

RECENT CHANGES IN THE AUSTRALIAN SHEEP INDUSTRY (THE DISAPPEARING FLOCK)

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The Australian sheep industry has undergone, and continues to undergo, significant restructuring. At the core of this restructure is a re-weighting of the value derived from the sheep and lamb meat industries relative to the value derived from wool. In addition, there has been a sustained decline in the size of the sheep population over the last 20 years.

These changes in flock size and relative value from sheep meat and wool are dramatic. This report presents evidence of these changes and asks if they are sustainable.

Sheep flock falling since 1990

ABS reports the national sheep flock at 76.9 million head for mid 2008, the lowest it has been since 1916 (Figure 1). Since 1990, when there were 170 million head, the flock has declined by 4.2% per year or around 4 million head per year. A total decline of 55%.

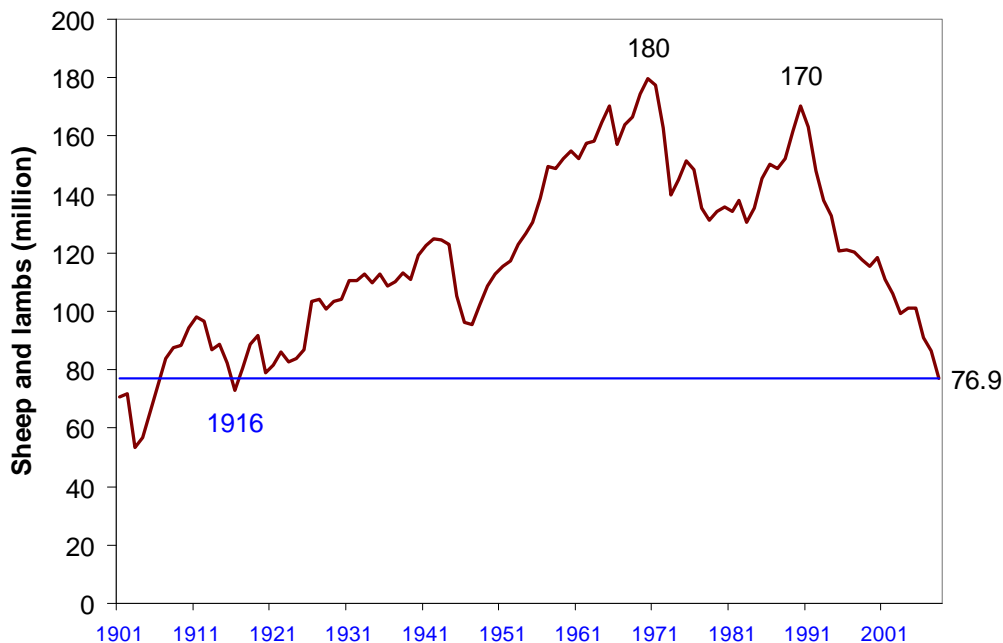


Figure 1 Size of the Australian sheep flock.
Source: ABS

Returns from sheep now balanced between meat and wool

Gross value of production from slaughter of sheep and lambs, and from wool for the periods 1989/90 through 1991/92, and 2005/06 through 2007/08 are presented in Table 1. In the earlier period, wool accounted for about 85% of the gross value from sheep. In the latter period, gross value is evenly balanced between wool and sheep meat. When adjusted for inflation, average gross value per year between 1989/90 and 1991/92 was \$732m (in 2007/08 dollars) from sheep and lambs and \$6706m from wool.

Table 1 Gross value of production per year (\$ million, not adjusted for inflation)
Source: ABS

Year	1989/90 to 1991/92	2005/06 to 2007/08
Livestock slaughterings and other disposals (net live exports) - Sheep and lambs (excludes value of wool on skins)	470	2112
Wool (includes dead wool and wool on skins)	4293	2225

The key question is how much of the gross value from sheep and lamb slaughter is from sustainable production, and how much is from selling down the national flock. An estimate can be made by splitting the drop in the population equally between lambs, sheep and live export, and then multiplying by the average value of each animal type. Averaged across the three years (2005/06 to 2007/08), the sell down has an estimated worth of \$457 million per year, or 22 per cent. A more conservative approach is to attribute all of the sell down to sheep (for mutton) giving an average estimate of \$242 million per year, or 11 per cent.

Changes in the regional distribution of sheep

The relative contribution to the Australian flock by each state has changed considerably since 1916 when New South Wales and Queensland accounted for over 70% of all sheep. By 1990, New South Wales (36%), Western Australia (23%) and Victoria (17%) dominate the national flock. Since 1990, while total sheep number has declined, Victoria has increased its share of the national flock by 5% and Queensland has declined by the same amount (Figure 2).

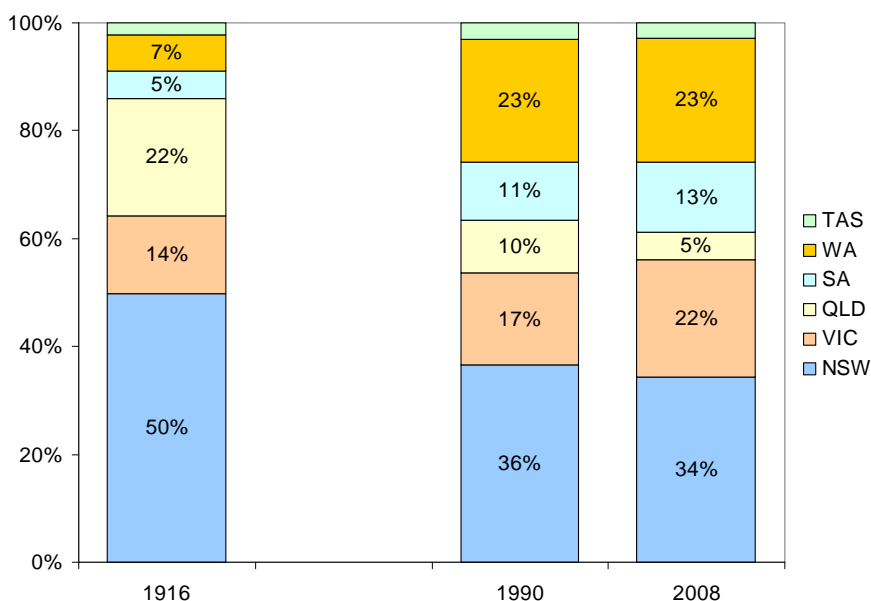


Figure 2 Distribution of the Australian sheep flock by state in 1916, 1990 and 2008.
Source: ABS.

