Australian Wool Innovation Limited

# WOOL 2030 – A STRATEGIC PLAN FOR AUSTRALIAN WOOLGROWERS

## DISCUSSION PAPER 2: DEMOGRAPHICS AND PRODUCTIVITY OF THE AUSTRALIAN WOOL FLOCK

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# CONTENTS




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# 1. INTRODUCTION

This is the second in a series of papers created to stimulate discussion among Australian woolgrowers in preparation for their input to the development of Wool 2030 – A strategic plan for Australian woolgrowers.

This paper sets the scene in relation to the national sheep flock and how it has changed in size and composition over the last 30 years. It also looks at the relative productivity and profitability of wool production versus other major land uses.

A series of questions is provided at the end of the paper. The questions are designed to prompt the reader to consider the directions in which the national sheep flock might move over the coming decade. What might be the implications for the wool industry in 2030?

# 2. SHEEP NUMBERS & FLOCK STRUCTURE

Between 1990 and 2010, the Australian sheep population declined from 170 million to 68 million sheep and lambs, an overall decline of 60%. Over the same period, the total number of breeding ewes declined from 75 million (1990) to 42 million (2010), a decline of 44% (Figure 1). Between 2010 and 2018, the number of sheep and lambs has averaged 70.5 million (varying between 67.5 and 72.1 million). Over the same period, the number of breeding ewes has contracted to just under 40 million.

Driven by consecutive years of drought, primarily in NSW and northern Victoria, the national flock is estimated to have fallen to 66.0 million in 2019 and forecast to contract to 63.7 million by June 2020 (MLA 2020).

Merino ewes remain the dominant component of the national flock. In the most recent published estimates (30th June 2018), Merino ewes account for 68% of all breeding ewes. In the 2017-18 financial year, 33.4 million ewes were mated (run with rams), and 46% of these were joined to produce pure Merino lambs.

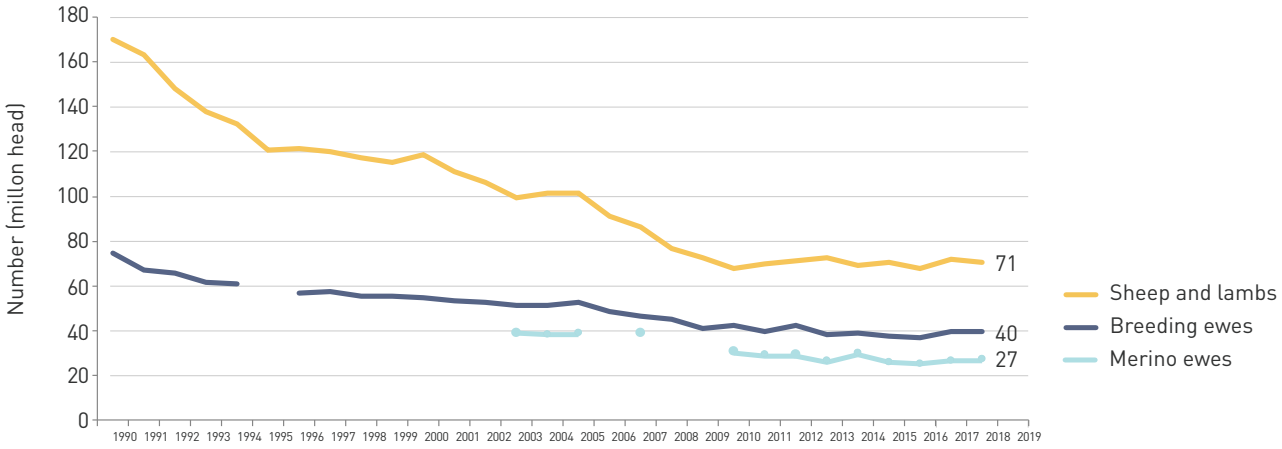



**Figure 1: Number of sheep and lambs (millions), number of breeding ewes and number of Merino breeding ewes (millions)**

Source: ABS 71210; ABS 71240

[1]Prior to the 2015-16 ABS agricultural census, only agricultural businesses (farms) with an estimated value of agricultural outputs (EVAO) of $5,000 or more qualified for inclusion. From 2015-16, this minimum was increased to $40,000 and applies to both census and survey collections. Retrospective estimates using the new $40,000 basis were released for the 2010-11 through 2014-15 collections and these are used here. At the national level, the increase in the EVAO basis reduced total sheep and lambs by 3.5%.

