

# Sheepmeat market structures and systems investigation

Meat and Livestock Australia





# Final report

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## Sheepmeat market structures and systems investigation

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## Foreword

This project is based around the available sheepmeat industry data with the aim of producing a robust report outcome, and regardless of the veracity of the data or any perceived or real shortcomings it is a requirement of this report that it references the available data to provide confidence in the findings.

It is equally important to the success of this project that the opportunity is taken to engage with as many industry participants as possible. We have called this component “ground truthing”; meeting and hearing the individual opinions of sheepmeat industry participants which allowed us to:

1. Reference and check on the data findings,
2. Identify any unique situations,
3. Provide the opportunity to document industry ideas and concerns

While we have heard a variety and range of strongly held views, we have been careful to not get caught up in the parochialism that can be found in the various market segments.

Additionally, in this report we will explore issues that we identify as worthy of comment, or more importantly any anomalies observed that may be contrary to the advancement of the Australian sheepmeat market systems and structures.

We note in compiling this report, that engagement with processors has been limited. However, the engagement of producers, agents and advisors has been enthusiastic. Any review now will provide insights that have the potential to continue the forward momentum of the sheep meat industry.

Natural industry evolution and competitive tension between industry participants is viewed by processors as the method that has generated innovation and improvement to date; they feel this should be the way forward and industry left to manage this process in a commercial setting.

We have observed in almost all discussions a healthy optimism regarding future demand and price for sheep and lamb. Importantly, the industry has more than its fair share of positive, passionate participants, which bodes well for the future.

At producer level, the feeling is that the sheepmeat industry has innovated and responded to the challenge from cropping and has largely succeeded in the “fight for acres”.

There is plenty of evidence of cutting edge technology applied at various points of the supply chain. The innovation at processor level and the advancements in the areas of automation are clear, while on-farm adoption of technology and science is to be admired.

*“Improvement in genetics, on-farm productivity and market access is positioning the industry to fully participate in future demand especially from emerging economies” Advisor, Vic*

Maintaining consistent supply of sheep and lambs is vital to ensure ongoing operation of the processing sector, improve profitability, encourage innovation and reduce operating cost. In recent years sheep processing plants have scaled back their operations or been forced to temporarily shut production due to sheep shortages.

While some smaller processors who are most exposed to market volatility have closed permanently. The case of the Manildra Meat Company closure at a time of record lamb prices early 2017 demonstrates the effect on processors of market volatility.

Competition at both a consumable product level and farming enterprise level are also essential to sustainability of the sheepmeat industry. Attracting producers to the sheepmeat production through viable returns, support and technological advancement is key. Industry and market risks through increasing competition, price and currency volatility, and a fragmented supply chain are all challenges for the immediate future.



## Executive Summary

This investigation into the systems and structures of the sheepmeat market was commissioned by industry research development corporation, Meat and Livestock Australia (MLA), at the request of peak industry body, Sheep Producers Australia (SPA). The need for this industry situation assessment was instigated to assist the Australian sheep industry in developing an evidence-based policy response to recommendations provided to the red meat industry from the ACCC's Cattle and Beef Market Study. It is the objective of this study to provide a foundation document which holds detailed information on the current situation of the sheepmeat market, enabling the sheep industry to best respond to the ACCC's recommendations that were developed from solely analysing the cattle and beef industries.

This report has been prepared using desktop analysis of relevant information, analysis of market data that is both publicly available or provided by Meat & Livestock Australia and consultation with industry participants. It was carried out by independent analysts with the guidance of a steering committee representing the full breadth of the sheepmeat value chain.

This report provides an overview of the sheepmeat industry and current market state and looks at the drivers for change faced historically, evident now, and likely to come in the future. Difficulties with engagement and access to some industry participants has also resulted in the postponement of some key elements to the full report. A full understanding of industry situations from the perceptions of those on the ground is essential for an accurate and robust assessment. This investigation has found that many of the issues faced by the cattle and beef industry are present in the sheepmeat industry. However, unique challenges are also evident that impact on market and supply chain function.

## Key Findings

- **Saleyards are generally efficient, especially the major selling centres**
  - Price discovery starts at the big saleyards
  - The bigger the saleyard the stronger the price and the lower the price volatility
  - Smaller saleyards follow the lead of bigger saleyards
  - Saleyards remain the preferred selling channel
  - At saleyards, prices reward production targeted to preferred weight and fat scores
- **There are structural differences between markets**
  - Three distinct market regions exist: Tasmania, South-eastern region and Western Australia
  - There is a low correlation between market regions
  - Eastern markets are well integrated
    - There is strong correlation between saleyards within each market
    - The most correlated markets are those that are within closer proximity of each other and share the same stock type category
  - Western Australia and Tasmania
    - The evidence is that WA and Tasmanian markets are not integrated with the main Eastern market
    - They operate on their own rhythm, with their own price dynamics
    - The average price of skins in Western Australia and Tasmania is at a significant discount to the south-eastern market
    - WA has a greater proportion of over-the-hooks (OTH) sales
    - WA producers perceive a lack of transparency and therefore accuracy of OTH reports
    - The relevance of the saleyard price in determining market movement suggests that greater insight into OTH and direct sale prices would improve visibility in Tasmania and Western Australia.
- **Profitable processors are vital to the broader industries sustainability**
  - Processing margins are tight, explaining the ongoing demise of smaller operators and the need in the future for large efficient processing plants
  - Processing is Victorian centric which draws livestock from NSW, SA, Vic and Tasmania
  - Lamb slaughter is steadily increasing while mutton slaughter has declined
  - Consistent supply is a major challenge for processors
- **Market price reporting is extensive yet the collection process requires improvement**
  - Saleyard reporting and performance provides transparency and confidence
  - OTH sales reports are less transparent and there is a lack of confidence in these reports by market participants



- While on-line sales reporting is transparent, comparison analysis with other selling options is difficult
- **Differences in saleyards vs direct sales pricing are evident**
  - In every state, the saleyard prices lead the OTH prices
  - OTH prices move within a much narrower band compared to saleyard prices
  - Victorian OTH and saleyard prices are the most integrated
  - WA saleyard Trade Lamb price movements demonstrated a weak interdependence with the South-eastern region.
  - WA OTH Trade lamb prices to the respective OTH South-eastern state prices shows a moderate to strong interdependence
  - Tasmanian OTH returns show very weak correlation scores across the board with all categories
- **OTH assessment transparency and grading is a significant issue to producers**
  - The grading system lacks transparency
  - Producers have limited confidence in OTH grading system
  - Producers have a poor understanding of the grading and trimming system
- **Barriers to entry and expansion in the processing sector are limiting market efficiencies**
  - The stage-barriers across the processing value chain are:
    - product and market development
    - livestock procurement
    - manufacturing skills and capital
    - sales and distribution infrastructure
    - customer support
  - There are industry benefits through further consolidation of processing
    - ability to succeed in international markets
    - ongoing investment in capability and technologies & R&D
    - reduced unit costs through economies of scale
    - managing regional supply fluctuations and species diversity
- **The supply chain perspective:**
  - Processors are focused on efficiency through maximizing plant use hook chain speeds, retaining intellectual property
  - Producers are focusing on on-farm productivity and improved efficiency
  - Processing is a “cents and pennies game”

# 1 Project Overview

## 1.1 Project Scope

At the request of peak industry council, Sheep Producers Australia (SPA), Meat and Livestock Australia (MLA) has commissioned this investigative report of the structures and systems in the Australian sheepmeat markets. This research is required to ensure a holistic understanding of the supply chain and market. It is also designed to inform and assist the sheep industry in providing an evidence based policy response to the recommendations advised to be implemented in response to the Australian Competition and Consumer Commission's (ACCC) Cattle and Beef Market Study and the Senate Standing Committees on Rural and Regional Affairs and Transport's inquiry into the Effect of Market Consolidation on the Red Meat Processing Sector. It is anticipated that this study will be used to provide the framework for policy development to assist in the sheep industry's response to beef specific market recommendations that, if implemented, will have implications for sheepmeat markets.

The primary objectives of this investigation were to:

- Identify the supply chain including selling structures between buyers and sellers of sheep and skins, including the supply chain structure of the Live Export market for sheep.
- Discover any impediments (perceived or real) to greater market efficiency, such as bottlenecks or potential distortions at certain points along the supply chain (saleyards, processing, skin production, live export).
- Describe the current carcase pricing and grading methods.
- Identify structural differences between regions including but not limited to: regulatory frameworks, purchasing protocols, composition and number of buyers, and processing environment.

Secondary objectives were to:

- Identify the allocation of commercial risk between sheepmeat producers and buyers.
- Seek information on the share of profits among the sheepmeat production, processing and retailing sectors throughout varying sheepmeat markets.

This report is designed to provide a detailed industry assessment of the sheepmeat supply chain and market at its current state and to identify issues which may be causing disruption to optimal market and production activities. It is not in the scope of this study to identify causes, determine detailed strategies or analyse costs for options which address the highlighted issues. However, recommendations are made for further areas of investigation that may benefit the industry. Any recommendations suggested are in no particular order but reflect preliminary review of suitable options and ease of application.

## 1.2 Methodology

This investigation was conducted through a combination of desktop literature review, stakeholder and industry consultation and quantitative data analysis. It was undertaken in collaboration with Strategis Partners (SP) to enhance the research.

Qualitative research was used to gather observations from industry participants, based on face to face interviews with people from production and processing sectors. The aim was to discover what actually occurs as people in the situation understand it. Consultation with industry participants has formed a major component of this investigation and contributed to the findings. A list of the consultations can be found in the appendix.

The following methodology was followed to ensure a structured approach is applied and that all aspects of the brief are met. These items form the basis of our study, and are the Milestone reference points for reporting.

### **1. Review of previous reports.**

A preliminary investigation was conducted to firstly establish the current data & information available, and the reliance the researcher can have on its accuracy and relevance.

Some care was needed here at the outset to focus on the information & reports of key relevance in a contemporary context. Also; it is useful to put the issue into perspective, namely an analysis of the extent of the issue. Literature reviews of the following key papers were included:

- Cattle & Beef Market Study – ACCC 3/2017
- Assessment of Price Transparency in the Beef Supply Chain – MLA 3/2015

### **2. Reported Market Prices**

There are sometimes large variations in reported market prices. This is particularly relevant between comparable OTH prices and NLRS Saleyard reports. There are also the regional diversions, specifically of note is the WATLI/ESTLI divergence at various times. This report identifies any seasonal and/or regional differences in market prices.

### **3. Western Australia sheepmeat supply & price.**

Western Australia has unique supply patterns influenced by seasonality and the effect of live export activity. This report seeks to identify the impacts of the unique WA situation on price and processor efficiency.

### **4. Direct sales vs saleyards.**

As outlined above, there is often a disconnect between quoted Meat & Livestock Australia's Over-the-hooks (OTH) prices and saleyard quotes. While commercial in confidence is cited as the reason accurate OTH prices are difficult to obtain, all avenues need to be fully tested to improve reporting of OTH & direct sales if greater transparency is to be applied. Analysis was conducted to identify correlations and any distinct trends in reported direct sale prices and saleyard price in the various states.

### **5. Carcase pricing & grading methods**

Confidence in the OTH grading system is an issue for the sheepmeat industry; if it is to progress along the pathway to a Saleable Meat Yield Pricing model then the system of pricing, assessing & grading must have absolute confidence. Industry participants were engaged to source as much information as possible on the process, pricing system and transparency of carcase grading.

## **6. Competitive barriers to entry and expansion**

The barriers to entry in the processing sector were identified, including addressing economies of scale in processing plants, capital costs as barriers to entry, fluctuating supply favouring fewer plants and the extent to which automation technologies favour large plants.

## **7. Structural differences**

The study analysed structural differences in the sheepmeat industry across the regions of Australia. This provides an understanding of the links and functional integration between production systems and regions on the one hand, and downstream processing and value-adding on the other.

Specifically:

- Cost and value analysis of the sheepmeat value chain; covering production, processing, transport and distribution;
- Structure-Conduct-Performance (SCP) and Transaction Cost Economics (TCE) frameworks were used to analyse the sheepmeat value chain, and structural differences across Australia's various sheepmeat markets. The SCP and TCE methodologies address questions of how markets perform, why they perform as they do, and what might be the consequences of alternative patterns of structure and conduct.

## 2 Review of previous studies

There have been two significant investigations into the Australian Red Meat Industry which were deemed as relevant to the Sheepmeat industry and prompted this investigation. These reports have been reviewed to form part of the desktop analysis of this investigation:

- i. Cattle & Beef Market Study – ACCC 3/2017
- ii. Assessment of Price Transparency in the Beef Supply Chain – MLA 3/2015

### 2.1 Cattle and Beef Market Study- ACCC 2017

The Australian Competition and Consumer Commission market study into the cattle and beef industry in Australia was conducted on the back of competition and consumer issues in the sector that raised concerns of market efficiency and efficacy. Key elements of the investigation were anticompetitive behaviour at saleyards, misuse of buyer power, unfair distribution of profits in the supply chain, consolidation in the processing sector, as stated in the report.

Several separate investigations by the ACCC could not find evidence to prove that anti-competitive behaviour had been conducted by processor collusion or consolidation in the processing sector. However, the Beef market study was able to highlight several issues that risked damaging transparency of price reporting and carcass grading, and concerns about conduct affecting the competitiveness of saleyard auctions.

Concerns were also raised in this report about the competitiveness of market structures in the Australian industry, which are likely mirrored in the Sheepmeat sector. In particular, were issues of market concentration and buyer power being favourable to the profitability of processors. Circumstances were evidenced of processors with stronger than usual bargaining power relative to producers who were faced with higher costs, discounted carcass prices and difficult trading conditions. The report also recognised the concern that aggregation and consolidation in processing sector could substantially lessen competition.

The report also highlighted that conflicts of interest regularly arise in saleyard transactions from situations where buyers or agents transact on behalf of multiple parties. Many producers were found to be unaware when these activities were occurring and left at a competitive disadvantage.

Market structure and competition dynamics in the sheepmeat sector are influenced by similar factors to those in the beef sector. However, consolidation in the processing sector may not necessarily cause a shift in power away from producers towards processors as is often feared. This concept will be further discussed later in this report.

The ACCC determined that cattle prices are not sufficiently transparent to provide useful signals for producers. They identified that significant gaps in reporting exist, specifically being the prices for paddock sales and OTH and saleyard transactions being inconsistently reported. This lack of transparency weakens price signals that guide production decisions and may create information asymmetries between industry participants. Direct sales prices are rarely reported and prices for OTH transactions only reflect prices offered to producers, rather than the prices paid. These issues are not specific to the beef sector but, as the analyses provided in this report identifies, are widely recognised to exist in the sheep sector.

Another issue highlighted was the grading of cattle. Existing audit systems do not give producers faith in the integrity of the process nor is there an industry wide standard for dispute resolution. This

is a concern considering the importance of this information in determining prices received by producers. This issue also exists in the sheepmeat processing system. However, the extent of issues with carcase grading is considered much more significant in the sheepmeat sector because, unlike the cattle market, sheep are not weighed at the saleyard and there is limited scope for the flow of information back to the producer with regards to grading and carcase value.

Along with the issues and concerns found in the ACCC study that were marked for further investigation, the report concluded that a focus on improving transparency across the supply chain would have significant benefits to the sector.

The following recommendations made by this inquiry are a selection that would likely also be of benefit to the sheepmeat industry:

- Data collection and reporting should be expanded to cover prices paid for:
  - a. Direct sales
  - b. OTH sales, noting that some processors pay prices over and above those quoted on their price grids
  - c. Stock sold to the live export market
- Introduction of objective carcase measurement technology
- Data produced from objective carcase measurements should be shared for the benefit of the industry
- The red meat advisory council should develop a uniform and independent complaints and dispute resolution process
- The carcase grading and auditing system should be strengthened by:
  - a. Increased communication and education about the process by AUS-MEAT and processors.
  - b. Increasing the number of random AUS-MEAT audits of grading results and standard trim.
  - c. Publication of audit results relating to grading and standard trim.
- Saleyards, commission buyers, auctioneers and agents should provide MLA with information that enables regular standardised market reports for each reported saleyard.

Upon initial review of the beef industry situation and report, it is suspected that further consistencies will be identified as key items and relevant issues by stakeholders across the Red Meat Industry (both sheep and cattle).

## 2.2 Assessment of Price Transparency in the Beef Supply Chain MLA 2015

The Cattle Council of Australia requested an assessment of the options to increase price transparency in the beef supply chain which was conducted by Meat & Livestock Australia. The project aimed to assess whether a lack of price transparency was evident in the beef supply chain and, if so identify points in the supply chain where greater price transparency is required and suggest potential options in terms of increasing transparency.

The report advised that a single approach solution would not be effective in rectifying issues around transparency considering the information gaps are present both horizontally and vertically along the supply chain. The study reviewed policy and processes implemented in the US cattle market to

address issues of transparency alike those identified in Australia. Mandatory price reporting was implemented and deemed beneficial to producers though the review acknowledges that a clean transfer of the US system would not be possible in Australia due to the complexity of our production system. However, some aspects could be implemented to improve price discovery that would have marginal benefits.

The report outlined six potential options to increase transparency in Australia. These include:

- Mandatory price reporting system
- Voluntary price reporting system
- Carcase cut out report
- On-line board including final OTH carcase selling price
- Enhanced MLA and commercial market reporting and intelligence services
- other feasible, mechanisms including a detailed map of the beef supply and value chain with volumes of transactions and regional factors, including live export.

Small industry benefits could be achieved by improving the identified issues through two possible pathways. Either improved price information over a period of time gives rise to an Australian futures market for cattle or beef. Or better price information, in combination with other initiatives to instil confidence in payment systems, results in move towards value based selling/marketing.



### 3 The Australian sheepmeat industry

This section of the report provides background information of the sheepmeat industry and an overview of the functions of the sheepmeat market which provides context for further developments in this report.

#### 3.1 Background

The sheepmeat industry is integral to Australia's agricultural identity and economic throughput. The off-farm value of the sheepmeat industry was estimated at approximately \$5.23 billion to the national economy in 2016-17 (Meat & Livestock Australia, 2017). The industry's largest market by value is from domestic expenditure, but it is also reliant on a strong position in numerous international export markets. Figure 1 summarises the value of sheepmeat products as they flow through the supply chain. In total, the industry accounts for approximately 6% of the gross value of agricultural production and 4% of agricultural export income. Not only is it significant to our nation financially but it is an important attribute to the Australian lifestyle, contributing to our international image and nations story.

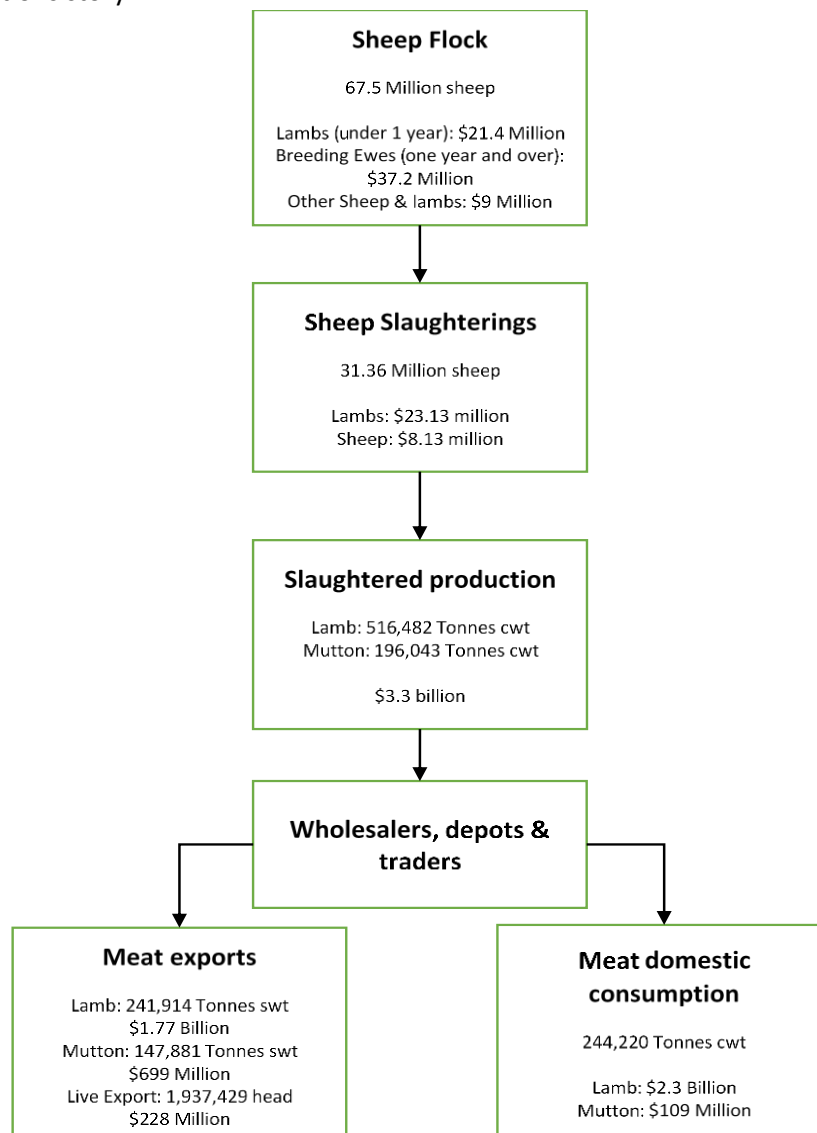


Figure 1. Product flows in sheepmeat marketing chain based on 2015-16 year (MLA estimates, DAWR, Australian Bureau of Statistics, 2016)

Perceptions of the sheepmeat industry have transitioned considerably since the 1980s. Limited market opportunities, poor quality and low prices characterised the early market and focus was aligned to other agricultural commodities. Historically, sheepmeat production was a common by-product activity of Merino sheep wool enterprises. It was often paired with other enterprises such as grain production or mixed enterprise farms in the Sheep-wheat belt zone. However, the industry underwent a momentous change with deregulation of wool prices in the 1980's and collapse of the Wool Reserve Price Scheme in 1991. These events, resulting in low wool prices and significant numbers leaving the industry, drove a shift from production of mutton as a by-product of the wool industry toward a focus on quality lamb production. This trend is reflected in supply, notably in the early 2000s where lamb slaughter rose to overtake sheep slaughter. Through strategic planning, development and industry research and investment, a high value, thriving industry has continued to build. Reduction in trade barriers and tariff rates, improvements in freight and coordinated marketing initiatives have been crucial in driving this growth.

The sheepmeat industry currently accounts for 32% of all businesses with agricultural activity. The number of farms producing lambs for slaughter has increased since the 1990s, along with the gross value of lamb production in aggregate on a per farm basis. In 2015-16 there were 31,136 agricultural businesses with reported sheep and lambs (Australian Bureau of Statistics, 2016). Majority of industry operators are small and medium-sized family businesses with less than 500 slaughter lambs (Table 1), and while these make up more than 54% of producers, they only contribute 19% of production.

**Table 1. Distribution of farms by lamb numbers sold, Australia 2015-16 (Ashton, et al., 2016)**

<b>Number of lambs sold</b>	<b>Average number of producers (no.)</b>	<b>Share of producers (%)</b>	<b>Share of slaughter lambs sold (%)</b>	<b>Share of lamb value of production (%)</b>
<b>Less than 200 lambs</b>	5700	23	4	3
<b>200 to 500 lambs</b>	7600	31	15	14
<b>500 to 2,000 lambs</b>	9800	40	52	52
<b>2,000 to 4,000 lambs</b>	1300	5	19	20
<b>More than 4,000 lambs</b>	300	1	10	11
<b>All broadacre farms selling lambs</b>	24700	100	100	100

As with most Australian agriculture industries, the top 20% of producers by size contribute the lion's share of numbers, in the case of slaughter lambs the top 20% contributes 54% of production. Approximately 60.0% of industry participants do not employ any workers, relying only on owner-operators and their family to carry out labour functions (IBIS, 2017).

### 3.2 Sheepmeat production

Sheep production can be classified into several different flock operational models:

- **Self-replacing flocks** make up majority of the national flock and are characterised by breeding systems where the only movements in an individual operation are stud rams onto the property and cull for age rams and ewes and surplus young sheep (hoggets or lambs) off the property. These flocks have traditionally been Merino based; however, a strong trend is evolving based on the New Zealand prime lamb production model of using composite ewes. These flocks are using specific genetics to not only produce prime lambs for sale, but also a composite ewe lamb for self-replacement.
- **Wether based systems** exist where wethers represent more than 50% of opening and closing sheep numbers. In this system replacement wethers are purchased with CFA wethers sold.
- **Cross Bred systems** exist where cross bred ewes represent more than 30% of ewes mated. Replacement ewes are purchased with all young sheep sold as lambs (Hassall & Associates, 2006).

Many production systems are built on a combination of the above flock structures. Clear trends develop over time in response to short term changes in market demand and climate, as well as long term, reflecting industry change.

Prime lamb production in Australia is still considered to be predominantly ‘opportunity based’. That is, the majority of farming systems that produce lamb or sheep operate their system alongside alternative farming enterprises such as broadacre cropping. Thus, production of lambs is highly dependent on other agricultural markets and the returns from alternative uses of land and available feed. This is unlike the industry in New Zealand, where majority of agricultural enterprises producing sheepmeat do so as their primary enterprise.

It is noted that this appears to be changing; good returns from prime lambs and disenchantment with the wool industry is positioning the sheepmeat industry as the “first choice” of sheep producers. Figure 2 provides evidence of this, showing the decline in the percentage of merino wool as a proportion of total wool volumes (mainly crossbred types). The growth of specialist farm advisors aiding lamb producers is likely to continue this growing trend, while any future retracement of wool prices will also provide further momentum.

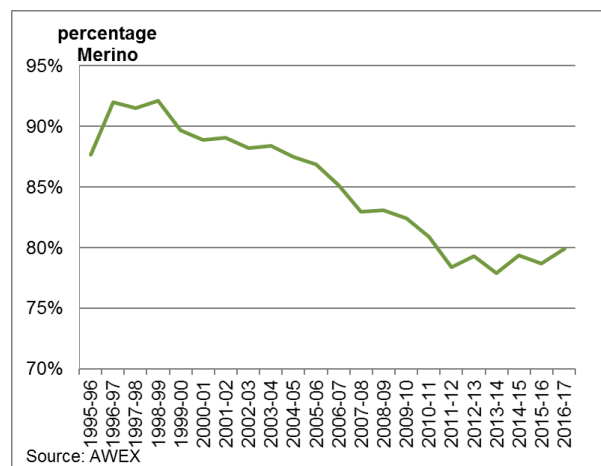


Figure 2. Percentage Merino of clean wool sales at auction

Various degrees of specialisation are present across the sheepmeat industry. The top-level producers, and by definition the larger producers who are growing their business, are now engaging

in highly advanced breeding and management practices, in many cases aided by advisors who have assisted them to identify the key drivers of success, and to assist in the measuring of progress at the farm level. These advisors perform a similar role to the agronomist in a cropping business.

*“.... we have seven years of production data and know exactly when the lambs will be ready sell and what weight they will be .....” M.C.*

In Victoria especially, this management is aided by the Electronic Identification (EID) tagging, with progressive producers adopting the electronic reading of tags to manage measurement data and directly import this into computer calculating and farm benchmarking programs. Producers in other states also identify that increased identification of individual sheep is the mechanism to drive new advancements, continuous improvement and innovation on farm. Implementation of the National Livestock Identification System (NLIS) has improved the tracking of livestock throughout the supply chain. All sheep are tagged with a Property Identification Code (PIC) before leaving their property which means they can be traced on sale. Mob based movements are also recorded in the NLIS database. This information has not only improved biosecurity for the industry but has provided useful information on characteristics of the Australian supply chain which is further analysed in this report.

Operations that focus on prime lamb production as their preliminary enterprise generally have management and marketing systems in place that drive productivity gains, generate profit and best meet the consumer requirements. Demographic of the flock, specifications of the individual animal traits and the marketing methods used are important technical aspects of the production system which determine the market segment and returns. There is an urgency by producers to maintain a model of continuous improvement, with a focus on fertility, lamb survivability, weight gain, feed conversion, optimal turnoff specifications and meeting market requirements.

A level of general frustration is held by these producers. They feel they are not seeing the same rate of innovation in the sales system as is evolving in their production system. Specifically, they are critical of the market signals conveyed around customer requirements. For some time, the message of specific fat and weight requirements have been conveyed via buyers and the wider industry, however at market level they see that in peak demand there is little evidence of any disadvantage for lambs that are clearly over-fat.

### 3.3 Marketing of sheep for meat products

Compared to other agricultural commodities, there is a wide variety of target market segments for sheepmeat in Australia. Driven by ongoing improvements in the processing and live export sectors, producers can have a degree of confidence in this respect that they will be able to access a market regardless of the type or quality of their turn off and regardless of any forced sales resulting from seasonal impact.

The market segments are divided, mainly on carcase characteristics and age of the animal, which vary according to the end consumers requirements (Figure 3 & Table 2). Producers are encouraged to understand the preferred specifications of their target markets to ensure best supply and returns. Marketing strategies must manage timing of operations, flock demographic, animal carcase traits, sale timing and selling method.

Carcase quality is a result of animal nutrition, genetic merit for muscle and leanness of the breeding flock and sex. The skins are also a valuable product of sheepmeat production, contributing anywhere

from 5 to 20% of the value paid for lambs and sheep (Australian Wool Innovation & Meat and Livestock Australia, 2011).

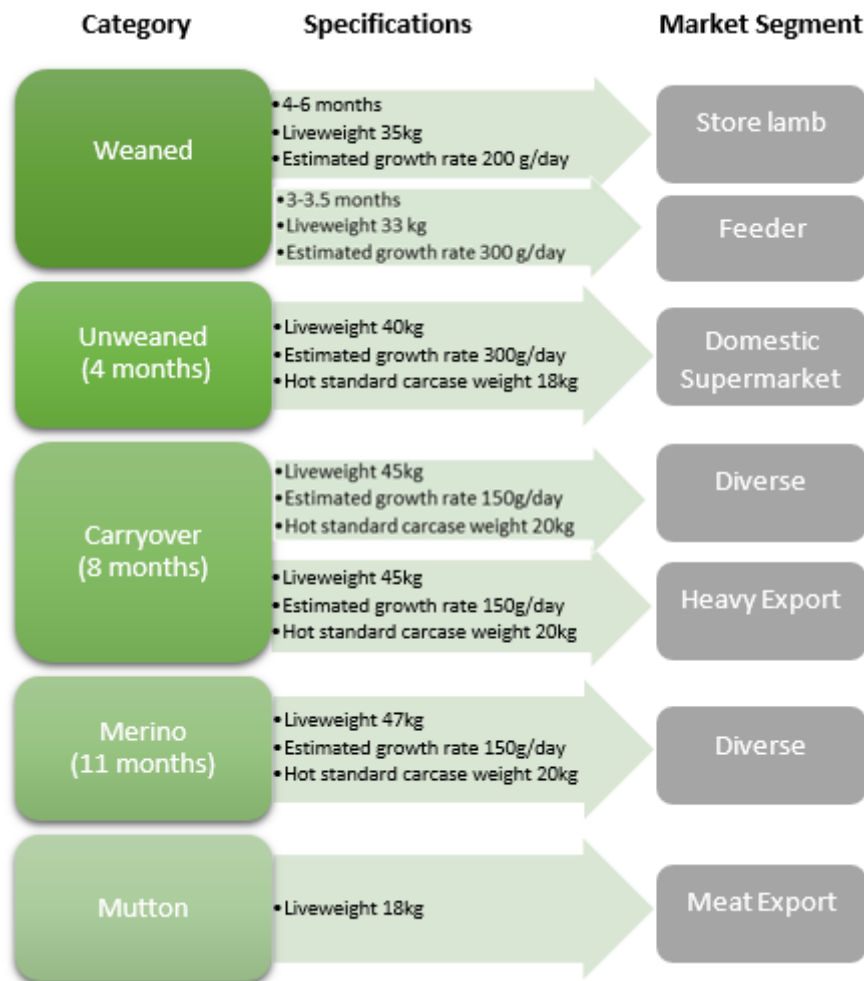


Figure 3. Key features of market categories (Australian Wool Innovation & Meat and Livestock Australia, 2011)

Table 2. Potential markets and specifications for sheepmeat (Australian Wool Innovation & Meat and Livestock Australia, 2011)

Market segment	Carcase weight (kg)	Preferred fat score	Comment
<b>Domestic lamb</b>			
Supermarket	18 – 22	2 and 3	Second Cross preferred
Food service	20 – 25	2 and 3	Lean and high yielding preferred
Other domestic	Variable	2 to 4	Range of lamb types depending of end user requirements
<b>Export lamb</b>			
Heavy Export	20 – 30	2 to 4	North America for prime cuts. Large volume markets for lower value cuts
Light Export	10-16	2	Majority Middle Eastern markets
'Haj' market	35 – 41 lwt		Market is for lambs (6-12 months). Entire male animals with long tail intact preferred.
<b>Domestic sheepmeat</b>			

Manufacturing	17- 21	1 to 3	For manufactured meat products
Retail			Hoggets sold through meat retailers
Food service			Cuts used in Asian and Middle Eastern style restaurants.
<b>Export sheepmeat</b>			
Heavy Export	20+	2 to 4	Heavy carcase weights preferred
Light Export	14-16	1 to 2	Lightweight, lean carcasses
Live Sheep	50+ lwt		Wethers more than 50 kg live weight

### 3.4 The Australian sheep flock

The National flock was estimated at 67,543,092 head in June 2016, with combined output to the sheepmeat and wool industries. As can be seen in Figure 4, the flock has been sitting at historically low levels since the record low of 2010. The suspension of the Wool Reserve Price Scheme in 1990 was the catalyst for the severe decline in sheep number between these two periods in time.

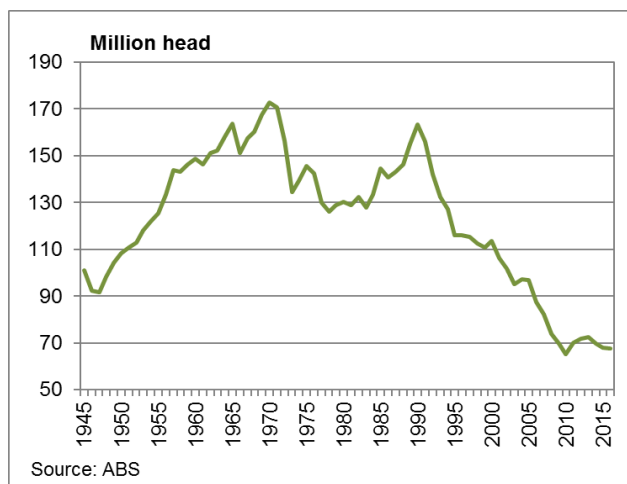


Figure 4. Australian Sheep flock

Figure 5 shows a rolling 12-month sheep offtake which is a combination of sheep sold to abattoirs, live export and the change in the lamb offtake expressed as a proportion of the flock size. The Australian flock size is overlaid on the graph and the shaded areas denote times when the sheep offtake is at low levels, consistent with an expansion in the flock. This sheep offtake is currently in expansionary phase. 2016-17 has been a period of low offtake, however, In July and August this year sheep offtake has again shot up to levels consistent with downward pressure on the flock size because of dry conditions on the East coast. A flock 'rebuild' is expected to occur over the next few years at slow pace, with real expansion dependent on seasonal conditions.

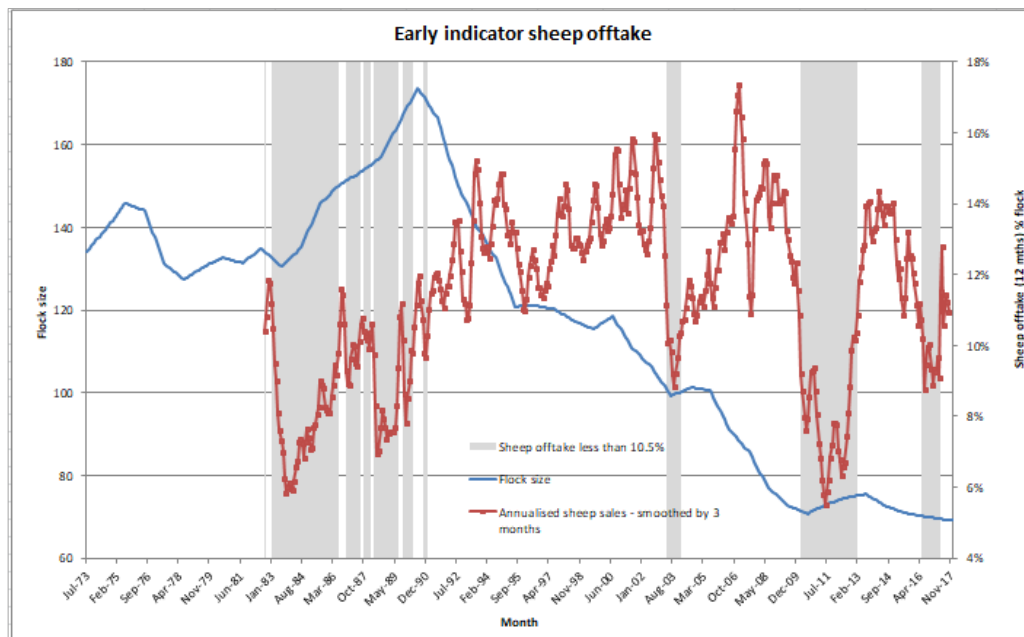


Figure 5. Sheep offtake over a rolling 12-month period since 1973 (Woods, 2017)

The distribution of the Australian flock has also transitioned over time. Sheep are mainly restricted to southern temperate regions of Australia, with production hubs in south-west Western Australian, south western Victoria and southern New South Wales. Western Australia's proportion of the total Australian flock has expanded, while the share of Queensland and New South Wales has been retracting for some time (Figure 6).

