Meat sheep, meat goats and wool sheep in Queensland

Overview and prospects

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Queensland
Government

Contents

List of figures

List of tables

1 Summary

This report provides production and economic data for the wool sheep, meat sheep and meat goat (collectively, the small ruminant) industries of Queensland. It also considers the prospects for a rebuilding of the Queensland sheep flock.

The current Queensland sheep flock (2.1 m head) is expected to produce around 7 m kilograms of greasy wool and about 520,000 sale stock. Total sheep (both merino and non-merino mated) slaughtered for mutton from Queensland is expected to be about 360,000 head, or about 5% of the national total, producing 16,900 tons liveweight or about 8,500 tons dressed weight. If lamb production (160,000 head) were added to this, total Queensland sheep meat production is expected to be about 12,500 tons dressed weight. Less than half of the sheep produced in Queensland are processed in Queensland. At last census, there are about 1,345 sheep businesses in Queensland. AWI reports 929 wool growers paying more than $100 per annum in wool levies in the past three years to 2019 across Queensland.

The Queensland meat goat sector produces about 200,000 slaughter goats per annum with a total carcase weight of about 3,000 tons. Queensland is expected to process more than 325,000 goats per annum with at least 1/3 of the total supplied by NSW producers. There are approximately 500 goat meat producers across Queensland.

A structural change to the economic underpinnings of the Queensland sheep industry occurred about 1960. Prior to 1960, total sheep numbers returned to about 25 million head after each drought or other industry shock. Post 1960, the competitiveness of the Queensland sheep industry changed, and total sheep numbers have been in steady decline since. Total sheep numbers are currently at the lowest level since records began. The long-term reduction is not due to drought or a change in pasture amount or quality or wild dog predation. The number of cattle grazing the same regions as sheep have not shown a downwards trend and cattle have replaced sheep across many of the former sheep producing regions.

The change in the cost of skilled labour relative to the cost and availability of capital throughout rural Queensland from the 1960's is a key factor in the decline in the sheep industry. The other factors underpinning the decline have been the relative profitability of beef production and adoption of significant labour-saving technologies by the rangeland beef industry. Beef producers have been able to improve the efficiency of labour through aggregation of properties to take advantage of the economics of size, make labour saving investments in infrastructure and to adopt highly adapted breeds of cattle. Wool sheep production has been unable to escape its requirement for skilled labour via capital investment or technology change, cannot compete effectively in the market for the labour it requires to operate at scale and has declined in size accordingly. The expansion of the mining and other sectors of the economy across Queensland since the 1970's has captured the skilled labour previously available at relatively low cost to the sheep and beef industries of the rangelands.

These factors indicate that rebuilding the Queensland sheep flock from record low numbers will be slow and numbers are considered unlikely to exceed five million sheep and about 500,000 meat goats (or some unknowable combination of wool sheep, meat sheep and goats totalling about 5.5 million small ruminants) within the medium-term future. Any increase in wool sheep production from the current levels will largely be due to smaller, family owned properties located in the Rangelands who have recently been sheep and wool producers, returning to sheep and wool production after drought. Corporate investors in agriculture appear unlikely to invest in the necessary skills and knowledge,

additional labour and capital required to convert much of their beef production on generally larger properties to small ruminant production.

To date there has been no discernible shift out of wool sheep to meat sheep or goats but it is expected that some wool sheep producers will switch to meat sheep or possibly meat goats if the current price relationships are maintained. Therefore, some expansion in the meat sheep and meat goat sectors may occur at the expense of the wool sheep sector.

Established beef producers who do not have exclusion fences or suitable infrastructure in place are unlikely to rebuild a drought depleted beef herd with small ruminants. Beef production is currently profitable for established beef producers and it is expected that few will change enterprises while their properties are profitable producing beef, even though they may be more profitable producing meat sheep, wool sheep or meat goats.

Where rebuilding numbers after drought is being considered by existing beef producers who have exclusion fences and /or sufficient infrastructure in place to manage goats or sheep, the recent change in the relative profitability of sheep and goat meat production compared to beef production is likely to encourage such beef producers to partially rebuild stock numbers with small ruminants. In the central western and south western rangelands, where there is a choice between beef and small ruminants, small ruminant enterprises are considered more likely to generate a positive cash flow sooner than rebuilding numbers with beef cattle alone.

Exclusion fences

The recent expenditure by industry and government on the construction of exclusion fences could support properties that previously focussed on beef production to switch to the currently more profitable production of small ruminants. There is insufficient information available to determine the extent and timing of any possible switch to an alternative enterprise by existing beef producers who have recently invested in an exclusion fence or become part of a larger cluster. Although the expenditure on cluster fencing can now be considered a sunk cost, the implications of the expenditure need to be more fully investigated, particularly the potential future impact on the size and distribution of small ruminant enterprises across the rangelands.

Value adding / Industry development

Industry and government need to pay attention to opportunities to improve efficiency behind the farm gate or between the farm gate and the first stage processor. Investment of public funds post the initial processing of the live animal appears unlikely to add value. The initial consideration of value adding opportunities for the small ruminant industries located in Queensland's rangelands indicates that the knowledge gaps centre around how the meat sheep and meat goat sectors have their efficiency improved under local conditions. Key questions include:

- What is the most profitable sale weight /age /condition for a lamb /meat goat produced in the rangelands?

- What is the optimum flock or herd structure to meet the targets set for optimum sale condition and profit?

- If these specifications cannot be met on pastures, are there opportunities for paddock fed supplements, custom off farm feeding or a separate feed lot sector where ownership of the lamb /goat is transferred to the lot feeder?

- What knowledge exists as to the capital investment, rations, feeding strategies necessary to make on farm feed lotting or paddock supplements efficient for sheep and meat goats?

- What is the relative profitability of on farm and off farm feedlotting to finish lambs or meat goats? Would larger commercial feedlots have access to different efficiencies that on farm feedlots cannot access?

There are also unanswered questions around whether the efficiency of transferring stock from the property to the point of sale or processing can be improved and, if it can be improved, how is it done. This is particularly so for the Rangelands lamb producer who may have to transport lambs some considerable distance to access to organic or other premium markets.

Policy makers and industry should be aware that a move downstream along the value chain is not a precondition for increasing domestic value creation and that Australia is not missing out on value creation through its focus on raw and minimally processed products. Value creation can be unlocked by pro-competitive reforms along the supply chain and ensuring production is consumer focused.

Processing

There has been an ongoing rationalisation in the sheep and goat processing sector across Australia and the developed world over recent decades. The Australian processing sector is rationalising into a very small number of large processors that are vertically integrated and reliant on export markets and a larger, but shrinking, number of very small processors who focus on supplying local or niche domestic markets.

Queensland does not have sufficient supply of either goats or sheep to support a major, vertically integrated specialist export sheep and goat processor of the scale of those found in NSW, Victoria or South Australia. Western Meat Exporters located in Charleville will rely on sourcing stock from northern NSW and a significant return of the Queensland sheep and goat population to pre drought levels to maintain viability and continue its planned development as an integrated processing entity.

2   General introduction

More than 80% of Queensland's total area of 173 million hectares is used for grazing livestock, extending from humid tropical areas to arid western rangelands (QLUMP 2017). Most extensive grazing enterprises occur on native pastures. Introduced (sown) pastures constitute less than 10% of the total grazing area and occur on the more fertile land types (McIvor 2005; QLUMP 2017).

The purpose of this report is to analyse the wool sheep, meat sheep and goat meat industries of Queensland. These industries comprise a minor component of the overall output of agricultural industries of Queensland.

3   Production regions and numbers

3.1   Sheep all types

Figure 1 indicates the total number of sheep by NRM region across Queensland. (MLA 2020a). Approximately 62% of the total number of sheep were in the Desert Channels or the South West Queensland NRM regions (Table 1) with just less than one third in the Queensland Murray Darling Basin NRM region.

Figure 1 - Total sheep numbers by NRM region (MLA 2020a)
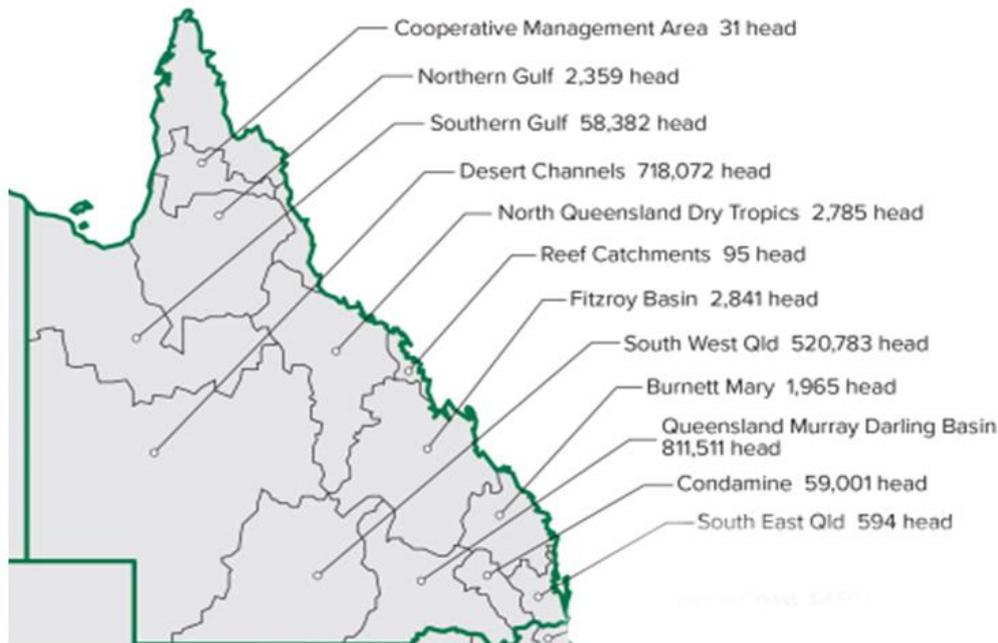
Table 1 summaries the number of sheep in the main sheep production regions of Queensland. The total number of sheep across Queensland is taken to be 2.1 million head.

Table 1 - Total number of sheep and sheep businesses in Queensland (ABS 2020a)

NRM Region	Number of sheep	% of total	Number of sheep businesses	% of total	average number of sheep
Desert Channels	912,925	43%	238	18%	3,836
South West Queensland	396,319	19%	157	12%	2,524
Queensland Murray Darling Basin	597,917	28%	498	37%	1,201
Other regions	193,535	9%	452	34%	428
Total	**2,100,695**	**100%**	**1,345**	**100%**	1,562

AWI (2019) reports that at 30th June 2019, there were 929 levy payers in Queensland that had paid more than $100 in levies in the past 3 years and so were eligible to become an AWI shareholder.

3.1.1 Change in numbers over time

Figure 2 shows the decline in total sheep numbers for Queensland over the past two decades. Sheep numbers almost halved during the first four years of the period and then took another decade to halve again. Most of the recent decline has been due to flow on effects of the poor profitability of wool production compared to beef production during the 1990's and significant drought events across the Queensland rangelands during the first and second decades of the 21st Century. A reduction in total sheep numbers of 77% has occurred across Queensland since 2000 while the Australian sheep flock (other than Queensland) has declined in total numbers by 42% over the same period. (Data not shown)

Figure 2 - Total sheep numbers for Queensland 1999-00 to 2018-19 financial years (Source ABS Ag Commodities)
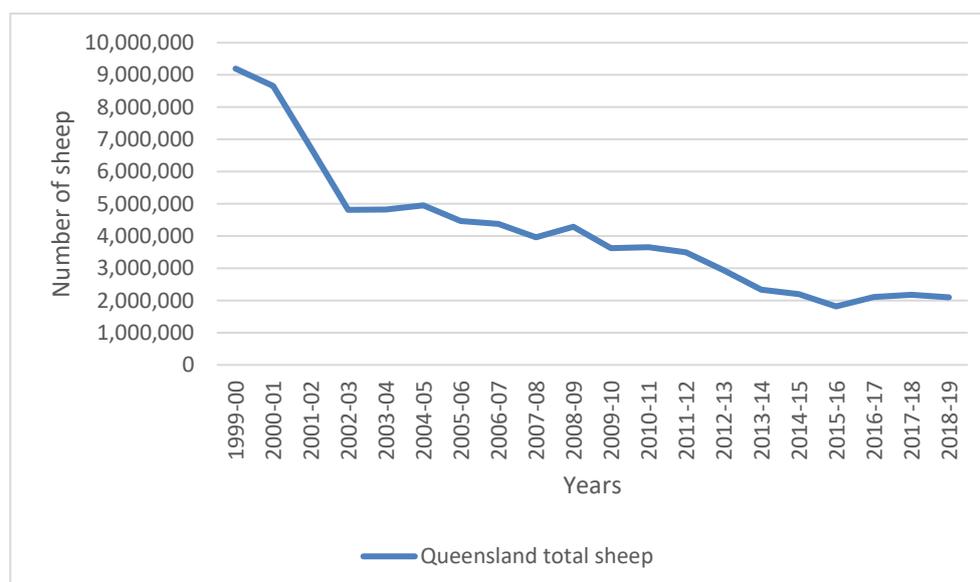
Figure 3 indicates that the total number of sheep currently in Queensland is the lowest since records began in 1885. The spike in numbers from 1980 to 1990, mainly due the relative profitability of wool and beef during that period, tends to mask the long-term structural decline in sheep numbers that

began about 1960. Up to 1960, total sheep numbers returned to about 25 million head in total after each downturn in numbers. Post 1960, the underlying economic condition and competitiveness of the Queensland sheep industry changed, and total numbers have been in decline since. The ongoing reduction in sheep numbers is not due to drought or a change in pasture condition or quality as the numbers of cattle grazing the same regions as sheep have not shown a similar trend. Predation by wild dogs is seen as a symptom of the decline in the profitability of the sheep industry, not a long-term cause of the decline in numbers.

Figure 3 – Long term sheep numbers for Queensland
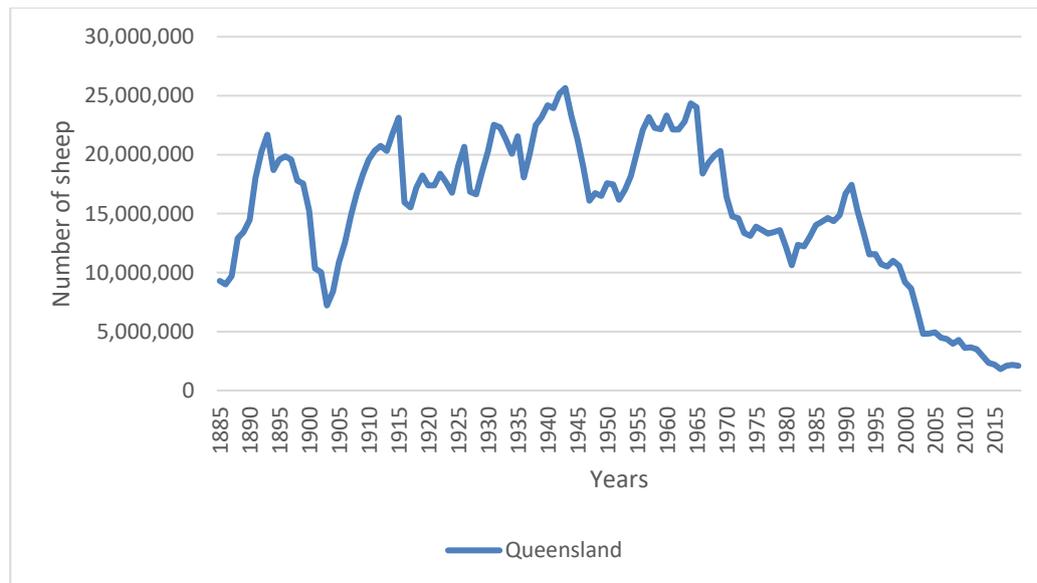
The changing cost and availability of skilled labour relative to the cost of capital throughout rural Queensland from the 1960's is thought to underpin the decline in the sheep industry. The other key factors underpinning the decline have been the relative profitability and significantly lower requirements for skilled labour by the rangeland beef industry compared to the rangeland sheep industry. The expansion of mining activities across Queensland since the 1970's has captured much of the skilled labour previously available to the sheep and beef industries of the rangelands. Beef production has been able to continue by accessing labour with lower skills or labour of a more transient nature; through property aggregation to access economics of size; investment in labour saving infrastructure and the adoption of highly adapted breeds of cattle. Wool sheep production has been unable to escape its requirement for reliable, skilled labour via capital investment or technology change. It has become relatively more difficult to efficiently manage at scale than rangeland beef production and has declined accordingly over the longer term.