Between 2001-02 and 2008-09, the number of mixed enterprise sheep producers declined by 50% to ~13,000 and remained at that level through to 2015-16 followed by further declines in the last three years of available data (Figure 2). The decline in the number of mixed enterprise sheep producers reflects the trend to increasing farm size to take advantage of economies of scale.

The number of specialist sheep producers (defined as 50% or more of their income from sheep and or wool sales) declined between 1991-92 and 2001-02 but has since remained steady at about 14,000.

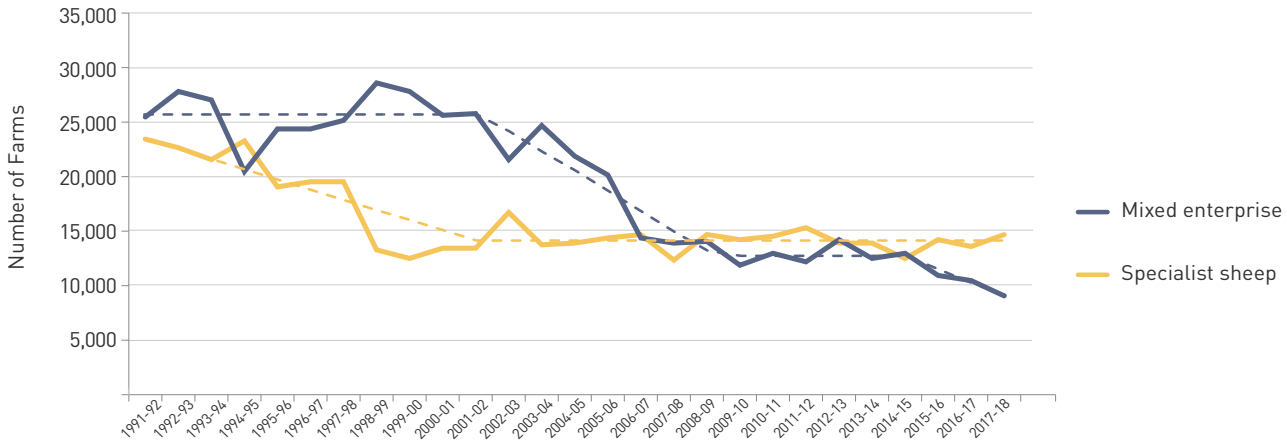



**Figure 2: Number of specialist sheep producers and mixed enterprise sheep producers**

Source: ABARES (AgSurf)

Since the mid-1990s, the Australian sheep meat industry has changed from processing similar numbers of lambs and sheep toward a focus on quality lamb production. Prior to this shift, sheep turn-off was largely a by-product of the wool industry. This changeover can be seen in Figure 3 where lamb slaughter has risen to overtake sheep slaughter from 2000 onwards. Prior to 1999-00, sheep slaughter had averaged 16.5 million head per year including an annual average sell-down of the Australian flock equivalent to 6.2 million per year. Since 2003-04, the trend in annual sheep slaughter has continued lower though with large inter-annual swings, and lamb slaughter has risen to between 22 and 23 million with some evidence of a levelling-off.