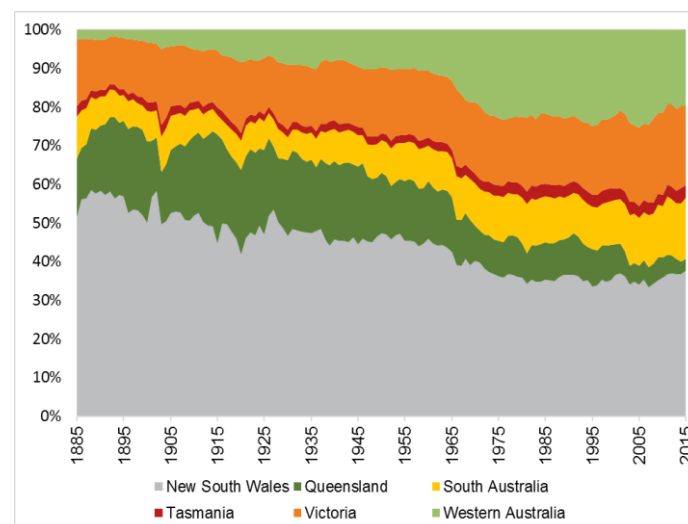


Figure 6. Percentage of total flock in each State

The breed structure of the flock is also a good reflection of how the sheepmeat industry has developed over time. The growing number of meat producers has seen an increase in the number of Merino ewes mated to non-Merino sires and rise in non-Merino breeds including dual purpose, shedding, pure meat and composites. In addition to this, over the last 15 years there has been a decline in the wether portion of the flock.



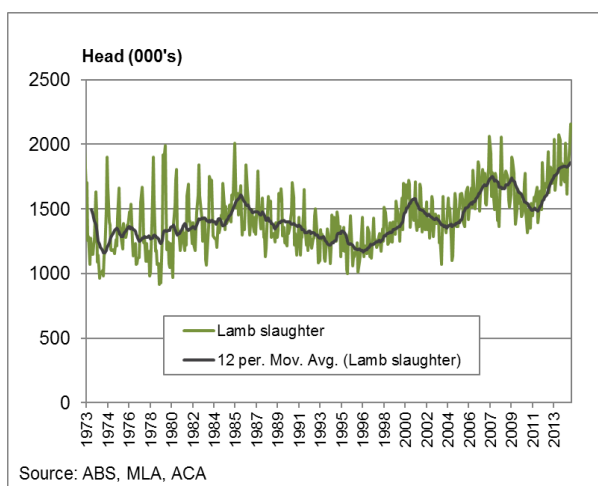
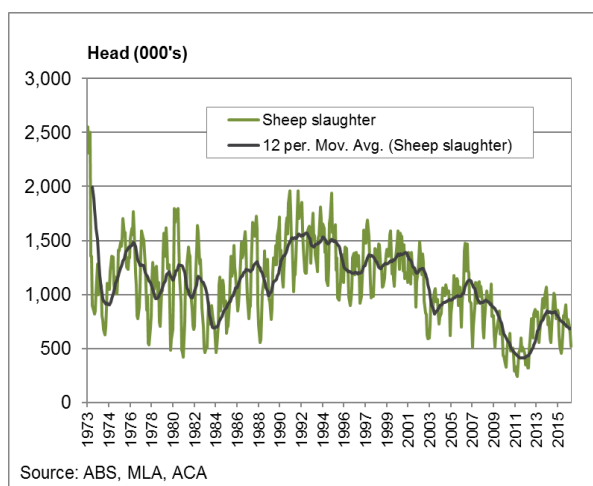
**Table 3. Lamb and sheep flock 15/16 (Australian Bureau of Statistics, 2016)**

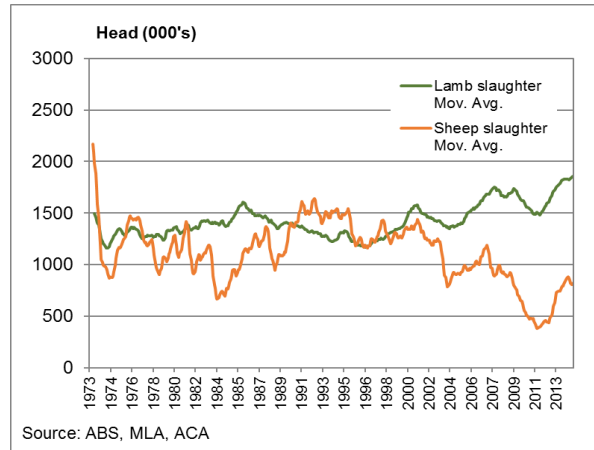
	Lambs (under 1 year)	Breeding ewes (1 year and over)	All other	Total sheep & lambs
<b>Australia</b>	21,358,699	37,181,862	9,002,530	67,543,092
<b>NSW</b>	8,229,800	14,603,848	3,134,545	25,968,194
<b>QLD</b>	354,785	1,043,074	416,923	1,814,782
<b>VIC</b>	3,881,242	7,284,324	1,899,177	13,064,743
<b>SA</b>	3,838,084	5,794,028	1,112,050	10,744,162
<b>WA</b>	4,503,058	7,260,852	2,097,832	13,861,742
<b>TAS</b>	543,629	1,168,434	332,337	2,044,400
<b>ACT</b>	8,102	27,303	9,665	45,069

### 3.5 Australia's domestic market for lamb and mutton

#### 3.5.1 Supply

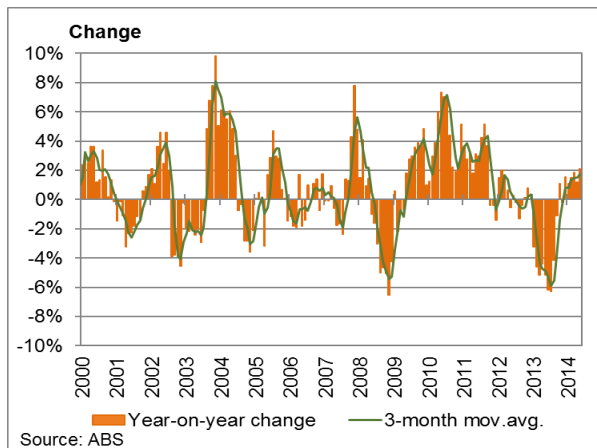
In the last three years, attractive prices have triggered an increase in lamb slaughter (Figure 7). Analysing the relative slaughter numbers for lamb and sheep pin-points a divergence beginning in 2000 (Figure 9). At this time, annual lamb slaughter rose above sheep slaughter and has remained significantly higher since. The decline in the sheep flock and the need to retain ewes to increase lamb supply has resulted in a decrease in the number of sheep available for slaughter.

**Figure 7. Australian monthly lamb slaughter****Figure 8. Australian monthly sheep slaughter**

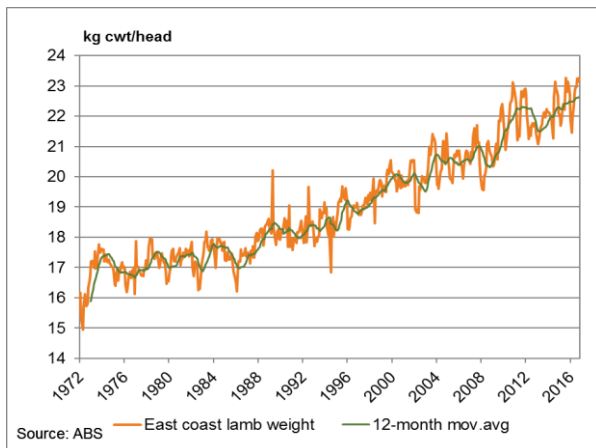


**Figure 9. Average slaughter of lamb and sheep**

Slaughter levels alone are not the only characteristic of production in the sheepmeat market that should be used to indicate industry health. Average carcase weights are also exposed to seasonality trends, due to high dependence on climate, feed availability and grain prices. Figure 10 shows the variability of average lamb carcase weights that can be experienced year on year subject to seasonality. An investigation of the difference between slaughter and average carcase weight, can provide a good indication of the performance of lamb and sheep producers over time. As such, a decline in slaughter coupled with an increase in average carcase weights can indicate greater productivity.



**Figure 10. Year on year monthly change in lamb carcase**

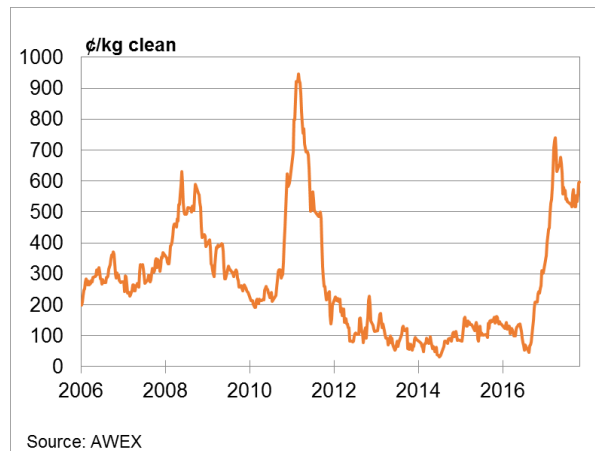


**Figure 11. Long term East Coast lamb carcase weights**

The yield per animal has been steadily rising since the 1980s (Australian Bureau of Statistics, 2016). As can be seen in Figure 11, the average carcase weight for east coast lambs is seasonally changeable, but reflects a marked increase in productivity over time. This trend is in line with the growing focus on production of prime lamb as the sheep industry has shifted away from its focus on Merino wool production.

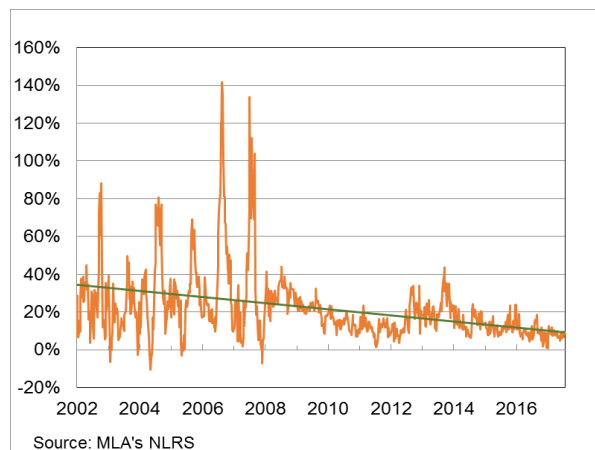
Criticism for the Australian sheep industry has centered on the disadvantage to sheepmeat productivity that has occurred from the domination of Merino breeds. Standard carcase attributes of the Merino are not seen as favorably for meat production as cross-breeds, with the Merino selection focused generally on wool traits. There has been substantial investment to research and development which have improved the genetics, breeding, feed conversion ratio and flock management of Australian sheep breeds used in meat enterprises (particularly prime lamb). In recent times, we are also seeing a greater focus on meat traits in Merino models; this is in response

to improved returns for sheepmeat sales. As shown in Figure 12, fine wool premiums since 2000 have been disappointing (with the exception of 2011 and the last 12 months), this has resulted in a more holistic approach to breeding Merino sheep with a greater emphasis on meat traits.



**Figure 12. Fine wool premiums 18 vs 21 MPG**

Further contributing to this move in breeding focus, the long-term discount for Merino lamb when compared to trade lamb prices has been declining (Figure 13). This is likely for two reasons. Firstly, the increasing demand for lamb has driven buyers onto Merino lambs, and secondly this increased focus has encouraged Merino breeders to invest in producing lambs suitable for slaughter.



**Figure 13. Long term trade lamb to merino lamb spread**

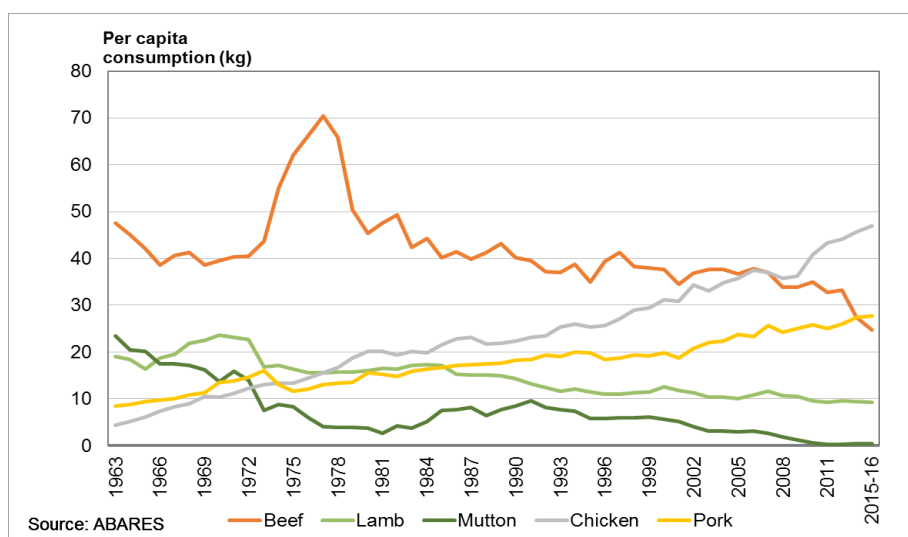
Sheep and lamb production attributes to approximately 24% of total red meat produced in Australia in 2016 (Table 4). The tonnes of lamb meat produced has increased since 2012, while mutton has experienced greater fluctuation. Considering the greater volatility in sheep slaughter (Figure 8) this is unsurprising.

**Table 4. Tonnes of meat production Australia calendar year (Australian Bureau of Statistics, 2017)**

Meat	2012	2013	2014	2015	2016
<b>Beef</b>	2,113,131	2,318,700	2,553,805	2,513,899	2,10,0851
<b>Veal</b>	38,900	40,363	41,345	32,920	24,202
<b>Lamb</b>	443,492	469,893	486,465	508,570	515,950
<b>Mutton</b>	139,232	216,637	233,992	201,920	169,868
<b>Pigs</b>	351,901	360,742	362,950	373,494	386,094
<b>Total</b>	3,088,668	3,408,348	3,680,571	3,632,818	3,198,981

### 3.5.2 Demand

Over the last 50 years, Australia's meat consumption pattern has changed significantly between the meat types. This can be related to a change in consumer taste as well as some supply side regulations such as trade restrictions and change in meat classifications. In 2015-16 Australia's total domestic consumption of lamb was 227,790 tonnes cwt (ABS, DAWR & MLA estimates). As such we are the third largest consumers of sheepmeat in the world with 9.5kg per capita consumption in 2015-16 (Figure 14).

**Figure 14. Per capita consumption of meat in Australia, five meat types, 1962- 2016**

However, consumption of sheepmeat faces challenges from social factors associated with production and consumption practices, including environmental consciousness, animal welfare concerns, health and nutrition awareness, religion and increasing competition from pork and chicken (Meat & Livestock Australia, 2017). The retail prices of all five meat types has steadily increased over the last 50 years while beef, lamb and mutton prices increased at faster rates than the prices increase of chicken and pork.

In terms of market share, chicken and pork have increased their share by 3 and 2 times respectively in the last 50 years, at the expense of beef, lamb and mutton. Widening price spreads between red meat and cheaper proteins (poultry and pork) have been the driving cause. The price spread between retail beef and lamb meat is significantly more volatile year on year than that of poultry and lamb (Figure 15 & Figure 16). Considering poultry prices have remained quite stable since 2000, the rising price of lamb has widened the gap between the two meats. So, while lamb, mutton and beef are more readily interchanged based on price at the supermarket, the trend towards consumption of cheaper protein meats (chicken and pork) over beef and sheepmeat reflect a changing demand largely based on the longer term widening price gap.

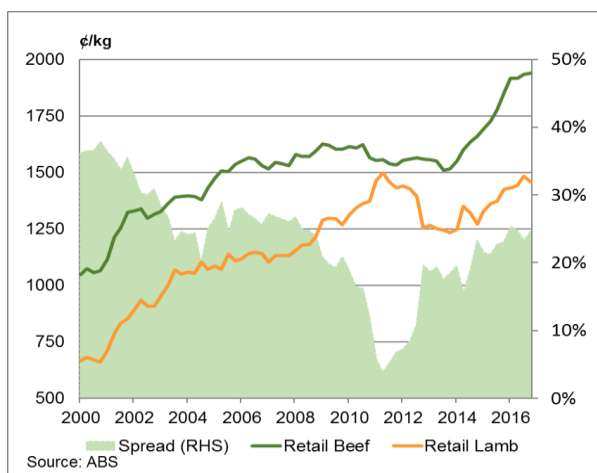


Figure 15. Retail price spread of beef and lamb

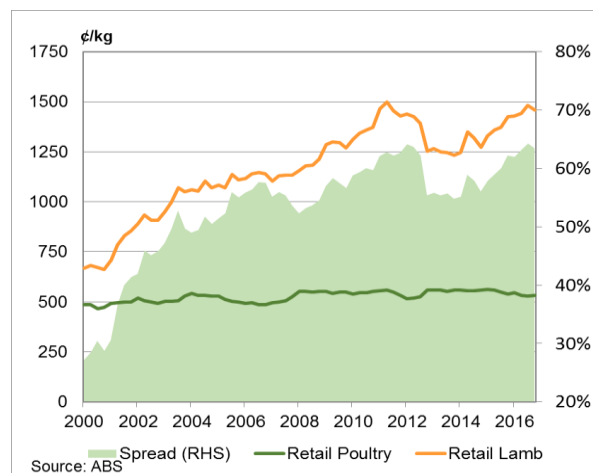


Figure 16. Retail price spread of poultry and lamb

Table 5 compares the growth rate of retail price and consumption in four major meat types, showing that the two factors are negatively correlated. Meats with a higher price growth rate have a lower consumption growth rate. This indicates that per capita consumption is reflecting overall retail price trends.

**Table 5. Average growth rates in consumption and prices of meat in Australia (1962- 2015)<sup>1</sup>**

Meat Type	Growth Rate	
	Consumption	Price
Beef	-0.63	5.59
Lamb	-1.17	5.87
Chicken	4.64	3.32
Pork	2.38	4.73

### 3.6 Australia's position in the global market

#### 3.6.1 Supply

On a global scale, behind China, Australia has the largest sheep population of any country, and is the largest exporter of sheepmeat. The combined volume of Australian and New Zealand exports accounts around 85% of global exports, meaning our supply has a major influence on the trade market. In 2015-16 Australia exported a total of 467,302 tonnes cwt of sheepmeat. There has been a steady rise in the volume of lamb exported over the last six years which has been a significant contributor to good price returns to the industry (Figure 17). This has stabilised total export volumes and compensated for mutton exports which have trended lower. Volatility in mutton exports can be attributed to seasonal conditions; drought is likely to facilitate a sell down of the flock including ewes and therefore an increase in mutton exports. The subsequent end to the drought will encourage a flock rebuild and consequently tightened supply for export (Figure 18). Recently this was evidenced in 2013-14 with sheep producers de-stocking because of the drought, with a subsequent flock rebuild commencing in 2015.

<sup>1</sup> Source: Meat & Livestock Australia historic retail price based on ABS Consumer price index data, ABARES Agricultural Commodity Statistics 2016 and Wong, et al., 2013. Note Chicken data from 1969-2015 only.

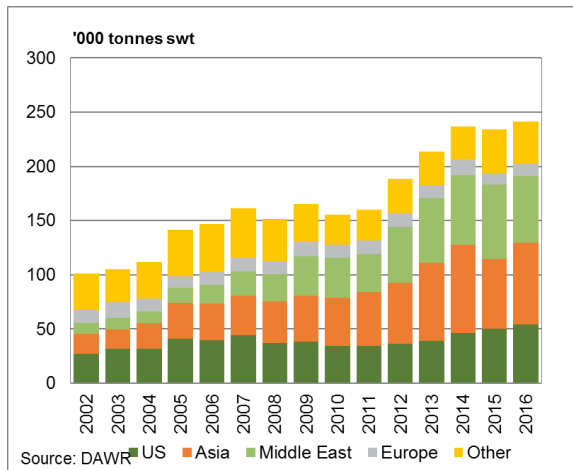


Figure 17. Australian Lamb exports

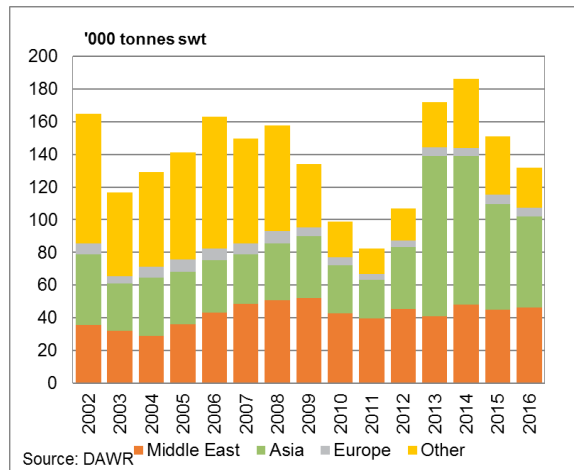


Figure 18. Australian Mutton exports

Live sheep export is an important market for Australia's sheepmeat industry, contributing \$217.5M of value in 2016 calendar year. Our reputation for quality animals, welfare standards and strict requirements have led to Australia's ranking as the second largest exporter of live sheep<sup>1</sup>. The major market for Australia's live sheep is the Middle East. Kuwait, Qatar and UAE are the largest customers, with demand for live animals stemming from their low production capacity, desire for 'fresh' meat and religious requirements on processing (Australian Bureau of Statistics). Live trade has faced many challenges in recent years, often causing disruptions to supply at times. Numbers have been in steady decline post 2001, and 2008/09 marks the recent step down in live export of sheep (Figure 19).

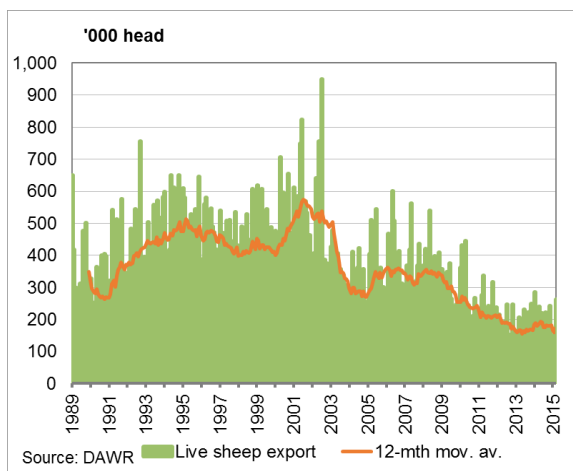


Figure 19. Australian live sheep exports total

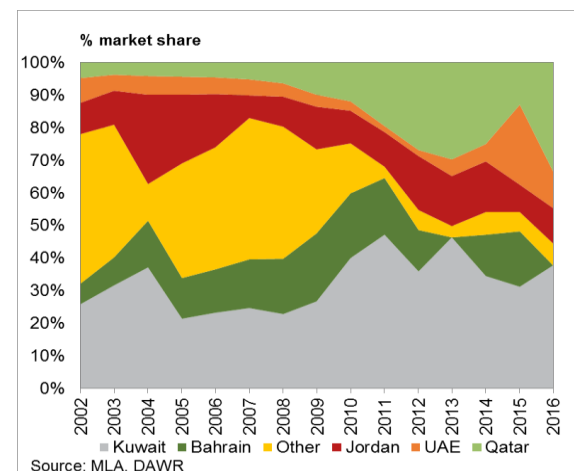


Figure 20. Total Live sheep exports market share

### 3.6.2 Demand

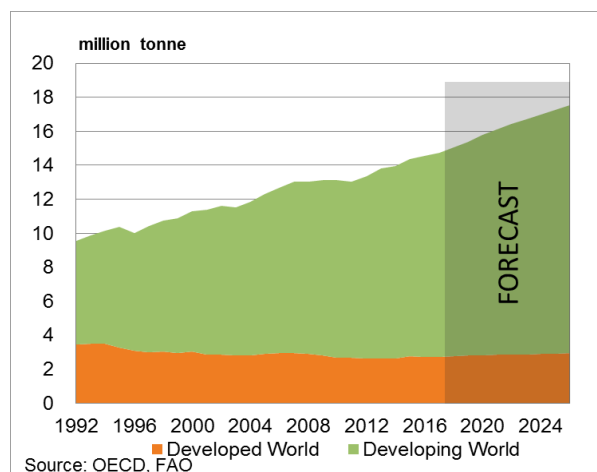
Global consumption of sheepmeat is determined by economic growth and consumer purchasing power, population and consumer income, consumer dietary preferences associated with history, culture and religion, competition from other proteins, trade policy and market access (Fletcher, et al., 2014). Increasingly, consumption of sheepmeat is being impacted by greater supply constraints and rising prices, more than any other competing proteins. Exports for Australian sheepmeat grew significantly between 2011 and 2014, but this has since eased, largely due to diminishing availability

<sup>1</sup> Source: FAOSTAT, based on average volumes between 2003-2013

of mutton supply. Total export demand is forecast to reach above 250,000 tonnes swt for lamb by 2020 (Meat & Livestock Australia, 2017). Evidence of strong emerging market growth through increasing size of middle class, higher disposable incomes and greater demand for western goods is providing opportunity for Australia to service this demand.

China and the USA are now Australia's largest export markets for frozen and chilled sheepmeat. However, this has not always been the case. Historically, most of Australia's consignments in these categories were destined for the Middle Eastern market. The United States is a small consumer of sheepmeat in terms of meat share in the average diet, however, demand for high quality cuts of lamb from Australia are increasing due to declining domestic production creating a growing dependence on imports. In contrast, China is the largest producer, consumer and net importer of sheepmeat in the world. A growing middle class is driving demand for higher quality cuts of meat, in addition to the relatively constant demand for mutton.

The Organisation for Economic Co-operation and Development (OECD) have projected that the major driver of agricultural commodity demand over the next 10 years will be population growth in developing countries (Figure 21). Australia's existing customers in Asia and the Middle East are already signalling demand increases for our sheepmeat and this is likely to continue further with their growing Middle class.



**Figure 21. Sheepmeat consumption: developed vs developing countries projection**

Bahrain has been a key driver for the recent increase in Middle Eastern demand for mutton as a cut to trade subsidies for lamb encouraged a shift to relatively cheaper mutton. Qatar is also quickly becoming one of Australia's top export customers, with shipments of live sheep increasing significantly in the last two years. Average monthly volumes for the first half of 2017 increased by 18.7% from 2016 levels and sit 200% above the equivalent 2015 trade flows.

Sheepmeat prices have gradually been gaining on world beef prices, and this trend is anticipated to continue over the next decade (Figure 22). Sheepmeat is now the second highest priced meat behind beef, and maintains a clear margin above pig meat.



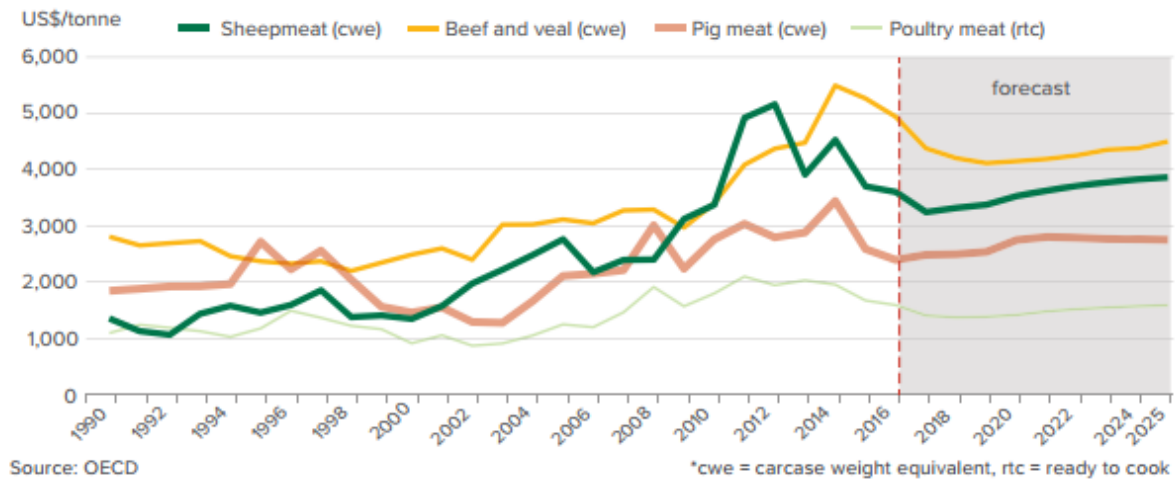


Figure 22. World meat prices (Meat & Livestock Australia, 2017)

When looking to global demand forecasting for Australian sheepmeat products it is important to consider our only major competitor, New Zealand. Generally, the sheepmeat industries in New Zealand and Australia are in sync, both markets being exposed to the same global influences but diverging in supply based on seasonal climate variances. However, in the last five years New Zealand has experienced unique challenges in isolation to Australia. Australia has approximately 33 times more arable land than New Zealand and as such competition for agricultural land is heightened in New Zealand.

The New Zealand dairy industry has been undergoing serious expansion since 2006. A trend away from sheep enterprises into dairy production, and more recently beef production, has been identified as a driving cause for reduced flock numbers. With the goal to lift NZ dairy export values to \$64 billion by 2025 this is expected to continue (Ballingall & Pambudi, 2017). The number of breeding ewes has been declining for most of the last decade which has had its effect on the lamb flock (Figure 23). With supply continuing to decline in New Zealand, and with global demand for sheepmeat predicted to at least be maintained or possibly increase, there is good opportunity for Australia to fill the gap in demand for the export market vacated by New Zealand.

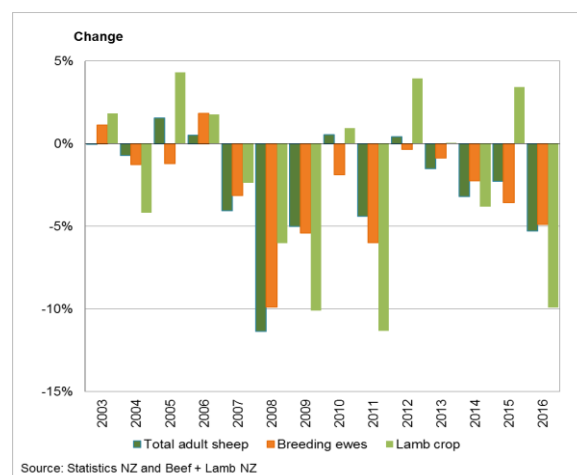


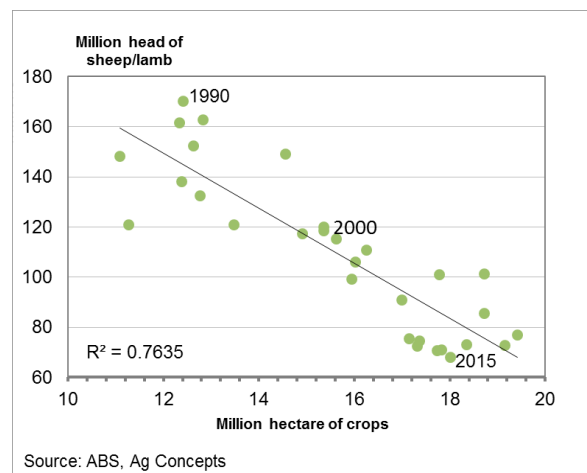
Figure 23. Annual change in NZ sheep and lamb numbers

### 3.7 Key factors that determine supply of lamb and sheep

A large domestic market in Australia helps to underpin prices, while recent growth in demand and future growth prospects are likely to be driven from offshore markets. That said, there are a number of challenges to profitable lamb production in Australia.

**Rising costs.** ABARES indicate that the cost of sheep production is averaged at 311 cents per kilogram liveweight and for slaughter lamb producers it is 298 cents per kilogram. Enterprises are subject to economies of scale whereby operating margins increase as the scale of slaughter lamb production increased, reflecting a decline in costs per unit relative to the value of sheepmeat (ABARES, 2017). Production costs include sheep purchases, shearing and crutching, finance costs, repairs and maintenance, feed, fertiliser, flock health costs, handling and selling costs, contractor wages, fuel and lubricants, administrative costs, transport and cartage, rates, land rent and pasture costs.

**Competing agricultural commodity value.** The fight for acres is best exemplified by the increase in sheep numbers directly correlating with the increase in crop production (Figure 24). In the major sheep states the negative correlation between crop area and flock size is strong. Until recent years, the area allocated to crops has continued to expand at the expense of sheep numbers. In recent years this trend has stabilised.



**Figure 24. Relationship between the number of sheep and lambs and the hectares of crops planted in Australia over time.**

The correlation between crop area and flock size differs between states (Table 16 in appendix). The relationship is strong for South and Western Australia, has weakened for New South Wales and does not exist for Queensland and Tasmania. This variation tells us that we need to investigate the drivers of flock size on a state basis rather than a national basis.

Given these correlations, expanding the flock size back up to around 180 million, where it was a decade ago, would require farm resources to be stripped from cropping industries. The ratio of the cost of sheep in relation to the cost of growing a crop was relatively stable from the mid-1970s to around 2000. From 2001 onwards this ratio has risen from 10-20% to 50-80%. Therefore, by historical standards, sheep are expensive in relation to the variable cost of growing a crop. This will slow any swing out of cropping into sheep despite the attractive sheep and wool prices compared to crop prices. This factor will not stop changes in enterprise mix but will act as a brake on change over time (Woods, 2014).

**Climate variability.** Lamb slaughter weights have increased considerably in the last 30 years but are exposed to changes in seasonal conditions. Year-on-year variances in rainfall conditions explain most of the yearly changes in average carcase weight and ultimately the premiums heavy lambs attract over light lambs (¢/kg cwt basis). Aside from the evident impact on total lamb meat production, yearly changes in average slaughter weights can also alter the price dynamics between lambs of different weight ranges. As a general rule, in years of falling average weights, the premiums paid for heavy lambs increase as supply of those categories diminishes. In years of increasing average weights, on the other hand, heavy lamb's premiums over lighter lambs shrink (Semmelroth, 2014).

When stock is held back from the market due to improved seasonal conditions and producers have the intention to rebuild their flocks, the industry may well exhibit surplus processing capacity. In drought times, when graziers want to destock quickly, the supply of stock can exceed abattoir ability to process them. As the season deteriorates the proportion of adult sheep sold off farm tends to rise. With improving conditions, the proportion of the flock sold off farm as adult sheep falls.

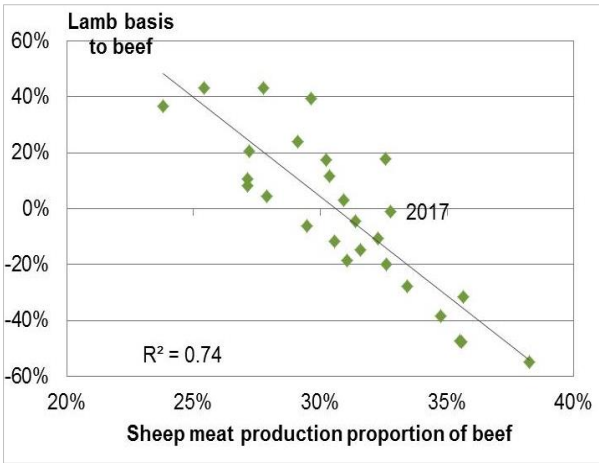
### 3.8 Key factors driving market price

The market prices for sheep and sheepmeat products along the supply chain are driven by many factors. Farmgate prices are influenced by domestic demand for sheep, the level of available supply, export prices, currency exchange rates, world trade and the strength of international demand.

Being the largest global exporter of lamb and sheepmeat, in Australia returns to the production and processing sector are strongly influenced by international demand. As such, local market prices are reflective of the following global factors:

- Foreign exchange rate
- Volatility
- Political events
- Trade policy and relations
- Seasonal conditions
- International population dynamics and consumer demand

As the meat markets are a series of interlinked markets, price and supply of competing meat products also has a strong impact on prices of sheep and lamb. As a replacement red meat, any movements in the beef sector influence market prices for the lamb industry. The relative price of trade lamb to beef prices is dependent on the volume of supply. Generally speaking, when the supply of sheep meat falls in relation to beef, the price of lamb and mutton will rise in relation to beef (Figure 25). This price based correlation further supports the importance of strategy synchronisation between the cattle and sheep industries.



**Figure 25. Relationship between the ratio of sheep meat to beef production in Australia and the trade lamb to trade setter price 1991 (Woods, 2017)**

## 4 The sheepmeat supply chain

In this section of the report the selling channels that exist in the sheepmeat supply chain are presented and an assessment made on their role and interaction in the current market environment. The role of sheepmeat advisor participants is also reviewed.

