

How are global and Australian sheepmeat producers performing?

Global *agri benchmark* network results 2021



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Global and Australian sheepmeat producer performance 2020: *agri benchmark*

Introduction

agri benchmark (AB) is a global non-profit, non-political network of agricultural economists, advisors, producers and specialists in key sectors of the agricultural value chain. It operates as an international network of research partners coordinated by the Thünen Institute – the German government rural research body. The sheep network has 16 member countries, covering 55% of world sheepmeat production and has produced global productivity and performance results, and comparative analysis, for the last eight years.

This report summarises the latest data from the network and provides insights into the performance of Australian sheepmeat farms and their productivity in comparison to their global counterparts.

Summary

Sheepmeat production remained extraordinarily profitable around the world in 2020, underpinned by strong growth in demand from China and restricted supply. Of the 40 typical sheep farms in the *agri benchmark* (AB) database, 90% made a cash profit¹ in 2020 and 82% were profitable in the short-, medium- and long-term².

Sheep and lamb prices remained near-record levels in 2020 and rose further in most countries, including Australia, where prices were at all-time highs post drought.

Global sheepmeat supply continues to be unresponsive to these high profits – new supply is not coming online to take advantage of these profits. The reasons that supply remains subdued despite the industry's profitability include:

- growing constraints on land, water and feed
- environmental issues and policies
- the effect of severe droughts in key producing countries, led by Australia.

Nearly all the AB Australian sheep farms had high profits in 2020 both in percentage terms and relative to overseas, despite the lingering impact of the severe 2018–2019 drought. The main exception was where the farmer had been forced to heavily liquidate their breeding flock during the drought.

Australian sheep farms are highly efficient compared to others around the world. Despite the ongoing impact of droughts, the Australian AB farms generally produced above average meat per ewe in 2020 and one farm had the highest liveweight production per ewe of any of the 40 global AB farms. Australian sheep farms have high weaning weights and lamb growth rates. While the two farms with composite breeds had relatively high lambing rates, the Merino-based farms had below average lambing rates due to the genetic trade-offs involved in the coproduction of sheepmeat and fine wool.

Australia remains a low cost sheepmeat producer, with average costs well below the global AB farm average. Australian sheep farms have lower costs for feed, labour (due to efficient usage, despite relatively high wage costs), land and capital.

Overall, Australia's generally stable and above average farm profitability are a result of the country being one of the most efficient, diversified and low-cost producers of sheepmeat in the world.

This competitive advantage is highlighted by Australia's position as one of only two major sheepmeat exporters in the world (along with NZ).

The forecast increase in sheep numbers indicates that sheep farmers in Australia have a high level of confidence in the medium- to long-term profitability of the industry. This is supported by the ongoing demand growth for sheepmeat globally, driven principally by consumer demand within China and the Middle East, but also underpinned by expanding foodservice demand in the US and Europe. This growth is despite the interruptions caused by COVID-19.

While Australian sheep farmers appear well placed to remain profitable in the short-, medium- and long-term, they need to remain vigilant in maintaining low-cost structures and continue to achieve productivity gains through improved genetics and management technologies.

¹ Cash profit (short-term profit) = Total returns minus cash costs.

² Medium-term profitability = Total returns minus (cash costs + depreciation).

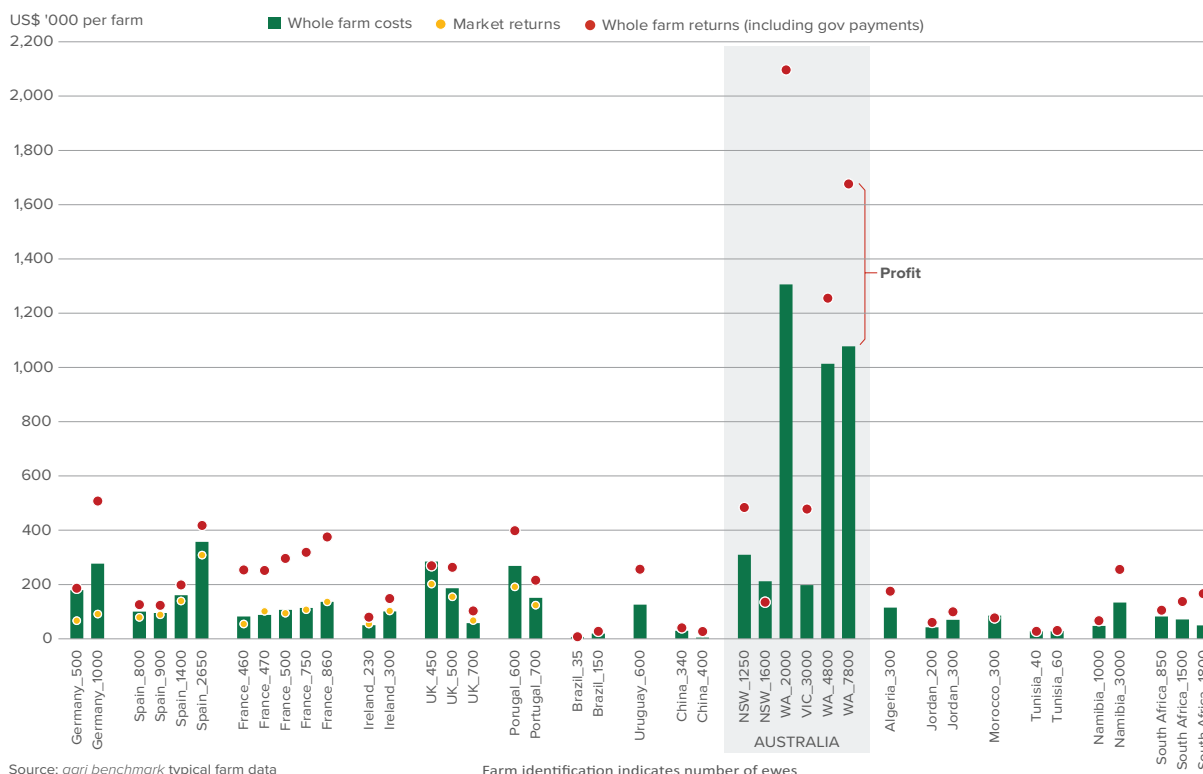


How did sheep farms perform financially in 2020 on a whole farm basis?

Global sheep farms' financial performance was again quite extraordinary in 2020 and similar to that of 2019. Nearly all farms made a profit. Out of the 40 typical farms in the *agri benchmark* data set, 90% made a short-term profit and 82% also made a medium-term profit.

Although many of the European farms relied on government payments to achieve a profit, such as Germany and Spain, three of the French farms (France_470³, France_500, France_800) and one of the UK farms (UK_700), achieved profits without government payments.

Figure 1: Whole farm medium-term profit



Source: *agri benchmark* typical farm data

Farm identification indicates number of ewes



³ The farm identification indicates country-number of ewes on the farm.