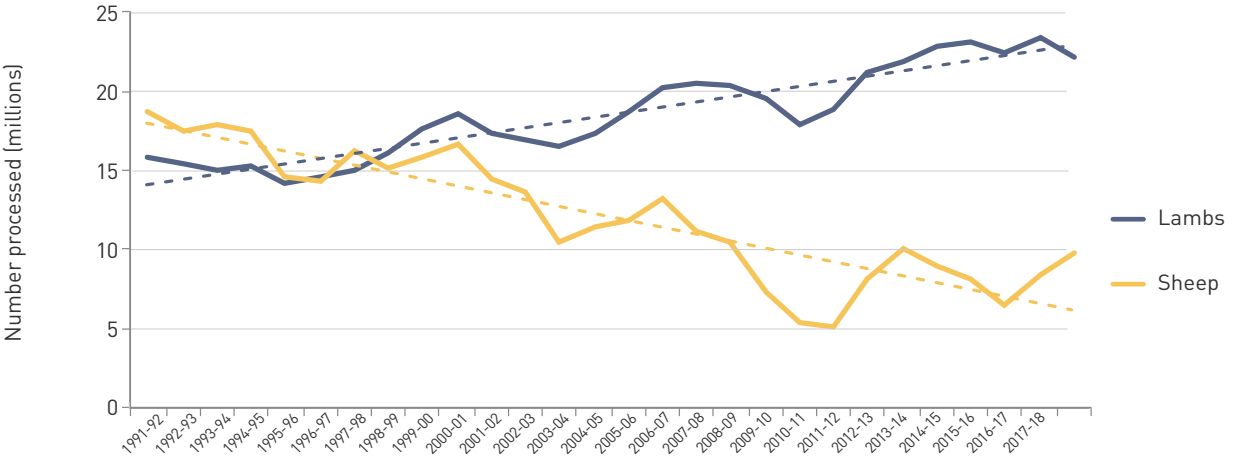



**Figure 3: Number of sheep and lambs processed in Australia**

Source: ABS 72180

One of the enablers of this increased turn-off of lamb has been an increase in reproductive rate. Figure 4 shows that the national annual marking rate for all ewes has increased from about 80% in 2000-01 to around 93% in the last three years of available data (2015-16 to 2017-18). An increase in the number of lambs marked has multiple benefits including the ability to apply greater selection pressure, potential to run fewer ewes for the same turn-off, and capacity to join a higher proportion of Merino ewes to meat breed rams for first cross production while still producing enough replacement Merinos.

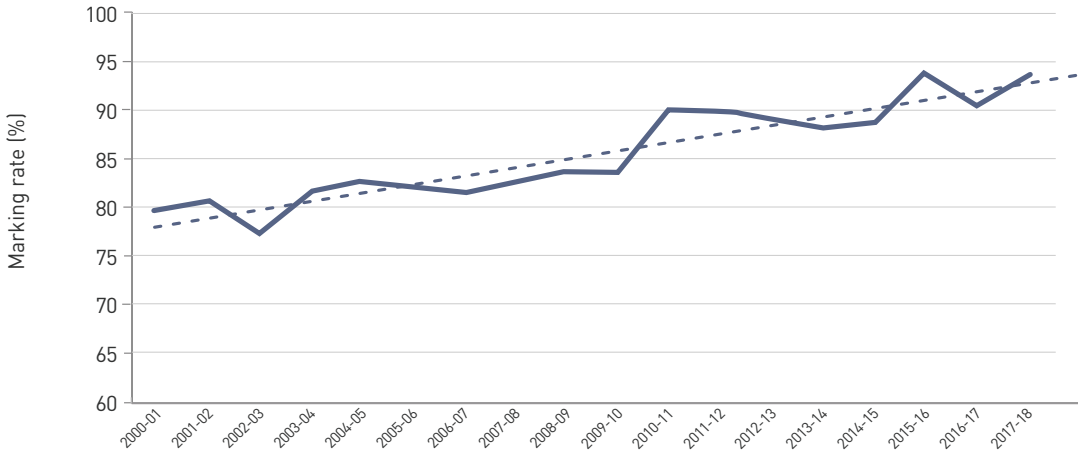



**Figure 4: Trend in the national average lamb marking rate**

Source: ABS (71210), ABARES (AgSurf) and AWI/MLA sheep meat and wool surveys

Proof of the transition to a dual product industry is best illustrated by the convergence of the gross value of production for wool and sheep meat. Figure 5 shows this convergence in nominal dollars. Prior to 1995, the gross value of agricultural commodities produced (GVACP) from wool was in excess of 3.5 times that from sheep meat. Since 2007-08, the GVACP ratio for wool to sheep meat has averaged less than one until the surge in wool prices during 2016-17 and 2017-18.