Figure 4 shows the change in total sheep numbers for selected NRM regions of Queensland. These regions run most of Queensland's current sheep flock. The largest decline in sheep numbers across the last decade has been for the Desert Channels NRM region. The Southwest Queensland NRM region also shows a downwards trend in numbers due to the droughts and dry seasons that have followed the exceptionally wet period of late 2011 and early 2012.

Figure 4 - Total sheep numbers for selected NRM regions 2007-08 to 2018-19 financial years (Source ABS Ag Commodities)
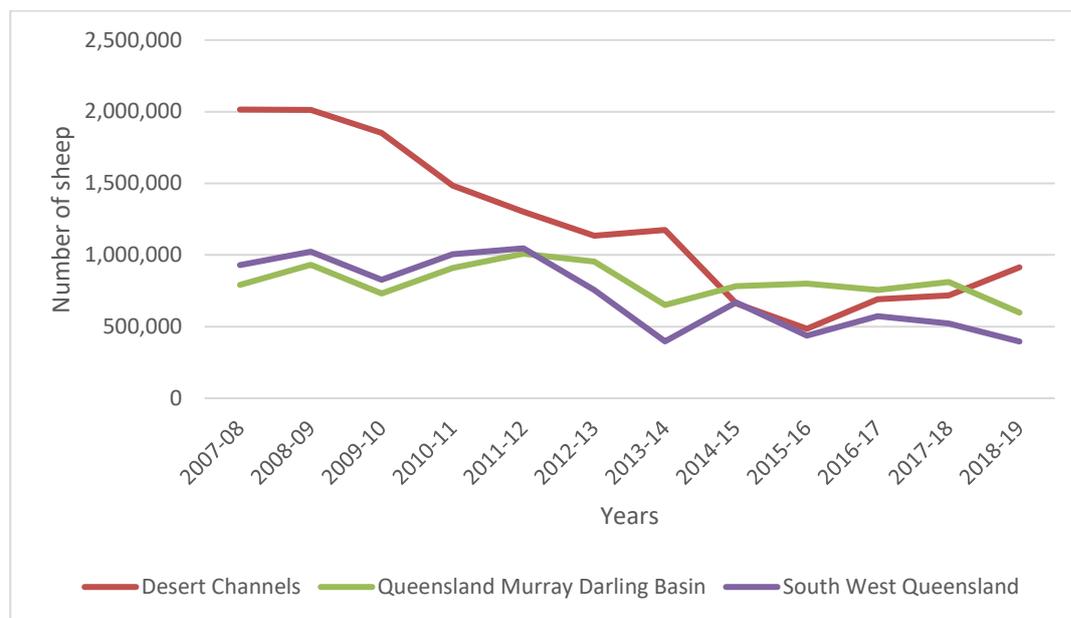
Figure 5 indicates the recent trend in total sheep and cattle numbers across three Queensland NRM regions (Desert Channels, Queensland Murray Darling Basin and South West Queensland). The same trend in total numbers has been followed by each type of livestock. This indicates either the different species of livestock have been destocked in the same proportion by landholders in response to drought or the ABS statistics have been smoothed between the main census dates to reflect indicator statistics gathered separately to the main census data collection. It is possible that drought has had the same proportional impact on numbers of total cattle and sheep across these regions and that the relative decline in sheep numbers compared to cattle numbers has slowed but not reversed.

Figure 5 - Trend in total cattle and sheep numbers across three NRM regions (Desert Channels, Queensland Murray Darling Basin and South West Queensland) (Source ABS Ag Commodities)

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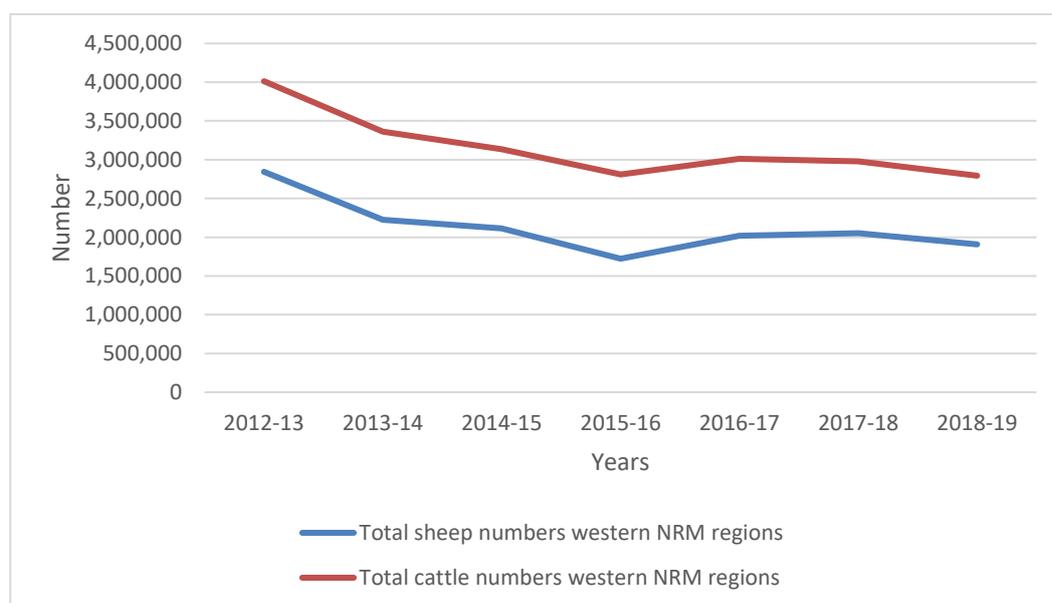
Figure 6 indicates that the proportion of total grazing pressure applied by sheep has fallen to less than 10% of the total grazing pressure applied by sheep and cattle across the Desert Channels, Queensland Murray Darling Basin and South West Queensland NRM regions. Figure 6 concurs with Figure 5 insofar that it indicates the proportional change in sheep and cattle numbers has more or less stabilised since 2012-13 and that sheep are now not destocked in preference to cattle in the selected NRM regions during drought or being further reduced as a proportion of the total grazing pressure applied by sheep and cattle across the rangelands.

Figure 6 - Proportion of total grazing pressure (DSE*) applied by sheep and cattle across three Queensland NRM regions (Desert Channels, Queensland Murray Darling Basin and South West Queensland) (Source ABS Ag Commodities)
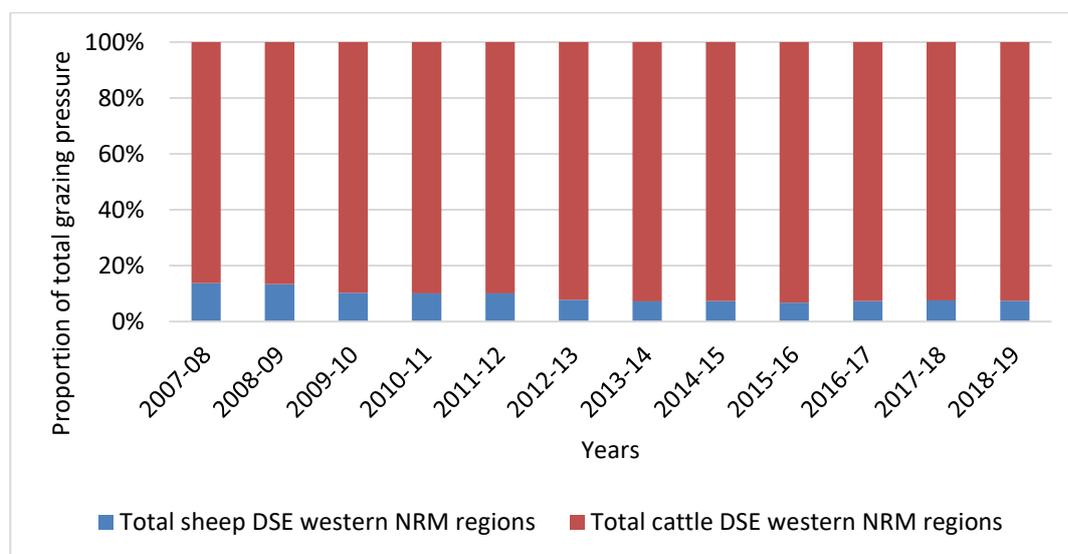
*DSE – Dry Sheep Equivalents

3.1.2 Wool sheep and meat sheep

The total sheep flock in Queensland in 2020 will be taken to average 2.1m head (Table 1) with the wool flock (merino component) estimated to be 1.55m head (75%) and the meat sheep component about 550,000 head (25%) (ABS 2020a).

Table 2 indicates the total merino and non-merino ewes and lambs for the three main NRM production regions of Queensland, the rest of Queensland, the total for Queensland, New South Wales, and Victoria. (ABS 2020a).

Queensland is a relatively minor contributor to the overall number of merino and non-merino lambs when compared to the major sheep production regions of south eastern Australia. There is also a suggestion that non-merino ewes in Queensland were not as productive as non-merino ewes in other regions included in the data set. For example, the ratio of non-merino lambs to ewes other than merinos in Table 2 is 82% for Queensland, 136% for NSW, 138% for Victoria and 138% for South Australia. This simple statistic suggests that the meat sheep breeds across Queensland are much less efficient at producing lambs when compared to the major meat sheep regions of eastern Australia.

Table 2 - Total ewes one year and older and lambs produced by merino and non-merino ewes (ABS 2020a)

Region	Merino ewes one year and older (No)	Merino lambs (No)	Ewes other than merinos one year and older (No)	Non merino lambs (No)
Desert Channels	381,806	172,117	64,710	43,398
South West Queensland	145,877	40,010	84,674	79,155
Murray Darling Basin	245,855	93,375	102,640	89,759
Other regions	77,711	15,671	31,828	21,319
Total Queensland	**851,249**	**321,173**	**306,307**	**233,631**
Total NSW	9,436,765	3,775,932	4,247,146	5,790,856
Total Victoria	4,296,753	1,760,116	3,540,020	4,893,736
Total South Australia	4,218,557	1,757,011	1,778,205	2,453,528
Queensland as a % of Eastern mainland States	**4.53%**	**4.22%**	**2.88%**	**1.75%**

Figure 7 indicates that the proportion of ewes mated to merino and non-merino rams has slightly changed over recent years. Even so, more than two thirds of ewes mated to rams in Queensland are mated to merino rams.

Figure 7 - Percentage of total ewes mated to merino and non-merino rams from 2012-13 to 2018-19 (Source ABS Ag Commodities)
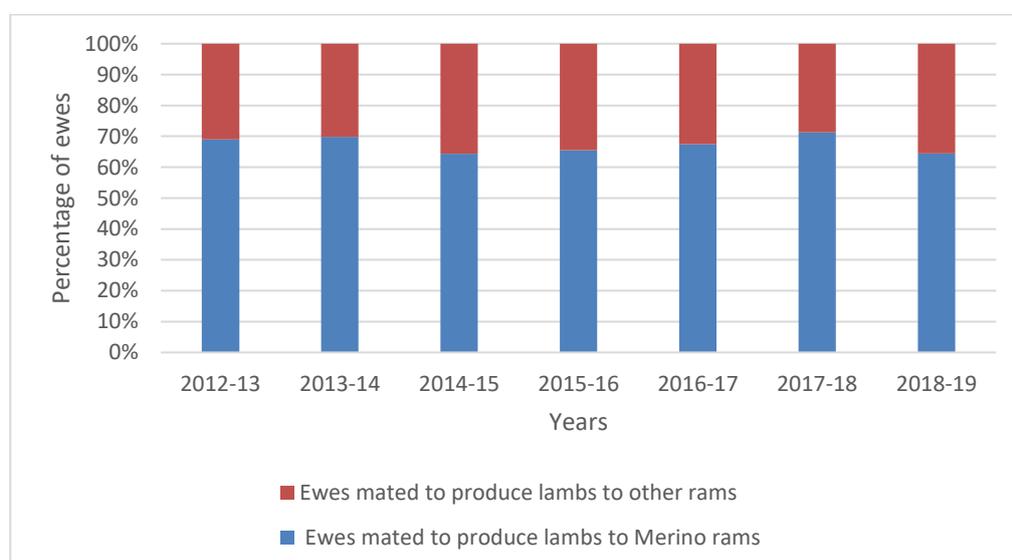
The total number of merino ewes mated to merino rams fell by about 45% over the seven years to 2018-19. Figure 8 indicates that the southwest Queensland NRM region has shown the greatest decline in the number of ewes mated to merino rams over that period.

Figure 8 - Ewes mated to merino rams for selected NRM regions of Queensland 2012-13 to 2018-19 (Source ABS Ag Commodities)
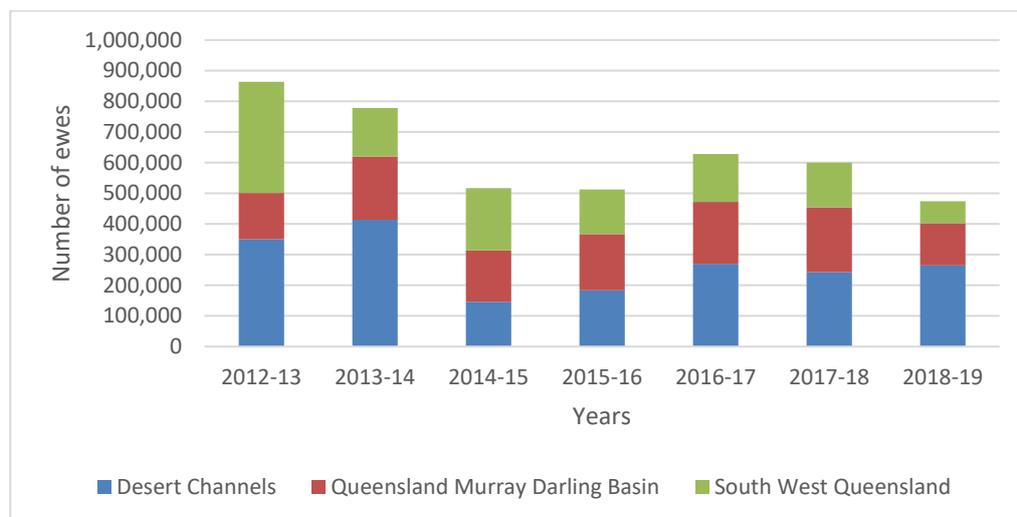
The total number on ewes mated to non-merino rams also fell in the seven years to 2018-19, but not by the same proportion as the ewes mated to merino rams. Figure 9 suggests that the number of ewes mated to non-merino rams has been highest in the Queensland Murray Basin NRM region but has halved in total over the seven years to 2018-19.

Figure 9 - Ewes mated to non-merino rams for selected NRM regions of Queensland 2012-13 to 2018-19 (Source ABS Ag Commodities)
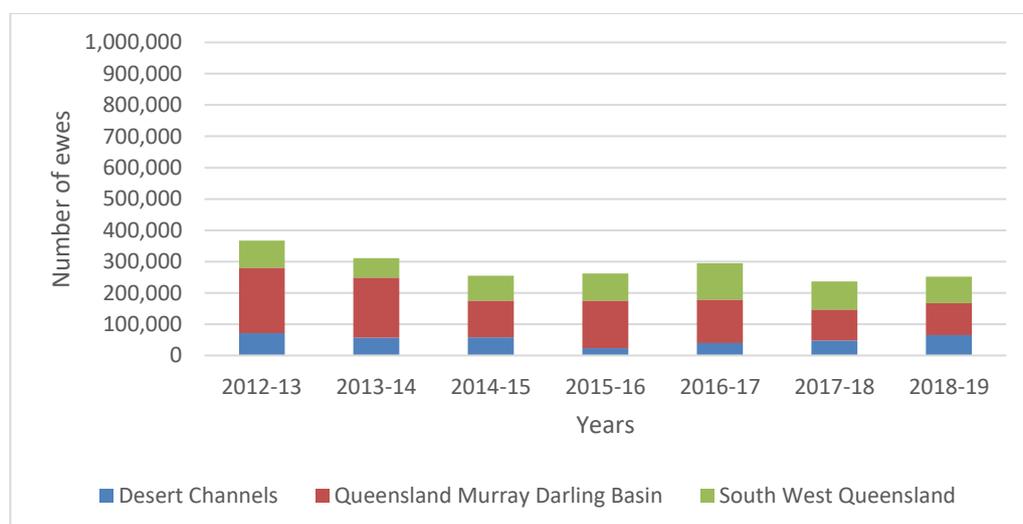
All regions have shown a steady decline in the total number of ewes mated to either merino or non-merino rams over the last seven years. Most of this recent decline is associated with severe and continuing drought across these regions.

3.1.3 Value of production and flock models

The ABS (2020b) estimates for the gross value of wool and sheep and lambs for selected Queensland regions are shown in Table 3.