In the last five years, global lamb prices have increased steadily and by 2020, they had reached similar levels to 2011 prices, when they were at their historical peak (Figure 2). For Australia, prices were higher in 2020 than 2011, as shown by the *agri benchmark* Lambs Price Index⁴ (Figure 2a). The Lambs Price Index for Australia (in AUD) was a record 151 in 2020, up 6% on 2019 and almost 50% higher than the 2011 peak. Iran, Tunisia and Namibia have also experienced significant lamb price increases since 2011, in local currency terms. Some countries' lamb prices, however, have not increased in the last two years on a USD basis, given the impact of local currency exchange rates relative to the US dollar.

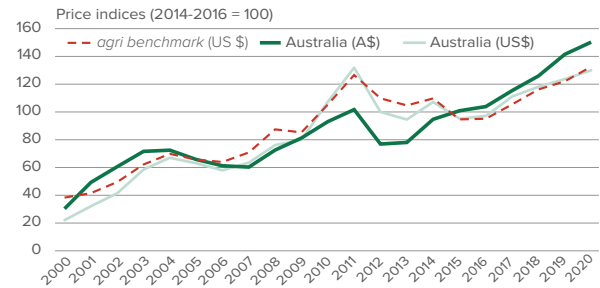
The NZ Lambs Price Index (in NZD) fell 10% in 2020 although it was still at historical highs and similar to the peak prices of 2011 (Figure 2c).

Australia and New Zealand are the dominant sheepmeat exporters, as shown in Figure 3. The largest trade flows are now to China. Australia exported 199,000 tonnes and New Zealand 218,000 tonnes to China/Hong Kong in 2019. The UK is the only other country that exports a significant amount of sheepmeat, although it is significantly less in comparison, at 30,000 tonnes, to other European markets (Figure 3).

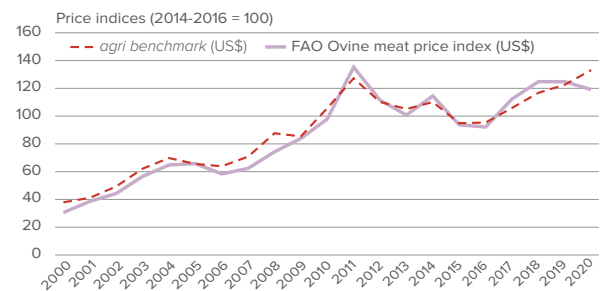
The strong demand from China and a free-trade agreement between New Zealand and China has resulted in some sheepmeat trade flows being redirected into the Chinese market and drawn away from more traditional consuming markets, like the EU.

Figure 2: *agri benchmark* Lambs Price Index

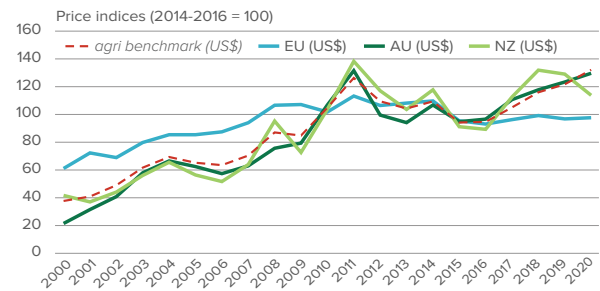
(2a) *agri benchmark* Lambs Price Index and Australia



(2b) *agri benchmark* Lambs Price Index Food and Agriculture Organisation (FAO) Ovine (meat) Price Index

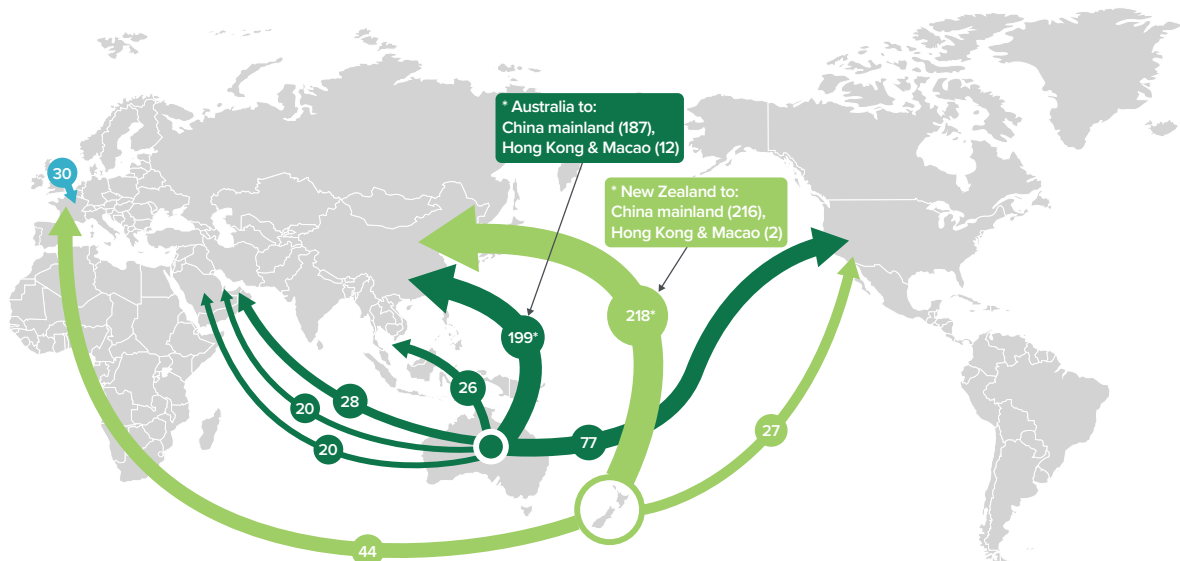


(2c) *agri benchmark* Lambs Price Index comparing regions



Source: FAO Ovine Price Index

Figure 3: Top 10 sheepmeat trade flows in 2019



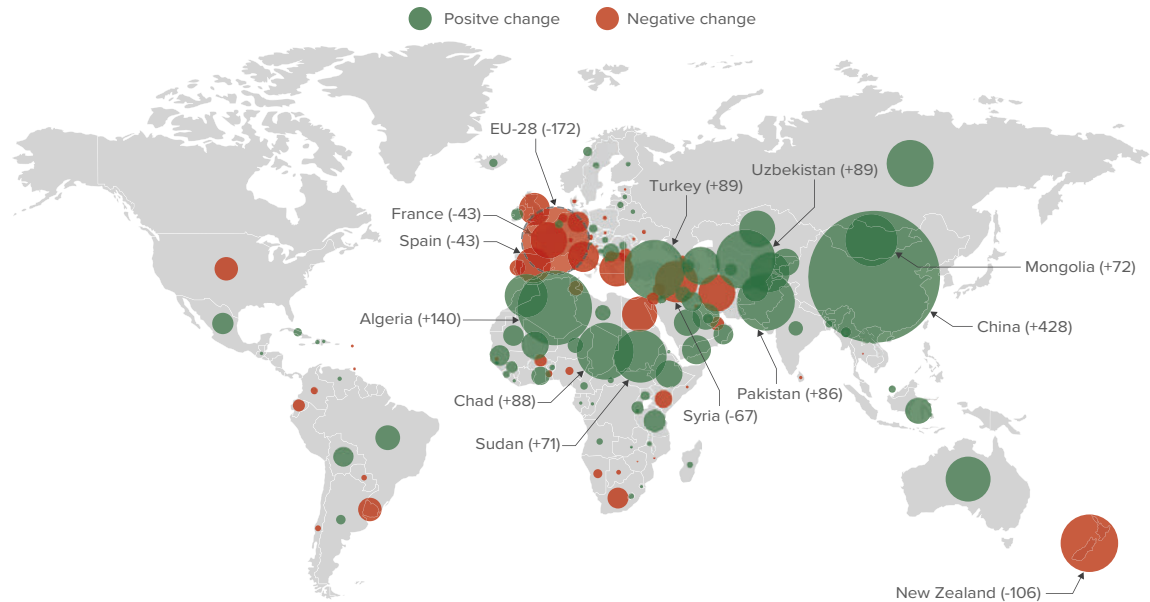
Source: C Deblitz & E Burghardt-Tiele, FAOstat 02/2021, SD=71 (South Sudan & Sudan), own calculations Note: figures are '000 tonnes carcass weight

⁴ This Index is calculated based on the Laspeyres approach. For more information visit www.agribenchmark.org/beef-and-sheep/agri-benchmark-price-index.