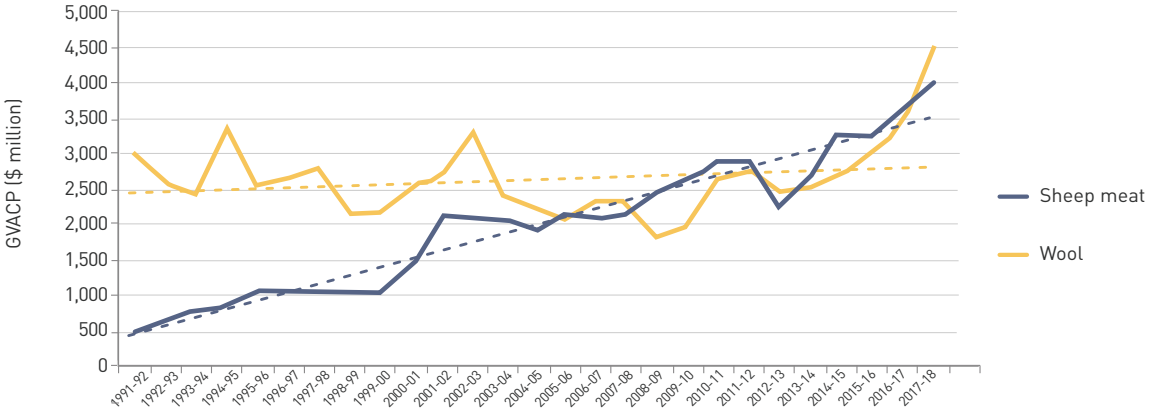



**Figure 5: Converging contributions from wool and sheep meat to the gross value of agricultural commodities produced (GVACP) (amounts are in nominal dollars)**

Source: ABS

The distribution of sheep and lambs and of breeding ewes is not uniform across agricultural businesses. A relatively small proportion of the agricultural businesses carry most of the sheep and lambs and the breeding ewes. The analysis presented in Table 1 is from a customised report prepared by ABS using its 2010-11 agricultural census and covers regions carrying ~99.7% of the sheep and lambs in Australia. Areas excluded are largely urban fringes or northern tropical areas. The table shows the proportion of sheep, breeding ewes (both total and Merino), businesses with sheep, and businesses with breeding ewes by farm flock size at 30th June 2011. The 28% of farms with more than 2000 sheep and lambs contributed 73% of the total sheep and lamb population in Australia. Conversely, the 72% of farms with flocks of 2000 or less account for just 27% of all sheep and lambs in Australia (Curtis, 2014).

Of the Merino breeding ewes on hand at 30th June 2011, 22.7 million or 75% were on farms with flocks of over 2000 sheep and lambs.

| FARM FLOCK SIZE | SHEEP AND LAMBS (MILLIONS) | FARMS (WITH SHEEP AND LAMBS) | BREEDING EWES (ALL BREEDS, MILLIONS) | BREEDING EWES (MERINO, MILLIONS) | FARMS (WITH BREEDING EWES) |
|---|---|---|---|---|---|
| Up to 500 | 2.74 | 15,400 | 1.58 | 0.83 | 13,000 |
| 501 to 1000 | 5.00 | 6,800 | 2.92 | 1.81 | 6,400 |
| 1001 to 2000 | 12.02 | 8,300 | 6.98 | 4.79 | 8,000 |
| 2001 to 4000 | 20.06 | 7,100 | 11.57 | 8.53 | 7,000 |
| 4001 to 8000 | 18.45 | 3,400 | 10.50 | 7.98 | 3,400 |
| 8001 to 16000 | 9.89 | 900 | 5.58 | 4.34 | 900 |
| OVER 16000 | 4.71 | 200 | 2.56 | 1.85 | 200 |
| **TOTAL** | **72.88** | **42,100** | **41.71** | **30.13** | **38,900** |

**Table 1: Distribution of sheep, farms, breeding ewes and farms with breeding ewes by farm flock size at 30 June 2011**

Source: ABS customised report; Curtis (2014)

A more recent analysis applied to the 2015-16 census was commissioned by the Department of Primary Industries and Regional Development (WA) but only reported total sheep and lambs and number of farms (Table 2). The criterion for inclusion of a farm was raised from an estimated value of agricultural outputs of $5,000 in 2011 to $40,000 in 2016. This resulted in fewer farms with low numbers of sheep and lambs.