Table 3 – Gross value of sheep and wool products for selected Queensland regions (ABS 2020b)

Region	Wool	Sheep and lambs
Desert Channels	$46,836,714	$7,726,118
South West Queensland	$20,332,741	$3,932,333
Murray Darling Basin	$30,675,534	$5,397,364
Other regions	$9,929,125	$1,859,163
Total Queensland	**$107,774,114**	**$18,914,978**

Given the likelihood that a large proportion of the lamb, sheep meat and wool produced in Queensland will be sold or processed in other States, flock models were developed to estimate the total sheep meat and wool produced in Queensland. As some statistics were for the sheep and wool industry overall and some were for components, three models were developed:

- One model was developed for sheep mated to merino rams to produce wool and mutton and identified the potential amount of mutton produced from the wool sheep flock.

- Another model was developed for sheep mated to non-merino rams to produce predominately prime lambs. This model was used to estimate the number and sale weight of lambs produced across Queensland.

- The final model was for all sheep in Queensland and attempted to match the prediction for total wool output, number of sheep shorn, and average wool cut per head provided in AWI estimates for 2020/21 wool output.

Each model was scaled up from case studies done at the farm level across the central Queensland Rangelands and modified to reflect the level of output and flock performance predicted by the available MLA, AWI and ABS statistics.

The statistics applied to the flock models were both State level estimates and farm level averages. For example, the Australian Wool Production Forecast Report (AWI 2020) estimates for wool production, total sheep shorn, and average wool cut were applied as targets in the overall flock model for Queensland. That report predicts 6.7 m kg of greasy wool production for the Queensland flock during 2020/21, a decline of 10.7% compared with the 2019/20 season total of 7.5 m kg greasy. The estimate was based on 1.9 m sheep shorn with a 3.6 kg per head greasy wool cut. (NSW expects to shear 22.8 m sheep at 4.13 kg per head to produce 94.3 m kg of greasy wool). The prediction by ABARES (2020a) for the Eastern Market Indicator to average 1,120 cents per kilogram clean equivalent was used to indicate the market value of the wool produced in Queensland. At an average yield of 64%, the greasy wool price was predicted by ABARES (2020a) to average about $7.17 per kilogram during 2020/21. This was increased to $7.99 per kilo greasy to reflect industry expectations for the wool coming predominately from the rangelands of Queensland.

Current ABS data for Queensland (ABS 2020a) suggests a 62% lambing rate for 515,502 ewes mated to merino rams. ABS (2020a) also recorded an 82% lambing rate for 283,852 ewes mated to non-merino rams. Data for specialist wool farms across Queensland (ABARES 2020b) identifies an average lambing rate of 62.3% for the period 1999/00 to 2018/19 and an average greasy wool cut of 4.2 kilograms per head. These lambing rates were applied in the relevant models to estimate lambs

produced. The wool cut estimated by AWI was applied as it includes all sources of wool produced in Queensland.

The overall Queensland sheep flock model had parameters for mortality, reproduction, growth and number of ewes mated structured so the total flock produced around 6.7m kilograms of greasy wool and about 520,000 sale stock. At $7.99 per kilogram greasy, the overall wool produced by the total Queensland flock model would be about $54 million, about half the value estimated by the ABS (2020b).

The separate model for the wool flock (ewes mated to merino rams) produced 290,000 sale sheep, mostly sold as mutton. The expected kilograms liveweight of mutton produced by the wool flock would be about 11,700 tons.

The model for the Queensland meat sheep flock (ewes mated to non-merino rams) produced about 160,000 lambs and 70,000 cull ewes and rams for sale. Most mature sheep sales from the meat sheep flock would be sold to abattoirs to produce mutton. Total lamb meat produced from the meat sheep flock would be about 8,000 tons liveweight. Expected total mutton from the meat sheep flock would be about 5,000 tons liveweight. The estimated growth path for lambs produced in Queensland underpins the tons of lamb meat produced in the meat sheep model and, as it was based on a well-managed rangelands production system, may be overstating the total production of lamb.

The total number of sheep (both merino and non-merino mated) slaughtered for mutton from Queensland is currently expected to be about 360,000 head per annum, or about 5% of the national total producing 16,900 tons liveweight, possibly 8,500 tons dressed weight. If lamb production were added to this, total Queensland sheep meat production is expected to be about 12,500 tons dressed weight. The farm gate value of the sheep meat and lambs produced by Queensland farms was predicted by the models to be about $32 million from the meat sheep flock and about $31 million from the wool flock, a total of about $63 million per annum

There seems to be little agreement between the ABS (2020b) estimate of wool receipts ($107m) and that made by the regional wool production model ($53.6m) even though the ABS data would be based on higher wool prices and volumes than those applied in the production models. There also seems to be a significant difference between the ABS value of sheep and lambs produced by Queensland (~$19m) and that predicted by the production models (~$63m). Even though there are some significant differences in the component estimates, the estimate of total value from ABS for sheep and wool combined is $126 m and the estimate of total farm gate value from the production models is $116 m. This suggests the production models are acceptable as an estimate of the total value of sheep and wool production for Queensland at the farm gate.

MLA (2020c) predicts a total Australian lamb production of 487,000 tonnes carcase weight (cwt) in 2020, while mutton production is projected to contract 31% to 157,000 tonnes cwt. Comparison between the regional production model and the MLA projections suggests the modelled estimate of total lamb and mutton production for Queensland may be a little high but not completely inaccurate. The excess production of meat from the modelled Queensland flock may be due to an underestimate of the average mortality rate across the flock combined with a better than average growth path for lamb production.

Total Australian lamb production has averaged more than 22 million head for the last decade (MLA 2019) indicating that Queensland lamb production is less than 1% of the national total and less than 2% of the total output of the major production regions located across south east Australia. Table 4

compares sheep meat output by Australia, New Zealand and Queensland sheep flocks. The Queensland flock is a minor component of the national and larger regional production of sheep meat production.

Table 4 - Meat production by Australian, New Zealand (MLA 2020c) and Queensland sheep flocks

Parameter	Australia	New Zealand	Queensland
Sheep flock (million head)	72.1	27.6	2.1
Sheep meat production ('000 tonnes cwt)	724	459	12.5*
Lamb production ('000 tonnes cwt)	511	358	4*
Mutton production ('000 tonnes cwt)	213	101	8.5*
Average carcase weight (kg/head)	22.7	18.6	24*
Sheep and lamb exports ('000 head)	1,865	0	
Sheep meat exports ('000 tonnes swt)	431	395	

*these values were estimated for Queensland in the combined regional models

3.1.4 Sheep and lamb slaughter statistics

Slaughter statistics are retained in the MLA online database (MLA 2020d) at the State and National level. Figure 10 shows the annual number of sheep and lambs processed in NSW and Queensland for the period 2010 to 2020. The Queensland statistics imply a significant turnoff of sheep due to drought during 2013, 2014 and possibly 2015.

Over the last five years, an average of approximately 100,000 sheep and 85,000 lambs have been processed in Queensland. This compares to the average processing number for the previous five years of 469,000 sheep and 323,000 lambs. Drought destocking and the closure of the Wallangarra abattoirs is thought to account for most of the difference between the number processed in Queensland across the two time periods. It is thought that NSW now processes a significant portion of the sheep meat produced by the Queensland flock.

Figure 10 – Number of sheep processed per annum in Queensland and NSW for the decade 2010 to 2020 (MLA 2020d)
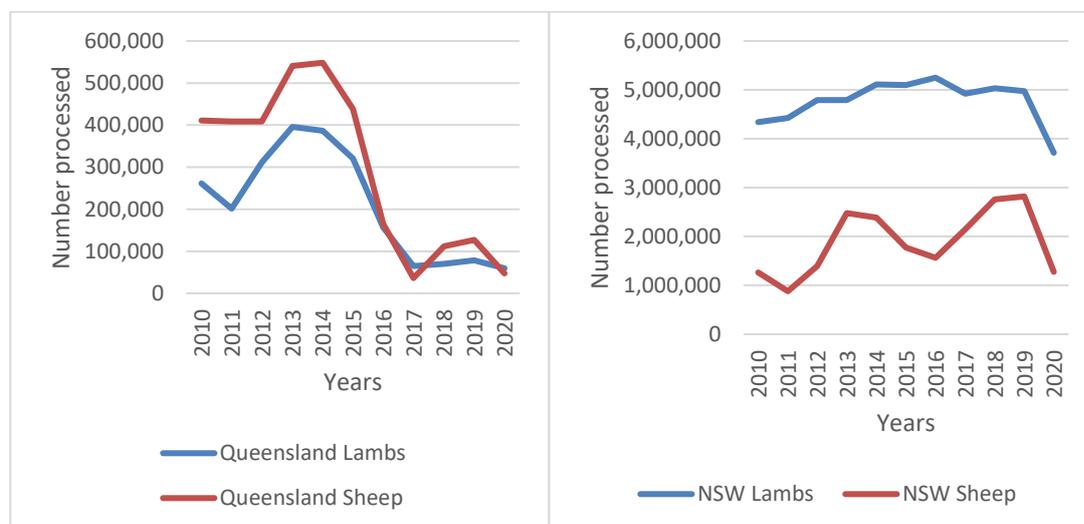
3.2 Meat goats

There is little data to identify rangeland goat numbers or producers across eastern Australia due to the nature of the production system, herd numbers that fluctuate with seasons, their mobility and their most common location being terrain that is difficult to survey.

Table 5 shows data collated by the NSW Department of Primary Industries during 2018/19. (Atkinson 2019). Although individual producers may have more than one Property Identification Code (PIC), it appears that there may be more than 500 properties producing goats / meat goat producers in Queensland.

Table 5 – Number of goat suppliers, based on the number of unique PIC's for each State (Atkinson 2019)

State	Number of unique PIC's
New South Wales	1917
Queensland	536
South Australia	329
Western Australia	120
Victoria	95
Tasmania	8

A 2017 survey of NSW goatmeat producers found that 71% of the 454 producers who responded had a harvest enterprise, while 29% operated a managed or semi-managed enterprise (Source: NSW SPI/MLA Goat Industry Data Collation and Tracking Project, 2017). It is expected that a similar industry structure would currently be found in the Queensland rangelands. Figure 11 shows the main meat goat production zones are found in the rangelands of central NSW and south west Queensland. (Atkinson 2019. Source: Integrity Systems Company)

Figure 11 - The number of goats supplied from each NLIS region of Australia during the 2017-18 financial year (Atkinson 2019. Source: Integrity Systems Company)

Legend
Goat Numbers
- 1 - 100
- 100 - 1,000
- 1,000 - 10,000
- 10,000 - 50,000
- 50,000 - 100,000
- 100,000 - 200,000
- 200,000 - 300,000
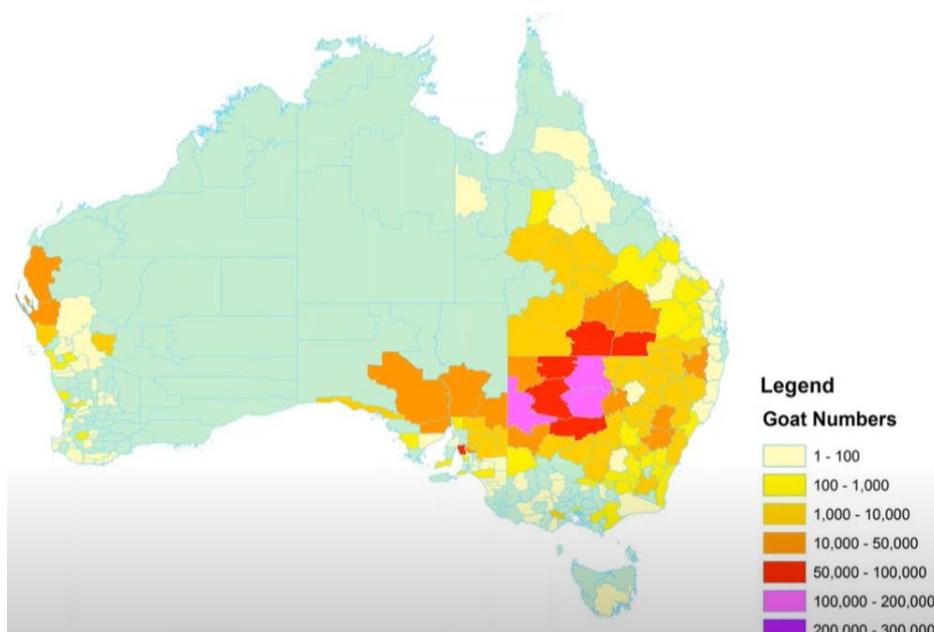
Estimates of Australian rangeland goat numbers range from 1.5 million (Pople et. al. 1996) to 5 million (DAFF 2005) and they occupy approximately 1.2 million sq km of rangelands (Ballard et al 2011). NSW has the largest population of rangeland goats, with the State recently contributing more than half of the total meat goat supplied nationally for processing. The NSW goat population is said to have declined from a peak of 5.8 million head in 2016 to an estimated the herd of 3.9 million head in 2019, a 33% decline from the peak. (Sheep Central 2017)

Figure 12 shows the results of goat surveys undertaken on a regular basis by the NSW Department of Primary Industries (Atkinson 2019). The data does not distinguish feral and rangeland goats under management and therefore represents an estimate of the total goat population in NSW. (Atkinson 2019)

Figure 12 - Goat abundance in New South Wales (Atkinson 2019)
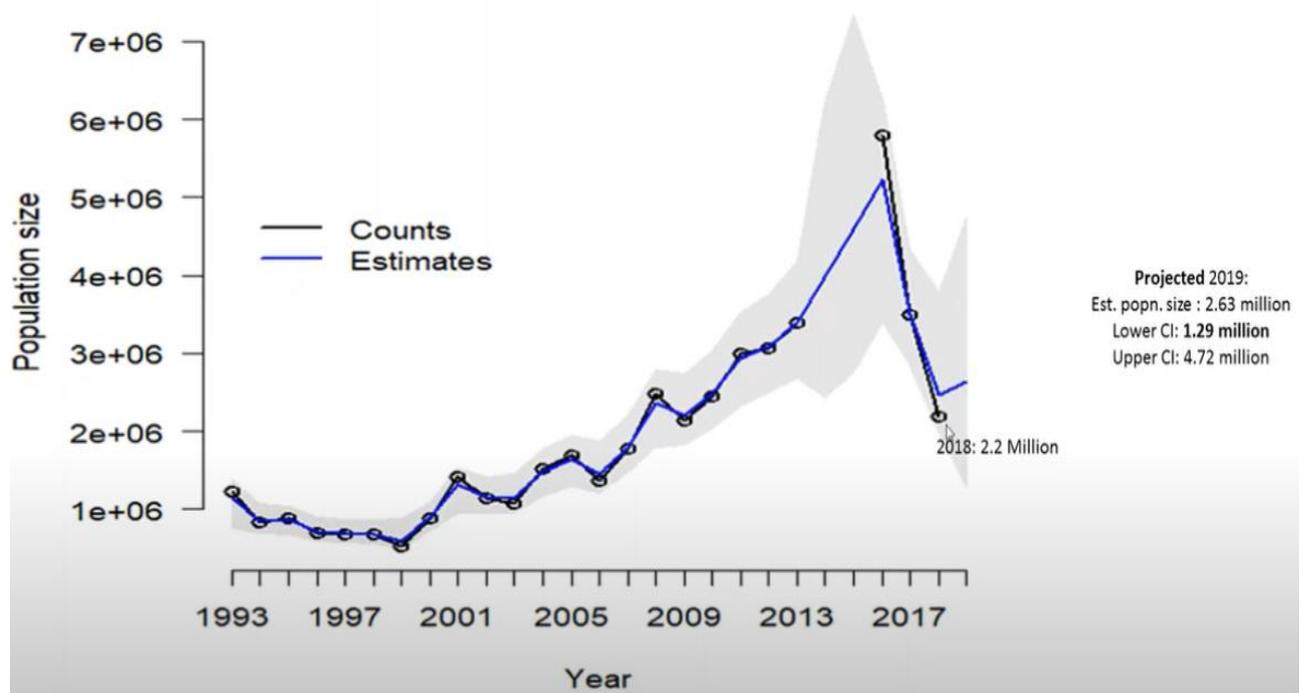
Atkinson (2019) identifies there is a limited understanding of goat population dynamics and the factors that influence change. The reasons for the decline in goat abundance are not certain but relate to a combination of the following factors:

- recent dry seasons potentially leading to high mortality rates,

- record high prices encouraged record high harvest rates. The high prices have been driven by demand in the USA and some of the major processors moving from bulk frozen carcase export to value added cuts (Thomas Foods International)

- low minimum carcase weights - meat goats can be processed down to 6kg carcase weight and this limits the capacity of the unharvested residual of the rangeland herd to reproduce and quickly replace the harvested stock

In Queensland, fixed-wing surveys were conducted annually over 1984-1992, and again in 2001, across an area of ~500,000 km2. (Pople and Froese 2012) Those authors identify an increase in feral goat numbers over the study period, particularly in the mulga lands where they identified goats have

increased almost five-fold over a 20-year period. However, numbers have been declining since 2006. A total population of 491,000 feral goats was estimated for Queensland in 2010. (Pople and Froese 2012)

Rangeland goats account for approximately 90% of total goats slaughtered (Stokes 2009) and a large component of rangeland meat goat production is harvested from often free ranging or semi feral herds.

