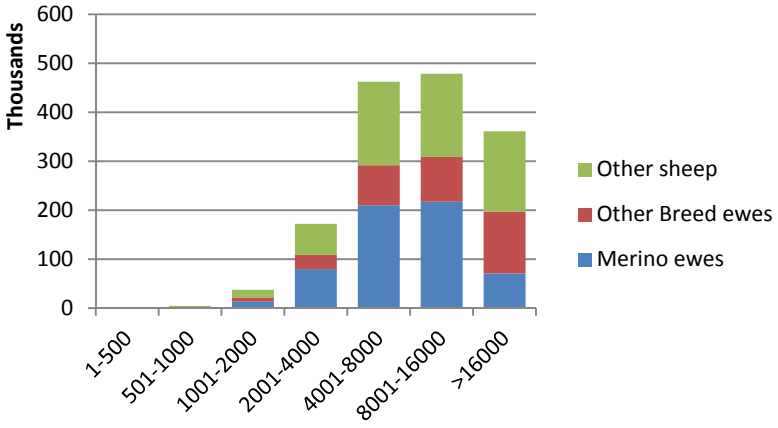
Example interpretation: *In NSW-Central West, 13% of all ewes mated were mated on the 16% of farms with an average marking rate <70%.*

Summary for NSW-Far West

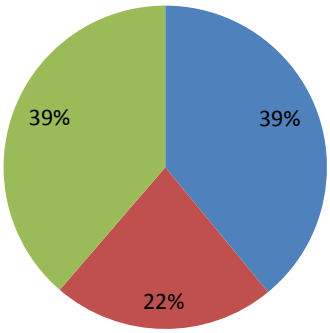
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	1,519
Breeding Ewes - total (thousand)	931
Breeding ewes - Merino (thousand)	593

Businesses at 30-Jun-2011	Total
with sheep and lambs	240
with breeding ewes	232
with Merino breeding ewes	179

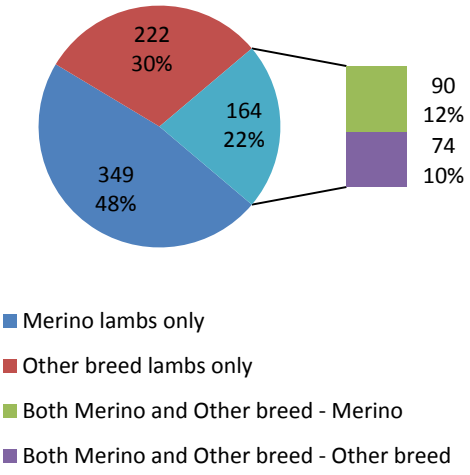
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



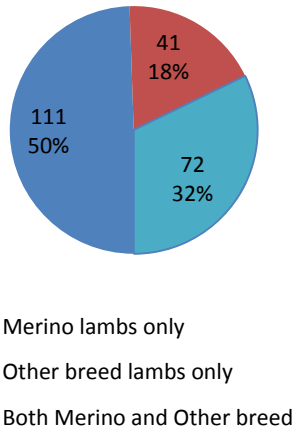
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



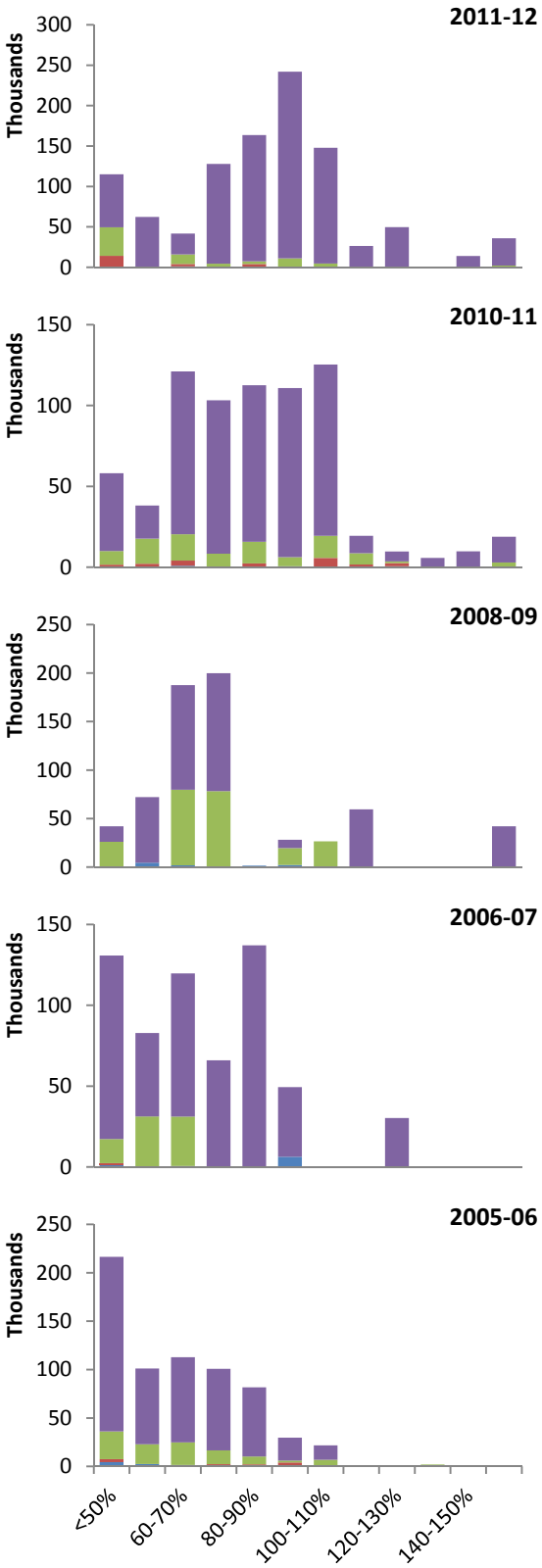
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	0	0	3	14	45	76	100
Businesses with sheep and lambs	7	9	20	43	76	95	100
Breeding ewes	0	0	3	14	46	79	100
Businesses with breeding ewes	5	7	17	42	76	95	100

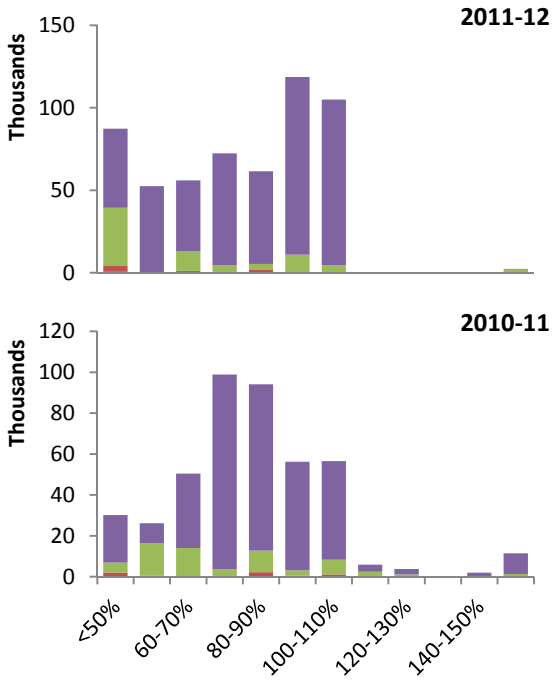
Example interpretation: *In NSW-Far West, 20% of all flocks have 2000 or less sheep and lambs, and those flocks carry 3% of the sheep and lambs in that region.*

Summary for NSW-Far West (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	95.3	60.3
1001-2000	74.7	57.7
2001-4000	72.2	70.1
over 4000	84.4	79.4
Total	82.5	78.0

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	50.5	81.4	70.5	89.0	150.8
1001-2000	74.9	19.2	100.0	86.5	53.2
2001-4000	60.3	57.0	68.9	77.8	70.1
over 4000	58.9	70.9	79.2	86.9	88.8
Total	59.2	69.2	75.5	85.8	86.9

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	8	13	30	44	59	74	91	94	95	96	97
Businesses mating ewes	7	14	26	38	51	67	84	88	91	92	93
Merino ewes mated	7	13	25	47	69	82	95	96	97	97	97
Businesses mating Merino ewes	5	13	25	37	51	67	84	87	91	92	93

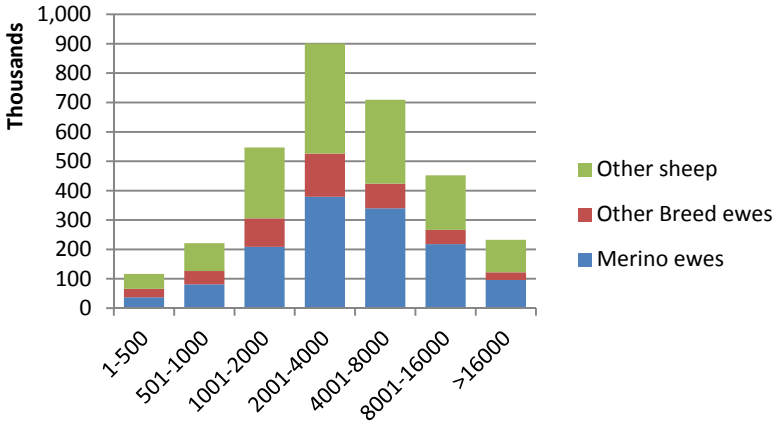
Example interpretation: *In NSW-Far West, 30% of all ewes mated were mated on the 26% of farms with an average marking rate <70%.*

Summary for NSW-Murray

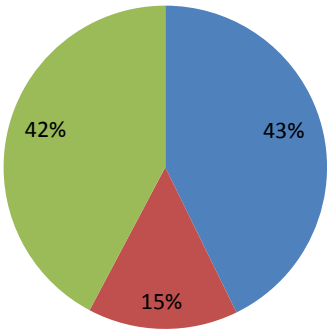
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	3,179
Breeding Ewes - total (thousand)	1,836
Breeding ewes - Merino (thousand)	1,359

Businesses at 30-Jun-2011	Total
with sheep and lambs	1,776
with breeding ewes	1,639
with Merino breeding ewes	1,173

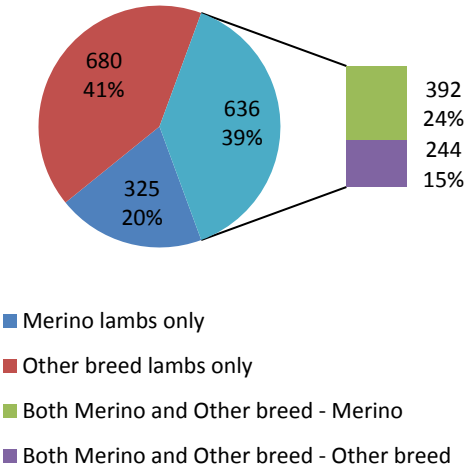
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



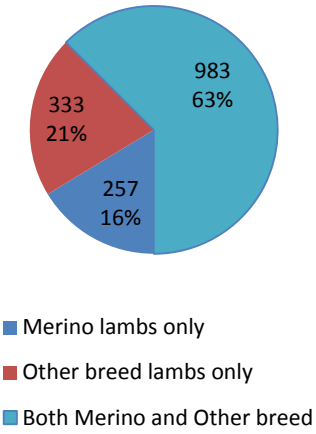
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



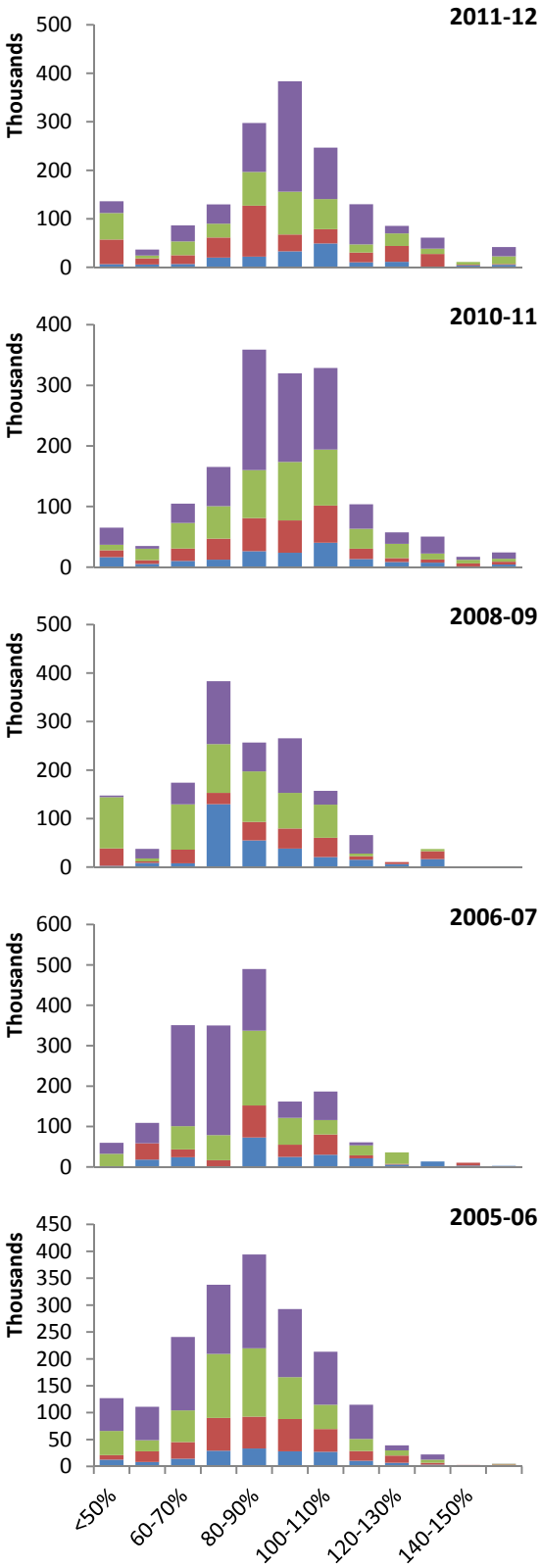
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	4	11	28	56	78	93	100
Businesses with sheep and lambs	34	51	72	90	97	100	100
Breeding ewes	4	10	27	56	79	93	100
Businesses with breeding ewes	30	48	70	89	97	100	100

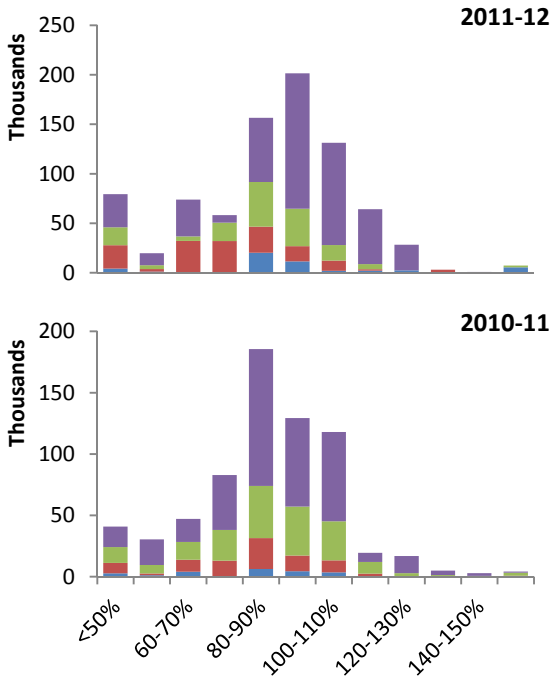
Example interpretation: *In NSW-Murray, 72% of all flocks have 2000 or less sheep and lambs, and those flocks carry 28% of the sheep and lambs in that region.*

Summary for NSW-Murray (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	86.8	98.7
1001-2000	79.1	73.3
2001-4000	87.5	80.8
over 4000	89.0	91.5
Total	87.3	86.7

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	86.0	91.4	86.3	92.7	94.8
1001-2000	88.2	84.9	83.0	92.5	86.8
2001-4000	80.5	85.3	72.4	93.1	91.1
over 4000	81.0	74.8	84.2	93.6	96.5
Total	82.5	81.0	80.1	93.2	92.8

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	4	6	13	23	45	64	85	91	94	97	99
Businesses mating ewes	4	8	14	23	39	55	78	85	91	94	95
Merino ewes mated	6	10	17	29	57	76	93	96	98	99	99
Businesses mating Merino ewes	2	6	12	21	38	54	77	85	90	94	95

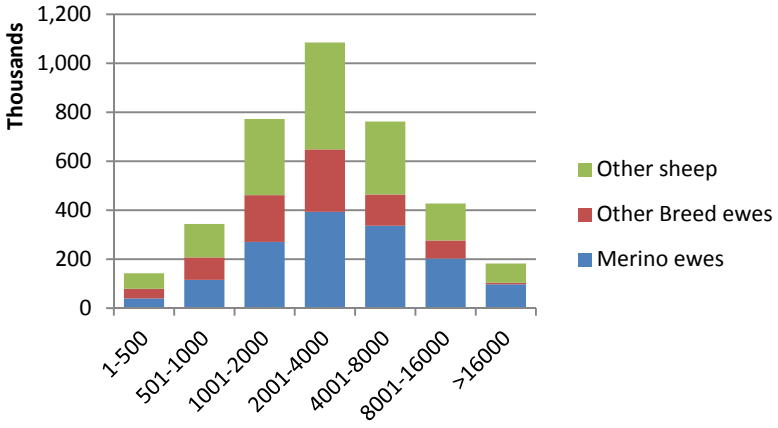
Example interpretation: *In NSW-Murray, 13% of all ewes mated were mated on the 14% of farms with an average marking rate <70%.*

Summary for NSW-Murrumbidgee

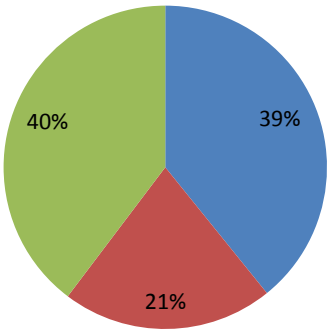
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	3,716
Breeding Ewes - total (thousand)	2,241
Breeding ewes - Merino (thousand)	1,456

Businesses at 30-Jun-2011	Total
with sheep and lambs	2,264
with breeding ewes	2,083
with Merino breeding ewes	1,415

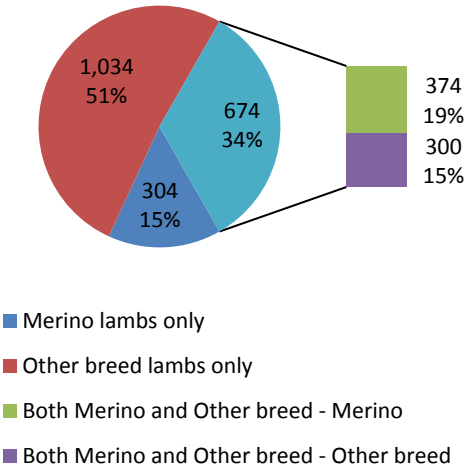
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



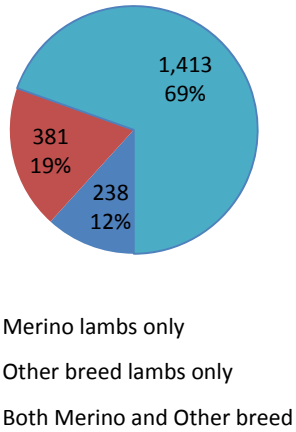
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



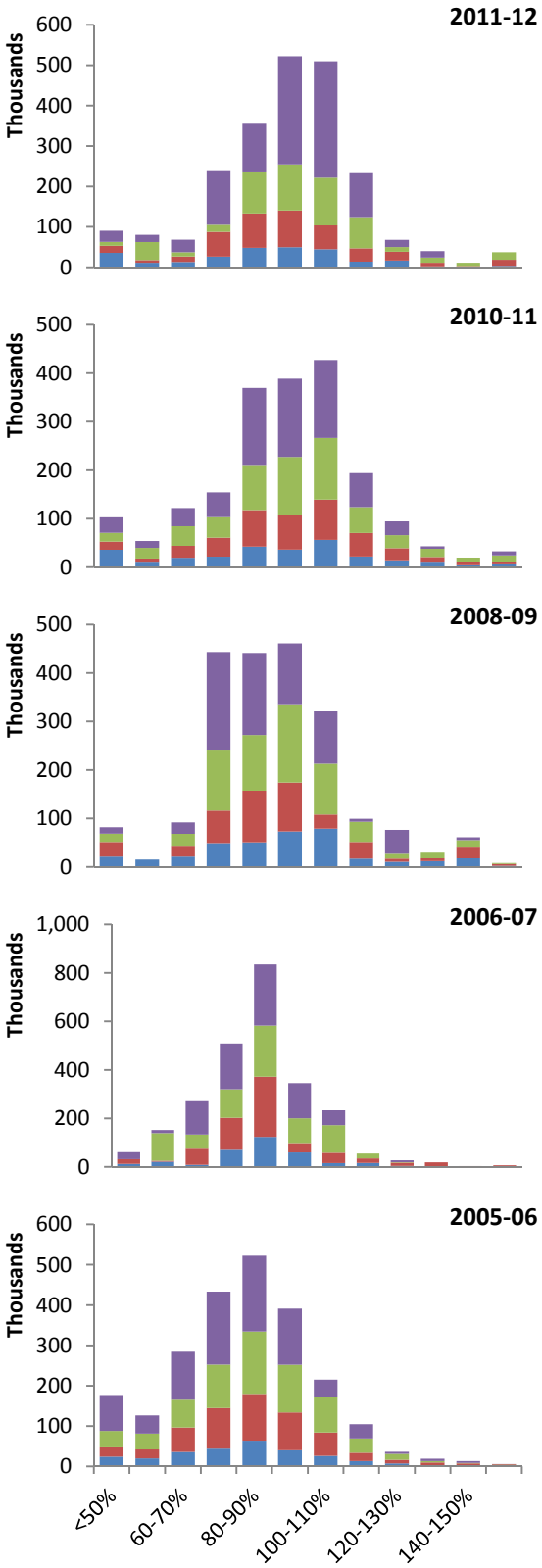
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	4	13	34	63	84	95	100
Businesses with sheep and lambs	31	51	74	92	98	100	100
Breeding ewes	4	13	33	62	83	95	100
Businesses with breeding ewes	27	48	73	91	98	100	100

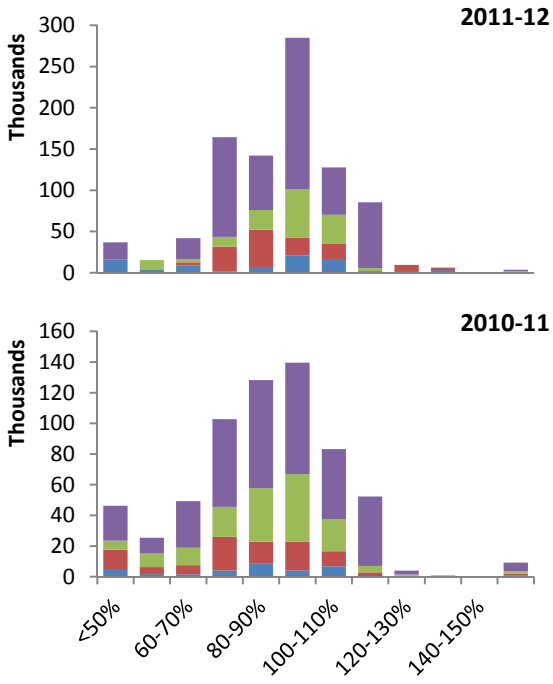
Example interpretation: *In NSW-Murrumbidgee, 74% of all flocks have 2000 or less sheep and lambs, and those flocks carry 34% of the sheep and lambs in that region.*

Summary for NSW-Murrumbidgee (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	83.0	75.2
1001-2000	78.4	90.0
2001-4000	87.0	90.6
over 4000	89.1	88.7
Total	86.7	88.1

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	81.6	82.1	91.7	88.3	86.1
1001-2000	84.4	85.7	91.0	95.4	96.0
2001-4000	83.4	81.7	91.1	95.7	96.5
over 4000	78.0	80.5	88.3	92.7	92.8
Total	81.4	82.3	90.3	93.5	93.5

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	5	8	14	22	40	60	81	91	95	97	98
Businesses mating ewes	4	8	14	22	39	55	77	85	91	94	96
Merino ewes mated	7	11	19	35	55	77	90	98	98	99	99
Businesses mating Merino ewes	2	6	12	21	37	54	76	85	91	94	96

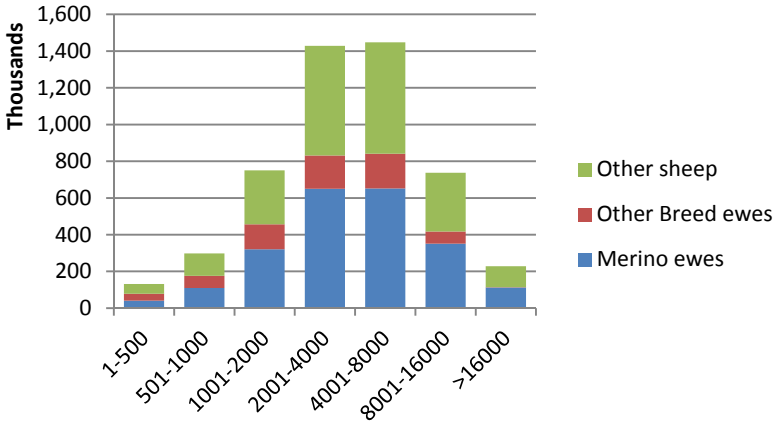
Example interpretation: *In NSW-Murrumbidgee, 14% of all ewes mated were mated on the 14% of farms with an average marking rate <70%.*

Summary for NSW-North Western

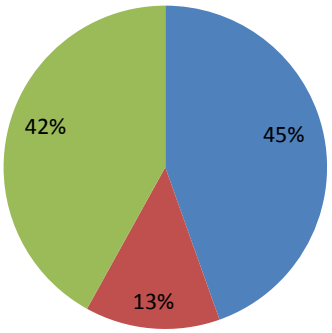
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	5,021
Breeding Ewes - total (thousand)	2,915
Breeding ewes - Merino (thousand)	2,237

Businesses at 30-Jun-2011	Total
with sheep and lambs	2,467
with breeding ewes	2,321
with Merino breeding ewes	1,712

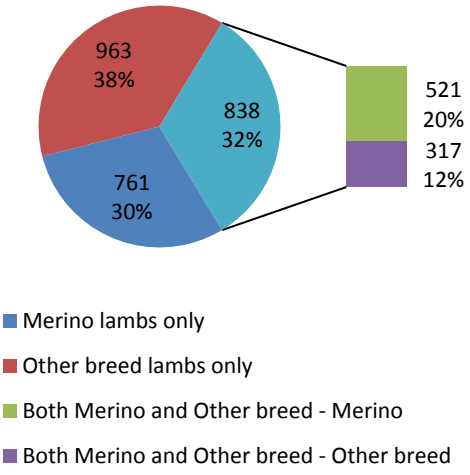
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



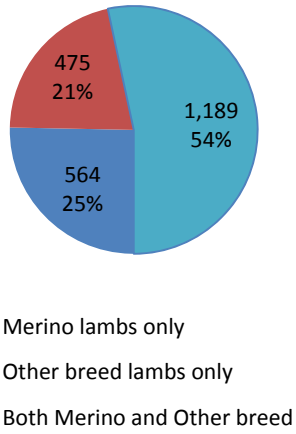
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



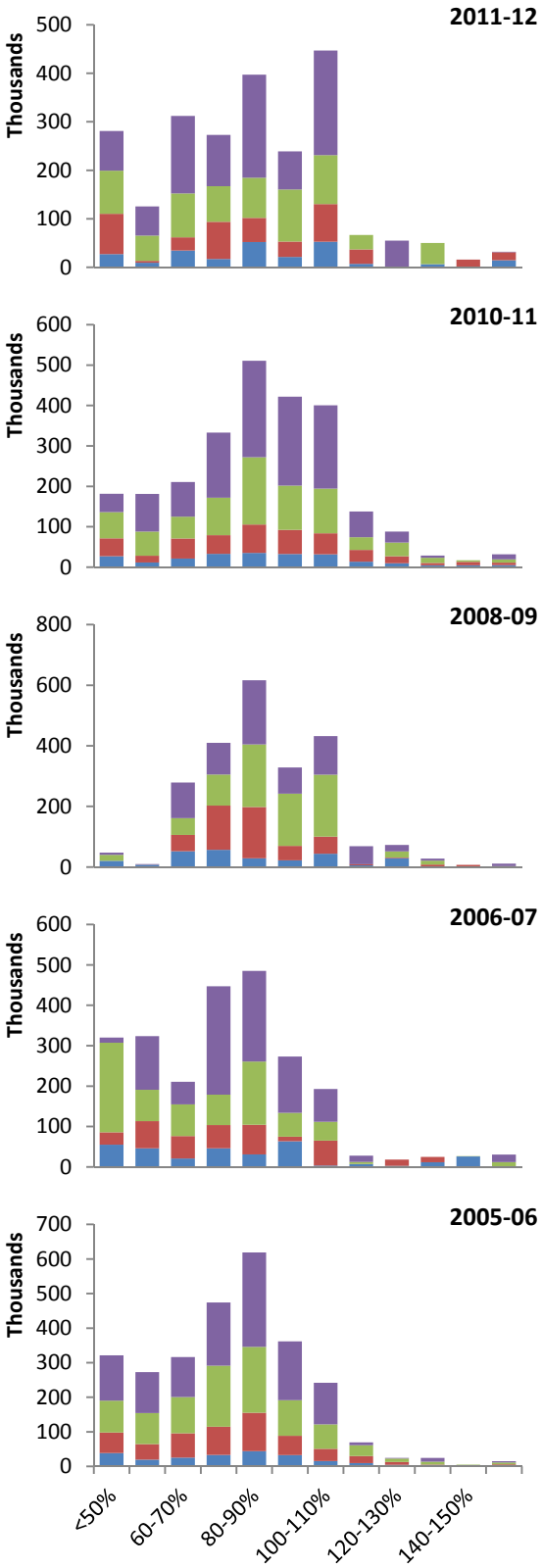
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	3	9	23	52	81	95	100
Businesses with sheep and lambs	29	44	66	86	97	100	100
Breeding ewes	3	9	24	53	82	96	100
Businesses with breeding ewes	26	42	64	85	97	100	100

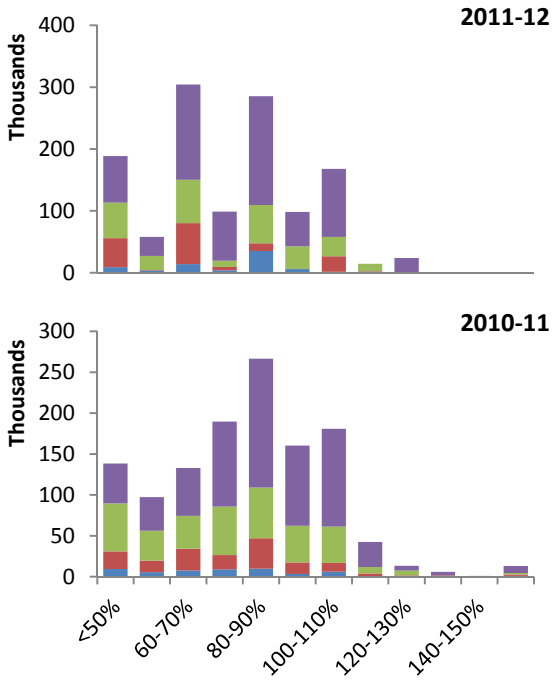
Example interpretation: *In NSW-North Western, 66% of all flocks have 2000 or less sheep and lambs, and those flocks carry 23% of the sheep and lambs in that region.*