### 4.1 Selling structures

Alike to many other agricultural industries, the sheep supply chain is highly fragmented with an extensive number of operators. Numerous selling channels exist for the marketing of sheep and lamb where the buyer pays on an estimated or actual weight of carcase with a skin value added. The supply chain can be simple or complex depending on the producers marketing strategy and their region. Figure 26, shows the supply chain structure of the sheepmeat market. A livestock agent is usually hired to manage the sale process and advise their seller or buyer clients. Buyers of livestock include producers, salaried or commissioned buyers (representing customers), livestock agents (bidding on behalf of clients), meat processors, exporters and meat retailers.

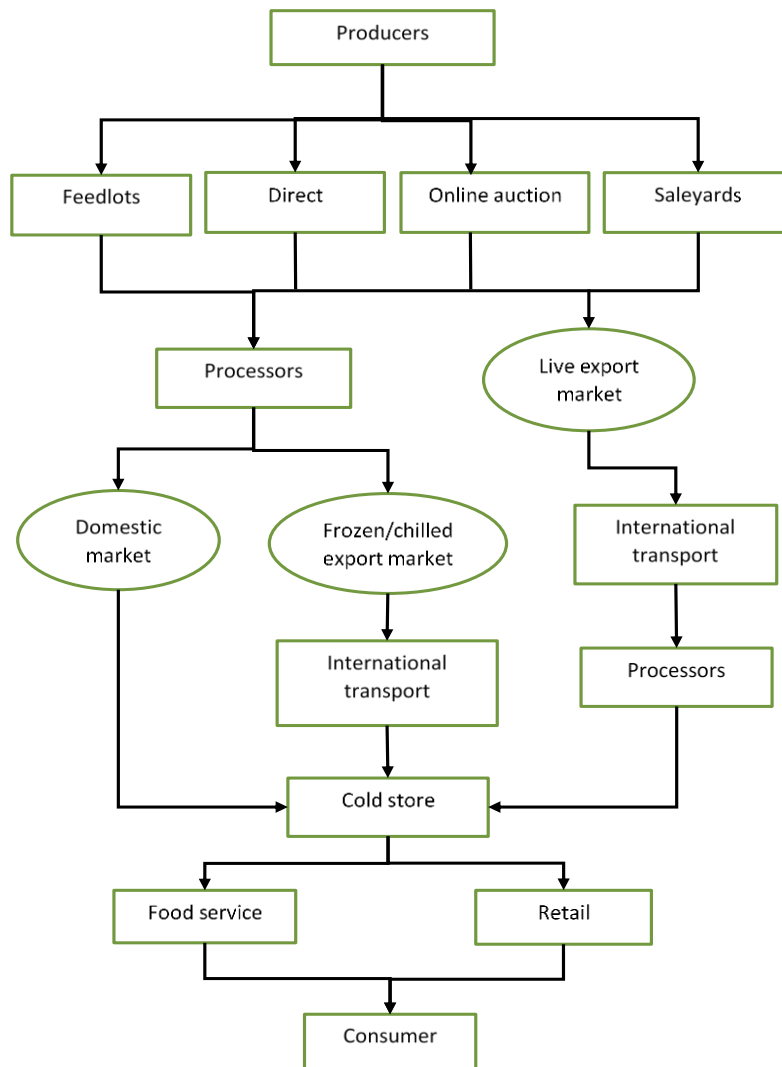


Figure 26. Sheepmeat supply chain structure

The selling systems that are available to producers and buyers include:

- Saleyard auction
- Paddock sales
- Over the hooks (OTH)
- Forward price contracts
- Online auctions
- New selling options

The selection of a sales channel will have a significant impact on the gross returns for producers and total buy price for purchasers. The following factors influence the sales channel used at any particular time by vendors, agents and buyers:

- Access to market/ location
- Sales experience and knowledge
- Cost of transaction
- Supply & demand
- Seasonal relatives
- Quantity and quality of stock
- Feedback availability
- Comparative pricing
- Handling time
- Disease
- Social value/relationships

#### 4.1.1 Saleyards

Saleyards in Australia are managed by both private businesses and local councils, and operate in a reasonably consistent manner. In June 2017, there were 54 saleyards facilitating the sale of sheep in Australia<sup>1</sup>. Sheep are sold on a \$/head basis in ascending price auctions run on predetermined days of the week. This selling system is considered the most competitive and is broadly perceived to reflect supply and demand factors adequately. Saleyard purchases represent only a proportion of slaughter space at an abattoir, with over-the-hooks (OTH) or other transaction methods being the primary channel. Processors may pay a premium or discount per kg for saleyard stock relative to the OTH prices in order to reach an optimal throughput number for a certain day or week.

Animals purchased in saleyards are combined and processed in batches. The National Livestock Identification System (NLIS) records movements of animals for traceability through the supply chain as biosecurity and health measures. As a result of the mingling of various individual producer mobs post sale, identity and information for individual sheep or producers is not retained.

The National Livestock Reporting Service (NLRS) reports on sales and prices of major saleyards. Saleyards attract a wide range of producer and buyer types, being attractive for the accessibility and

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<sup>1</sup> Based on MLA sheep saleyard survey reports with the support of the Australian Livestock Markets Association

the ability to sell all stock types and any lot sizes. This selling method is also valued for its social connectivity and ability for producers to benchmark against other operators.

Producers have the flexibility to “pass in” their sheep at auction when they do not have confidence that the sale price is reflective of the market. However, transactional costs associated with saleyard sales, including transportation of stock, saleyard dues and potentially stress induced loss of meat quality, can add a degree of inflexibility to this marketing strategy. The level of costs incurred are rarely recouped by returning the stock at a time when the auction market is better performing, effectively making producers price takers. Under these conditions, it can be considered a captured market and cause short term price variability for producers. Transactional costs of saleyard marketing encourage some sellers to look to alternative selling methods where these are reduced or nonexistent.

Saleyard dues are most commonly priced on a dollar per head basis. Yard dues were aggregated from 32 sheep saleyards across Australia, of which the average rate was 77 cents per head and ranged between 32 cents and \$1.90 per head of sheep. A few saleyard operations calculate the dues on a sliding scale based on the head of sheep processed or price, or alternatively as a percentage of the total sale price. Table 6 shows a sample of the saleyard dues charged for sale of sheep.

**Table 6. Saleyard dues and pricing structure (2017)**

<b>Saleyard</b>	<b>Pricing structure</b>	<b>Fee</b>
<b>Bendigo</b>	\$/head flat	\$0.73
<b>CTLX Carcoar</b>	\$/head varies with sale price	\$1.10 for \$51- \$100 or \$1.20 for >\$100
<b>Dubbo</b>	\$/head flat	\$0.85
<b>Griffith</b>	\$/head flat	\$1.05
<b>Hamilton</b>	\$/head flat	\$0.76
<b>Muchea</b>	\$/head flat	\$0.85
<b>Naracoorte</b>	\$/head flat	\$0.95
<b>Swan Hill</b>	% of sale price	1.1%
<b>Wagga Wagga</b>	\$/head varies with sale price	\$0.50 - \$1.44

In addition to these predetermined costs the effects of increased transport and handling on carcase quality can result in a dollar cost to producers, or at least the understanding by the buyer of these issues is reflected in the price paid. The period immediately prior to slaughter has the most significant effect on meat quality. Carcase weight is lost with increased time off feed before slaughter at the rate of about 3 – 4% after 24 hours, 6 – 7% after 48 hours and 8% after 72 hours (O'Halloran & McLeod, 2014). Combinations of stressful conditions appear to have a cumulative effect on muscle pH, as well as potential bruising of the carcase. It is therefore recommended pre-slaughter practices to minimize handling and transport where possible.

Saleyards are generally efficient, especially the larger saleyards. They provide a clearing model for all types of stock and provide competition for all lot sizes. They also provide an immediate supply of a range of stock for processors to purchase. Small producers with low numbers of stock for sale at any given time rely heavily on access to saleyards.



#### 4.1.2 Paddock sales

Paddock sales are an agreement between the producers and buyers where the exchange of stock and ownership occurs on property. It is suited to transactions with large-scale producers that can commit to sale of large quantities of sheep and who have a reputation for consistent quality. This selling method has the potential to reduce or eliminate some of the costs of selling, handling and transporting from the producer. However, the price is paid on dollars per head and lacks any pull from buyer competition.

Producers usually won't receive the benefits of an over-the-hooks system where carcase feedback and premiums are received. This selling model requires the seller to make their own enquiries regarding current prices. There are no published prices of paddock sales and this is seen as an area that needs to be expanded. Greater transparency of paddock sale pricing and information would assist in sellers making decision, and market analysis in general. Given these are private sale transactions, any contribution of price information would need to be permitted by both parties and a central platform for collection and reporting would require development.

#### 4.1.3 Over-the-hooks

Over-the-hooks (OTH) sales is a direct contract arrangement between the producer and/or agent and processor. This selling strategy requires the seller (or the agent) to make their own investigation to establish market prices. The lack of price transparency is a disadvantage to the seller.

Sales can be made on three different price systems:

- Cents/kg flat price with no penalties.
- Cents/kg price basis against a grid for an agreed specification of carcase weight and fat score. Premiums and discounts are applied based on carcase attributes and meeting specifications.
- Forward contracts based on price grid.

Prices from over-the-hooks sales are a truer reflection of the quality of the sheep supplied as all carcasses are weighed and graded and skins valued. Stock is supplied directly to the abattoir which reduces handling and stress of the animals. Handling procedures and agreements for over-the-hooks sales vary according to the processor and their accreditation.

There is a question over who assesses and oversees the quality of carcasses processed via the OTH model. In general producers are unaware of how carcasses are assessed including feedback on issues relating to damaged carcasses. The disadvantage in selling OTH can be the lack of competition and variation of carcase results between abattoirs (non AusMeat accredited). The OTH model can however reduce exposure to market volatility, and by negotiation secure access to kill-space.

#### 4.1.4 Forward contracts

Online trading forwards contracts are relatively new to the Australian sheepmeat industry. This hedging option allows producers to lock in future stock sales at an agreed price. Buyers of stock can secure their supply of suitable sheep and lambs which provides a level of risk management. There are also planning advantages for producers. Forward contracts are usually traded on a price grid based on the carcase value.

Forward contracts are available, however their offering by processors is inconsistent. Generally, they are for short term only (3 – 6 weeks), or offered by processors when they are trying to manage supply and delivery in predicted times of short supply. To this end they provide limited price risk management for the producer.

The issue of forward contracts, or specifically the lack of forward contracts, is a major concern to the industry. This is particularly so for producers who need to manage price risk and processors who are looking to manage supply risk. Producers have the perception that the only time forward contracts are offered is when supply is expected to be an issue. This acts to reduce the uptake of forward contracts, if supply is of concern it is likely to have a positive effect on the future price so the producer is dis-inclined to participate.

Producers in general would prefer on-going relationships with one or two processors. The view is that this would enhance the flow of carcase information, improve the ability to supply exacting quality, and provide the setting to develop models to manage or share price risk.

Without forward supply agreements producers are likely to continue to choose the best market option each year, so a processor considers providing performance feedback in this light- will the sheep and lambs return next year? If not, why should the processor supply performance feedback?

In other commodity markets, it is a futures market that provides the under-pinning of any forward market. It is the transparency, anonymity and novation of a futures market that attracts sufficient participants to provide the necessary liquidity and volume to allow any market participants to choose to hedge prices.

Forward contracts are currently available, in a limited way, and generally offered to enable processors to manage their supply requirements. Offering forward contracts can also provide an incentive for producers to increase their production during tight supply periods. However, processors don't wish to lock in a full forward price without having their meat output price secured, so forward prices when offered are at a conservative level and therefore not sufficiently attractive for producers to contract their lambs. Producers are often reluctant to forward contract for fear the market will go higher, even though contract prices may offer good returns.

The challenge with forward contracting has never been highlighted more than in early 2011, where processors forward contracted supply at almost \$2.00 above the market price at delivery. While the producers who took up the forward contracts were undoubtedly happy, the processors weren't, with the result being that they would likely be reluctant to offer similar forward contracts in the future. Had the market gone the other way, the processors would have been happy, with the producers feeling they were on the 'losing' end of the deal.

#### 4.1.5 Online auctions

Online web based sales are gaining popularity as a selling method for livestock. A sample of the lot for sale are assessed by an accredited assessor and purchased by description, based on either a live weight basis, over the hooks price or a per head basis. A reserve price is set which offers some security as a price floor for producers. However, this selling method is reliant on confidence in the accuracy of assessment which can be difficult to assure to satisfy some market players.

The advantage of online auctions is in the ability to source animals under competitive conditions on real market value without the physicality of saleyard auctions and associated transaction costs. AuctionsPlus is the dominant service provider for online livestock sales in Australia. Their system requires producers to use an agent to facilitate the sale so agent fees are still costed to producers.<sup>1</sup>

### 4.2 Selling structures of the live export market

Western Australia is by far the largest exporter of live sheep. Generally, these are predominately wethers, and increasingly, younger sheep.

Live sheep exporters generally purchase through agent networks, although at times producers may sell directly to the exporter.

Western Australia has two ports that are used for the export of live sheep in Geraldton and Fremantle. Live exports from time to time also depart from Adelaide in South Australia, and Portland in Victoria.

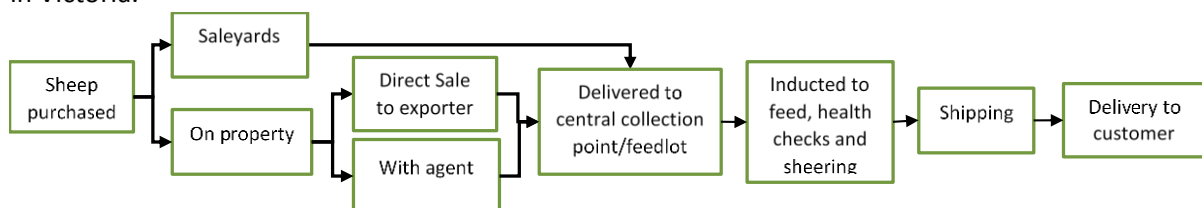


Figure 27. Expansion of the live export process from sale to customer

### 4.3 Market advisors

#### 4.3.1 Livestock advisors

Increasingly the influence of advisors is noted in the livestock industry. These advisors generally begin working with the producer to improve production and profit, including genetic selection, fertility management and animal health. This advice then moves into involvement in the marketing decisions as the business looks to apply the new technologies and approach implemented across the whole spectrum of the business.

Improvements and innovation at the producer level should be measured and reported. Reflection of farm management activities in carcase performance results would be of advantage to producers.

Increasingly these “new” entrants (advisors) to the sheep industry are frustrated that there is limited meaningful information available about the carcase, and that any information is not readily provided and basic.

*“...but again, there needs to be a commercial benefit to the processors providing the feedback. Processors would be more likely to do so if there were reliable commercial outcomes, but it costs*

<sup>1</sup> Further information of online auctions can be found in section 9.2

*money to generate and provide various levels of feedback, and there are no guarantees that the feedback provided will be used for on-farm improvement - and if it is, that the producer then could head off to another processor, meaning the initial provider misses out on the commercial benefits.”- AMIC*

Advisors are intruding into the traditional area of expertise usually supplied by the livestock agent, and as such are a competitor to the traditional livestock agent. They do however bring a new approach to the business, focusing on the key drivers of business profitability rather than just the turn-off returns or sale price of the lambs. While progressive agents are also supplying this modern marketing service, it is the advisors that are disrupting the traditional service model.

*“ .... 80 – 90% of lambs from my clients are traded OTH...” Advisor, Vic.*

As on-farm systems and practices improve, the logical next focus is on performance feedback on the lamb carcass. Clearly this directs sales to the over-the-hooks (OTH) method. Advisors are strong advocates of OTH sales, as the resultant opportunity to gain carcass information which can be fed back directly to the management reports provides both the producer and the advisor with a measure of business performance. This also provides the ability for the advisor to highlight where improvement has been achieved and areas for further focus.

The advisor has a different relationship with the producer compared to the traditional agent role; being involved from the selection of genetics through the production and management stage places the advisor in a unique relationship with the producer. Based on a broader involvement, the advisor is not challenged by the producer cultivating a direct relationship with the processor, in fact this is actively encouraged.

*“ ... the industry has no linkages, has a disjointed supply chain which removes the flow of information to drive producer improvements” N.S. Advisor*

The fact that generally only hot standard carcass weight (HSCW) and animal health feedback are available are an anathema to advisors who use any available science to assist their clients to improve. Their view is that hook-tracking, measurement for intra-muscular fat, meat eating quality, tenderness & juiciness should all be assessments that are provided as a matter of course given technology advancements in recent times.

#### 4.3.2 Livestock agents

Producers choosing to sell through saleyards, paddock sales and over-the-hooks usually engage a livestock agent to sell sheep on their behalf. Greater marketing opportunities are often available to agents as they have local market knowledge and more direct relationships for sale to processors or other farmers. Trust in the agents' capability and decisions is the foundation of the relationship with producers.

Regulation and licensing of livestock agents is unique to each state and territory. NSW and the ACT require operating licenses for agents but this is not a requirement in other states and territories. Commission and professional buyers also require a stock and station agent license through training in these states, with regulations governed by the Office of Fair Trading.

In contrast to advisors, a close relationship between the processor and producer has the potential to remove the role of the livestock agent. As producers with quality lambs grow their relationship with the buyer the question of the role of the agent emerges. It is noted that progressive livestock agents

are facilitating OTH sales, however to retain the client relationship it is still in the interest of the agent to not see too closer liaisons develop.

The traditional role in Australian agriculture of the livestock agent was to provide market information & advice, and to facilitate the sale. This included settling the sale and providing del credere insurance to guarantee payment.

With improved communication, market information is now widely available, supplied principally from MLA/NLRS, and increasingly from other private commercial sources. This challenges the livestock agent to remain relevant, especially when the major processors are prepared to engage directly with large and professional lamb suppliers to secure supply.

Placing further pressure on the traditional livestock agent relationship is the sales commission model. In general seller's commissions are between 4 % & 5.5%, with no significant difference between states. Some larger and more active producers can negotiate more favorable commission rates. This can reflect their ability to meet the strict quality standards and quantity demands that processors may have for direct sale contracts over-the-hooks which bypass the need for a selling agent. While the cost has remained constant as a percentage of revenue, the increased sheep and lamb price over the recent time has meant that the cost is now on the radar of producers. They see that when lambs were selling for \$80 selling costs applied by the agent was around \$4, however if lambs are today sold for \$160 commission is levied of \$8.

Agents report that the progressive (younger) producers are now questioning that value, especially if they have also engaged an advisor. The result is that many agents, especially those located around the major selling centres, are more likely to continue the traditional model of supporting the weekly auction. This sales method retains a clear delineation between buyer and seller, thereby protecting the agent/client relationship.

Indirectly, this approach by agents is counter-productive to the move towards carcase measurement and feedback which can only increase with greater numbers pushed via OTH sales and direct engagement with the processor.

#### 4.4 Changing nature of selling channels

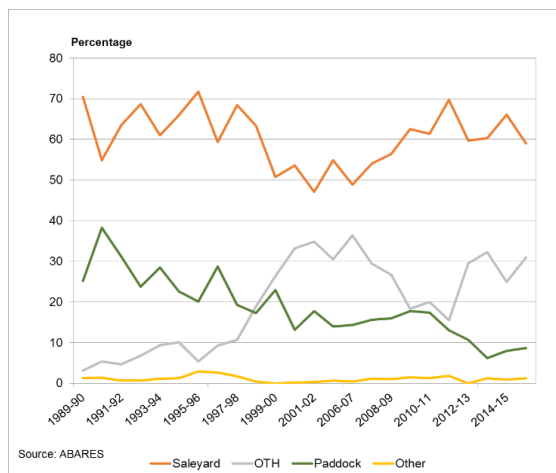
Producers and agents select the selling channel that they estimate will achieve the greatest returns on the stock. On the other hand, livestock buyers purchase their stock through the market channel where they believe they can obtain stock that meet their specifications for the lowest price. Buyers have greater flexibility as they do not bear the costs to freight the stock to saleyards regardless of the market activity on the day. Access to sales method, the sale process, market specifications and buyer preferences will influence their decisions.

Access to market is the preliminary determinant of the selling channel selected. Under times when the market is poor, particularly during droughts, sheep travel greater distances to market in pursuit of more sale and purchase opportunities and larger margins than opportunities nearby (Hassall & Associates, 2006). The distance producers are willing to move their sheep has been increasing over time as sheep flock numbers and processors decline, combined with an increase in the popularity of different sale mechanisms (online, and direct) greater transparency through bettering technology and favourable prices from travel. Figure 80 through Figure 85 in the appendix illustrate the

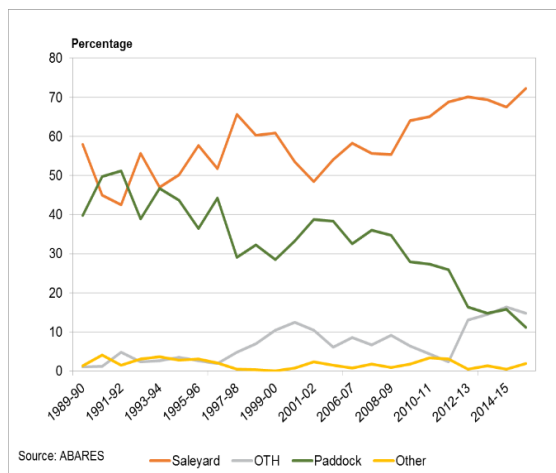
distribution of sheep saleyards in Australia, and the distribution of AusMeat accredited meatworks that facilitate sheep processing.<sup>1</sup>

In the mid to late nineties, the industry exhibited a strong preference for sales over-the-hooks in substitution of saleyard auctions. Buyers argued in favour of more accurate carcass assessment and condemnation for unfavourable specifications at the seller's risk. Market share of the various selling channels, as illustrated in Figure 28 and Figure 29, reflect preferences of buyers and sellers in response to industry changes<sup>2</sup>. The following trends are evident:

- Lambs and sheep sold in paddock have been declining steadily.
- Share of sheep sales by auction have been increasing but lamb has been slowly declining over time.
- Over the hooks sales method has increased in popularity for both lamb and sheep since 2011.



**Figure 28. Percentage share of lambs sold through various selling channels in Australia**



**Figure 29. Percentage share of sheep sold through various selling channels in Australia**

Changes to the livestock market and advancing technology have opened opportunities for producers to access different markets and use new methods. Online auctions and direct sales have increased in popularity. Such systems allow significant savings for producers in terms of cost and time and can reduce the risk of disease spread which is often a concern with saleyard selling.

Several key trends in the agriculture sector are leading to changing requirements and resources for local markets. Consolidation throughout the entire food supply chain is evident in a range of production sectors across Australia. Larger producers are becoming increasingly dominant, with small to medium sized operators feeling growing pressure to intensify in order to remain viable in the current tight commodity markets. It is well known that saleyards in Australia are rationalizing. Small saleyards are tending to close, while large regional sales, such as Dubbo, Carcoar, and Wagga Wagga, have expanded.

There is also an industry trend of consolidation of purchasers of livestock. Large processors such as JBS Australia and Thomas Foods own multiple abattoirs across Australia which make them large holders of market share in the processing sector. It is the producer perception that significant purchasing power is held by large retailers and processors who require consistent supply volumes

<sup>1</sup> Based on AusMeat defined accreditation listing, provided by Australian Meat Industry Council

<sup>2</sup> Source: ABARES farm survey results

and therefore often bypass small producers and traditional small market sales. Combined consolidation right through the sheepmeat supply chain is contributing to the growing favour for direct selling methods.

Continued consolidation is likely to occur and should be considered impartially. It will continue to assist processors to lower their cost of production on a per unit basis. Increased scale will enhance ongoing investment in R&D, and innovation will also benefit from larger businesses. For consolidation to lead to overall benefits for the industry it must balance improvements in efficiencies and market competition.

#### 4.5 Disruptions to consistent supply

For the processor, the major disruption to supply can be segregated into short and medium term.

**Short term.** The effects are generally caused by rain events. If there is a significant rain event in the lead up to a sale day, producers may decide not to participate. This can have an immediate impact on available stock for sale at the relevant markets.

**Medium term.** Again, this effect is weather related, specifically when areas of sheep producing country are affected by adverse seasonal conditions, then producers will destock and oversupply the market. A recent example is in the widespread drought that affected Eastern Australia (2012-2013).

This sell off in periods of dry is then compensated by producers restocking when the drought breaks. This has the effect of reducing supply while producers retain more female ewes and rebuild their flock.

#### 4.6 Share of price risk in the market

The relative risks of the buyer and the seller are not the same, and therefore not conducive with developing a consistent, transparent and active forward market. The producer has a price risk; they will be impacted if the price falls and more specifically if prices are below the production cost. Their supply is known and is therefore not a risk.

For the processor or buyer, price is not perceived as a risk requiring management, however, supply of the required grade and quality is their risk. Providing lambs are purchased at the market price of the day, the processor will extract their margin from operating efficiencies. However, the processor may forgo taking a margin in order to keep the operation running and ensure staffing levels and supply to customers is constant. Maintaining throughput is the key requirement. Should the processor offer a forward contract, in the absence of corresponding forward sales of meat they take on the price risk, that is if the market falls they will have expensive product compared to their competitors.

The dichotomy is that while both buyer and seller have risk, they are vastly different types of risks. It is also unreasonable to expect the buyer, in the case of sheepmeat it is generally the processor, to take on the grower price risk. Conversely, it is unreasonable to expect a producer to commit supply without a price attached.



## 5 Carcase pricing and grading

This report inquired into the assessment of live sheep, carcase grading by processors, pricing and feedback availability. This report was unable to engage with most processors; there was a reluctance to supply information and data during the commissioning of the report. The opinion expressed in this report is principally a result of “best efforts” to aggregate information and to test grower and agent experience.

While the information collected was predominately from the producer side of the equation, it was not always clear whether the decisions on carcase quality and ultimately trimming of the carcase was made by an employee of the processor or an independent assessor.

Further consultation with processors is required for the completion of this milestone, and to date engagement from participants has not been sufficient to allow a meaningful review. It is recommended that further efforts should be made to attempt to gain processor engagement to gain a clear picture on the process for grading carcasses.

There is a need to standardize the assessments between processors. This will require industry consultation and should be a collaborative approach facilitated by MLA. The publication of this information would also go a long way to explaining how carcasses are finally priced, as well as increasing the knowledge of producers around this subject.

The following key components should be addressed:

- Detailed review of processor grading methods, including who is responsible.
- Outline of the processes in place to ensure accuracy of assessment and grading.
- Implications of the current assessment system on pricing.

Several processors did provide valuable insights and advice, and demonstrated an industry view of collaboration. However, there was expressed scepticism that any direct benefit would flow to the processor because of this research project. In fact, concern was expressed that an investigation of this type runs the risk of bringing unwanted attention.

### 5.1 Live assessment at saleyards

#### 5.1.1 Overview

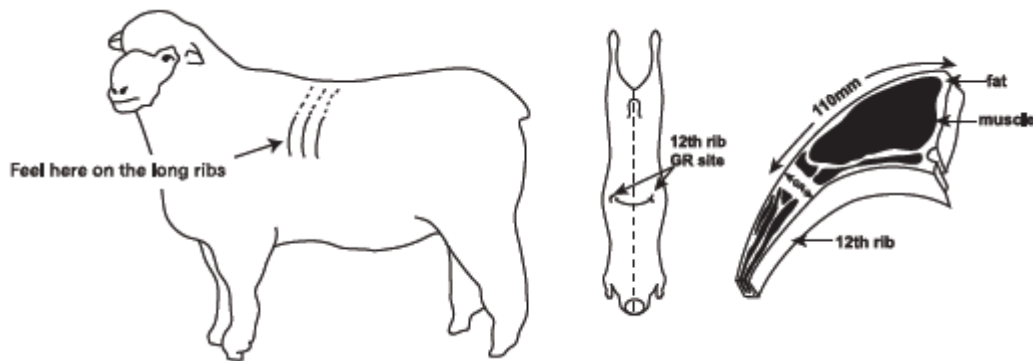
Live sheep are priced at saleyard auctions based on the value of the stock as judged by the buyer, considering supply and demand factors. Buyers estimate the carcase weight and skin value of a pen of animals before making a bid in dollars per head. Unlike cattle, sheep are generally not weighed for sale at saleyard auctions. Live sheep assessment accuracy is therefore key to all auction trading activity.

Fat score is used for live animal assessment of slaughter animals. The score is based on the tissue thickness at the GR site, which gives an indication of the overall fatness (and yield) of the whole carcase (Table 7)(Figure 30). Buyers receive daily reports from the meatworks regarding their purchases, and make adjustments across the season to continue the purchase of sheep and lambs as per the processor specification.



**Table 7. MLA fat scoring guide (Australian Wool Innovation & Meat and Livestock Australia, 2011)**

Fat Score	1	2	3	4	5
GR Tissue depth (mm)	0 to 5 mm Not eligible for MSA	6 to 10 mm	11 to 15 mm	16 to 20 mm	20 mm and over
12 <sup>th</sup> long rib	Individual ribs felt easily. Cannot feel any tissue over the ribs	Individual ribs easily felt but some tissue present	Individual ribs can still be felt. Can feel more tissue over the rib.	Can only just feel ribs. There is fluid movement of tissue	Ribs cannot be felt. Tissue movement very fluid

**Figure 30. Location of the GR on live sheep and meat carcass (Australian Wool Innovation & Meat and Livestock Australia, 2011)**

The National Livestock Reporting Service (NLRS) has its Livestock Market Officer's (LMO) make a manual palpation of the sheep or lamb before estimating carcass weight. This estimate is made on the overall live weight of the stock in the saleyards and by applying a dressing percentage to them to help convert into carcass weight.

Estimated carcass weight= live weight x dressing percentage.

Carcass price= (\$/head value - \$/skin value) / carcass weight

Skin evaluation is also a component of live assessment of sheep and lambs that determines the carcass weight price. An estimate of the skin value is made on the quality of skin and current supply. Traits such as wool length, quality, vegetable matter, skin weight, markings and disease determine are used to judge the skin quality. The live animals skin value is assessed against market values that are issued in a weekly report prepared by MLA's Market Information, based on a survey to establish the value of skin trades for the week (Meat & Livestock Australia, 2017).

### 5.1.2 Reporting

Data for the National Livestock Reporting Service is collected by Livestock Market Officers at saleyard auctions. They are required to collect on no less than 70% of livestock offered in each market to ensure statistically accurate sample of data for each sale reported. As such, LMO's must have superior livestock assessment skills.

Collaboration exists between saleyard buyers and the MLA LMO's with feedback exchanged on the estimated carcass weight of sheep and lambs, as well as estimated skin values. This exchange assists in the provision of accurate LMO reporting, and provides confidence that the estimates of carcass weight and skin values reflect market reality.

Sheep assessments capture the pen number, description, fat score, carcass weight and skin values averaged across the pen. This data is keyed into a reporting program which then generates a sales

report detailing price ranges and correctly weighted averages. The carcase weight prices generated are based on estimations from the livestock marketing officers and not correlated with abattoir figures. A detailed analysis following data entry is also part of the LMO's duties. This market comment on the physical auction for which the LMO is responsible, explains price trends, competition levels, quality of the yarding and other factors impacting the market. Such detail is critical for ensuring the provision of accurate market signals to industry (Gregor, 2001). MLA have set guidelines in place to ensure the consistency of these reports between assessors, however the comments and assessments are still subjective to the individual assessor's interpretation. MLA require LMO's to undergo regular performance testing, particularly on the accuracy and comprehensive nature of their assessments, to minimise error in reporting.

On an annual basis livestock assessors are required to demonstrate their competency through the following:

1. Seasonal work place assessments. 70% of the selected stock must be accurately assessed.
2. Annual abattoir assessment training day. 70% of the selected stock must be accurately assessed
3. Question and answer assessment- A series of multiple choice and question answer scenarios provided through MLA's "the FEEDlot".

An accurate assessment of livestock carcase weight and fat score determines the assessor's competency. This is defined as an estimate within 1.6kg (+/-) of actual carcase weight and 1 score (+/-) of the actual fat score. Meat & Livestock Australia use a Quality Management System (QMS) to help maintain the quality and integrity of the data provided and ensure customer and stakeholder requirements are satisfied.

### 5.1.3 Transparency of saleyard reporting

The NLRS provides a market reporting service at saleyards that provides confidence to users of NLRS reports.

Transparency exists in the auction market as a result of:

1. The independence of the LMO's
2. The consistency of reporting – usually it is the same LMO reporting each week for each saleyard
3. The 70% requirement of sales to be reported at each saleyard

## 5.2 Over-the-hooks carcase grading

### 5.2.1 Overview

For over-the-hooks sales, carcase grading determines the value of the animal by reference to the processors price grid. It is most commonly based on Fat Score and a dressed-out carcase weight with premiums and discounts on the price grid. Procedures and specifications used to make carcase weight measurement can be distinct to the processor. They will also vary according to the carcase trim used and whether the processor trades on hot or cold weight. In most cases, the hot carcase is weighed at the end of a chain or a \$3 deduction is made to account for cold weight.

The following provides an example of the process of sheep and lamb assessment when supplied via OTH contracts by one of the major Australian processors:

'Payment is transacted on a dollar per kilogram of HSCW as per the price grid. Sheep and lamb carcasses are assessed on HSCW and Fat Score. HSCW is measured by means of an AusMeat accredited and verified electronic scale (kg carcase weight) and Fat Score (1 to 5)

determined by palpation and GR knife verification. HSCW are determined by electronic scale (AusMeat accredited and Fat Score checked and verified to ensure accuracy and consistency). Fat Score 1 and 5 are further verified personally with the onsite AusMeat officers for accuracy and consistency. Dentition is verified by Ausmeat accredited assessors.'

Meat Standards Australia (MSA) is the current eating quality grading program for sheepmeat. All participants in the chain for MSA products must be registered and licences to the MSA trademark and certified to the standards. 18 processors across Australia are licensed for MSA which accounts for more than 5.4 million lambs per annum. In 2015-16 this accounted for 17% of the kill. Producers that meet the requirements consign sheep through the MSA system through MSA abattoirs and saleyards.

For abattoirs that hold a Meat Standards Australia (MSA) license, carcase grading is conducted by a MSA accredited grader. The graders are trained, monitored and their computerised records correlated by AusMeat to track performance remotely. Carcases are classified into categories based on qualities such as fat depth and colour, muscle shape and size and detrimental characteristics.

Non-compliance with market specifications costs the lamb industry in excess of an estimated \$8.4 million per annum in just the domestic supermarket carcase and Middle Eastern market, according to 2014 research funded by MLA (Meat & Livestock Australia, 2017). These findings suggested that between 30-65% of Australian lambs do not meet market specifications for carcase. This includes value lost due to:

- downgrades (discounts) for out of specification carcases
- carcase condemned
- loss of meat and offal value due to animal health and disease

The perceived reasons for the substantial quantity of non-compliant carcases in the system is a lack of feedback available to producers, minimal use of feedback when available and lack of incentive to meet market and processor specifications.

This report has identified a lack of clarity around the process applied to OTH carcase sales, specifically from the perspective of the producer. The suspicion reported by producers towards processors in general, is in no small part a result of the lack of transparency surrounding carcase pricing and grading methods.

Therefore, it is identified that this is an area for further inquiry. Any improvement or transparency around carcase grading and pricing will produce three important results:

- a) Confidence in the carcase pricing and grading system
- b) Greater understanding of carcase qualities from the perspective of the processor
- c) Improved quality of delivery by producers as a result

### 5.2.2 Pricing

The payment model for lamb and sheep by processors is not consistent across the industry. Most Australian processors pay on a carcase weight and manual palpation fat score. These characteristics are indicative of carcase conformation and lean meat yield which is incorporated in the payment grid.

Price grids are used by processors to determine the value of each carcase based on the dressed-out carcase weight (Cwt) and fat score. The pricing grid is based on seasonal market conditions, supply, demand and competitor pricing, and is adjusted as and when influenced by these market conditions.

Premiums and discounts are applied to the price according to how the specifications of the individual fit the desired traits for the end target market. Value of the by-products of the animal, including skins and offal, is usually incorporated in the price agreed by the buyer. Separate prices can however be paid. Skin value can be included in the price per kilogram, paid separately or tendered on the producer's behalf by the processor. Where a separate price for skins is to be paid, that price or its means of determination would usually be confirmed when the agreement is made between the vendor and the buyer (AUS-MEAT Ltd, 2006). Any identified animal health issues such as bruising, pleurisy, infected glands, dog bites etc. are deducted from the final payable price, unlike sales via sale yard auctions where this risk and cost is born by the buyer.

Often there is a level of confusion with both producers and agents in understanding whether the carcass weight paid for includes the removal of channel fat and kidneys, or not, which is dependent on the type of export market (Craig, 2016). The variation of grid offers creates a level of confusion in the OTH market place. While the difficulty to implement is accepted, more uniform grid price offers between processors would assist producers to identify and evaluate price offers.