Figure 13 indicates the huge variation in the numbers of goats processed each quarter across the eastern mainland States. (MLA 2020d) Most of the goats processed in Victoria are produced in NSW and transported south. The quarterly variation in numbers processed likely relates to the unpredictable harvest nature of the rangeland goat industry. The increase in numbers processed coincides with the significant improvement in goat meat prices occurring about 2015 and onwards. (See Figure 17 later)

Figure 13 - Quarterly goat processing numbers for the decade 2010 to 2020 (MLA 2020d)
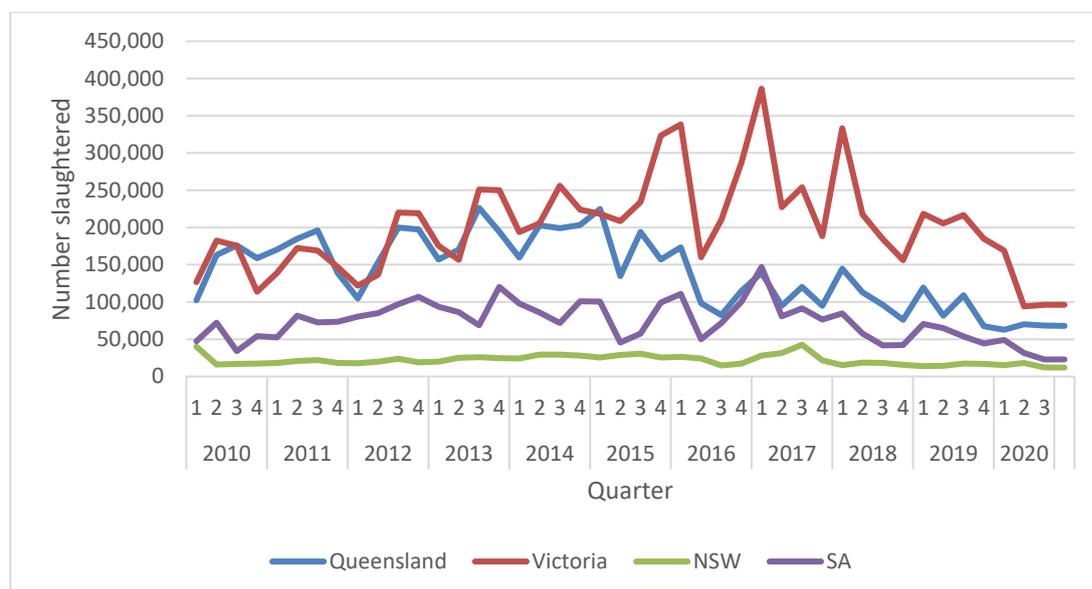
Figure 14 indicates that the number of goats slaughtered across eastern Australia during the period up to about 2017/18 was most likely related to a very profitable harvest of all free roaming rangeland goats. MLA (2020b) identify that Australian goat slaughter fell by 7% year-on-year to 1.54 million head in 2019. The persistent poor seasonal conditions saw slaughter ease across all States. Victoria produced the highest slaughter figures for 2019 at 825,416 head, followed by Queensland (377,634) and SA (234,064).

Data available from the NSW DPI (Atkinson 2019) identifies that at least 30% to 50% of Queensland's (377,634) production was transported in from NSW. The average number of goats processed across eastern mainland States averaged 1.3 m head for this period. This is unlikely to represent the average level of production over the next five years, given the run down in the rangeland population and the ongoing impacts of drought.

Figure 14 – Goats processed year to date for Queensland and the total for the eastern mainland States including Queensland (MLA 2020d)
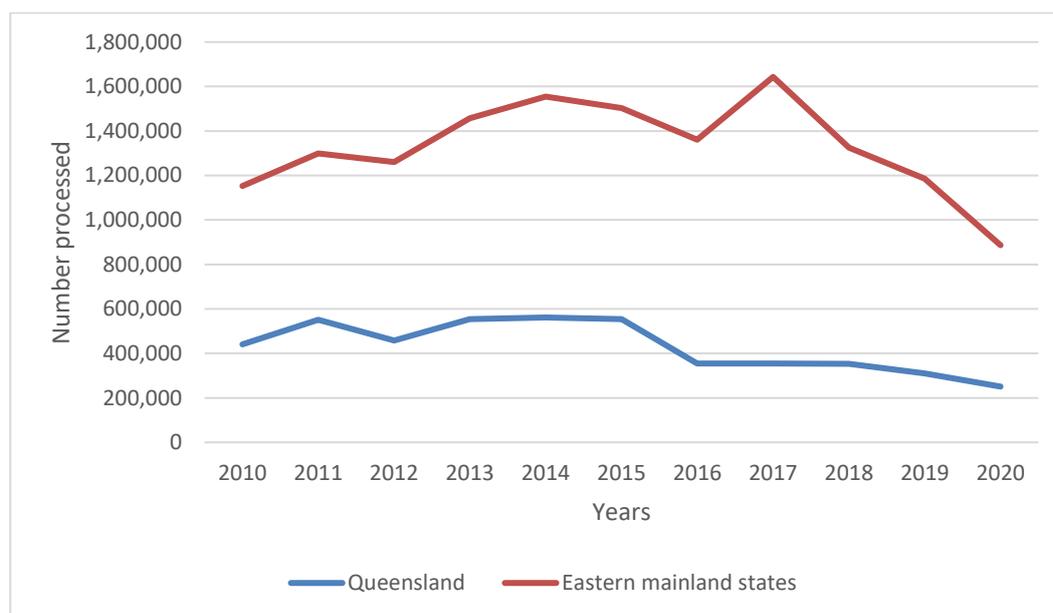
The number of goats processed in Queensland averages about 325,000 per annum over the last five years. Table 6 shows the source of goats processed by the various States. Although Victoria is the leading goat processor, most of its goats were sourced from NSW. In 2019, about 60% of the goats processed in Queensland during 2019 came from NSW. (Atkinson 2019)

Table 6 - Influence of western NSW on supply (Atkinson 2019)

Processing State	Supply State				
	New South Wales	**Queensland**	**South Australia**	**Victoria**	**Western Australia**
Victoria	99%	<1%		<1%	
Queensland	60%	40%			
South Australia	20%	<1%	76%	<1%	<3%
New South Wales	98%	<1%	<1%	<1%	
Western Australia					100%

Table 7 indicates the annual slaughter of goats for meat in Australia. The average for the last decade is 1.9 m goats slaughtered with an average carcase weight of 15.5 kilograms. Based on the output of a speculative herd model compiled on these statistics and industry expectations of herd performance under rangeland and extensive conditions, this average rate of slaughter suggests 1.5 m does being mated annually producing about 2.04 m kids. On this basis, the average national population of goats over the last decade would be in the vicinity of 5.3 m (give or take a few 100,000).

Table 7 - Australian meat goat slaughter numbers and average carcase weight (ABS 2020a, MLA 2020b)

Year	Slaughtering's ('000 head)	Average carcase weight (kg/head)
2009	1637	15.7
2010	1676	15.8
2011	1739	16.3
2012	1857	16.1
2013	2073	15.3
2014	2129	15.5
2015	2140	15.3
2016	1934	15.7
2017	2071	15.2
2018	1650	14.2

The semi managed and feral herd in Queensland will be taken as 10% of the Australian total or about 530,000 meat goats based on the 2010 estimate of a goat population of 491,000 head by Pople and Froese (2012). A regional goat model for south west and western Queensland suggests, with improved management of the total herd, this would provide about 200,000 slaughter goats per annum with a total carcase weight of about 3,000 tons. The farm gate value of the goat meat produced would be about $18 million per annum at $6 per kilo net of selling costs.

The 200,000 head estimate for goat slaughter from Queensland lines up reasonably well with the 325,000 total goat slaughter number for Queensland with more than 1/3 of the total supplied by NSW.

The recent high prices and significant harvest of feral and rangeland goats has led some to suggest the meat goat industry is now in new era (Atkinson 2019). The implication is that the meat goat has shifted from being a pest to being a resource. The focus of meat goat producers is now on enterprise development with a production focus. The movement of the industry from a harvest mentality to a semi managed and then on to a managed production system will require a focus by managers on total grazing pressure management, altered sex ratios within mobs (segregation of the herd into management units) and management of supply (timing of sales and targeting more precise market specifications) to meet market demands.

4 Price data

All red meat prices have increased over recent years, driven mainly by protein demand in developing countries and, more recently, the impacts of swine fever on domestic protein supply in impacted countries. All meat price data in this section is sourced from the MLA website. (http://statistics.mla.com.au/Report/List)

4.1 Mutton

Figure 15 shows the NSW saleyard prices for mutton and trade lamb from January 2010 to the end of November 2020. The NSW saleyard prices are taken to be a better indicator of price trends and values for Queensland sheep over recent years. There is a noticeable impact on price of the seasonal supply of lambs across NSW.

Figure 15 – Saleyard mutton and lamb indicators – NSW monthly average (MLA market information)

4.2 Lamb

Figure 16 shows the NSW saleyard prices for light lamb and merino lamb from January 2010 to the end of November 2020 (Trade lamb 18-22 kg is repeated from Figure 15 as a comparison)

Figure 16 – Saleyard sheep and lamb indicators – NSW monthly average (MLA market information)
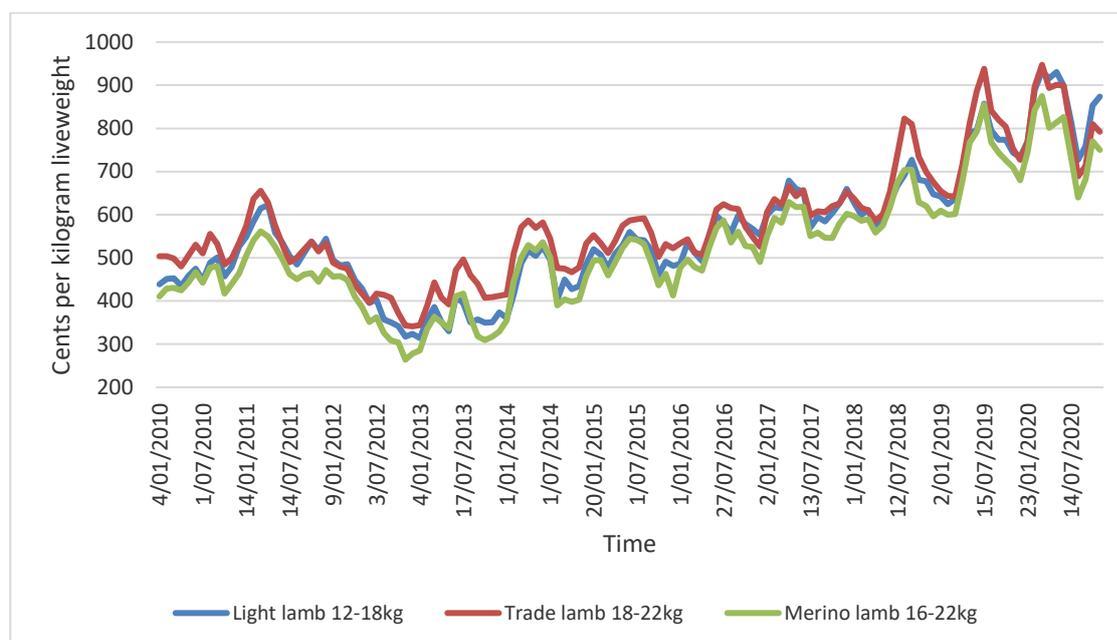
Table 8 shows the range, median and mean values of lamb prices from January 2010 to November 2020. Most prices show a range of more than 50% around the average price over the period. There is a noticeable market for store lambs that shows similar or better values to the finished product. Store cattle also often trade on a premium to the finished market price on a cents per kilo basis.

Table 8 - Price distribution for lamb and mutton saleyard prices, Jan 2010 to November 2020 (MLA market information)

Parameter	Light lamb 12-18kg	Trade lamb 18-22kg	Heavy lamb 22+kg	Merino lamb 16-22kg	Restocker/ feeder lamb 0-18kg	Mutton 18-24kg
Average	557	584	582	525	597	392
Median	535	558	559	505	569	394
Maximum	932	947	976	875	1044	703
Minimum	314	341	353	264	311	123

4.3 Meat goats

Figure 17 shows the Eastern States over the hooks (OTH) goat prices collected by the MLA from January 2010 to November 2020. All weight classes above a dressed weight of 8.1 kilograms have the same selling price.

Figure 17 – Eastern States OTH goat prices –monthly average (MLA 2020d)
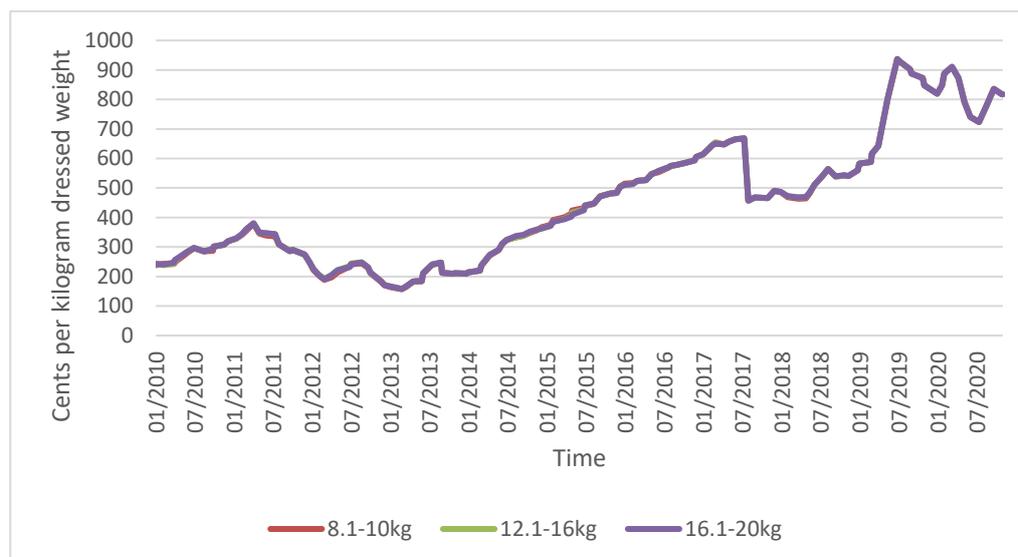
Table 9 shows the price distribution for slaughter goats since January 2010. The variation of goat meat prices around the mean has been almost 100% over the period to 2020.

Table 9 - Price distribution for goats - January 2010 to November 2020 OTH prices (MLA 2020d)

Parameter	8.1-10kg	10.1-12kg	12.1-16kg	16.1-20kg	20.1+kg
Average	452	452	452	452	452
Median	432	427	427	424	427
Maximum	937	937	937	937	937
Minimum	157	158	158	158	158

4.4 Combined meat prices

Figure 18 shows the over the hook (OTH) price trends for example classes of meat animals slaughtered at NSW abattoirs over the past eleven years. The divergence between goat prices and mutton prices over the past five years is notable as well as the significant upward trend in all classes of livestock.