Summary for NSW-North Western (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	75.3	79.9
1001-2000	76.2	70.1
2001-4000	75.8	70.6
over 4000	86.5	77.5
Total	81.6	75.0

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	76.3	77.6	82.9	86.0	88.5
1001-2000	77.2	77.1	84.2	86.3	85.2
2001-4000	78.0	67.5	89.6	85.6	80.9
over 4000	76.7	81.4	92.0	88.1	81.6
Total	77.2	75.9	88.5	86.9	82.8

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	7	14	23	36	56	72	88	93	97	98	99
Businesses mating ewes	9	15	24	36	54	67	83	88	92	94	96
Merino ewes mated	11	19	30	45	66	79	94	97	98	99	99
Businesses mating Merino ewes	6	12	21	34	52	66	82	88	92	94	96

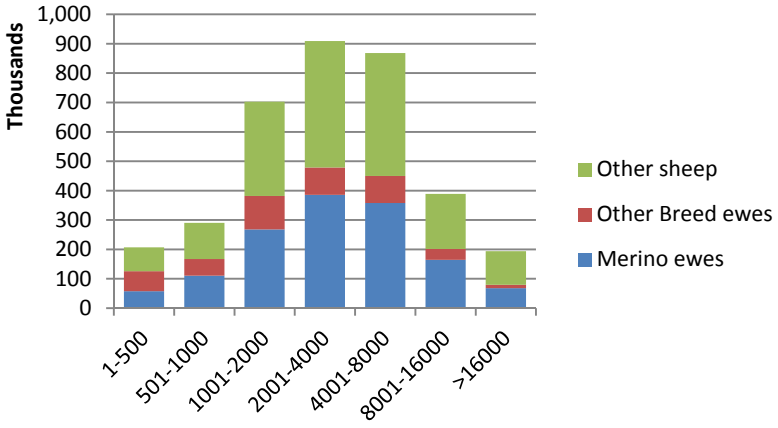
Example interpretation: *In NSW-North Western, 23% of all ewes mated were mated on the 24% of farms with an average marking rate <70%.*

Summary for NSW-Northern (including Hunter)

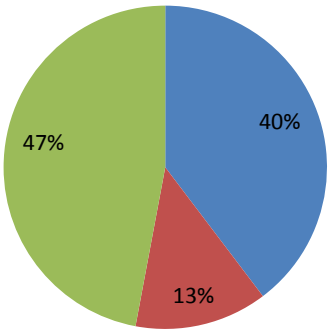
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	3,560
Breeding Ewes - total (thousand)	1,885
Breeding ewes - Merino (thousand)	1,413

Businesses at 30-Jun-2011	Total
with sheep and lambs	2,816
with breeding ewes	2,569
with Merino breeding ewes	1,736

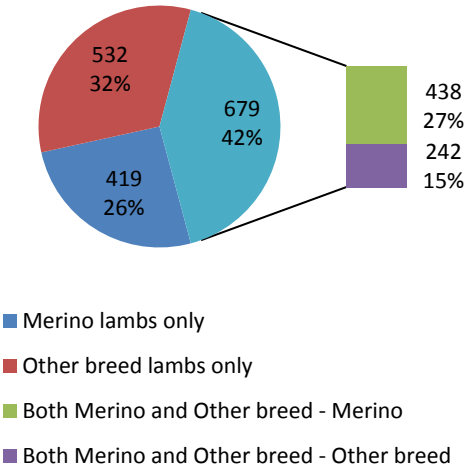
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



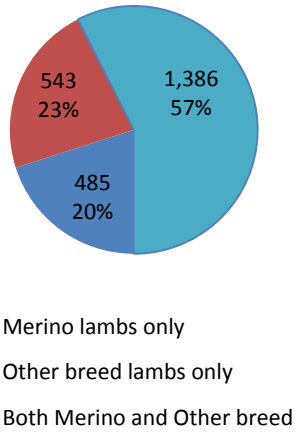
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



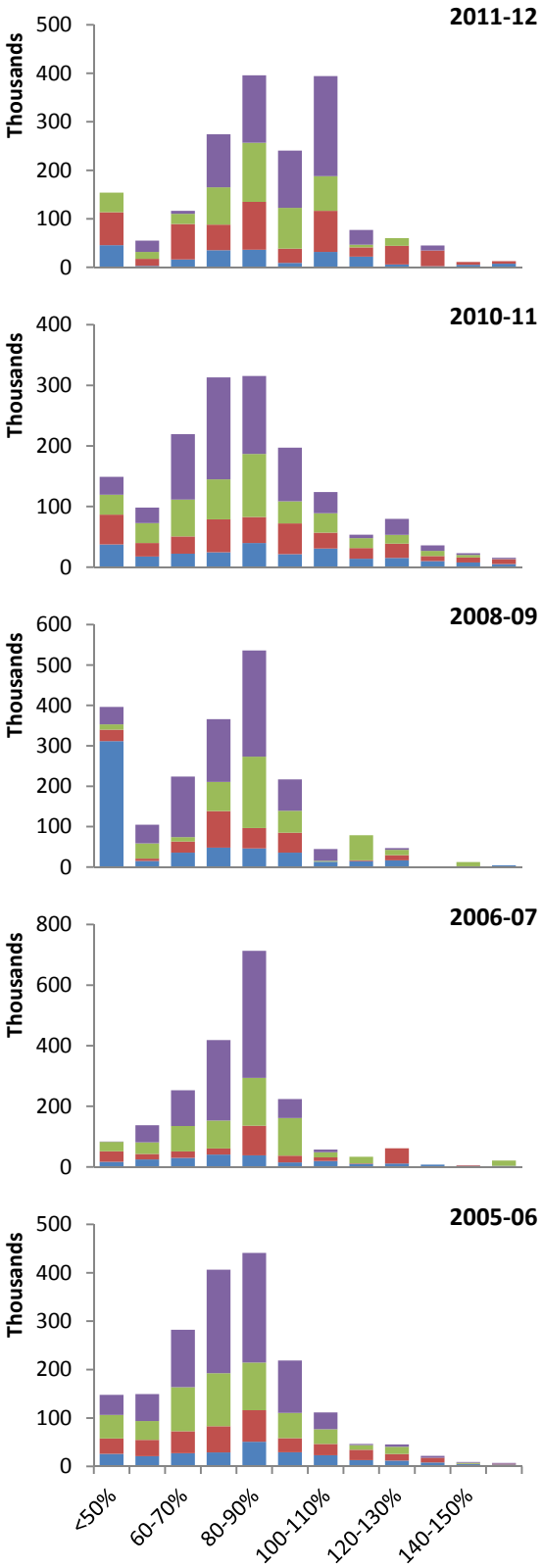
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	6	14	34	59	84	95	100
Businesses with sheep and lambs	50	64	81	93	98	100	100
Breeding ewes	7	16	36	61	85	96	100
Businesses with breeding ewes	48	62	80	92	98	100	100

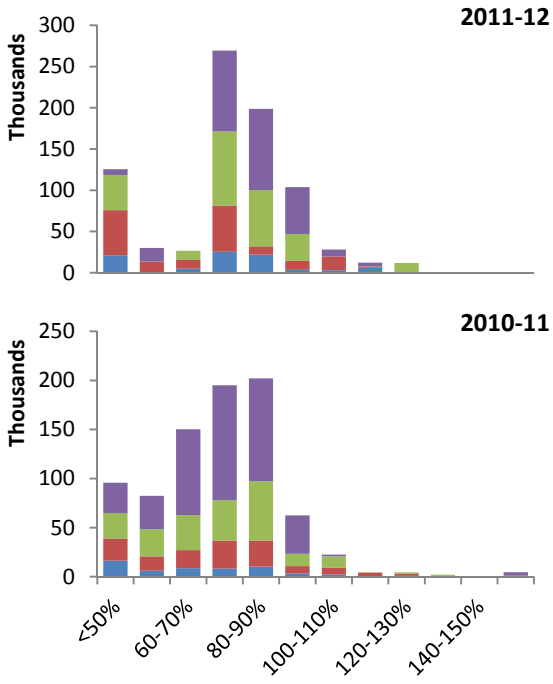
Example interpretation: *In NSW-Northern (including Hunter), 81% of all flocks have 2000 or less sheep and lambs, and those flocks carry 34% of the sheep and lambs in that region.*

Summary for NSW-Northern (including Hunter) (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	65.2	72.8
1001-2000	74.4	59.2
2001-4000	71.8	77.5
over 4000	73.7	80.7
Total	72.7	74.2

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	83.5	81.9	43.5	85.3	82.8
1001-2000	80.8	82.4	76.2	84.8	82.7
2001-4000	75.5	81.5	87.7	80.8	85.8
over 4000	77.4	78.9	76.4	82.0	90.9
Total	78.3	80.4	70.1	82.8	86.3

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	9	15	29	48	67	80	87	91	95	98	99
Businesses mating ewes	11	19	29	42	58	67	79	83	89	92	95
Merino ewes mated	12	22	40	63	88	95	98	99	99	99	99
Businesses mating Merino ewes	6	14	25	38	55	65	78	82	88	92	94

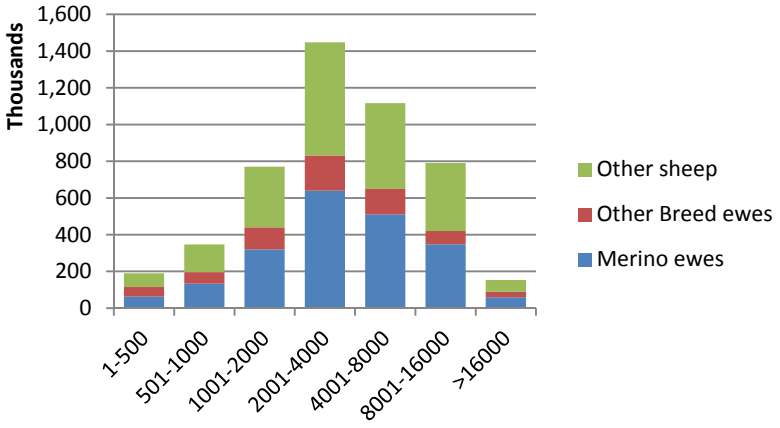
Example interpretation: *In NSW-Northern (including Hunter), 29% of all ewes mated were mated on the 29% of farms with an average marking rate <70%.*

Summary for NSW-South Eastern (including ACT)

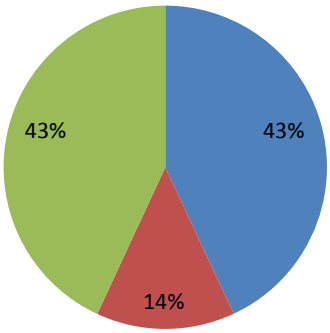
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	4,815
Breeding Ewes - total (thousand)	2,741
Breeding ewes - Merino (thousand)	2,072

Businesses at 30-Jun-2011	Total
with sheep and lambs	2,800
with breeding ewes	2,611
with Merino breeding ewes	2,049

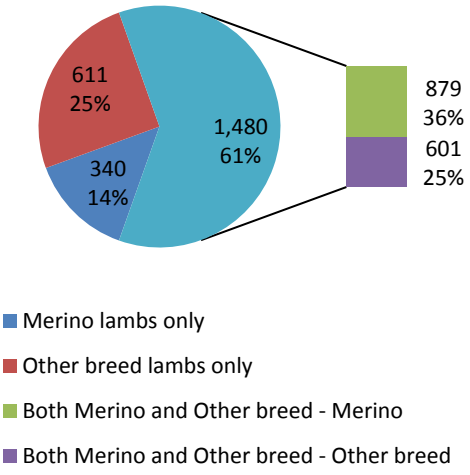
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



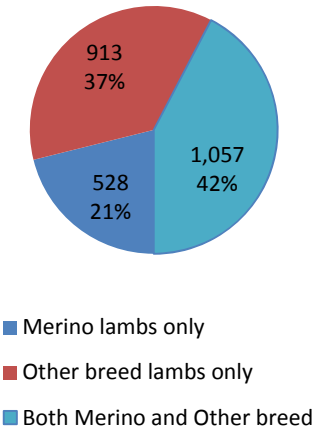
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



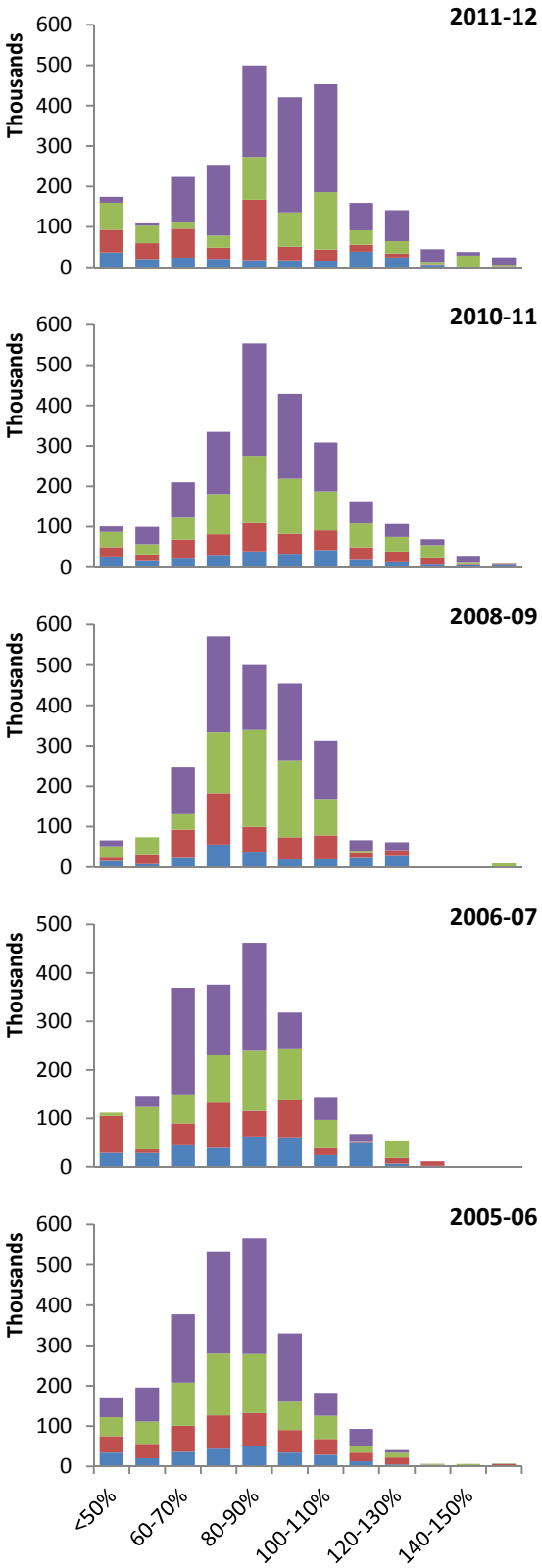
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	4	11	27	57	80	97	100
Businesses with sheep and lambs	36	53	72	90	97	100	100
Breeding ewes	4	11	27	58	81	97	100
Businesses with breeding ewes	33	50	70	89	97	100	100

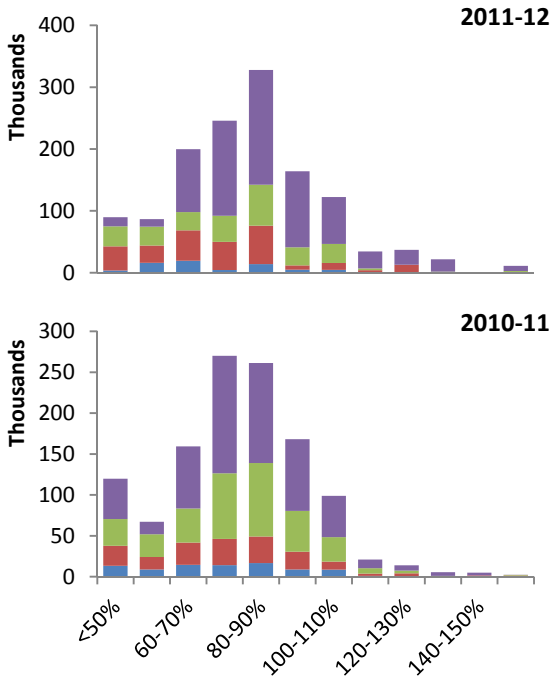
Example interpretation: *In NSW-South Eastern (including ACT), 72% of all flocks have 2000 or less sheep and lambs, and those flocks carry 27% of the sheep and lambs in that region.*

Summary for NSW-South Eastern (including ACT) (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	74.5	77.9
1001-2000	73.6	72.0
2001-4000	76.8	76.6
over 4000	80.9	86.8
Total	78.1	81.5

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	80.2	81.1	86.8	89.5	88.0
1001-2000	79.9	73.6	82.0	90.7	76.7
2001-4000	78.9	81.7	91.7	89.4	90.7
over 4000	79.4	77.9	86.6	90.2	93.5
Total	79.4	78.7	87.5	89.9	89.5

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	4	8	17	31	54	72	84	91	96	98	100
Businesses mating ewes	5	10	20	33	52	66	79	86	91	94	96
Merino ewes mated	10	16	29	52	74	88	96	98	99	99	100
Businesses mating Merino ewes	5	10	20	33	52	66	79	86	91	94	96

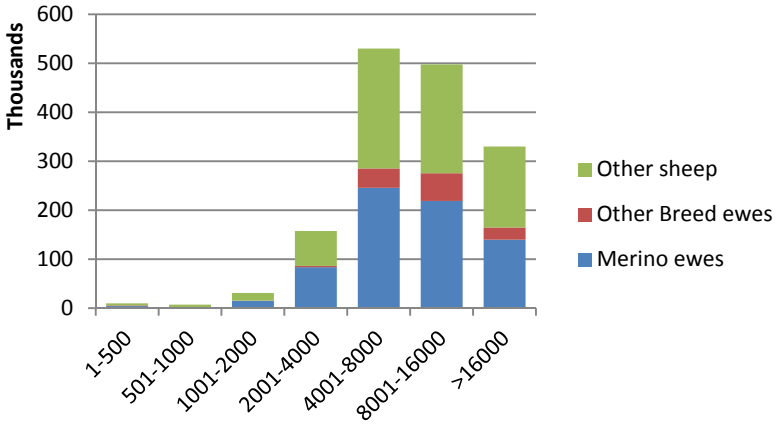
Example interpretation: *In NSW-South Eastern (including ACT), 17% of all ewes mated were mated on the 20% of farms with an average marking rate <70%.*

Summary for QLD-Central West (including North Western)

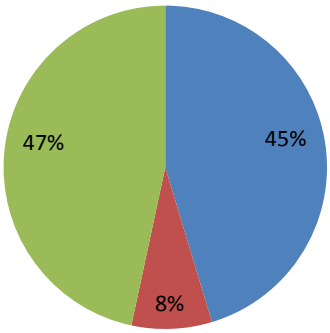
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	1,564
Breeding Ewes - total (thousand)	835
Breeding ewes - Merino (thousand)	709

Businesses at 30-Jun-2011	Total
with sheep and lambs	299
with breeding ewes	272
with Merino breeding ewes	242

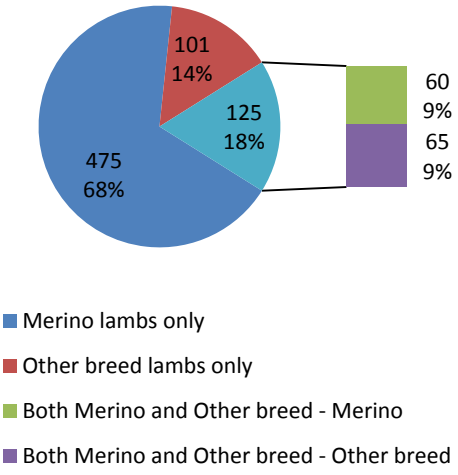
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



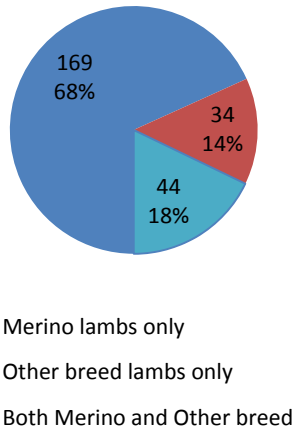
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



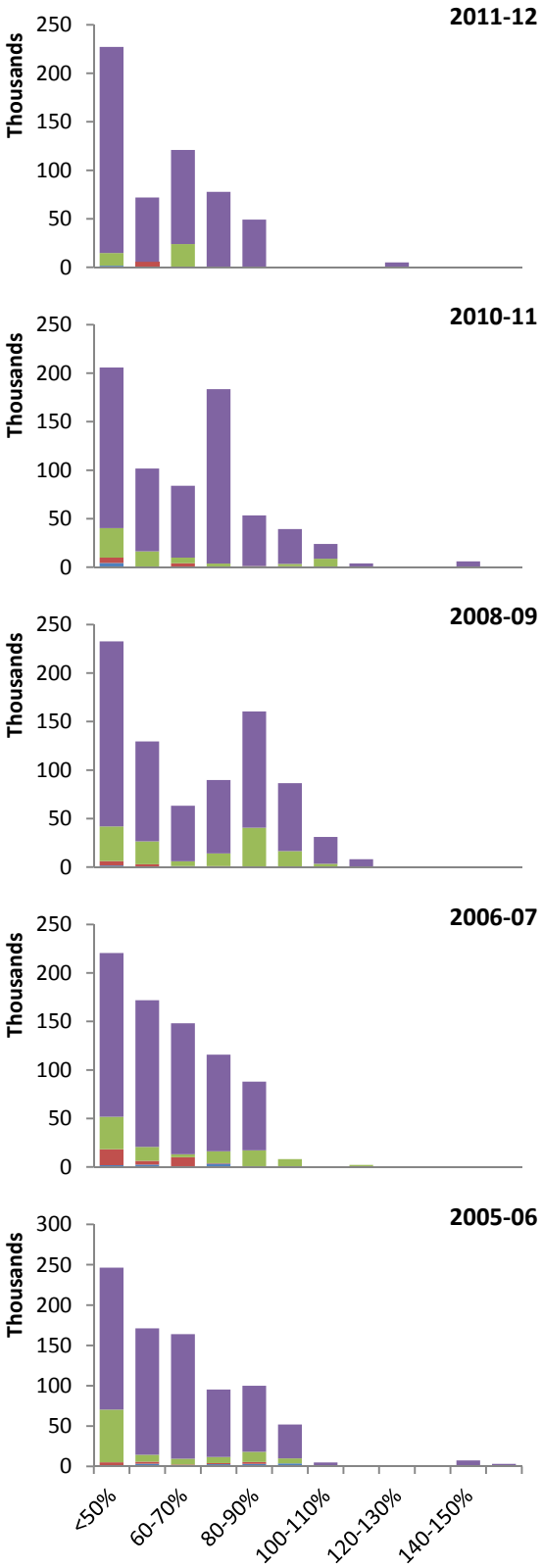
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	1	1	3	13	47	79	100
Businesses with sheep and lambs	23	26	32	50	80	95	100
Breeding ewes	1	1	3	13	47	80	100
Businesses with breeding ewes	21	23	29	47	78	95	100

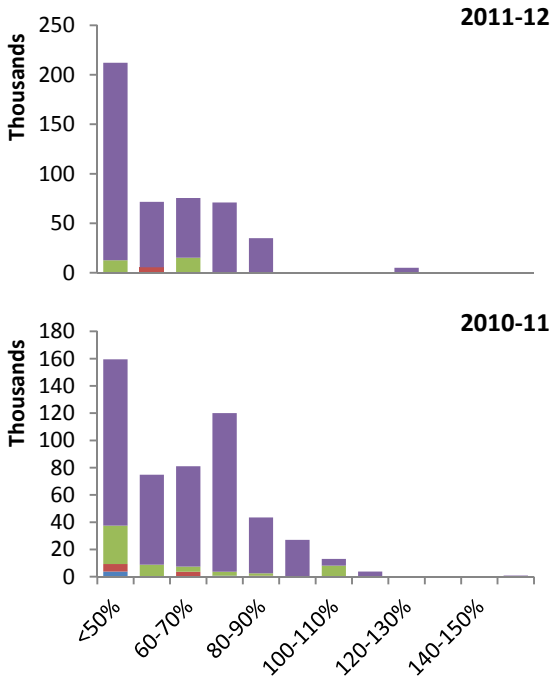
Example interpretation: *In QLD-Central West (including North Western), 32% of all flocks have 2000 or less sheep and lambs, and those flocks carry 3% of the sheep and lambs in that region.*

Summary for QLD-Central West (including North Western) (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	45.6	##
1001-2000	51.6	56.9
2001-4000	52.3	52.2
over 4000	63.2	56.0
Total	61.6	55.7

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	71.5	57.4	48.2	48.8	39.7
1001-2000	91.4	46.6	49.6	51.6	56.9
2001-4000	44.0	62.9	64.7	52.6	55.6
over 4000	64.0	59.1	64.8	63.5	57.2
Total	62.0	59.0	64.6	62.2	57.0

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	29	44	56	82	90	95	99	99	99	99	100
Businesses mating ewes	32	48	61	75	84	90	97	98	98	98	98
Merino ewes mated	30	45	60	83	91	97	99	100	100	100	100
Businesses mating Merino ewes	28	45	58	74	83	90	96	98	98	98	98

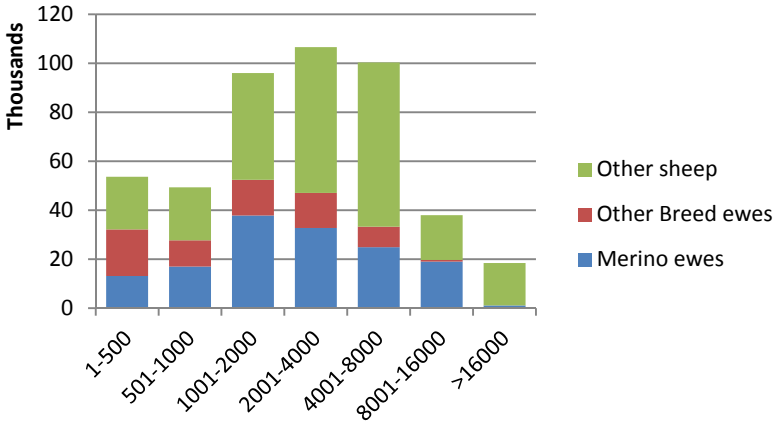
Example interpretation: *In QLD-Central West (including North Western), 56% of all ewes mated were mated on the 61% of farms with an average marking rate <70%.*

Summary for QLD-Darling Downs

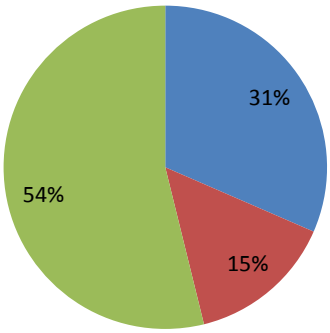
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	462
Breeding Ewes - total (thousand)	213
Breeding ewes - Merino (thousand)	146

Businesses at 30-Jun-2011	Total
with sheep and lambs	691
with breeding ewes	614
with Merino breeding ewes	353

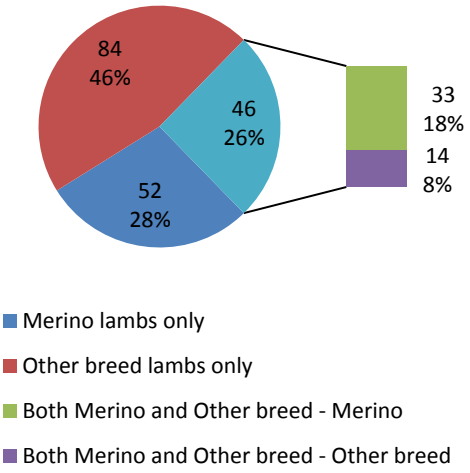
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



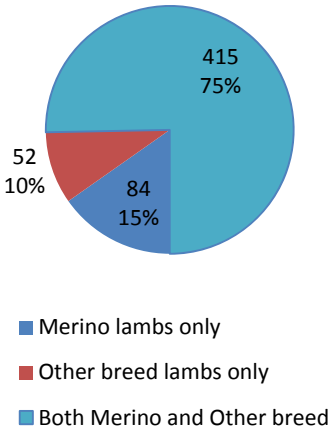
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



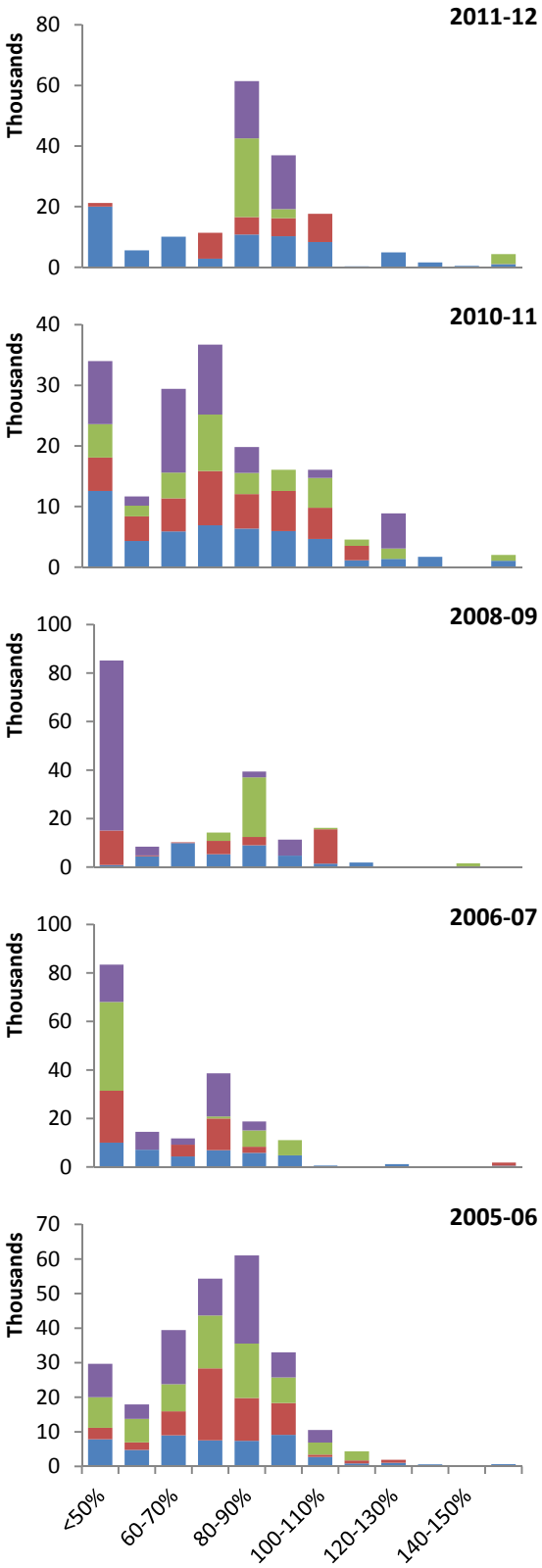
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	12	22	43	66	88	96	100
Businesses with sheep and lambs	72	82	91	97	99	100	100
Breeding ewes	15	28	53	75	90	99	100
Businesses with breeding ewes	71	82	92	97	99	100	100