The high prices enjoyed by farmers in Australia and New Zealand reflects the high global demand for sheepmeat and a shortage of supply to meet that demand. Supply is restricted due to land constraints and the impact of drought on both New Zealand and Australia. Figure 4 shows how much New Zealand sheepmeat production has decreased, mostly due to the expansion of the dairy industry, which has changed farmers' resource allocation and land uses.

Figure 4: Absolute change in global sheepmeat production (1,000 tonnes) 2017–2019 versus 2007–2009

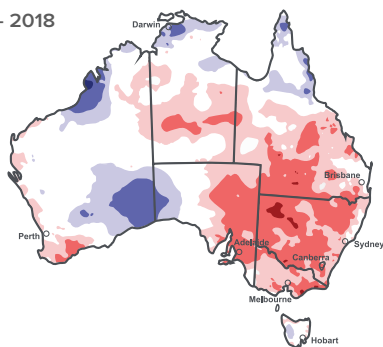
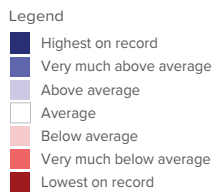


Source: C Debilzt & E Burghardt-Tiele, FAOstat 02/2021, SD=71 (South Sudan & Sudan), own calculations () Brackets indicate change in '000 tonnes carcase weight

In Australia, sheep numbers were significantly impacted by severe drought in 2018 and 2019. 2019 was one of the lowest rainfall years on record in the main sheep regions and came after a string of five low rainfall years between 2013 and 2018, with the exception of 2016. Figure 5 shows the rainfall deciles for 2018 and 2019. In 2020, conditions improved but not until mid-year for some regions.

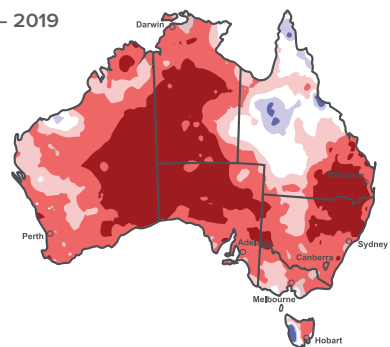
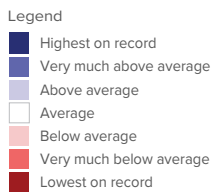
Figure 5: Australian rainfall deciles for 2018 and 2019

Rainfall decile ranges – 2018



Source: Bureau of Meteorology

Rainfall decile ranges – 2019



Source: Bureau of Meteorology



By the end of 2020, most of Australia had received average or above-average rainfall as seen in Figure 6, although some regions remained in drought conditions.

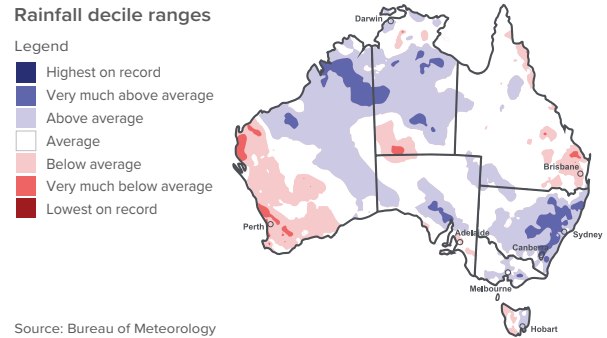
Consequently, sheep numbers have declined, and the flock has decreased to an estimated 64 million, the lowest level since 1904⁵, (Figure 7).

The forecast for 2021 shows a significant flock recovery and more rapidly than initially anticipated. By June 2023, the flock is expected to be 76.3 million head⁶.

The low sheep numbers in Australia have been partly responsible for the increase in global sheepmeat prices. These high global prices have translated into higher market returns for producers and extraordinary sheep profits for most *agri benchmark* partner countries, with 90% achieving short-term profitability.

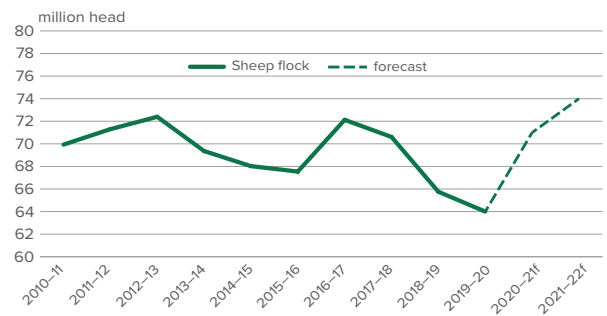
Most Australian sheep farms are mixed-farming enterprises that also grow cash crops, which contributed significantly to their returns in 2020 (Figure 8). High prices for grains, combined with favorable seasonal conditions for cash crops, meant the income from cash crops was high. VIC_3000 is the only Australian *agri benchmark* farm that does not grow cash crops, being totally reliant on the sheep enterprise to achieve a profit. Note, the ewe revenue includes income from the sale of lambs.