Number of sheep producers declines

ABS data for the 1997 census shows that there were 54,000 producers with sheep¹, while the 2007 agricultural census reports 45,000 farm businesses with sheep in the same areas. Between these collections, ABS revised the data frame, hence the numbers are not directly comparable. The trend however is clearly down.

ABARE splits producers into categories based on their principal agricultural industry. ABARE's main categories producing sheep are: Sheep, Sheep-Beef, and Mixed livestock. The change in the number of producers in each of these categories between 1990 and 2008 are shown in Figure 3. After an initial fall in numbers between 1990 and 1995, the number of "Sheep" producers remained relatively steady until further erosion started around 2006.

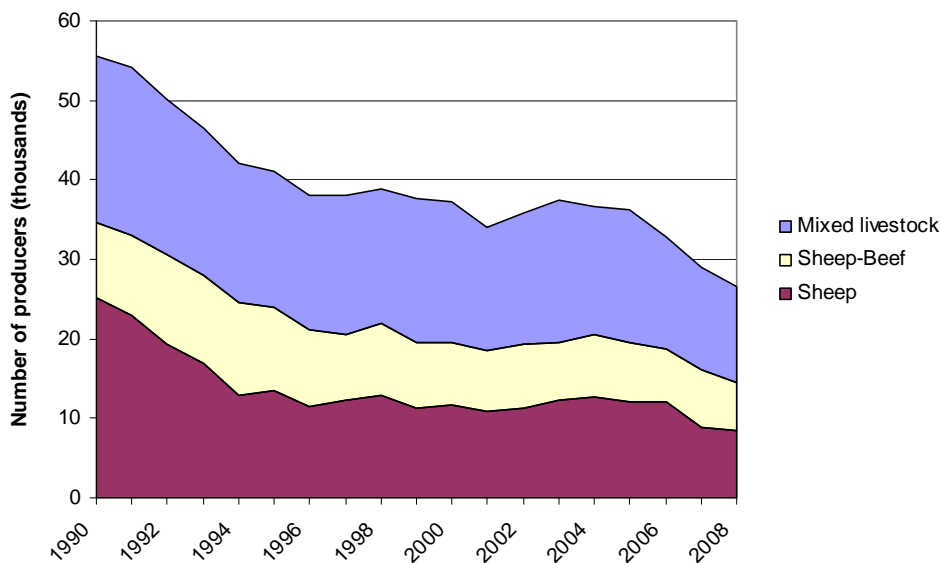


Figure 3 Number of producers (thousands) by enterprise classification between 1990 and 2008.
Source: ABARE AgSurf data

Overall, the ABARE data shows a reduction in producers running sheep (Sheep, Sheep-Beef, and Mixed livestock) from around 55,500 in 1990 to just 26,500 in 2008.

ABS use a different data frame and report a decline from 63,700 producers in 1990 to 47,300 producers in 2007, or a decline of 26%. For comparison, producers of cereals for grains changed from 44,500 in 1990 to 36,100 in 2007, a fall of 19%. Consolidation has occurred in grazing and cropping enterprises, but the number of sheep enterprises has fallen by a larger percent.

¹ Producers in non-sheep producing statistical divisions were excluded from this total. These excluded areas include metropolitan areas (e.g. Sydney, Darwin), coastal areas (e.g. Richmond-Tweed, West Moreton) and tropical and arid northern areas (e.g. Pilbara, all of Northern Territory, Far North Queensland).

Wethers out – Ewes dominate – More lambs produced

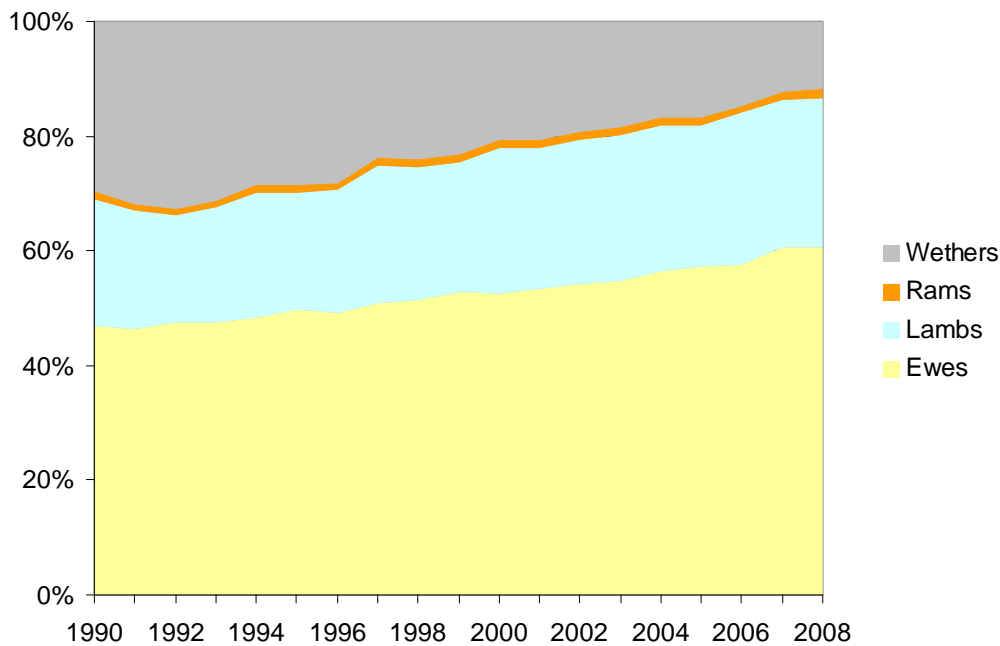


Figure 4 Changes in the composition of the national sheep flock between 1990 and 2008.
Source: ABARE AgSurf data

The data from ABARE in Figure 4 shows the reduction in the contribution of wethers to the flock and their substitution with ewes, and to a lesser extent lambs. Clearly wethers are being turned off either for slaughter as lambs or for live export. This shift to a ewe dominant flock is associated with an increase in lamb production and a reduction in sheep slaughter for mutton (Figure 5). This restructuring of the industry has meant that the number of lambs slaughtered has increased despite the overall sheep population falling significantly. This scenario can not be sustainable.