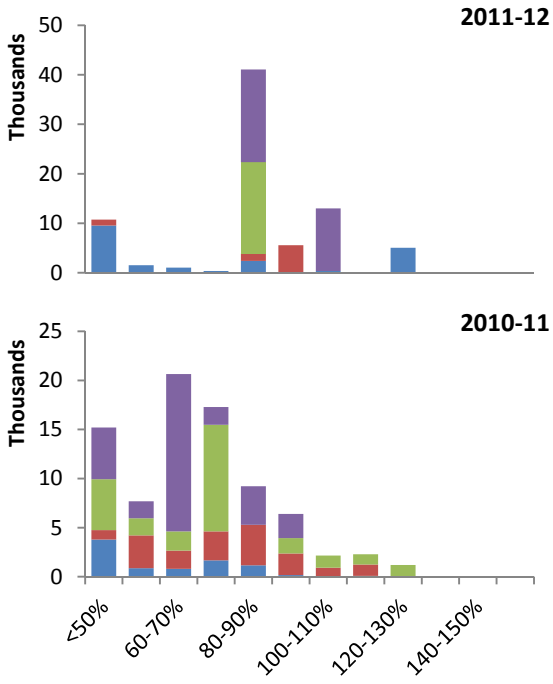
Example interpretation: *In QLD-Darling Downs, 91% of all flocks have 2000 or less sheep and lambs, and those flocks carry 43% of the sheep and lambs in that region.*

Summary for QLD-Darling Downs (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	59.7	62.5
1001-2000	75.7	76.3
2001-4000	68.9	81.9
over 4000	66.8	96.3
Total	68.6	82.1

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	75.3	64.8	77.0	74.5	73.3
1001-2000	77.5	60.0	61.7	76.7	92.2
2001-4000	73.7	55.0	87.7	78.7	91.6
over 4000	73.4	60.2	52.2	70.6	92.5
Total	74.8	59.7	64.7	74.8	84.0

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	19	25	41	62	73	82	90	93	98	99	99
Businesses mating ewes	17	25	36	48	58	66	80	84	87	90	91
Merino ewes mated	19	28	53	74	85	93	96	99	100	100	100
Businesses mating Merino ewes	5	14	27	40	53	62	77	82	85	88	89

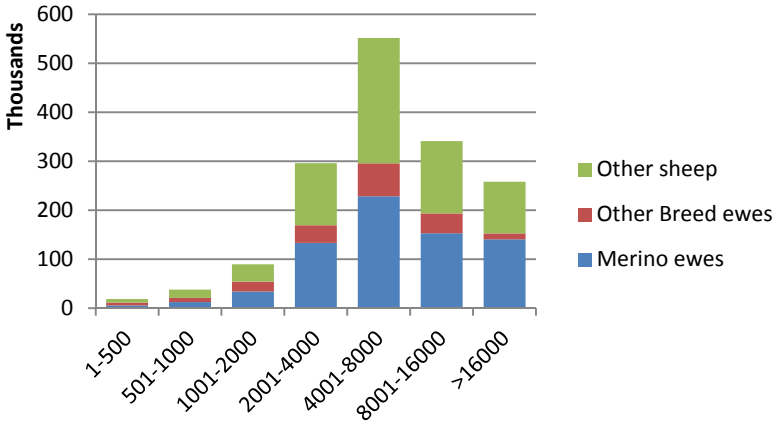
Example interpretation: *In QLD-Darling Downs, 41% of all ewes mated were mated on the 36% of farms with an average marking rate <70%.*

Summary for QLD-South West

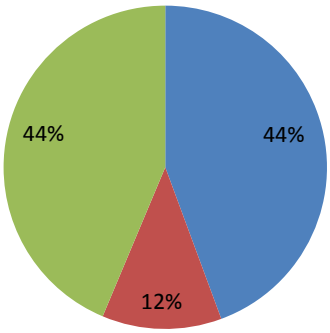
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	1,593
Breeding Ewes - total (thousand)	897
Breeding ewes - Merino (thousand)	707

Businesses at 30-Jun-2011	Total
with sheep and lambs	487
with breeding ewes	457
with Merino breeding ewes	340

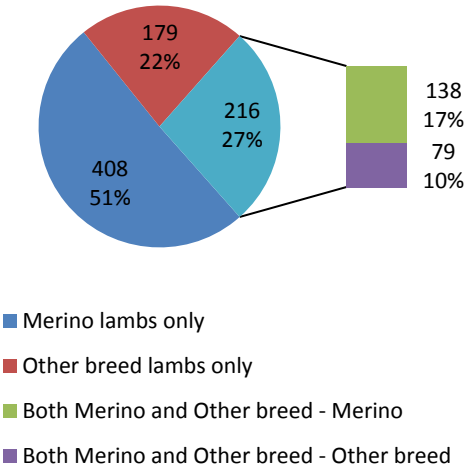
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



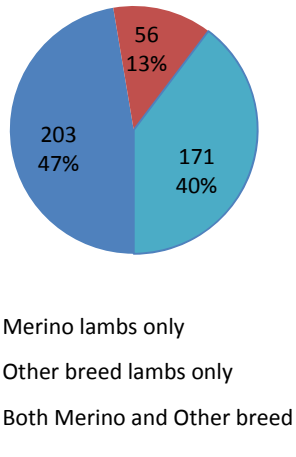
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



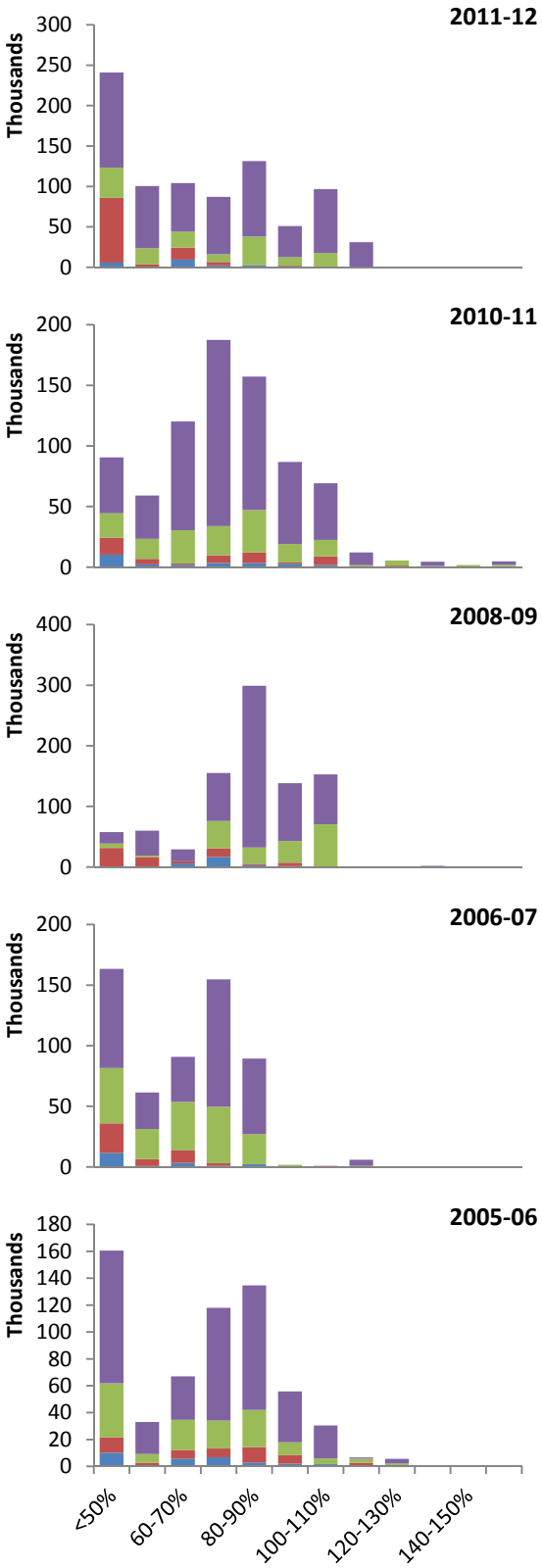
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	1	4	9	28	62	84	100
Businesses with sheep and lambs	28	38	51	72	92	99	100
Breeding ewes	1	4	10	28	61	83	100
Businesses with breeding ewes	27	37	50	71	92	99	100

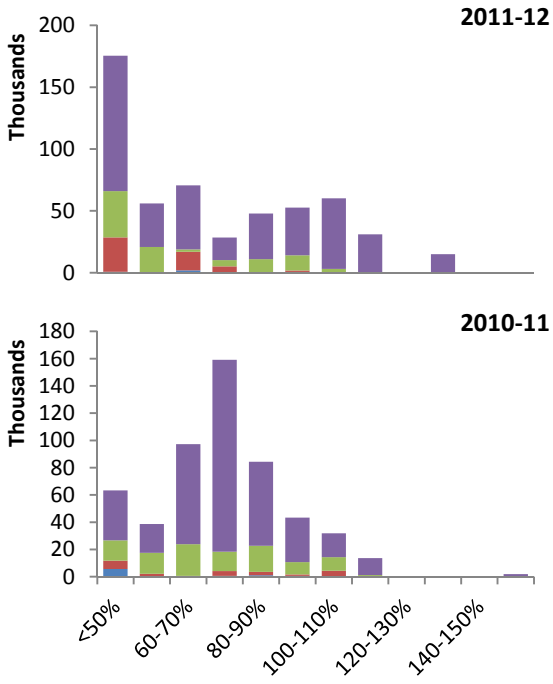
Example interpretation: *In QLD-South West, 51% of all flocks have 2000 or less sheep and lambs, and those flocks carry 9% of the sheep and lambs in that region.*

Summary for QLD-South West (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	65.1	62.4
1001-2000	70.4	41.5
2001-4000	71.1	55.7
over 4000	75.3	74.6
Total	74.1	68.3

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	66.0	45.8	72.1	65.5	63.1
1001-2000	69.7	49.9	54.5	71.8	36.0
2001-4000	62.9	62.6	89.3	75.1	66.4
over 4000	68.2	64.1	83.0	77.8	72.7
Total	67.0	61.9	81.6	76.5	66.8

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	11	19	34	57	77	88	96	98	99	99	99
Businesses mating ewes	18	26	39	55	71	82	91	92	94	95	95
Merino ewes mated	12	19	37	67	83	91	97	100	100	100	100
Businesses mating Merino ewes	12	20	34	52	69	81	90	92	93	94	95

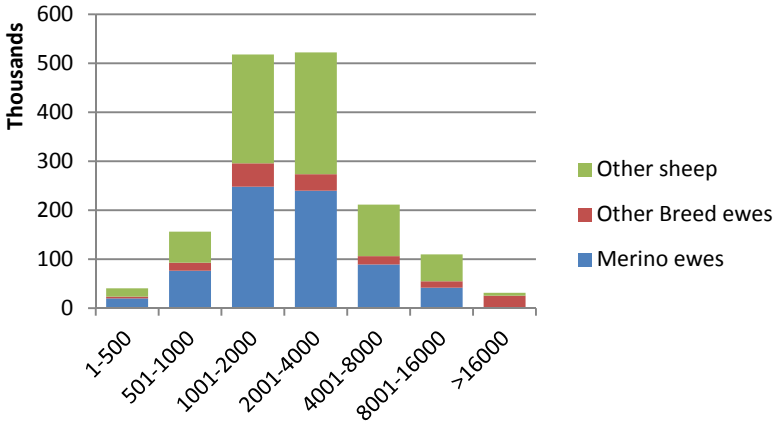
Example interpretation: *In QLD-South West, 34% of all ewes mated were mated on the 39% of farms with an average marking rate <70%.*

Summary for SA-Eyre

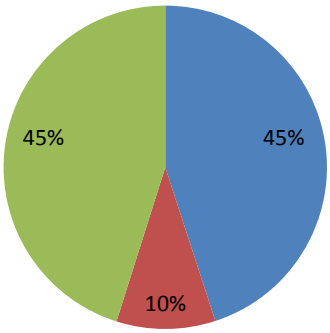
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	1,590
Breeding Ewes - total (thousand)	872
Breeding ewes - Merino (thousand)	715

Businesses at 30-Jun-2011	Total
with sheep and lambs	985
with breeding ewes	951
with Merino breeding ewes	840

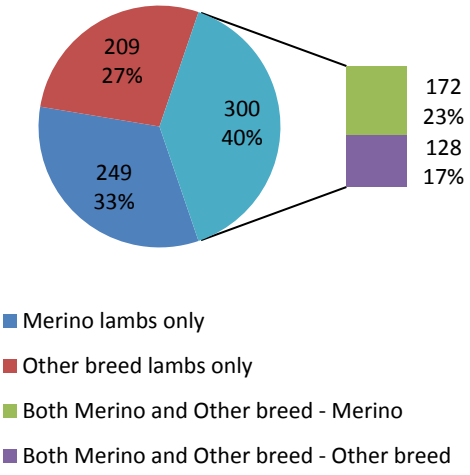
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



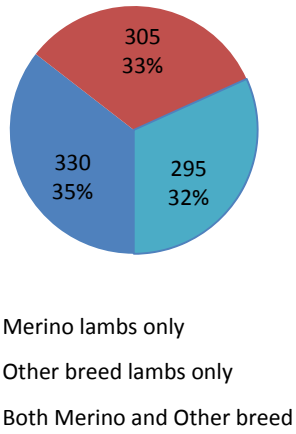
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



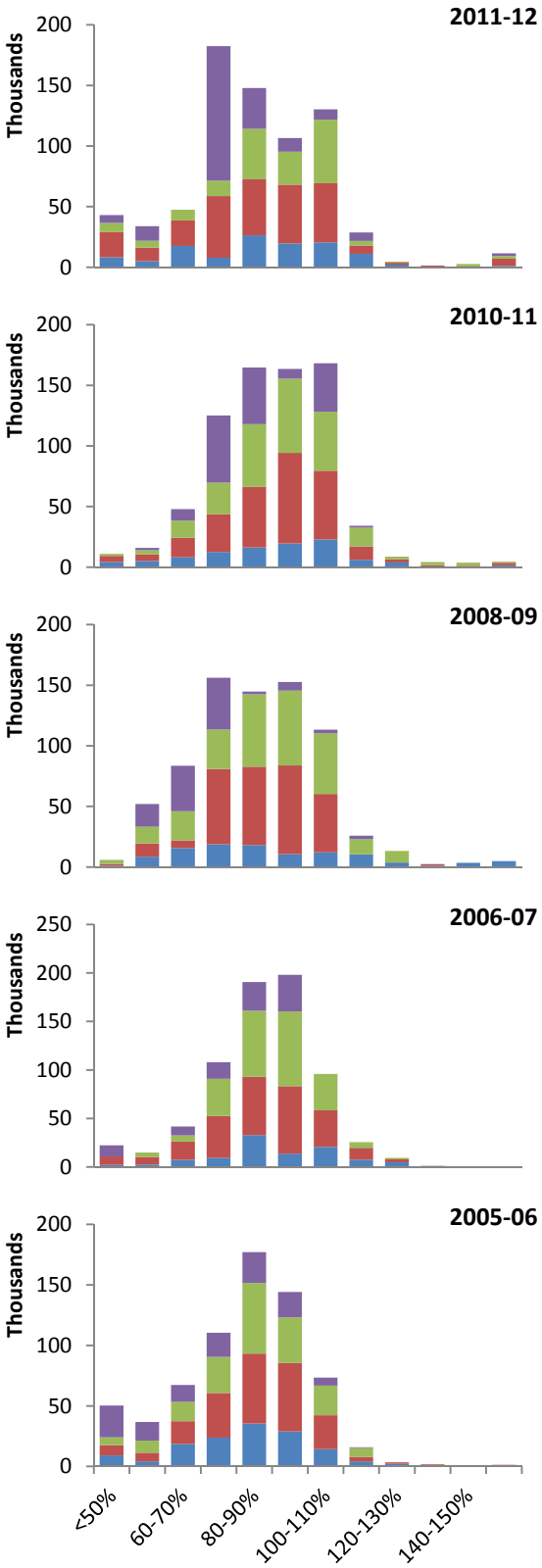
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	3	12	45	78	91	98	100
Businesses with sheep and lambs	18	39	75	95	99	100	100
Breeding ewes	3	13	47	79	91	97	100
Businesses with breeding ewes	16	37	74	95	99	100	100

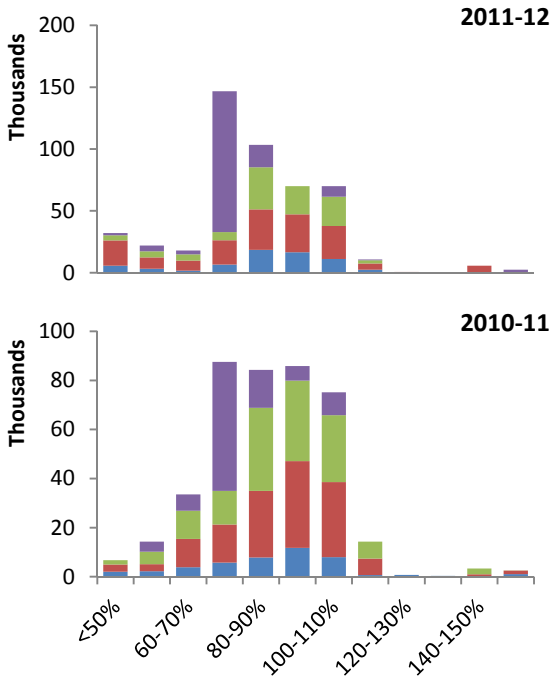
Example interpretation: *In SA-Eyre, 75% of all flocks have 2000 or less sheep and lambs, and those flocks carry 45% of the sheep and lambs in that region.*

Summary for SA-Eyre (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	90.5	90.1
1001-2000	91.1	81.4
2001-4000	89.9	89.4
over 4000	78.8	76.4
Total	87.8	82.7

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	82.1	90.3	90.3	91.6	89.0
1001-2000	84.7	86.0	86.5	91.7	84.6
2001-4000	83.7	88.5	87.6	92.8	90.7
over 4000	69.3	78.8	72.3	84.5	78.1
Total	81.0	86.4	85.3	90.5	85.0

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	1	4	10	27	49	70	93	97	98	99	99
Businesses mating ewes	2	5	12	24	43	65	87	93	95	96	96
Merino ewes mated	2	5	13	35	55	76	95	98	98	99	99
Businesses mating Merino ewes	1	4	11	23	43	64	87	93	95	96	96

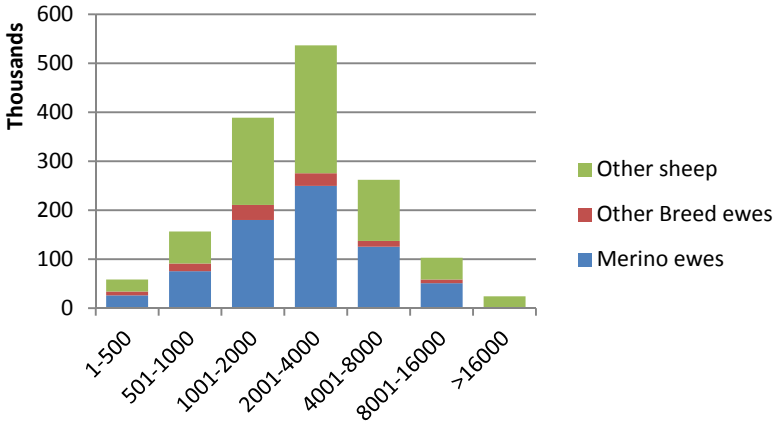
Example interpretation: *In SA-Eyre, 10% of all ewes mated were mated on the 12% of farms with an average marking rate <70%.*

Summary for SA-Murray Lands

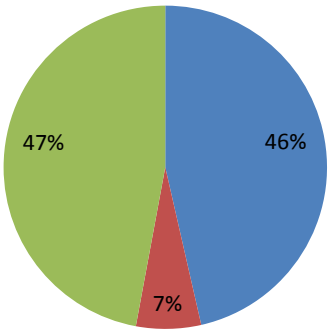
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	1,530
Breeding Ewes - total (thousand)	810
Breeding ewes - Merino (thousand)	710

Businesses at 30-Jun-2011	Total
with sheep and lambs	1,002
with breeding ewes	956
with Merino breeding ewes	840

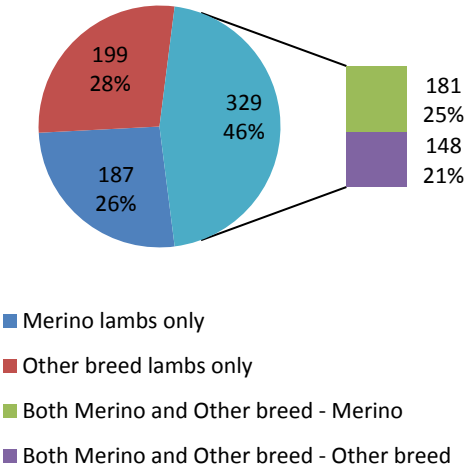
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



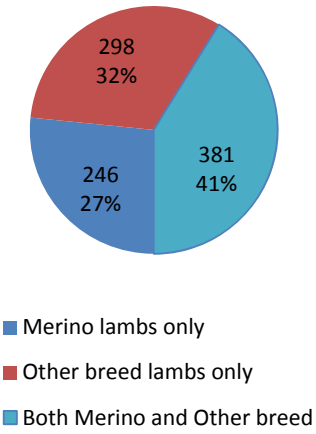
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



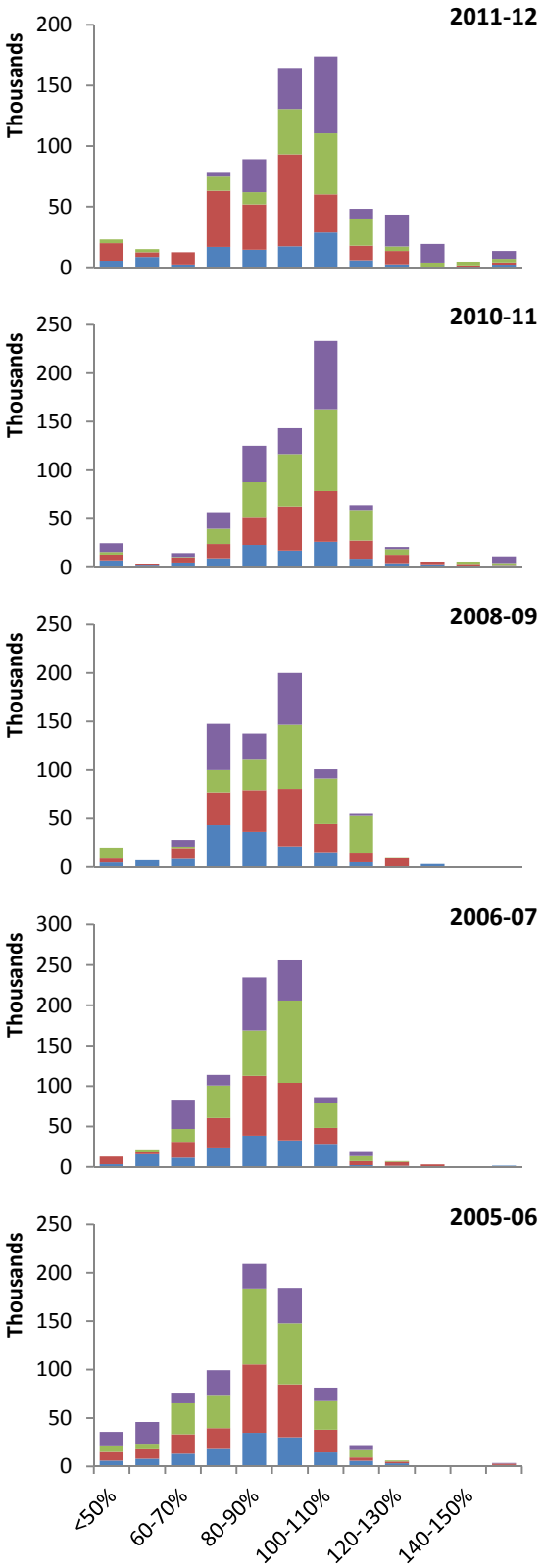
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	4	14	39	75	92	98	100
Businesses with sheep and lambs	27	48	75	94	99	100	100
Breeding ewes	4	15	42	76	92	100	100
Businesses with breeding ewes	24	45	73	94	99	100	100

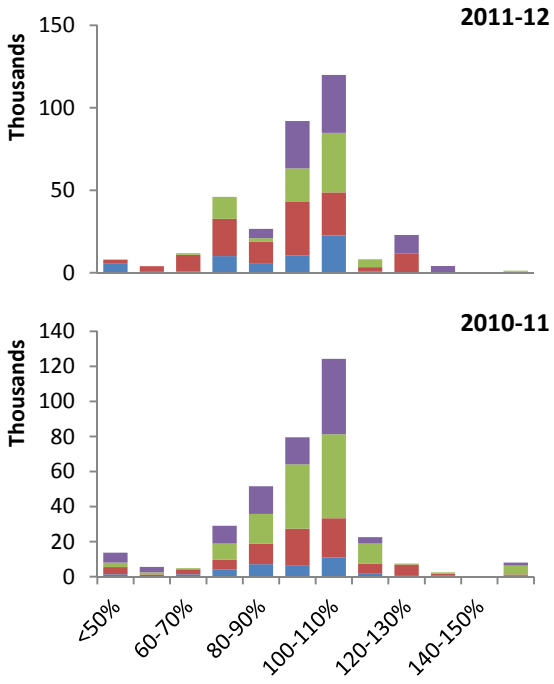
Example interpretation: *In SA-Murray Lands, 75% of all flocks have 2000 or less sheep and lambs, and those flocks carry 39% of the sheep and lambs in that region.*

Summary for SA-Murray Lands (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	95.7	84.7
1001-2000	95.6	92.6
2001-4000	100.5	103.2
over 4000	94.9	104.4
Total	97.3	96.6

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	87.5	84.6	83.5	94.2	89.5
1001-2000	84.5	86.0	89.6	97.6	89.2
2001-4000	84.1	88.0	93.5	100.8	103.7
over 4000	77.8	83.6	86.0	96.0	106.9
Total	83.5	85.8	88.8	97.8	97.2

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	3	4	6	14	32	52	85	94	97	98	98
Businesses mating ewes	3	4	8	16	32	51	80	90	94	95	96
Merino ewes mated	4	6	7	15	30	53	88	95	97	98	98
Businesses mating Merino ewes	2	3	7	15	31	51	80	90	93	95	96

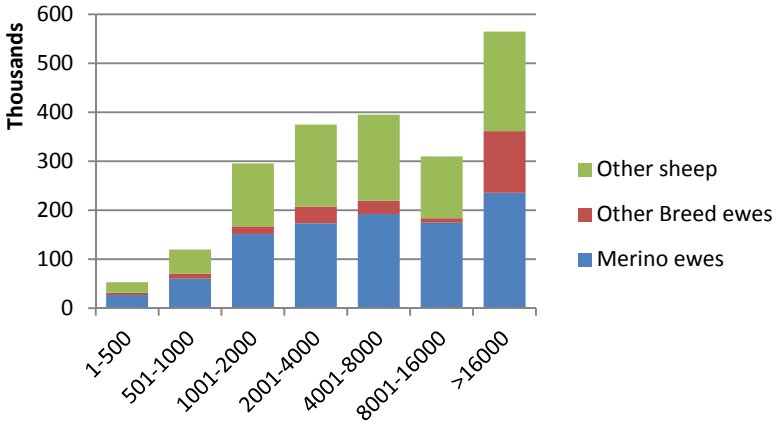
Example interpretation: *In SA-Murray Lands, 6% of all ewes mated were mated on the 8% of farms with an average marking rate <70%.*

Summary for SA-Northern

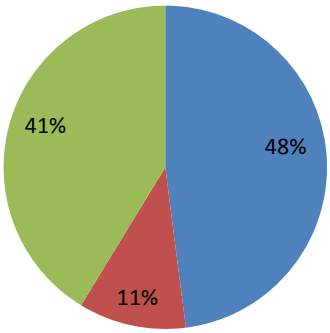
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	2,112
Breeding Ewes - total (thousand)	1,240
Breeding ewes - Merino (thousand)	1,013

Businesses at 30-Jun-2011	Total
with sheep and lambs	839
with breeding ewes	810
with Merino breeding ewes	740

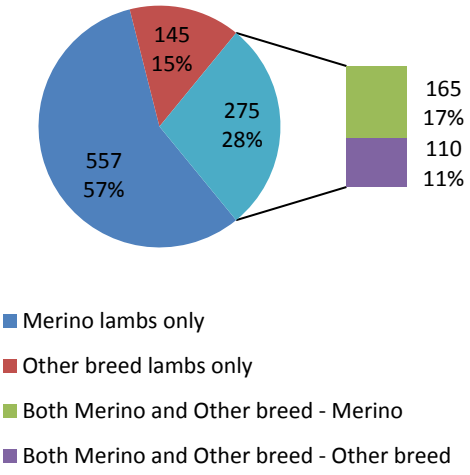
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



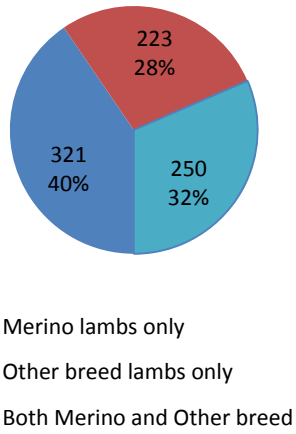
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



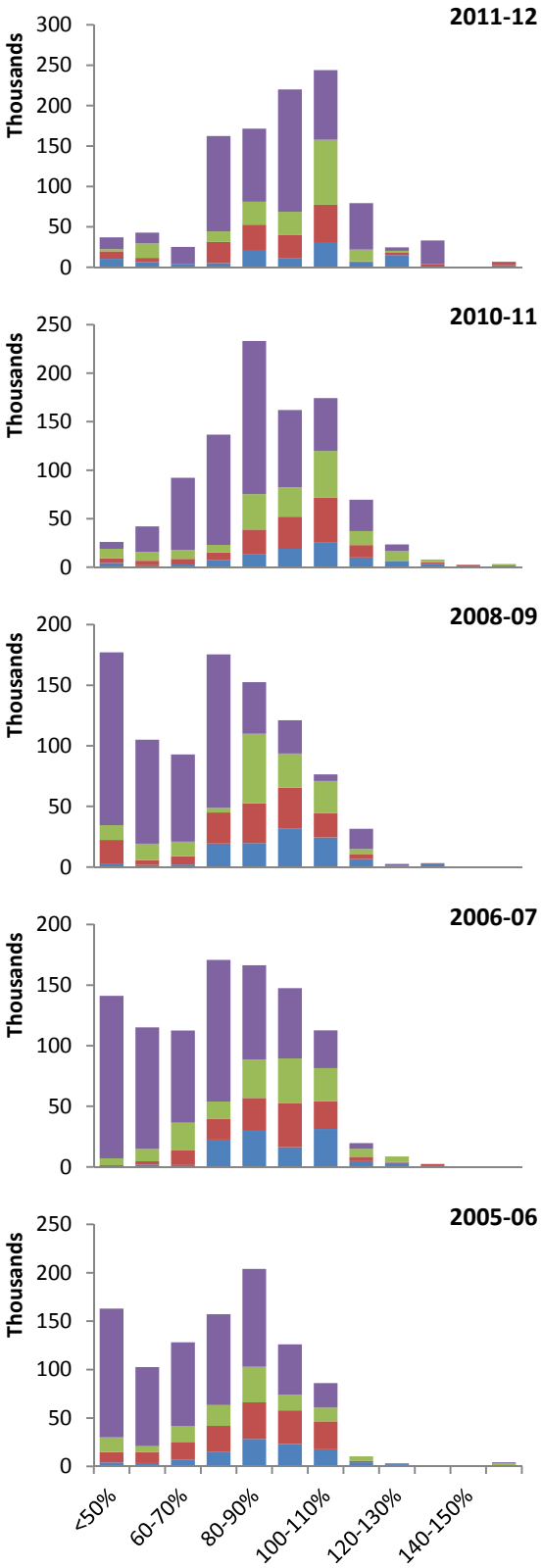
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	2	8	22	40	59	73	100
Businesses with sheep and lambs	27	46	71	87	95	98	100
Breeding ewes	3	8	22	38	56	71	100
Businesses with breeding ewes	25	45	70	86	95	98	100

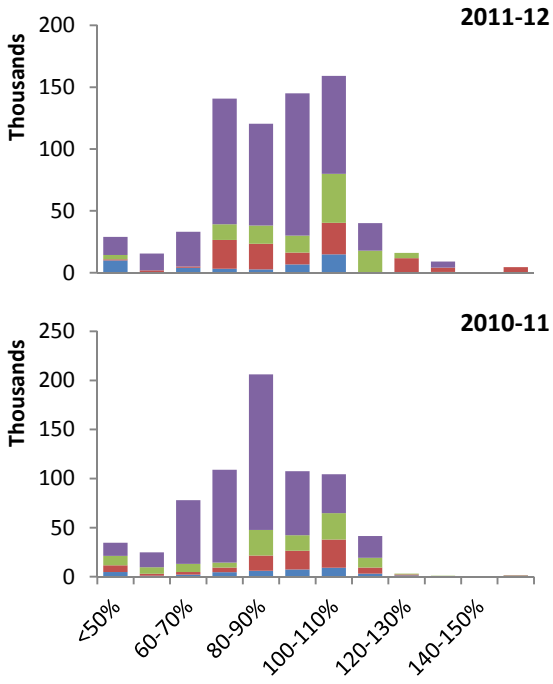
Example interpretation: *In SA-Northern, 71% of all flocks have 2000 or less sheep and lambs, and those flocks carry 22% of the sheep and lambs in that region.*

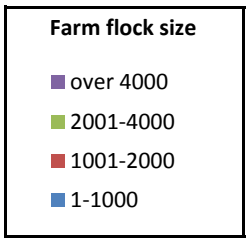
Summary for SA-Northern (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.





Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	85.5	82.0
1001-2000	91.8	95.4
2001-4000	87.4	95.2
over 4000	83.6	86.2
Total	85.3	88.6

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	88.7	92.3	91.8	95.8	93.4
1001-2000	85.5	89.6	80.9	94.6	90.4
2001-4000	83.2	85.6	81.9	91.8	92.2
over 4000	66.7	66.3	64.1	84.9	90.7
Total	74.6	75.2	73.0	88.7	91.2

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	3	7	16	31	55	71	89	96	99	99	100
Businesses mating ewes	4	6	11	18	35	55	82	91	94	97	98
Merino ewes mated	5	8	19	35	64	79	93	99	100	100	100
Businesses mating Merino ewes	4	6	11	19	36	55	82	91	94	97	98

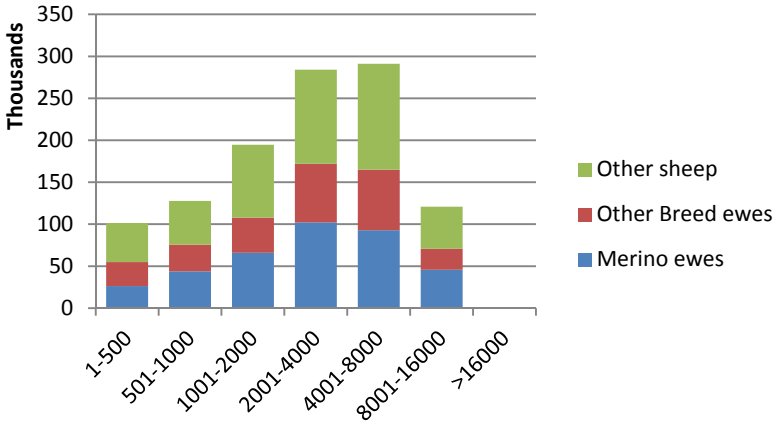
Example interpretation: *In SA-Northern, 16% of all ewes mated were mated on the 11% of farms with an average marking rate <70%.*

Summary for SA-Outer Adelaide (including Adelaide)

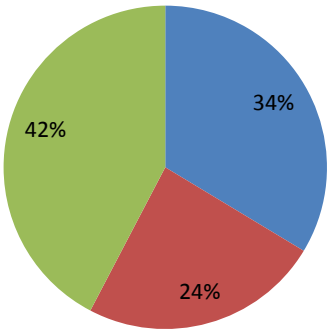
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	1,120
Breeding Ewes - total (thousand)	646
Breeding ewes - Merino (thousand)	377

Businesses at 30-Jun-2011	Total
with sheep and lambs	1,204
with breeding ewes	1,060
with Merino breeding ewes	651

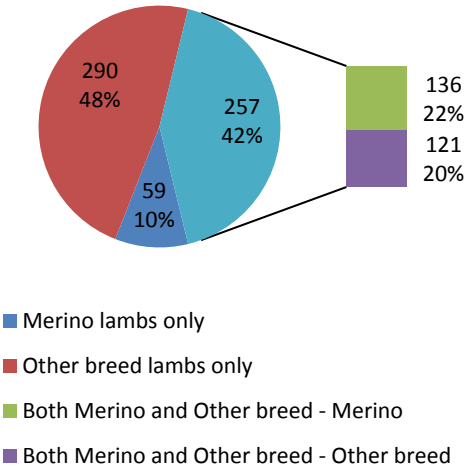
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



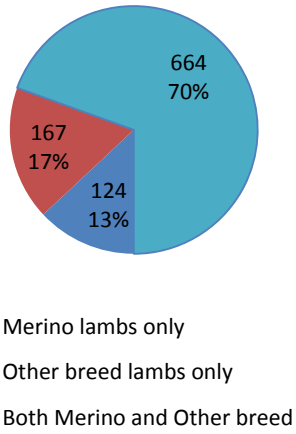
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



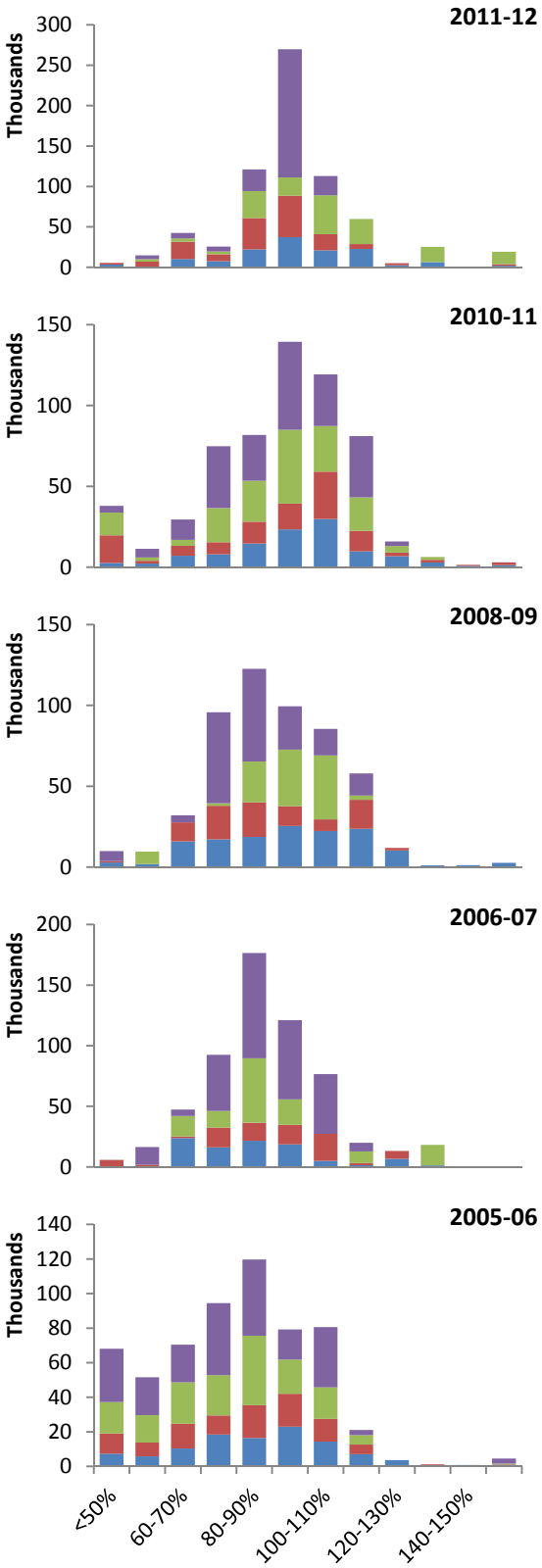
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	9	20	38	63	89	100	100
Businesses with sheep and lambs	61	75	86	95	99	100	100
Breeding ewes	8	20	37	64	89	100	100
Businesses with breeding ewes	57	72	84	94	99	100	100

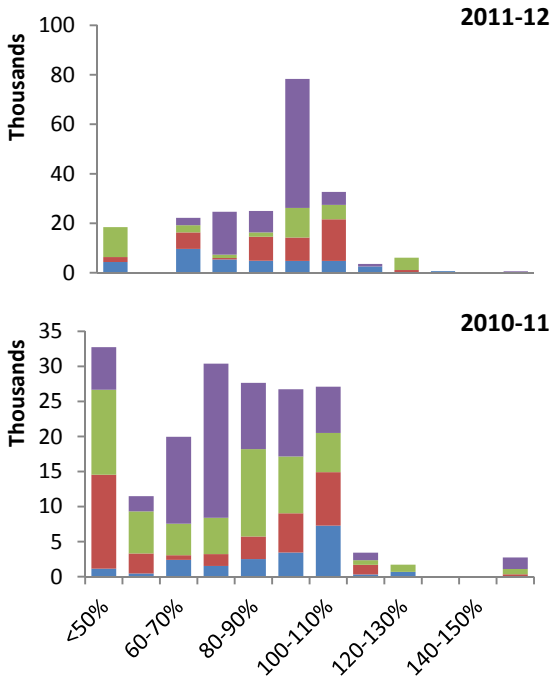
Example interpretation: *In SA-Outer Adelaide (including Adelaide), 86% of all flocks have 2000 or less sheep and lambs, and those flocks carry 38% of the sheep and lambs in that region.*

Summary for SA-Outer Adelaide (including Adelaide) (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	92.9	78.2
1001-2000	62.1	91.1
2001-4000	68.7	80.7
over 4000	78.5	90.9
Total	73.8	86.8

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	86.0	85.3	93.5	98.9	96.7
1001-2000	79.6	89.4	88.5	84.9	91.7
2001-4000	77.6	91.7	92.4	88.0	107.4
over 4000	76.7	87.2	85.0	92.4	90.9
Total	79.1	88.2	89.5	91.0	96.4

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	6	8	13	26	39	62	82	96	98	99	100
Businesses mating ewes	5	8	14	23	37	54	76	85	90	93	95
Merino ewes mated	18	24	35	51	66	81	96	98	99	99	99
Businesses mating Merino ewes	2	5	12	21	36	53	76	85	90	93	95

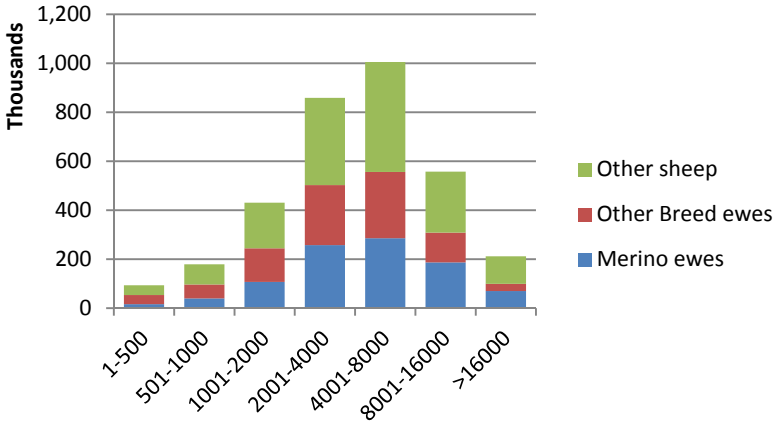
Example interpretation: *In SA-Outer Adelaide (including Adelaide), 13% of all ewes mated were mated on the 14% of farms with an average marking rate <70%.*

Summary for SA-South East

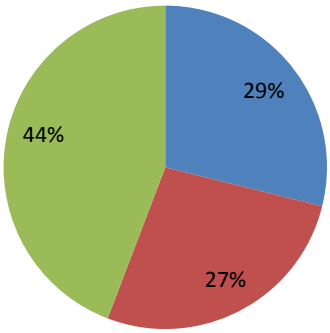
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	3,336
Breeding Ewes - total (thousand)	1,861
Breeding ewes - Merino (thousand)	963

Businesses at 30-Jun-2011	Total
with sheep and lambs	1,559
with breeding ewes	1,429
with Merino breeding ewes	849

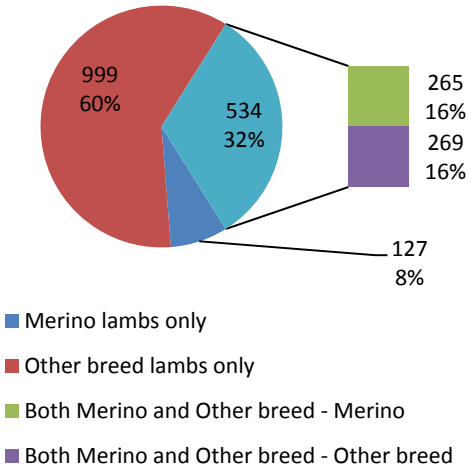
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



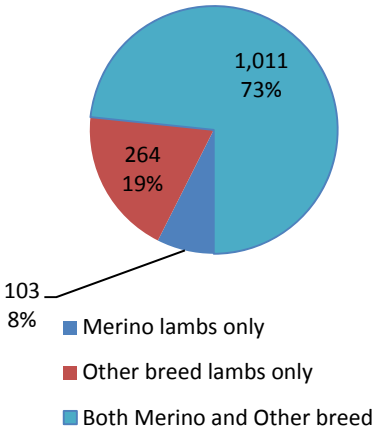
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



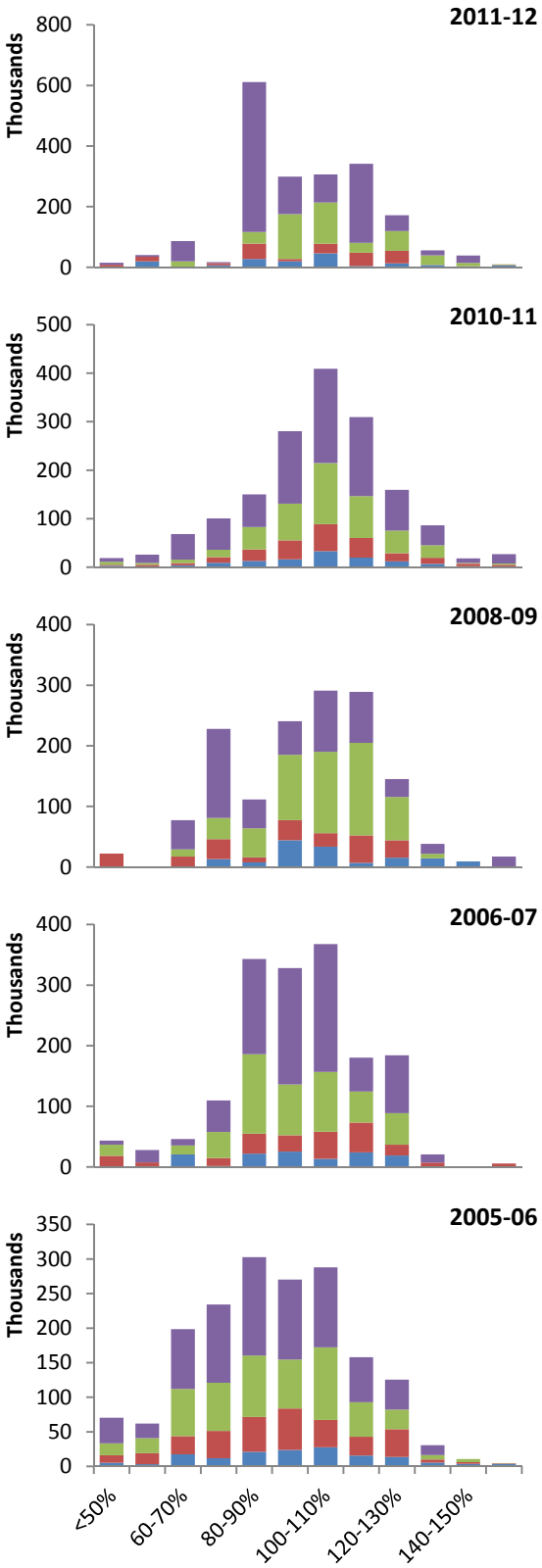
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	3	8	21	47	77	94	100
Businesses with sheep and lambs	30	46	65	84	96	99	100
Breeding ewes	3	8	21	48	78	95	100
Businesses with breeding ewes	26	42	62	83	96	99	100

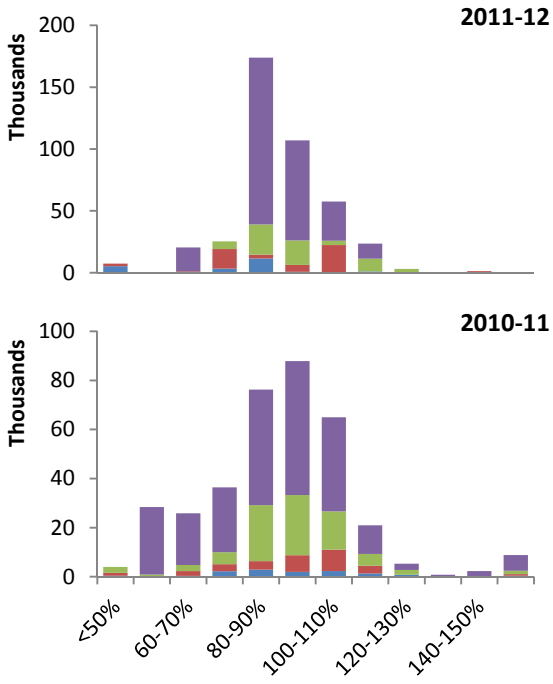
Example interpretation: *In SA-South East, 65% of all flocks have 2000 or less sheep and lambs, and those flocks carry 21% of the sheep and lambs in that region.*

Summary for SA-South East (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	98.0	67.9
1001-2000	95.1	90.1
2001-4000	94.1	93.3
over 4000	90.6	87.0
Total	92.0	87.4

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	95.9	97.0	105.5	104.1	100.4
1001-2000	91.8	97.9	90.5	104.7	102.2
2001-4000	89.7	94.1	104.1	106.0	103.9
over 4000	88.5	97.0	97.9	103.1	97.2
Total	90.1	96.3	100.0	104.2	99.6

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	1	3	7	13	22	39	64	82	92	97	98
Businesses mating ewes	2	3	5	11	21	37	63	79	89	94	96
Merino ewes mated	1	9	16	26	47	72	89	95	97	97	98
Businesses mating Merino ewes	0	1	4	9	20	36	63	79	88	94	96

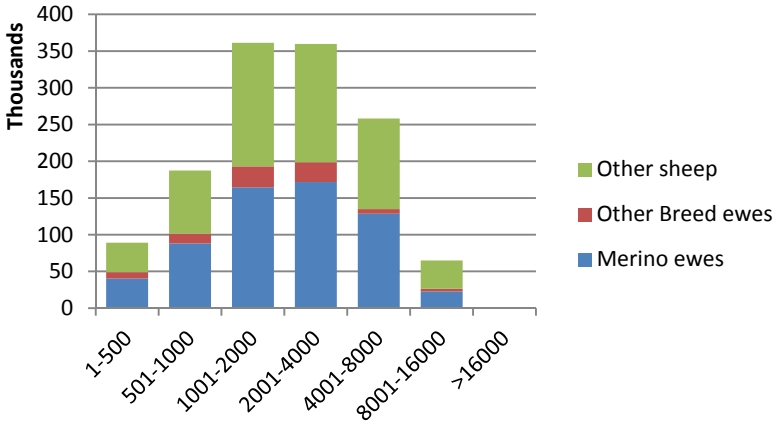
Example interpretation: *In SA-South East, 7% of all ewes mated were mated on the 5% of farms with an average marking rate <70%.*

Summary for SA-Yorke and Lower North

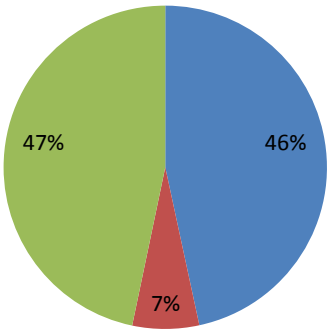
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	1,320
Breeding Ewes - total (thousand)	704
Breeding ewes - Merino (thousand)	616

Businesses at 30-Jun-2011	Total
with sheep and lambs	1,142
with breeding ewes	1,024
with Merino breeding ewes	902

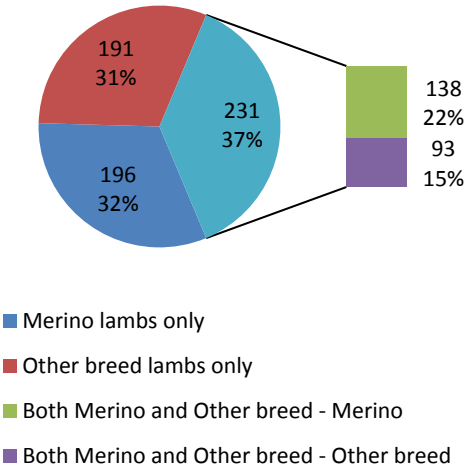
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



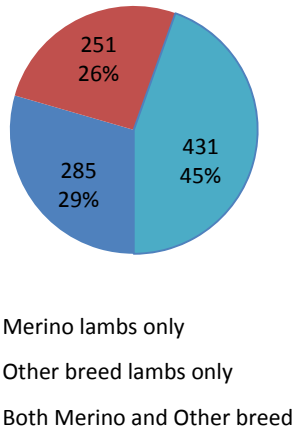
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



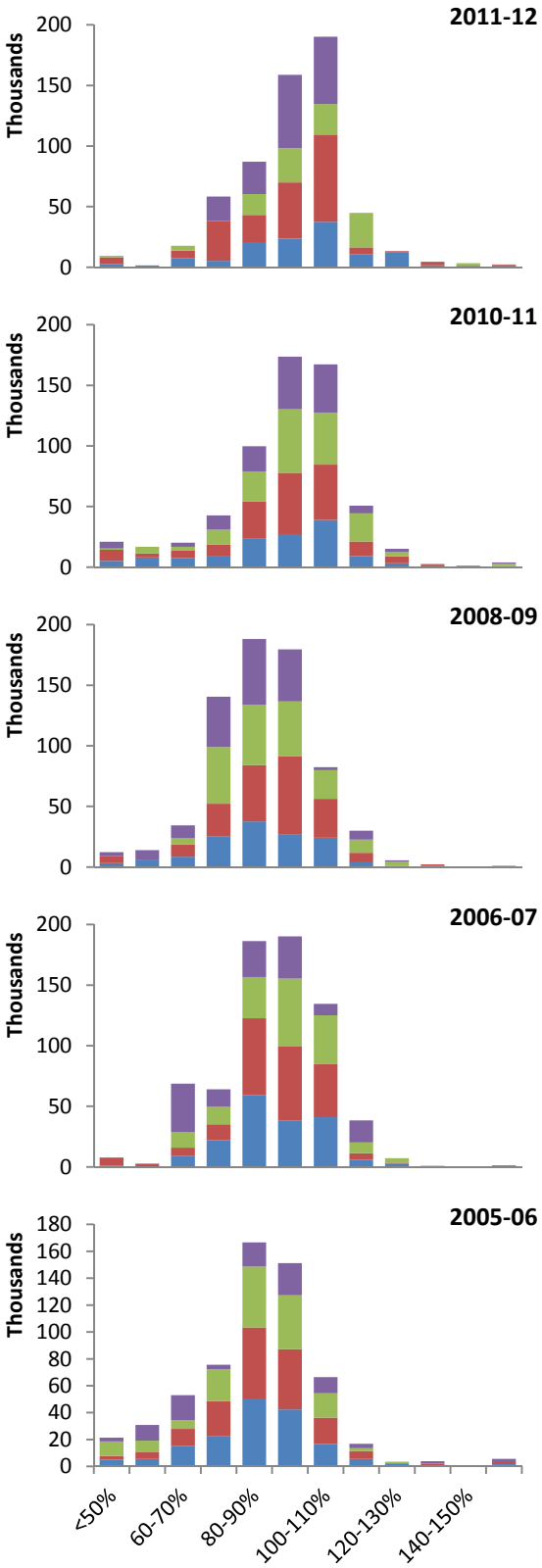
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	7	21	48	76	95	100	100
Businesses with sheep and lambs	38	61	83	95	99	100	100
Breeding ewes	7	21	49	77	96	100	100
Businesses with breeding ewes	33	57	81	94	99	100	100

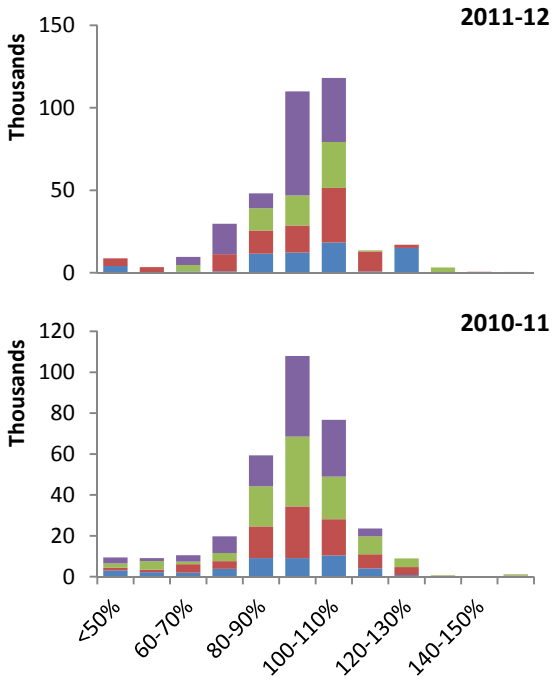
Example interpretation: *In SA-Yorke and Lower North, 83% of all flocks have 2000 or less sheep and lambs, and those flocks carry 48% of the sheep and lambs in that region.*

Summary for SA-Yorke and Lower North (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	90.8	96.5
1001-2000	94.9	94.0
2001-4000	94.7	96.6
over 4000	93.5	92.5
Total	93.8	94.4

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	90.9	89.9	86.8	93.0	98.9
1001-2000	88.0	90.7	88.8	91.5	93.3
2001-4000	82.5	92.7	88.6	96.1	98.6
over 4000	86.0	86.6	83.7	94.9	92.9
Total	87.0	90.1	87.1	93.9	95.3

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	3	6	9	16	33	61	88	96	99	99	99
Businesses mating ewes	3	6	11	18	34	58	84	93	96	97	98
Merino ewes mated	3	6	9	15	33	66	89	97	99	100	100
Businesses mating Merino ewes	2	5	10	16	33	57	84	93	95	97	98

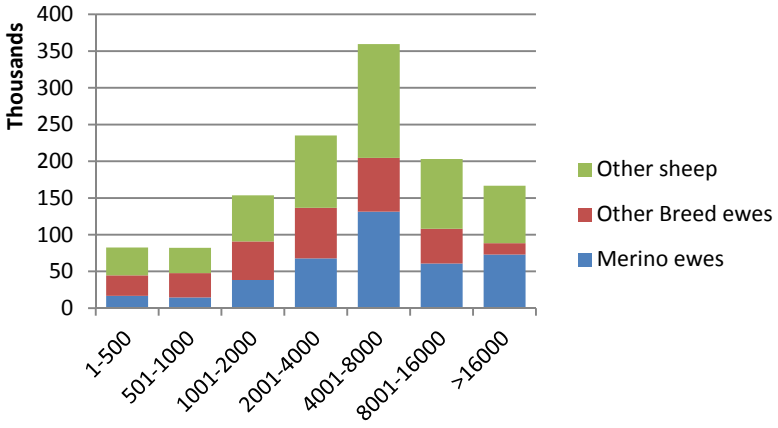
Example interpretation: *In SA-Yorke and Lower North, 9% of all ewes mated were mated on the 11% of farms with an average marking rate <70%.*

Summary for TAS-Northern (including Mersey-Lyell)

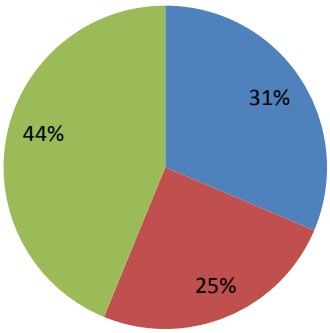
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	1,283
Breeding Ewes - total (thousand)	721
Breeding ewes - Merino (thousand)	403

Businesses at 30-Jun-2011	Total
with sheep and lambs	984
with breeding ewes	855
with Merino breeding ewes	418

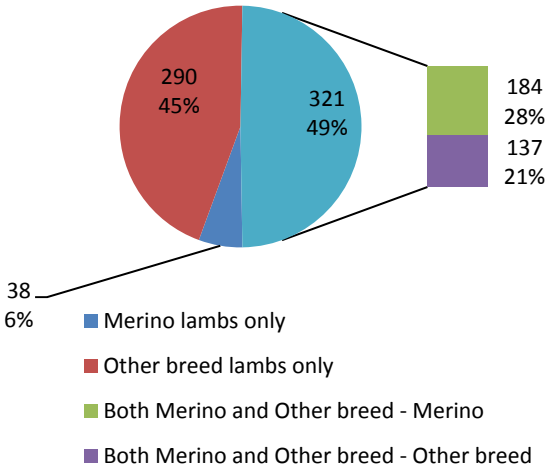
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



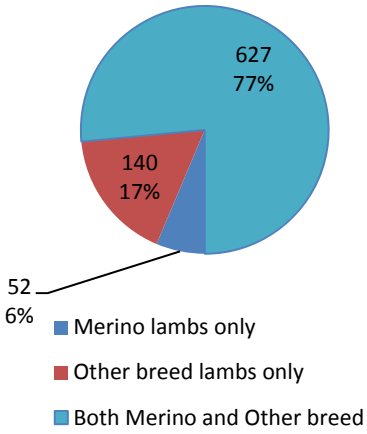
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



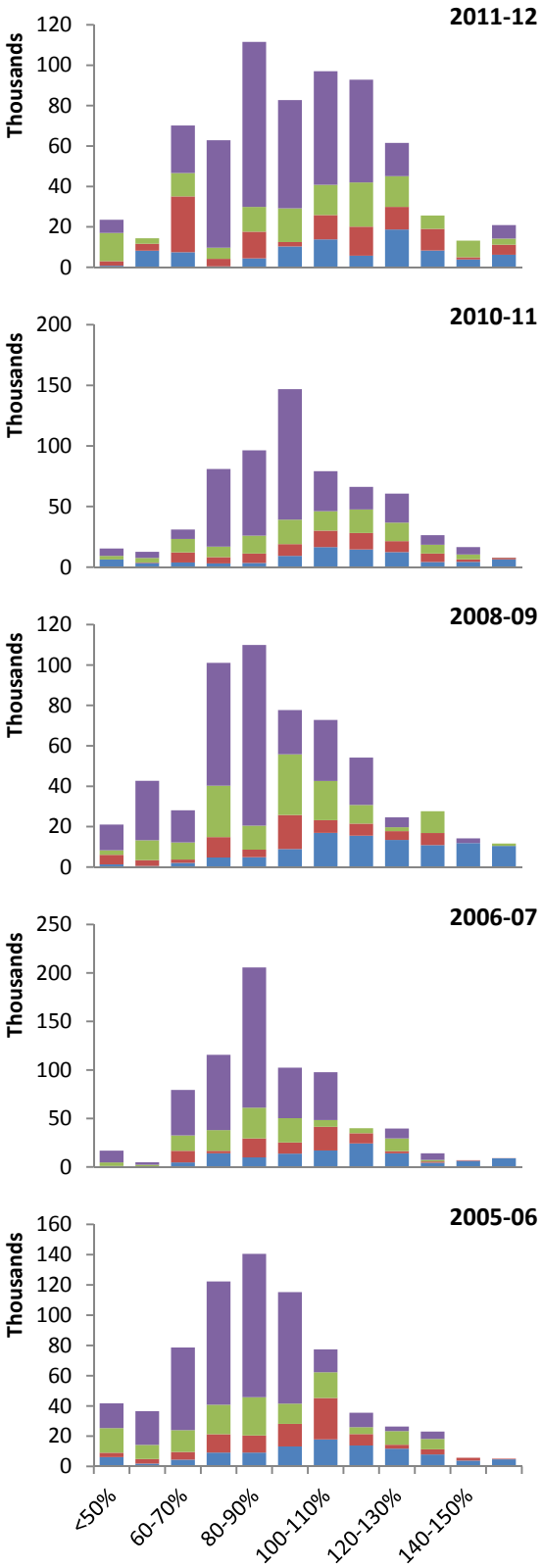
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	6	13	25	43	71	87	100
Businesses with sheep and lambs	60	72	83	91	97	99	100
Breeding ewes	6	13	25	44	73	88	100
Businesses with breeding ewes	55	69	80	90	97	99	100