Figure 18 - Meat prices for four classes of livestock from January 2000 to November 2020 (MLA 2020d)
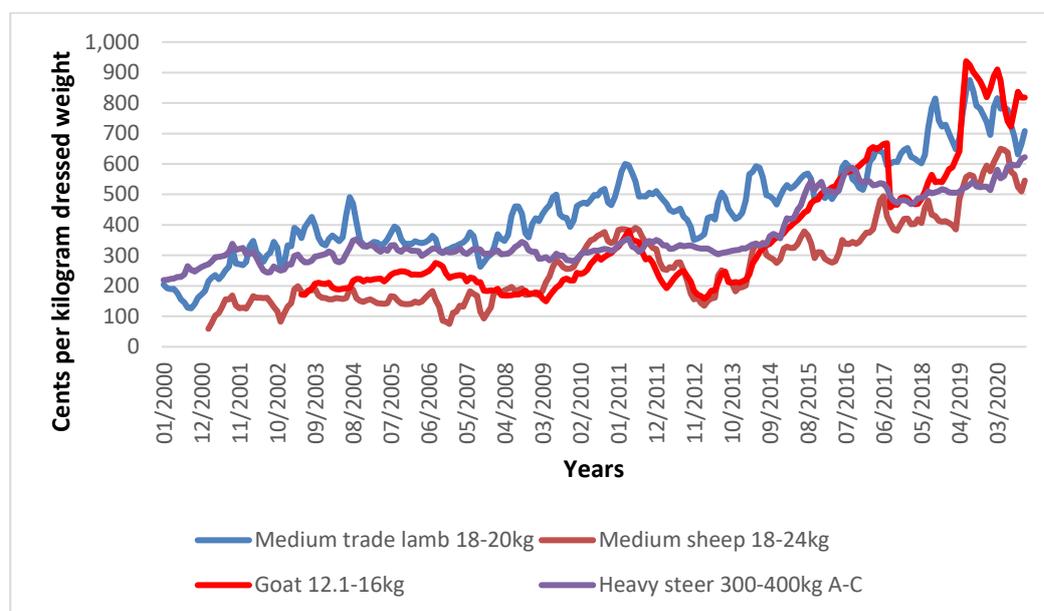
Table 10 Shows the relative change in red meat prices for example classes of livestock sold through NSW abattoirs. Prices at Queensland abattoirs would reflect similar trends. Over the last five years, the increase in prices normally associated with lower quality meat (mutton and goat meat) has been up to three times that of the price increase in steer beef. Lamb prices have shown a marked upwards trend, but nowhere near the proportional movement upwards of mutton and goat meat prices.

Table 10 - Level of price increase for different categories and classes of red meat between December 2015 and November 2020

Livestock Class	Medium trade lamb	Medium sheep	Goat	Heavy steer
Category	18-20kg	18-24kg	12.1-16kg	300-400kg A-C
Price increase	42%	76%	62%	15%

Although all classes of red meat have shown significant upwards movement in prices over the most recent decade, the proportional price increase in classes of meat traditionally seen as difficult to sell on the Australian market has been much greater. Most of the price increase for goat meat and mutton has been derived from increased demand in overseas communities that traditionally consume those classes of red meat and have shown significant economic growth and improvement in living standards.

4.5 Wool prices

The Eastern Market Indicator (EMI) price for wool is forecast to average 1,120 cents per kilogram clean in 2020–21, down by 23% from 2019–20. Wool prices are forecast to be lower due to reduced demand for wool in textile manufacturing. (ABARES 2020a)

Figure 19 indicates the real trend in the EMI since 1995/96 (ABARES 2020a). The ABARES forecast for 2020/21 is shown as a dotted line in orange. The EMI peaked at its highest value in real Australian Dollar (AU$) terms in 2018/19 for the 25-year period to 2020/21.

Figure 19 – Clean wool prices over time from 2010 to 2019 (average price (c/kg clean) after sale for 19 and 20 micron wool from selling centres in the eastern states of Australia (source: ABARES 2020a).

Eastern Market Indicator, Cotlook 'A' index, real terms, 1995–96 to 2020–21

Legend:
- EMI (AU$)
- EMI (US$)
- Cotlook 'A' index (right axis)
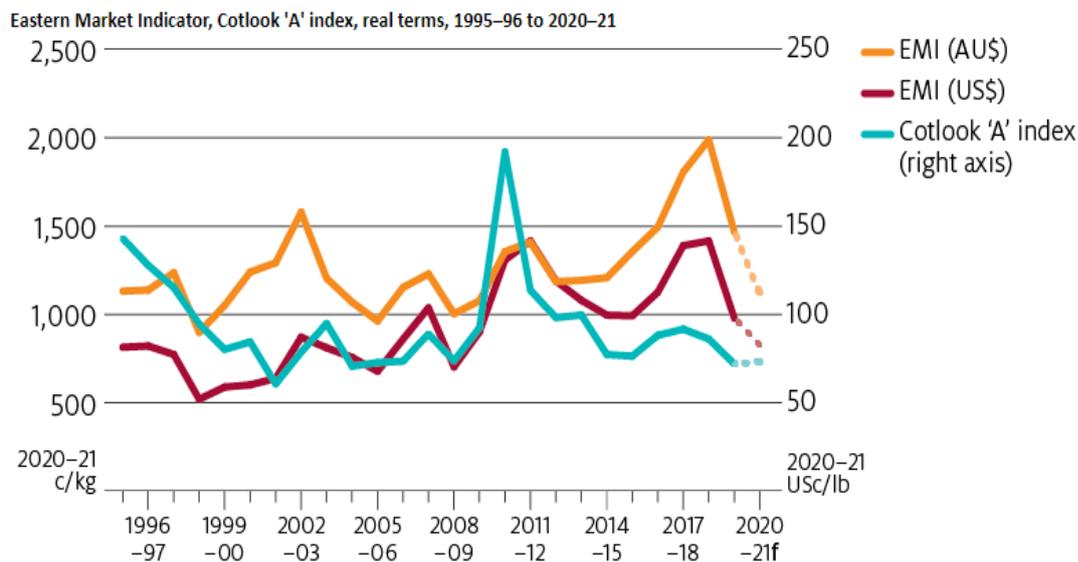
Sources: ABARES; AWEX; Cotlook

Wool prices have declined dramatically during 2020 due to COViD-19 impacts on wool processors and retail markets. ABARES (2020a) has predicted an Eastern Market Indicator for 2020/21 of 1,120 cents per kilogram clean equivalent.

ABARES (2020a) indicates that in relative price terms, wool is the most competitive it has been against cotton since 2011. The price of wool has also retreated to a 3-year low against polyester at a time when oil and polyester prices have been historically low due to COVID-19 containment measures. A low relative price could lead to increased purchasing and incorporation of wool into textile blends in the second half of 2020–21. (Figure 20)

Figure 20 – Relative price of wool, cotton and polyester (ABARES 2020a)

Legend:
- Wool to polyester
- Wool to cotton
- Cotton to polyester
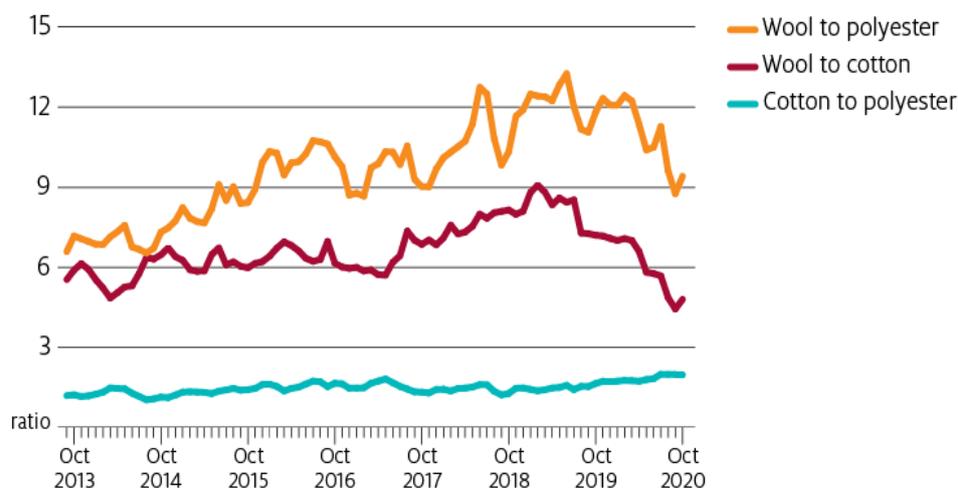
Note: 'Wool' refers to the 21-micron average, 'Cotton' refers to the Cotlook 'A' index, 'Polyester' refers to China domestic polyester 1.4 denier. All prices originally in US cents per kilogram.

Sources: ABARES; AWEX; Cotlook; Fibre2Fashion

28

5 Markets and marketing

5.1 Wool

Notes from https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0010/543547/Paper-1-global-supply-and-demand.pdf

World wool production has fallen significantly in the past 20 years or more, because of a fall in wool prices during the 1990s, as well as competition from other agricultural enterprises. The lower wool prices were brought about by a significant decline in demand in the early 1990s and, subsequently, the build-up then disposal of wool stockpiles in Australia and, to a smaller extent, New Zealand and South Africa.

The high share for Australia of world apparel wool production and, in particular, of merino wool has some important implications. First and foremost, world merino wool prices are in essence determined in A$ terms, which is unlike any other agricultural commodity. Prices in other countries reference Australian merino wool prices. This means that increases in Australian wool production will have a dampening effect on prices, while falls in Australian wool production will support prices. By implication, efforts to boost wool production and productivity in Australia will dampen prices. On the other side of the supply-demand equation, lifting demand for merino wool at the consumer stage will mainly benefit Australian wool growers because of Australia's dominant position.

Over the past two decades China has risen to be the world's leading producer of man-made fibres, processor of textile fibres and manufacturer and exporter of textiles, clothing and interior textiles. 73% of Australia's wool exports went to China in 2013/14, compared with 12% in 1991/92. The second largest country destination was India, with a share of 8%. Exports to Western Europe accounted for 10% of Australia's exports, down from 39% in 1991/92. The recent impacts of COVID-19 have seen up to 95% of Australian wool sold to China.

Men's suits were a solid foundation of global wool use in apparel, as were men's jackets and trousers. There appears to be a shift away from traditional Australian superfine wool (with its emphasis on crimp) towards a style defined as top making type due to increased casualisation and a growth in woven-spun knitwear (i.e. for circular knitting). This reduces the demand for wool to make suits, jackets and suit trousers but this could be replaced by demand for wools suitable for incorporation in casual clothing.

Global demand for textile fibres to 2025 and beyond will, in the first instance, be driven by population and incomes. World fibre consumption has tracked the rise in world Gross Domestic Product (as a proxy for incomes) and of population.

On the production side, it is difficult to envisage a solid increase in wool sheep numbers across Australia or wool production over the next decade. One of the key factors that will constrain a sizeable increase in sheep numbers for wool production is the rising demand for food.

5.2 Sheep meat - Mutton and Lamb

Notes from MLA Global Snapshot 2019 – Sheep meat https://www.mla.com.au/globalassets/mla-corporate/prices--markets/documents/trends--analysis/sheep-projections/mla-september-australian-sheep-industry-projections-2020.pdf

The value of Australian sheep meat exports doubled over the last decade to A$3.28 billion in 2017–18.

Australia produces a small portion of the world's sheep meat supply but accounts for almost 40% of exports and is the largest supplier to the global market.

Consumption of Australian sheep meat globally is facing a range of opportunities and challenges:

- In most developed markets, sheep meat remains a niche protein with low per capita consumption, which can be considered both a challenge and opportunity, especially in wealthier markets like the US.

- Sheep meat's high price, compared to competitor proteins such as chicken and pork, will continue to challenge growth and make demand susceptible to economic shocks.

- Messaging around provenance, sustainability, animal welfare, along with food integrity and transparency, are opportunities for Australian brands to consider in targeted consumer communication.

- Australia has only one major export competitor – New Zealand, whose production is forecast to flat line in coming years. This will provide opportunities for Australia to capture a greater share of high value global markets.

- China, the world's largest producer and consumer of sheep meat, has emerged to become the leading importer over the last decade and has underpinned the recent rise in global prices. China's domestic production is cyclical and a downturn in import demand would impact global markets.

Developing markets, led by Asia, are the driving force behind sheep meat consumption growth, accounting for 95% of forecast growth in the next decade. However, consumption growth is increasingly limited by supply availability and prices rising at a faster rate than other major meat proteins. For Australia, targeting export markets that could purchase high quality sheep meat is key, with households earning over US$35,000 one measure of the potential market size.

The supply outlook for Australia is positive. While subject to volatile seasonal conditions, production is expected to expand. Growth in lamb production over the last three decades has been underpinned by an industry shift from predominantly wool to an increased emphasis on meat production, and corresponding improvements in lambing rates and carcase weights. However, mutton production has generally declined since 1990, following trends in the national flock, and mirrors short-term variation in seasonal conditions.

5.3 Meat goats

Notes from MLA Global Snapshot 2019 – Goatmeat https://www.mla.com.au/globalassets/mla-corporate/prices--markets/documents/os-markets/red-meat-market-snapshots/2020/2020-mla-ms_global-goatmeat_v2.pdf

Goat meat makes up most goat exports (97%), with a national export value of $235.7 million in 2019 (21,248 tonnes). In contrast, live goat exports were valued at $7 million or 3% of total goat exports nationally.
Australia produces less than 1% of global goat meat production but is a major exporter (90% of Australian production is exported). North America has long been the largest and most important market for Australian goatmeat (70% of Australian exports).

Goatmeat is widely consumed around the world but remains a largely niche part of many consumers' diets, in demand mostly among key ethnic segments.

Australian goatmeat needs to overcome some 'key barriers to purchase' to tap into opportunities in developed markets:

- Goatmeat, when compared to other proteins, has the advantage of no religious taboos and, in some cultures, has a unique role in religious and traditional family events.

- Its niche status can be considered a challenge, but also an opportunity in markets where there is potential to highlight perceived health and nutritional credentials.

- Consumers' lack of familiarity with goatmeat and consequent low confidence preparing it remain challenges for goatmeat across many markets.

- Australian goatmeat production and exports are exposed to the somewhat volatile supply of the rangeland goat flock and seasonal conditions.

- Goatmeat is considered most suitable for slow, wet cooking methods like curry, and as such is strongly associated with Indian, Pakistani and Nepalese cuisines. On menus, goat is often interchangeable with sheep meat and other red meats (Source: GlobalData Foodservice Menu Intelligence, 2017).

6 Farm level production systems and economics

Analysis of meat sheep, wool sheep, meat goat and beef production systems for the central western Queensland rangelands and the Queensland Mulga lands has been undertaken as part of Drought and Climate Adaptation Program project activities. (Bowen and Chudleigh 2020 in review) The next section summarises the results of the farm level analyses undertaken to identify the relative profitability and investment opportunities of the alternative enterprises.

6.1 Rangelands

The rangelands analysis covered land types and climate like the Desert Channels NRM region of Queensland. (Figure 21)

Figure 21 – Map of the rangelands of central-western Queensland showing the distribution of major land types on land used for grazing
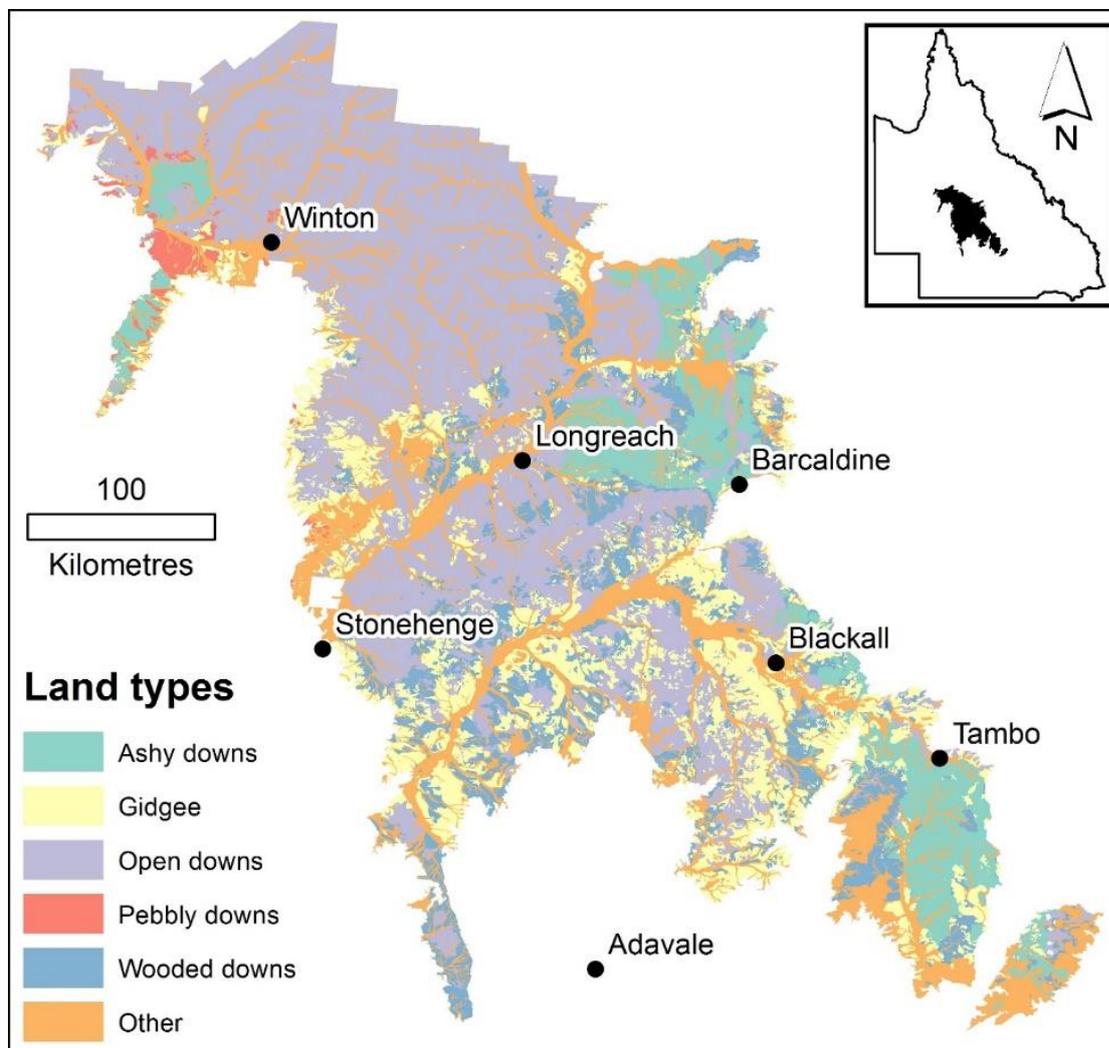
Land used for purposes other than grazing is marked white. The region includes the Mitchell Grasslands bioregion sub-IBRAs MGD07 and MGD08 but with the northern boundary set as the ABS Outback South statistical division boundary. Note that Wooded downs land type includes Boree wooded downs on this map

The relative profitability of alternative livestock enterprises modelled for the hypothetical central western Queensland rangelands property is shown in Table 11. The base property was 16,200 ha of primarily native pastures growing on a range of land types common to the region. A simplifying assumption was initially made that an effective exclusion fence was already in place and that the property would be capable of running either beef cattle, wool sheep, meat sheep, or meat goats with minimal further expenditure. The results of the analysis should only be compared on that basis.