Figure 6: Australian rainfall deciles 1 January to 31 December 2020



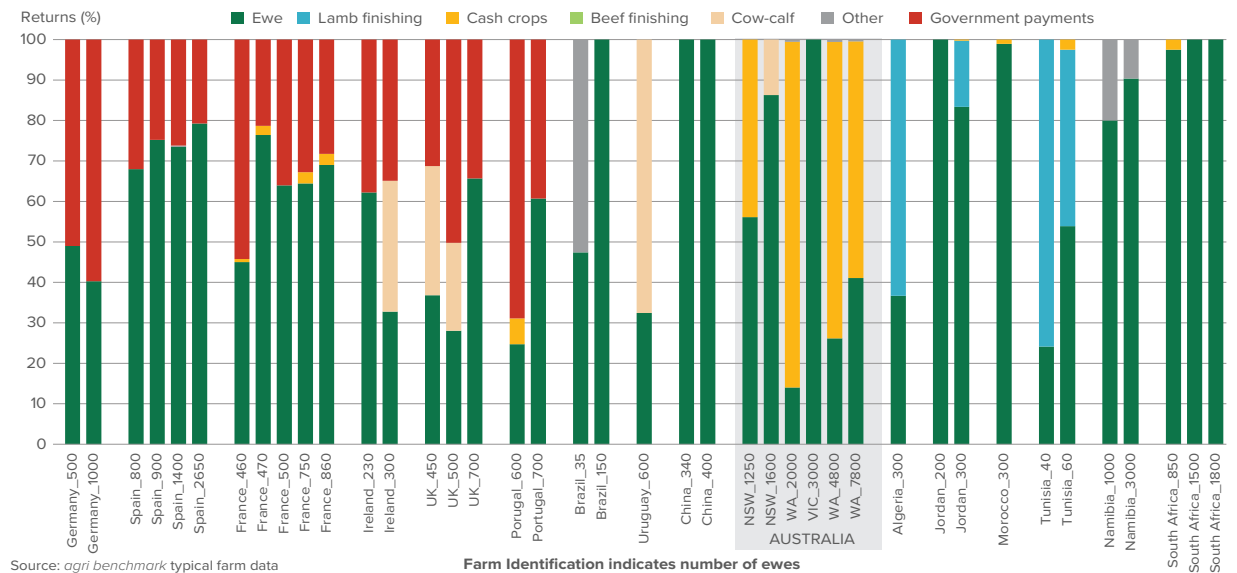
Source: Bureau of Meteorology

Figure 7: Sheep and lamb flock size in Australia



Source: MLA sheep projections and market information statistics database

Figure 8: Percentage composition of the returns for farms



Source: *agri benchmark* typical farm data

Farm Identification indicates number of ewes

Most farms in the other countries are reliant on sheep enterprises generating most of their income. A few exceptions include Ireland_300, UK_450, UK_500 and Uruguay_600, which all have cow-calf enterprises. Many of the European countries also rely on government payments, shown as the red bars in Figure 8. Most of these farms would not generate a profit without this government support.

⁵ The many changes to the methods of counting the sheep inventory make this comparison imperfect. Official records have the national flock at 56.8 million in 1904.

⁶ <https://www.mla.com.au/prices-markets/Trends-analysis/sheep-projections/#:~:text=In%202021%2C%20the%20national%20sheep,head%2C%20after%20years%20of%20drought.>



The profiles for the Australian AB typical farms, along with a summary of the 2020 seasonal conditions, is given in Table 1.

Table 1: Australian agri benchmark typical farm profile

	NSW_1250	NSW_1600	WA_2000	VIC_3000	WA_4800	WA_7800
Region	New South Wales	Northern Tablelands (NSW)	Northern agriculture region (WA)	Western Victoria	South-West WA	South-West WA
Production system	Grazing	Grazing	Grazing	Grazing	Grazing	Grazing
Climate	Temperate No dry season (hot summer)	Temperate No dry season (warm summer)	Grasslands Hot (summer drought)	Temperate No dry season (warm summer)	Temperate Distinctly dry and hot	Temperate Distinctly dry and warm summer
Main growing season	Spring	September to February	April/May to October	April/May to October	April/May to November	April/May to November
Precipitation distribution	Even	All year summer dominance	Winter dominant	Winter dominant	Winter dominant	Winter dominant
Average annual precipitation	627	790	320	680	350–450	550–600
Relief	Undulating	Hill	Plains	Undulating	Plains	Undulating
Feed source	Pasture	Pasture and Forage oats	Pasture, Grain and Hay	Pasture, Hay and Forage Oats	Pasture and Grain/Lupins	Pasture and Grain/Lupins
Pasture (ha)	350	423	1,375 ⁷	600	1,270	1,370
Ewes	1,250	950 ⁸	2,080	3,000	2,805	6,218
Breed of ewe (F1)	Merino x Border Leister	Merino	Merino	Coopworth X	Merino	Merino
Breed of sire (% ewes mated)	Dorsett Horn (100%)	Dorset (30%)	Poll Dorset (30%)	Dorset (100%)	Poll Dorset (30%)	Poll Dorset (25%)
Lambs sold as suckers (head)	219	169	84	1648	–	1358
Lambs sold later (head)	1239	846	1136	1730	1187	1972
Seasonal conditions for 2020	<p>Bumper year – top decile. Drought persisted for the first 2 months of the year with full hand feeding of barley and hay to sheep in confinement at high feed prices. Autumn drop ewes fed 1kg/hd/d for 60 days=60kg. Spring drop fed 0.7kg/hd/d for 60 d =42kg. Autumn break occurred late February saw quick pasture response, grazing crops sown early – difficult to control with grazing management. Spring drop lambs fed 200g/hd/d for 75 days =15 kg grain just to supplement on pastures/ lucerne which remained green over summer/ autumn. Crop yields very high and prices good. Higher fertiliser amounts to boost crops. Oats retained on farm to replenish drought reserves for sheep feed.</p> <p>Ewe replacement cost high – \$300 per head. Meat prices remain buoyant, lambs kept to heavier weights.</p> <p>XB and 32 micron wool prices dropped significantly.</p> <p>No fertilizer topdressing on pastures – tight budget post drought.</p>	<p>Prices for commodities and livestock varied considerably throughout 2020 given the drought eased with significant rain in January. Most notably, cattle prices were lower in the first quarter and gradually increased throughout the year. Restocking was the priority and fertiliser was foregone to purchase livestock instead.</p>	<p>The region had a difficult and later start than normal, with several severe wind events resulting in poor emergence for crops on the lighter soils or those soils which lacked stubble cover. The rainfall in 2020 was more at the back end of the season, with crop roots following moisture deep into the profile during the winter, then receiving some decent rain in August just as they were starting to stress from lack of moisture. It has been the distribution of rainfall, rather than the total amount, that has made the positive difference to production this year. The dry and difficult start to the season meant sheep required feeding – August rainfall meant good pasture production in spring and management of sheep eased.</p>	<p>The southwest region experienced good summer rainfall and a fairly wet month of April, followed by a dry winter and a good spring. The timely rainfall throughout the year provided for good pasture production and a subsequent reduction in the amount of supplementation required compared to the previous year. The reduced supplement feeding combined with lower hay and grain prices and higher lamb and mutton prices supported an increase in prime lamb enterprise profits across the region during 2020.</p>	<p>Most of the region (the Lakes) had 50-100mm of summer rain which got everyone excited – first time for several years. The areas with more rainfall had a good germination of winter weeds and pasture that made it through to the general break of the season. The areas with less than 50mm of summer rain lost most of the pasture that germinated. The summer rainfall was not enough to maintain surface water for livestock and other domestic water supplies, causing some growers to opt out of sheep altogether for the first time – due mainly to the dry years and the profitability of sheep versus cropping in this region.</p> <p>Good winter rains came late (August) but meant good crop yields and improved water supplies for sheep.</p> <p>Generally, there was a high cost for feeding sheep in the autumn feed gap.</p>	<p>The previous year's rainfall and lack of run-off into dams impacted on livestock water supplies and many people carted water throughout the summer and autumn.</p> <p>Variability in summer rainfall and a late break to the season meant many crops went in dry.</p> <p>Rainfall from August onwards allowed for crop recovery, good spring pasture growth rate and many lambs were finished early.</p>

⁷ Numbers of ewes decreased

⁸ The reduction in numbers occurred in 2019 as a drought mitigation strategy.