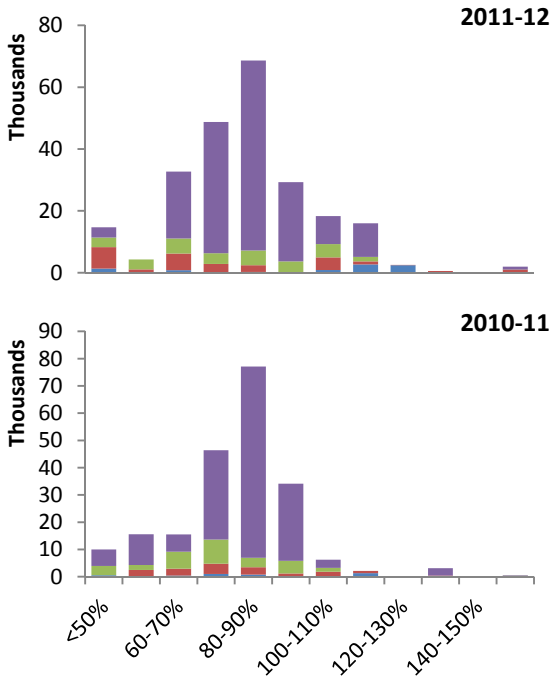
Example interpretation: *In TAS-Northern (including Mersey-Lyell), 83% of all flocks have 2000 or less sheep and lambs, and those flocks carry 25% of the sheep and lambs in that region.*

Summary for TAS-Northern (including Mersey-Lyell) (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	95.4	93.7
1001-2000	92.7	77.8
2001-4000	78.9	78.9
over 4000	85.3	85.0
Total	85.2	83.8

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	102.0	107.7	117.6	105.4	109.5
1001-2000	94.1	94.3	91.7	105.2	98.6
2001-4000	83.1	87.6	90.5	100.7	96.4
over 4000	79.5	84.4	83.1	94.6	96.5
Total	85.4	89.9	91.6	98.5	98.5

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	2	4	9	22	37	60	72	83	92	96	99
Businesses mating ewes	3	5	11	17	26	38	54	67	78	85	90
Merino ewes mated	5	12	19	41	78	94	97	98	98	100	100
Businesses mating Merino ewes	1	4	9	16	25	37	53	67	78	85	89

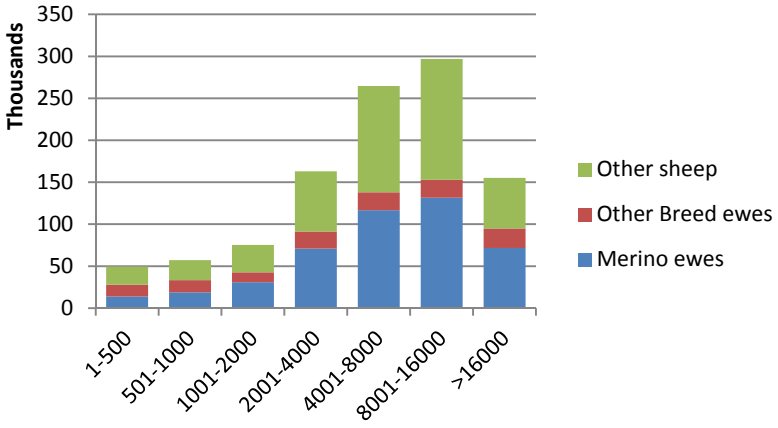
Example interpretation: *In TAS-Northern (including Mersey-Lyell), 9% of all ewes mated were mated on the 11% of farms with an average marking rate <70%.*

Summary for TAS-Southern (including Hobart)

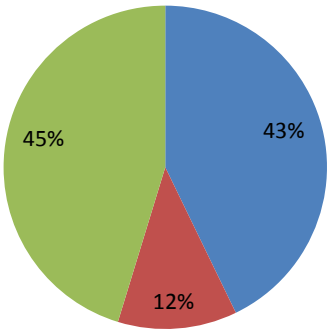
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	1,062
Breeding Ewes - total (thousand)	581
Breeding ewes - Merino (thousand)	454

Businesses at 30-Jun-2011	Total
with sheep and lambs	553
with breeding ewes	490
with Merino breeding ewes	338

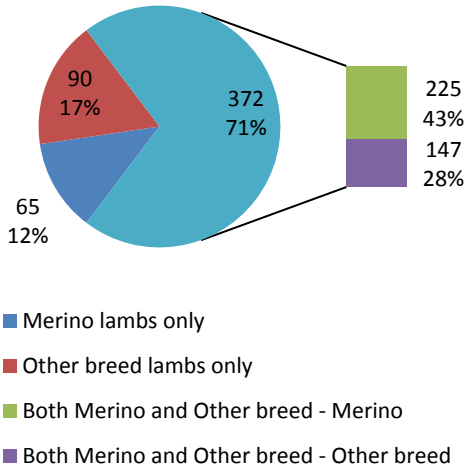
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



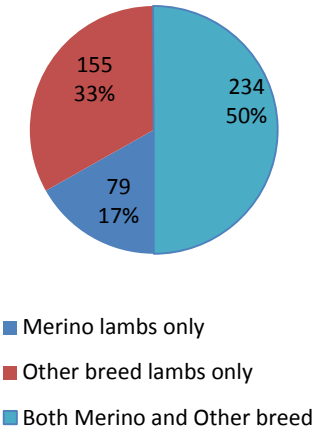
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



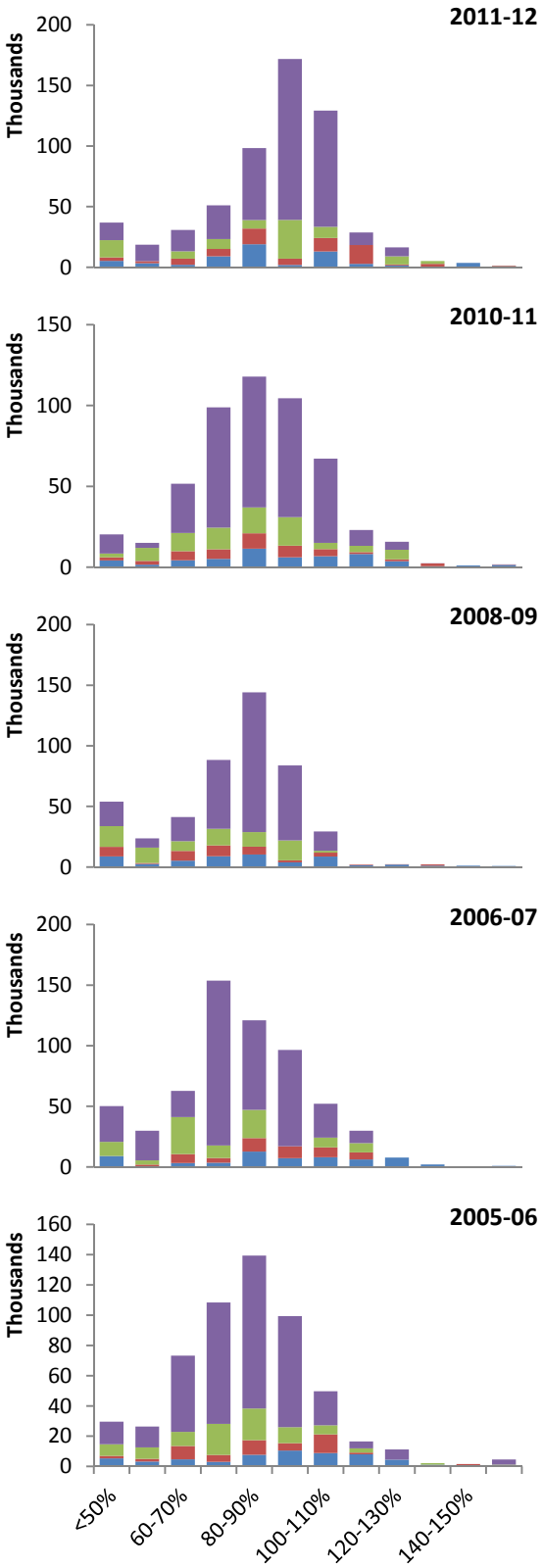
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	5	10	17	32	57	85	100
Businesses with sheep and lambs	52	66	75	86	94	99	100
Breeding ewes	5	11	18	34	57	84	100
Businesses with breeding ewes	48	62	72	84	94	99	100

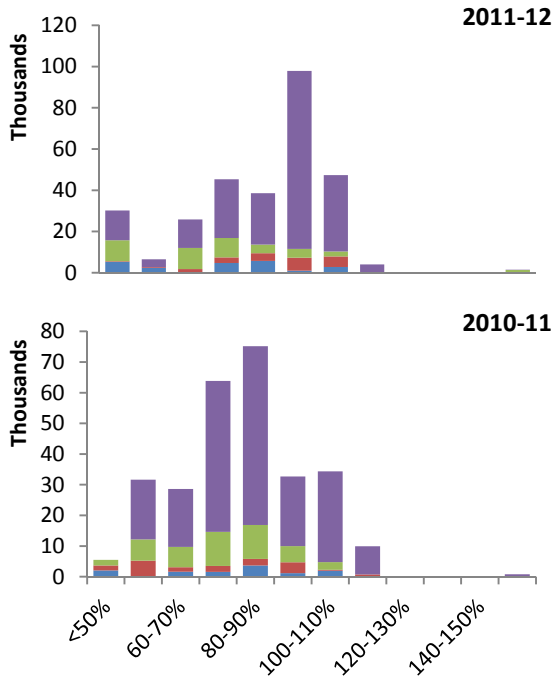
Example interpretation: *In TAS-Southern (including Hobart), 75% of all flocks have 2000 or less sheep and lambs, and those flocks carry 17% of the sheep and lambs in that region.*

Summary for TAS-Southern (including Hobart) (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	75.3	64.9
1001-2000	72.5	92.1
2001-4000	74.4	63.9
over 4000	84.8	87.9
Total	82.0	83.1

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	89.0	90.9	80.8	92.0	92.0
1001-2000	84.2	87.7	70.3	84.8	93.7
2001-4000	80.4	75.1	66.4	84.2	83.4
over 4000	81.1	80.0	80.1	87.7	92.9
Total	82.1	81.0	77.0	87.4	91.5

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	4	7	17	36	58	79	92	96	99	99	100
Businesses mating ewes	6	10	20	31	53	67	79	86	92	94	96
Merino ewes mated	2	13	23	46	72	84	96	100	100	100	100
Businesses mating Merino ewes	3	8	17	29	51	66	78	86	92	94	96

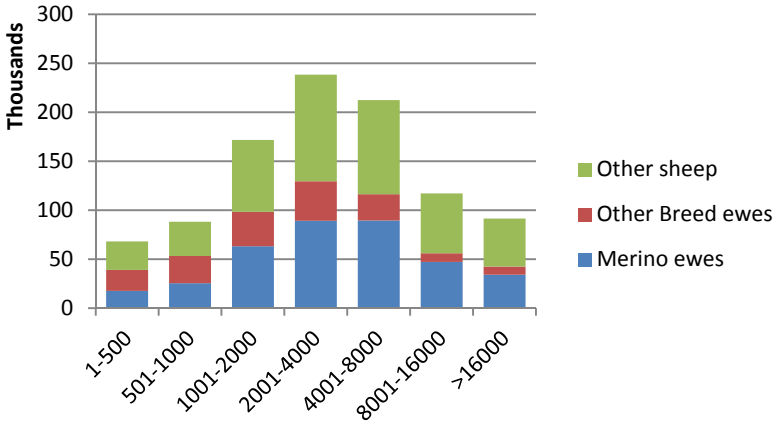
Example interpretation: *In TAS-Southern (including Hobart), 17% of all ewes mated were mated on the 20% of farms with an average marking rate <70%.*

Summary for VIC-Barwon

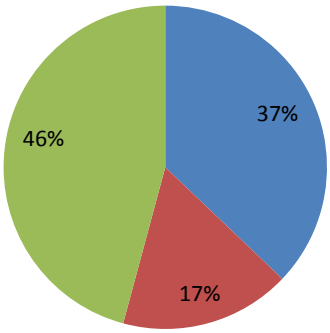
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	988
Breeding Ewes - total (thousand)	535
Breeding ewes - Merino (thousand)	367

Businesses at 30-Jun-2011	Total
with sheep and lambs	752
with breeding ewes	677
with Merino breeding ewes	447

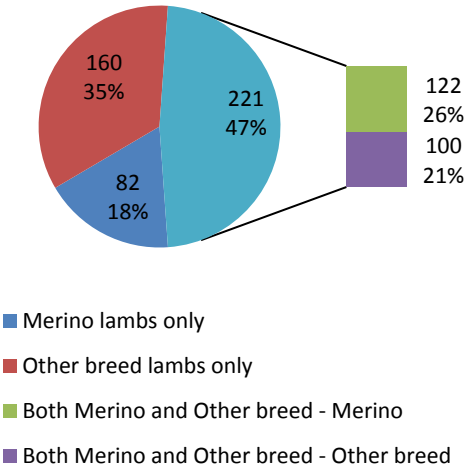
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



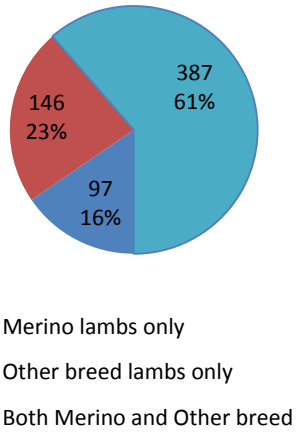
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



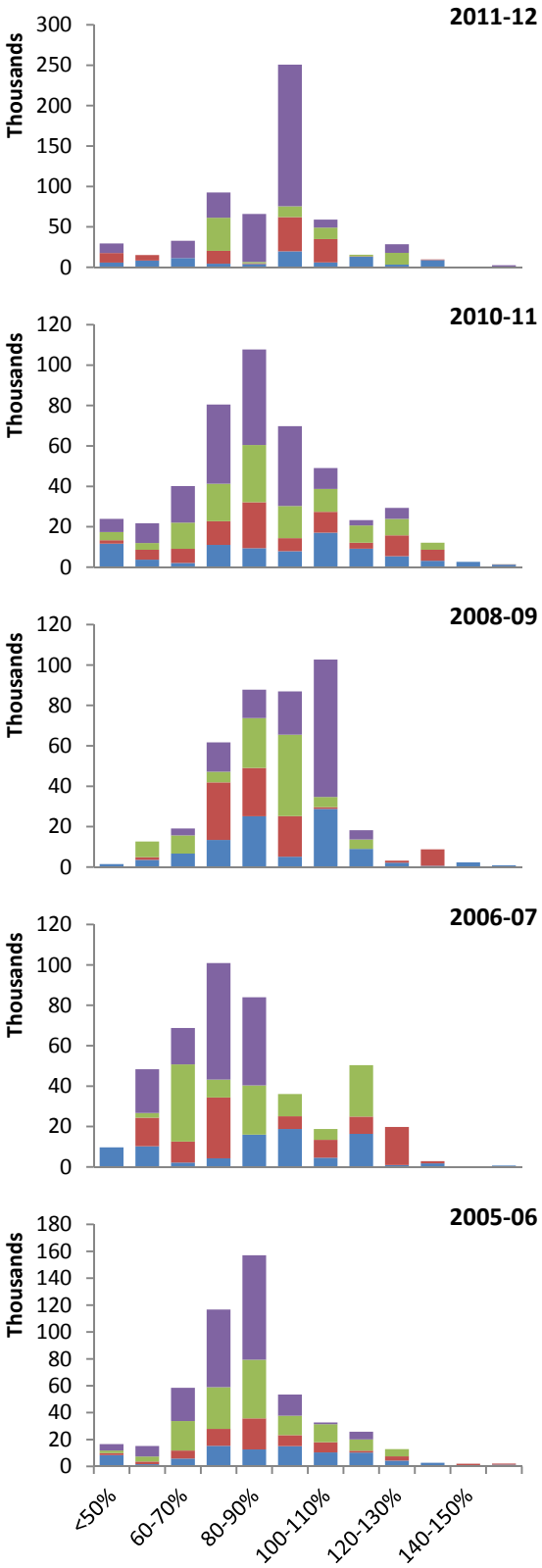
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	7	16	33	57	79	91	100
Businesses with sheep and lambs	49	65	81	93	98	99	100
Breeding ewes	7	17	36	60	82	92	100
Businesses with breeding ewes	46	63	80	92	98	99	100

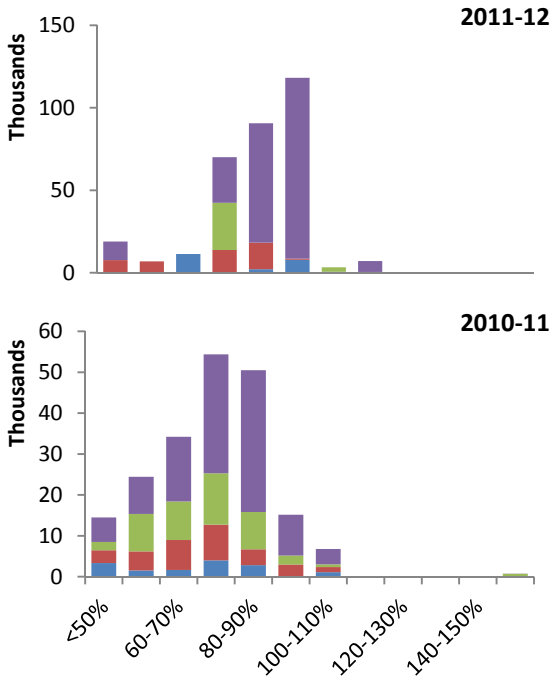
Example interpretation: *In VIC-Barwon, 81% of all flocks have 2000 or less sheep and lambs, and those flocks carry 33% of the sheep and lambs in that region.*

Summary for VIC-Barwon (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	65.9	80.1
1001-2000	71.1	63.5
2001-4000	73.7	77.6
over 4000	79.4	85.3
Total	75.8	81.2

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	87.1	87.4	91.6	91.4	91.9
1001-2000	87.6	88.6	88.7	93.0	85.0
2001-4000	83.6	85.6	86.0	88.3	90.7
over 4000	78.7	73.7	93.8	85.8	90.6
Total	82.8	82.8	90.4	88.7	89.8

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	5	10	19	36	59	74	85	90	97	99	100
Businesses mating ewes	5	10	16	30	47	57	74	82	90	95	96
Merino ewes mated	7	19	36	63	89	96	100	100	100	100	100
Businesses mating Merino ewes	3	8	14	28	46	56	74	81	90	94	96

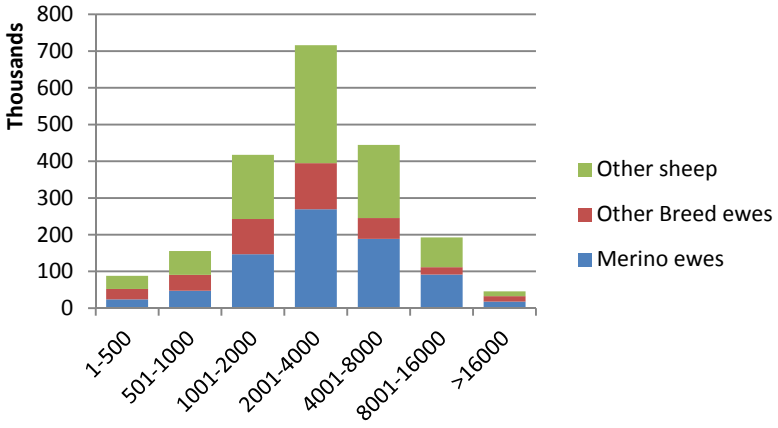
Example interpretation: *In VIC-Barwon, 19% of all ewes mated were mated on the 16% of farms with an average marking rate <70%.*

Summary for VIC-Central Highlands

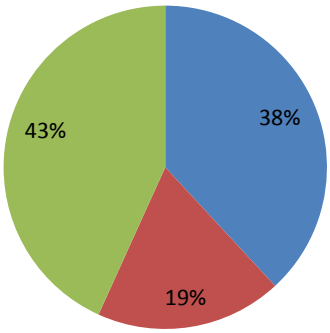
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	2,060
Breeding Ewes - total (thousand)	1,170
Breeding ewes - Merino (thousand)	785

Businesses at 30-Jun-2011	Total
with sheep and lambs	1,261
with breeding ewes	1,154
with Merino breeding ewes	830

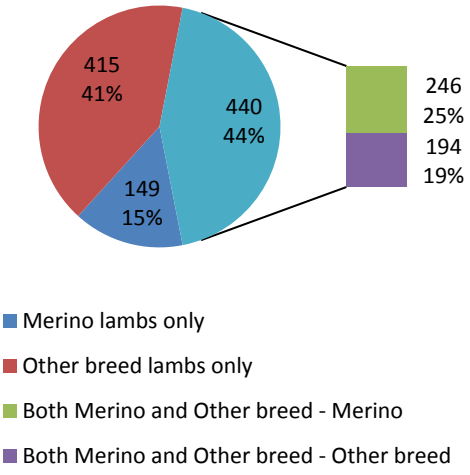
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



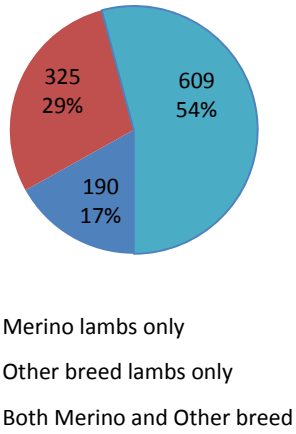
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



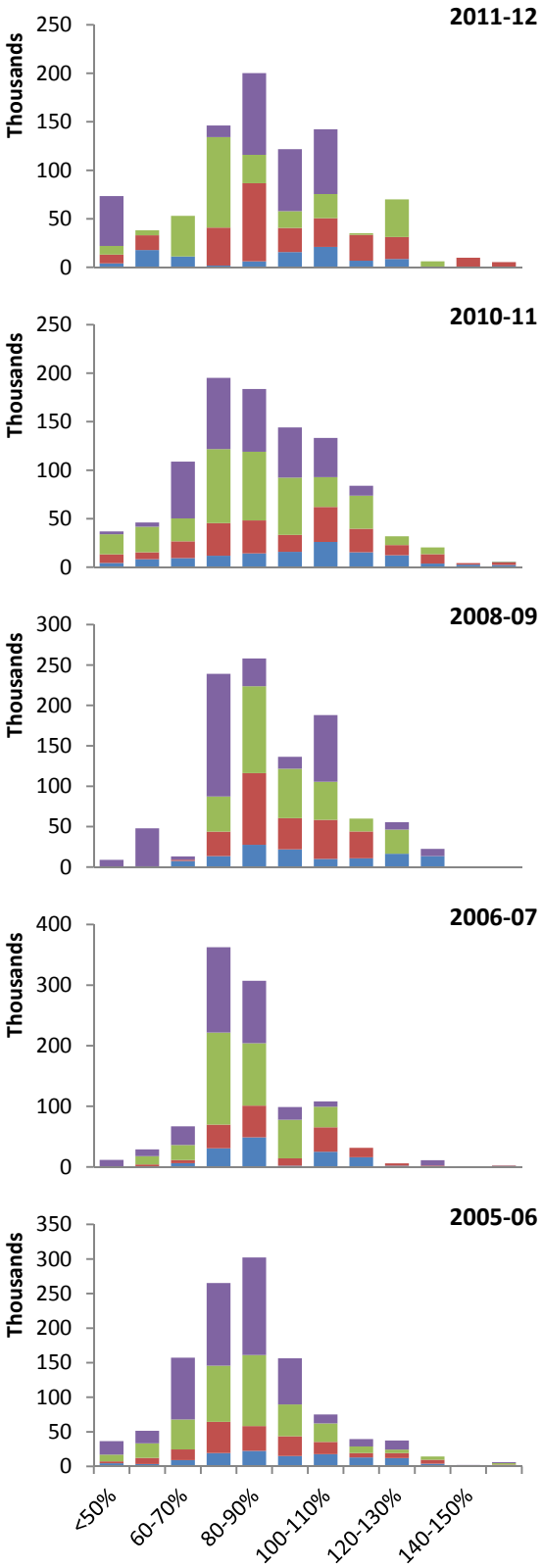
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	4	12	32	67	88	98	100
Businesses with sheep and lambs	32	49	71	92	98	100	100
Breeding ewes	4	12	33	67	88	97	100
Businesses with breeding ewes	30	47	70	91	98	100	100

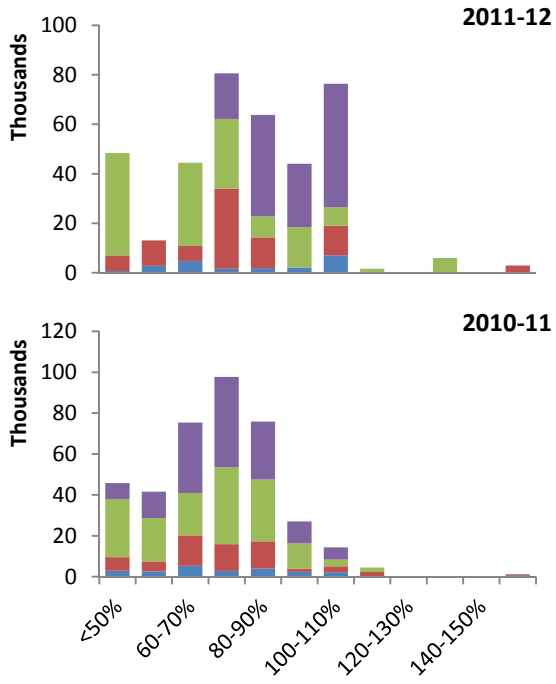
Example interpretation: *In VIC-Central Highlands, 71% of all flocks have 2000 or less sheep and lambs, and those flocks carry 32% of the sheep and lambs in that region.*

Summary for VIC-Central Highlands (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	76.2	88.6
1001-2000	75.9	78.8
2001-4000	68.0	71.1
over 4000	76.0	90.0
Total	72.7	80.4

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	94.0	89.4	97.6	97.3	85.8
1001-2000	86.3	90.1	90.6	93.8	93.8
2001-4000	85.3	81.5	93.2	84.4	85.0
over 4000	81.9	79.3	81.6	85.8	83.5
Total	84.9	83.2	89.0	88.4	87.2

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	4	8	19	39	57	72	85	94	97	99	99
Businesses mating ewes	3	9	17	33	48	60	76	85	91	95	96
Merino ewes mated	12	23	42	68	88	95	98	100	100	100	100
Businesses mating Merino ewes	3	9	17	33	48	60	76	85	91	95	96

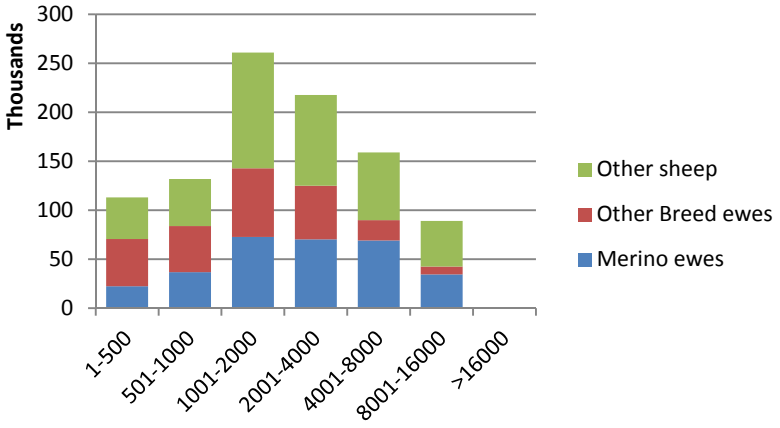
Example interpretation: *In VIC-Central Highlands, 19% of all ewes mated were mated on the 17% of farms with an average marking rate <70%.*

Summary for VIC-Gippsland & Ovens-Murray

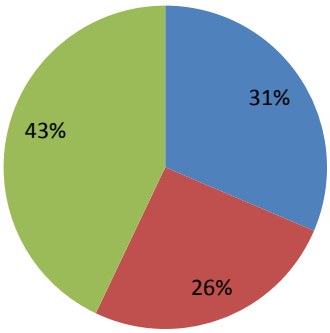
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	972
Breeding Ewes - total (thousand)	555
Breeding ewes - Merino (thousand)	306

Businesses at 30-Jun-2011	Total
with sheep and lambs	1,411
with breeding ewes	1,275
with Merino breeding ewes	597

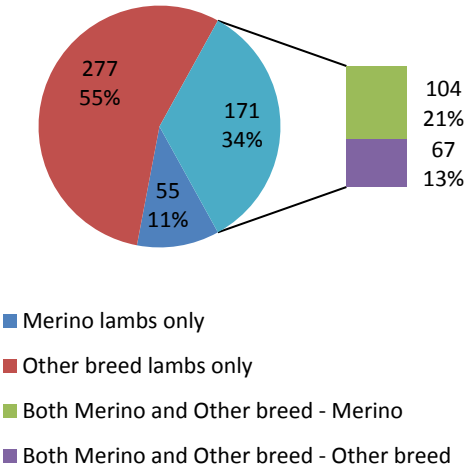
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



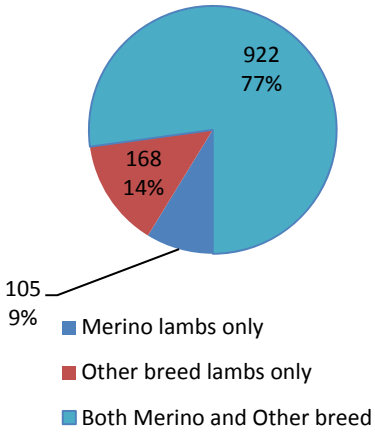
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