Table 11 – Property-level returns expressed as the operating profit, rate of return on total capital, and the gross margin per dry sheep equivalent (DSE) after interest, for alternative enterprises on a representative property in the Central West Rangelands of Queensland

Calculation of property-level returns	Enterprise scenario						
	Beef cattle		Merino wool sheep			Meat sheep	Rangeland meat goats
	Self-replacing herd	Steer finishing	Self-replacing flock	Wethers (8 months shearing)	Wethers (12 months shearing)		
Assumed meat price ($/kg cwt)	$5.15	$5.28	$5.98	$3.80	$3.80	$6.46	$6.00
Assumed wool price ($/kg greasy)			$8.00	$7.94	$7.94		
Net livestock sales	$373,431	$635,977	$347,340	$206,831	$206,831	$552,471	$480,741
Net wool sales	-	-	$294,892	$445,698	$356,558	-	-
Husbandry costs	$12,615	$1,645	$174,678	$115,459	$89,040	$9,535	$6,651
Net bull, steer, ram or buck replacement	$10,000	$251,807	$26,000	$265,098	$265,098	$58,000	$4,000
Gross margin	*$350,816*	*$382,525*	*$441,554*	*$271,972*	*$209,251*	*$484,937*	*$470,090*
Gross margin/DSE after interest	*$33.92*	*$37.92*	*$43.97*	*$26.65*	*$19.68*	*$49.28*	*$48.80*
Fixed costs and labour	$87,500	$87,500	$97,500	$92,500	$87,500	$97,500	$102,500
Plant replacement allowance	$21,950	$21,950	$21,950	$21,950	$21,950	$21,950	$21,950
Allowance for operators labour and management	$60,000	$60,000	$80,000	$65,000	$60,000	$80,000	$70,000
Operating profit	***$181,366***	***$213,075***	***$242,104***	***$92,522***	***$39,801***	***$285,487***	***$275,640***
Rate of return on total capital	*2.41%*	*2.76%*	*3.26%*	*1.34%*	*0.58%*	*3.85%*	*3.74%*

DSE, dry sheep equivalent.

The prices, costs and productivity estimates applied in each model reflected the recent experience and research data gained from experienced property managers, researchers, extension officers and research trials located in each region. The insight gained was that, once an exclusion fence was in place, the expected profitability of wool sheep, meat sheep and meat goat enterprises would be similar.

One key insight from Table 11 is the amount allocated to husbandry costs for wool sheep enterprises. It is many times the total husbandry costs allocated to the alternative sheep meat, goat meat and beef enterprises and it is this expenditure on things like shearing, crutching and other wool sheep expenses that underpins many of the claimed economic benefits accruing to local communities from beef producers converting to wool sheep. Much of the additional expenditure on wool sheep variable costs is spent locally. This additional expenditure, along with the higher-level skill set and labour input required to manage a sheep flock in the rangelands, act as impediments to managers of alternative livestock enterprise considering a change to wool sheep.

Beef production has become the predominant land use in the central west rangelands of Queensland. Many properties in the region either have moved away from wool sheep over recent decades or have never run large numbers of meat goats. To facilitate the change to an alternative sheep or goat enterprise, or to diversify their current enterprise mix, those properties currently focussed on beef would need to invest capital and time to learn new skills. Although each property considering change faces different circumstances, a number of change scenarios have been modelled for variations of the starting point of the constructed property (Table 12). It needs to be clearly stated that the results of the discrete analysis shown do not indicate whether change is warranted for any particular property. Furthermore, the results shown in Table 12 may only indicate the value of change for (1) properties that have similar characteristics to the constructed property and (2) face similar prices, costs and outputs in the future.

Table 12 – Value of implementing alternative strategies to improve profitability and resilience of a representative property in the central-western rangelands of Queensland at a 5% discount rate

Enterprise change scenario	Annualised NPV[A]	Peak deficit (with interest)[B]	Years to peak deficit	Payback period (years)[C]	IRR (%)[D]
Convert from self-replacing beef herd to self-replacing merino wool sheep flock with investment in exclusion fencing	-$20,256	-$1,637,496	20	never	2.99
Convert from self-replacing beef herd to rangeland meat goats with investment in exclusion fencing	$45,686	-$681,884	3	12	12.83
Convert from 100% self-replacing wool sheep to 50% wool sheep and 50% rangeland meat goats with investment in goat infrastructure	-$6,469	-$419,531	20	never	1.82

The analysis was conducted for a 30-year investment period

[A]**Annualised (or amortised) NPV** (net present value) is the sum of the discounted values of the future income and costs associated with a farm project or plan amortised to represent the average annual value of the NPV. A positive

annualised NPV at the required discount rate means that the project has earned more than the 5% rate of return used as the discount rate. In this case it is calculated as the difference between the base property and the same property after the management strategy is implemented. **The annualised NPV provides an indication of the potential average annual change in profit over 30 years, resulting from the management strategy.**

[B]**Peak deficit is the maximum difference in cumulative net cash flow between the implemented strategy and the base scenario over the 30-year period of the analysis.** It is compounded at the discount rate and is a measure of riskiness.

[C]**Payback period is the number of years it takes for the cumulative net cash flow to become positive.** The cumulative net cash flow is compounded at the discount rate and, other things being equal, the shorter the payback period, the more appealing the investment.

[D]**IRR (internal rate of return) is the rate of return on the additional capital invested**. It is the discount rate at which the present value of income from the project equals the present value of total expenditure (capital and annual costs) on the project, i.e. the break-even discount rate. It is a discounted measure of project worth.

Where the constructed property was (1) operated as a beef property, (2) had some existing infrastructure to manage sheep or goats, but (3) required the construction of an exclusion fence to operate a sheep or goat meat enterprise, the relative profitability of the property could be improved over the long term with an investment in an exclusion fence and a switch to a meat goat enterprise.

The significant constraint on this investment was the level of additional debt required to make the change and the number of years before the hypothetical property would be back to the same financial position that it would have maintained without the investment. These aspects make the investment in an exclusion fence quite risky for the hypothetical property where it is operated solely as a beef production enterprise and has minimal sheep or goat infrastructure.

The better performance of the investment in the exclusion fence and conversion to a rangeland meat goat enterprise (compared to wool sheep) is heavily dependent upon the assumptions that the capital adjustment to move from beef to goats will be lower than a move from beef to wool sheep and that the relative and absolute price of goat meat will be maintained over the longer term. In this analysis the greater capital adjustments required to convert to sheep (cf. goats) is largely due to the higher value placed on wool sheep in this analysis.

The relatively poor investment performance of the conversion from a self-replacing wool sheep flock, to a mixture of meat goats and wool sheep, is mainly due to the small difference between the expected returns of the two enterprises. The opportunity cost of the extra capital invested in goat infrastructure is greater than the extra return generated by the combined enterprises. However, this component of the analysis did not account for any potential synergies arising from running goats and sheep on the one property when it comes to either pasture and grazing land management or drought management.

In summary, the switch from beef production to an alternative enterprise could be risky and requiring significant additional capital expenditure, particularly where an exclusion fence was not already in place. The impediments to moving to wool sheep are considered greater than moving to meat sheep or meat goats but without an exclusion fence and a significant fall in the price of beef relative to the alternative livestock enterprises, the rate of change to any alternative enterprise is unlikely to be rapid.

6.2 Mulga Lands

The mulga lands analysis covered land types and climate like the South West Queensland NRM region of Queensland. (Figure 22)

Figure 22 - Map of the Mulga Lands region of Queensland showing the distribution of the major land types on land used for grazing
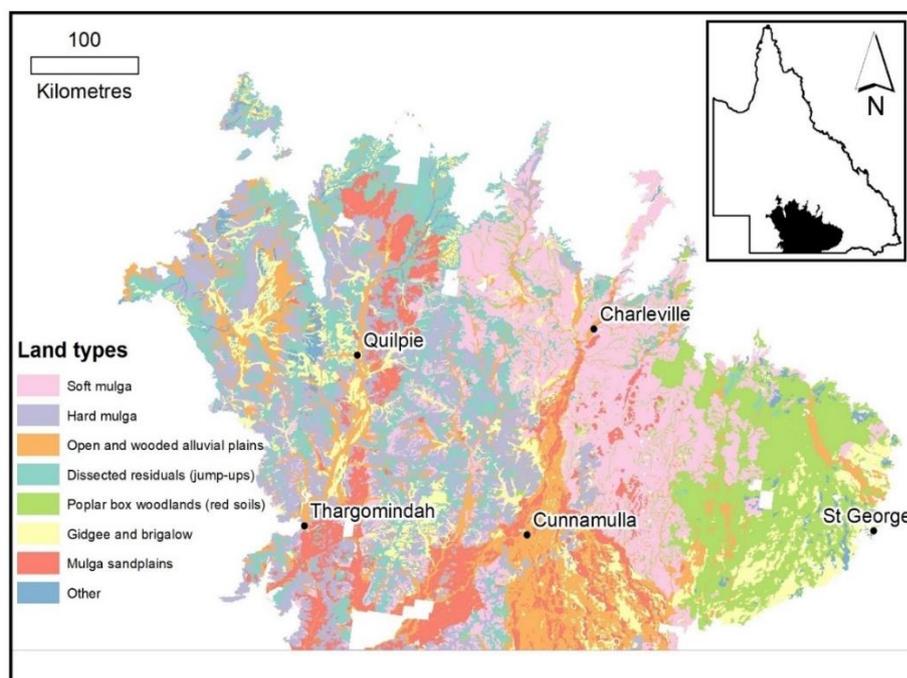
The Mulga Lands region is the Mulga Lands bioregion but with the southern boundary set as the Queensland border. Land used for purposes other than grazing is marked white on the map

The relative profitability of alternative livestock enterprises modelled for the hypothetical mulga lands property is shown in Table 13. The base property was 20,000 ha of primarily mulga land types common to the region. A simplifying assumption was initially made that an effective exclusion fence was already in place and that the property would be capable of running either beef cattle or meat goats with minimal further expenditure. The results of the analysis should only be compared on that basis.

Table 13 – Property-level returns expressed as the operating profit, rate of return on total capital, and the gross margin per dry sheep equivalent (DSE) after interest, for alternative enterprises on a representative property in the Mulga lands of Queensland

Calculation of property-level returns	Enterprise scenario		
	Beef cattle		
	Self- replacing herd	Steer finishing	Rangeland goats*
Net livestock sales	$121,722	$493,096	$241,370
Husbandry costs	$8,488	$3,830	$17,458
Net bull, steer or buck replacement	$4,000	$393,136	$6,000
Gross margin	*$109,234*	*$96,132*	*$217,912*
Gross margin/DSE after interest	*$21.01*	*$17.00*	*$47.44*
Operating overheads	$97,600	$97,600	$106,600
Plant replacement allowance	$14,089	$14,089	$14,089
Allowance for operators labour and management	$45,000	$45,000	$45,000
Operating profit	*-$47,455*	*-$59,557*	*$52,223*
Rate of return on total capital	***-1.53%***	***-1.88%***	***1.59%***

*assumption that suitable exclusion and internal fencing was in place was made.

Beef production has become the predominant land use in the Mulga lands. Many properties in the region either have moved away from wool sheep over recent decades or have never run large numbers of meat goats. To facilitate the change to an alternative enterprise, or to diversify their current enterprise mix, those properties currently focussed on beef would need to invest additional capital and time to learn new skills.

Although each property considering change faces different circumstances, one change scenario was modelled (*Table 14*). It needs to be clearly stated that the results of the discrete analysis shown do not indicate whether change is warranted for any particular property. Furthermore, the results shown may only indicate the value of change for properties that have similar characteristics to the constructed property and face similar prices, costs and outputs in the future. The analysis was conducted for a 30-year investment period using current input costs and average cattle prices over the period January 2010 to December 2019

Table 14 - Profitability and financial risk of implementing meat goat enterprise to improve profitability and drought resilience of a beef property in the Mulga Lands at a 5% discount rate[A]

Scenario	Annualised NPV[B]	Peak deficit (with interest)[C]	Year of peak deficit	Payback period (years)[D]	IRR (%)[E]
Convert from self-replacing beef herd to rangeland meat goats with investment in exclusion fencing	$48,326	-$876,011	3	14	10.82%

[A]The base herd was the herd after implementation of the safe carrying capacity, weaning, pregnancy testing and basic vaccinations, and inorganic supplements fed in the growing season.

Where the hypothetical property was (1) operated as a beef property, (2) had some existing infrastructure to manage sheep or goats, but (3) required the construction of an exclusion fence and internal fencing to operate a goat meat enterprise, the relative profitability of the property could be improved over the long term with an investment in an exclusion fence and a switch to a meat goat enterprise.

The significant constraint on investment was the level of additional debt required to make the change and the number of years before the constructed property would be back to the same financial position that it would have maintained without the investment. These aspects make the investment in an exclusion fence quite risky for the constructed property where it was operated solely as a beef production enterprise and had minimal goat infrastructure.

The performance of the investment in the exclusion fence and conversion to a rangeland meat goat enterprise is heavily dependent upon the assumption that the relative and absolute price of goat meat will be maintained over the longer term. This component of the analysis cannot account for the potential synergies arising from running goats and beef on the one property when it comes to either pasture and grazing land management or drought management.

In summary, the switch from beef production to an alternative enterprise could be risky and requiring significant additional capital expenditure, particularly where an exclusion fence was not already in place.

7 Sensitivity of enterprise profitability to parameter variation

Bowen and Chudleigh (2020 in review) detail the economic analysis of alternative livestock enterprises applicable to building resilience and profit across the rangelands of central western Queensland. Regionally-representative property level models were developed for the following enterprises: (1) self-replacing beef cattle herd, (2) steer finishing, (3) a self-replacing merino wool flock, (3) merino wether sheep, (4) meat sheep, and (5) rangeland meat goats. Table 15 shows the sensitivity of each enterprise, when run as a sole enterprise on the hypothetical property, to a change in key parameters underpinning the models.

Each parameter was varied by an amount relevant to their expected medium-term variability. Operating profit for all enterprises, other than Merino wethers, was most sensitive to the meat price. For example, for the self-replacing beef enterprise, a 1% change in meat price had up to four times the impact on profit of any other factor. For the rangeland meat goat enterprise, a 1% change in the price of goat meat had five to six times greater effect on the level of farm operating profit than any of the other main model parameters.