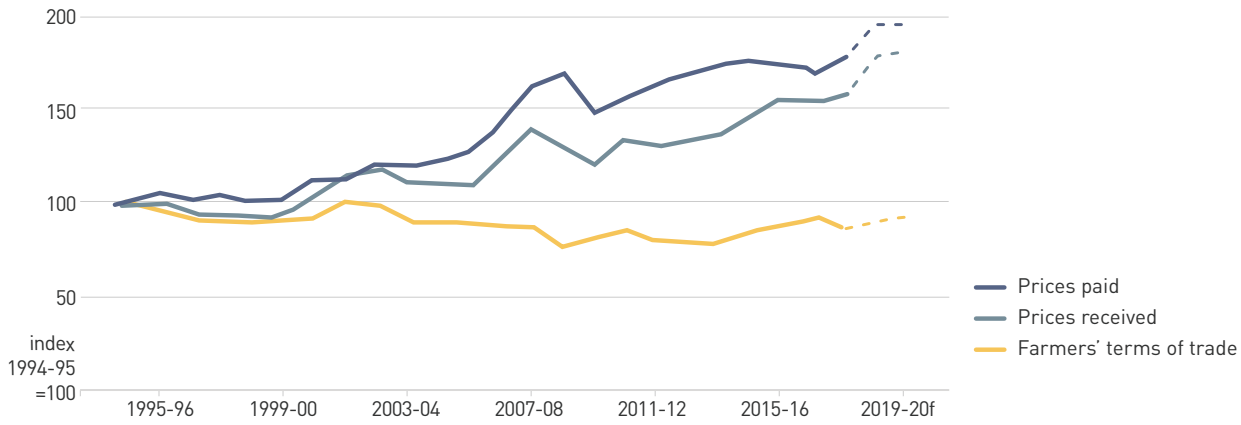
| FARM FLOCK SIZE | SHEEP AND LAMBS (MILLIONS) | FARMS (WITH SHEEP AND LAMBS) |
|---|---|---|
| Up to 500 | 1.63 | 8,728 |
| 501 to 1000 | 3.51 | 4,706 |
| 1001 to 2000 | 9.8 | 6,714 |
| 2001 to 4000 | 17.92 | 6,337 |
| 4001 to 8000 | 18.36 | 3,373 |
| 8001 to 16000 | 11.26 | 1,061 |
| 16001 to 32000 | 3.99 | 192 |
| Over 32000 | 1.08 | 23 |
| TOTAL | **67.54** | **31,136** |

**Table 2: Distribution of sheep and farms by farm flock size at 30th June 2016**

Source: ABS data, customised report; Pritchett 2019 (pers comm)

# 3. FARM PROFITABILITY & PRODUCTIVITY

Over the last five or six years, farmers' terms of trade have been relatively stable on the back of very good commodity prices. In 2018–19 farmers' terms of trade were estimated to have increased by 3% year-on-year. Strong export demand and increased prices received for livestock products more than offset higher prices paid for inputs. However, over the last 20 years, farmers' terms of trade have generally been reducing[2].




s ABARES estimate. f ABARES forecast.