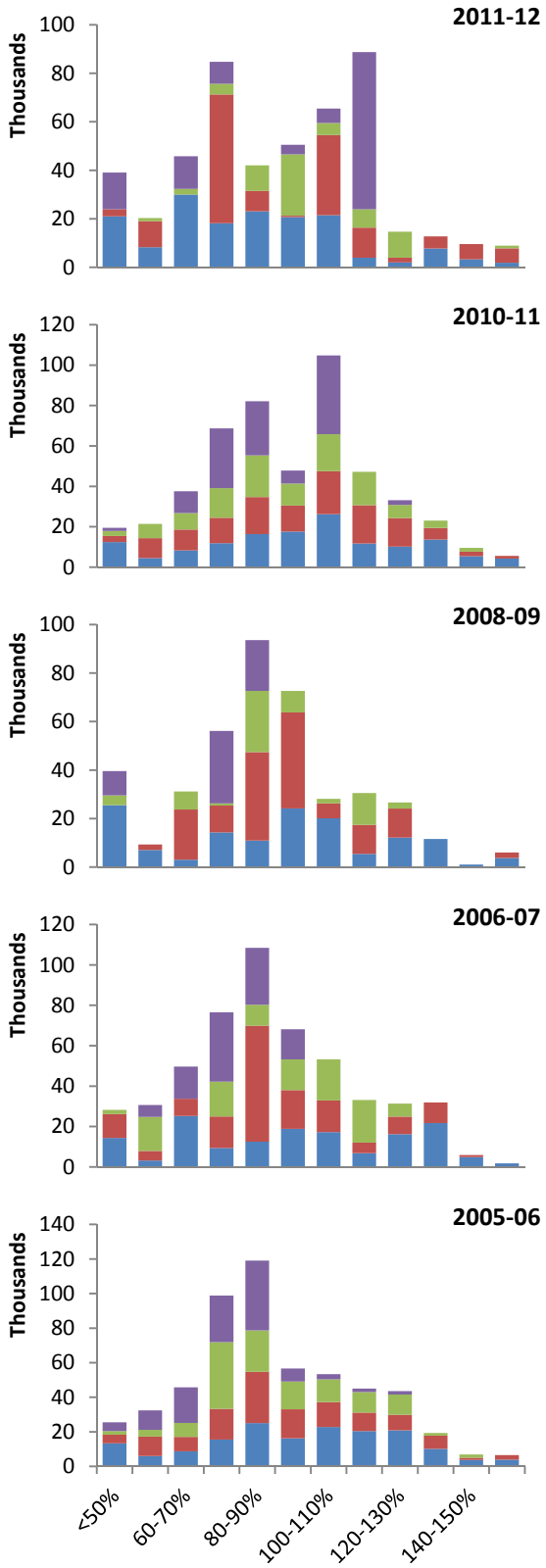
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	12	25	52	74	91	100	100
Businesses with sheep and lambs	65	78	91	97	99	100	100
Breeding ewes	13	28	54	76	92	100	100
Businesses with breeding ewes	63	77	91	97	99	100	100

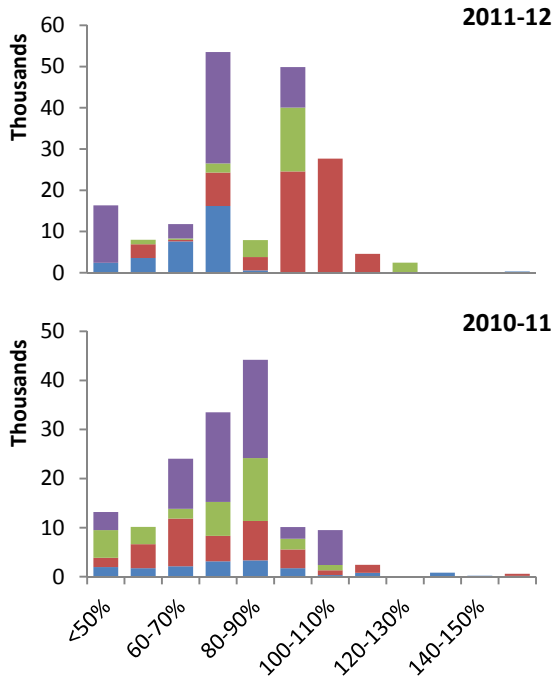
Example interpretation: *In VIC-Gippsland & Ovens-Murray, 91% of all flocks have 2000 or less sheep and lambs, and those flocks carry 52% of the sheep and lambs in that region.*

Summary for VIC-Gippsland & Ovens-Murray (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	84.4	71.1
1001-2000	75.2	93.8
2001-4000	72.2	92.4
over 4000	76.9	67.8
Total	76.2	82.1

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	95.6	93.8	88.2	97.5	80.8
1001-2000	90.7	87.7	91.2	96.5	92.6
2001-4000	89.2	89.6	89.7	93.0	98.7
over 4000	77.0	77.8	74.5	87.2	92.0
Total	88.9	88.0	87.4	93.8	89.4

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	4	8	16	29	46	55	76	86	92	97	99
Businesses mating ewes	7	13	20	30	41	50	68	76	83	89	92
Merino ewes mated	9	16	32	54	84	91	97	99	99	99	100
Businesses mating Merino ewes	2	8	16	26	38	48	67	75	82	88	91

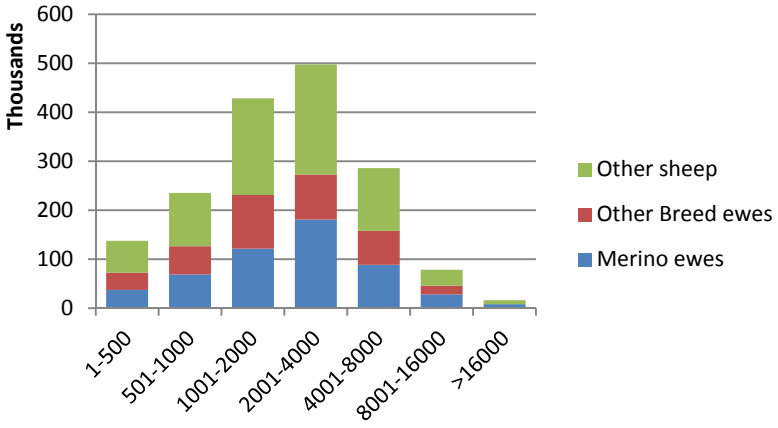
Example interpretation: *In VIC-Gippsland & Ovens-Murray, 16% of all ewes mated were mated on the 20% of farms with an average marking rate <70%.*

Summary for VIC-Goulburn

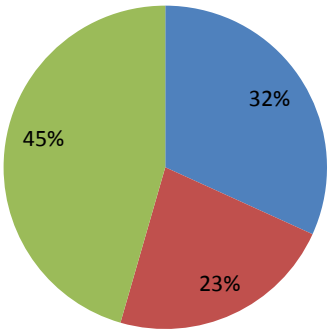
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	1,680
Breeding Ewes - total (thousand)	915
Breeding ewes - Merino (thousand)	534

Businesses at 30-Jun-2011	Total
with sheep and lambs	1,661
with breeding ewes	1,452
with Merino breeding ewes	919

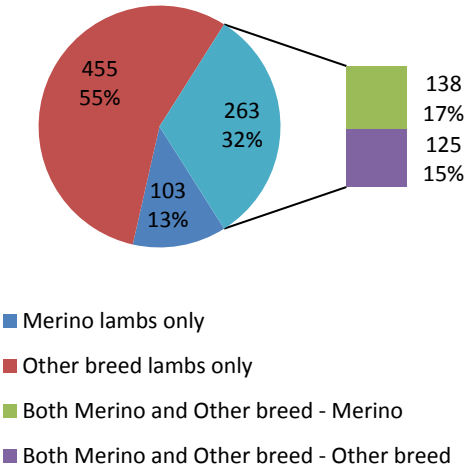
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



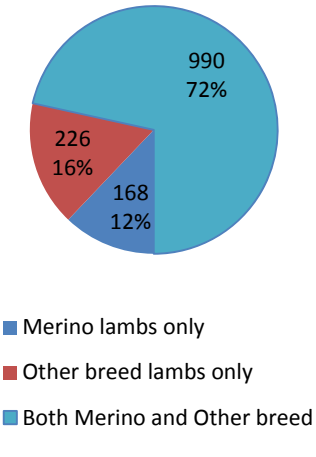
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



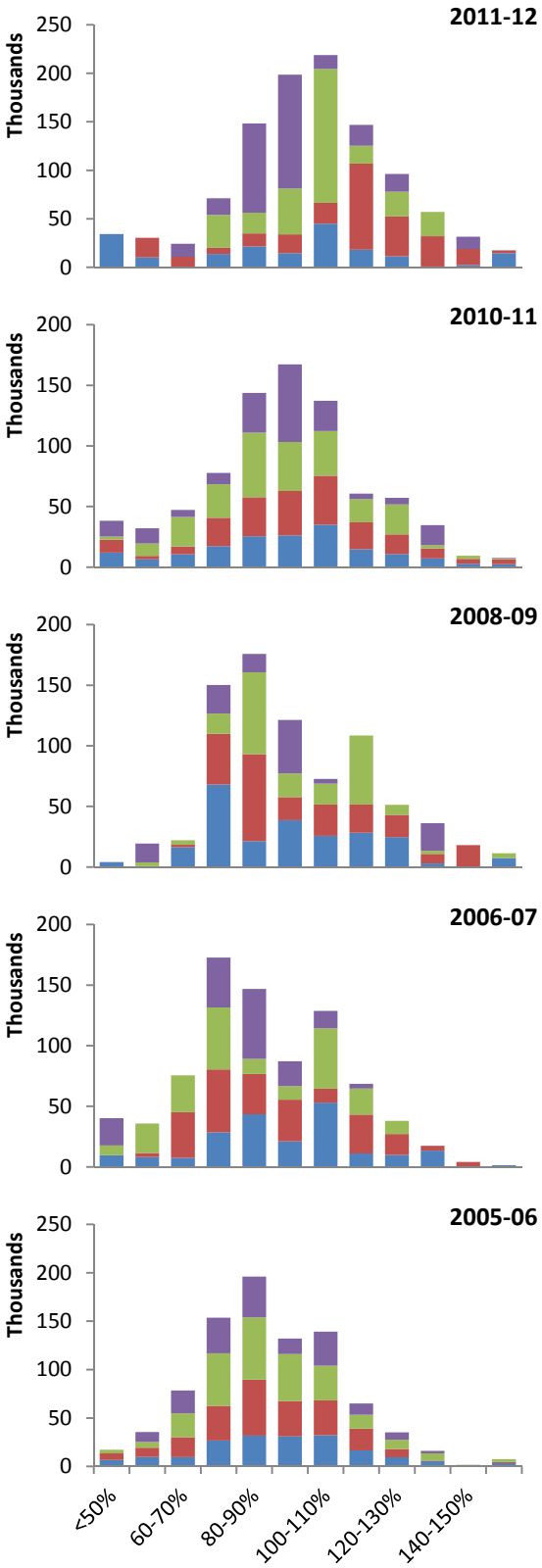
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	8	22	48	77	94	99	100
Businesses with sheep and lambs	47	66	85	96	99	100	100
Breeding ewes	8	22	47	77	94	99	100
Businesses with breeding ewes	43	63	83	96	99	100	100

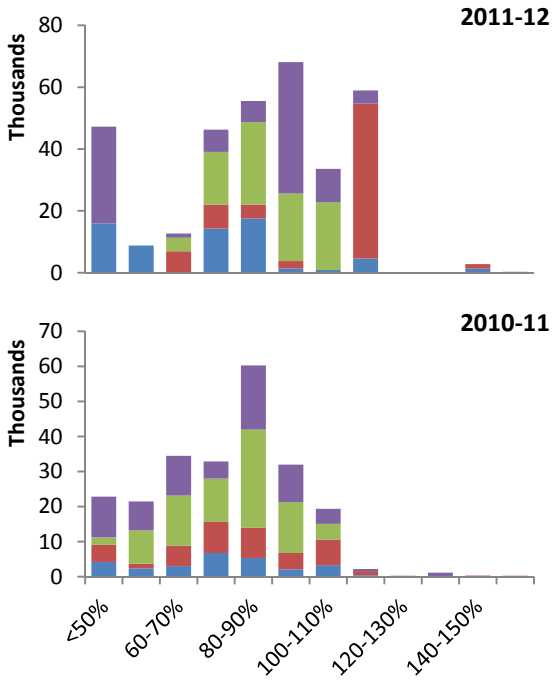
Example interpretation: *In VIC-Goulburn, 85% of all flocks have 2000 or less sheep and lambs, and those flocks carry 48% of the sheep and lambs in that region.*

Summary for VIC-Goulburn (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	74.2	75.9
1001-2000	80.8	105.6
2001-4000	77.0	85.4
over 4000	71.8	72.8
Total	75.8	84.0

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	92.1	91.5	97.9	94.2	92.9
1001-2000	88.3	89.6	97.9	99.5	110.6
2001-4000	89.0	85.1	97.3	92.7	101.0
over 4000	87.1	79.1	92.9	89.6	93.9
Total	89.1	86.8	97.0	94.0	100.0

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	5	9	14	24	42	62	79	87	94	98	99
Businesses mating ewes	6	10	16	26	40	55	74	82	89	93	94
Merino ewes mated	10	19	35	49	76	90	98	99	99	100	100
Businesses mating Merino ewes	2	6	13	23	38	54	73	81	88	92	94

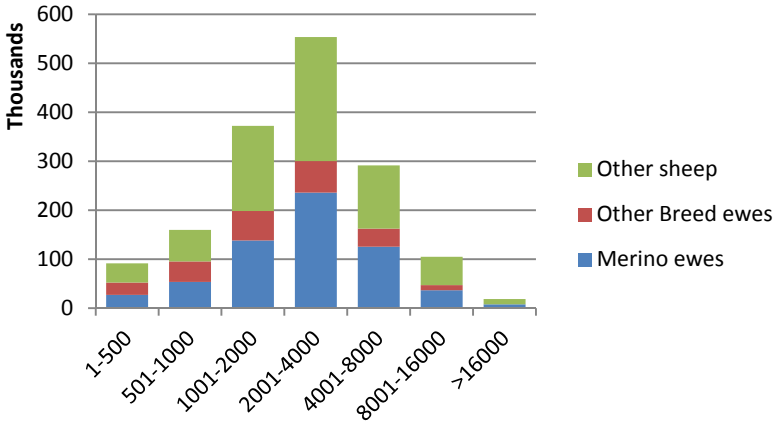
Example interpretation: *In VIC-Goulburn, 14% of all ewes mated were mated on the 16% of farms with an average marking rate <70%.*

Summary for VIC-Loddon

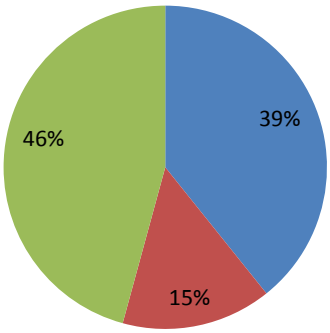
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	1,592
Breeding Ewes - total (thousand)	864
Breeding ewes - Merino (thousand)	625

Businesses at 30-Jun-2011	Total
with sheep and lambs	1,179
with breeding ewes	1,098
with Merino breeding ewes	807

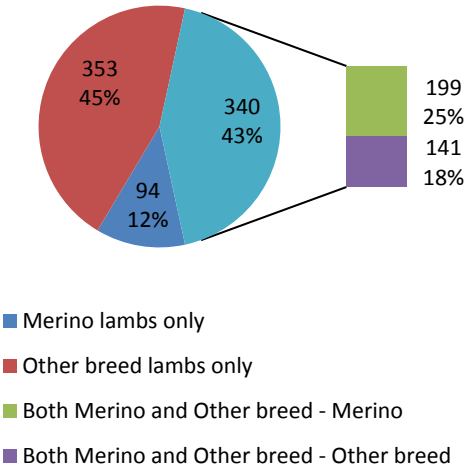
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



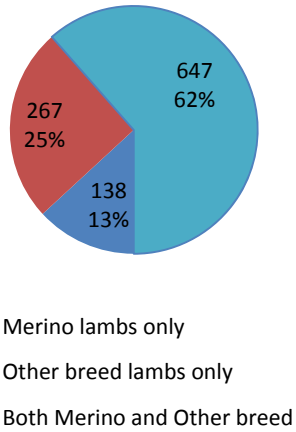
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



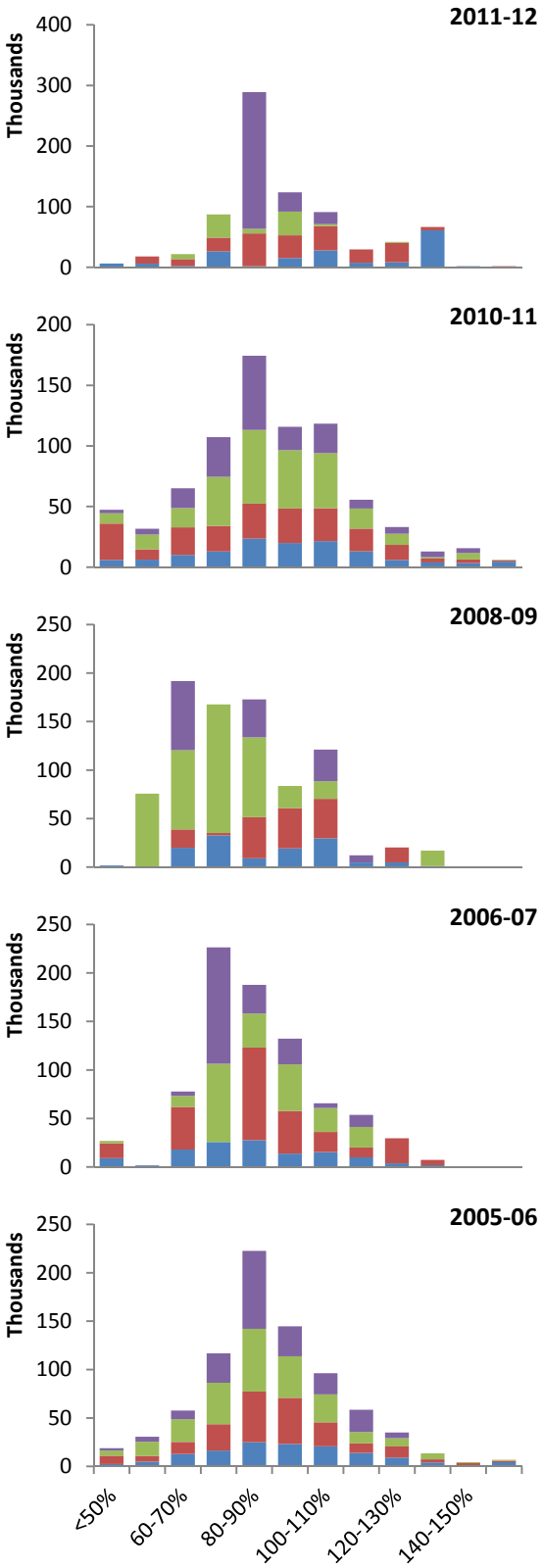
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	6	16	39	74	92	99	100
Businesses with sheep and lambs	37	56	77	94	99	100	100
Breeding ewes	6	17	40	75	94	99	100
Businesses with breeding ewes	34	53	76	94	99	100	100

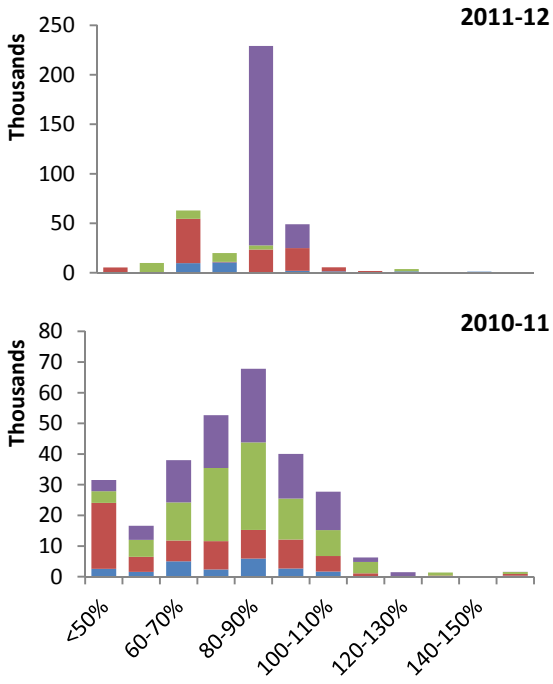
Example interpretation: *In VIC-Loddon, 77% of all flocks have 2000 or less sheep and lambs, and those flocks carry 39% of the sheep and lambs in that region.*

Summary for VIC-Loddon (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	74.9	79.5
1001-2000	60.9	76.9
2001-4000	82.2	70.0
over 4000	84.0	88.0
Total	77.1	82.9

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	95.0	81.4	87.3	94.2	106.3
1001-2000	88.8	86.9	92.8	81.4	95.7
2001-4000	90.4	85.6	78.5	89.6	83.6
over 4000	89.3	81.6	82.9	89.7	90.0
Total	90.5	84.4	83.2	88.2	94.4

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	6	10	18	32	54	69	84	91	96	97	99
Businesses mating ewes	4	8	17	29	47	61	77	86	91	94	96
Merino ewes mated	11	17	30	49	72	86	96	98	99	99	99
Businesses mating Merino ewes	3	7	16	27	46	60	77	85	91	93	96

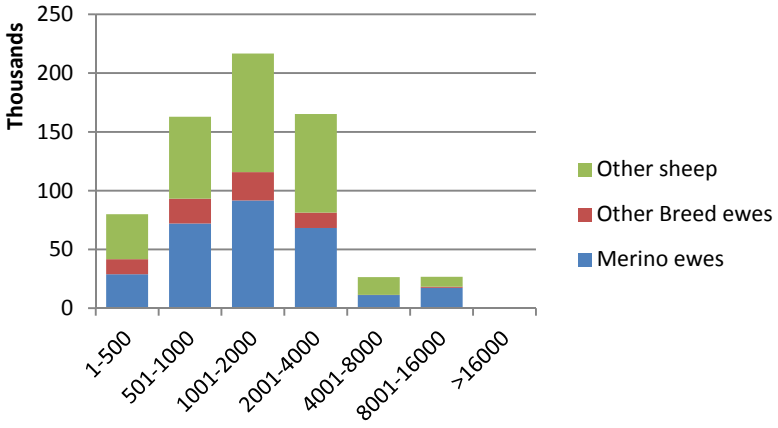
Example interpretation: *In VIC-Loddon, 18% of all ewes mated were mated on the 17% of farms with an average marking rate <70%.*

Summary for VIC-Mallee

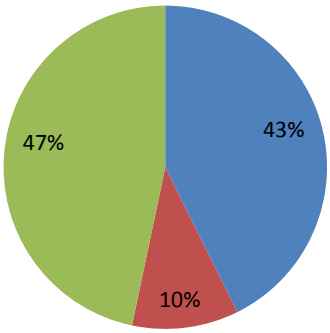
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	678
Breeding Ewes - total (thousand)	361
Breeding ewes - Merino (thousand)	289

Businesses at 30-Jun-2011	Total
with sheep and lambs	807
with breeding ewes	730
with Merino breeding ewes	563

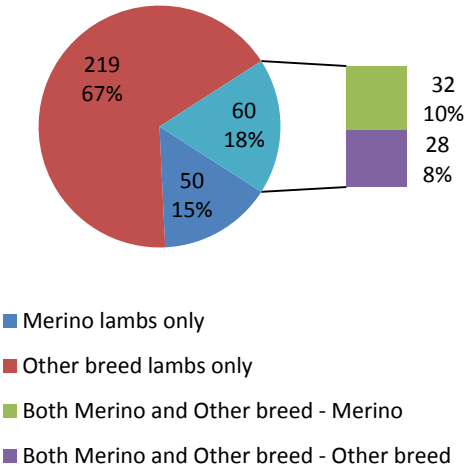
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



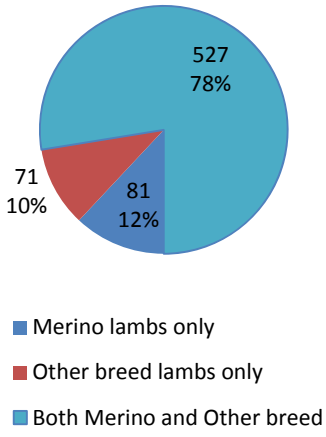
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



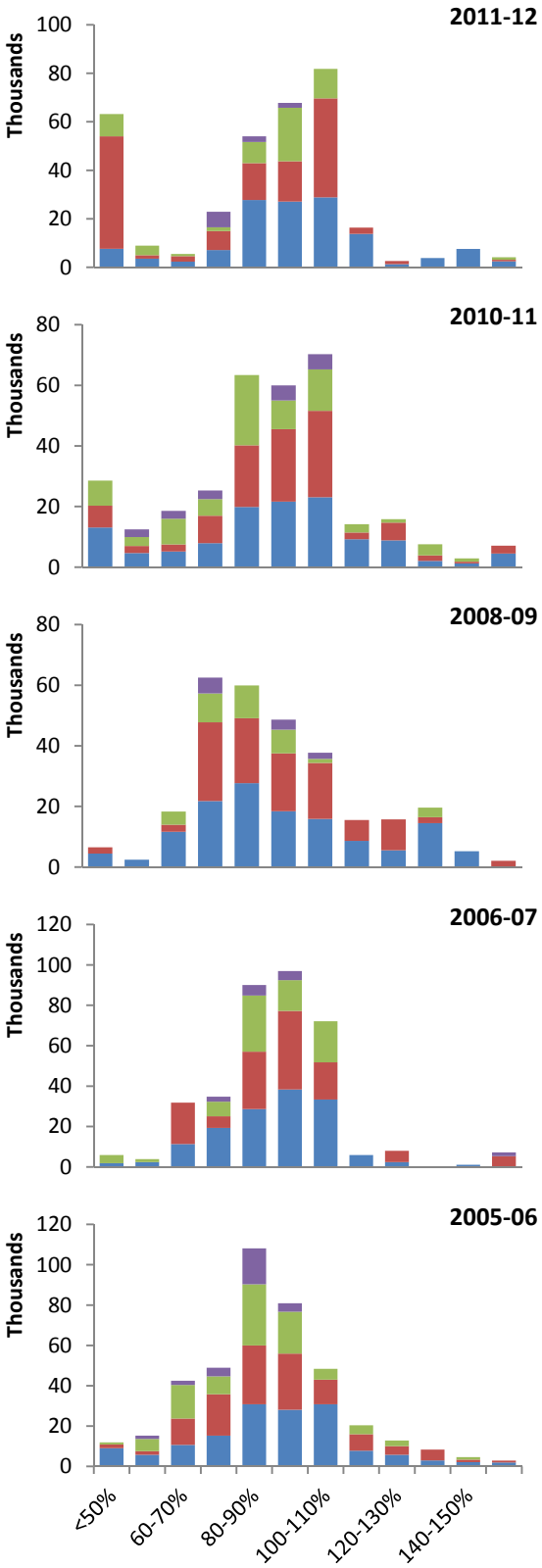
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	12	36	68	92	96	100	100
Businesses with sheep and lambs	44	72	92	99	100	100	100
Breeding ewes	12	37	69	92	95	100	100
Businesses with breeding ewes	40	70	91	99	100	100	100

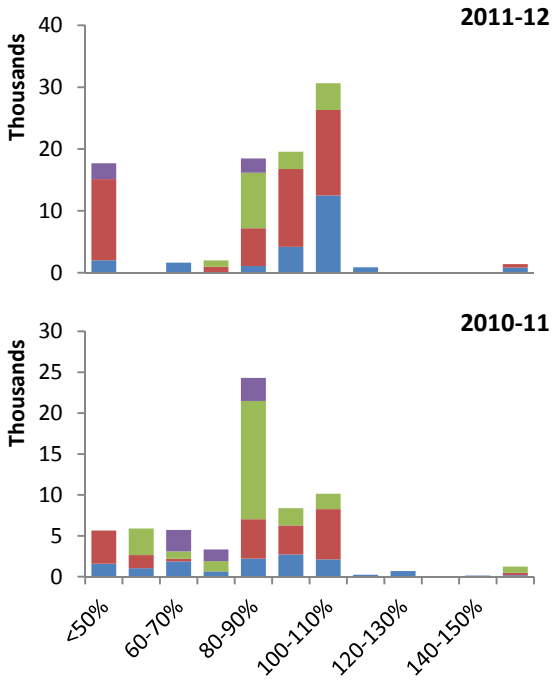
Example interpretation: *In VIC-Mallee, 92% of all flocks have 2000 or less sheep and lambs, and those flocks carry 68% of the sheep and lambs in that region.*

Summary for VIC-Mallee (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	84.4	95.8
1001-2000	78.7	78.1
2001-4000	86.3	90.4
over 4000	77.2	46.6
Total	82.5	83.2

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	89.9	89.5	93.7	93.8	96.8
1001-2000	90.1	91.7	94.1	92.7	71.6
2001-4000	84.1	86.7	87.3	84.5	85.5
over 4000	80.8	93.4	84.7	83.7	78.9
Total	87.9	89.8	92.7	90.6	84.2

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	9	13	18	26	45	64	85	90	95	97	98
Businesses mating ewes	4	8	13	20	36	53	76	83	89	92	93
Merino ewes mated	9	18	26	31	68	81	97	97	98	98	98
Businesses mating Merino ewes	1	4	9	17	34	51	75	82	89	91	93

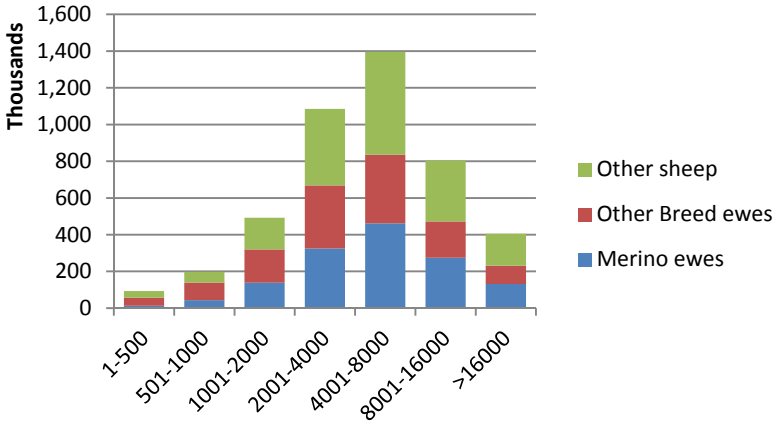
Example interpretation: *In VIC-Mallee, 18% of all ewes mated were mated on the 13% of farms with an average marking rate <70%.*

Summary for VIC-Western District

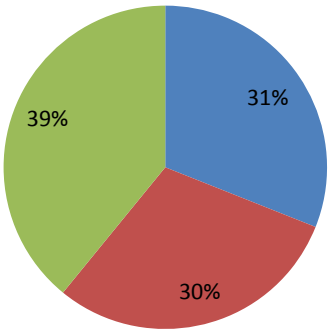
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	4,473
Breeding Ewes - total (thousand)	2,724
Breeding ewes - Merino (thousand)	1,388

Businesses at 30-Jun-2011	Total
with sheep and lambs	1,831
with breeding ewes	1,728
with Merino breeding ewes	1,022

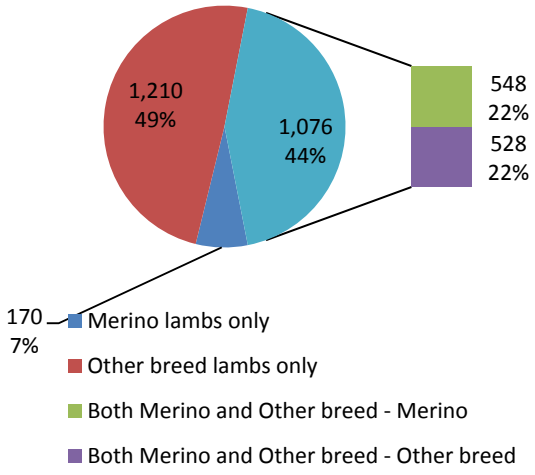
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