A further break down of the flock by breed, age and sex for each state is shown in appendix 2. These data are from the February 2009 national survey of sheep producers. Clearly Merino sheep dominate the flock in all states. A full presentation of this data is given in the July 2009 issue of Wool Desk Report (Download from www.agric.wa.gov.au) and results for 2007 and 2008 are available in past editions.

Slaughter data (left axis) and flock size (right axis) for Australia

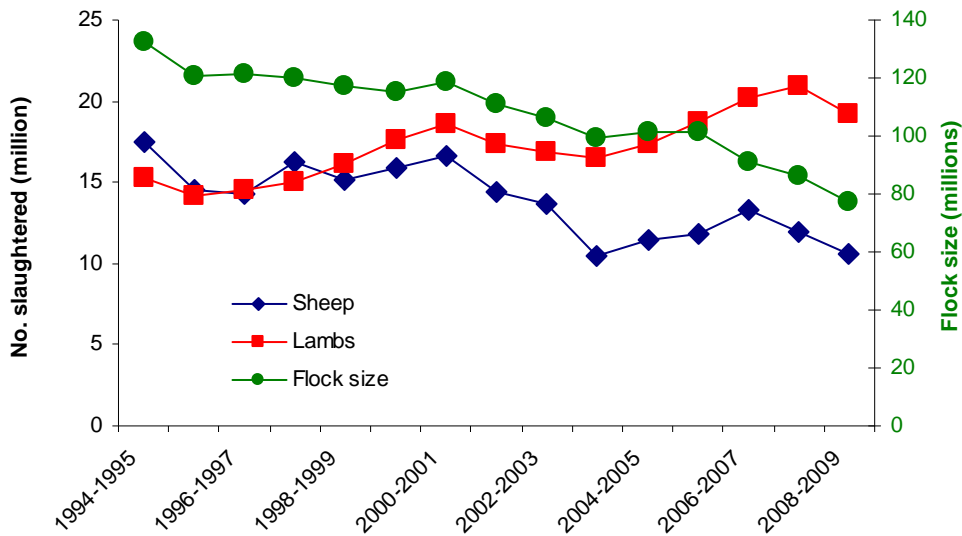
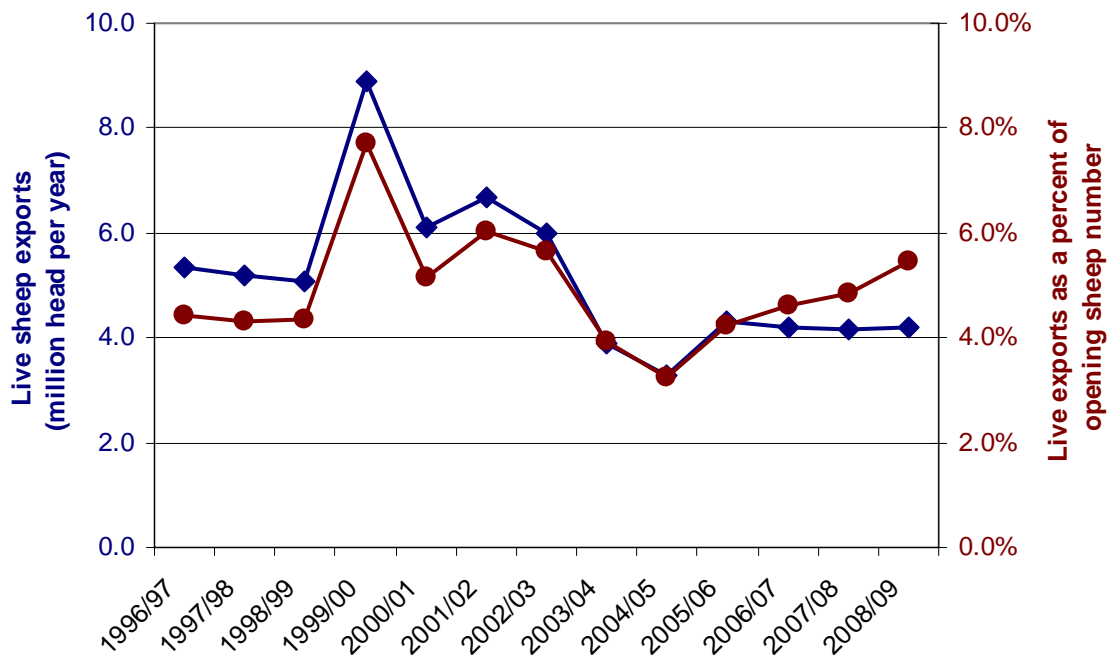


Figure 5 Number of sheep and lambs slaughtered for meat (million head per year) and opening flock size for Australia, 1994-95 through 2008-09.
Source: ABS

Live sheep exports maintained

Since 1996, live sheep export has mostly held in a band between 3 and 6 million head per year, with a couple of higher years, most notably 1999/2000. As a percentage of opening sheep number, live exports in recent years have started to climb. While not outside the range observed in the last decade or more, the upward trend reflects almost constant annual exports from a declining flock. Obviously this is not sustainable indefinitely, and as the majority of live sheep exports have been sourced out of Western Australia, the decline in the Western Australian flock must soon impact on that sector of the industry.



Wool clip going finer

The build up of a stockpile and the subsequent demise of the reserve price scheme led to a period of sustained downward pressure on wool prices. This was most severely felt in the mid to high diameter range for Merino wool. As a result producers faced declining returns from wool or the decision to reduce the diameter of their clip. Alternatively they exited the wool industry.

Figure 6 shows the decline in average fibre diameter since 1998/99² for both Australia (-0.8 µm) and Western Australia (-1.4 µm). Using AWEX auction data for the period from 1989/90 through to 2008/09, the average diameter of all Australian wool offered has fallen by about 1.8 µm and Western Australian auction wool by 1.9 µm.