*"I know everything about the performance & production of my lambs except the price!" M. C. Producer*

### 5.2.3 Price reporting

MLA publish state based indicators on a weekly basis by surveying regional processors. This process of survey relies on accurate and regular reporting by processors. Being a voluntary collection system, processors are not obliged to provide price information and there is little incentive for them to do so. MLA collect the information from a list of processors centrally either through price grids where available or quotes over the phone. 11 Plants in total across (NSW, VIC, SA & WA) regularly provide price information. MLA have noted that they experience little difficulty in receiving consistent information from sheep processors.

To formulate the OTH state indicators, quotes received by contributors are averaged. Given quotes may be attributed to multiple plants or a proportion of a single plants kill, no weightings can be applied in calculating the indicator. Due to this shortcoming, minimum and maximum quotes are also reported each week to provide further price information. For the purpose of analysing trends and market strength, the indicators are sufficient.

Producers and advisors report a lack of confidence in the veracity of OTH quotes on the basis that:

1. They are acquired via survey
2. It is unclear if all trades are included or weighted by lot size
3. Their experience is that daily OTH prices vary widely depending on supply.

Several processors have also raised their desire for additional breakdown of the data currently supplied in OTH reports.

There is a lack of publicly available OTH prices, with intending sellers unable to visit a centralised portal to identify the most suitable offers at any time. This creates a tension between sellers (and their agents) and the buyers, with suspicion and rumour pervading in the absence of data.

### 5.2.4 Transparency of price reporting

It is recognised by the authors of this report that the publishing of prices in a more transparent mode is not to the buyer's advantage, and therefore resistance to this concept should be expected. However, this should be balanced against the benefit to the producer. In the current situation

market information regarding OTH pricing is not readily available, transparent or easily analysed. Improvement will contribute to assist in marketing decisions for producers.

**Table 8. Comparison of level of transparency in price reporting of different sales methods**

Sales method	Collection	Transparency	Able to be analysed?
<b>Saleyards</b>	Independent reporting	Accumulated via LMO	Readily
<b>On-line livestock sales</b>	Reported	Published	No
<b>OTH</b>	Reported via survey	Direct via PIC	No

Barriers to transparent system:

- Too many independent data sources- concern over duplication
- Data ownership status unclear
- Abattoirs not willing to provide information
- Paper based system
- Legal restrictions on NLIS
- Privacy

A barrier to greater provision and publication of price information by processors is “commercial in confidence”. To address this legitimate concern published prices should continue to be anonymised and reflect only aggregated state based indicators.

This issue of OTH price information is considered important to producers; OTH price information lacks the transparency of saleyard data publication.

#### 5.2.5 Carcase feedback

Carcase performance feedback is principally to the benefit of the producer, with little identified short-term value to the processor. Traditionally, abattoirs have not provided detailed carcase feedback to suppliers, any feedback at the request of the producer is generally mob based and detailed only to average weight/ fat data. To provide any assessment and price calculation of sheep and lambs sold OTH, each carcass must be weighed and assessed. It is reasonable to assume that all processors purchasing via the OTH method have this data.

Frequently producers bemoan the averaging carcase reports; they would prefer a very targeted grid and price calculation relating back to individual carcase. While processors agree that this is the future, progress has been slow with programs such as DEXA slow to achieve implementation. Hook-tracking and the carcase feedback including eating quality assessment is seen by producers as essential to provide data for further improvements in the industry at the producer and production level.

*“... We receive little feedback on the carcass, even a comment that the lambs were fine and perfectly met the requirements would assist in building knowledge...”*, NS, Advisor

AusMeat OTH feedback for lambs records the number of lambs, average hot carcase weight and fat class. For ‘other sheep’ group data recordings of the number of sheep and average hot carcase weight are recorded and available to producers. This feedback is only available to the owner of the animals at the time of sale to the processor. As a result, when sheep are traded to a feedlot before processing, the link, and therefore right to feedback, is lost to the breeder. It is up to the feedlot to then return the information through to the producer if arranged.

Again, it is recognised that this additional impost on processors does not provide direct value to them. In some way, the longer-term view should be promoted. That is by providing this information producers will be better able to meet supply obligations, and a resulting improved quality of stock supplied will contribute to plant efficiency. Some of the larger operators recognise the value of this information to producers and so provide detailed carcase feedback reports, encourage discussion of these reports and even offer site visits.

Access to carcase feedback data is in the process of being streamlined to producers, being made available through Meat & Livestock Australia's 'Livestock Data Link (LDL)' online portal in addition to information on carcase performance. LDL was launched to facilitate information flow through the meat supply chain from processors to their suppliers. The objective is to assist in optimising supply chain performance through turning complex information into simple decision making via analysis and reporting. The carcase compliance module allows users to analyse carcase performance in terms of compliance to the grid they have consigned against. It enables individual animal slaughter data to be retrieved, identifying non-compliant carcasses, non-compliance issues and associated cost of these traits. Suppliers may also benchmark carcase performance against average regional, state or national performance data. Information benefits are also gained upstream as processors can compare and benchmark supplier performance across traits that reflect their market specifications.

There are 26 processing facilities monitoring either carcase attributes or sheep production health and welfare conditions for the program. However, not all processors release carcase compliance data to producers. Early feedback from suppliers receiving carcase data has been positive, with users seeing the benefits from additional information which they can use to enhance decision making and operation strategy. However, for the LDL to provide significant commercial outcomes for the red meat industry the tool must be expanded across the industry to other processors. It is expected that as the commercial benefits of such a system become more evident in time, more individual processors will seek involvement.

#### 5.2.6 Transparency of carcase feedback

The industry provides mixed messages on this subject of carcass reporting. On the one hand, this transfer of information is considered vital in building the knowledge needed to continue improvement in the process, however these reports are not always supplied to a sufficient level of detail, and not always understood by the producer.

Compounding this is the practice of limited information supplied to explain outlier results such as carcass downgrades or trimming. Sheep & lamb producers account many stories where carcass performance results were well below their expectation. This was reported to occur principally in carcass weight results including trimmed product. In the absence of individual and verifiable data, it is not possible that this issue can be adequately addressed. It therefore contributes to suspicion and scepticism especially in the event of a perceived "poor" result for OTH sales.

The lack of transparency is a consistent theme espoused by sheepmeat producers across all states; any improvement in transparency will contribute to an improved confidence and only enhance the ability of producers to engage and assess the OTH sales process. There is an extremely poor understanding of the trimming process by producers, and equally little information provided by processors to assist in this understanding. This contributes to a suspicion that trimming is arbitrary and not in the interests of the producer.

Information flow between producers and processors has begun to improve with the implementation of programs funded by industry which aim to increase transparency and reduce gaps in the supply



chain. The National Sheep Health Monitoring Program was implemented to monitor the factors that reduce farm profit through productivity losses or increase meat processing wastage. Endemic diseases, other illnesses, dog bites and grass seeds are among the reported animal conditions that are collected at 14 domestic and export processing plants and held in a national database (the Endemic Disease Information System). This data is used to report on the overall health of the Australian sheep flock, which in turn is valuable information for use by governments, industry groups and processors as a driver for improving animal health status, market access, profitability, investment into research and development and productivity in the value chain by improving quality. Feedback of data collected is available directly to producers in NSW, QLD, VIC and SA from state coordinators.

Access to this information is a significant step in industry transparency and will prove a valuable knowledge tool for producers and processors to manage their operation. Both will benefit from harnessing the opportunity to reduce product non-compliance, with significant flow on effects lifting meatworks productivity and reducing costs.

### 5.3 Improving the current system

**EID.** The Electronic Identification (EID) of sheep currently mandated in Victoria will contribute to improved collection and delivery of individual carcass data. The forward-thinking producer is embracing electronic identification as an essential tool in the genetic and on-farm constant improvement model to monitor and measure a wide range of key performance production data. While the principle purpose is to improve bio-security protection, the use of EID technology to improve on farm performance is well established by progressive producers not only in Victoria (Department of Economic Development, Jobs, Transport and Resources, 2017) but also in other states. This concept is directly connected with the objective of data flowing from the carcass assessment to the farm.

Further roll-out of EID tagging in other states would increase the slaughter number of sheep that can be individually recorded, and positively contribute to increased data flow. Expansion of MLA's Livestock Data Link program offers a solution to this traditional limitation of information.

**Carcase grading.** New technologies are emerging which are designed to objectively measure carcass characteristics during processing. Dual Energy X-Ray Absorptiometry (DEXA) technology has been endorsed by the industry and planning for its implementation in Australian AUS-MEAT processing plants is underway. This technology provides a single scientific measurement of lean meat yield of carcasses by measuring meat, fat and bone, providing benefits to all levels of the supply chain. Carcass grading will be accurately categorised and matched to customer specifications using this technology which will optimise operating efficiency and profitability for processors. It will also allow more detailed feedback for producers on their animals' carcass measurements which will in turn allow more informed farm management decisions with particular vitality is genetics and feed.

**Trimming.** An improvement would be for the industry to conduct an information campaign to firstly explain the trimming process, and secondly to highlight this practice and identify models for improved outcomes. It is contended that producers would welcome this information as a valuable contribution to their efforts of continuous improvement. This project should be delivered as an "industry initiative", with a hands-on approach at meatworks.

To further improve this understanding and confidence, regular audits should be performed, including "spot" checks by industry appointed assessors. This will include the construction of a

report that provides confidence to the producer's that there is oversight of all treatments to the carcass prior to final assessment. It should also identify any shortcomings observed, and recommend improvements including training. It is noted that this would be an additional cost to the industry.

**Carcass feedback.** A cooperative project with AMIC to qualify the benefit to processors from an improved and more consistent product should be promoted, with a focus on identifying the compound benefit when integrated with the new innovations of automation and robotics. At a basic level, the impact on labour efficiency and "chain speed" should be quantified to advance the feedback delivery to producers. Engagement with processors should include explanation of the value the producer will receive, with the objective of improved communication and cooperation.

**Dispute Resolution.** Consideration should be given to a cooperative approach with processors to develop a standardised dispute resolution process which can be applied across the industry<sup>1</sup>. This would reference AusMeat as the provider of "Technical Assistance", however should include equal representatives representing buyers & sellers. Publication and promotion of an industry sponsored Dispute Resolution Process throughout the industry, as well as a report on any settled disputes, will instil further confidence as well as provide "fair and reasonable" outcomes where disputes are reported.

**Public display of OTH pricing.** Further inquiry with processors to research the prospect of public display of price bids should also be considered. This could take the form of a bid/offer board, similar to CLEAR Grain<sup>2</sup> or Wool Trade<sup>3</sup>, where anonymised bids and offers are posted.

It is accepted that sheepmeat buyers will in general resist publishing price bids, however greater visibility of market prices will in the long run contribute to a stronger industry. As outlined previously, greater transparency will improve seller/buyer engagement. It is noted that full transparency currently exists at saleyards, where buyer bids are public and prices recorded and reported. It should be the aim to replicate this transparency for OTH prices providing valuable information to the industry.

**OTH Price reporting.** In relation to the survey method, an improvement would be for processors to supply all prices paid for the week, including the size of each lot. This would assist in the calculation of weighted price indicators in a similar model to the saleyard indicators. It would also contribute better data providing the ability to test the veracity of the prices supplied via agents and others who have sold in the week.

This report concludes that mandatory reporting is not considered a possibility in the Australian sheepmeat industry; however, SPA & MLA should engage with AMIC with the aim of developing a positive argument to prosecute the case for meat processors publicly posting OTH & forward prices. This should include an analysis of a centralised on-line platform to post prices. The focus of this proposal must identify benefits to the processor and have clear explanations to counter resistance. Without identified benefit to the processor, this initiative will fail.

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<sup>1</sup> The current AusMeat policy and procedure for Over-The-Hooks trading is available at:  
[http://www.ausmeat.com.au/WebDocuments/Complaints\\_Handling\\_-\\_Over\\_the\\_Hooks\\_-\\_OTH.pdf](http://www.ausmeat.com.au/WebDocuments/Complaints_Handling_-_Over_the_Hooks_-_OTH.pdf)

<sup>2</sup> CLEAR Grain service: <https://www.cleargrain.com.au/>

<sup>3</sup> Wool Trade service: <http://www.wooltrade.com.au/>



## 6 Reported market price analysis

This chapter of the report focused largely on quantitative analysis of reported market prices between states for the various stock types. It also provides an overview of the market data and information availability for sheepmeat. Detailed analysis and calculation methods are included in the appendix.

Key findings:

- Publicly available market information is adequate for industry needs, however a single coordinated platform and improvements to the reliability of collection processes would be valuable.
- The most correlated markets are those that are within closer proximity of each other and share the same stock type category.
- The lack of price movement correlation between the more remote sites of Tasmania and Western Australia to the South Eastern region does not infer that there are any significant long term price differentials between these markets.
- The lack of relevance of the saleyard price in determining market movement in Western Australia and Tasmania suggests that greater insight into OTH and direct sale prices would improve visibility in these markets.
- The average price of skins in Western Australia and Tasmania is at a significant discount to the south-eastern market and the normal range of prices received is considerably narrower.
- There is little correlation of skin price movements between states.

### 6.1 Market reporting

The complex and fragmented structure of the red meat supply chain in Australia means that vertical flow of information is also impeded by such barriers. Data that is available and deemed useful to sheepmeat industry participants has been scoped and listed in Table 9.

Table 9. Type of data available in the sheepmeat supply chain and relevant sources

Data/ information	Source	Data collection method	Public availability
Historical & current prices	NLRS-MLA	Accumulated via LMO	Limited
Livestock Indicators	MLA & AWEX	LMO	Yes
Livestock movement & biosecurity information	NLIS data	Direct via PIC	Not public
Saleyard throughput	MLA	LMO	Yes
Slaughter figures	MLA & ABS	-	Yes
Over-the-hooks prices	MLA	MLA survey	Yes
Direct farmgate price/volumes	Buyers, producers	NA	Not public (private transaction)
Live export volumes	MLA	ABS, DAWR	Yes
Carcase feedback	Livestock Datalink (LDL)	Processor	Limited (pilot stage)
Animal health conditions	State Coordinators- Dep of Primary Industries & LDL	-	Yes
Flock records	ABS/ABARES	Survey	Yes
Macro Statistics	ABS/ABARES/DAWR/MLA	Various	Yes

Meat & Livestock Australia maintain the largest publicly available resource of data and information of livestock price and throughput. MLA's platform for market reporting allows meaningful analysis to be conducted which meets the needs of industry participants. This information is collected from their represented saleyards weekly and presented in the form of raw data, market reports and commentary. Each week Meat & Livestock Australia survey processors on over the hooks prices for a range of lamb and sheep categories. A range of prices, and an average are released in weekly reports. The amount of information available is sufficient to industry needs. However, the accuracy of price information in these reports has been questioned, based on the method of collection, and at times significant divergences.

It is recognised that while on-line auction platforms publish detailed data of the stock offered and the price received, this sales information is not analysed to the same extent as saleyards reports and as such, is of lesser value. Being the largest single 'saleyard', a significant improvement would be for the inclusion of on-line sales data on MLA's interactive online data platform. This would allow analysis and comparisons, and contribute to more informed buyers and sellers. While NLRS currently publishes limited high-level reports regarding on-line sales results, more public availability of all price data would improve transparency. It should be noted that this is not the responsibility of MLA, but would require voluntary contribution from on-line sales providers.

Greater consolidation and interconnection of data and information systems would be valuable to the Red Meat Industry. A scoping investigation into a sheep meat industry value chain information system in Western Australia was conducted as funded by the Sheep Industry Business Innovation (Hoban, 2017). The report concluded that the lack of coordination and independent operation of systems holding industry information and data is hindering industry development at all levels of the

supply chain. The preferred option to address this issue was to develop a Content Management System; a dedicated website that combines various sources of publicly available information and data which would be aggregated. This would provide access to relevant information including market prices and volumes, throughput, over the hooks grid prices, other prices offered, content and social media with potential advantages being improved efficiencies, reduced costs and better outcomes for the whole industry.

## 6.2 Price based seasonality trends by state

Lamb and mutton prices are influenced by the supply and demand factors, both in Australia and in our export markets. While they vary from year to year and over time, lamb prices exhibit within-year seasonality. An understanding of this seasonality can help producers, traders, processors and other industry players make informed decisions around the best time to sell or buy stock.

The following summarises the findings of analysis conducted on price seasonality in each state (detailed in the appendix Figure 87 - Figure 101):

### **New South Wales**

- NSW lamb and mutton markets present one distinct peak and trough.
- Markets tend to peak around June/July with average upside in the order of 20% and 50% from January levels for Trade Lambs and Mutton, respectively.
- Markets tend to bottom in October/November.

### **Victoria**

- Victorian lamb and mutton markets present one distinct peak and trough.
- Markets tend to peak around June/July with average upside in the order of 20% and 40% from January levels for Trade Lambs and Mutton, respectively.
- Markets tend to bottom in October/November.

### **South Australia**

- SA lamb and mutton markets present one distinct peak and trough.
- Markets tend to peak around July with average upside in the order of 15% and 60% from January levels for Trade Lambs and Mutton, respectively.
- Markets tend to bottom in October/November.

### **Western Australia**

- WA lamb and mutton markets present one distinct peak and trough.
- Lamb markets tend to peak around July with average upside in the order of 10-20%, while mutton tends to peak in June/July with upside in the order of 40% from January levels.
- Markets tend to bottom in October/November.

### **Tasmania**

- Tasmanian lamb markets present one distinct peak and two troughs.
- Markets tend to peak around July with average upside in the order of 15% and 40% from January levels for Trade Lambs and Mutton, respectively.

- Markets tend to bottom in October/November, with a second trough for lambs in May.

### 6.3 Drivers of seasonality

Most livestock markets, particularly lambs and mutton, display a distinct supply and price seasonality pattern. As supplies gradually increase following the main growing season, prices ease accordingly, reflecting the peak in supply. On the contrary, when supplementary feed is required to finish stock, lamb and sheep supply tends to dwindle to see prices rise.

As opposed to cattle with its clear divide between northern and southern producing systems, lamb markets are generally concentrated in Southern Australian (NSW, VIC, SA, TAS and WA). Given most producers are in a Winter/Spring dominate rainfall area, we have not observed major differences in seasonal price trends for lambs within states over the longer term. That's not to say there are no slight changes in the timing of turnoff and market peaks and troughs between regions.

As a rule, the lamb growing season follows the periods of pasture growth in late Winter and Spring. This sees most animals reared until October/November/December to reach sale target weights and maximise pasture utilisation and weight gains. Thus, large quantities of stock hit the market during that period periodically leading to downward pressure on prices. During summer, autumn and winter, feed availability is scarcer leading to tighter supplies and firmer prices in all states.

The long-term average seasonal price patterns show that price movements when averaged out across many seasons tends to conform to a similar pattern across states, with trade lambs and mutton having a more pronounced pattern of peaks/troughs throughout the season than restocker lambs. However, this measure of seasonal percentage price gains/losses compares each category of lamb/state to its own past price history over time and should not be used to infer that these markets are correlated.

Indeed, climatic conditions may vary between states for any given season, impacting upon the regional supply and demand situation and creating a potential for price divergence between lamb/sheep categories and/or states.

### 6.4 Price correlation between states and stock types

To assess the strength of price correlations between stock and/or state categories we have produced a correlation matrix which compares monthly prices changes, or returns, for restocker lambs, trade lambs and mutton between states.

Unsurprisingly, the correlation matrix (Figure 31) highlights that the most correlated markets are those that are within closer proximity of each other and share the same stock type category with Victorian Mutton registering a very strong correlation to both NSW Mutton and South Australian Mutton at an  $r^2$  of 0.8053 and .8057, respectively. Similarly, trade lamb categories among the three South Eastern states of Victoria, NSW and South Australia all share strong correlations between them with  $r^2$  measures ranging from 0.6936 to 0.7867.

NSW Mutton to SA Mutton is the only other category to score a strong correlation ranking with an  $r^2$  measure of 0.6654. Restocker lamb scores less within the South-Eastern region which is due to the actions of restocker buyers which are highly determined by local conditions and therefore much more variable than the actions of buyers seeking trade lambs or mutton.

	Vic Restocker Lamb	Vic Trade Lamb	Vic Mutton	NSW Restocker Lamb	NSW Trade Lamb	NSW Mutton	SA Restocker Lamb	SA Trade Lamb	SA Mutton	Tas Restocker Lamb	Tas Trade Lamb	Tas Mutton	WA Restocker Lamb	WA Trade Lamb	WA Mutton
Vic Restocker Lamb		0.3531	0.1561	0.3535	0.2807	0.1622	0.3662	0.2721	0.1321	0.0214	0.2371	0.0819	0.0406	0.0046	0.0082
Vic Trade Lamb	0.3531		0.3090	0.2571	0.7639	0.3008	0.2621	0.7867	0.2735	0.0518	0.4428	0.2065	0.0141	0.1652	0.1028
Vic Mutton	0.1561	0.3090		0.2786	0.2753	0.8053	0.2140	0.2700	0.8057	0.1064	0.2716	0.4924	0.0053	0.0931	0.2392
NSW Restocker Lamb	0.3535	0.2571	0.2786		0.4183	0.3678	0.3644	0.3047	0.2382	0.0512	0.2848	0.1305	0.0153	0.0129	0.0314
NSW Trade Lamb	0.2807	0.7639	0.2753	0.4183		0.3976	0.2954	0.6936	0.2182	0.0428	0.3713	0.1515	0.0059	0.1259	0.0887
NSW Mutton	0.1622	0.3008	0.8053	0.3678	0.3976		0.2220	0.2918	0.6654	0.0803	0.2544	0.4443	0.0020	0.0723	0.1939
SA Restocker Lamb	0.3662	0.2621	0.2140	0.3644	0.2954	0.2220		0.3499	0.2130	0.0757	0.2127	0.1274	0.0357	0.0413	0.0446
SA Trade Lamb	0.2721	0.7867	0.2700	0.3047	0.6936	0.2918	0.3499		0.2621	0.0367	0.3830	0.1829	0.0157	0.1455	0.0856
SA Mutton	0.1321	0.2735	0.8057	0.2382	0.2182	0.6654	0.2130	0.2621		0.0895	0.2217	0.4258	0.0176	0.0989	0.2100
Tas Restocker Lamb	0.0214	0.0518	0.1064	0.0512	0.0428	0.0803	0.0757	0.0367	0.0895		0.2388	0.0845	0.0218	0.0208	0.0286
Tas Trade Lamb	0.2371	0.4428	0.2716	0.2848	0.3713	0.2544	0.2127	0.3830	0.2217	0.2388		0.2828	0.0030	0.0466	0.0739
Tas Mutton	0.0819	0.2065	0.4924	0.1305	0.1515	0.4443	0.1274	0.1829	0.4258	0.0845	0.2828		0.0000	0.0425	0.1354
WA Restocker Lamb	0.0406	0.0141	0.0053	0.0153	0.0059	0.0020	0.0357	0.0157	0.0176	0.0218	0.0030	0.0000		0.1929	0.1274
WA Trade Lamb	0.0046	0.1652	0.0931	0.0129	0.1259	0.0723	0.0413	0.1455	0.0989	0.0208	0.0466	0.0425	0.1929		0.2990
WA Mutton	0.0082	0.1028	0.2392	0.0314	0.0887	0.1939	0.0446	0.0856	0.2100	0.0286	0.0739	0.1354	0.1274	0.2990	

Figure 31. Returns correlation matrix of stock type and state based on monthly averages

The matrix demonstrates that the correlation between states for the same stock types diminish as the region becomes more geographically isolated. Indeed, the separation of Tasmanian markets from the South-Eastern states by Bass Strait and the isolation of Western Australian markets by the Nullarbor appear to have a significant impact on price relationships between these markets.

The impact of these geographical barriers has a lesser impact on the Tasmanian markets than in the West but there is a noticeable reduction in correlation scores for both regions when compared to the same stock types within the South-Eastern area. TAS Trade Lamb and TAS Mutton share a moderate to weak positive correlation to their respective stock type classifications in the South-Eastern region with  $r^2$  measures ranging between 0.3713 to 0.4924. Tasmanian restockers the clear exception, scoring very weak correlations across nearly all categories.

The Western Australian correlation measures shows all categories of stock analysed with weak to very weak correlation present. WA Mutton to WA Trade lambs scoring the highest correlation figure for all the Western categories at an  $r^2$  of 0.299. In comparison to the South-Eastern state's returns, WA mutton shows the closest relationship to the South-Eastern mutton prices with  $r^2$  ranging between 0.2392 and 0.1939.

The dominance in correlation rankings of the South-Eastern categories, particularly for Trade Lamb and Mutton is noted in the top twenty ranking table highlighted in (Figure 108). Indeed, none of the top twenty correlation combinations feature any West Australian categories and only six out of a forty possible combinations feature a Tasmanian sheep or lamb category.

In contrast, the lowest twenty correlation score combinations show a large proportion of Western Australian and/or Tasmanian categories, with Restocker Lamb dominating the combination possibilities (Figure 109). Undeniably, considering the forty available spots for state/stock type combinations there are;

- Eighteen featuring a Western Australian category

- Seven featuring a Tasmanian category
- Twenty-five times a Restocker category has been represented

In addition, there isn't one place within the bottom twenty rankings that doesn't contain either a Tasmanian or Western Australian category. These  $r^2$  measures suggest there are three distinct market segments for price correlation across the sheep/lamb producing areas of the country, namely;

- The South East region (encompassing NSW, Victoria and South Australia)
- Tasmania (experiencing a moderate relationship to the South Eastern region)
- Western Australia (largely independent of the price fluctuations along the East coast)

The lack of price movement correlation between the more remote sites of Tasmania and Western Australia to the South Eastern region does not infer that there are any significant long term price differentials between these markets. It does however allow Victorian, NSW and South Australian prices to be grouped according to stock types to create a broader South Eastern indicator for restocker lambs, trade lambs and mutton in order to compare long term price spread differentials to see if there is any beneficial or disadvantageous price disparities that persist through time.

Based on ABARES farm survey data, Tasmania and WA have smaller sales auctions throughput as a percentage of reported slaughter numbers. That is, a greater percentage of sheep and lambs are traded over the hooks or by direct sales. This questions the relevance of the saleyard price in determining market movement and suggests that greater insight into OTH and direct sale prices would improve visibility in these markets.

## 6.5 South Eastern market price spreads to remote regions

### 6.5.1 Comparison of South East region to Tasmania

Despite the apparent higher variability of restocker prices and the reasonably low correlations between restocker category comparisons to other stock/state types, analysis of the South Eastern Restocker to Tasmanian Restocker percentage price spread shows that over the long run South Eastern Restocker prices do not demonstrate a persistent premium nor discount to Tasmanian Restocker prices (Figure 110).

Indeed, the long term average percentage spread premium of South Eastern Restocker prices is a mere 0.2% above Tasmanian Restocker prices. Furthermore the spread pattern since 2008 shows that a fairly even amount of time is spent between a 15% discount to a 15% premium, suggesting there is no apparent price disadvantage over the long term for restocker lamb producers in Tasmania due to the distance from the South Eastern region.

The historic percentage spread of South Eastern Trade Lamb to Tasmanian Trade lamb going back to 2000 shows a slight disadvantage to Tasmanian producers of Trade Lamb with the long run average spread at a 3.1% premium (Figure 111).

Although as the spread pattern indicates over the last decade the spread premium appears to be narrowing. Indeed, measuring the average spread since 2008 onwards shows the average spread to be at a 1.4% premium. Analysis of the spread pattern since 2000 shows that 70% of the time the South-Eastern Trade Lamb spread to Tasmanian Trade Lamb has ranged between a discount of 5% to a premium of 12%.

The percentage spread of South Eastern Mutton to Tasmanian Mutton shows this category to be the worst performer of the three stock types analysed for Tasmania compared to their respective South-Eastern prices, with the long-term percentage spread since 2000 sitting at 11.3% (Figure 112).

The mutton spread pattern also has the highest level of variability of the three categories; restocker lambs, trade lambs and mutton – as highlighted by the wider 70% range banding which shows the spread has fluctuated between an 8% discount to a 31% premium for 70% of the time since 2000.

Interestingly for Tasmanian Mutton, and in a similar fashion to the Tasmanian Trade Lamb spread, there has been a narrowing of the mutton spread between the South East and Tasmania over the past decade. Indeed, a measure of the long term spread since 2008 shows the average spread to be a 7.8% premium, in favour of South East Mutton.

#### 6.5.2 Comparison of South East region to Western Australia

The percentage spread pattern for South East Restocker Lambs to West Australian Restocker Lambs since 2000 shows a starkly different picture than Tasmanian Restocker Lambs, suggesting that over the long run WA producers of Restocker Lambs have experienced disadvantageous price performance compared to their South-Eastern counterparts. The long-term average spread shows a 14.2% premium being achieved in favour of the South-Eastern region (Figure 113).

Interestingly, and in contrast to the Tasmanian experience for Trade Lamb and Mutton, the spread pattern for WA Restockers in the last decade has been widening such that a measure of the average spread premium since 2008 for South Eastern Restocker to WA Restocker sits at a 20.5% premium. Furthermore, the variability in the WA Restocker spread is higher than the Tasmanian Restocker spread with the 70% range showing a wider fluctuation between an 8% discount to a 37% premium.

The percentage spread for South Eastern Trade Lamb to West Australian Trade Lamb over the longer term also demonstrates a benefit accruing to the South-Eastern region, albeit to a smaller degree than that displayed by WA Restockers, with an average spread since 2000 calculated at a 7.2% premium (Figure 114). Looking at the most recent decade the spread has also shown to have widened slightly with the average since 2008 coming in at a premium of 7.8% in favour of the South-Eastern region.

The 70% range in spread for WA Trade lamb demonstrates a higher variability than that displayed by the Tasmanian Trade Lamb spread with a potential range of an 8% discount to a 22% premium noted, nearly double the variation set by the Tasmanian Trade spread pattern.

The South-Eastern Mutton to WA Mutton spread shows the price benefits over the long term continue for South Eastern mutton producers with the average spread since 2000 coming in at a 14.5% premium (Figure 115).

In a similar fashion for the other two WA stock categories analysed in this report, the spread for WA Mutton has been widening over the last decade with the spread since 2008 calculated at a premium of 15.6% in favour of the South-Eastern region. The WA mutton spread pattern also has the highest level of variability in spread behaviour with the 70% range showing a range of 11% discount to 40% premium.

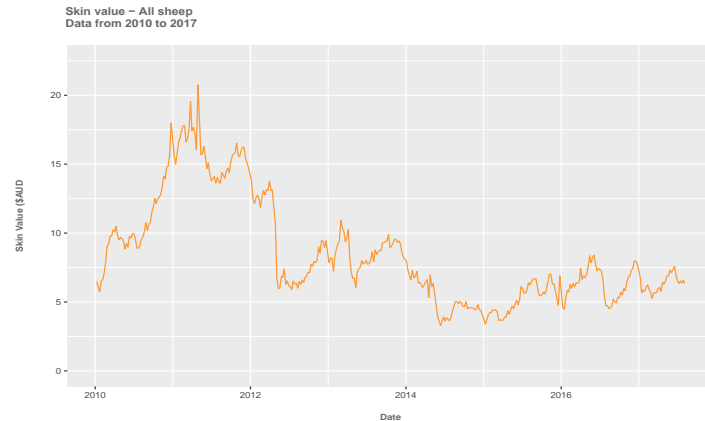
### 6.6 Skin value comparison by state

This section explores how skin prices have varied over time and how differences in skin prices are influenced by livestock lot characteristics - saleyard location, sheep and lamb category, average weight and breed.



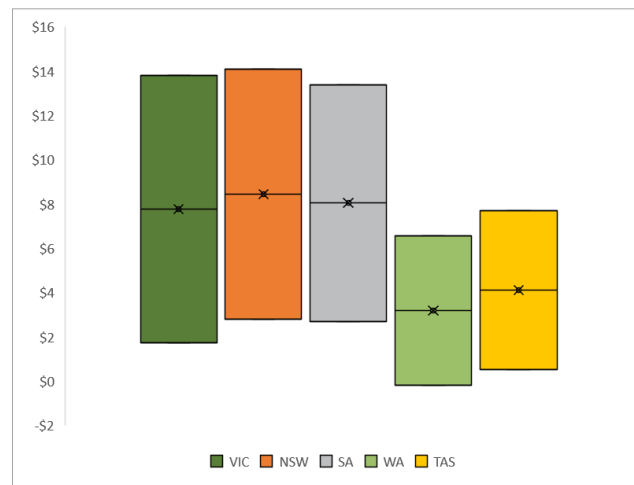
### 6.6.1 State based price comparison

Figure 32 shows the Australian average time series for skin prices from 2010 to 2017.



**Figure 32. Australian skin prices for sheep and lamb, 2010-2017**

Consistent with findings of other analysis in this report, skin values in Western Australia and Tasmania are distinct to Victoria, New South Wales and South Australia. The average price is at a significant discount to the south-eastern market and the normal range of prices received is considerably narrower (Figure 33). It should be noted that what would be considered a normally strong price in Western Australia and Tasmania is still lower than the average price received in other states.



**Figure 33. Skins value 2010-2017 by state**

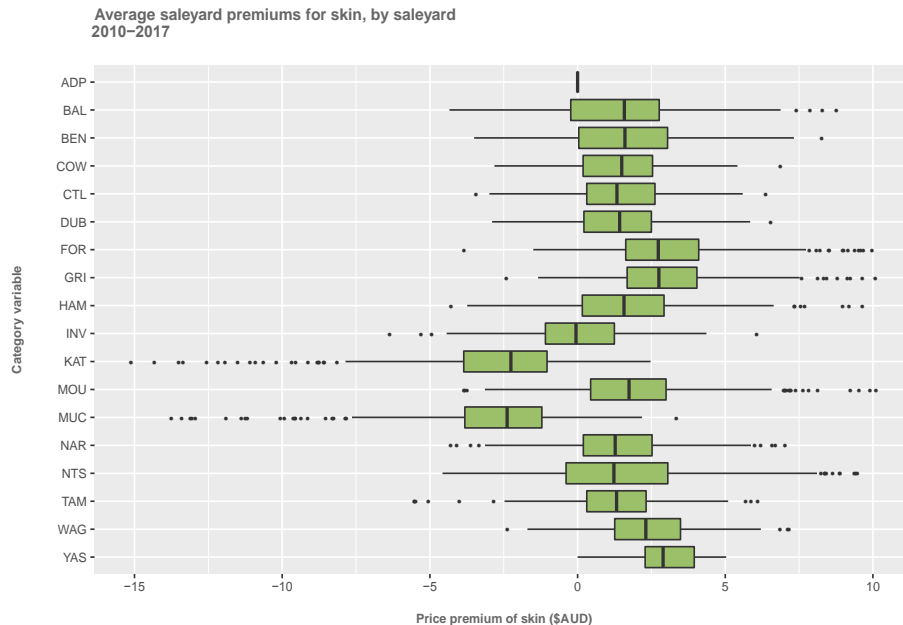
Analysis of the monthly returns correlation for skin values across states revealed that no strong correlative interdependence is present between states (Figure 116)<sup>1</sup>. The remote regions showed the weakest correlations to other states.

<sup>1</sup> Correlation matrix analysis is further detailed in the appendix.



The boxplot<sup>1</sup> Figure 34 reveals a similar outcome to the analysis of carcass prices, specifically:

- The highest average premiums apply to Griffith, Forbes and Wagga.
- The highest average discounts, apply to Katanning and Muclea, while the largest variances in premiums and discounts, as measured by the width of the boxes and the points outlying the boxes, also apply to Katanning and Muclea.



**Figure 34. Saleyard premiums and discounts for skin prices**

### 6.6.2 Analysis of the influence on skin values of sheep categories

Figure 35 and Figure 36 show the influence on skin values of sheep and categories (relative to Ewe sales) and average weight (relative to lots less than 14 kgs).

<sup>1</sup> The boxplot a simple way of representing statistical data on a plot in which a box is drawn to represent the second and third quartiles, with a horizontal line inside to indicate the median value. The lower and upper quartiles are shown as vertical lines either side of the rectangle.