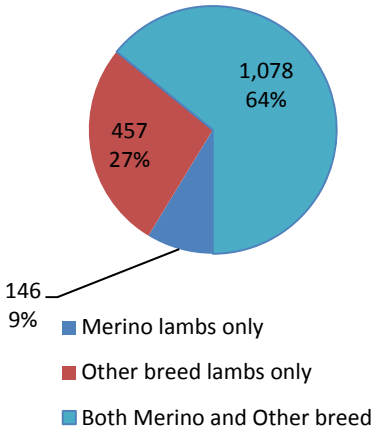
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



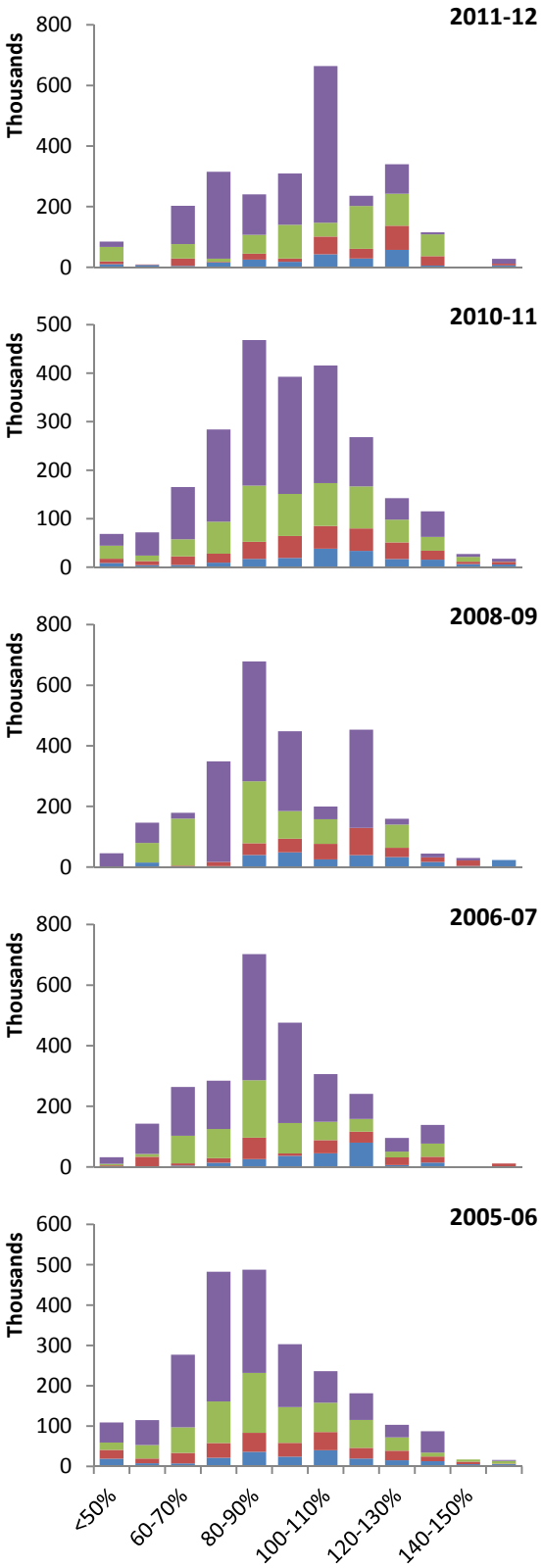
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	2	6	17	42	73	91	100
Businesses with sheep and lambs	27	41	60	81	95	99	100
Breeding ewes	2	7	19	43	74	92	100
Businesses with breeding ewes	24	39	58	80	95	99	100

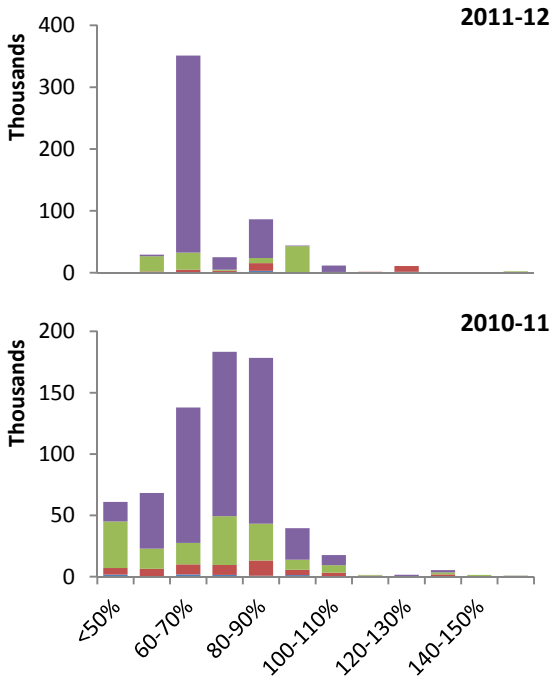
Example interpretation: *In VIC-Western District, 60% of all flocks have 2000 or less sheep and lambs, and those flocks carry 17% of the sheep and lambs in that region.*

Summary for VIC-Western District (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	76.9	130.5
1001-2000	78.0	93.1
2001-4000	67.4	81.9
over 4000	73.9	68.1
Total	72.7	73.0

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	95.6	103.8	107.8	104.9	103.9
1001-2000	90.5	96.0	106.8	100.2	106.6
2001-4000	90.1	89.2	86.1	94.6	101.8
over 4000	85.2	87.6	88.8	91.6	93.7
Total	88.1	90.2	91.9	94.4	98.0

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	3	6	13	24	43	60	77	88	93	98	99
Businesses mating ewes	3	6	11	21	37	51	68	80	88	94	96
Merino ewes mated	9	19	38	65	90	96	98	99	99	100	100
Businesses mating Merino ewes	3	6	11	21	37	51	68	81	88	94	96

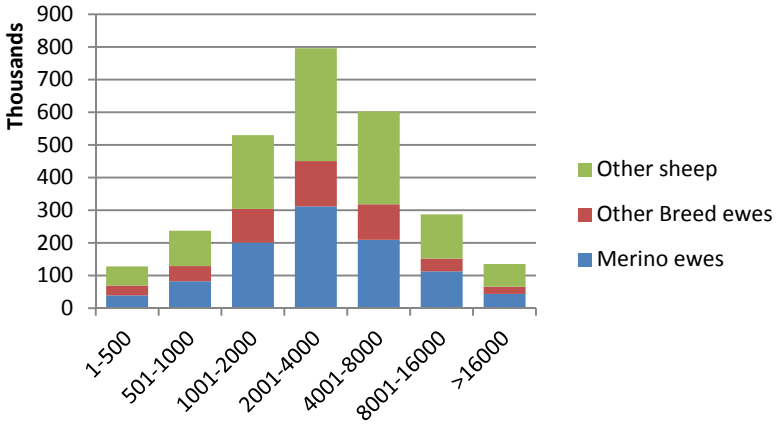
Example interpretation: *In VIC-Western District, 13% of all ewes mated were mated on the 11% of farms with an average marking rate <70%.*

Summary for VIC-Wimmera

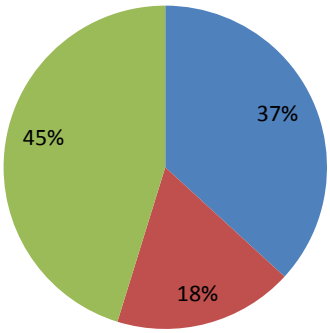
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	2,716
Breeding Ewes - total (thousand)	1,488
Breeding ewes - Merino (thousand)	1,000

Businesses at 30-Jun-2011	Total
with sheep and lambs	1,691
with breeding ewes	1,560
with Merino breeding ewes	1,220

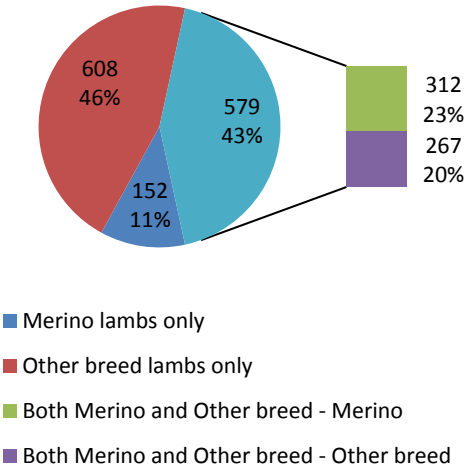
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



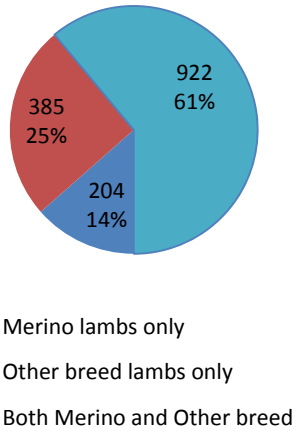
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



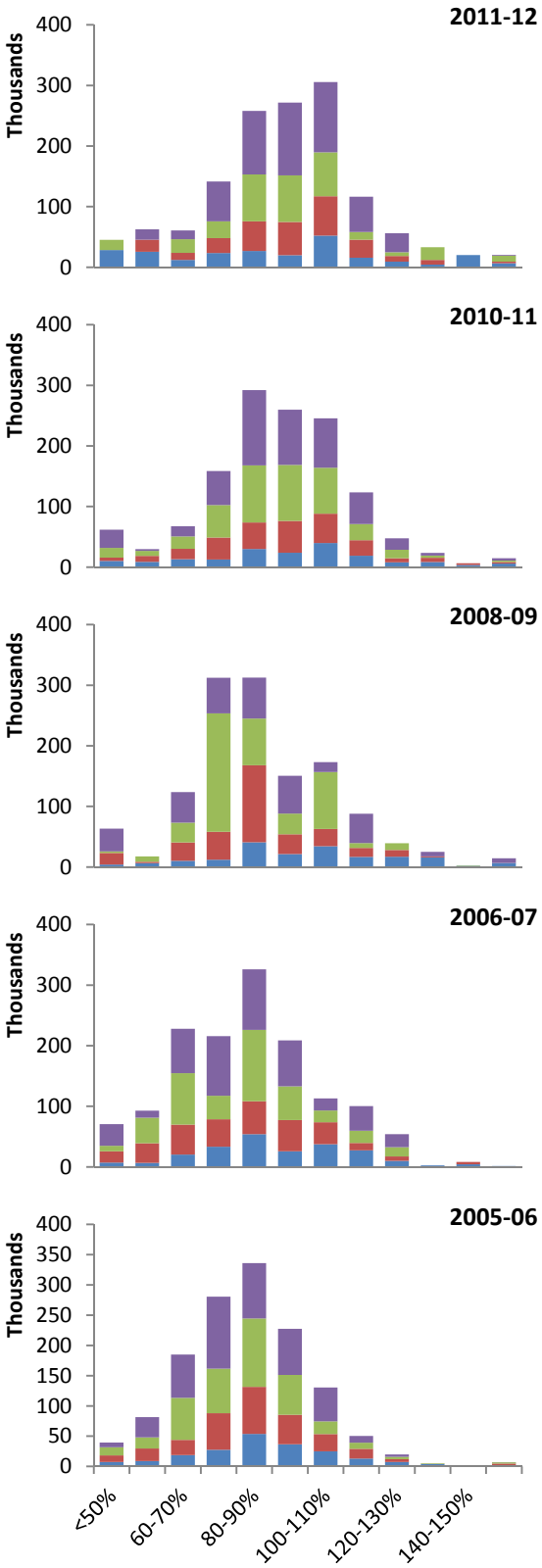
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	5	13	33	62	84	95	100
Businesses with sheep and lambs	33	52	74	92	98	100	100
Breeding ewes	5	13	34	64	85	96	100
Businesses with breeding ewes	29	49	72	91	98	100	100

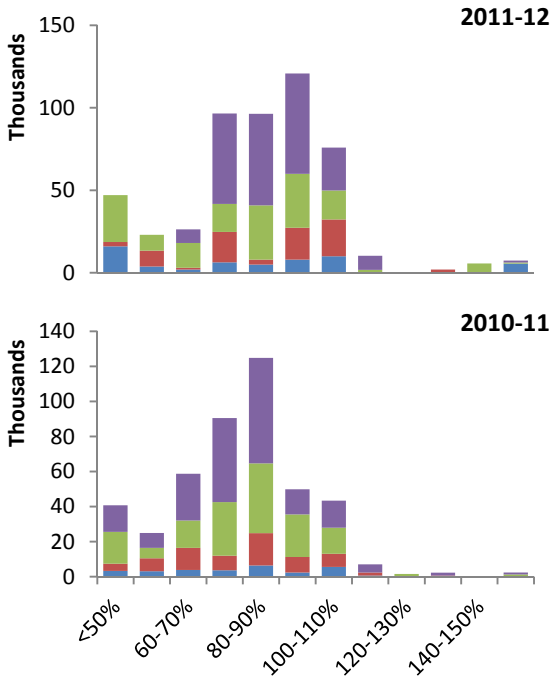
Example interpretation: *In VIC-Wimmera, 74% of all flocks have 2000 or less sheep and lambs, and those flocks carry 33% of the sheep and lambs in that region.*

Summary for VIC-Wimmera (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	76.8	86.3
1001-2000	82.0	85.3
2001-4000	76.9	78.7
over 4000	79.0	88.0
Total	78.6	84.5

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	88.0	90.8	99.2	95.7	91.1
1001-2000	83.4	79.9	83.1	93.8	95.4
2001-4000	81.0	79.7	85.1	89.6	96.3
over 4000	81.5	83.0	85.5	90.8	95.0
Total	82.8	82.6	86.7	91.7	94.7

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	5	7	12	24	46	65	84	93	97	98	99
Businesses mating ewes	3	7	14	24	42	60	78	88	92	95	96
Merino ewes mated	9	15	28	48	76	87	97	99	99	99	99
Businesses mating Merino ewes	2	6	12	23	41	59	78	88	92	95	96

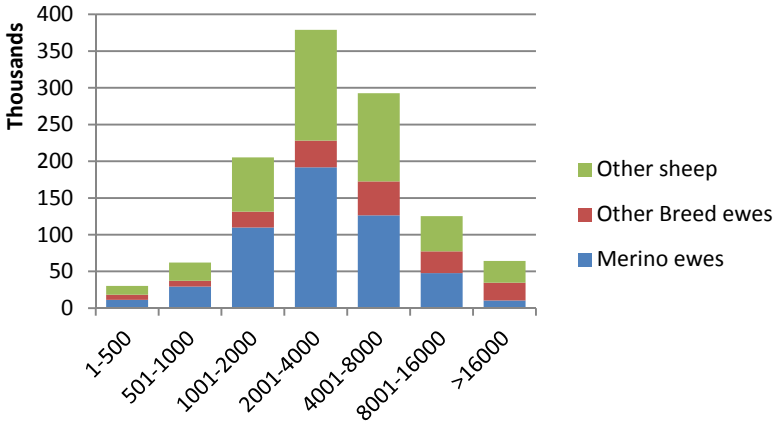
Example interpretation: *In VIC-Wimmera, 12% of all ewes mated were mated on the 14% of farms with an average marking rate <70%.*

Summary for WA-Central

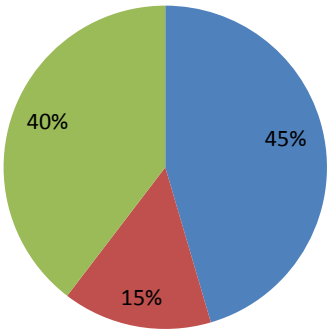
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	1,159
Breeding Ewes - total (thousand)	700
Breeding ewes - Merino (thousand)	527

Businesses at 30-Jun-2011	Total
with sheep and lambs	583
with breeding ewes	557
with Merino breeding ewes	437

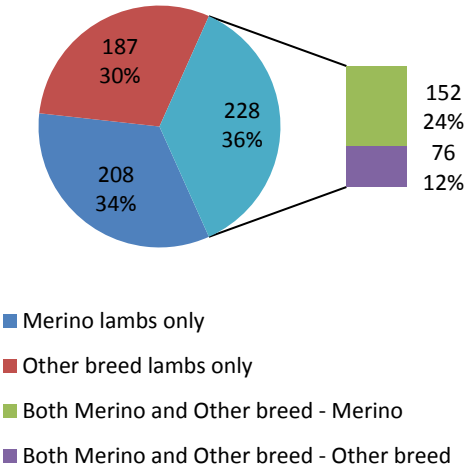
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



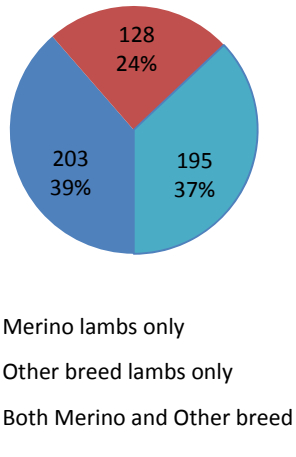
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



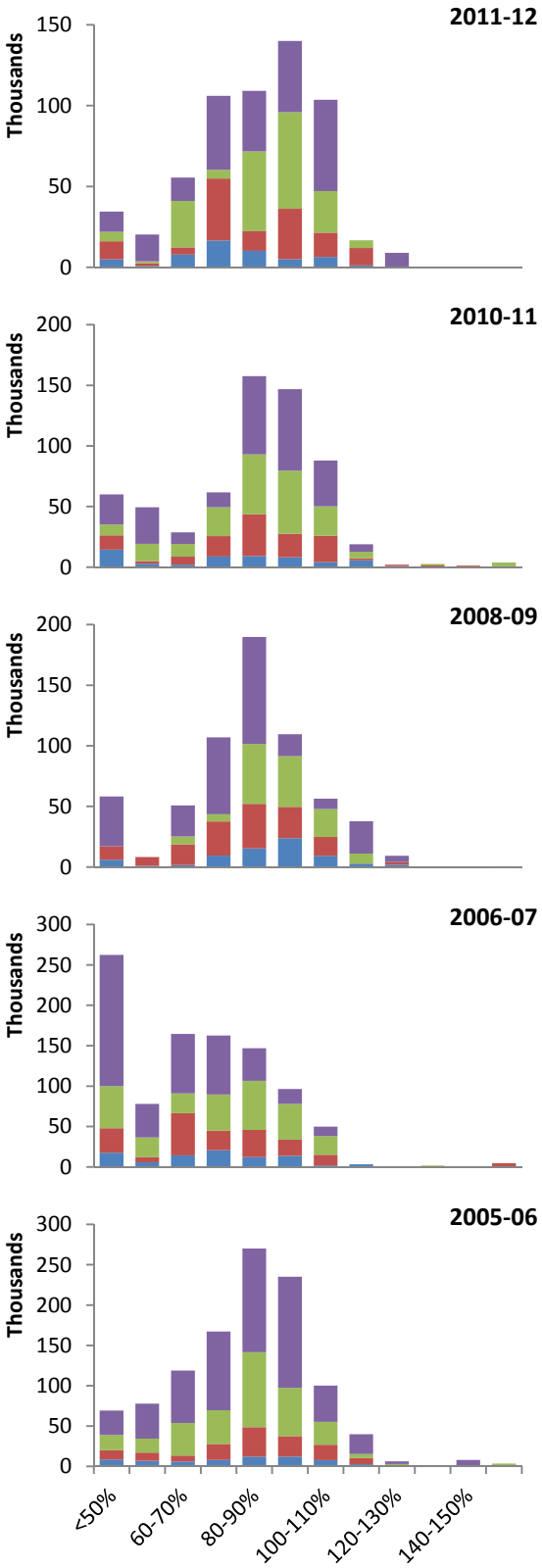
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	3	8	26	58	84	94	100
Businesses with sheep and lambs	27	42	65	88	97	99	100
Breeding ewes	3	8	27	59	84	95	100
Businesses with breeding ewes	25	40	63	87	97	99	100

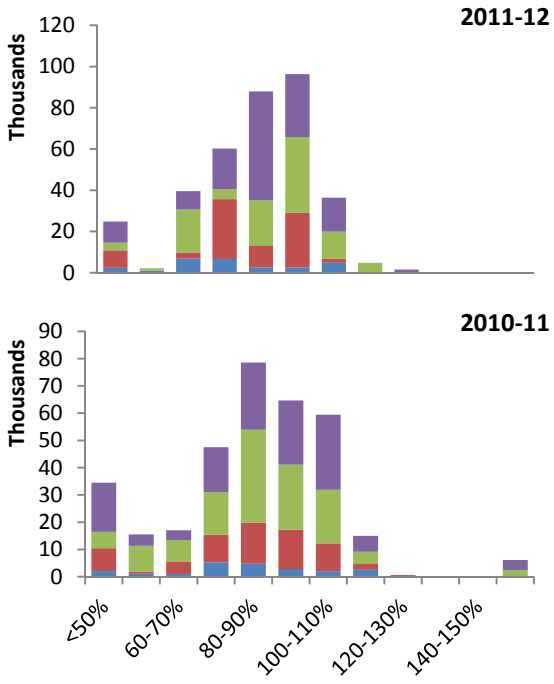
Example interpretation: *In WA-Central, 65% of all flocks have 2000 or less sheep and lambs, and those flocks carry 26% of the sheep and lambs in that region.*

Summary for WA-Central (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	82.8	76.5
1001-2000	82.7	78.1
2001-4000	86.1	84.5
over 4000	83.0	82.1
Total	84.0	81.5

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	77.0	67.7	86.2	70.2	80.5
1001-2000	80.7	70.6	78.9	84.8	82.9
2001-4000	80.6	72.5	91.3	86.5	85.6
over 4000	81.9	59.9	76.9	79.9	85.3
Total	81.1	66.2	81.5	82.0	84.4

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	10	18	22	32	58	81	95	98	99	99	99
Businesses mating ewes	9	14	21	33	57	75	89	95	96	97	97
Merino ewes mated	10	15	20	34	57	76	94	98	98	98	98
Businesses mating Merino ewes	5	11	18	31	56	74	89	94	96	97	97

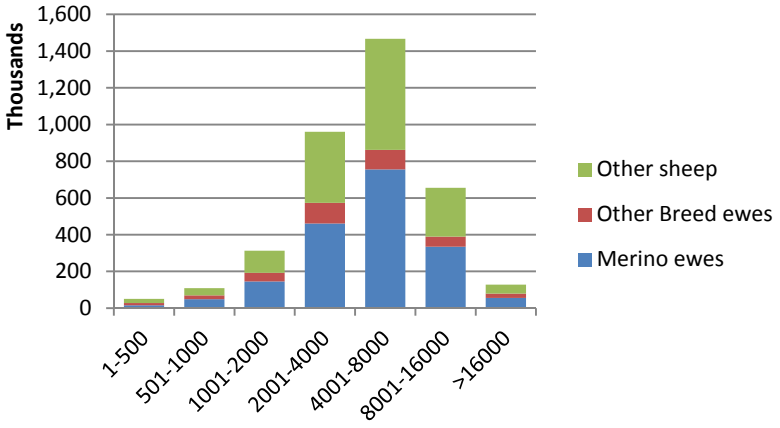
Example interpretation: *In WA-Central, 22% of all ewes mated were mated on the 21% of farms with an average marking rate <70%.*

Summary for WA-Lower Great Southern

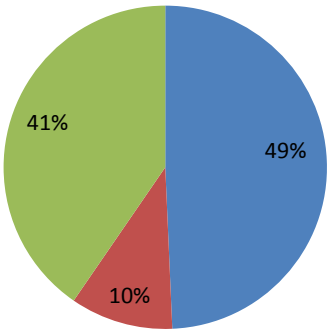
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	3,684
Breeding Ewes - total (thousand)	2,195
Breeding ewes - Merino (thousand)	1,816

Businesses at 30-Jun-2011	Total
with sheep and lambs	1,301
with breeding ewes	1,233
with Merino breeding ewes	994

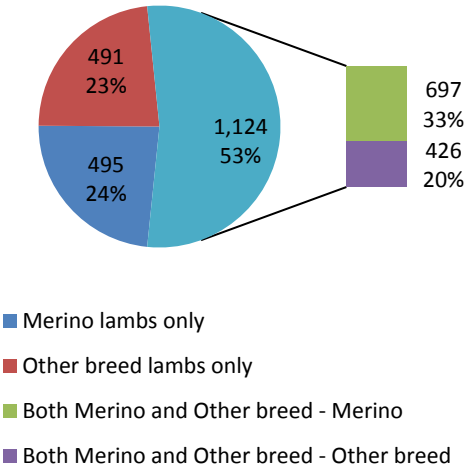
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



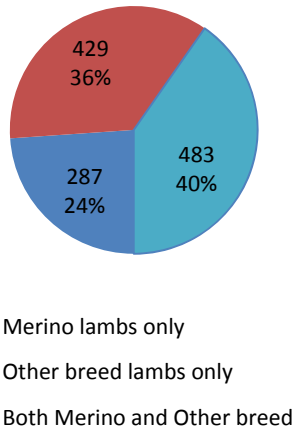
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



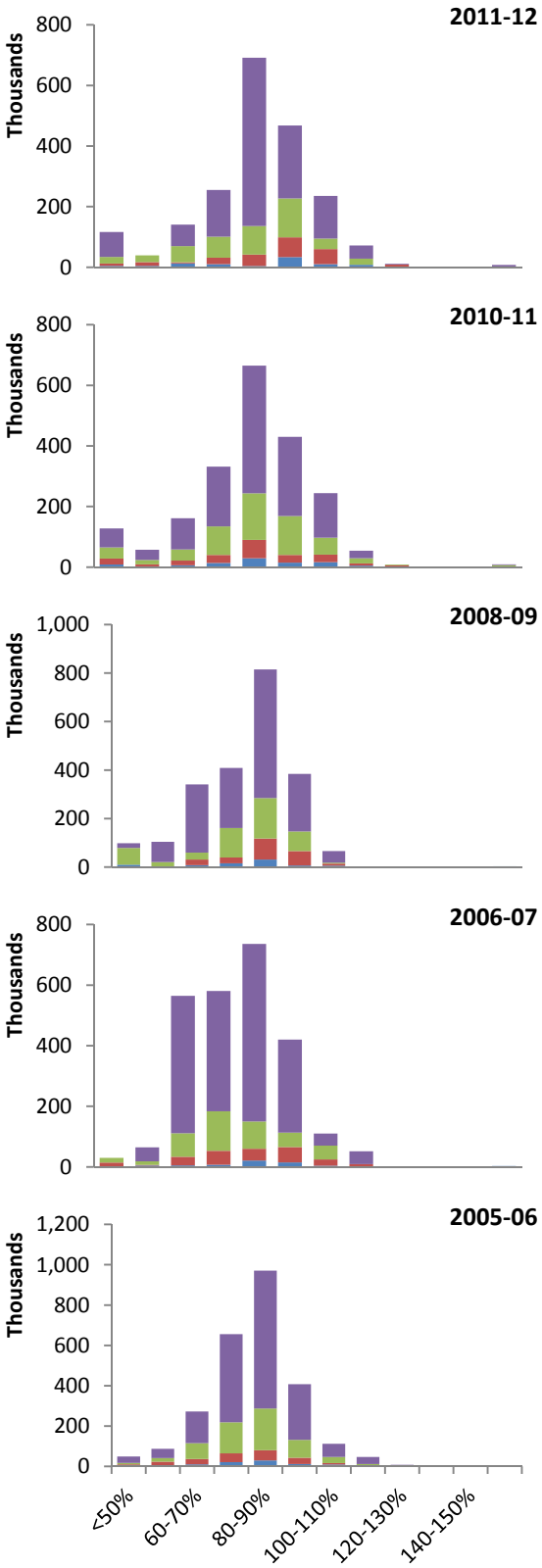
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	1	4	13	39	79	97	100
Businesses with sheep and lambs	22	33	49	74	95	100	100
Breeding ewes	1	4	13	39	79	96	100
Businesses with breeding ewes	20	31	47	73	94	99	100

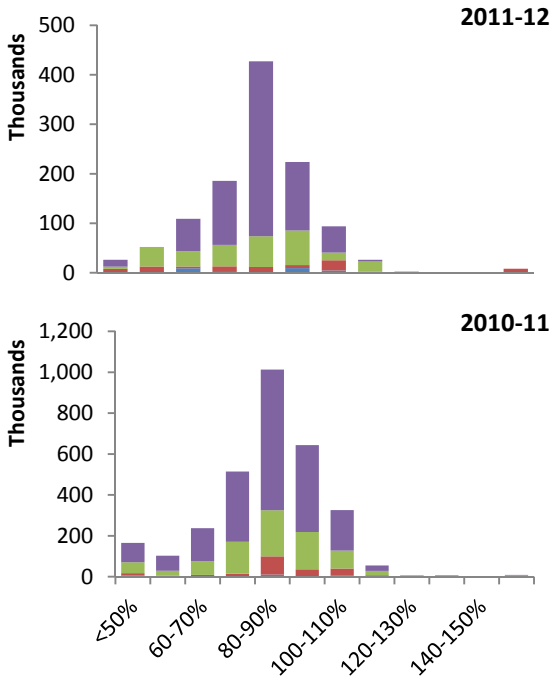
Example interpretation: *In WA-Lower Great Southern, 49% of all flocks have 2000 or less sheep and lambs, and those flocks carry 13% of the sheep and lambs in that region.*

Summary for WA-Lower Great Southern (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	78.8	87.6
1001-2000	88.3	96.6
2001-4000	84.4	81.1
over 4000	82.8	83.0
Total	83.5	83.6

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	80.6	87.3	81.5	86.2	86.8
1001-2000	82.9	80.8	83.2	83.1	92.5
2001-4000	81.1	79.6	76.0	85.1	83.1
over 4000	82.0	80.0	79.0	83.4	84.6
Total	81.8	80.1	78.8	84.0	85.2

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	6	9	17	32	64	85	96	99	99	100	100
Businesses mating ewes	6	9	17	32	60	78	91	94	96	97	97
Merino ewes mated	6	10	19	38	71	90	99	99	99	100	100
Businesses mating Merino ewes	3	7	15	31	59	78	91	94	96	97	97

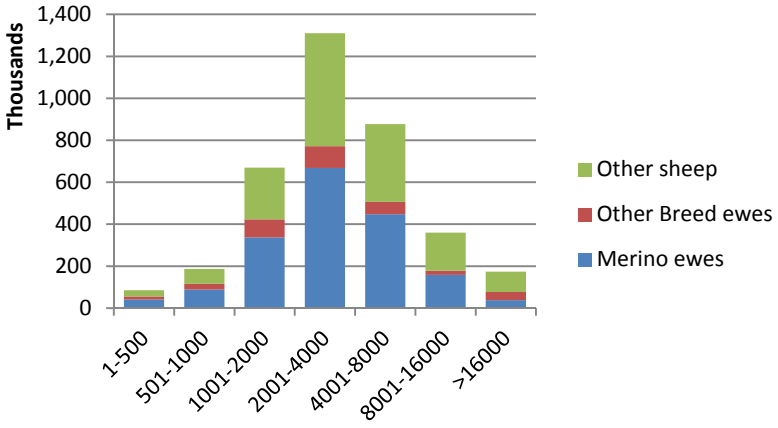
Example interpretation: *In WA-Lower Great Southern, 17% of all ewes mated were mated on the 17% of farms with an average marking rate <70%.*

Summary for WA-Midlands

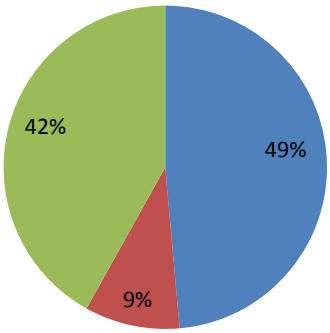
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	3,663
Breeding Ewes - total (thousand)	2,128
Breeding ewes - Merino (thousand)	1,780

Businesses at 30-Jun-2011	Total
with sheep and lambs	1,840
with breeding ewes	1,742
with Merino breeding ewes	1,469