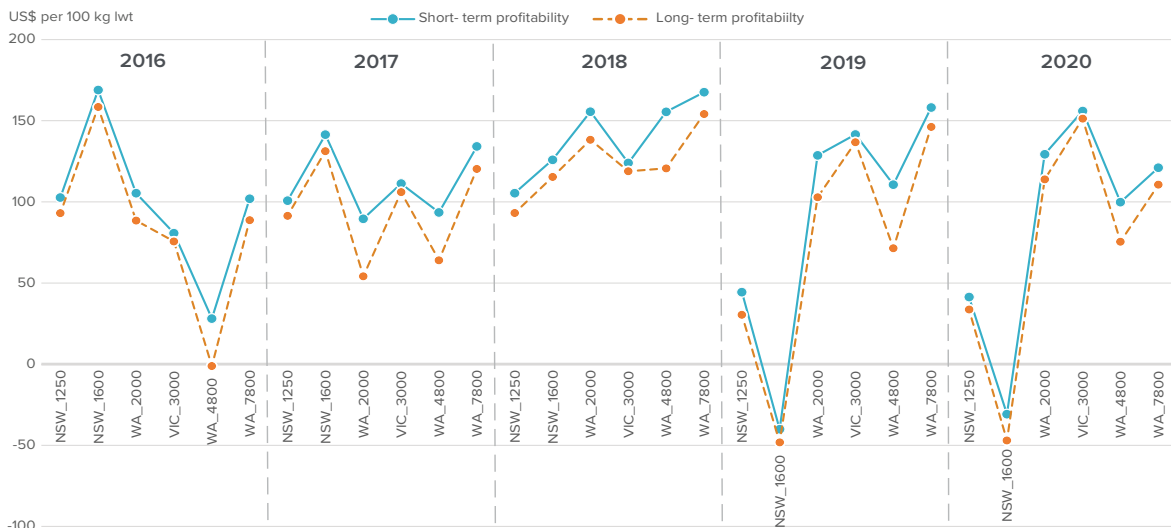
In Australia, nearly all the *agri benchmark* typical sheep farms achieved high levels of profitability in 2020 (Figure 1 and Figure 9) except for NSW_1600. The effects of drought conditions lingered despite rains starting in January.

NSW_1600 was the only farm that did not manage to achieve either a short-term or medium-term profit, including for the second year (Figure 9). This farm had a smaller breeding flock than usual. Its breeding ewes were reduced to 950 in 2019, in response to the severity of the 2019 breeding season and as a drought-mitigation strategy. Therefore, there were lowering turnoff receipts and increasing costs as the farm rebuilt its flock.

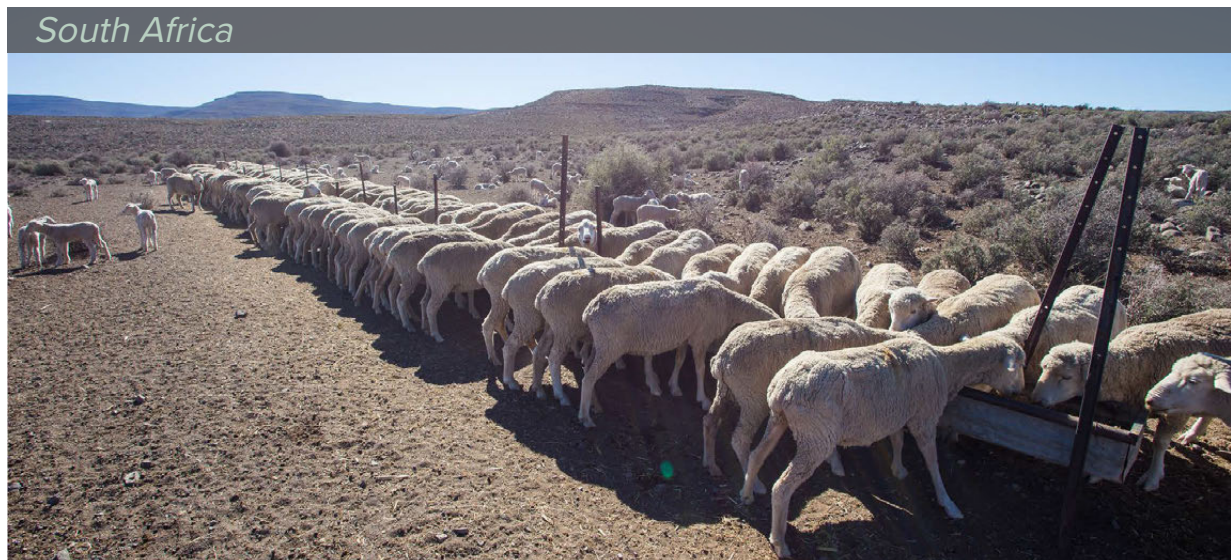
It is also worth noting the significant reduction in ewe numbers in the WA farms in Table 1, compared to their original numbers at the start of data collection. Mixed farming enterprises alter their enterprise mix annually, and in the last five years, sheep numbers have generally declined. Improved technologies for cropping enterprises, including improved crop genetics and better machinery, as well as the adoption of new technologies (e.g. GPS) and new generation sprays for weed and disease control, have all driven improved productivity for cropping operations. Grain prices have also generally been above long-term average, thus improving the profitability of grain and cropping farming. At the same time, a drying climate has facilitated a change in land-use since WA entered the AB program in 2013.

Rainfall was very much below average across most of the WA sheep farm regions in 2020 (April to October). It was a very dry start to the season as drought conditions continued until August, however good spring rainfall meant crops and pastures recovered. The impact of these dry conditions is evident in Figure 9, where profits for the three WA farms slipped slightly in 2020 to dip well below 2018 profits, despite higher lamb prices and cropping returns.