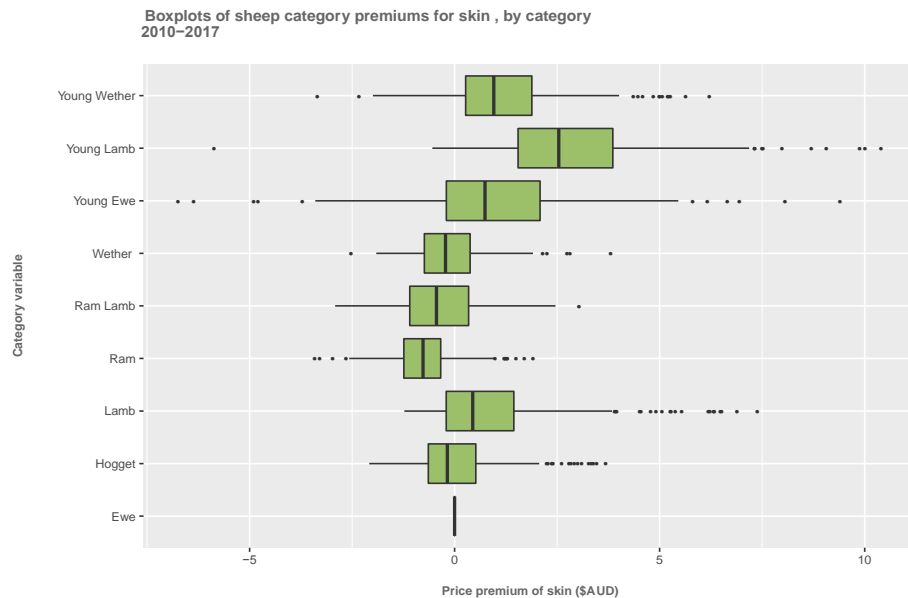


Figure 36. How sheep categories influence skin values

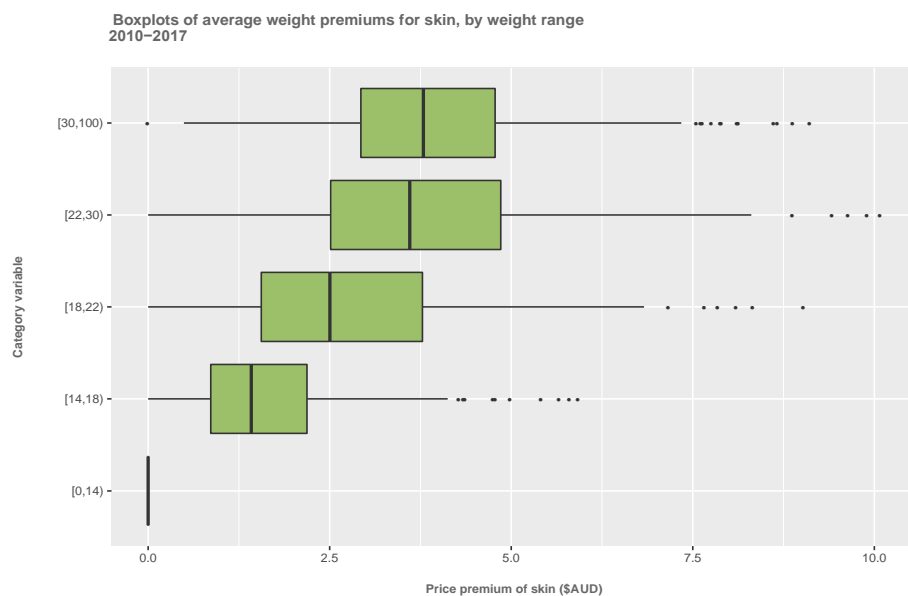


Figure 35. How carcase weights influence skin values

Noteworthy features of Figure 35 and Figure 36 are:

- Young animals (young lamb, young wether and young ewe) attract the largest premiums.
- Skin values rise with the weight (i.e. physical size) of the animals.

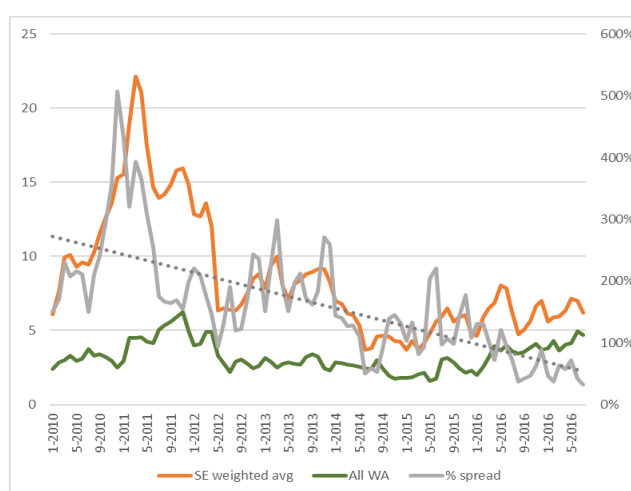
### 6.6.3 The role of breed in South Eastern states when analysing Western Australia price differences

The seemingly independent nature of the market for sheepmeat in Western Australia is consistent with skin products. It has been noted by some report participants that a possible difference in breed makeup of the respective flocks has some role in the variance in skin value. The West Australian

flock is predominantly Merino lambs while there is a higher proportion of second cross lambs in the east coast market, which have a higher quality, and therefore value, skin product.

Analysis was undertaken on average monthly skin prices for all types of stock at the saleyard across the mainland South-eastern states and Western Australia. A weighted South-east skins index average price was created, with the weighting factor based off respective saleyard volumes, and a percentage spread measurement was calculated to determine the trend in the spread between South eastern and West Australian skin prices over time.

Figure 37 shows the time series analysis of the two skins prices and the percentage spread pattern. Clearly, the South-Eastern producers have been enjoying a premium for skins compared to their Western counterparts. Although, as the spread pattern demonstrates this premium is being eroded, as the spread trend line demonstrates in broad terms the premium has more than halved since 2010.

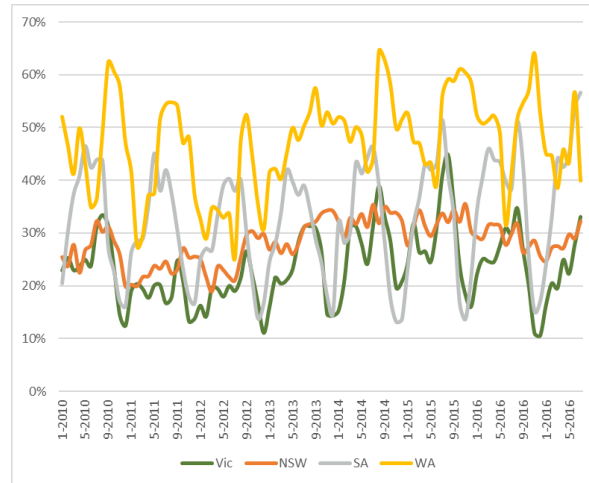


**Figure 37. Monthly average skin prices and East/West spread (all types)**

One factor likely to contribute to the persistence of a skins premium in favour of the mainland South-eastern states has been the proportion of Merino stock types going through the saleyard in Western Australia, in comparison to the mainland South Eastern states.<sup>1</sup>

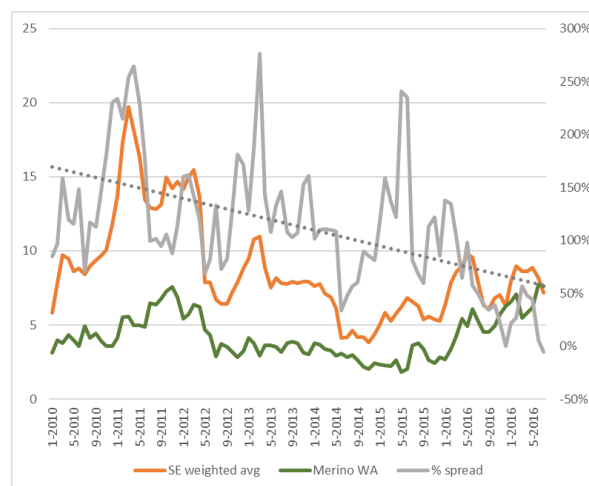
Figure 38 highlights that Merino types account for a much higher proportion of total saleyard volume within Western Australia and is a likely factor in reducing the average monthly skin values, across all types in this state, compared to the East. Indeed, since 2010 the average proportion of Merino types in WA saleyards has run at 47%, compared to 33% in South Australia, 28% in NSW and 24% in Victoria.

<sup>1</sup> Analysis was undertaken on average monthly skin prices for all types of stock at the saleyard across the mainland South-eastern states and Western Australia. Price data for Tasmania was not sufficient on a monthly basis for comparative analysis in this section and so has not been included.



**Figure 38. Proportion of Merino type sheep of total sheep Yardings in each state.**

Filtering the average monthly skin prices within each state to include only Merino types shows that the presence of a premium to the South East still existed for much of the 2010 to 2017 period. Although, in recent times the premium has narrowed significantly. Indeed, as highlighted in Figure 39, July 2017 saw the average monthly skin price for Merino types at WA saleyards moved to a premium of 6%.



**Figure 39. Monthly average skin prices and East/West price spread (merino types)**

#### 6.6.4 Economies of scale in skins processing

Industry sources suggest that a contributing factor to the divergence of skin prices between WA and Tasmania and the Eastern States may be economies of scale. That is, due to the smaller kills in WA & Tasmania, skins may not receive the same degree of segregation to attract maximum value. Skins are unable to be built up over long periods of time as storage and shelf life are a constraint. With fewer skins traded in WA and Tasmania, there is less opportunity to sort into uniform lines based of customer specifications and be sold at a premium.

Based on this theory, greater value for skins would be achieved if skins were able to be aggregated by a trader or processor. This would allow for more specialised sorting to maximise skin price, and create larger batches for sale and shipping in shorter timeframes.

## 7 A focus on West Australian sheepmeat supply & price

This chapter of the report further analyses supply patterns, price and processing capacity of the Western Australian sheepmeat market and supply chain in isolation to eastern markets by applying the findings of consultations to provide ground truthing for the data analysis conducted in section 6 Reported market price. For this analysis, no account is given to any dividends or other benefits paid by processors to their suppliers.

Key findings:

- Broadly, the sheepmeat market in Western Australia acts independently.
- Quarterly return patterns for live export wethers to trade lambs are similar.
- Monthly supply or demand anomalies tend to dissipate over each quarter.
- Live exports wether prices are most closely correlated to trade lambs, followed by mutton then restocker.
- In WA, selling channel selection is distinctly more changeable year to year compared to other states, and shows a recent move towards saleyard.
- Processors are subject to unique supply challenges
- Live exporters must compete with processors, restockers and Eastern buyers for supply and hence when supply is problematic export competitors arrange ships at separate times.

### 7.1 East-West price differences

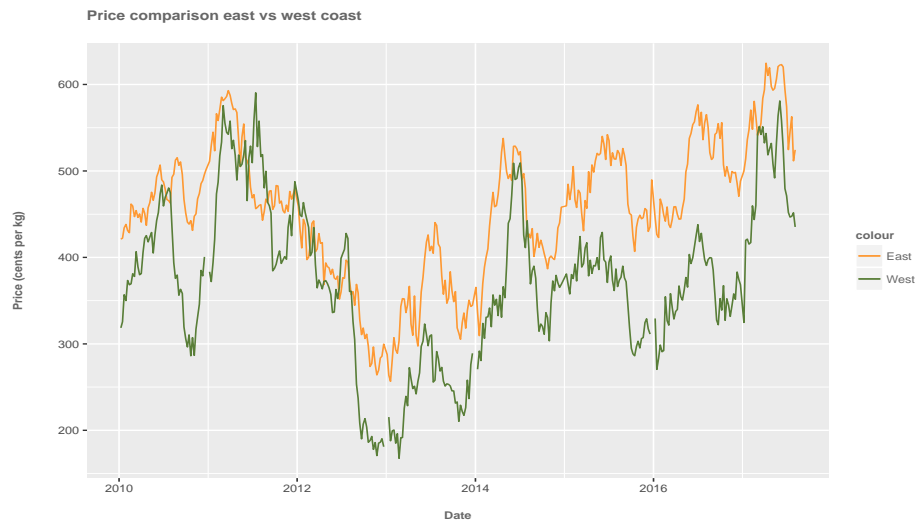
One of this studies priorities has been to explore regional differences in sheep and lamb markets, in particular East versus West prices. Figure 40 and Figure 41 presents time series of carcass prices for East and West saleyard markets from 2010 to 2017<sup>1</sup>, while Figure 42 presents the difference of these time series, i.e. the price gap between East and West saleyard markets.<sup>2</sup> They reveal the following:

- WA prices have lagged eastern prices in most periods, although during 2011 and 2012 WA prices were higher.
- The price gap, East minus West, has been quite large for extended periods during 2010, 2013, 2015 and 2016, when the price gap climbed above 100 cents per kg.

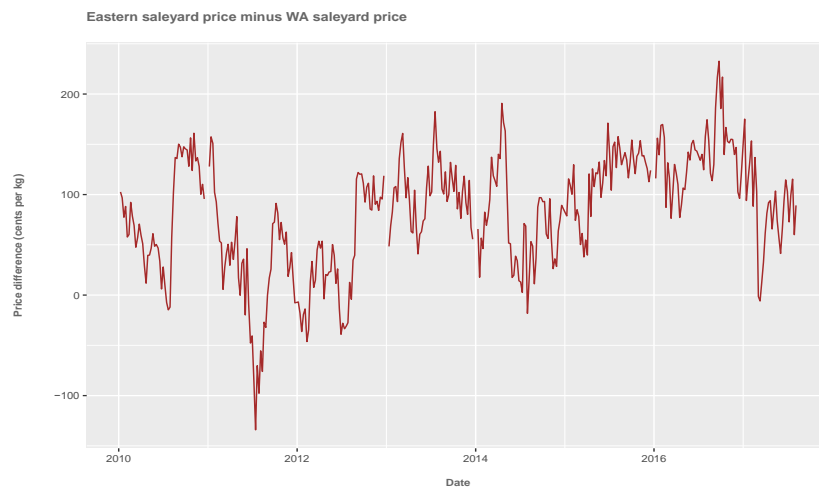
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<sup>1</sup> Data for Saleyards in the East cover: ADP (Adelaide Plains, SA), BAL (Ballarat, VIC), BEN (Bendigo, VIC), COW (Cowra, NSW), CTL (CTLX Carcoar, NSW), DUB (Dubbo, NSW), FOR (Forbes, NSW), GRI (Griffith, NSW), HAM (Hamilton, VIC), INV (IRLX Inverell, NSW), MOU (Mt Gambier, SA), NAR (Naracoorte, SA), NTS (Northern Tas Saleyards, TAS), TAM (TRLX Tamworth, NSW), WAG (Wagga, NSW), and YAS (Yass, NSW). Data for Saleyards in the West cover: KAT (Katanning, WA) and MUC (Mucchea, WA).

<sup>2</sup> Volume-weighted prices are calculated across the major Saleyards in the East: ADP (Adelaide Plains, SA), BAL (Ballarat, VIC), BEN (Bendigo, VIC), COW (Cowra, NSW), CTL (CTLX Carcoar, NSW), DUB (Dubbo, NSW), FOR (Forbes, NSW), GRI (Griffith, NSW), HAM (Hamilton, VIC), INV (IRLX Inverell, NSW), MOU (Mt Gambier, SA), NAR (Naracoorte, SA), NTS (Northern Tas Saleyards, TAS), TAM (TRLX Tamworth, NSW), WAG (Wagga, NSW), and YAS (Yass, NSW). Prices for the West cover: KAT (Katanning, WA) and MUC (Mucchea, WA).



**Figure 41. Time series of saleyard sheep and lamb prices, East versus West (2010-2017)**



**Figure 40. Time series of the price gap, Eastern price minus WA saleyard price (2010-2017)**

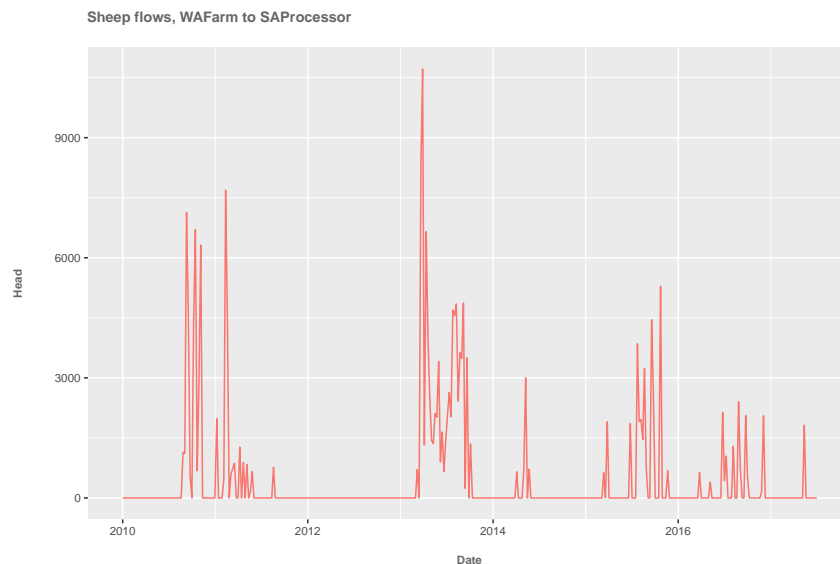
Table 10 below shows the outflows from WA to customers in each State:

- Two-thirds of livestock go to SA, while the remainder is split between VIC and NSW.
- Processing (in SA and VIC) is the main inter-state customer segment, closely followed by farms in SA, VIC and NSW.
- Live exports via SA comprise 12 per cent of WA's inter-state movements.

**Table 10. WA inter-state livestock flows from 2010 to 2017, expressed as a percentage of all movements out of WA (100 per cent = 521 thousand sheep)**

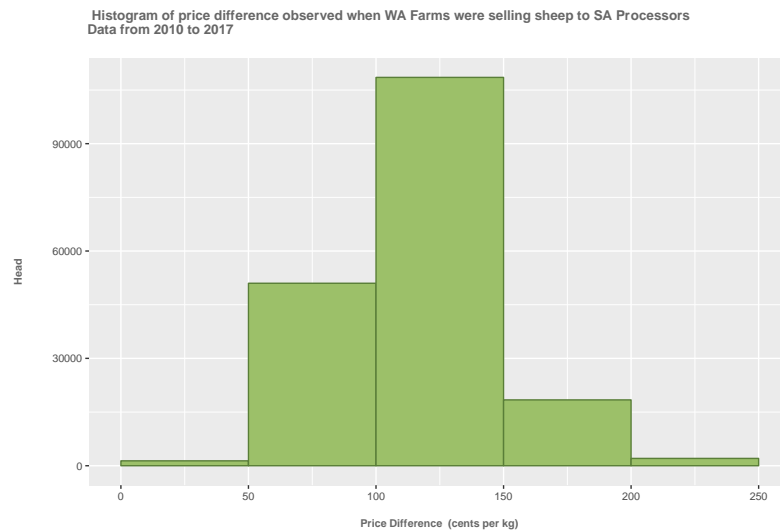
Destination.State	To.Farm	To.Port	To.Processor	To.Saleyard	Total
NSW	14%			1%	15%
QLD	0%				0%
SA	17%	12%	39%	0%	68%
TAS	0%				0%
VIC	9%		3%	4%	17%
<b>Total</b>	<b>40%</b>	<b>12%</b>	<b>43%</b>	<b>5%</b>	<b>100%</b>

To understand the effect of these East-West price differences, Figure 42 shows the movements from WA farms to processors in SA from 2010 to 2017. The periods of significant movements occurred during 2010, 2013, 2015 and 2016, when the price gap was largest.



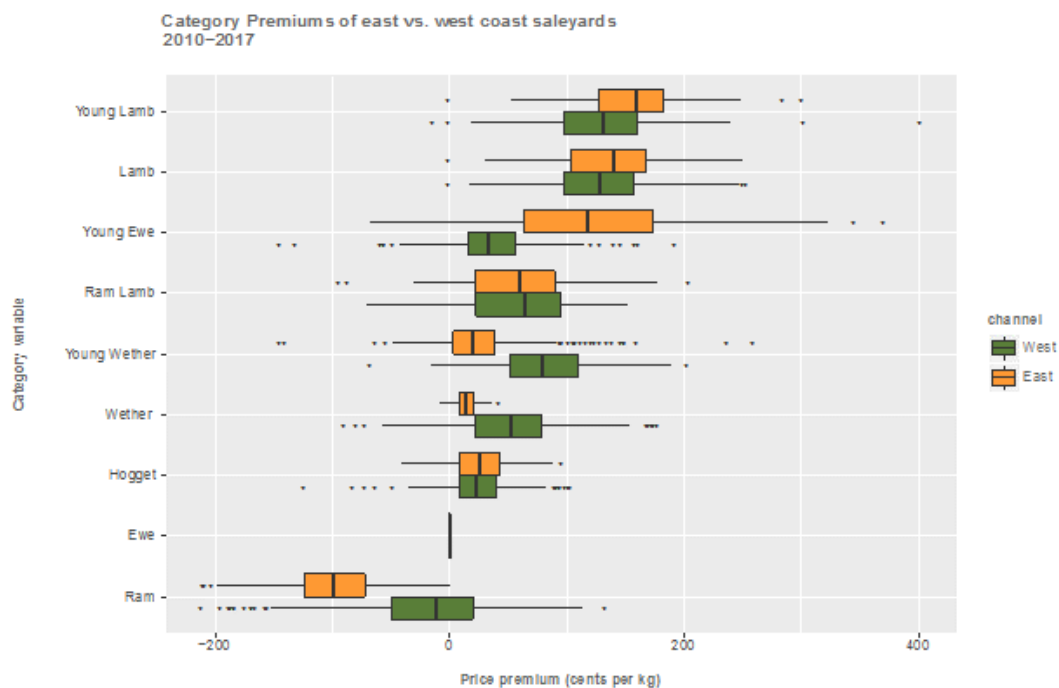
**Figure 42. Time series of flows from WA farms to SA processors**

Figure 43 shows a histogram of the price gap during those weeks when SA Processor purchases from WA Farms were greater than 1,000 head per week. It reveals that these trade flows generally occur when the price gap is 50 to 100 cents per kg or greater.



**Figure 43. Histogram of price gaps during periods of SA processor purchases from WA farms**

Figure 44 shows how East and West prices differ by sheep and lamb categories. It reveals that Eastern prices are higher than most categories, in particular for Young Ewe, while Western prices are higher on average only for the Young Wether and Ram categories.<sup>1</sup>



**Figure 44. Category premiums of east versus west saleyards, 2010-2017**

<sup>1</sup> The boxplot a simple way of representing statistical data on a plot in which a box is drawn to represent the second and third quartiles, with a horizontal line inside to indicate the median value. The lower and upper quartiles are shown as vertical lines either side of the rectangle.

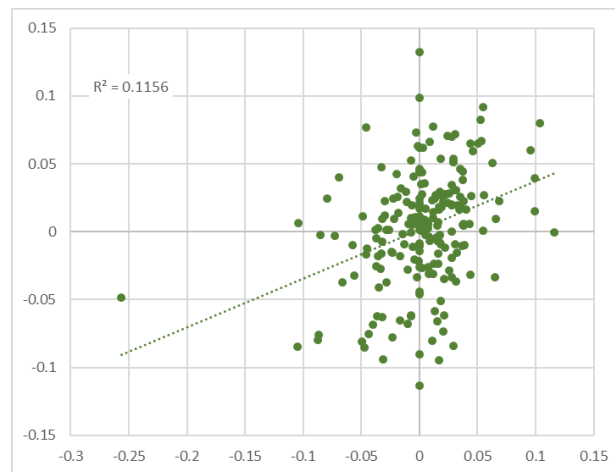


## 7.2 Live export wether prices to WA saleyard trade lamb

Analysis of the monthly returns correlations between lamb and sheep price movements at the saleyard between Western Australia and the South-Eastern region (encompassing Victorian, NSW and South Australian saleyards) demonstrated a broad lack of price interdependence between the East and West.

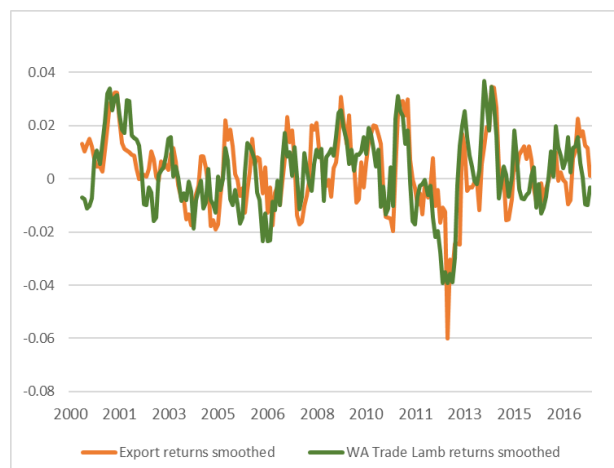
Given the predominance of live export volumes exiting Western Australia an analysis of the returns correlation between Muchea live export wether price movements and a selection of Western Australian saleyard prices was undertaken to determine if there was a stronger relationship between these markets, compared to the South-eastern region saleyards.

Monthly returns correlation between the Live Export Wether and WA Trade Lambs showed that there was limited price interdependence with an  $r^2$  of 0.1156, which is lower than the monthly returns correlation displayed between WA Trade Lambs and Trade Lamb price movements within Victoria, South Australia and NSW at an 0.1652, 0.1455 and 0.1259 respectively (Figure 45).



**Figure 45. Monthly returns correlation live export wether to WA trade lambs**

However, a smoothed time series analysis of the monthly returns between Live Export Wethers and WA Trade Lambs indicated there is a stronger relationship between these two-price series when assessed over a longer time horizon. Indeed, the quarterly returns pattern for Live Export Wethers to WA Trade Lamb since 2000 shows a reasonably close trend variation, suggesting that market supply or demand anomalies that may be present in the monthly return data set tend to dissipate over the quarterly cycle (Figure 46).



**Figure 46. Smoothed monthly returns of exports vs WA trade lamb**

The correlation coefficient between quarterly returns for Live Export Wethers and WA Trade Lambs increases to 0.5363 when the reporting frequency is expanded, mirroring the result of the smoothed monthly returns time series (Table 11). A comparison of selected WA saleyard indicators suggests that WA Trade Lambs are the most correlated category to Live Export Wether price movements on a quarterly basis, in comparison to WA mutton and WA Restocker Lamb saleyard price movements, with an  $r^2$  of 0.4673 and 0.3899, respectively.

Table 11. Live export price- quarterly returns	
	R squared Correlation
WA Trade Lamb	0.5363
WA Mutton	0.4673
WA Restocker Lamb	0.3899

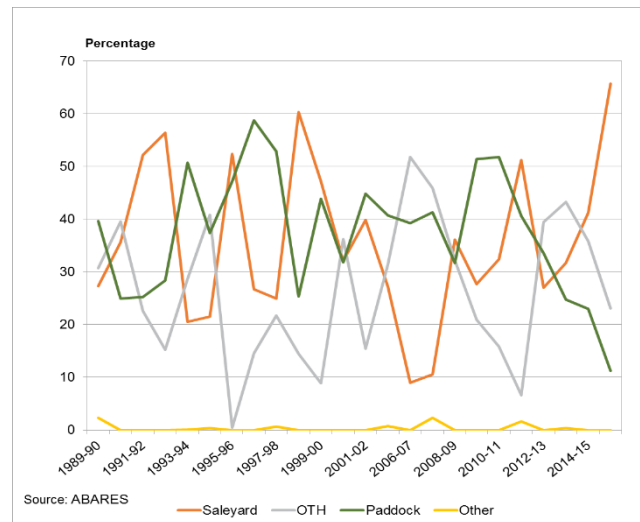
### 7.3 Impediments to greater market efficiency in WA

This state is clearly operating at times as a separate market from the larger East Coast sheep and lamb market. To this end, it has developed its own set of unique parameters both on the sales models and industry attitudes and perceptions. At producer level, this contributes to confusion and suspicion.

*“.... On average, our lambs are 30 -40 cents lower than the East....” F.G. WA Producer*

On the other hand, processors see that dealing with extreme seasonality of supply, a greater percentage of Merino or Merino Cross lambs, and the tyranny of distance provide circumstances for operating a processor meatworks in WA unique and challenging.

Selling channel selection is distinctly more changeable year to year compared to other states, and shows a recent move towards saleyard (Figure 47). In WA, there is also a far greater percentage of sheep traded by methods other than the auction saleyards compared to East coast sales. As recommended in this report, increased reporting of sale prices for OTH trades will enhance transparency and ultimately confidence. This is particularly relevant for WA as the greater percentage of OTH trades highlights the requirement to have OTH price reporting as accurate as possible.



**Figure 47. Percentage share of lambs sold through various selling channels in Western Australia**

In terms of market competition, the largest live sheep export activity emanates from Western Australian ports, and East Coast buyers are constantly looking for buying opportunities to truck stock across the Nullarbor providing competition. While east coast buyers are opportunistic operators in WA when prices including freight are below East Coast prices, they do however perform a valuable service providing purchasers and a floor price in sheep sales.

There are also unique situations that have evolved; one of the major WA processor's only purchases sheep and lambs on-farm on a "flat dollars per head" basis, electing to take on the carcase performance risk. WA also has on average a greater potential distance for sheep and lambs to travel to meatworks. This along with the seasonality of supply, at times places pressure on the producer's ability to access "kill space" at peak supply times. The seasonality of supply also poses problems for processors.

### 7.3.1 Live exporter challenges

As noted, Live Export plays a significant role in the WA sheep industry, and this area again has divergent and polarised viewpoints. Exporters arrange shipping to match available supply and turnoff, taking account of the seasonal variabilities of Western Australia. In addition, short export timings are heavily influenced by the need to match with Middle East peak religious demand periods. Producers are sceptical that true competition exists in the live export market with competing exporters rarely arranging export ships at the same time.

Live exporters, however, explain that with decreasing supply it is problematic to arrange export contracts, shipping and supply, so a prudent approach is required. They also point out that they must compete with sheepmeat processors, restockers and Eastern States buyers for supply. Due to the capital required (ships, infrastructure and port access) the live export trade has significant barrier to entry – in the current low sheep number environment this is unlikely to change.

### 7.3.2 Market signals

WA has 2 saleyards, and throughput as a percentage of total slaughter and export is lower than the East Coast situation. This raises the issue of reliable OTH price reporting to provide market information to potential suppliers. This is a heightened challenge for the WA sheep and lamb market. The confidence Eastern Australian producers have in the saleyard reported prices as a basis for sheep and lamb prices in general is more problematic in WA given this situation.

NLRS Livestock Market Officers record prices and report on the saleyards, however the lower number of sheep and lambs as a percentage slaughter in WA traded through Katanning and Muchea highlights the need to have transparent and accurate OTH and direct meatworks pricing to provide meaningful market information on price and supply.

Agents report that they are satisfied with the access to spot pricing direct to meatworks and for OTH sales, however there is no evidence of any historic price records to assist with meaningful market analysis. This places increased importance on the NLRS collection of OTH prices.

The lack of transparency and accuracy is a problem, and only further contributes to the mistrust between buyer and seller. Clearer and more easily accessible OTH price information would assist in providing WA producers with transparent market information. This would also lend to greater analysis of spot pricing, long term price comparisons and price trends, providing more objective information for WA producers to access and use.

### 7.3.3 Buyer competition

In WA, the 2 major supermarkets, unlike their East Coast buying model, don't purchase directly from producers or at saleyards. The purchase of lambs to meet their requirements is performed by the contract processor, removing the normal competitive tension between two major buyers in the market place. We have not been able to determine how the processor identifies when purchases are made to which supermarket customer the lambs are assigned, or if indeed an allocation is made, or do the lambs process as a general pool.

It is contended that the inclusion of two major domestic buyers in the market (saleyards and OTH/direct) would at least increase the appearance of competition in the WA market. Domestic supermarkets purchase a similar quality and weight of lamb; the WA model of procurement via the contract processor is a potential reduction of competition for domestic quality lamb. For this analysis, no account is given to any dividends or other benefits paid by processors to their suppliers.

## 8 Direct sales vs saleyards

This chapter of the report analyses the difference between reported over-the-hooks (OTH) prices and saleyard prices. The analysis compares the prices of both trade lamb and mutton by state, identifying the relevance of category and state in any price differences. The spread between OTH and saleyard prices across the season was undertaken to identify whether there are any distinct times of year by which there is greater variation between the two.

Key findings on price differences between direct sales and saleyard:

- OTH to OTH price correlations are distinctly lower than OTH to saleyard price correlations.
- WA saleyard Trade Lamb price movements demonstrated a fairly weak interdependence with the South-eastern region saleyard Trade Lamb price movements, while WA OTH Trade lamb prices to the respective OTH South-eastern state prices shows a moderate to strong interdependence.
- Tasmanian OTH returns show very weak correlation scores across the board with all categories.

### 8.1 OTH to saleyard correlation returns- trade lamb and sheep via state

Analysis of monthly returns for over-the hooks prices across each state for both Trade Lambs and Mutton has been undertaken to determine the interdependence between market segments for price data over the last two decades.

The matrix in Figure 48 shows the result of the correlation calculation for Trade Lambs which shows some interesting outcomes, particularly with respect to the OTH Western Australian figures and OTH Tasmanian figures. In addition, there is a distinct contrast in correlation levels between OTH to OTH comparisons in relation to OTH to saleyard comparisons.

The return correlation analysis for saleyard prices highlighted that WA Trade Lamb price movements demonstrated a weak interdependence with the South-eastern region saleyard Trade Lamb price movements, with an  $r^2$  ranging between 0.1259 and 0.1652. In contrast, the correlation measure for WA OTH Trade lamb prices to the respective OTH South-eastern state prices shows a moderate to strong interdependence with an  $r^2$  calculation ranging between 0.5910 and 0.6180. In contrast, Tasmanian OTH returns show very weak correlation scores across the board with all categories scoring an  $r^2$  below 0.15, apart from Tasmanian OTH Trade Lamb to Tasmanian saleyard Trade Lamb with posted an  $r^2$  of 0.1981.

	Vic OTH	Vic Saleyard	NSW OTH	NSW Saleyard	SA OTH	SA Saleyard	Tas OTH	Tas Saleyard	WA OTH	WA Saleyard
Vic OTH		0.3709	0.8620	0.2677	0.8017	0.3097	0.1254	0.2914	0.6180	0.0630
Vic Saleyard	0.3709		0.2866	0.7639	0.2968	0.7867	0.0867	0.4428	0.1030	0.1652
NSW OTH	0.8620	0.2866		0.2696	0.6883	0.2439	0.1324	0.2316	0.5910	0.0480
NSW Saleyard	0.2677	0.7639	0.2696		0.2056	0.6936	0.0590	0.3713	0.0529	0.1259
SA OTH	0.8017	0.2968	0.6883	0.2056		0.2322	0.1412	0.2095	0.5934	0.0760
SA Saleyard	0.3097	0.7867	0.2439	0.6936	0.2322		0.0729	0.3830	0.0513	0.1455
Tas OTH	0.1254	0.0867	0.1324	0.0590	0.1412	0.0729		0.1981	0.0444	0.0267
Tas Saleyard	0.2914	0.4428	0.2316	0.3713	0.2095	0.3830	0.1981		0.0773	0.0466
WA OTH	0.6180	0.1030	0.5910	0.0529	0.5934	0.0513	0.0444	0.0773		0.1008
WA Saleyard	0.0630	0.1652	0.0480	0.1259	0.0760	0.1455	0.0267	0.0466	0.1008	

Figure 48. Returns correlation matrix- monthly averages OTH and saleyard lambs

Analysis for the correlation returns for OTH mutton to saleyard mutton price movements is highlighted in the matrix below (Figure 49). Notably, all the saleyard to saleyard mutton combinations have higher  $r^2$  values than their corresponding OTH to OTH measures, other than the WA figures. The mainland South-eastern region figures show saleyard to saleyard and OTH to OTH correlations that are strong to very strong, ranging between 0.6244 and 0.8057.

	Vic OTH	Vic Saleyard	NSW OTH	NSW Saleyard	SA OTH	SA Saleyard	Tas OTH	Tas Saleyard	WA OTH	WA Saleyard
Vic OTH		0.5073	0.7831	0.4229	0.6902	0.4263	0.2610	0.4547	0.2157	0.1251
Vic Saleyard	0.5073		0.3959	0.8053	0.2903	0.8057	0.0188	0.4924	0.0285	0.2392
NSW OTH	0.7831	0.3959		0.3389	0.6244	0.3303	0.2302	0.3415	0.2733	0.1041
NSW Saleyard	0.4229	0.8053	0.3389		0.2515	0.6654	0.0189	0.4443	0.0428	0.1939
SA OTH	0.6902	0.2903	0.6244	0.2515		0.2574	0.2846	0.3013	0.2329	0.0892
SA Saleyard	0.4263	0.8057	0.3303	0.6654	0.2574		0.0233	0.4258	0.0305	0.2100
Tas OTH	0.2610	0.0188	0.2302	0.0189	0.2846	0.0233		0.0981	0.1372	0.0101
Tas Saleyard	0.4547	0.4924	0.3415	0.4443	0.3013	0.4258	0.0981		0.0648	0.1354
WA OTH	0.2157	0.0285	0.2733	0.0428	0.2329	0.0305	0.1372	0.0648		0.0288
WA Saleyard	0.1251	0.2392	0.1041	0.1939	0.0892	0.2100	0.0101	0.1354	0.0288	

Figure 49. Returns correlation matrix- monthly averages OTH & saleyard mutton

Compared to the WA OTH Trade lamb figures the W.A OTH mutton figures are close to their respective saleyard  $r^2$  measures, with all the W.A saleyard to saleyard and OTH to OTH combinations ranging between very weak to weak correlations of 0.1354 to 0.2733.

OTH and saleyard correlations have been further analysed through rankings in the appendix (Figure 117 & Figure 118).

## 8.2 OTH to saleyard historic spreads – trade lamb and mutton by state

Table 12 highlights the historic average spreads for saleyard to OTH prices for Mutton and Trade Lamb according to state, along with the 70% range and 95% range – which gives an indication of the normal and extreme variation that can exist across each category<sup>1</sup>.