Figure 7 shows the number of Western Australian brands classified by average diameter of the wool sold at auction over three selling periods of 3 years each. In this analysis, brand is analogous to a producer. Apart from the obvious decrease in the number of brands selling wool, the analysis shows that:

- Brands selling in the 23.6 to 25.5 micron classification have almost completely disappeared.
- The 21.6 to 23.5 classification has gone from being the dominant group to being a minority.
- The fine wool groups have expanded with the 19.6 to 21.5 group including almost two thirds of all brands.

The increase in fine wool producing brands indicates a genetic improvement of the flock, not just a dispersal/disposal of broad wool producing brands.

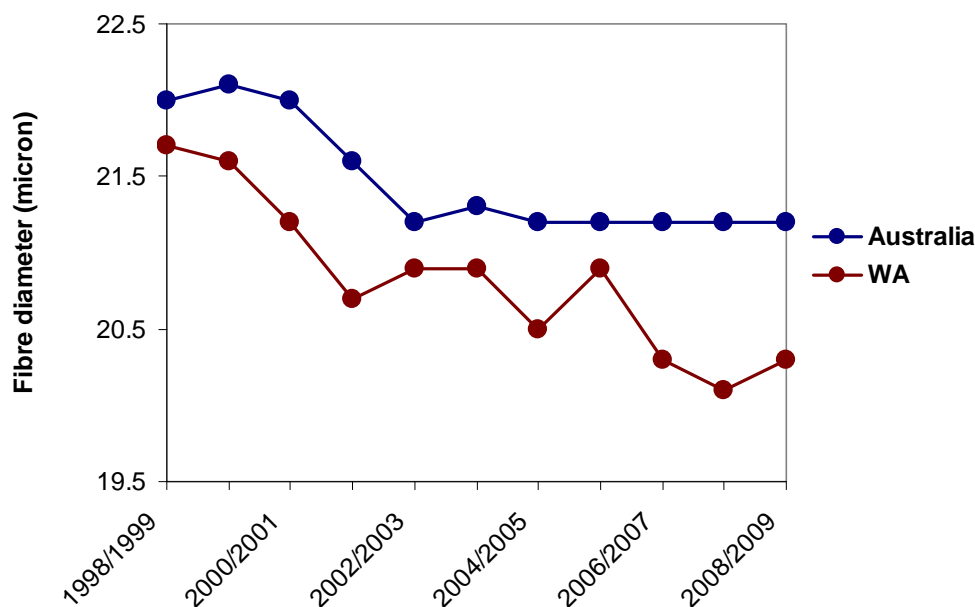


Figure 6 Average diameter of all wool presented for testing by AWTA between years 1998/99 and 2008/09. Results for all of Australia and for Western Australia.
Source: AWTA Key Test Data

An overlooked aspect of this move to finer wool, is that it enables greater income from wool without a rise in the micron indicator prices or volume produced. This is sometimes overlooked when analysing progress made by the industry.

² AWTA Key Test Data is not available to the author prior to 1998/99.

Western Australia

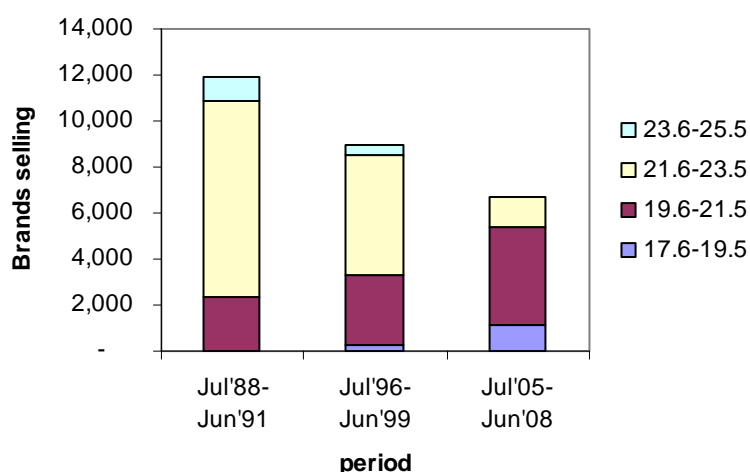


Figure 7 Number of brands (producers) from Western Australia across three time periods and classified by average diameter of the wool they sold.
Source: AWEX auction data and Wool Desk analysis

The distribution of production of wool by diameter categories across Australia and the changes over time are mapped in the appendix at the end of this report. These clearly show the run down in production of the broader wool and the increase in production of fine wool.

More ewes joined to terminal sires

A key factor in the rise of lamb production has been the use of terminal sires to produce first cross lambs. The table below (Table 2) presents data from Wool Desk surveys on the proportion of all ewes joined to Merino rams. The data presented is for a short period and so does not follow the rise in use of terminal sires. It does however illustrate large differences between states that traditionally produce prime lamb (Victoria, New South Wales) and states that have wool as their dominant product (Queensland, Western Australia).

Table 2 Proportion (percentage) of ewes joined in 2004 through 2008, and intended to be joined in 2009 to Merino rams

State	2004	2005	2006	2007	2008	2009
NSW	62	61	57	66	64	57
QLD	92	87	79	81	82	83
SA	55	54	61	64	60	58
TAS	66	61	56	65	44	46
VIC	53	50	51	55	56	48
WA	69	68	69	69	69	66
AUST	63	61	61	65	64	59

As emphasis is transferred from wool production to prime lamb production, more Merino ewes are joined to non-Merino rams and fewer Merino ewe lambs become available as replacements. To further increase prime lamb production, first cross ewes are retained and used to produce second cross lambs. This results in an increase in the non-Merino component of the flock, and in the proportion of adult wool from cross bred sheep. This latter point is illustrated in Figure 8.