Figure 9: Short- and medium-term profit for Australian sheep farms 2016 to 2020



Source: *agri benchmark* typical farm data



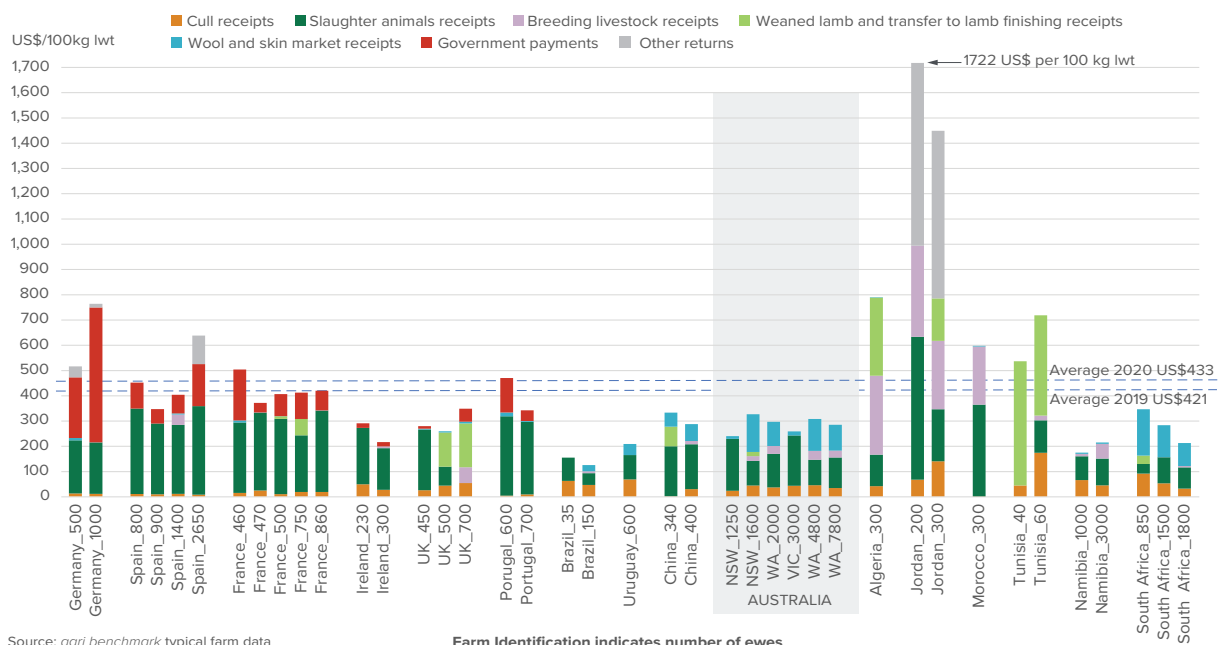
How do Australian sheep enterprises compare to their global peers?

The range in sheep income between farms is extraordinary, from US\$124 per 100kg liveweight (lwt) in Brazil (Brazil_150) to US\$1722 per 100kg lwt in Jordan, which is a further increase on 2019 returns.

The average total returns for the sheep enterprise component of each farm across the *agri benchmark* network increased by 2.7% from the previous year to US\$433 per 100kg lwt. Australia's increase was 5%, supported by lamb and sheep price increases and the breaking of the eastern drought.

Australian farmers receive income from several sources for their sheep enterprise besides slaughter animal receipts. Most Australian sheep enterprises also receive income from breeding livestock receipts and wool receipts. VIC_3000 however does not, because its focus is meat production and uses Coopworth cross ewes. As a result, this farm receives no income from wool, however the productivity in meat production compensates for this. All the other Australian farms use Merino breeding ewes which also produce wool for the apparel market, generating a secondary income. South Africa also uses wool-producing Merino ewes and receives significant income from wool (Figure 10).

Figure 10: Total returns per 100kg lwt, 2020



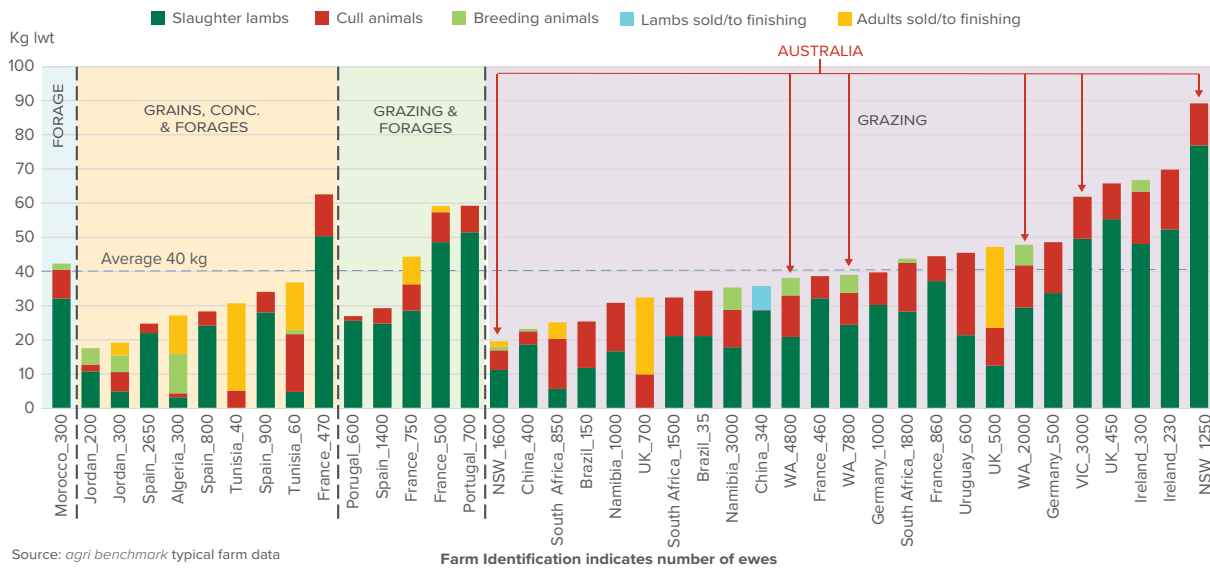
Sheep and lamb revenue is generated by the quantity of liveweight sold, multiplied by price per kg of liveweight. This means the amount of liveweight sold per ewe (kg lwt) is a good indicator of productivity per ewe and returns. In Figure 11, the total liveweight sold per ewe is presented and countries are ranked according to the type of grazing system they use and liveweight sold per ewe – therefore providing a comparison between farms and countries according to level of performance.

Australian farms employ grazing systems with grain and hay fed on a supplementary basis in summer and autumn when there is minimal pasture growth. Even during drought conditions, the number of sheep fed grain or forage in Australian systems is generally less than in other countries where grain/concentrate and forage systems dominate.

The overall global average total liveweight sold per ewe was 40kg, with five of the six Australian farms close to, or above, this average. Three of the Australian farms sold more than the average: VIC_3000, WA_2000 and NSW_1250, with the NSW farm the highest ranked of all global farms. NSW_1600 only sold 19.5kg per ewe and was ranked the lowest, selling the least amount of liveweight per ewe for all the grazing farms. This farm's strong focus on producing fine wool Merinos reduces its meat production. They also sold breeding animals in 2019 to cope with drought conditions, leaving fewer lambs or cull animals to be sold in 2020.