Note: Indexes calculated in a chain-weighted basis using Fisher's ideal index with a reference year of 1994-95=100

**Figure 6: Farmers' terms of trade, prices paid and prices received indexes, 1994–95 to 2019–20**

Source: ABARES; ABS

[2]ABARES (2020) Agricultural overview: March quarter 2020

ABARES recently released a report[3] into farm performance on broadacre and dairy farms over the period 2017-18 to 2019-20. The key findings were:

- *In 2019–20 climate conditions (rather than commodity prices) remain the dominant driver of broadacre and dairy farm performance in Australia.*

- *In New South Wales average farm business profit on broadacre farms in 2019–20 is projected to be the lowest recorded by ABARES in over 40 years, reflecting low production, reduced livestock numbers and high fodder costs. The compounding impact of drought conditions over a number of years is expected to result in record-low average farm cash incomes in northern New South Wales.*

- *Drier seasonal conditions are also driving reductions in average farm incomes in both Western Australia and the Northern Territory in 2019–20, but income levels are projected to remain relatively high in historical terms.*

- *Average farm cash incomes are projected to improve for Victorian broadacre farms in 2019–20, mostly as a result of increased broadacre crop production.*

- *In Queensland and Tasmania average broadacre farm cash incomes are also projected to increase slightly in 2019–20, but largely at the expense of reductions in livestock numbers. As a result, average farm business profit in these states is expected to decline.*

For Australia as a whole, the average farm cash income for all broadacre farms was projected to fall by 8% between 2018-19 and 2019-20 – from $165,700 per farm in 2018-19 to $153,000 per farm in 2019-20. The ABARES review also compared financial performance across farm business type. However, this can be misleading depending on scale of operation. For example, average farm size for wheat and other crops is likely to be higher than for specialist livestock operations in southern Australia.

Table 3 shows the comparison across broadacre industries and highlights the impact of the drought across 2018 and 2019.

| BROADACRE INDUSTRIES | FARM BUSINESS PROFIT | | |
|---|---|---|---|
| | **2017-18** | **2018-19p** | **2019-20y** |
| **All broadacre industry** | 69,130 | 2,400 | -19,000 |
| **Wheat & other crops** | 209,230 | 198,800 | 78,000 |
| **Mixed livestock - crops** | 70,690 | 8,200 | -34,000 |
| **Sheep** | 25,250 | -900 | -7,000 |
| **Beef** | 40,160 | -50,500 | -43,000 |
| **Sheep-beef** | 38,050 | -87,700 | -80,000 |

p – preliminary estimates; y -provisional estimates

**Table 3: Comparative performance of broadacre industries 2017-18 to 2019-20**

[3]ABARES research report 20.9. Farm performance: broadacre and dairy farms, 2017–18 to 2019–20
Peter Martin and Vernon Topp. March 2020

The Holmes Sackett publication AgInsights[4] draws on a unique production and financial benchmarking database of 170 broadacre farms across Australia. The data comes from a sample of farms biased towards the larger and more profitable and is therefore skewed in comparison to ABARES data, but arguably this provides a more accurate picture of the performance that is achievable by better-managed enterprises. The sample is also drawn almost entirely from south-east Australia.

The most recent analysis compares the relative profitability of livestock and crop enterprises in south east Australia over the past 20, 10, 5 and 1-year periods (from 2017 back). The main findings were:

- The top 20% of farms (as ranked by return on assets under management) had a gross profit 25% higher than the average. This finding was noted to be typical of previous years. The top 20% retained 54% of gross profit as net profit, compared with 38% average retention.

- Dryland cropping was the most profitable enterprise per hectare on average across all timeframes except 1-year, although it also showed the greatest variability in profitability between years. Dual-purpose sheep enterprises (Merino ewes joined to maternal or terminal sires, generating roughly equal income from wool and meat) came closest to matching cropping profits. Specialist prime lamb enterprises showed the lowest average profits over 10, 5 and 1 years, with specialist wool and beef enterprises slightly more profitable than lamb over these periods, although beef relative profitability had increased substantially over the last 5 years.

- In each of three defined rainfall zones (<500mm, 500-650mm and >650mm), cropping was clearly the most competitive land use from 2013-17. The relative profitability of livestock enterprises varied between zones, with wool performing relatively best in the low rainfall (<500mm) zone behind dual-purpose enterprises.

Holmes Sackett make the point that there is always much more variation within each enterprise than between them. The top 10 wool producers in the database (ranked on profit per dry sheep equivalent (DSE) and per hectare per 100mm rainfall over 5 years) generated an additional 166% profit/Ha/100mm profit than the rest, largely through higher stocking rates, and had 14% lower costs per DSE. The top 10 farms were distributed across a wide geographic area.