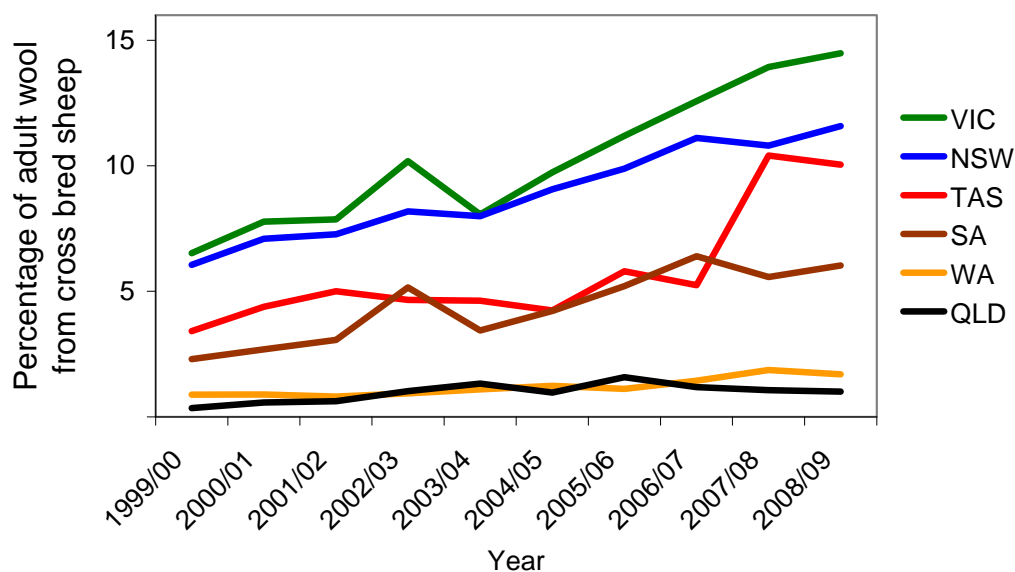


Figure 8 Change in percentage of adult wool from cross bred sheep by state of production (Wool Desk research using Australian Wool Exchange auction data).

An alternate interpretation of the rise in cross bred wool is that changes in practice among wool buyers has seen less cross bred wool bought privately and hence more sold at the auction. Either way the higher levels of cross bred wool produced in NSW and Victoria support the presence of more adult cross bred sheep in those states.

Future sheep numbers

To understand recent and likely future changes in the size of the national flock, a simple demographic model was build and populated with published statistics where available. The purpose of this exercise was (a) to provide a framework or context for the statistics and thus an understanding or their interaction, and (b) to enable projections based on a range of assumptions (or inputs).

The calibration/validation section of the model is shown in Table 3 and future projections are in subsequent tables. The model is build around a financial year with the opening numbers indicating the population on 1st July. All numbers are for the whole of Australia. Table 3 covers three seasons - 2004/05, 2005/06 and 2006/07. For these years, full data is published and available.

From the opening number of sheep, the percent ewes (ABARE data) is used to calculate the number of ewes in the flock. In this case 'ewes' is all female sheep excluding lambs. The percent (ewes) joined is a derived value. It is set so that the calculated number of ewes joined approximates the ABS reported number of ewes mated.

Lambs marked is calculated from ewes joined and marking rate. Actual number of lambs marked (as reported by ABS) is used as a check on the calculated number.

Sheep turn off (slaughter of lambs and sheep, plus live exports) are as reported by ABS. Death rate is then adjusted to bring the closing sheep number close to that reported by ABS. The difference between the calculated value for closing number (30th June) and the ABS value is shown at the bottom of the table as "Balance".

Only partial data (opening numbers, turn-off) is available for 2007/08 and 2008/09 and naturally, from 2009/10 forwards, all values are assumptions.

Table 3 Sheep population model – calibration and validation section. Values in black are published statistics available from the indicated sources. Values in blue are inputs/assumptions. Values in green are projections calculated by the model.

Australia			2004/05	2005/06	2006/07
Opening Sheep Number	million		101.3	101.1	91.2
	million	ABS	101.3	101.1	91.0
Percent ewes	percent	ABARE AgSurf	56.4	57.3	57.4
Percent joined		[derived]	80.0	74.0	79.0
Ewes joined	million		45.7	42.8	41.4
Ewes mated	million	ABS	46.1	42.7	41.5
Marking rate	percent	ABS	80.7	82.1	82.0
Lambs marked	million		36.9	35.2	33.9
	million	ABS	37.2	35.1	34.1
Turn off					
Lambs	million	ABS	17.3	18.7	20.2
Sheep	million	ABS	11.4	11.8	13.3
Live export	million	ABS	3.3	4.3	4.2
Death rate (%)	percent	[derived]	5.0	10.1	3.0
Sheep deaths	million		5.1	10.2	2.7
Closing Sheep Number					
reported	million	ABS	101.1	91.0	85.7
projected	million		101.1	91.2	84.8
Balance	million		-0.1	0.2	-0.9

In order to compare scenarios, a baseline set of assumptions for 2007/08 onwards has been assembled and are shown in Table 4. The justifications for those assumptions are listed below:

- Percent ewes. ABARE data between 2004 and 2008 has shown an almost linear increase in the proportion of ewes in the flock. This trend was extrapolated through to 2012/13.
- Percent joined. A large proportion of ewe weaners are not joined (Wool Desk Report 2005 – only 3% of Merino ewe weaners and 18% of other breed ewe weaners are mated). If ewes were kept longer, then the proportion of ewe weaners would drop and so a higher percent of ewes would be joined. A baseline value of 80% has been entered, the highest of the values in the years from Table 3.
- Marking rate. As the Merino component of the flock decreases, the marking rate is expected to rise. For the baseline set, 82% has been used, close to the top of the values in Table 3.
- Turn off. Lamb and sheep slaughter and live exports for 2007/08 and 2008/09 are as reported by ABS. From 2009/10 onwards, the baseline values are set at those published by MLA³. Alternate values could have been sourced from ABARE for some of these inputs.
- Death rates. In the absence of any expected values, conservative (optimistic) estimates have been entered starting at 5% and dropping to 2.5%. Changing these values is not going to alter the primary factors affecting the projection.
- Opening sheep numbers. Values from ABS are used for 2007 and 2008. For 2009 through 2012, the baseline values are those published by MLA³. These values are for comparison only and are not used in calculating the projection.

³ 2009 Australian Sheep Industry Projections Mid-year update

Table 4 Sheep population model – baseline input and projection to 2012/13. Values in black are published statistics available from ABS and in purple are from MLA. Values in blue are inputs/assumptions. Values in green are projections calculated by the model.