Table 15 - Expected impact on average operating profit of changing model parameter values for each alternative enterprise

Parameter	Percentage change relative to base				
	Self-replacing beef herd	Self-replacing wool flock	Wethers (8 months shearing)	Meat sheep	Rangeland meat goats
Wool price minus 20%	-	-25%	-98%	-	-
Wool price plus 20%		25%	98%		
Wool cut minus 20%	-	-24%	-96%	-	-
Wool cut plus 20%		24%	96%		
Meat price minus 20%	-43%	-31%	-48%	-41%	-36%
Meat price plus 20%	43%	31%	48%	41%	36%
Fixed costs minus 20%	10%	8%	18%	7%	7%
Fixed costs plus 20%	-10%	-8%	-18%	-7%	-7%
Treatment costs minus 20%	1%	14%	25%	1%	0%
Treatment costs plus 20%	-1%	-14%	-25%	-1%	0%
Mortality rate minus 50%	8%	7%	15%	2%	6%
Mortality rate plus 50%	-8%	-8%	-16%	-2%	-6%
Growth rate minus 5%	-1%	-3%[A]	12%[A]	-6%	0%
Growth rate plus 5%	1%	1%[A]	-12%[A]	-2%	4%
Weaning rate minus 5%	-2%	-5%	-	-4%	-6%
Weaning rate plus 5%	2%	3%	-	6%	5%

[A]No change in wool cut per head.

An insight provided by the analysis of the impact of a change in key parameter values on enterprise profitability is that product price is critically important in deciding the relative and absolute level of farm profit. This analysis shows that meat enterprises focussed on sheep and goat meat production would have seen their relative profitability rapidly improve over recent years when compared to beef production.

The trend relationship in meat prices for sheep, beef and goat meat shown by the individual analyses of price over time suggests that a falling or rising trend in meat prices will be reflected across all meat-based production systems in the rangelands. Therefore, having a component of the overall operating profit derived from wool sales may offset the variation in operating profit expected compared to if all income from the business was derived from meat sales.

That is, where the contribution to operating profit of different livestock enterprises was similar over time, incorporating the capacity of a self-replacing wool sheep flock to moderate the expected variation in returns due to fluctuation in meat price could be important. The self-replacing wool flock can also have the proportion of dry sheep and lambing ewes in the flock adjusted relatively quickly when faced with seasonal and inter-annual climate variability.

If the property was run solely as a self-replacing merino wool sheep enterprise, a similar change in the expected level of price received for wool, sheep meat, or the expected amount of wool cut, has a similar impact on the expected operating profit of the property. The implication is that a 20% increase in sheep meat price could offset a 20% decrease in wool price.

8 Likelihood of sheep flock rebuilding and/or substituting small ruminants for beef production

8.1 History

Since the recent 1991 peak in both Australian sheep numbers and wool prices, the Queensland sheep population has declined by approximately 90%, from around 18 million to two million. As identified previously (Figure 3) this decline in the Queensland sheep flock began in the 1960's and, except for a decade during the 1980's has continued unabated with the total reduction being from about 24 million sheep to about 2 million sheep. Most of the grazing land released by the long-term reduction in sheep numbers is said to have switched over to cattle. (AgForce 2019)

Figure 23 - Change in livestock population in Queensland over time (AgForce 2019)
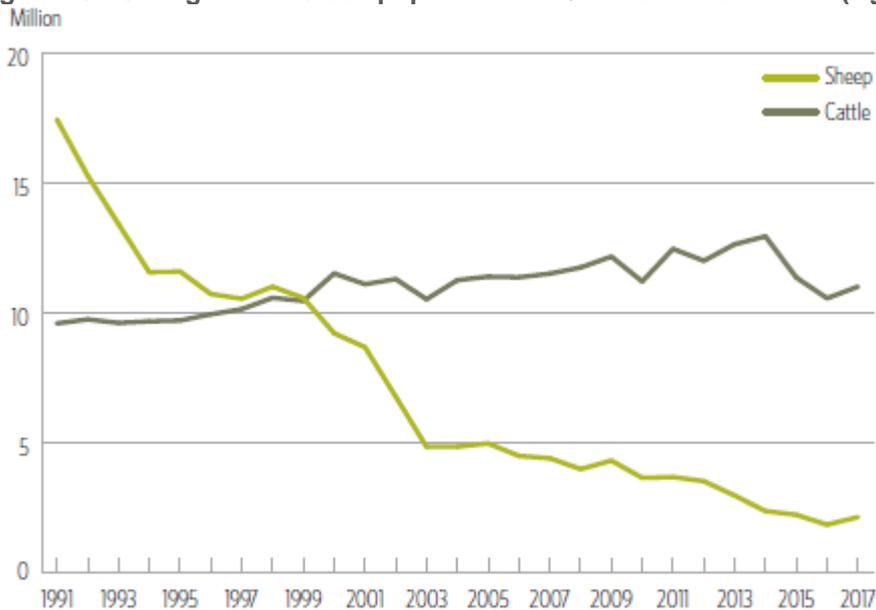
Source: ABS 7121.0 – Agricultural Commodities 2017

AgForce (2019) contends that the sheep and wool industries in Queensland currently have the potential for a major surge in both numbers and productivity and estimates that sheep numbers in Queensland will increase to approximately 5 million head by 2025. This estimate looks to have been made based on sheep numbers returning to the level they were fifteen years ago within five years. As one of the years have already passed since the prediction was made and little change in numbers has occurred due to ongoing drought, it appears reasonable to suggest that the target will not be met by 2025.

8.2 Looking forward

There are several identifiable mechanisms that support an increase in the number of sheep and goats across Queensland. They are:

- Existing wool sheep producers who have destocked due to drought are likely to rebuild their flock and not convert to cattle due to the relative profitability of sheep production. Whether they rebuild a wool production system or move to sheep meat or possibly goat meat production is somewhat unpredictable but existing wool producers are expected to continue with what they know, in the main. This is expected to be the main source of growth in sheep numbers over the short to medium term.

- Where rebuilding numbers after drought is being considered by existing beef producers who have exclusion fences and sufficient infrastructure in place to manage goats or sheep, the recent change in the relative profitability of sheep and goat meat production to beef production is likely to encourage such beef producers to partially rebuild stock numbers with small ruminants. In the central western and south western rangelands where there is a choice between beef and small ruminants, those enterprises are currently more profitable than cattle production and are likely to generate a positive cash flow sooner than rebuilding numbers with beef cattle alone. This is not expected to be a major source of growth in sheep numbers in the short term as many such beef producers are expected to transition to alternative enterprises at a conservative pace.

- The amount of capital expenditure required to restock with goats or sheep coming out of drought has traditionally been lower than that required to restock with beef cattle although the current prices being paid for store and breeding cattle, breeding sheep or possibly meat goats indicate there may be little difference in the final amount of total capital required to restock a property and the choice will be made on the basis of which class of livestock is likely to return the property to a positive cash flow and profit sooner. Quite often, the quickest path back to profitable production will be an investment in small ruminants.

- Where capital is limited, a well-managed goat herd appears likely to rebuild numbers more quickly that a well-managed beef herd, simply due to the better reproduction efficiency of the rangeland goat when run under sound management. A well-managed meat sheep herd is likely to rebuild at a pace somewhere between meat goats and beef cattle, depending upon the need for cash flow.

- Much of the infrastructure previously applied to run a sheep flock of about five million head would still be in reasonable repair, given that most of the recent destocking was drought related, not due to a switch in enterprises. This would support the Queensland sheep flock rebuilding to five million head as better seasonal conditions and cash flow needs of the property manager allowed.

- Given the existing store of knowledge and skills for the management of sheep flocks under rangeland conditions and the lack of similar detailed knowledge for large mobs of rangeland goats held under close management, it is likely that the predominant small ruminant restocked will be some form of sheep. Where some goat knowledge is held and regrowth control is an issue, producers may restock part of their properties with rangeland goats.

- There is still a stigma in many regions concerning the production of rangeland goats as a significant part of property operations and income – although a recent goat field day in Cunnamulla did attract more than 70 interested parties and property managers.

There are several identifiable mechanisms that limit current beef producers switching to sheep and goats during herd rebuilding across central western and south western Queensland. For example:

- The long term decline in sheep numbers since the 1960's has been related partly due to the long term change in the cost of farm labour compared to the cost of capital and partly due to the more recent relative improvement in profitability of beef cattle production in the rangelands compared to wool sheep production. Larger firms in the rangelands have shown a willingness to invest in labour saving infrastructure suitable to improve the efficiency of beef production, making their reliance on skilled labour almost negligible. It appears unlikely such firms will restock with wool sheep even though some suitable infrastructure could be available.

- Established beef producers who do not have exclusion fences or suitable infrastructure in place are unlikely to rebuild a drought depleted herd with small ruminants. The profitability of a sheep

flock or goat herd exposed to wild dog attack is significantly below the profitability of beef production on the same property.

- The risks and debt associated with the extra capital investment required to invest in an exclusion fence to reduce wild dog attack on many rangeland properties suitable for sheep or meat goat production will prevent many of the owners of such properties making the investment to change from beef production.

- Beef production is currently profitable for established beef producers and it is expected that not many will change enterprises while their properties are profitable, even though they may be more profitable producing meat sheep, wool sheep or meat goats.

- The additional operating expenditure associated with wool sheep production, along with the higher-level skill set and labour input required, act as impediments to managers of alternative livestock enterprise considering a change to a wool sheep.

- Many larger rangeland properties are owned by corporate investors. Even though those properties may have previously run as mixed or predominately sheep enterprises, the additional labour and management costs and the difficultly of retaining labour skilled in wool sheep production limits the capacity of large corporate properties to move back into wool production, even though much of the infrastructure may be still available on those properties. Wool production still requires significant amounts and timely input of reliable and skilled labour on larger properties, and this requirement is not expected to change with any foreseeable new technology.

- Any change in the economic circumstances of countries currently paying high prices for goat meat and mutton would likely cause prices for those products return to long term price trends. The current uncertainty around the state of the world economy and markets for meat products would limit a rapid change from beef to sheep or goat production by many risk averse investors.

- Significant parts of the mulga lands have been placed under carbon contracts over recent years. Even though the mulga lands ran large numbers of sheep in the decades after it was settled and much of those lands would be suitable to goat meat production, the limits placed on carrying capacity by carbon contracts means that restocking the mulga lands with any form of livestock will be limited by the carbon contracts in place, even if better seasonal conditions are experienced for longer periods of time in the future.

On balance, it appears that Queensland is likely to rebuild sheep (small ruminant) numbers towards levels predicted by AgForce (2019). The rate of recovery is likely to be slow, and even with good seasonal conditions, likely to take at least a decade or about the same period over which the recent decline in numbers occurred. The return to wool sheep production will largely be among the smaller, family owned properties located in the Rangelands who have recently been sheep and wool producers. This factor is likely to limit the total wool sheep population of Queensland and suggests that some expansion in the meat sheep and meat goat sectors may occur at the expense of the wool sheep sector. The final choice of enterprise will be encouraged by the relative profitability of the alternative enterprises but decided by the willingness of the manager to learn new skills and take on additional risk in what is an already very risky production environment.

9 Exclusion fences

The Queensland Feral Pest Initiative has provided $19.74 million in grants since 2015 to assist regional communities with the construction of cluster /exclusion fences and the control of invasive plants and animals. This investment has been complemented with $14 million from the Federal Government. Additional funding was announced by the Queensland State Government in October 2020 ($5 million) and (check this number) December 2020 ($4 million).

As of December 2019, approximately 6,590,100 ha of Outback Queensland's grazing lands have been exclusion fenced within 105 individual clusters (*Figure 24*). Estimates suggest there could be as much as an additional 3,450,000 ha enclosed through private fencing. (Smith *et. al.* 2020)

Figure 24 - Distribution of cluster fenced areas in Outback Queensland as of December 2019.
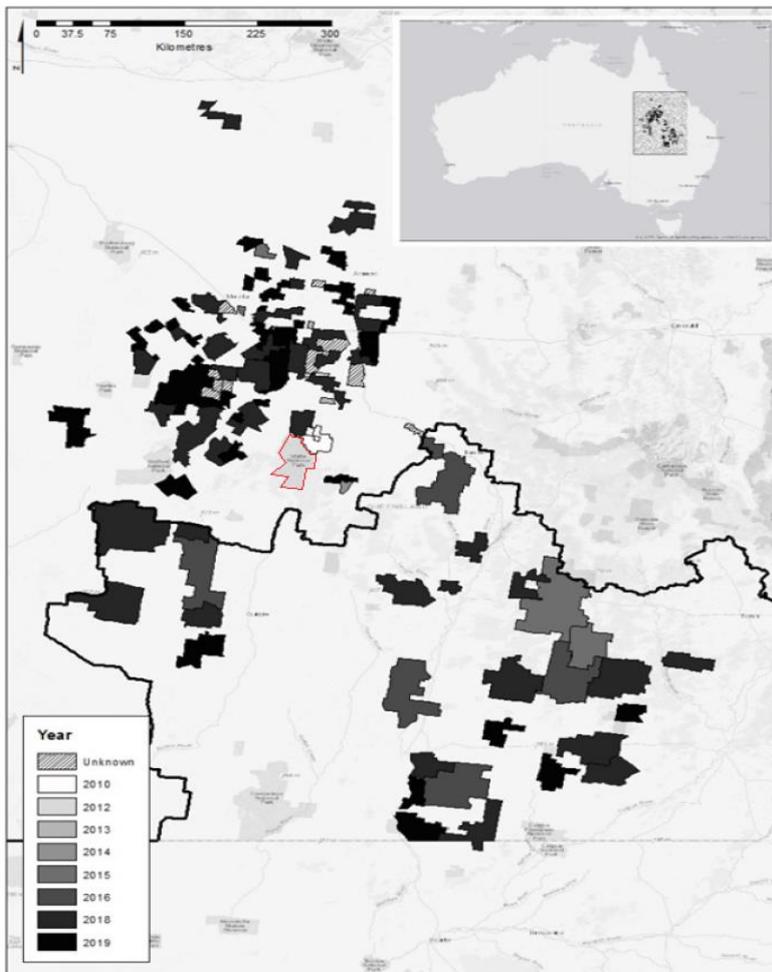
The map is shaded by final funding year or known year of completion. Unknown completion years of privately funded exclusion fences are indicated by hatching. The black line shows the location of the national dingo barrier fence (Smith *et. al.* 2020)

Cuskelly (2019) describes the observations and learnings of landholders who have used exclusion fencing to protect sheep and goats from wild dog impact in the pastoral zones of South West Queensland. Outcomes reported by landholders who have erected exclusion fencing on the boundaries of their properties were grouped by Cuskelly (2019) as follows:

Landholders report many personal benefits, apart from the benefits to their livestock.

- Mental health benefits. This was common to all respondents, a feeling of being in control and not being affected by the stress of having to deal with mauled livestock.

- Ability to select enterprise that best suits land type, particularly important in the mulga areas and the more marginal rangelands, where the economics of small stock are nearly double that of cattle.

- Ability to take advantage of very good prices in wool, lamb, mutton and goat meat.

- Better able to pursue organic product status if they desire to do so.

- Generational succession planning is more straightforward – some variables and uncertainties are removed when enterprises are given better economic sustainability.

Community aspects.

- The social as well as the economic health of that community is largely dependent on the grazing enterprises surrounding it.

- Exclusion fencing provides (generally one off) business for contractors & retailers in the local community.

- Wool enterprises are large local employers – shearing and crutching are labour intensive.

- Other industries can emerge. The goat meatworks in Charleville currently employs 160 people and exports to 100 global markets.

- Employment creates social capital in country towns. Schools with healthy enrolled numbers, sporting teams, social clubs, etc.

The primary driver of exclusion fencing has been the exclusion of wild dogs from sheep flocks, but an animal proof fence has many benefits.

- Exclusion of wild dogs, foxes, pigs etc.

- Ability to manage goats. Moving from harvesting of feral goats to farming goats.

- Sheep lice control between neighbouring flocks. Sheep are the only vector for sheep lice.

- Less straying stock or opportunity for stock theft.

- The elimination of the mixing of neighbouring wool sheep with meat sheep reduces fibre contamination.

- Exclusion fences enable the use of guardian dogs.

- Protection of cash or fodder crops from feral pigs and macropods.

Pastures and native vegetation

- The original exclusion fencing that commenced in the 1860's was based on a bottom 900mm of rabbit netting topped with a 900mm of marsupial netting. Fencing to protect from macropod migration is not something new.

- Migratory macropod populations (of up to half the property's long-term carrying capacity) after local rainfall events can be controlled.

- Exclusion fences allow for true pasture spelling, not only farmed animals excluded.

- The positive role sheep/goats play in controlling native vegetation regrowth

- Allowing a fire regime to control suckers rather than mechanical clearing

- Some native plants can be difficult in grazing enterprises – for example, Pimelea poisoning is a real problem in cattle but much less so in sheep.

Livestock production

- Livestock are easier to manage.

- Less predation of livestock by wild dogs, foxes and feral pigs.

- Higher weaning rates of livestock, from both reduced predation but also from better nutrition through pasture management.

- Calmer stock, resulting in:

    o Better mothering in breeding operations.

    o Better quality & quantity of wool.

    o Better growth rates of livestock.