Figure 11: Total liveweight sold per ewe

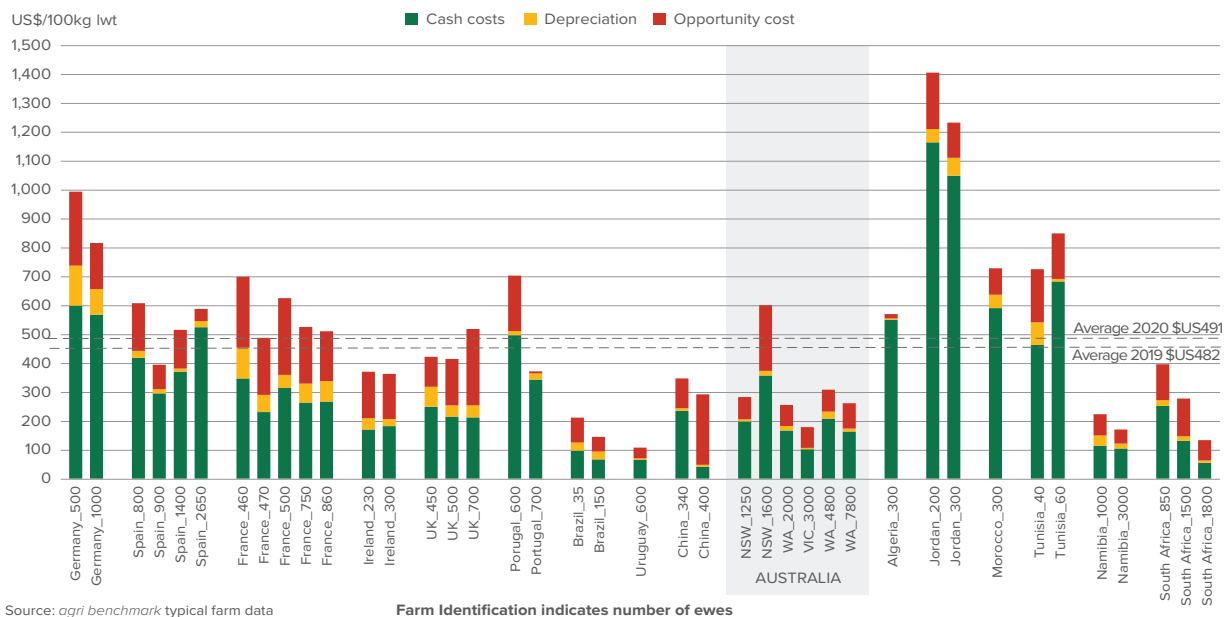


How have costs impacted on sheep enterprise profitability in 2020?

In 2020, the average cost of production was US\$491 per 100kg lwt, higher than the average cost of production shown in 2019, (Figure 12).

The stand-out countries are Jordan and Tunisia, where sheep producers receive high prices and generate high levels of revenue. Jordan's cost of production, however, is almost three times higher than the average. The cost of production for Jordan_200 and Jordan_300 is US\$1407 and US\$1234 per 100kg lwt, respectively, which has increased since 2019.

Figure 12: Total costs of production US\$ per 100kg lwt



Australian farms generally have low costs of production which is well below the average. The exception in 2020 was NSW_1600 which, as a result of the drought, sold few animals, and at lower sale weights per head sold. This increased their cost of production per 100kg lwt sold.



Table 2 breaks down the cost of production into cash costs, depreciation and opportunity costs for each Australian farm, providing a comparison to the average for all the farms. The breakdown of opportunity cost, which includes land, labour and capital, is also provided in Table 1. Besides NSW_1600, labour costs are below average on the Australian farms, while land costs are mixed but generally near or above the average, and capital is below average. Overall, this means that generally the Australian farms' cost of production is well below the average.

Table 2: Average cost of production for all 40 farms compared to Australian farms (US\$ per 100kg lwt)

	US\$/100kg lwt				Opportunity cost			
	Cash cost	Depreciation	Opportunity cost	Total	Labour	Land	Capital	Total
Average of all farms	323	35	133	491	95	53	13	158
AU_1250	198	8	77	283	45	26	5	77
AU_1600	357	16	228	601	96	115	17	228
AU_2000	167	16	73	255	26	46	0	73
AU_3000	102	5	72	178	35	29	8	72
AU_4800	208	24	76	308	24	51	0	76
AU_7800	163	10	87	261	25	61	1	87

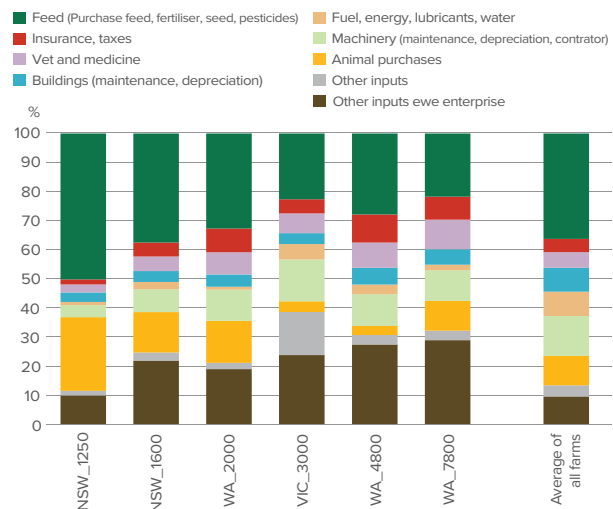
Source: *agri benchmark* typical farm data

Figure 13 shows the composition of the enterprise costs (cash costs) for the Australian farms compared to the global average for all sheep farms. Feed costs are the largest cost for all farms, accounting for 38% of the enterprise costs. For most Australian farms, the feed costs were less than the global average, except for NSW_1250. This farm's feed costs were 50% of their sheep enterprise cost, as in 2019, because of the drought conditions experienced. NSW_1600 feed costs reduced in 2020 compared to 2019 because they had less stock.

When comparing the cost of production by farming system, it is apparent that the lowest average cost of production can be achieved in the grazing systems (Figure 14) at US\$358 per 100kg lwt.

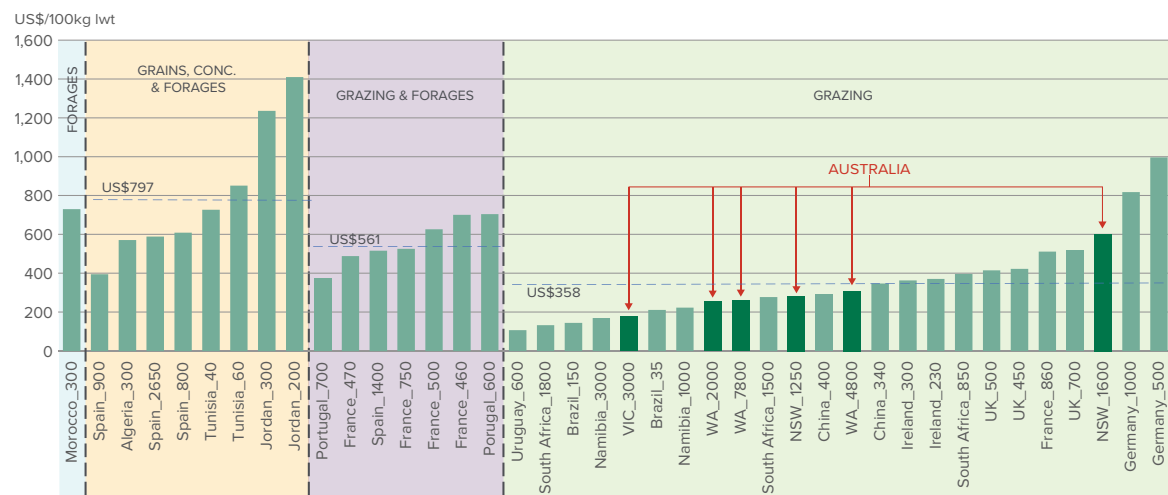
The cost of production on specific grazing farms in Germany, however, such as Germany_1000 and Germany_500, was higher than any of the farms classified as grazing and forages.

Figure 13: Composition of enterprise costs for all 40 farms compared to Australian farms 2020



Source: *agri benchmark* typical farm data

Figure 14: Cost of production by farming system ranked from lowest cost of production to highest per 100kg lwt produced



Source: *agri benchmark* typical farm data

Farm Identification indicates number of ewes



Conclusions

The general stable and above-average profitability of Australian sheep farms is derived from being one of the most efficient, diversified and low-cost producers of sheepmeat in the world. This has resulted in Australia being one of only two major sheepmeat exporters in the world (along with New Zealand).