Australia			2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Opening Sheep Number	million		84.8	77.2	69.3	61.9	52.9	40.7
	million	ABS; MLA	85.7	76.9	71.9	70.1	69.2	68.5
Percent ewes	percent	ABARE AgSurf	60.5	60.6	61.9	63.1	64.2	65.4
Percent joined		[derived]	80.0	80.0	80.0	80.0	80.0	80.0
Ewes joined	million		41.0	37.4	34.3	31.2	27.2	21.3
Ewes mated	million	ABS						
Marking rate	percent	ABS	82.0	82.0	82.0	82.0	82.0	82.0
Lambs marked	million		33.6	30.7	28.2	25.6	22.3	17.4
	million	ABS						
Turn off								
Lambs	million	ABS; MLA	20.9	20.8	21.3	21.5	21.9	22.7
Sheep	million	ABS; MLA	11.9	11.3	9.3	8.3	8.1	8.0
Live export	million	ABS; MLA	4.2	4.2	3.3	3.3	3.3	3.3
Death rate (%)	percent	[derived]	5.0	3.0	2.5	2.5	2.5	2.5
Sheep deaths	million		4.2	2.3	1.7	1.5	1.3	1.0
Closing Sheep Number								
reported	million	ABS; MLA	76.9	71.9	70.1	69.2	68.5	68.1
projected	million		77.2	69.3	61.9	52.9	40.7	23.1
Balance	million		0.3	-2.6	-8.2	-16.2	-27.8	-45.0

The projection⁴ based on these baseline inputs is shown as a summary chart in Figure 9. The stand-out and perhaps alarming point in this chart is the accelerating fall in the size of the sheep flock. The crucial point to note is that the total number of lambs marked in 2007/08 (33.6 million) is 3.9 million less than total turn off (sheep and lambs slaughtered and live sheep exported) and that does not consider deaths on farm. In the following years, the shortfall is even greater.

What could change the scenario? Lifting marking percent will have a significant effect. If more lambs are born, then more will remain on farm to replace sheep slaughtered and perhaps build the flock. From the baseline value of 82%, marking rate needs to be around 94% from 2008/09 to bring the population to a plateau (at around 71-72 million) while delivering the baseline turn off of sheep and lamb and live exports.

Another option is to reduce sheep slaughter and live sheep export. Dropping sheep slaughter to 4 million and live exports to 2 million per year would come close to arresting the decline in the population (Figure 10).

A third alternative is to reduce lamb slaughter, sheep slaughter and live exports by a constant percent of their 2008/09 level. To halt the decline in the flock, all turnoff levels would need to be reset at 75% of their 2008/09 level, that is 15.6 million lambs, 8.5 million sheep and 3.2 million exports (see Figure 11).

⁴ Projection. The term projection is used to denote a calculated result based on a series of assumptions. That is, if those assumptions hold then this is the calculated result. The use of 'projection' is different to a forecast. A forecast is an expectation of what will happen.

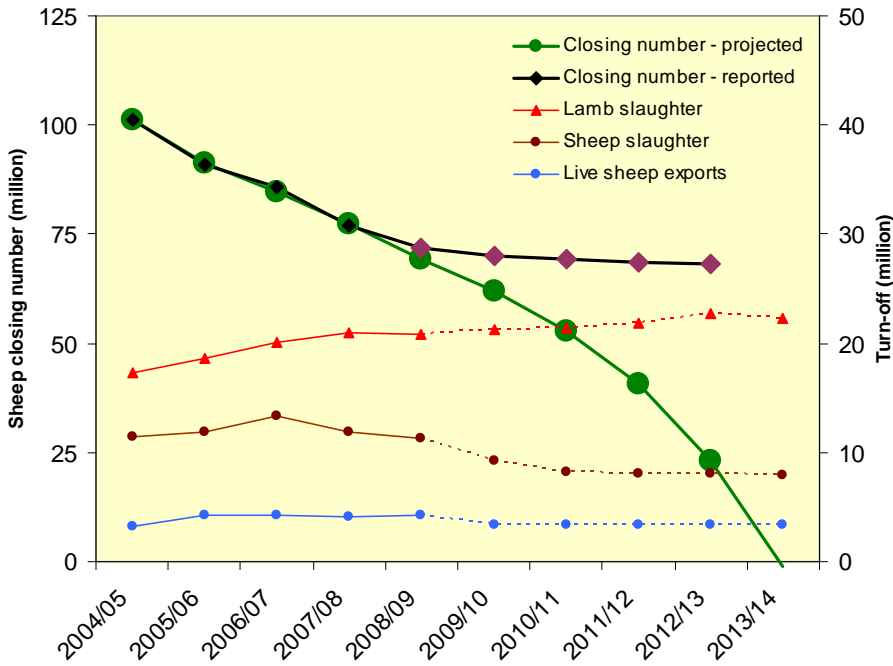


Figure 9 Actual and projected closing sheep number (left hand axis) using the baseline assumptions described in this report and reported/assumed sheep turn off (right hand axis)

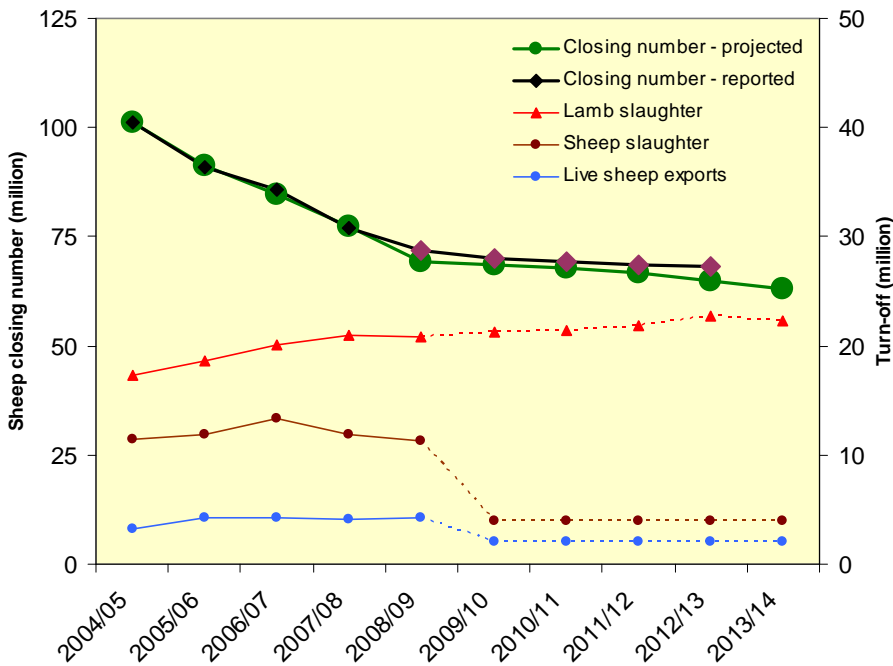


Figure 10 Actual and projected closing sheep number (left hand axis) with the baseline assumptions modified. Sheep slaughter is reduced to 4 million per year and live exports to 2 million from 2009/10 onwards. Sheep turn off assumptions are plotted against the right hand axis.