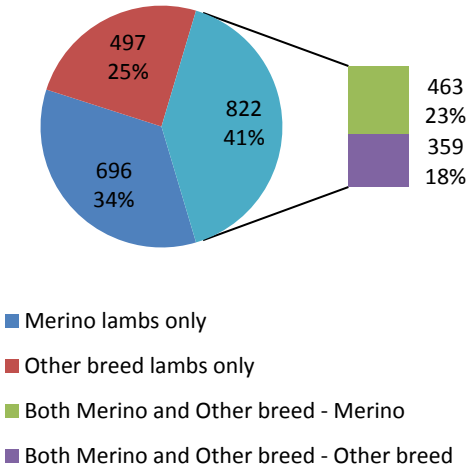
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



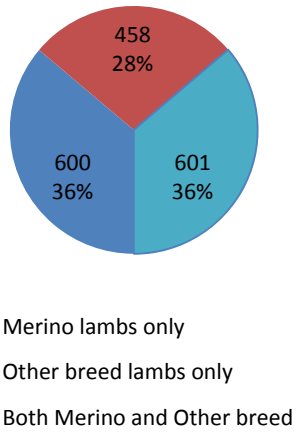
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



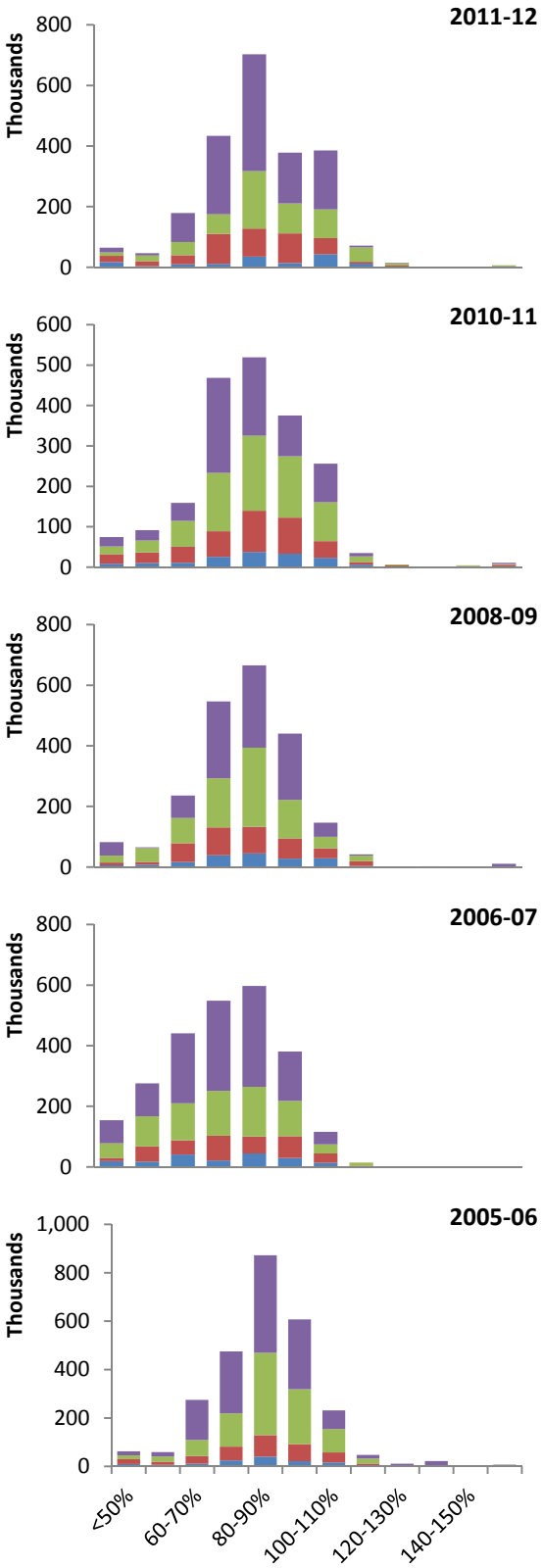
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	2	7	26	61	85	95	100
Businesses with sheep and lambs	25	38	63	89	98	100	100
Breeding ewes	3	8	28	64	88	96	100
Businesses with breeding ewes	22	36	61	88	98	100	100

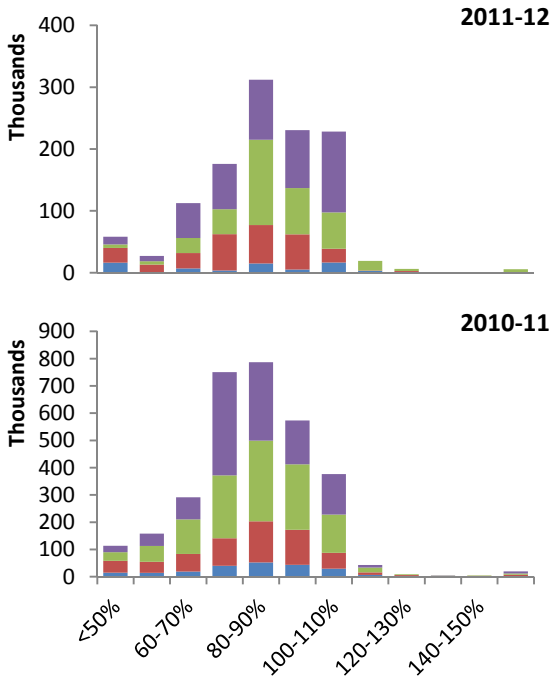
Example interpretation: *In WA-Midlands, 63% of all flocks have 2000 or less sheep and lambs, and those flocks carry 26% of the sheep and lambs in that region.*

Summary for WA-Midlands (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	85.2	80.3
1001-2000	82.2	78.9
2001-4000	83.7	90.0
over 4000	82.8	85.4
Total	83.2	85.1

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	82.8	73.5	82.6	88.0	88.3
1001-2000	85.6	77.2	81.5	83.5	83.0
2001-4000	87.1	74.9	81.0	85.0	89.1
over 4000	83.6	74.9	83.1	82.7	84.2
Total	85.0	75.1	82.1	84.1	85.5

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	4	8	16	40	66	84	97	99	99	99	99
Businesses mating ewes	5	10	19	37	62	81	93	96	97	97	98
Merino ewes mated	3	9	21	46	70	87	98	99	99	99	99
Businesses mating Merino ewes	3	8	17	36	61	80	93	96	97	97	98

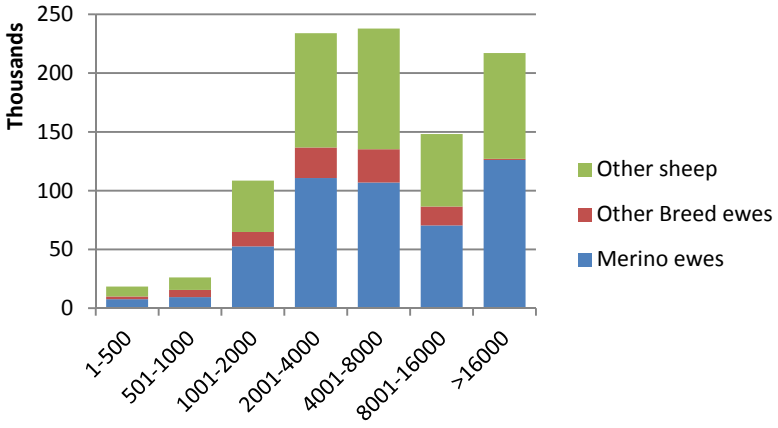
Example interpretation: *In WA-Midlands, 16% of all ewes mated were mated on the 19% of farms with an average marking rate <70%.*

Summary for WA-South Eastern

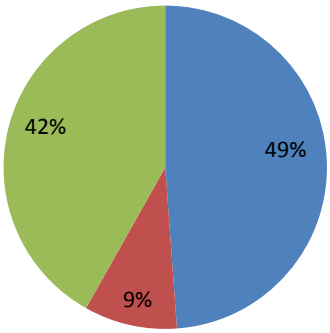
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	990
Breeding Ewes - total (thousand)	576
Breeding ewes - Merino (thousand)	484

Businesses at 30-Jun-2011	Total
with sheep and lambs	350
with breeding ewes	323
with Merino breeding ewes	265

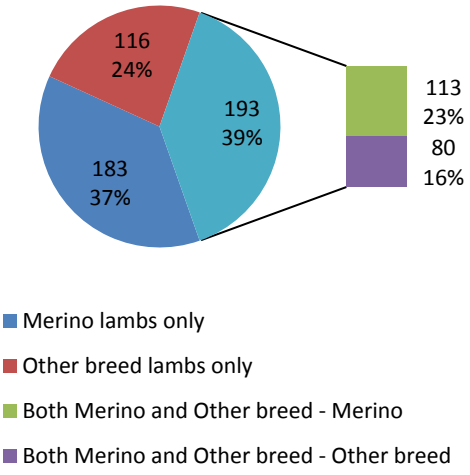
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



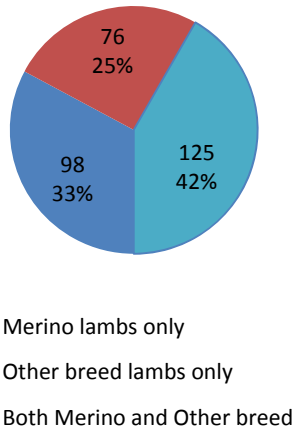
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



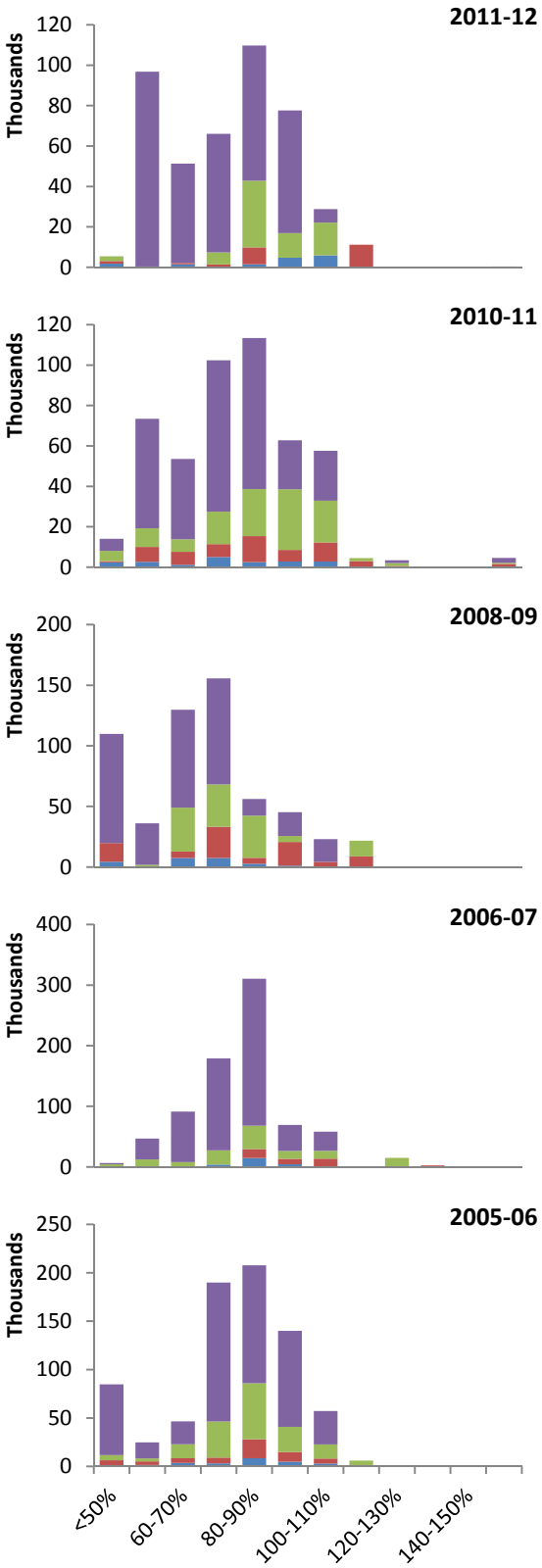
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	2	4	15	39	63	78	100
Businesses with sheep and lambs	26	37	58	82	94	98	100
Breeding ewes	2	4	16	39	63	78	100
Businesses with breeding ewes	22	33	55	81	93	97	100

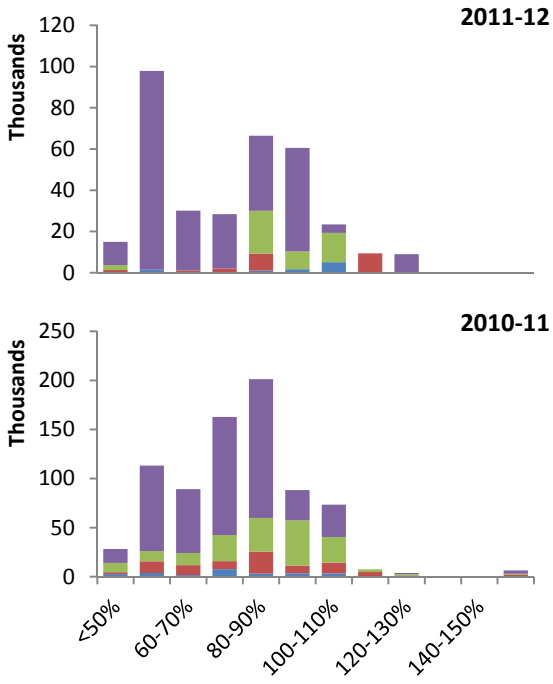
Example interpretation: *In WA-South Eastern, 58% of all flocks have 2000 or less sheep and lambs, and those flocks carry 15% of the sheep and lambs in that region.*

Summary for WA-South Eastern (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	75.8	88.1
1001-2000	87.4	92.5
2001-4000	88.1	96.6
over 4000	75.3	70.5
Total	79.4	75.9

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	82.3	83.9	66.6	76.4	86.9
1001-2000	80.9	95.3	75.5	88.8	94.6
2001-4000	87.9	85.3	79.2	88.2	93.8
over 4000	74.8	78.4	59.7	76.4	75.3
Total	78.4	80.6	66.5	80.5	79.6

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	3	18	29	50	73	86	97	98	99	99	99
Businesses mating ewes	5	13	21	39	59	72	92	93	95	95	95
Merino ewes mated	5	19	31	53	84	93	98	99	99	99	99
Businesses mating Merino ewes	4	12	20	38	58	72	92	93	95	95	95

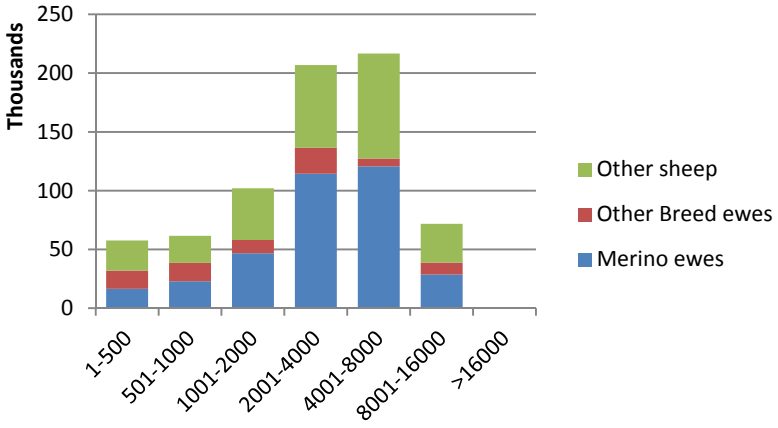
Example interpretation: *In WA-South Eastern, 29% of all ewes mated were mated on the 21% of farms with an average marking rate <70%.*

Summary for WA-South West

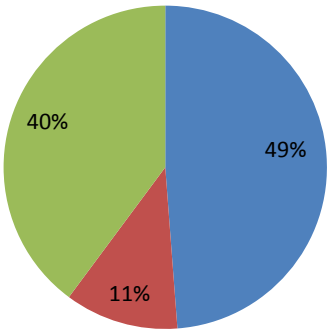
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	716
Breeding Ewes - total (thousand)	431
Breeding ewes - Merino (thousand)	350

Businesses at 30-Jun-2011	Total
with sheep and lambs	740
with breeding ewes	635
with Merino breeding ewes	383

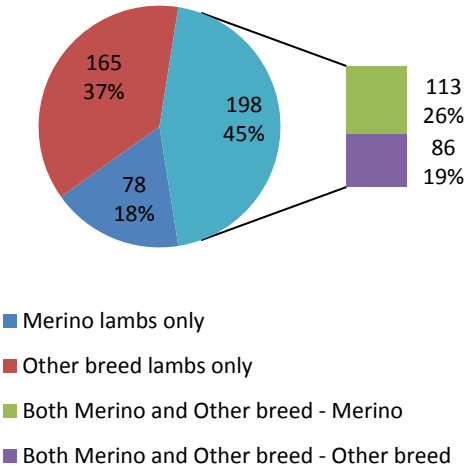
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



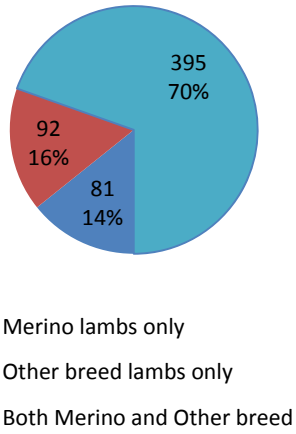
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



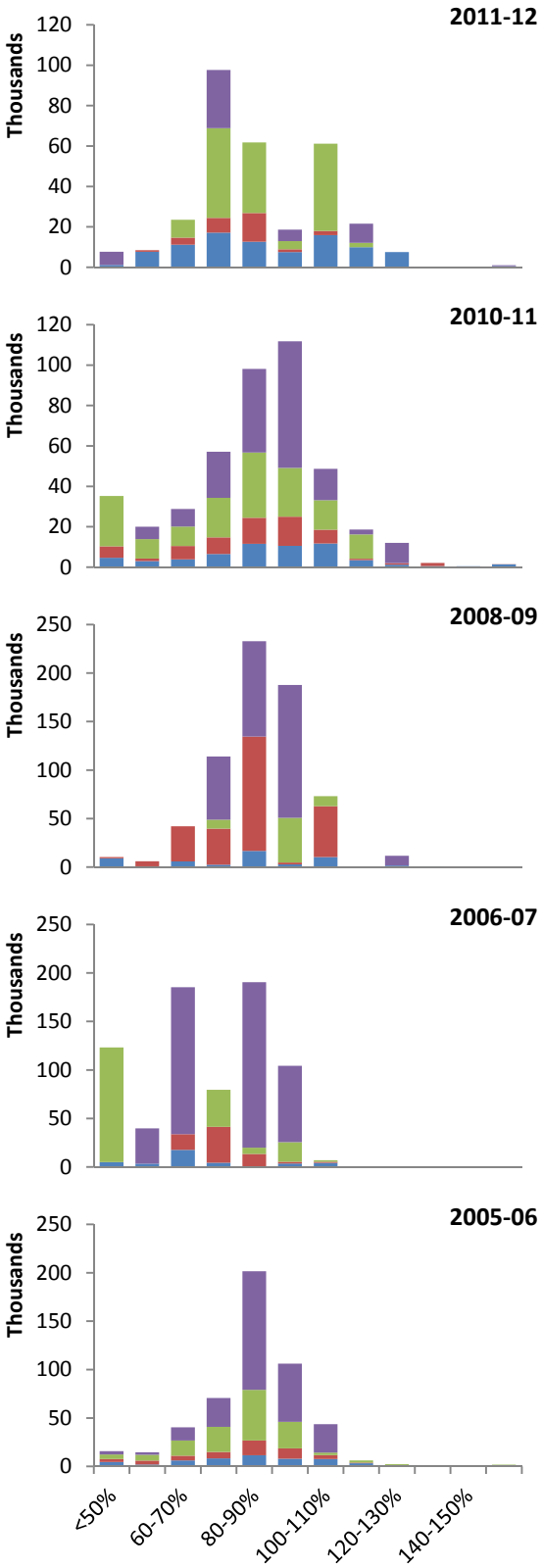
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	8	17	31	60	90	100	100
Businesses with sheep and lambs	63	75	84	94	99	100	100
Breeding ewes	7	16	30	61	91	100	100
Businesses with breeding ewes	60	71	81	93	99	100	100

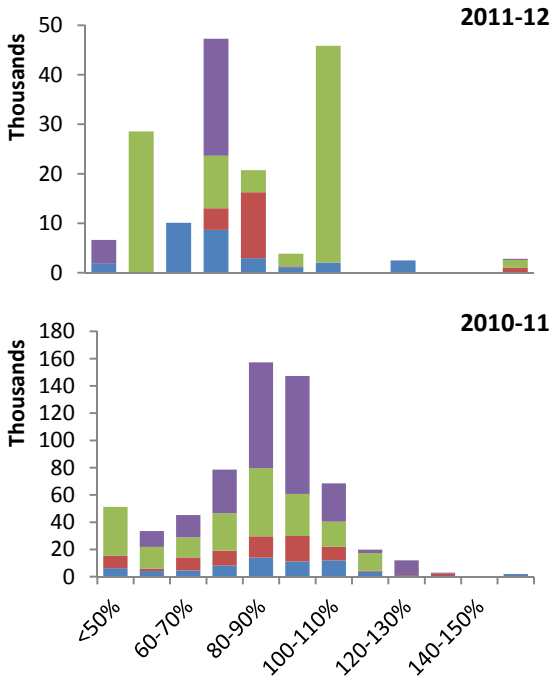
Example interpretation: *In WA-South West, 84% of all flocks have 2000 or less sheep and lambs, and those flocks carry 31% of the sheep and lambs in that region.*

Summary for WA-South West (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	88.7	76.5
1001-2000	82.7	92.7
2001-4000	75.6	92.2
over 4000	88.4	119.1
Total	83.4	94.1

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	83.3	68.2	80.0	89.7	92.0
1001-2000	80.3	75.6	83.0	84.7	83.4
2001-4000	81.3	49.3	96.4	77.2	87.5
over 4000	86.1	76.6	89.4	90.2	105.1
Total	83.9	69.2	87.0	85.0	91.4

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	8	13	19	32	55	81	92	96	99	100	100
Businesses mating ewes	7	13	22	32	49	65	82	87	91	92	93
Merino ewes mated	9	16	25	37	69	88	99	99	99	100	100
Businesses mating Merino ewes	3	10	19	29	47	64	81	86	90	92	93

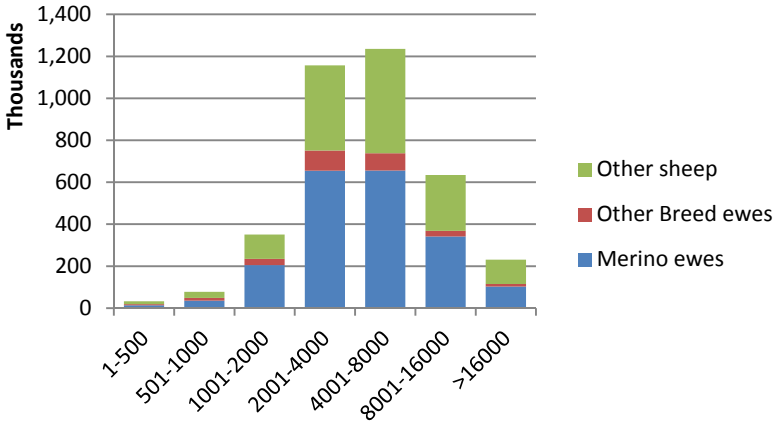
Example interpretation: *In WA-South West, 19% of all ewes mated were mated on the 22% of farms with an average marking rate <70%.*

Summary for WA-Upper Great Southern

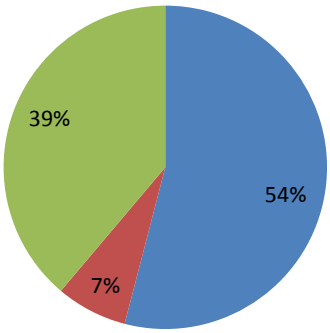
Flock size at 30-Jun-2011	Total
Sheep and lambs (thousand)	3,719
Breeding Ewes - total (thousand)	2,275
Breeding ewes - Merino (thousand)	2,010

Businesses at 30-Jun-2011	Total
with sheep and lambs	1,190
with breeding ewes	1,147
with Merino breeding ewes	1,044

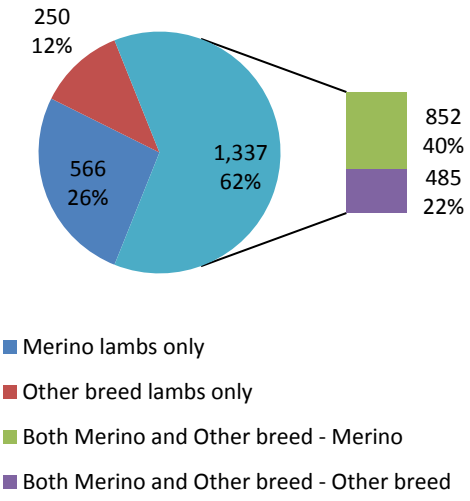
Number (thousands) of Merino ewes, other breed ewes and other sheep (lambs, wethers, rams) by farm flock size



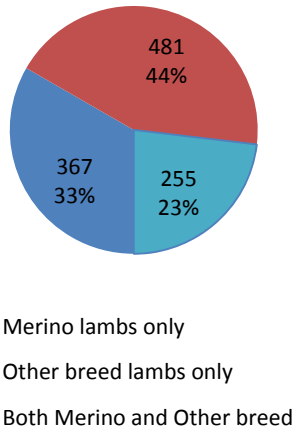
Flock Composition



Number of ewes mated (thousands) by types of lambs produced by the business



Number of businesses by types of lambs produced by the business



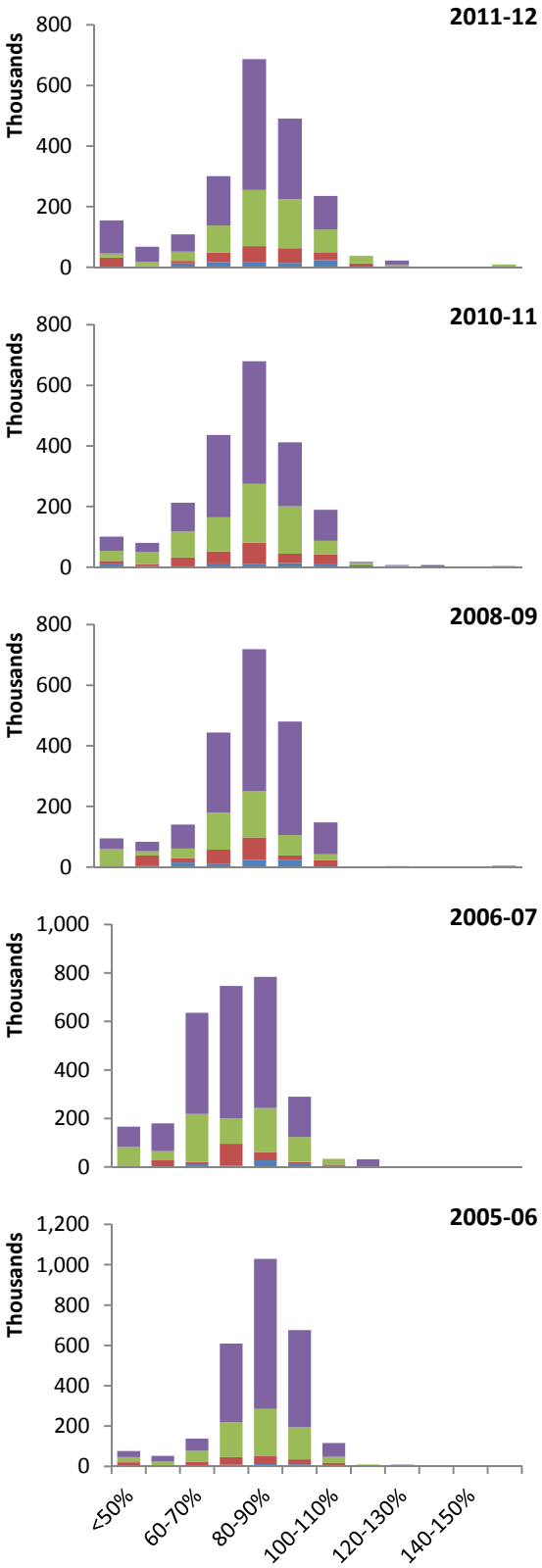
Flock size (number of sheep and lambs)

Cumulative percent by flock size	<=500	<=1000	<=2000	<=4000	<=8000	<=16000	All
Sheep and lambs	1	3	12	44	77	94	100
Businesses with sheep and lambs	13	22	41	75	94	99	100
Breeding ewes	1	3	13	46	79	95	100
Businesses with breeding ewes	12	20	40	74	94	99	100

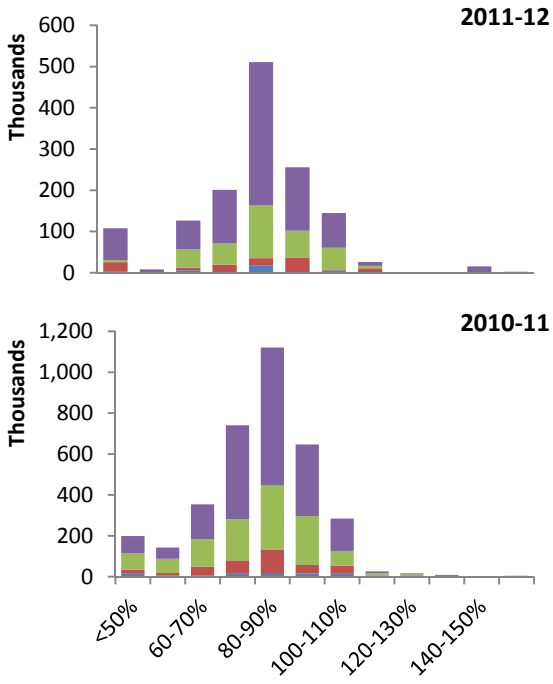
Example interpretation: *In WA-Upper Great Southern, 41% of all flocks have 2000 or less sheep and lambs, and those flocks carry 12% of the sheep and lambs in that region.*

Summary for WA-Upper Great Southern (continued)

Number of ewes joined by marking rate category (all lambs) and farm flock size.



Number of Merino ewes joined by Merino marking rate category and farm flock size.



Farm flock size

- over 4000
- 2001-4000
- 1001-2000
- 1-1000

Average marking rate, Merino lambs

Flock size	2010-11	2011-12
1-1000	80.2	80.2
1001-2000	84.3	78.7
2001-4000	80.6	85.6
over 4000	82.1	82.9
Total	81.8	83.2

Average marking rate, all lambs

Flock size	2005-06	2006-07	2008-09	2010-11	2011-12
1-1000	84.1	83.5	83.0	81.4	86.8
1001-2000	79.6	73.3	78.3	85.7	82.8
2001-4000	81.5	73.7	74.4	81.9	88.0
over 4000	84.1	75.3	83.8	82.5	81.7
Total	83.2	75.0	81.2	82.6	83.8

Cumulative proportion of ewes mated and businesses by marking rate categories, 2010-11

Marking rate category	<50%	<60%	<70%	<80%	<90%	<100%	<110%	<120%	<130%	<140%	<150%
All ewes mated	5	8	18	39	70	89	98	99	99	100	100
Businesses mating ewes	5	9	20	40	67	85	95	96	97	97	98
Merino ewes mated	7	12	22	43	75	92	99	99	100	100	100
Businesses mating Merino ewes	5	10	20	40	67	85	95	96	97	97	98

Example interpretation: *In WA-Upper Great Southern, 18% of all ewes mated were mated on the 20% of farms with an average marking rate <70%.*