[4]Holmes Sackett, AgInsights 20. Knowing the past: Shaping the future

# 4. CONTRIBUTION OF PRODUCTIVITY IMPROVEMENTS TO GVP

The last couple of decades have seen the sheep industry transition from a wool industry to an industry that derives near equal value from sheep meat and wool. Over that period, the sheep industry has increased its gross value of production (GVP) (in nominal dollars) despite a significant reduction in the national flock size. While some of that increase can be attributed to movements in commodity prices, there have also been significant gains through increased productivity and changes to product produced.

This analysis presented in Table 4 estimates the contribution to current GVP of the main productivity improvements that have been achieved over two decades, between 1994-95 to 1996-97 and 2014-15 to 2016-17. The two three-year periods, twenty years apart, were used to smooth out the impact of seasons.

The estimated extra value is the difference between the current GVP and that which would have been achieved with the current number of sheep and lambs delivering products equivalent to those produced 20 years ago and valued using current prices.

| PRODUCTIVITY IMPROVEMENT | | EXTRA VALUE |
|---|---|---|
| **Change in wool quality and quantity** | | **-$212 million** |
| • Lower average fibre diameter (21.9 to 20.9 µm) | +$203 million | |
| • Decreased wool production per sheep (5.38 to 4.72 kg greasy) | -$415 million | |
| **Increased carcase weights** | | **+$612 million** |
| • Lambs 18.2 kg to 22.4 kg | +$520 million | |
| • Sheep 20.7 kg to 24.3 kg | +$92 million | |
| **Increased marking rates – from 76% to 92%, extra 5.9 million lambs** | | **+$590 million** |
| • 92% sent to processors | +$545 million | |
| • 8% sent to live export | +$45 million | |
| **Total increase in GVP attributed to improved productivity** | | **+$990 million** |

*Annual wool production divided by sheep population at start of season. This metric does not reflect a change in the wool cut per head of a specific class of sheep e.g. Merino wethers.

**Table 4: Contribution of productivity improvements over the 20-year period between 1994-95 to 1996-97 to 2014-15 to 2016-17 to the GVP (nominal)**

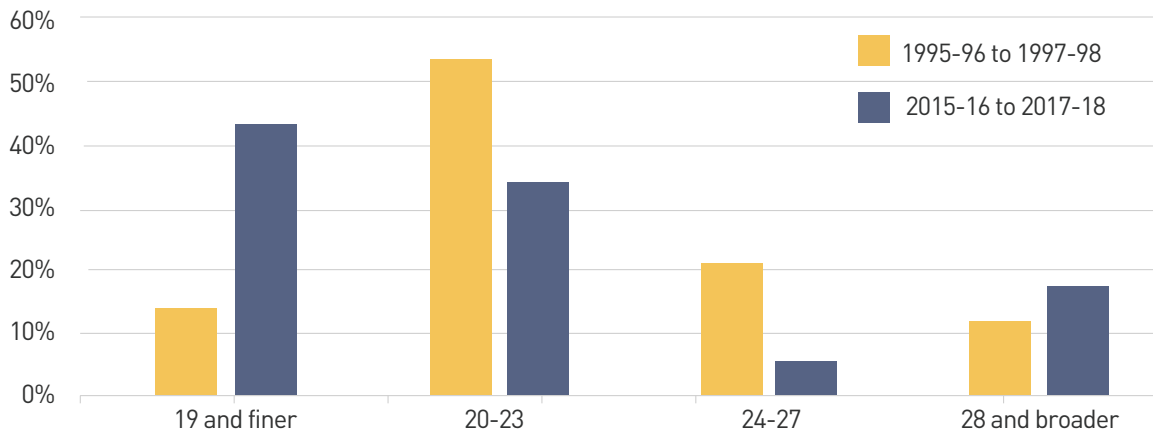
Source: International ABS (72150, 72180, 75030), AWTA key test data, AWEX market indicators, ABARES (AgSurf), AWI/MLA sheep meat and wool surveys. Analysis by Livestock Dynamics.