<sup>1</sup> The 70% range measures one standard deviation away from the average and can be considered what is normal spread variation. The 95% range measures two standard deviations away from the average and fluctuations outside this range could be considered extreme, according to the historic data over the last two decades.

**Table 12. Summary of OTH spreads**

		Average Spread ¢/kg	70% range	95% range
<b>Trade</b>	NSW Saleyard to OTH	9	18¢ discount to 36¢ premium	45¢ discount to 63¢ premium
	Vic Saleyard to OTH	5	22¢ discount to 31¢ premium	48¢ discount to 57¢ premium
	SA Saleyard to OTH	4	34¢ discount to 42¢ premium	72¢ discount to 79¢ premium
	WA Saleyard to OTH	-9	51¢ discount to 33¢ premium	92¢ discount to 75¢ premium
	Tas Saleyard to OTH	2	29¢ discount to 34¢ premium	60¢ discount to 65¢ premium
<b>Mutton</b>	NSW Saleyard to OTH	26	2¢ premium to 51¢ premium	22¢ discount to 76¢ premium
	Vic Saleyard to OTH	26	2¢ discount to 53¢ premium	29¢ discount to 81¢ premium
	SA Saleyard to OTH	15	19¢ discount to 48¢ premium	53¢ discount to 82¢ premium
	WA Saleyard to OTH	18	17¢ discount to 54¢ premium	52¢ discount to 89¢ premium
	Tas Saleyard to OTH	4	33¢ discount to 40¢ premium	69¢ discount to 76¢ premium

### New South Wales

The long-term average spread for NSW saleyard trade lamb to NSW OTH Trade Lamb sits at a 9¢ premium and the trend in the spread over the last two decades has remained fairly even, as evident by the relatively flat linear spread line (Figure 119).

Similarly, the NSW saleyard mutton to NSW OTH mutton historic spread pattern shows a stable spread linear trend, although the long-term average spread level is higher at a 26¢ premium.

The long-term average spread for NSW saleyard trade lamb to NSW OTH Trade Lamb sits at a 9¢ premium and the trend in the spread over the last two decades has remained fairly even, as evident by the relatively flat linear spread line.

Similarly, the NSW saleyard mutton to NSW OTH mutton historic spread pattern shows a stable spread linear trend, although the long-term average spread level is higher at a 26¢ premium (Figure 120).

### Victoria

The Victorian Saleyard Trade Lamb long term average spread to the Victorian OTH Trade Lamb sits at a 5¢ premium (Figure 121). However, the linear trend of the spread over time shows that the spread has been narrowing over time. Indeed, over the last five years the average spread has been running at a discount of 11¢.

The long-term average spread for Victorian saleyard Mutton to Victorian OTH Mutton (Figure 122) shows a remarkably similar situation to NSW Mutton with a reasonably stable linear trend to the spread, showing a very slight widening over time, at sitting at the same level of a 26¢ premium. The 70% and 95% range for the Victorian and NSW Mutton spreads are also similar.

### South Australia

The South Australian Saleyard Trade Lamb to OTH Trade Lamb long-term average spread sits at a slight premium of 4¢, although as was the case in the Victorian Trade Lamb trend it has been narrowing significantly over time (Figure 123). Indeed, the average spread was at a premium of 32¢ during 2000 to 2005, narrowing to an average spread of just 2¢ premium during 2006 to 2010 and has recorded an average of a 22¢ discount over the last five years.

The SA Saleyard Mutton to OTH Mutton has displayed a reasonably stable spread over time, in a similar vein to the other two mainland South-eastern states, albeit at a slightly narrower long-term average premium of 15¢ (Figure 124).



## Western Australia

The Western Australian Saleyard Trade Lamb to OTH spread trend through time is mirroring the experience of the South-eastern regions in that the spread has shown to be narrowing over time (Figure 125). However, in contrast to all the other Trade Lamb to OTH spreads the W.A spread is sitting at a long-term discount of 9¢. Over the last five years the WA Saleyard to OTH Trade Lamb spread has widened to an average discount of 27¢.

The WA Saleyard Mutton to OTH Mutton spread continues to replicate the other states Mutton patterns with a relatively stable liner spread trend and a long-term average premium recorded of 15¢ (Figure 126). Just as the Victorian and NSW long-term average spread levels, 70% range and 95% range were similar, so too is the case for the South Australian and Western Australian Mutton.

## Tasmania

The Tasmanian Saleyard to OTH Trade Lamb long-term average spread sits at a very narrow 2¢ premium and is the only category of Trade Lamb to show a slight widening of the premium spread over time (Figure 127). However, there has been a lack of reported OTH data in the last few years from Tasmania which limits the ability to obtain a view of the most recent spread situation. The Tasmanian Saleyard to OTH Mutton spread also demonstrates a slight widening over time and recorded a long-term spread of a mere 4¢ premium, by far the narrowest spread of all mutton spread categories. The OTH data is also unreported for the recent period making the current spread situation for Tasmanian Mutton difficult to assess (Figure 128).

## 8.3 OTH spread seasonality- trade lamb and mutton by state

Just as seasonality in price movement has been identified for the state trade lamb and mutton categories there also exists a level of seasonality in terms of spread patterns between saleyard to OTH prices for state trade lamb and mutton categories.

The following findings were determined from the spread seasonality analysis (Figures in the appendix):

### New South Wales

- NSW saleyard to OTH Trade Lamb spread patterns do not tend to present a distinct peak and trough during the season (Figure 129).
- NSW saleyard to OTH Trade lamb spreads tend to show widening during the beginning and end quarter of the season between a 20-40¢ premium range and often narrow through the second and third quarter of the year towards a flat to 5¢ discount.
- NSW saleyard to OTH Mutton spreads displays a slight tendency for a peak during Winter after a gradual widening over the first two quarters of the season, from 20¢ discount to 40¢ premium range early in the season to a 20¢ premium to 60¢ premium range by the middle of the year (Figure 130). This is followed by a narrowing into late Winter/early Spring back toward a 20¢ discount to a 40¢ premium range. Although, compared to the other state patterns the peak and trough are far less pronounced for NSW Mutton.

### Victoria

- Victorian saleyard to OTH Trade Lamb spread tends to consolidate sideways for much of the first two quarters of the season within a 20¢ discount to a 40¢ premium range, followed by a distinct

trough during early spring towards a 40-70¢ discount (Figure 131). The spread then tends to widen gradually during Spring to begin consolidating again between a discount of 20¢ and 40¢ premium range by the year end.

- Victorian saleyard to OTH Mutton spread stages a gradual widening during the first two quarters of the season, but much of the spread pattern shows consolidation with a slight bias to widening over this period without a clear seasonal peak present. Much of this time is spent ranging between a 10¢ premium to 70¢ premium boundary (Figure 132). The saleyard to OTH Mutton spread does narrow significantly during late Winter/early Spring toward a flat to 40¢ discount spread, before staging a gradual widening over quarters three and four back toward a 10¢ premium to 70¢ premium range.

### South Australia

- South Australian saleyard to OTH Trade Lamb spread shows a reasonably consistent pattern of narrowing from a 20¢ discount to 40¢ premium range at the start of the season to reach a trough between the 10¢ discount to 60¢ discount range by the middle of the year (Figure 133). The second half of the year is denoted by a gradual move from a discount to a premium spread such that the end of the season is characterised by a spread ranging between a discount of 20¢ to a 40¢ premium.
- South Australian saleyard to OTH Mutton spread pattern is characterised by broad consolidation between a 10¢ discount to an 80¢ premium range for much of the first half of the season (Figure 134). This is followed by a distinct trough with the spread narrowing to a discount into a trough in early Spring between a flat to 70¢ discount range. The spread then gradually improves to finish the season between a flat to 60¢ premium range.

### Western Australia

- Much of the first two quarters of the season for the Western Australian saleyard to OTH spread pattern is characterised by a broad sideways consolidation ranging between a 50¢ discount to a 50¢ premium (Figure 135).
- The Western Australian saleyard to OTH spread pattern shows the most distinct seasonal trough of all Trade Lamb state categories with a significant widening of the discount spread during Spring to see it range between a discount of 40¢ to a discount of 100¢ by mid Spring.
- Western Australian saleyard to OTH Mutton spread displays slightly more volatility than the other state mutton spread patterns but still shows a tendency toward consolidation with a widening bias during the first half of the season (Figure 136). The spread can widen from a 20¢ discount to a 40¢ premium range at the start of the year toward a 20¢ premium to 90¢ premium range by late Winter. A distinct trough is noted during Spring to see the spread move toward a 40¢ discount to 20¢ premium range by late Spring/early Summer.

### Tasmania

A lack of regular OTH data reporting for Tasmania over the last eighteen months have rendered spread seasonality analysis for Trade Lamb and Mutton ineffective and has not been included as part of this analysis.

## 9 Structural differences across the sheepmeat value chain

This chapter analyses structural differences in the sheepmeat industry across the regions of Australia. The analysis focuses on understanding the links and functional integration between production systems and regions on the one hand, and downstream processing and value-adding on the other.

It also seeks to understand the degree of integration across saleyards and direct producer-processor transactions (as measured by over-the-hook prices), and to understand what structural differences might exist between these markets.

Key structural questions are:

- What differences across regions and States be observed in the data on price, quantity and quality variables?
- What effect do quality attributes have on prices, in particular fat score and carcass weight?
- What regularities are there between prices across sheep categories and across buyer categories?
- To what extent do prices at these saleyards move together over time? In other words, how integrated are the markets?
- Which of these saleyards are dominant? That is, which are the most influential in so far as they lead other saleyards in the price discovery process? <sup>1</sup>
- Which are the satellite markets, taking their price cues from other, more dominant saleyards?

Key findings on over the hooks prices versus saleyard prices:

- In every State, the saleyard prices lead the OTH prices. The implication is that processors are not determining livestock prices, but simply following the lead provided by saleyards; typically responding with a lag of up to three weeks. Refer to section 9.1.2 for more details, in particular Figure 55.
- OTH prices move within a much narrower band compared to saleyard prices. They do not follow the large swings that are a feature of saleyard prices.
- Victorian OTH and saleyard prices are the most integrated. This result is possibly related to the fact that Victoria has the largest sheepmeat processing industry, substantially exceeding Victoria's processor purchases at saleyards; so processors need to source substantial livestock volumes inter-state.

Key findings on saleyard price differences:

WA saleyard prices do not track Eastern saleyard prices closely. WA prices are generally lower and can be more volatile from time to time. Local demand factors may explain at least part of the East-West differences. For example, live export purchases at saleyards are almost exclusive to WA.

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<sup>1</sup> When price lags are considered (previous weeks' prices), a dominant market relationship can be said to exist if lagged prices from saleyard X are stronger in influencing prices in saleyard Y, than Y is stronger in influencing prices at X.

Moreover, Live Export demand tends to fluctuate and does not follow a seasonal pattern. Feedlotter purchases are higher in WA than all other saleyards.

Larger saleyards tend to realize higher sale prices and lower volatility in prices. This may be explained by an inherently more efficient price discovery process at work in larger saleyards:

- Sheep and lamb trades at larger saleyards attract a *saleyard premium*; 'large' is measured by the volume of sheep and lamb sold on sale days. This premium can range from +50 cents per kg to - 50 cents per kg, depending on the saleyard.
- At the same time the volatility of this saleyard premium tends to be lower at larger saleyards.
- Relative to an SA saleyard baseline, NSW and VIC saleyards attract the largest premiums, while WA saleyards attract a *saleyard discount*.

Structural price-quality premiums are also confirmed in the data. Livestock prices at saleyards are generally rational in the sense that, over the longer-run:

- Lamb and Young Lamb categories attract a large premium over sheep categories.
- Fat scores of 3 and 4 attract a premium over lower and higher fat scores.
- Carcass weights around 18 to 22 kgs are more highly valued over lower and higher weights.
- Larger lot sizes tend to trade at a higher price.

From time to time, supply and demand imbalances can drive these premiums out-of-kilter, but quality premiums revert to their long-run average value.

In terms of buyer groups:

- Processor purchases generally represent 80% or more of saleyard throughput across the year, except in WA saleyards, where Live Exporters are active in the saleyard market.
- NSW has by far the largest number of saleyard purchases by processors.
- The WA saleyards have the largest purchases by feedlot operators, as a proportion of saleyard throughput, as well as the largest purchases by Live Exporters.
- The Live Export category premium has been the most volatile.
- The Feedlotter category premium has declined sharply since 2014.

## 9.1 Structural differences at the state-level

The findings are as follows:

- The saleyard markets in NSW and Victoria are the most integrated, followed by South Australia, then Western Australia.
- NSW saleyards tend to lead those in Victoria, while NSW and Victoria lead South Australian markets.
- Saleyards in Western Australia are not well integrated with markets in South Australia, Victoria or NSW.

Which are the dominant markets?

- in NSW, (in alphabetical order): Carcoar, Cowra, Griffith and Wagga

- in Victoria: Ballarat
- in South Australia: Adelaide Plains
- in Western Australia: Katanning.

Which are the satellite markets?

- in NSW, these are (in alphabetical order): Dubbo, Forbes, Inverell and Tamworth
- in Victoria: Bendigo and Hamilton
- in South Australia: Naracoorte and Mount Gambier
- in Western Australia: Muchea.

### 9.1.1 Movements of livestock

Since 2010, the movements of some 335 million sheep livestock, both inter- and intra-state, have been recorded by the National Livestock Integrity Service. Table 13 below shows the composition of these flows, from each State to each other State, together with State originations (each row total), and each State's total inflows (each column total).<sup>1</sup> It shows:

- The largest producer is NSW, which originated 43.30 per cent of total flows, followed by VIC (25.105 per cent) and SA (15.213 per cent).
- The largest cross-border flow was from NSW to VIC (7.66 per cent of total flows).
- Livestock movements out of WA to NSW, SA and VIC were recorded (0.023 per cent, 0.106 per cent and 0.026 per cent respectively).

**Table 13. All inter- and intra-state livestock flows from 2010 to 2017, expressed as a percentage of all movements (100 per cent = 335 million sheep).**

Origin	To.NSW	To.QLD	To.SA	To.TAS	To.VIC	To.WA	Total
<b>NSW</b>	33.508%	1.028%	1.133%	0.002%	7.668%		43.340%
<b>QLD</b>	0.531%	0.755%	0.031%		0.072%		1.388%
<b>SA</b>	0.074%	0.001%	12.073%	0.001%	3.063%	0.001%	15.213%
<b>TAS</b>	0.001%		0.001%	0.473%	0.525%		0.999%
<b>VIC</b>	1.197%	0.002%	2.512%	0.005%	21.388%	0.001%	25.105%
<b>WA</b>	0.023%		0.106%		0.026%	13.799%	13.954%
<b>Total</b>	35.333%	1.785%	15.857%	0.481%	32.743%	13.801%	100.000%

Table 14 shows the composition of inter-state movements:<sup>2</sup>

- The largest 'exporting' state is NSW, which generated 54.6 per cent of total inter-state flows, followed by VIC (20.6 per cent) and SA (17.4 per cent).
- The largest 'importing' state is VIC, which absorbed 63 per cent of total inter-state flows, followed by SA (21 per cent) and NSW (10 per cent).

<sup>1</sup> The Table shows only inter-state flows of more than 1000 livestock over the period 2010 to 2017. Each 1 per cent represents 3.35 million sheep, while each 0.001 per cent represents 3,350 sheep.

<sup>2</sup> The Table shows only inter-state flows of more than 1000 livestock over the period 2010 to 2017. Each 1 per cent represents 600,000 sheep.

- The largest cross-border flow was from NSW to VIC (42.6 per cent of total interstate flows).
- Livestock movements out of WA to NSW, SA and VIC were 0.865 per cent of total flows, while imports into WA were 0.013 per cent.

**Table 14. Inter-state livestock flows from 2010 to 2017, expressed as a percentage of all inter-state movements (100 per cent = 60 million sheep).**

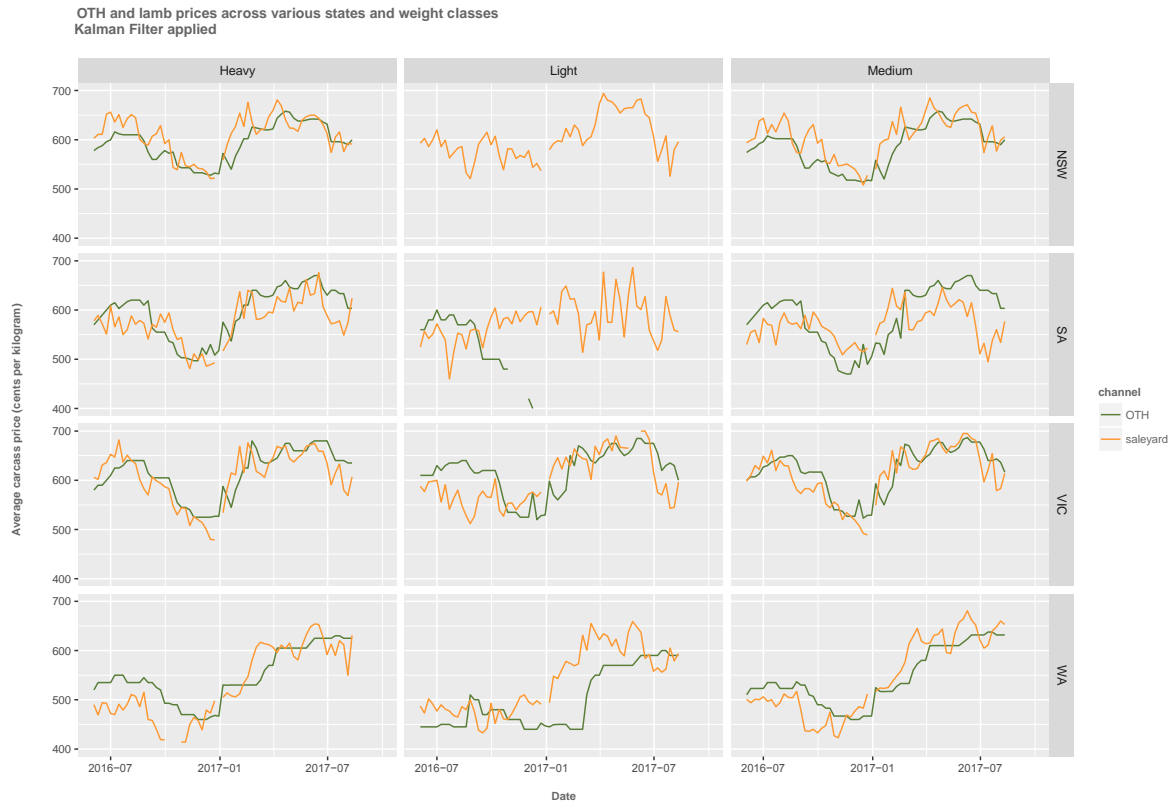
Origin	To.NSW	To.QLD	To.SA	To.TAS	To.VIC	To.WA	Total
<b>NSW</b>		5.708%	6.294%	0.012%	42.592%		54.606%
<b>QLD</b>	2.948%		0.173%		0.398%		3.520%
<b>SA</b>	0.409%	0.004%		0.005%	17.014%	0.007%	17.440%
<b>TAS</b>	0.004%		0.004%		2.918%		2.926%
<b>VIC</b>	6.646%	0.013%	13.952%	0.027%		0.005%	20.644%
<b>WA</b>	0.129%		0.590%		0.146%		0.865%
<b>Total</b>	10.137%	5.725%	21.013%	0.044%	63.067%	0.013%	100.000%

### 9.1.2 The direction and strength of price information flows

A key aspect of market operations is to do with the direction in which price information flows across different livestock markets. Where the price in one market persistently leads prices elsewhere, a lead-lag relationship can be said to exist between prices at this 'dominant' price discovery market and those at 'satellite' markets. A second aspect is to do with the speed by which prices at a satellite market adjust to a price change in the dominant market.

This section explores the relationship between State-level saleyard prices of Trade Lamb and OTH prices of Medium Lamb. Figure 50 below shows the strength and direction of influences based on the Granger causality test, which is explained in the appendix. The nodes represent the price variables (OTH or Trade Lamb) and their State, while the arcs show the direction of influence and strength of influence (arc thickness). The network map reveals the following:

- In every State, the saleyard prices lead the OTH prices. The implication is that processors are not determining livestock prices, but simply following the lead provided by saleyards; typically responding with a lag of up to three weeks.
- NSW saleyard prices lead South Australian and Tasmanian saleyard prices, as well as OTH prices in NSW, South Australia and Victoria.
- Victorian saleyard prices lead Tasmanian saleyard prices, as well as OTH prices in NSW, South Australia and Victoria.
- The two-way causality between WA saleyard prices and OTH prices in South Australia indicates the presence of other factors (variables) which have not been modelled in this Granger test; similarly for OTH prices in Victoria and Western Australia.
- NSW OTH prices lead OTH prices in South Australia, Tasmania, Victoria and Western Australia.



**Figure 50. OTH and saleyard lamb prices across various states and weight classes**

Figure 51 presents OTH and saleyard lamb prices across various states and weight classes. It reveals the following:

- OTH prices tend to lag saleyard prices in each State in most periods; slow to follow saleyard prices up and slow to follow them down.
- Victorian OTH and saleyard prices are the most integrated. This result is possibly related to the fact that Victoria has the largest processing industry, substantially exceeding Victoria's processor purchases at saleyards; so processors need to source substantial livestock volumes inter-state.<sup>1</sup>

Figure 52 presents comparative histograms of the week-to-week price movements of OTH and saleyard prices, Heavy, Light and Medium lamb prices in the States of NSW, VIC, SA, TAS and WA. It reveals that OTH prices move within a much narrower band compared to saleyard prices, and do not follow the large swings that are a feature of saleyard prices.

<sup>1</sup> See Figure 68 , showing how the number of sheep and lamb slaughtering compare with the number of head purchased by processors at saleyards, for each State.



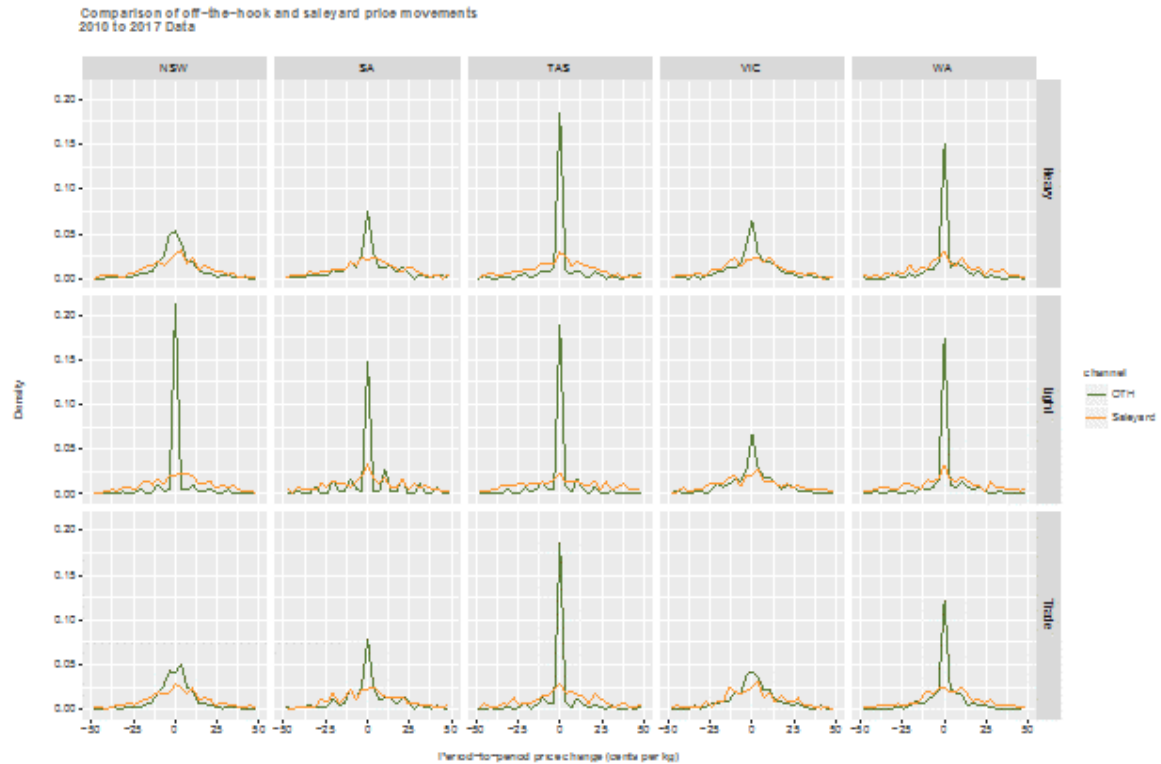


Figure 52. Comparison of OTH and saleyard price movements

Figure 53 presents comparative histograms of the fat scores reported at saleyards, aggregated to the State level. It reveals the following:

- NSW, SA, TAS and VIC have the tightest conformance to the target scores of 2, 3 and 4.
- WA has lower overall fat scores, with the highest proportion of 1 and 2 fat scores.

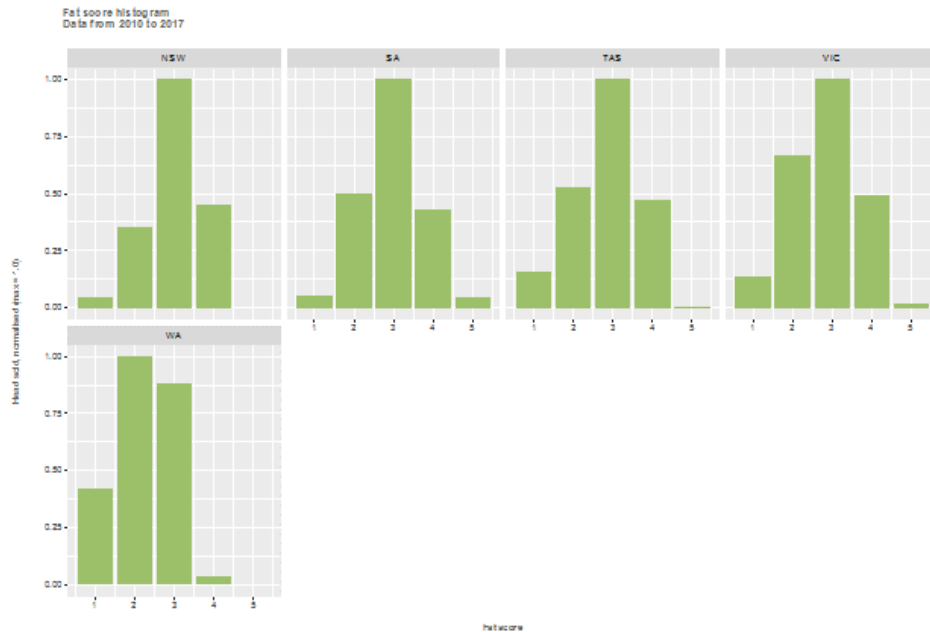


Figure 53. Comparison of overall fat scores by State

## 9.2 Structural differences across auction marketing channels

Electronic online auction of livestock by description is the fastest growing channel in livestock marketing. Compared to the saleyard channel, the e-channel enables direct consignment from farm to the buyer; while for producers greater control of livestock trade is retained since they can set a reserve price.

In Australia, AuctionsPlus is Australia's only commercial internet auction system for marketing livestock. Once an AMLC research project<sup>1</sup>, AuctionsPlus is now a company, owned by the three major pastoral houses of Elders, Landmark and Ruralco.<sup>2</sup>

At AuctionsPlus the volume of sheep traded has been growing at a compound annual rate of more than 10 percent per year since 2013-14, reaching 2.75 million sheep and lamb sales in 2016-17. A total of 3.3 million head of sheep and lamb is projected for the year to June 2018, a 34 percent increase over the previous year. The company currently accounts for 8% of the sheep transacted in Australia, with some 85 percent of trades being store animals traded between producers. As for the saleyard channel, the largest sheep and lamb markets for AuctionsPlus are in NSW followed by VIC and SA.<sup>3</sup>

Figure 54 compares the sheep and lamb lot sizes at the auctions: AuctionsPlus versus saleyards, by State. It shows that average lot sizes on the e-commerce channel are 200 or more, compared with less than 70 livestock at saleyards. Queensland and WA have the largest e-commerce lot sizes.<sup>4</sup> AuctionsPlus now manage more than 80,000 sheep and lamb per sale day, compared with 5,000 to 35,000 per day at saleyards across Australia.

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<sup>1</sup> The Computer Aided Livestock Marketing (CALM) project was created in 1986 with funding by the former R&D levy service provider, Australian Meat & Livestock Corporation.

<sup>2</sup> The AuctionsPlus website is <[www.auctionsplus.com.au](http://www.auctionsplus.com.au)>

<sup>3</sup> Source: Personal communications with the CEO of AuctionsPlus, Anna Speer.

<sup>4</sup> Note that Queensland saleyard data for sheep and lamb are not reported by MLA.

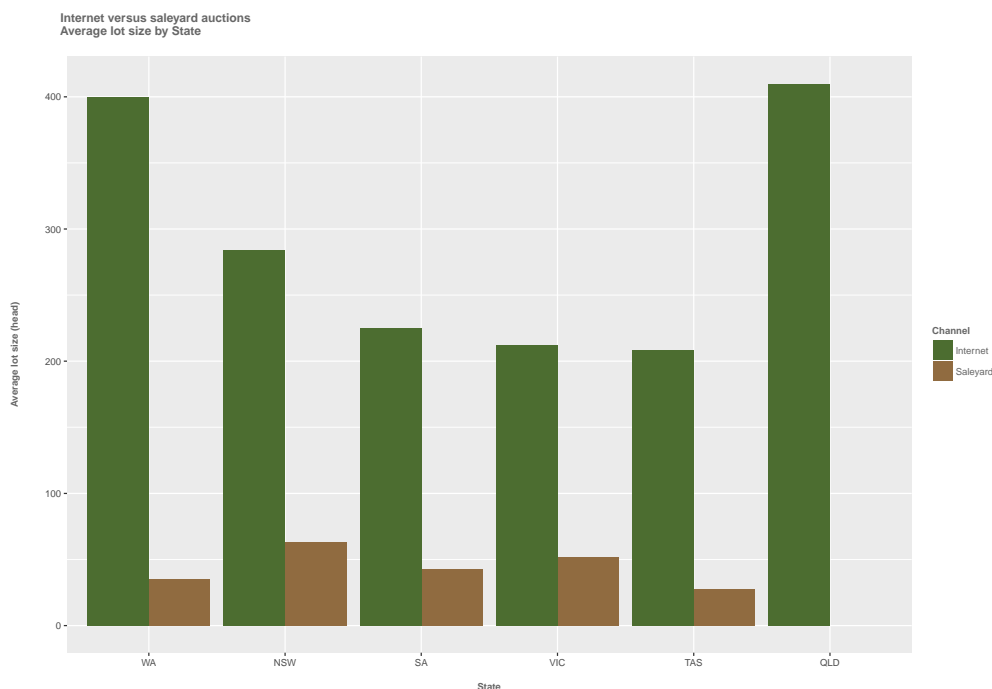


Figure 54. Lot sizes of internet auctions vs saleyards

### 9.2.1 The operation of online auctions

At its weekly commercial auctions, AuctionsPlus employs the Helmsman system of simultaneous auctioning of lots. In the Helmsman system, the whole offer board is closed off only after a certain interval during which no bids have been lodged. Livestock are assessed by independent assessors who are accredited by AuctionsPlus to ensure that buyers have the confidence to purchase. Assessors must meet tolerances for weight, age, breed and description of risk penalties.

Features of the Internet channel include:

- **Option to re-offer:** The seller is able to set a reserve price, and to re-offer the lot at a later date if it does not sell. This means that the seller can avoid the downside volatility in auction prices that can be a feature of physical auctions, particularly the smaller saleyards.
- **Superior auction design:** In a simultaneous auction, a large collection of related lots is up for auction at the same time. Hence, the bidders get information about prices on all the lots as the auction proceeds. Bidders can switch among lots based on this information, so there is less of a need to anticipate where prices are likely to go.<sup>1</sup>
- **Potentially more buyers and sellers on the day:** Since anyone, anywhere can participate, the internet auction lowers the barriers to transactors. Currently, attendance at AuctionsPlus Eastern sheep and lamb sales is around 300 registered bidders, with a similar number of guests and viewers. More than 60 percent of participants access the auctions via mobile devices. Buyers are mainly re-stockers and agents.

<sup>1</sup> According to (Chan, et al., 2003) at the Productivity Commission, the simultaneous auction may be the most efficient system for trading, in the sense that the lots tend to go to those buyers who value them the most.

- **Animal health and welfare:** As with direct sales from farm to processor, bio-security risks are lower with internet auctions compared with live auction markets. Moreover, the journey to market can be much shorter, for example direct from farm to processor or from farm to re-stocking farm.
- **Connectivity needed:** Participants generally require little training, but they must have good telecommunications connectivity. The lack of good connectivity in rural Australia is an inhibitor to the growth of the Internet channel.

### 9.3 Structural differences across saleyards

This section explores the relationship between prices across saleyards. Figure 55 presents a network map of the significant relationships estimated between prices at different saleyards, in terms of both strength and direction of influence. The nodes represent the saleyards, while the arcs show the direction of influence and strength of influence (arc thickness).<sup>1</sup> What the network map reveals is that:

- The NSW saleyards of Wagga (WAG), Carcoar (CTL), Cowra (COW), Griffith (GRI) are the dominant markets. They lead other NSW saleyards such as Forbes.
- SA saleyards (Adelaide Plains (ADL), Mt Gambier (MOU) and Naracoorte (NAR)) and VIC (Ballarat (BAL) Bendigo (BEN) and Hamilton (HAM)) saleyards take their lead from the NSW.
- Larger saleyards, for example Wagga, tend to influence smaller saleyards such as Tamworth. One anomaly is Dubbo (DUB), which is the second largest saleyard; yet it takes its lead from other NSW saleyards.
- The strength of influence tends to increase for saleyards in closer proximity.

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<sup>1</sup> The saleyard codes are as follows: ADP (Adelaide Plains, SA), BAL (Ballarat, VIC), BEN (Bendigo, VIC), COW (Cowra, NSW), CTL (CTLX Carcoar, NSW), DUB (Dubbo, NSW), FOR (Forbes, NSW), GRI (Griffith, NSW), HAM (Hamilton, VIC), INV (IRLX Inverell, NSW), KAT (Katanning, WA), MUC (Mucchea, WA), NAR (Naracoorte, SA), NTS (Northern Tas Saleyards, TAS), TAM (TRLX Tamworth, NSW), and WAG (Wagga, NSW).

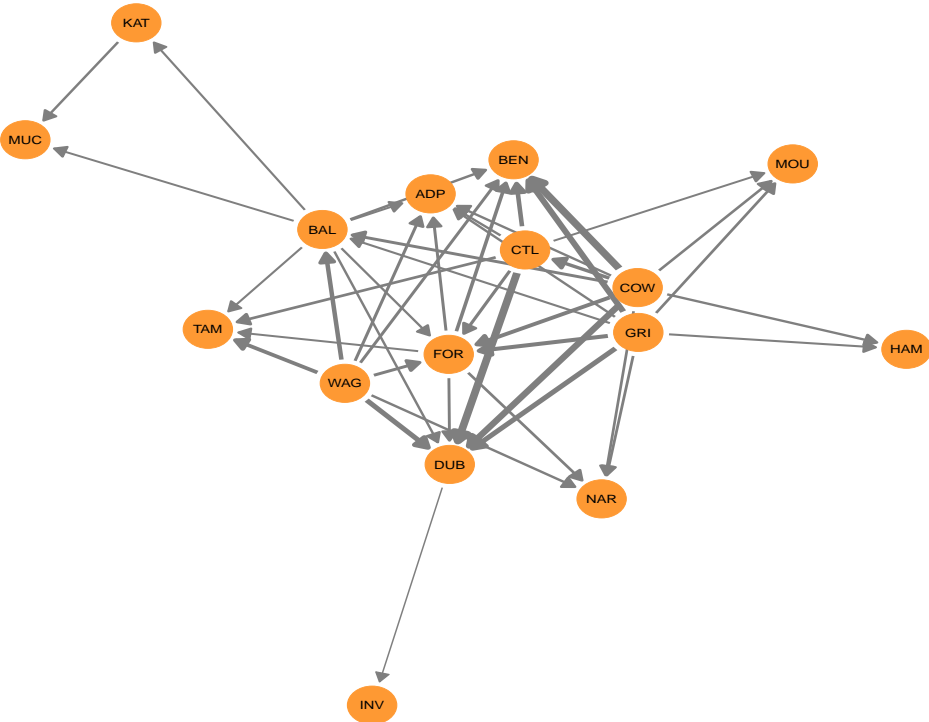


Figure 55. Network map of the significant relationships between saleyards

One implication of these results is that for those regions where information is transmitted rapidly across the separate saleyard markets, there may be little gain in the detailed reporting of all saleyards. The underlying movements will be the same. A summary of price levels for different categories of livestock maybe sufficient. However, at the 'strategic' saleyards such as Wagga, it may be valuable to extend reporting to a more detailed level to provide the wider market with more price information; for example, on livestock quality, weight range and category premiums.