The forecast increase in sheep numbers (Figure 7) indicates that sheep farmers in Australia have a high level of confidence in the medium- to long-term profitability of the industry. This is supported by the high level of demand for sheepmeat globally, driven by consumer-demand within China and the Middle East, whose populations are experiencing increasing levels of prosperity. In addition, the US and Europe continue to support the food service demand for sheepmeat. Despite the interruptions caused by COVID-19, exports have also remained high in these markets .

Sheep farmers appear well-placed to remain profitable. High and ever-rising demand for sheepmeat and constrained supply growth is contributing to this long-term profitability for the industry. Australian sheep farmers, however, need to remain vigilant in maintaining low-cost structures and continue to achieve productivity improvements through improved genetics and management technologies.

Spain



Appendix 1

What is *agri benchmark*?

agri benchmark is a global non-profit, non-political network of agricultural economists, advisors, producers and specialists in key sectors of the agricultural value chain. It is operated as an international network of research partners coordinated by the Thunen Institute – the German government rural research body. The sheep network has 16 member countries, covering 55% of world sheepmeat production and has been producing AB sheep reports for the last eight years.

The core competence of the network is in its ability to analyse production systems, their economics, drivers and perspectives.

agri benchmark aims to assist:

- producers to better align future production through analysis of comparative performance and positioning;
- non-profit organisations (NGOs, international organisations) to monitor global agricultural challenges;
- public and industry institutions to better plan research, farm policy and programs and make their case; and
- agri-businesses to operate successfully through in-depth understanding of markets and customers.

agri benchmark has branches covering beef cattle, sheep, dairy, pigs, cash crops, horticulture, organic farming and fish.

Figure A1: Countries in the *agri benchmark* beef and sheep network as of 2020



Source: *agri benchmark*

Within sheep farms, *agri benchmark* measures the sheep (or ewe) enterprise performance separately from (and together with) other outputs where the operation is diversified (in Australia, this is typically with cropping and/or beef). Sheep enterprises are also often divided into those based on:

- grazing
- grazing and forages
- grains
- concentrates and forages
- forages alone.

The farm-level results in this report are drawn from the collection of ‘typical farm’ data in each country, and subsequent analysis and research efforts of all member countries, culminating in the 18th annual *agri benchmark* Conference (online), 15–17 June 2020.

A ‘typical farm’¹⁰ (Chibanda, C., et al. 2020) can be based on data for an actual farm, judged to be typical of a key production system in a key region¹¹, or ‘engineered’ by local producers and experts to be typical (using annual data drawn from farms in the key production regions). In Australia, data was collected for six typical sheep farms in NSW, Victoria and WA.

¹⁰ A preferred method compared to compiling data from a group of individual farms and ranking them according to the average, or above-or below- average which is argued as being a futile exercise in farm business management economics (Sefton and Cox, 2005; Ferris and Malcolm, 1999; Mauldon & Schapper 1970).

¹¹ Such individual farm data is further ‘typified’ where necessary by replacing farm individual particularities by prevailing characteristics, figures, technologies and procedures.

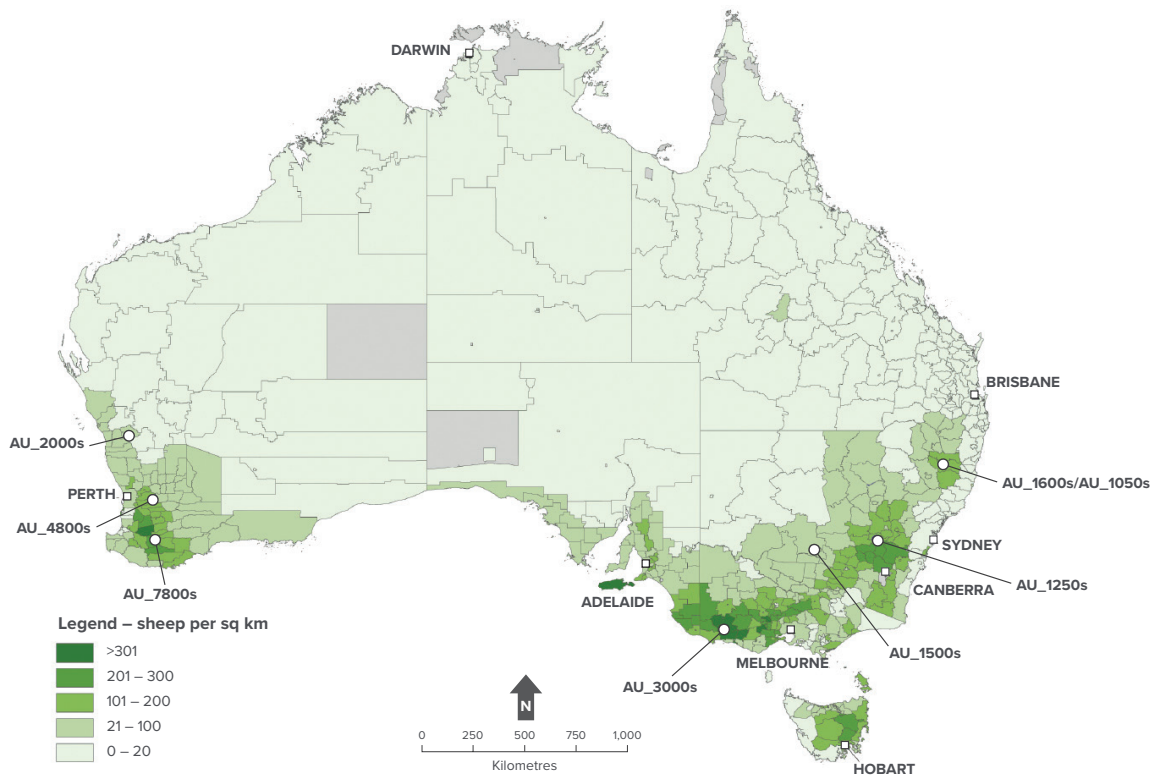


The characteristics of the six typical Australian *agri benchmark* farms are outlined in Table A1, which includes information about their sheep enterprises.

Table A1: Australian *agri benchmark* typical sheep farms

Held (ewes)	Farm make-up
AU_1250s	(1250 ewes) – NSW slopes; Border Leicester X Merino ewes, Dorset rams; sheep + crops
AU_1600s	NSW Northern Tablelands; Merino ewes, Dorset & Merino rams; sheep + wool + cattle
AU_2000s	WA low rainfall; Merino ewes, Merino & Poll Dorset rams; sheep + crops
AU_3000s	Western VIC; Coopworth X Dorset self-replacing
AU_4800s	WA medium rainfall; Merino ewes, Merino & Poll Dorset rams; sheep + crops
AU_7800s	WA high rainfall; Merino ewes, Merino & Poll Dorset rams; sheep + crops

Figure A2: Location of Australian *agri benchmark* typical sheep farms and sheep density



Source: ABS and *agri benchmark*

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