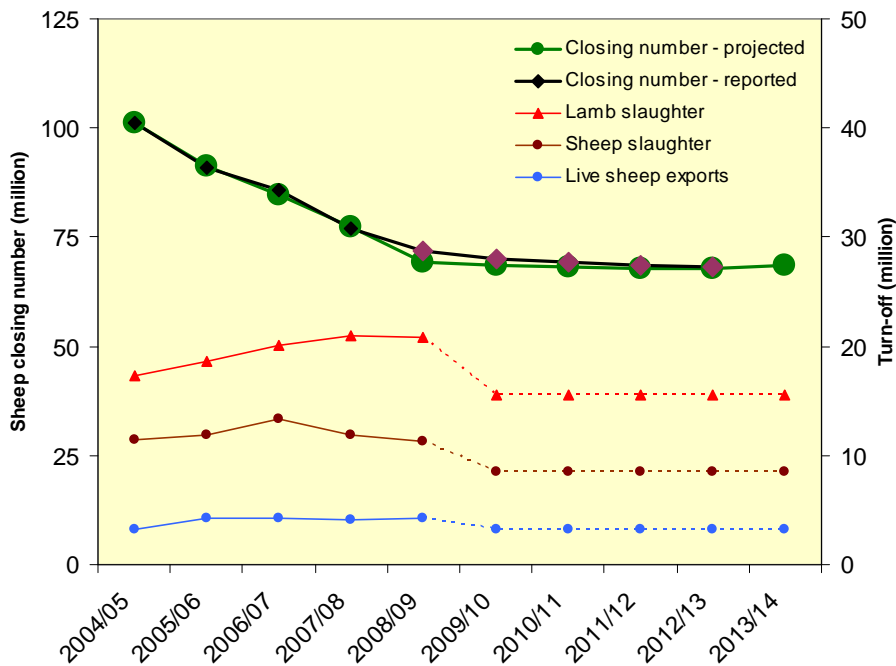


Figure 11 Actual and projected closing sheep number (left hand axis) with the baseline assumptions modified. Turn off set at 75% of 2008/09 levels from 2009/10 onwards (Lamb - 15.6 million, sheep - 8.5 million and live exports - 3.2 million). Sheep turn off assumptions are plotted against the right hand axis.

The scenarios presented above define the bounds of how much individual assumptions need to change to stop the decline in the population. A more realistic expectation is that that a combination of events will occur. A switch toward more prime lamb production may well increase marking rates as the ewe breed mix changes. Fewer sheep may well be sold for slaughter as producers maintain their breeding flock and seek income from selling more lambs.

However, the number of lambs sold is the key driver of flock size. If lamb sales are maintained at the baseline level, and marking rates are increased to 87% (up from 82% in the baseline scenario), sheep slaughter and live exports need to fall to just under 50% of their 2008/09 level – 5.3 million for sheep and 2.0 million for live exports – to bring the national flock to a steady state (Figure 12).

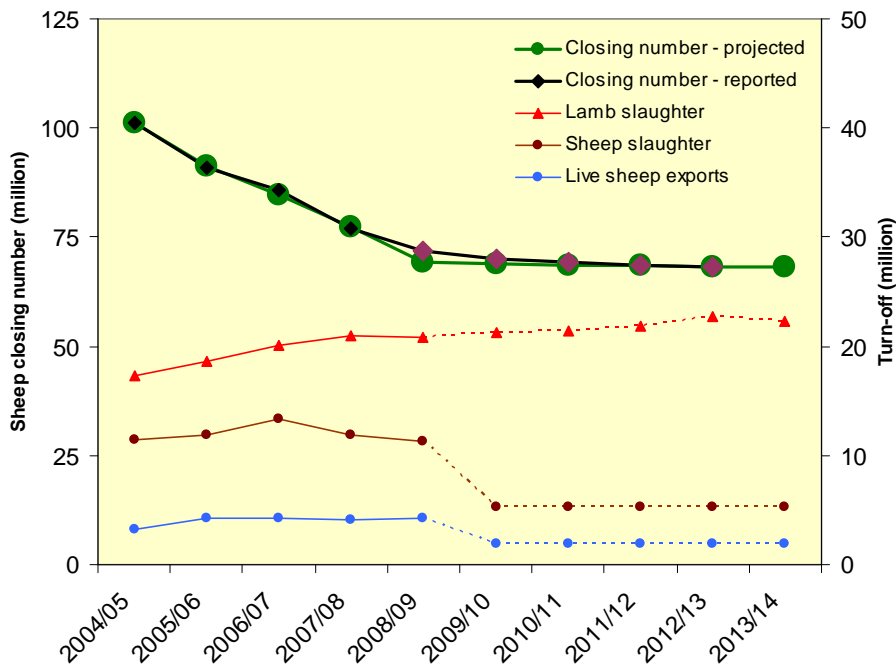


Figure 12 Actual and projected closing sheep number (left hand axis) with the baseline assumptions modified. Marking rate increased to 87%, and sheep slaughter and live exports set at 47% of 2008/09 levels from 2009/10 onwards (sheep – 5.3 million and live exports – 2.0 million). Sheep turn off assumptions are plotted against the right hand axis.