During the 2014-15/2016-17 period, the sheep industry (wool plus sheep meat) had an average GVP per year of $6.4 billion. Thus the $990 million extra value estimated in the above table represents a nett lift of 18% due to these gains in productivity.

Explanatory notes are as follows:

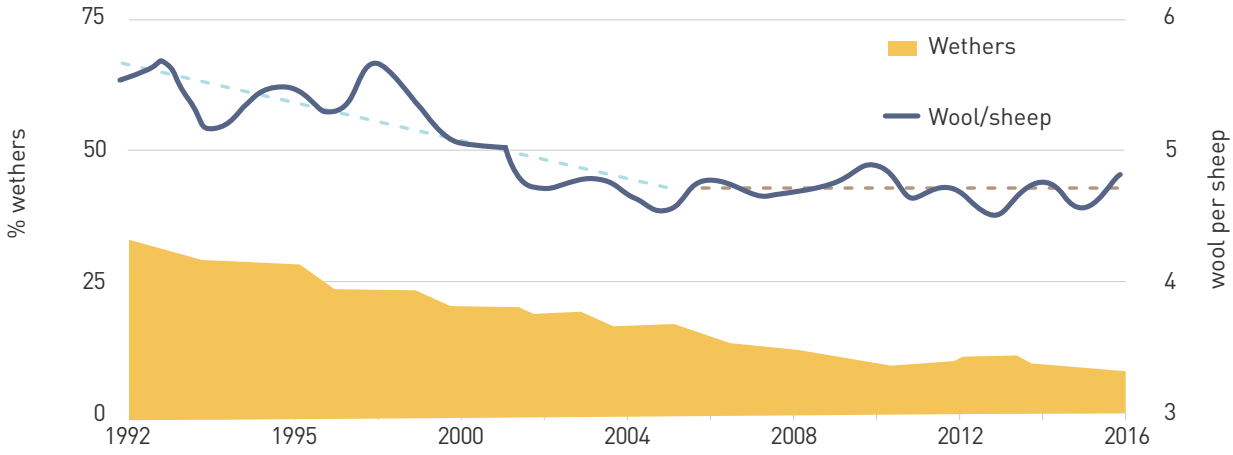
- **Lower fibre diameter.** The estimated extra value is a conservative estimate because it only looks at the decrease in the average fibre diameter. This decrease has been buffered by an increase in broad wool from meat breeds and to a lesser extent Merino crosses.

Source: Based on ABS export data (customised report). Analysis by Livestock Dynamics.




- **Decreased wool production per sheep.** This reduction is driven by a range of factors including the change in the composition of the flock – fewer wethers, more breeding ewes and lambs, and more crossbreds, maternals and shedding sheep – and in Merinos, the move away from medium and strong wool toward fine and superfine wool.

Source: Based on ABS (71210), AWPFC and ABARES data. Analysis by Livestock Dynamics.



• **Carcase weights**. The rise in demand for sheep meat has seen slaughter weights for both lambs and sheep (mutton) rise. Part of this rise can be attributed to the use of meat breeds and to the joining of terminal sires to Merino ewes. Rising lamb prices combined with the introduction of price grids have pushed producers to deliver carcases that better match processor specifications.

• **Increased marking rates.** As prime lamb turn-off has contributed an increasing proportion of the farm income, reproductive rate has become a key driver of sheep profitability. It is the key to how many lambs can be turned off without "mining" the flock. It also impacts on genetic progress and, naturally, profitability. Consequently, there has been a strong emphasis on improving ewe/lamb management programs and their messages appear to have been widely adopted. Extra lambs have been allocated between slaughter and live export in the same proportion as turn-off during 2015-16 to 2017-18.

See Figure 4 above.

# 5. QUESTIONS FOR CONSIDERATION

- How are the demographics of broadacre farms likely to change over the next 10 years?
- How are the demographics of the sheep industry likely to change over the next 10 years?
- What are the factors most likely to affect Australia's wool production over the next 10 years? Wool price, climate change, a shift to more profitable enterprises, others?
- What specific strategies (if any) are needed in the 10-year plan to address wool supply?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