9.3.1 Methodology to quantify structural differences across saleyards

To explain carcass prices, the statistical modelling presented in the following sections is based on MLA saleyard data on individual sheep and lamb lot sales. Each lot records its saleyard ID, the category of sheep type, its SalePrefix ID (buyer group), fat score and average weight. Figure 56 shows the full range of 'factors' used to explain carcass prices.

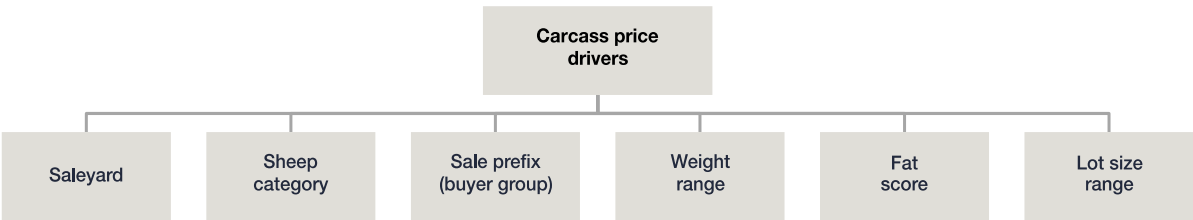


Figure 56. Factors used to explain carcass prices in the statistical model

For each factor such as Saleyard ID, a baseline is selected. The baseline selected for the Saleyard ID is ADP (Adelaide Plains), although any other saleyard could be chosen as the baseline, since the choice of baseline does not change the inferences that can be drawn from the statistical modelling. The model estimates the values of other Saleyards as either premiums or discounts against ADP.

Statistical models were run for each trading week across all saleyards to determine the strength of the effect of each factor and its variables on the predicted price. Each factor's strength is expressed as a premium or a discount relative to the nominated baseline.

From these individual week-by-week models, a picture emerges of long-run trends over time.

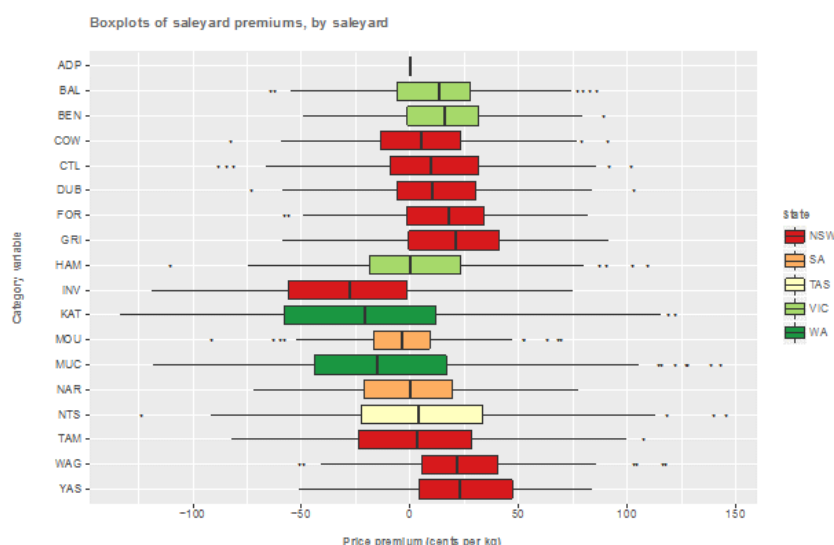
The source of data is the MLA's National Livestock Reporting Service, which provided more than 1.5 million records of lot transactions at the main saleyards across Australia available for statistical analysis:

- 16 major saleyards across NSW, SA, TAS, VIC and WA, for which a full data set is available<sup>1</sup>
- data from January 2010 to August 2017.

Some key data are collected in real-time by the Livestock Marketing Officer (LMO) at each saleyard. While each lot is being auctioned, approximately ten seconds is available for the LMO to assess two key value indicators for each lot, fat score and average carcass weight.

The following charts reveal structural differences using boxplots<sup>2</sup>, which summarizes the means and volatility of the time series of factor premiums and discounts.

Figure 57 presents the premiums and discounts applying to each of the 17 saleyards.<sup>3</sup> As explained in the previous section, the saleyard premium is relative to the selected baseline saleyard, which is the Adelaide Plains Saleyard (ADP).



**Figure 57. Saleyard premiums and discounts**

<sup>1</sup> The 16 saleyards modelled are as follows: ADP (Adelaide Plains, SA), BAL (Ballarat, VIC), BEN (Bendigo, VIC), COW (Cowra, NSW), CTL (CTLX Carcoar, NSW), DUB (Dubbo, NSW), FOR (Forbes, NSW), GRI (Griffith, NSW), HAM (Hamilton, VIC), INV (IRLX Inverell, NSW), KAT (Katanning, WA), MUC (Mucchea, WA), NAR (Naracoorte, SA), NTS (Northern Tas Saleyards, TAS), TAM (TRLX Tamworth, NSW), and WAG (Wagga, NSW).

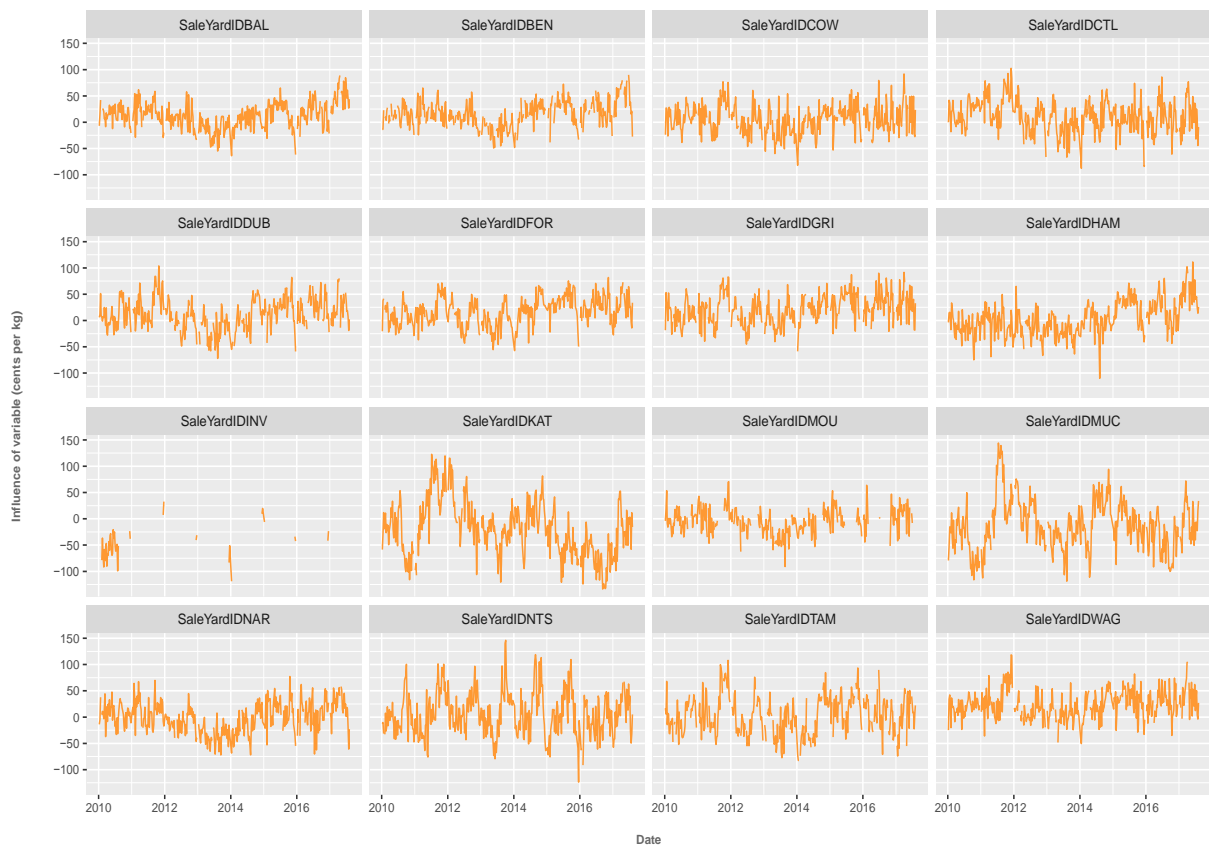
<sup>2</sup> The boxplot a simple way of representing statistical data on a plot in which a box is drawn to represent the second and third quartiles, with a horizontal line inside to indicate the median value. The lower and upper quartiles are shown as vertical lines either side of the rectangle.

<sup>3</sup> The saleyard codes are as follows: ADP (Adelaide Plains, SA), BAL (Ballarat, VIC), BEN (Bendigo, VIC), COW (Cowra, NSW), CTL (CTLX Carcoar, NSW), DUB (Dubbo, NSW), FOR (Forbes, NSW), GRI (Griffith, NSW), HAM (Hamilton, VIC), INV (IRLX Inverell, NSW), KAT (Katanning, WA), MUC (Mucchea, WA), NAR (Naracoorte, SA), NTS (Northern Tas Saleyards, TAS), TAM (TRLX Tamworth, NSW), and WAG (Wagga, NSW).

Some features of Figure 57 are noteworthy:

- The highest average premiums, in order, apply to Wagga, Griffith and Forbes (24, 21 and 17 cents per kg respectively).
- The highest average discounts, in order, apply to Inverell, Katanning and Muchea (-27, -20 and -12 cents per kg respectively).
- The largest variances in premiums and discounts, as measured by the width of the boxes, apply to Katanning and Muchea and Northern Tasmania Saleyard (NTS).
- The smallest variances in premiums and discounts, in order, apply to Mount Gambier, Bendigo and Ballarat.

These saleyard premiums and discounts reflect the long-run structural differences in the saleyard markets across Australia. The corresponding time series of these statistical modelling results are shown in the following Figure 58.<sup>1</sup>



**Figure 58. Time series of saleyard price premiums and discounts from 2010 to 2017**

Some features of Figure 58 are noteworthy:

- In the short-run, supply and demand imbalances can drive these premiums up and down, but over the long-run, each saleyard premium generally reverts to its long-run mean value.

<sup>1</sup> Note that the data for Inverell is incomplete.



- WA saleyards Katanning and Muchea have more volatile premiums, compared with similar sized saleyards in NSW such as Griffith (GRI) and Carcoar (CTL)
- Smaller saleyards such as Northern Tasmania (NTS) and Tamworth (TAM) tend to have more volatile saleyard premiums.

### 9.3.2 Saleyard premiums and the effect of saleyard market volume on price discovery

The presence or absence of many buyers and sellers in a market has been examined extensively in the general economics literature; for example, see Tomek, 1980.

There can be a problem in price discovery where there are fewer market participants and fewer market transactions. Tomek, 1980 examined the effect on price behaviour of thin markets for agricultural commodities. He pointed out that an increase in the number of transactions per unit of time leads to an increase in the amount of information to market participants about the likely level of the unknown equilibrium price. Conversely, a reduction in the number of transactions will lead to a reduction in such information (Tomek, 1980, p.435). Such a reduction in information would be revealed through an increase in the variance of the mean transaction price.

If there is an effect of saleyard market volume on price discovery process, it should be expressed in the saleyard premiums and discounts, after taking account of the quality characteristics of the lots being sold. This effect is explored in the following Figure 59 and Figure 60.

Figure 59 below shows the relationship between each saleyard's market volume, as measured by the average head sold each sale day, and the mean saleyard premium over the period 2010 to 2017, for each saleyard. As the market volume of traded livestock increases, there is an increase in saleyard premiums. Outliers on this chart are Inverell, Katanning and Muchea with abnormally high discounts (negative saleyard premiums), as well as Griffith (GRI), Carcoar (CTL) and Northern Tasmania (NTS) with abnormally high premiums.

The R-squared value <sup>1</sup> for the line of best fit on the chart, shown in the top right-hand corner, is 0.33, which indicates a moderate relationship. If the WA saleyards are removed from the data, the R-squared value increases to 0.48.

---

<sup>1</sup> R-squared is a statistical measure of how close the data are to the fitted regression line. A value of 1.0 indicates that the model explains all the variability of the response data around its mean, while a value of 0 indicates that the model explains none of the variability.

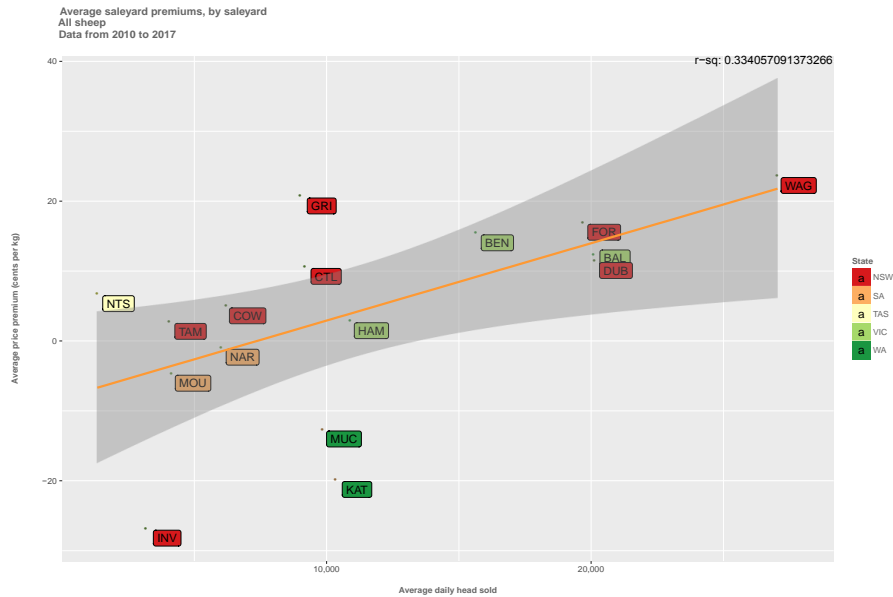


Figure 59. Saleyard premiums are positively related to saleyard size

Figure 60 below shows the relationship between each saleyards market volume and its premium volatility, as measured by the standard deviation of the mean saleyard premium. As market volume increases, there is a reduction in saleyard premium volatility.

Outliers on this chart are Katanning and Muchea with abnormally high volatility in the saleyard premium. Saleyards with abnormally low volatility are Mount Gambier, Cowra and Griffith.

The R-squared value for the line of best fit on the chart, shown in the top right-hand corner, is 0.13, which indicates a weak relationship. If the WA saleyards are removed from the data, the R-squared value increases to 0.31.

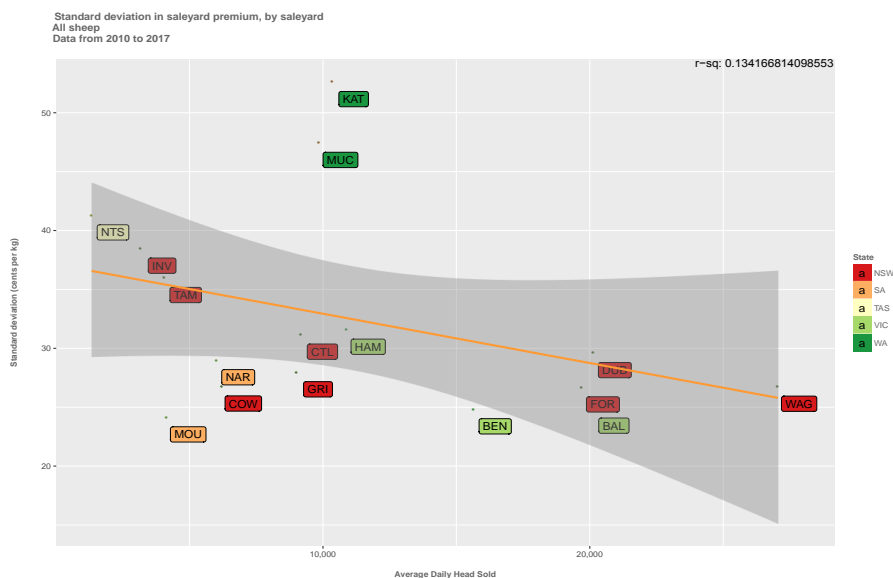
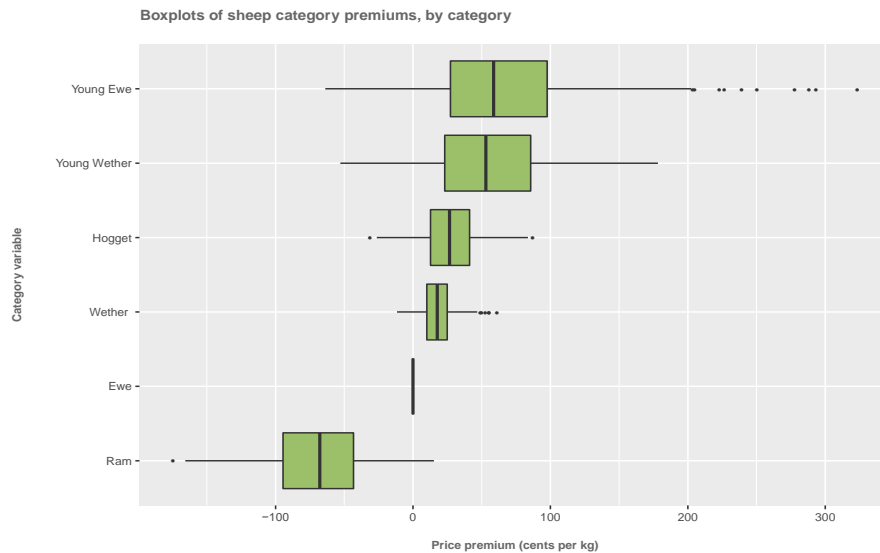


Figure 60. The standard deviation in saleyard premiums are negatively related to saleyard size

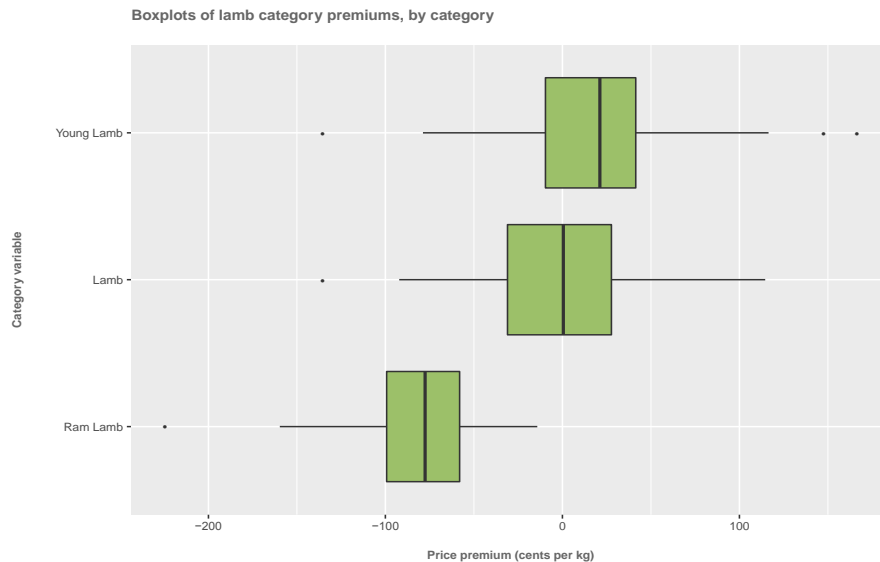
## 9.4 Price premiums across sheep and buyer categories

### 9.4.1 Sheep categories

Saleyards record up to nine sheep categories for lot sales. Figure 61 and Figure 62 presents the premiums and discounts associated with sheep categories (relative to Ewe sales) and the lamb categories (relative to lamb).



**Figure 61. Sheep premiums by category**



**Figure 62. Lamb premiums by category**

Some features of Figure 61 and Figure 62 are noteworthy:

- Relative to the Ewe category, Young Ewe attract an average premium of 60 cents per kg, Young Wether 55 cents, while Rams attract a discount of 70 cents.
- Relative to the Lamb category, Young Lamb attract an average premium of 25 cents per kg, while Ram Lamb attract a discount of 70 cents.

Figure 63 shows the time series of the sheep and lamb category premiums, (using the Ewe category as the baseline).



**Figure 63. Time series of sheep category premiums by saleyard**

Some features of Figure 63 are noteworthy:

- Since 2010, the premiums for Hoggett, Lamb and Young lamb have tended to increase.
- The Wether premium has been very stable.
- The Young Ewe premium has been quite volatile, possibly due to variable restocker activity and a limited number of data points.

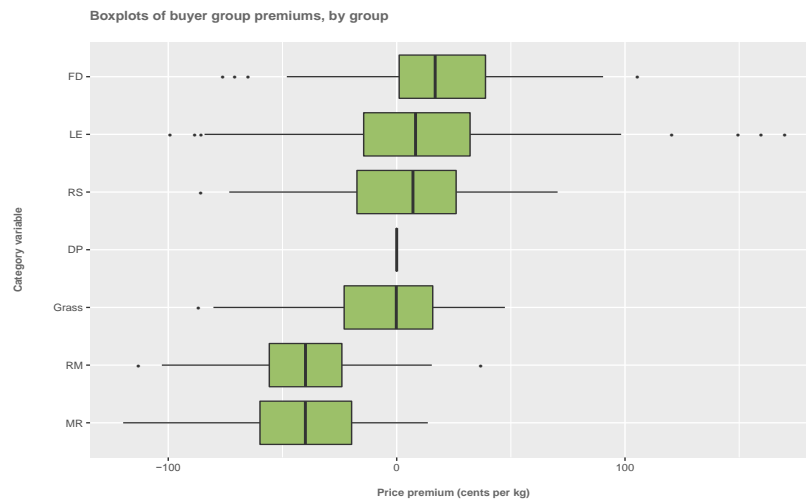
### 9.5 Livestock buyer groups

The indicator of livestock buyer groups, MLA's SalePrefixIDs for sheep and lamb are as follows:

- **1X:** Merino crossed with a meat breed
- **DP:** Dorper
- **FD:** Purchased by lot feeders
- **Grass:** Purchased by processors
- **LE:** Purchased by Live Exporters
- **MR:** Merino sheep or lambs
- **RM:** Merino sheep or lambs purchased by restockers
- **RS:** Purchased by Restockers.

#### 9.5.1 Buyer group premiums and discounts

Figure 64 presents the premiums and discounts associated with each buyer group (relative to Dorper sales).



**Figure 64. Buyer group premiums**

Some features of Figure 64 are noteworthy:

- Purchases by lot feeders attract the highest premium, followed by Live Exporters and Restockers.
- Purchases of Merino sheep or lambs including by Restockers have the largest discount of some 40 cents per kg.

Figure 65 shows the time series of the buyer group premiums.



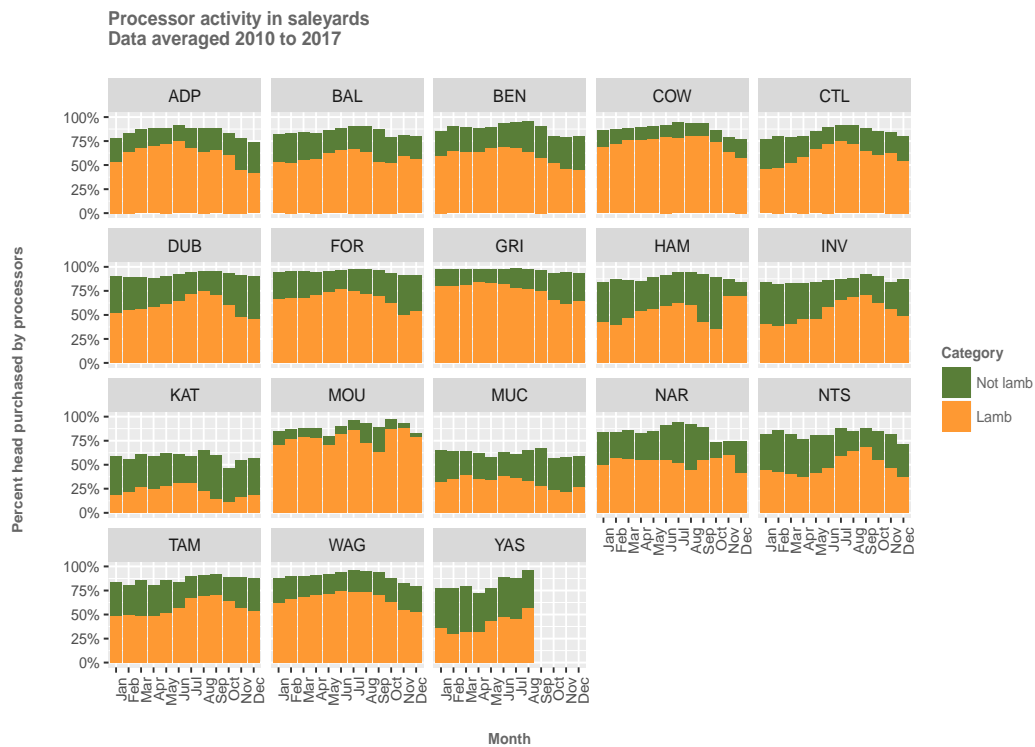
**Figure 65. Time series of buyer category premiums by saleyard**

Some features of Figure 65 are noteworthy:

- The lot feeder premium FD has declined sharply over the past few years.
- The Grass category and the MR premiums jumped significantly in 2014. Grass and MR is the main categories for processor purchases.
- The Live Export category LE premium has been the most volatile.

### 9.5.2 Purchases by processors at saleyards

Figure 66 shows the volume of purchases by processors<sup>1</sup> at each saleyard, as a percentage total saleyard throughput, as well as the mix of purchases of lamb versus other sheep categories.



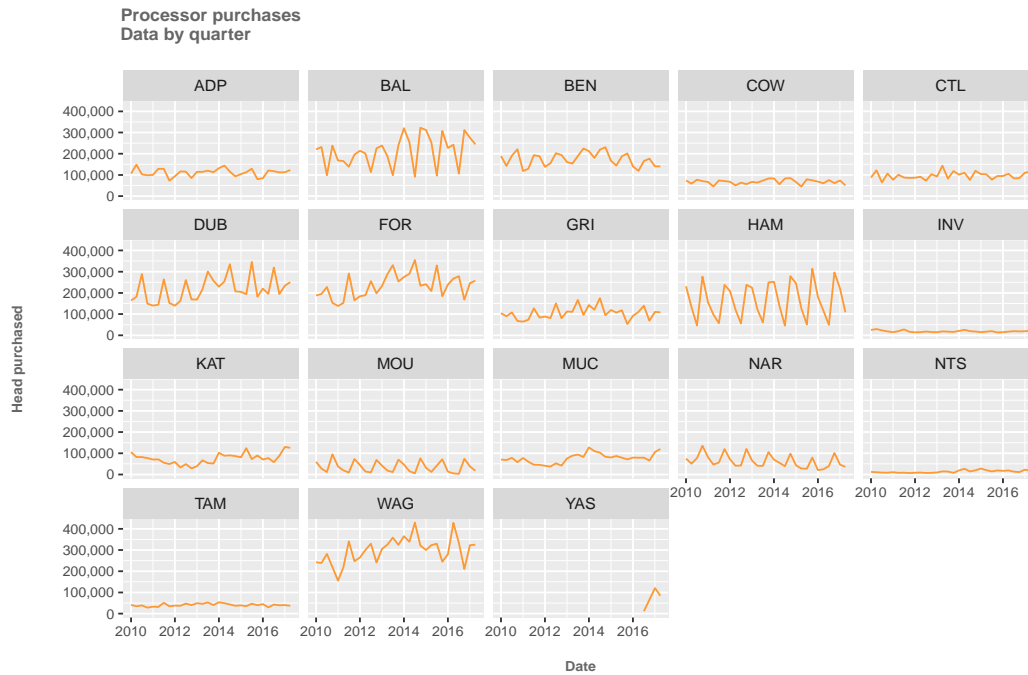
**Figure 66. Processor purchases of sheep and lamb at saleyards**

Figure 66 shows that:

- Over the course of the year, processors purchase sheep to balance out the lamb season such that the overall level of purchases is quite constant, expressed as a percentage of total saleyard volume. However, total saleyard volumes and processor purchases are seasonal, particularly in Victoria as the following Figure 67 shows.
- Processor purchases generally represent 80% or more of saleyard throughput across the year, except in the WA saleyards of Katanning and Muchea, where Live Exporters are active in the saleyard market.

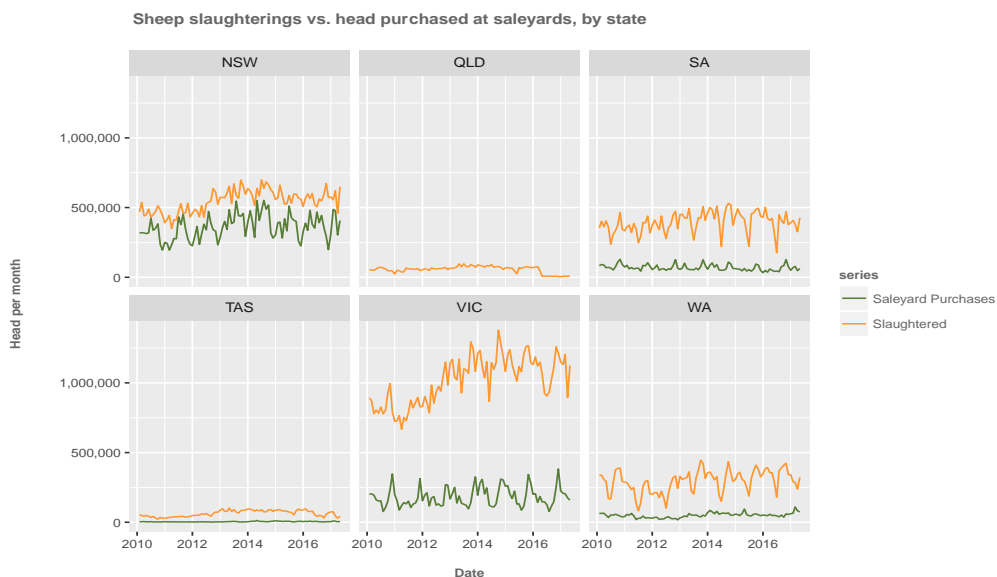
Figure 67 shows the total purchases by processors at each saleyard. The Wagga (WAG), Dubbo (DUB) and Ballarat (BAL) saleyards have the largest processor purchases. Over the decade processor purchases at saleyards have been quite stable.

<sup>1</sup> Processor purchases are defined as the total of 1X (Merino crossed with a meat breed), DP (Dorper) and MR (Merino sheep or lambs) and Grass categories.



**Figure 68. Processor purchases at saleyard**

Figure 68 shows how the number of sheep and lamb slaughterings compare with the number of head purchased by processors at saleyards, for each State.



**Figure 67. Sheep and lamb slaughterings versus head purchased by processors at saleyards by state**

Figure 68 reveals that:

- NSW has by far the largest number of saleyard purchases by processors.
- Growth in slaughterings has mostly occurred in Victoria and to a lesser extent in NSW and WA.
- The proportion of saleyard purchases by processors in NSW is the highest as a proportion of purchases at saleyards.

These comparisons do not take account of inter-State movements by processors; for example, livestock purchased in NSW for processing in VIC.

### 9.5.3 Purchases by restockers at saleyards

Figure 69 shows the total purchases by restockers at each saleyard. The Wagga (WAG), Dubbo (DUB) and Forbes (FOR) saleyards have the largest volume of purchases by restockers.

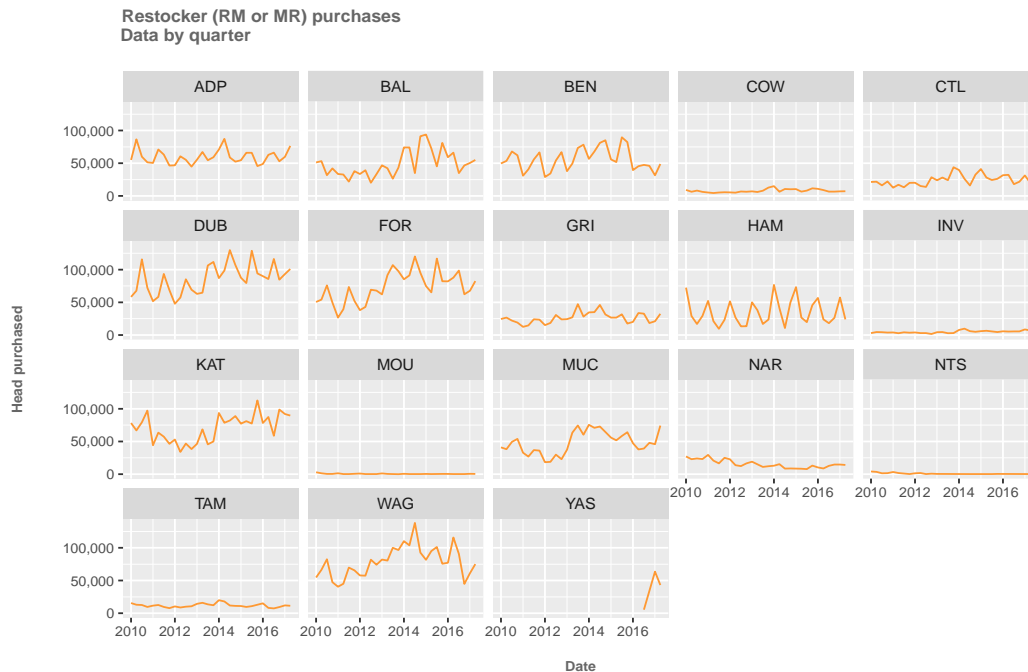


Figure 69. Processor restocker purchases at saleyard

### 9.5.4 Purchases by feedlot operators at saleyards

Figure 70 shows the purchases by feedlot operators at each saleyard. The WA saleyards of Katanning (KAT) and Muchea (MUC) have the largest purchases by feedlot operators, while purchases at Wagga (WAG) have declined since 2010 and Adelaide Plains (ADP) has seen a sharp fall since 2015.



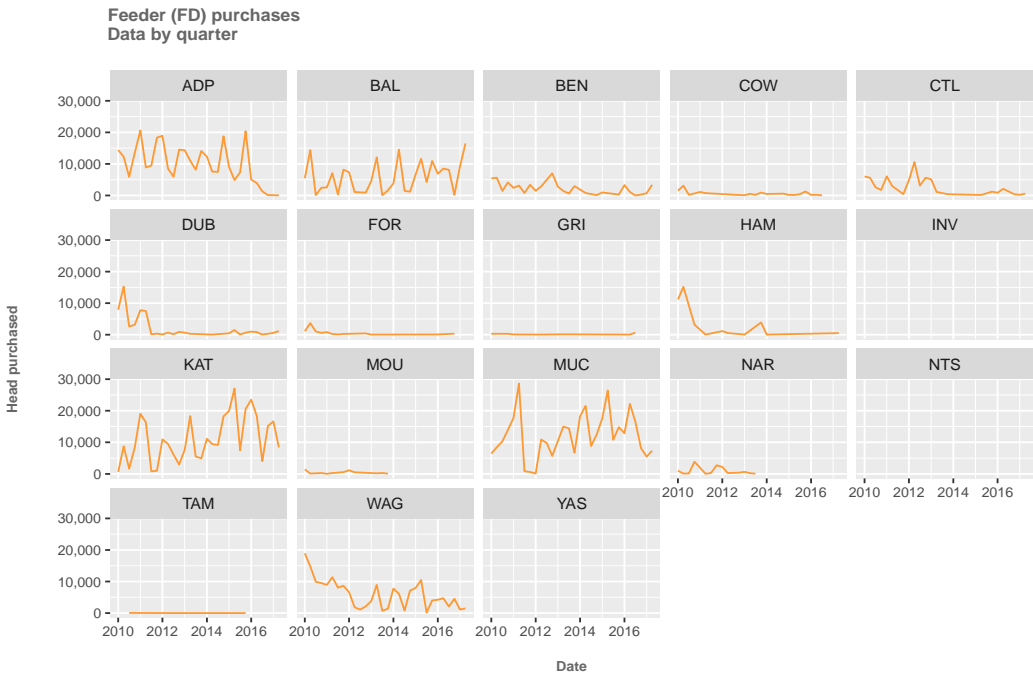


Figure 71. Feedlotter purchases at saleyards

Figure 71 shows the purchases by feedlot operators at each saleyard, as a percentage of all sales. The WA saleyards of Katanning (KAT) and Muchea (MUC) have the largest proportion, followed by Adelaide Plains (ADP).