- Greater enterprise adaption to rainfall variability – broadly speaking sheep and goats will perform better in dry times compared to cattle [e.g. supplementary feeding, destocking, etc.]

- Landholders have a greater ability to more accurately feed budget i.e. match livestock numbers to predicted pasture availability.

There is insufficient information to determine the extent and timing of any possible switch to an alternative enterprise by exiting beef producers who have recently invested in an exclusion fence of become part of a larger cluster. More information is required in the following areas:

- The number of properties /landholders within fences. RAPAD (2018) undertook monitoring and evaluation and found the total number of properties involved in Round 2 was 31. Round 2 will take the total properties up to 118 and the EOI will take the total number up to 168. The RAPAD data does not cover the full region subject to exclusion fencing and the total number of properties / landholders involved needs to be estimated.

- The number of goats, meat sheep, wool sheep, cattle currently on fenced properties needs to be discerned / surveyed. Also, what change in enterprise size, performance or type are expected as outcome of fence. That is, what enterprises are expected to increase? By how much? What enterprises are expected to decrease? By how much?

- More information is needed about the proportion of fenced properties that are cattle only or predominately cattle as these properties may convert to small ruminants and contribute to more diversity in enterprises across the rangelands. They may also change the predicted totals for wool sheep, meat sheet and meat goats across the rangelands.

- Independent assessment of carrying capacity within the fenced region so that the reality of predictions and survey results can be checked.

Although the expenditure on cluster fencing can now be considered a sunk cost, the implications of the expenditure need to be more fully investigated, particularly the impact on the size and distribution of small ruminant enterprises across the rangelands.

10 Value adding

ABARES (2020c) identifies value creation can come from several sources including when there is a change in the form of a product or through the addition of an attribute to a product. Value adding activities can generate additional returns that accrue to producers and other sectors of the economy involved in the supply chain.

ABARES (2020c) indicates that Australian agriculture has benefited significantly from its historical focus on exports of raw agricultural and minimally transformed products and the focus on these products has likely created more value for the Australian economy than would have been available from a focus on more processed products. This understanding has caused a shift in thinking from the previous attention to downstream processing as the means to grow returns (Commonwealth of Australia 2000, 2001) to contemporary attention to a mixed and consumer-centred approach (CSIRO 2019).

ABARES (2020c) identifies it is likely that trade in raw and minimally processed products will continue to provide the largest and most important value-creation opportunities for Australian agriculture in coming decades. Despite volatile production years, the production of primary products by Australian farmers is intrinsically tied to our geography and natural endowments. These attributes cannot easily be traded and therefore contribute significantly to Australia's competitive advantage in Global value chains.

ABARES (2020c) identifies that Australian policy makers and industry have key considerations around creating further domestic value from Australia's competitive agricultural base.

- Market access, responding to emerging consumer preferences and access to imported agricultural products and other inputs will be important. Pursuing new and improved market access and lowering the cost of importing are key roles of government.

- The government's role in supporting a move towards downstream processing is less clear. Government intervention through subsidies or incentives does not necessarily lead to value creation and can distort the competitiveness of firms and harm international reputations. The government can focus on removing regulatory barriers and reducing red tape to assist with competitiveness.

- While certain attributes can be value-creating, they are also subject to international competition, making wider pro-competitive reforms and best-practice regulation part of the basis for maximising value creation.

Ultimately, Australia must rely on competitiveness achieved by its own endowments, production efficiencies, and the quality and reliability of its products.

The implication of the findings of ABARES (2020c) for the development of value adding opportunities for the small ruminant industries located in the rangelands of Queensland is reasonably clear. Industry and government need to pay attention to opportunities to improve efficiency behind the farm gate or between the farm gate and the first stage processor. Government or public investment targeted post the initial processing of the live animal appears unlikely to add value.

Policy makers and industry should be aware that a move downstream is not a precondition for increasing domestic value creation and that Australia is not missing out on value creation through its focus on raw and minimally processed products. Value creation can be unlocked by pro-competitive reforms along the supply chain and ensuring production is consumer focused.

The initial consideration of value adding opportunities for the small ruminant industries located in Queensland's rangelands indicates that the knowledge gaps centre around how the meat sheep and meat goat sectors have their efficiency improved under local conditions. Key questions include:

- What is the optimum sale weight /age /condition for a lamb /meat goat produced in the rangelands?

- If these specifications cannot be met on pastures, are there opportunities for paddock fed supplements, custom off farm feeding or a separate feed lot sector where ownership of the lamb /goat is transferred to the lot feeder?

- What knowledge exists as to the capital investment, rations, feeding strategies necessary to make on farm feed lotting or paddock supplements efficient for sheep and goats?

- What is the relative profitability of on farm and off farm feedlotting to finish lambs or meat goats? Would larger commercial feedlots have access to different efficiencies that on farm feedlots cannot access?

11 Sheep, lamb and goat meat processing

There is an ongoing rationalisation in the sheep and goat processing sector across Australia and the developed world. The industry is rationalising into a very small number of large processors that are vertically integrated and reliant on export markets and a larger, but shrinking, number of very small processors who focus on supplying local or niche domestic markets.

Queensland does not have sufficient supply of goats and sheep to support a major, vertically integrated specialist export sheep and goat processor of the scale of those found in NSW, Victoria or South Australia. Western Meat Exporters located in Charleville will rely on sourcing stock from northern NSW and a significant return of the Queensland sheep and goat population to pre drought levels to maintain viability and continue its planned development as an integrated processing entity.

11.1 Queensland based

11.1.1 Small scale

There are ten small-scale family owned meat processing facilities across western Queensland, from Normanton in the north to Augathella in the south that could provide capacity for local sheep meat producers to enter local restaurant and tourism markets, and then leverage into larger domestic markets.

11.1.2 Western Meat Exporters Charleville

This works is Queensland largest operating goat and sheep meat processing facility. It was established to process goats but continues to develop sheep processing as a core component of its business. It was established in 1996 as Australia's first purpose-built goat processing plant. It is a 100% Australian owned, private company that employs about 160 staff and undergoing a $15 million expansion which will employ an additional 60 staff.

- current capacity approximately 15,000 sheep and goats per week; current data suggests the plant is operating between 50% and 75% of current capacity.

- sources significant goat numbers from NSW.

- planned expansion will increase capacity to 21,000 head per week, with the focus on sheep

- a key constraint is knowledge of sheep numbers and potential growth in supply. The owners would invest further if they were confident that the sheep industry will continue to grow

- export focused with Halal, EU and organic certification; also accredited for domestic supply

- markets are well established, with sheep exports complementing goat

- most products are frozen, whole or broken carcase

- sheep meat and lamb comprise 25% of total current processing

- current markets are seeking a lean product (both goats and sheep)

- could easily find markets for prime lambs if there was a consistent supply of quality product (probably supply domestic into Brisbane and Sydney)

- the management team has sheep branded products ready to launch in the domestic market

- expansion and tech upgrades will reduce freezing time from 48 to 24 hours, increasing efficiency and flexibility

11.1.3 Wallangarra

This plant was closed July 2016, not long after it was purchased. Owner Thomas Foods International (TFI) cited livestock shortages and difficult global trading conditions. The abattoir had a capacity of about 3,000 sheep per day single shift. During 2015 the plant employed around 260 workers. Some Wallangarra employees transferred to the company's Tamworth operation.

TFI maintains large meat processing centres in Murray Bridge in South Australia and Tamworth in New South Wales. The Southern Times (January 2018) reported TFI has categorically ruled out re-opening its Wallangarra abattoir following a fire which destroyed its processing plant at Murray Bridge in South Australia. (See comments re expansion of Tamworth abattoir by TFI in 2015 below)

11.2 Southern States

11.2.1 Thomas Foods International (TFI)

Established in 1988 by Chris Thomas, TFI grew from small beginnings to become one of Australia's largest family-owned food businesses, and is now led by his son, Darren Thomas. With teams in Australia, the US, China, Japan and Europe, the TFI brands and business partnerships grow, supply, and distribute premium meat, seafood and fresh produce all over the world. It is a major supplier to supermarket chain Woolworths and supplies Coles, Aldi, Costco and Metcash's IGA supermarkets. It also has a large red meat export footprint across Asia, North America, the Middle East and the EU. The company is vertically integrated from a cattle feedlot through processing, chilling or freezing, distribution and sales of meat, seafood and vegetables. The company has an annual turnover of more than $2 billion. Prior to the Murray Bridge fire, the company had the capacity to process 5,000 cattle and 120,000 lambs per week at four sites, including the one at Wallangarra.

Beef Central (2015) reported TFI will spend $25 million further upgrading its Tamworth meat processing facility. Utilised at full capacity, Tamworth TFI abattoir will become the largest lamb chain in Australia, capable of processing 11,000 lambs a day. This expenditure was made just prior to the closing of the Wallangarra plant.

Sheep Central (2020) reported the New Murray Bridge TFI abattoirs to eventually process up to 15,000 sheep and lambs, and 1200 head of beef per day. The works is to be built on a greenfield site over the next two years with the latest technology for automation. It replaces and significantly upgrades the plant previously destroyed by fire. TFI sees the new Murray Bridge facility becoming the most advanced multi-species meat processing facility of its kind in Australia, if not the world, servicing its global operations for decades to come. The sheep and lamb processing capacity will not come online immediately but will be expanded to meet the supply created by the hoped for restocking with sheep across southern states in coming years.

11.2.2 Fletcher Foods

Fletcher International Exports is one of Australia's most integrated processors and exporters of lamb and sheep meat products. A private, family-owned company, Fletcher International operates two processing facilities: one located in Dubbo, New South Wales; and the other near Albany in Western Australia. These two plants have a combined processing capacity of more than 90,000 sheep and lambs per week, which equates to over 4.5 million head per year. Fletcher Foods exports sheep and

lamb products to more than 100 countries across the Middle East, North Africa, Europe, the US and Asia. The capacity of the Dubbo abattoir has not been identified.

11.2.3 JBS

JBS Australia is the largest meat processing company in Australia and a division of JBS, the largest animal protein processing company in the world. Its focus is on cattle processing in NSW and Queensland (JBS Northern Division).

The Southern Division of JBS has a combined processing capacity of 110,000 small stock and 9,500 head of cattle per week, employing 2,500 employees. Sheep, goats, pigs and cattle are processed at five facilities spread throughout the southern states of Australia. The largest facility in the Southern Division is the Brooklyn plant - a multi-species operation with a daily capacity of 1,400 head of cattle and 8,200 head of small stock. The Brooklyn plant employs 1,230 people and is located 7km from the Port of Melbourne. It has recently been severely impacted for a short time by an outbreak of COVID 19 amongst staff. The focus by JBS on its northern division makes predictions for the future level of operations of the southern division difficult to find in the rural press and elsewhere. The absence of such reports suggests no major changes are being considered.

11.2.4 Goat abattoir at Bourke

Beef Central (2019) reported that the $60m Bourke goat abattoir closed, five months after launch. The abattoir initially aimed to employ 100 people.

The Land (2020) reported that Bourke's new $60m small animal abattoir has been put on the market with its owners blaming the drought and "statutory" hold-ups for upsetting its dream of being a major goat processor. The abattoir was closed in May last year only five months after it opened. At that stage, rain, not the drought, was blamed for goat contractors being unable to get goats into the facility. The abattoir owners had promised numerous times to reopen since but have since decided to exit the industry.

The capacity of the abattoir was stated as 6,000 head/day of goats, sheep and lambs. The Federal government provided a $10 million grant to assist with construction of the abattoir and to supply some infrastructure. Bourke Shire Council also put in $10m. Total cost was $60m.

Beef Central (2019) reported "however, a Bourke district station owner who did not want to be identified told Sheep Central the projected 6,000-head daily kill rate was "never going to happen" considering the weekly national goat kill rates." We all had great hope, but were lied to," he said. "The kill numbers show that the Bourke planned 6,000 a day means that would have to kill all the goats being processed in eastern Australia to meet their numbers." The station owner is annoyed at what he believes was the lack of research into the variability of the plant and the numbers of goats, and the state and federal governments giving money to private businesses.

The Bourke abattoir is thought to be still closed and still for sale.

11.3 Transport and logistics

Sheep and goats produced in the central and southern Queensland rangelands typically are sent long distances to their point of sale or processing. The trucking distance from Longreach to Dubbo is about 1,350 kilometres, similar to the trucking distance from Longreach to Tamworth (1,315 kilometres). Although the distance from Longreach to Charleville is about 515 kilometres, the cost of sending stock to processing in southern States from the rangelands of central western Queensland is not

proportional to the distance travelled and can reduce significantly on a per kilometre basis as distance increases. There are limits to the amount of time livestock can spend on trucks, but many existing sheep and lamb producers appear to have little trouble sending stock to Victorian destinations from locations around Longreach.

The better average prices available at the larger processing works in southern Australia due to their economies of scale and access to more diverse markets for a wider range of product identifies that the sheep meat producer located in the central western Queensland rangelands will continue to send product over the border, simply because they achieve a better net return on farm. Many sheep meat producers located in the Murray Darling Basin of Queensland reported that sending sheep to Charleville from their region would be considered as sending them 'backwards" (Carswell and Hickey 2018).

The lamb and sheep slaughter numbers for 2020 (MLA MIDAS database) indicate that there is capacity to slaughter at least 16 million small ruminants per annum within 2,000 kilometres south and south east of Longreach.

Carswell and Hickey (2018) identified two general streams for sale of lambs to processors by their surveyed producers. The "southwest" producers tend to sell their lambs to Victorian processors - Hardwick Meat Works (Kyneton) and Wagstaff Cranbourne (Cranbourne) - while the "eastern" producers sell their lambs to the closer NSW processors - Junee Lamb (Junee), Macleay River Meats Aka Eversons Food Processors (Frederickton) and Thomas Foods International (Tamworth). Carswell and Hickey (2018) also report that 59% of surveyed producers used Auctions Plus (an online selling platform) to sell stores or sold them to Dubbo (6%) or Swan Hill (18%) sale yards. 24% of producers identified that they sent their sheep directly to Fletchers International in Dubbo.

There appears to be sufficient transport infrastructure and capacity to efficiently move sheep and goats produced in the Queensland rangelands to their point of sale or processing whether it is in Queensland or in nearby States. The question of whether there is sufficient flexibility to meet the needs of an industry that may attract new entrants initially with relatively small numbers to sell is difficult to answer. Small sale lots transported over long distances incur increased selling costs per head which may make small ruminant production relatively less profitable in some regions. Western Meat Exporters in Charleville own several trucks and trailers suitable for the transport of small ruminants and offer package deals to stock owners that allow efficient movement of relatively small consignments of stock to their works. It is likely that the existing arrangements between neighbouring or adjacent landholders will expand to accommodate loads of sheep or goats made up with stock sourced from different owners and new industry entrants being sent to market.

12 Development of the small ruminant industry in Queensland

The role of Government in the development of the small ruminant industry in Queensland has been minimal over recent decades. After the collapse of the wool market and the rapid fall in numbers of sheep and wool producers across Queensland, a decision was made by the former Queensland Department of Primary Industries and Fisheries to close active sheep and wool research and development activities and to not seek new funding. A relatively small number of sheep extension activities have been facilitated by the Department over recent years.

The recent and significant funding of exclusion fencing and fencing clusters by the State and Federal governments was apparently predicated on the fences stimulating a revival of the sheep and wool industry and leading to increased local employment and economic activity in towns located in the former wool producing regions of western and south western Queensland. Although the regeneration of the sheep and wool industry of Queensland appears unlikely to happen at the pace or size desired, it may be possible that the recent funding of the fencing combined with the relative improvement in profitability for small ruminant producers may provide opportunities for public funds to be applied and gain a positive return from investment in targeted industry development opportunities.

These opportunities are expected to be found by exploring the following topics:

- There are large differences in flock and mob performance between statistics reported by ABARES and the sheep and meat goat models developed for competent managers in each alternative enterprise. Although this performance gap exists in all agricultural industries and is nearly always highly intransigent to change, it may be possible to identify development activities to improve the average level of production technologies applied across a developing small ruminant industry.

- The meat goat industry, in particular, is hamstrung by limited knowledge of production technologies that facilitate the better management of goats under extensive rangeland conditions and some effort should be made to join the NSW DPI and MLA meat goat industry development activities.

- Caswell and Hickey (2018) identified many sheep meat producers did not effectively meet market specifications with the sheep they produced. Analysis of the market specifications provided by different processors or market segments, price discounts or premiums and the benefit to producers of meeting market specifications may provide beneficial insight to new industry entrants.

- Many existing lamb producers target organic production systems. All the factors underpinning this choice need to be identified and whether further production would crowd these markets may help policy direction.

All these development activities are prior to processing as it appears unlikely that applying State funds to market development opportunities post processing would provide a positive return.

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