Summary

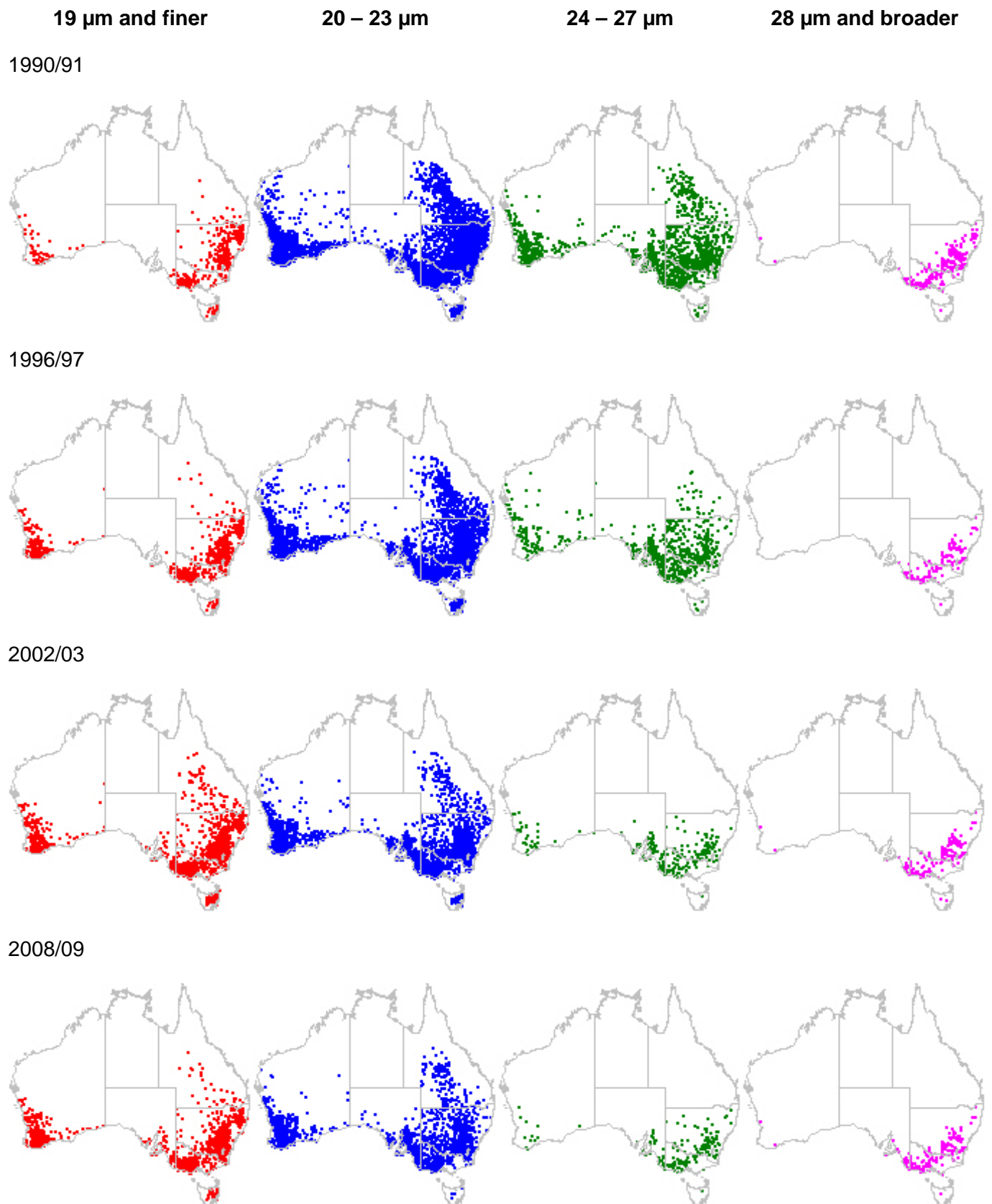
The Australian sheep industry has undergone significant change over the last 2 decades and in the last 5 years, change has been accelerating. The key changes not necessarily in order of importance are:

- The number of sheep in Australia has fallen and continues to fall;
- The number of sheep producers across Australia has also fallen;
- The mix of sheep has changed with ewes dominating in a way not seen before;
- The diameter of the wool being produced has fallen over the last 15 years;
- Gross value of product for sheep is equivalent to the gross value of wool, though at some expense to the size of the national flock;

Simple projections based on recent performance of the flock suggest that the Australian sheep population may well continue to decline unless current turn off levels are reduced. At its most basic level, the number of lambs born in recent years has been less than the total of lambs slaughtered, sheep slaughtered and live sheep exports. That cannot continue in a stable population.

Appendix 1

Change in distribution of wool production between 1990/91 and 2008/09 by diameter category.



Appendix 2

Flock composition (percentage) at 1 January 2009 by breed, sex and age for each state and Australia-wide. In this table, lambs are sheep born in 2008, hoggets are sheep born in 2007 and adults are sheep born before 2007

Breed	Sex	Age	NSW	QLD	SA	TAS	VIC	WA	AUST
Merino	Ewes	Lambs	12.2	10.8	12.9	7.5	11.4	14.6	12.6
		Hoggets	10.5	8.7	11.3	5.7	9.1	11.6	10.4
		Adults	38.2	31.8	43.0	34.7	30.6	44.4	38.6
	Wethers	Lambs	9.9	10.3	8.6	7.1	8.5	10.9	9.8
		Hoggets	4.3	6.3	4.5	4.9	5.5	4.3	4.7
		Adults	8.7	23.9	5.2	7.6	11.2	3.6	8.2
Merino 1 X	Ewes	Lambs	3.9	2.4	3.0	2.0	3.2	2.7	3.2
		Hoggets	1.0	0.7	1.0	1.5	1.9	0.8	1.1
		Adults	3.3	0.8	4.0	7.8	7.6	2.0	3.8
	Wethers	Lambs	3.1	0.9	2.4	0.6	1.3	2.2	2.3
		Hoggets	0.3	1.3	0.3	0.3	0.2	0.2	0.3
		Adults	0.1	0.7	0.6	0.3	0.4	0.2	0.3
Merino 2 X or meat breed	Ewes	Lambs	1.6	0.4	1.0	4.3	2.5	1.1	1.5
		Hoggets	0.4		0.4	2.2	1.2	0.1	0.5
		Adults	1.2	0.2	1.1	5.8	2.9	0.4	1.3
	Wethers	Lambs	1.1	0.3	0.5	7.7	2.5	0.8	1.3
		Hoggets		0.3			0.1	0.1	0.1
		Adults	0.1	0.1				0.1	0.1
Total ¹			100	100	100	100	100	100	100

¹ Totals may not add up due to rounding.