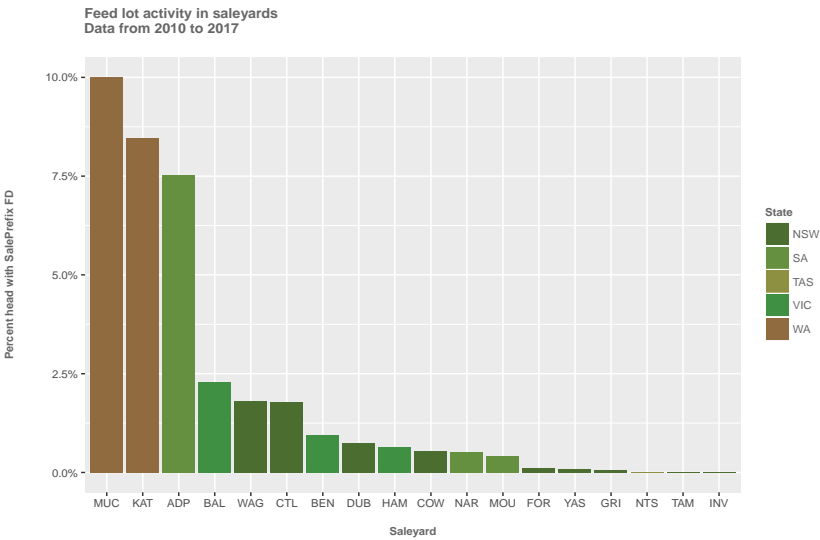
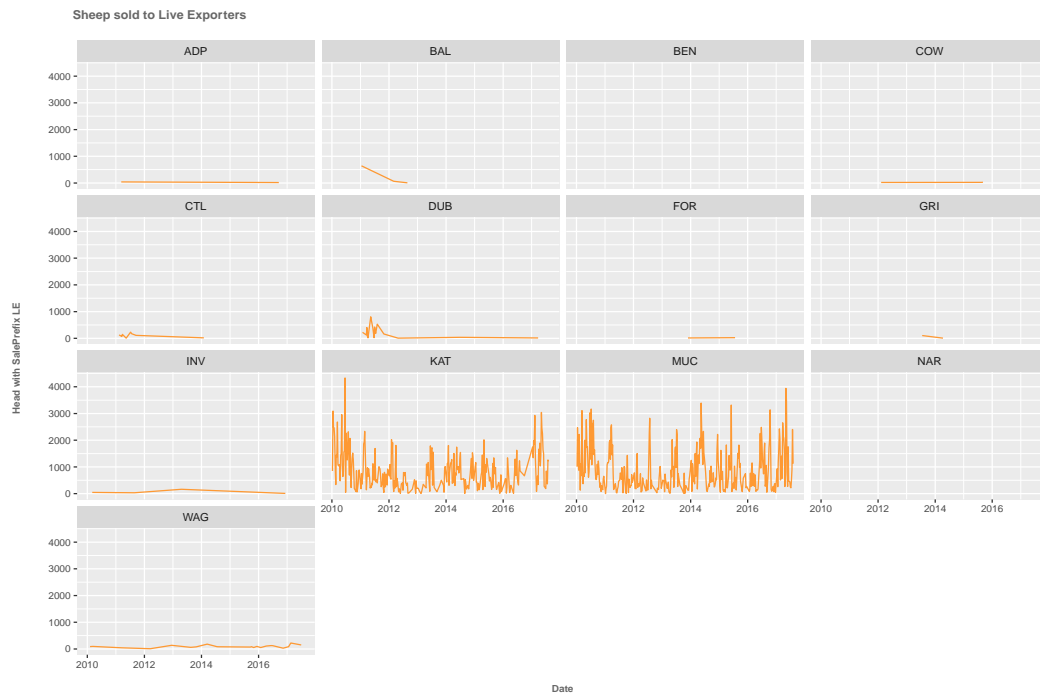


Figure 70. Feedlotter purchases at saleyards as a percentage of all sales

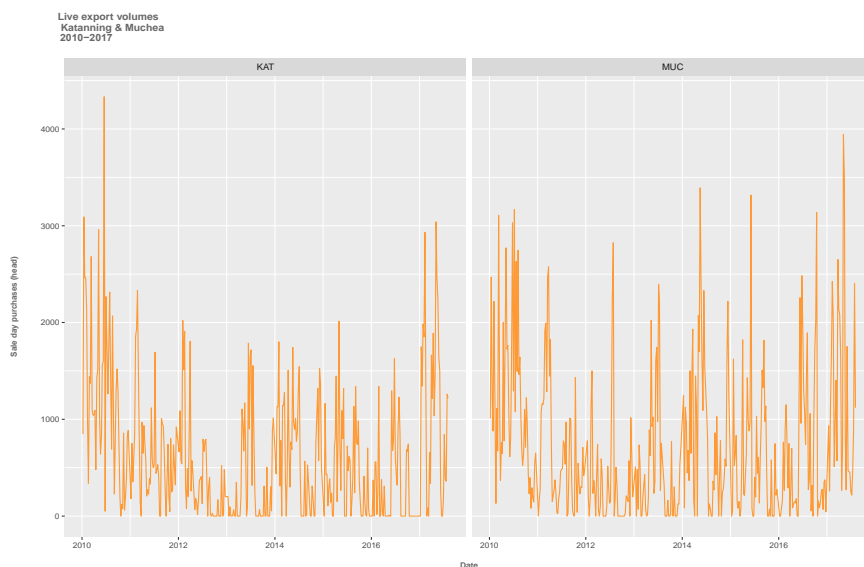
### 9.5.5 Purchases by Live Exporters at saleyards

Figure 72 shows the purchases by Live Exporters (LE) at each saleyard. The WA saleyards of Katanning (KAT) and Muchea (MUC) have by far the largest LE purchases, while LE purchases at Eastern saleyards are extremely low.



**Figure 72. Live exporter purchases at saleyards**

Figure 73 shows the specific time series of Live Export volumes for Katanning (KAT) and Muchea (MUC), as per the previous chart. It reveals highly irregular purchase patterns, possibly determined by the export shipping schedules, exchange rate movements, and seasonal conditions affecting direct on-farm purchases.



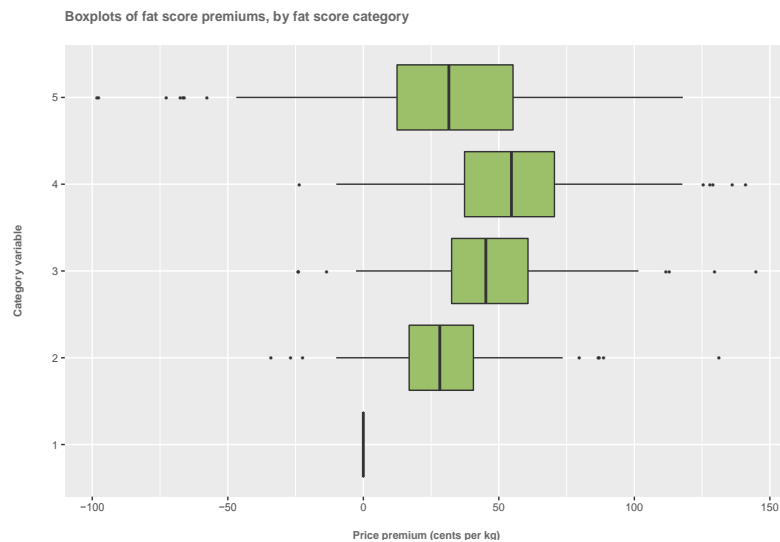
**Figure 73. Time series of live export volumes at WA saleyards**

## 9.6 The effect of quality attributes on prices

The following charts examine the effect of quality attributes on prices: fat score and average weight.

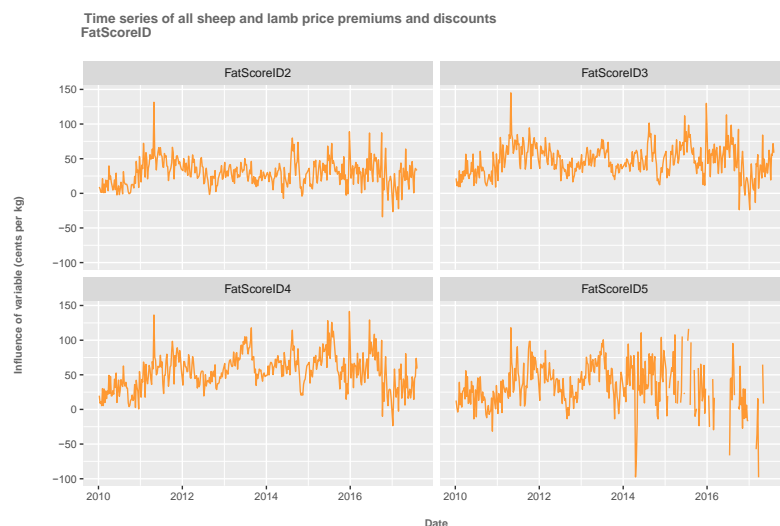
### 9.6.1 Fat score premiums

Fat scores of lots can vary from 1 (lean) to 5 (very fat). Figure 74 shows how the premiums on these fat scores vary.



**Figure 74. Fat score premiums by fat score category**

Figure 74 shows that fat scores of 3 and 4 attract a premium over lower and higher fat scores of around 40 to 60 cents per kg, relative to a fat score of 1.



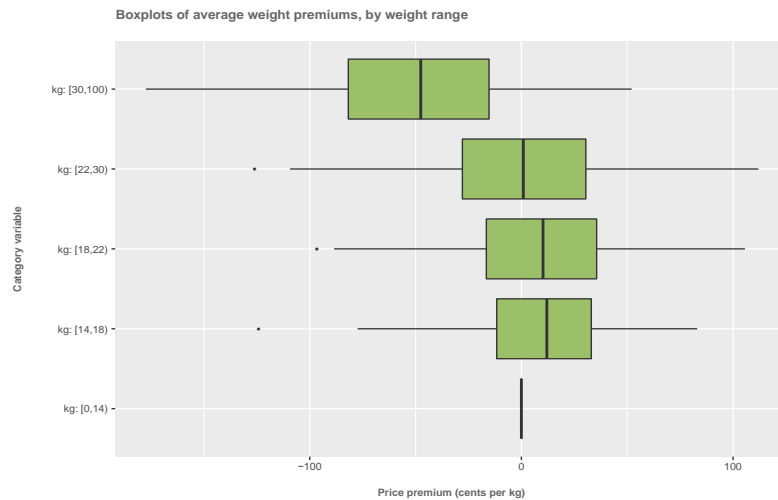
**Figure 75. Time series of fat score premiums for sheep and lambs**

Figure 75 shows the time series of fat score premiums. It shows that from time to time, these fat score premiums can be quite volatile and can go out of kilter before reverting to their long-run averages.

### 9.6.2 Weight premiums and discounts

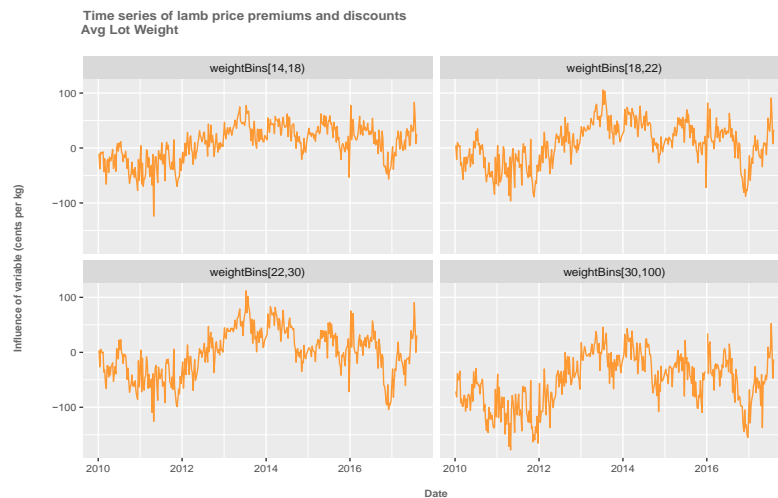
To determine the effect of average carcass weight, each lot has been classified according to the following weight groupings: 0 to 14kgs, 14 to 18kgs, 18 to 22kgs, 22 to 30kg and above 30kgs.

Figure 76 shows how carcass weight premiums vary. Weight ranges around 18 to 22 kgs are more highly valued, though not by much.



**Figure 76. Average weight performance premiums by weight range**

Figure 77 shows the time series of carcass weight premiums. It shows that weight premiums can be quite volatile, with movements in a range of -100 cents to + 100 cents per kg.



**Figure 77. Time series of lamb price premiums and discounts**

## 9.7 Differences in lot sizes

### 9.7.1 How lot sizes vary by saleyard

Figure 78 shows how the median lot size varies by saleyard. It shows quite a large variation across saleyards but a consistency within States.

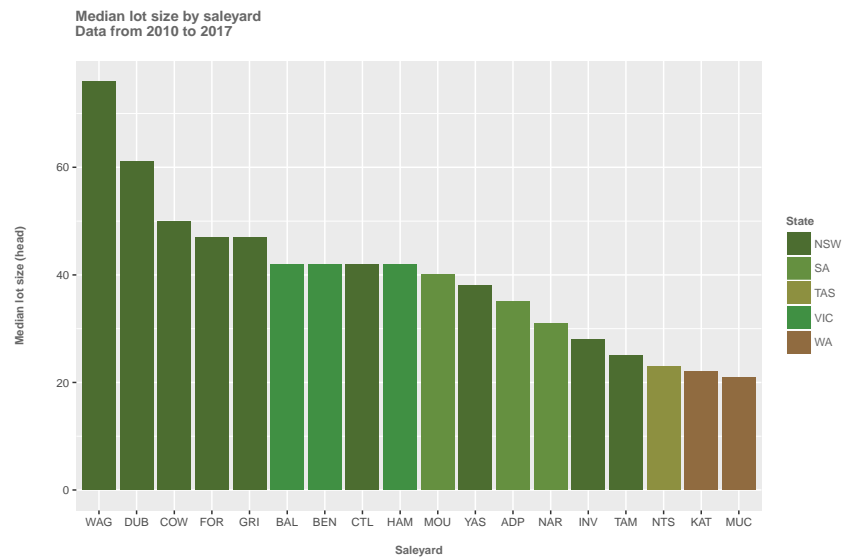


Figure 78. Median lot sizes at saleyards

## 10 Competitive barriers to entry and expansion in the processing sector

This chapter examines the barriers to entry and expansion in the processing sector. The first section explains the potential barriers present at each stage of the meat processing value chain. The second section explains how 'challenger' firms might develop entry and expansion strategies, while the third section explores how incumbent firms can build defensive barriers to deter entry. The fourth section provides an overall assessment of entry and expansion barriers in the meat processing sector.

The stage-barriers across the meat processing value chain are:

- product and market development
- livestock procurement
- manufacturing skills and capital
- sales and distribution infrastructure
- customer support.

Across all industries, what makes entrant firms successful are factors such as timing, a large scale of entry relative to the incumbents, and the ability of the entrant to leverage complementary assets such as an existing customer and distribution network. Incumbent firms defend their positions by building cost, informational and relationship advantages to ward off challengers. Acquisition, rather than greenfield development, has been the most common mode of entry in the meat processing sector.

There are potential benefits from processor consolidation. Fewer, larger processing plants operating with lower unit costs can open up more sales opportunities, particularly in overseas markets. So, downstream industry consolidation can ultimately benefit producers.

### 10.1 The competitive context

Business strategy comes down to making a choice between:

- a low-cost strategy, by which competitive advantage arises as a result of scale and experience, market reach and volumes in each market, product design, supply relationships and process innovations
- a focused strategy, by which (typically smaller) players target market segments rather than the entire market
- a differentiation strategy, whereby players pursue a sustainable advantage based on superior products, investment in advertising and marketing, and general reputation, all of which are paid for through higher output prices.

While each of these positions are observed in the meat processing industry, the low-cost strategy appears to be the dominant strategy. It is possible that increased scale and scope will become more important in the future.

Execution of a differentiation strategy in an industry marked by an emphasis on low-cost and strong similarity of product offerings among competitors, is difficult and therefore less common. Generally, it is a niche player strategy.

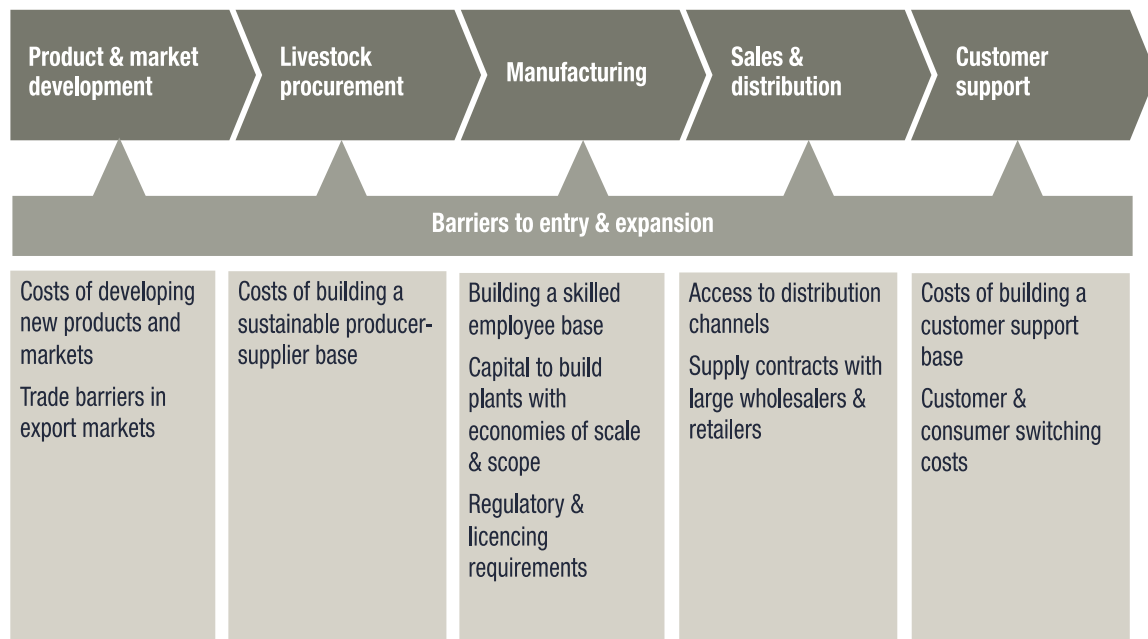
## 10.2 Overview of barriers across the meat processing value chain

Barriers are factors that make entry unprofitable for new firms and expansion difficult for firms already operating in the industry.

In meat processing, the key barriers to entry are the time and cost required for:

- creating product and market positions
- building a producer-supplier base
- developing a customer base
- hiring and developing a skilled employee base.

The following Figure 79 presents a schematic of the meat processing value chain, containing the steps by which the business delivers its products to a market or market segment. In a full-service meat processing company, these system elements span the following: product and market development, livestock procurement, manufacturing, sales and distribution, and customer service support. Figure 79 also shows the entry and expansion barriers that are present at each stage of the value chain.



**Figure 79. Barriers to entry and expansion along the meat processing value chain**

The following sections discuss these stage barriers in detail.

**Product and market development.** Meat processing is a disassembly process<sup>1</sup> that requires finding a profitable home for all the disassembled parts of the animal in order to generate profits. This implies that a range of low, medium and high-income markets need to be accessible by the new entrant. Market development is not easy:

<sup>1</sup> Disassembly is the process of cutting the carcass into muscle groups, meat cuts and trimmings.

- In the domestic market, the ability of the major supermarkets to source product at least cost, often through upstream integration, puts a cap on food manufacturers' output prices.
- In the export market, there is strong price competition between exporters and between other producing nations. Generally there are barriers to entry into foreign markets, although Australia's free trade agreements have opened markets for sheepmeat in China, Japan, Republic of Korea, Singapore, Thailand, US, Chile, the Association of South East Asian Nations (with New Zealand) and Malaysia.

New entrants may need to develop some kind of product differentiation to attract customers.

**Livestock procurement.** The development of a livestock supply base is an important barrier:

- It takes time and cost for a new entrant to build trusted commercial relationships with producers and agents. These producers would have existing relationships with incumbent processors, so producers may be reluctant to switch to a new and possibly unfamiliar processor-customer.
- The new entrant may not know which producers can supply the best livestock that yield the highest returns in processing.

**Manufacturing.** Economies of utilisation, scale, and scope are critical to profitability in meat processing. New entrants can be disadvantaged in the following ways:

- **Utilisation:** Plants that operate more days per year can lower their fixed costs per unit of output. If seasonal fluctuations in the supply of livestock can be balanced, capacity utilisation and profitability can be increased. A fluctuating livestock supply favours fewer plants due to the risk-pooling benefits of centralised processing, which draw supply from many different regions.
- **Scale:** Economies of scale drive lower unit costs of operation, lower unit costs of capital investment and lower unit costs of marketing and distribution. Cost efficiencies also derive from operating multiple plants. However, many potential entrants may not be able to source the capital needed to build plants that operate at the minimum economic scale.
- **Scope:** Plants that produce a greater range of products and process multiple species may also have cost advantages.

Sophisticated know-how is also needed to manage the manufacturing production process, since every carcass or batch of carcasses needs to be processed according to its intrinsic characteristics and the mix of customer orders for meat cuts. This is not a simple planning problem. For example, the abattoir's weekly sales and operations plan may involve processing lamb carcasses across a dozen or more grades, to fulfil hundreds of product-market orders, using multiple cutting methods and selecting from over 1,000 cutting patterns.

**Sales and distribution.** The new entrant must secure distribution channels for its products. A new food item, for example, must displace others from the supermarket shelf via price breaks, promotions, intense selling efforts, or some other means. The more limited the wholesale or retail channels are and the more that existing competitors have tied them up, the tougher entry into an industry will be. Sometimes access to distribution is so high a barrier that new entrants must bypass existing distribution channels altogether and create their own.

**Customer support.** Established firms will have brand identification and customer loyalties due to advertising, being in the market for a long time and careful attention to customer service.



Downstream customers of the incumbent processor may also face switching costs if they buy from the new entrant; those fixed costs that buyers face when they change suppliers. Such costs may arise because a buyer who switches vendors must, for example, alter product specifications, retrain employees to sell a new product range, or modify processes or information systems. The larger the switching costs, the harder it will be for an entrant to gain customers. For end-market consumers, small consumer switching costs can constitute large barriers to entry, especially for mass-market food products.

#### 10.2.1 Regulatory barriers

Regulatory barriers to adopting new products and processes are relevant in meat processing. Food manufacturers are closely monitored concerning any change in their manufacturing operations, for example, whereas firms in many other industries can change their processes freely. The sheer complexity of the food regulatory environment may present as a barrier, at least for some entrants.

### 10.3 How 'challenger' firms develop entry and expansion strategies

What makes entrant firms successful are factors such as timing, large scale relative to the incumbents, and the ability to leverage complementary assets such as an existing customer and distribution network, according to Horn, et al., 2005.

Key factors for success for entry or expansion are:

**Size of entry.** Companies that are closer to an industry's minimum efficient scale upon entry are much more likely to succeed.

**Relatedness of the market entered.** The more related the market to a company's current portfolio of products and services, the greater the chance of success.

**Complementary assets.** Complementary assets such as marketing and distribution, can be more important for entry success than core assets, such as brands.

**Stage of the industry life cycle.** Companies entering early in the industry's life cycle have greater odds for success.

**Degree of 'insider' innovation.** When a high level of 'inside' industry knowledge is necessary to succeed, incumbents have an advantage over new entrants.

**Degree of 'outsider' innovation.** When 'outside' knowledge is essential, entry is easier. Innovative entrants succeed by entering niches that dominant players might be ignoring.

**Entry barriers also depend on the particular strategic group that the entrant seeks to join.** Entry barriers may be thought to impact all firms equally from potential entrants. Yet there are differences in the strategies of firms, as defined by their strategic group.

Meat processing companies group according to:

- market focus: export or domestic or both
- customer focus: small, medium or large customers
- scope of business: local, multi-regional or multi-national
- scope of livestock processing: single-specie or multi-species
- degree of vertical integration: upstream or downstream.

Costs of entry will depend on which group the new entrant seeks to join. For example, entering the meat processing industry as a nationally branded, full-line, vertically-integrated firm will be a great deal more difficult than entering as an assembler of a narrow line of unbranded goods for small private label accounts.

#### 10.3.1 Acquisition as the mode of entry

Given the potentially large costs and associated risks facing a new entrant startup, acquisition has been the most common mode of entry in the Australian meat processing sector.

Since 2002, the ACCC has approved eight mergers and acquisitions in the red meat processing sector, according to Heilbron, 2016, of which two involved sheepmeat processing:

- **2008:** JBS Southern Australia Pty Ltd acquisition of Tasman Group Services Pty Ltd
- **2010:** ZM Australia Pty Ltd acquisition of Tatiara Meat Company Pty Ltd.

### 10.4 How incumbent firms defend their positions

As with many other manufacturing sectors, there is a risk that competitive forces will drive the domestic meat processing industry towards “commoditisation”, where commoditisation means that the downstream markets in Australia perceive the products of competing manufacturers to be highly substitutable. In international markets, however, Australian lamb will continue to be seen as a premium niche product.

Two factors facilitate commoditisation: standards and transparency. The first factor is the emergence of standards or techniques of measurement and classification, for example meat product standards and saleyard specifications for livestock. The second factor is an increase in pricing and product feature transparency.

When customers can more easily compare products, or when suppliers can compare alternative offers from buyers quickly and accurately, they may be more willing to switch from one processor to another. Similarly, when processors can see competitors’ offerings in real time, they are quicker to adapt to innovations by others, thereby shortening the life span of any differentiation advantage.

Commoditisation is accompanied by:

- **Increasing price sensitivity.** As switching costs drop, customers develop a better understanding of product qualities and place a greater focus on price, thereby acquiring more negotiating power.
- **Increasing price competition.** Companies begin to cut prices to attract customers. This can create a downward spiral on prices throughout the market, squeezing margins across the board.
- **Industry consolidation.** As companies struggle to survive, larger companies acquire smaller companies to gain advantages in scale, reach, and capability.

The opposite of commoditisation is differentiation. At this stage of the sheepmeat industry’s development, it appears that lamb is a less differentiated product compared to beef.

#### 10.4.1 Building cost, informational and relationship advantages to deter entry

From the perspective of incumbent processors, their interests and those of their shareholders, are served by resisting the commoditisation of their products. They do this by building cost, informational and relationship advantages:

- **Driving down unit costs through scale and scope.** Companies compete on the basis of more efficient cost structures, which in turn are based on increasing scale, automating processes, achieving high rates of capacity utilisation, and developing market outlets for the full range of carcass products, both domestic and export. Over the past decade, the number of abattoirs in Australia certified to process sheepmeat has dropped by almost 25 per cent, from 91 to 39<sup>1</sup>
- **Developing informational advantages.** Where market imperfections are present, companies aim to build on these to create asymmetries in information over their suppliers and over their customers.
- **Building relationships.** An incumbent seller who faces a threat of entry into their market may sign up to long-term contracts with customers to deter entrants, even though such contracts will not preclude entry completely. Incumbent firms, under the threat of new firms entering the livestock procurement market, could also decide to offer more attractive terms to suppliers.

If entry presents as a major threat to their business, processors may decide to forward integrate into distribution in order to foreclose on marketing channel options of the potential entrant. Similarly, they may decide to backward integrate into livestock production.

As one industry observer describes it, processing “is a game of cents and pennies”. Every cent counts, and processors should work on cost, informational and relationship advantages.

What is observed in many industries such as banking, insurance, energy and telecommunications that greater price transparency is resisted by incumbents. Their risk is that greater transparency may destroy a key source of profits, by making it easier for suppliers or customers to switch, and making it easier for new players to enter.

This implies that incumbent processors would aim to maintain an information advantage over new competitors by:

- knowing more about what is happening in the livestock market in order to take advantage of market volatility and arbitrage opportunities;
- knowing which sheep and lamb producers supply animals that enable the processor to achieve higher carcass yields or higher prices;
- resisting efforts to improve price transparency in livestock markets.

Increased price transparency can open up more options for sellers in the livestock market. It also reduces the search costs of producers aiming to seek out the best prices available from processors. Not surprisingly, the “information rules of the game” has become a subject of intense political debate in the industry.

## 10.5 Assessing the importance of entry barriers in meat processing

In assessing the importance of entry barriers, relevant issues are the size of the new entrant effect on the one hand, and the benefits from industry concentration on the other.

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<sup>1</sup> Source: AusMeat data.

### 10.5.1 Size of the new entrant effect

The effects of entry in concentrated markets has been studied by Bresnahan & Reiss, 1991. They study the relationship between the number of firms in a market, market size, and competition. Their empirical results suggest that competitive conduct changes quickly as the number of incumbents increases. In markets with five or fewer incumbents, almost all variation in competitive conduct occurs with the entry of the second or third firm. Bresnahan & Reiss (1991) find that once the market has between three and five firms, the next entrant has little effect on competitive conduct.

The estimated number of abattoirs currently licenced to process sheepmeat in each State is shown in the Table below. Tasmania, QLD and SA have fewer than five sheep abattoirs.

**Table 15. List of abattoirs by state in 2017 (AusMeat)**

State	Abattoirs
NSW	7
QLD	4
SA	3
TAS	3
VIC	20
WA	10
<b>Total</b>	<b>47</b>

### 10.5.2 Potential benefits from industry concentration

A large body of research over the past three decades has attempted to estimate the degree of market power in the agricultural processing sector, and while many studies find evidence of market power, it is often the case that these effects are offset by benefits from concentration such as use of technologies that lower cost.

Research by Sexton (2012) suggests that the high levels of concentration seen in agriculture may not be a result of market power *per se* but rather represent an attempt by firms to secure a high volume of quality input required to run plants at cost-lowering, full capacity.

Michael Wohlgenant (2013) has studied competition in the U.S. meatpacking industry. His findings are:

- Concentration in procurement of livestock (in cattle and hogs) has not adversely affected prices received by producers or prices paid by consumers.
- There is evidence that overall, producers may be better off because of lower processing costs due to the concentration and introduction of new technical innovations.

However, with larger and fewer processing plants, more remote livestock producers may be worse off because of longer distances to ship their livestock and because of the thinness of the cash markets in which their livestock are sold. If there were remote processing facilities, such facilities may not be able to pay as much per head as larger facilities. They would have lower throughput, raising unit costs of processing, and may have to pay higher wages to encourage employee retention, and higher costs for energy and water, due to their remote locations.

## Glossary

**Abattoir:** A plant or factory where livestock are slaughtered for food. Also, referred to as meatworks or processor.

**Carcase weight (Cwt):** The standard AUS-MEAT definition of the weight of a carcass with hide, feet, tail, head and innards removed, taken within two hours of slaughter

**Del Credere:** agent guarantees the ability to pay prospective clients he or she has brought to the principal.

**Eastern States Trade Lamb Indicator (ESTLI):** Seven-day weighted average price of trade lamb prices (18-22kg cwt, 1<sup>st</sup> or 2<sup>nd</sup> cross) recorded at NLRS-reported saleyards in New South Wales, Victoria, Tasmania and South Australia. Published daily

**Mutton Indicator:** Seven-day weighted average price of adult sheep 18-24 kg cwt with a fat score of 2-3.

**Fat Class:** the amount of external fat present on a sheep carcass, classified from lean (class 1) to very fat (class 5).

**Feeder:** Light lambs sold for finishing

**Feedlot:** an area of land where livestock are kept at high density, with small pens in which the animals are fattened. All feed is brought into the feedlot from outside sources.

**Forward price contracts:** contract to buy or sell at a specified future time at a price agreed upon today. Lamb and sheep forwards contracts are settled by delivery.

**Grade score:** The combination of fat and muscle scores used in assessing the quality of an animal.

**Market weight:** the target weight at which livestock will be sold at market or slaughtered

**Mutton:** the meat of a mature sheep, produced from older sheep such as ewes which are finished for breeding.

**National Livestock Identification System:** Australia's system for the identification and traceability of cattle, sheep and goats which is underpinned by State/Territory legislation.

**National Livestock Reporting Service (NLRS):** MLA's market reporting service, that provides an independent source of livestock market data, collected directly from major prime and store markets, direct sales. In addition, the NLRS provides weekly summaries, skin prices and slaughter information.

**Over the hooks (OTH):** Where sheep are sold direct to the processing plant and the producer is paid based on a price grid. The weight of the processed carcass along with the carcass grade is used to determine price. The OTH average price reported by NLRS uses data collected directly from contributing processors

**Property Identification Code (PIC):** Eight-character alphanumeric code allocated to a property used for agricultural purposes

**Live weight (LWT):** The weight of an animal before slaughter.

**Livestock agent:** A livestock broker.

**Livestock market officer:** Employed by Meat and Livestock Australia to collect and report market data from livestock sales to provide livestock market information to the meat and livestock industry for the National Livestock Reporting Service.

**Price grid:** pricing of sheep on an individual animal basis. The prices receive premiums and discounts that are calculated for different carcase attributes.

**Restocker:** A producer or agent who purchases sheep or lambs and returns them to the farm.

**Saleyard:** A physical auction market where buyers and sellers trade livestock. Physical and store markets are conducted at a saleyard. Also referred to as selling centres.

**WATLI:** Western Australian Trade Lamb Indicator.

**Wether:** Castrated male sheep with no 'ram' like characteristics and with more than two permanent teeth.

**Yardings:** Number of sheep and lambs penned at an auction sale.

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Appendix

3 The Australian sheepmeat industry

Table 16. Correlation between crop and flock size 1987-2017 (woods, 2017)

	VIC	NSW	QLD	SA	WA	TAS
Correlation	0.84	0.64	-	0.71	0.71	-

4 The sheepmeat supply chain

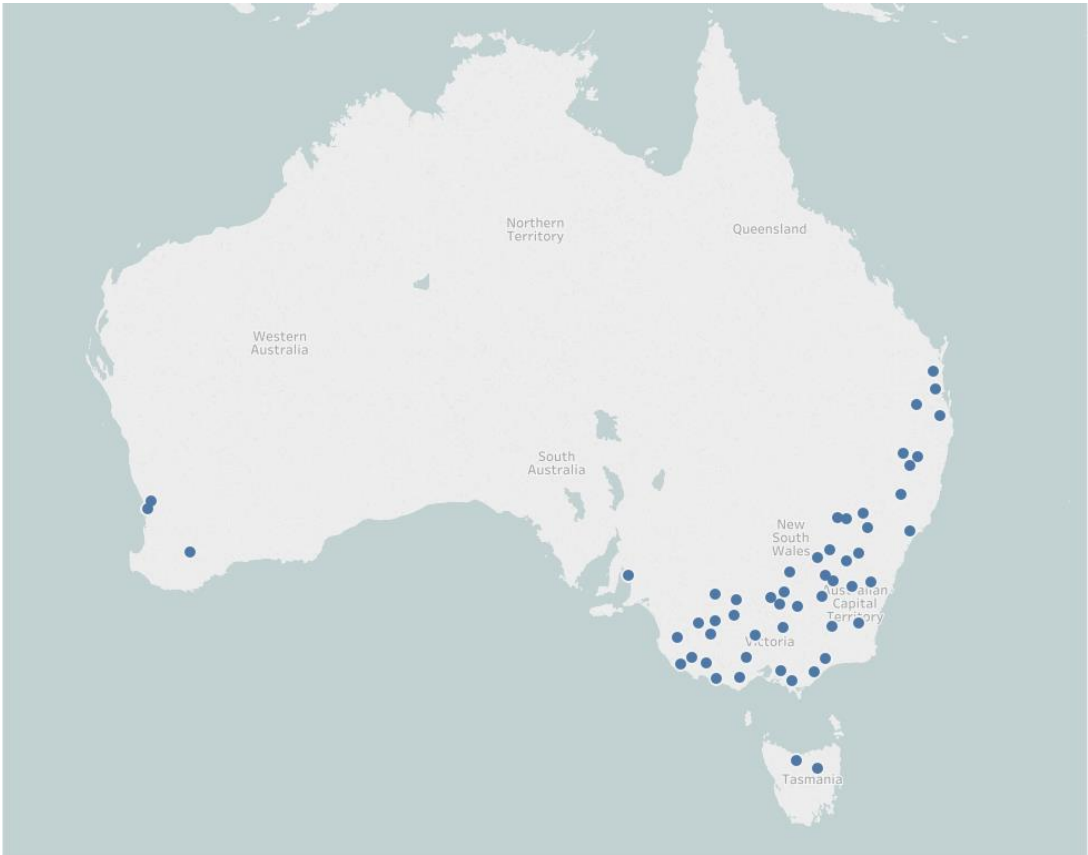


Figure 80. Distribution of sheep saleyards

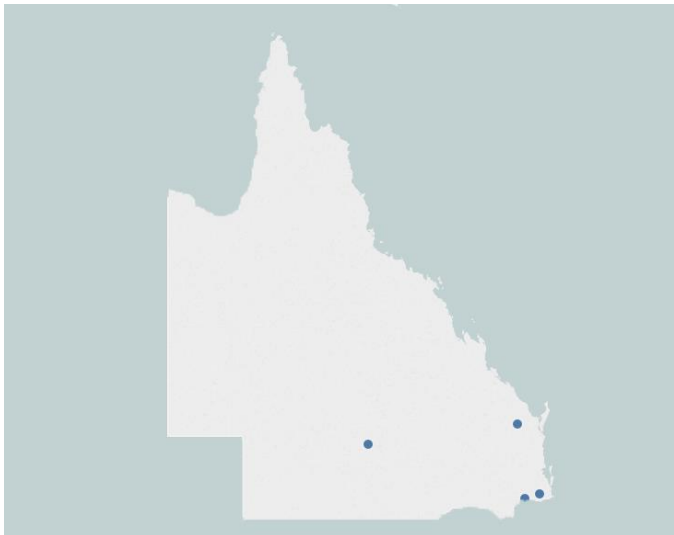


Figure 81. Sheep processor locations in Queensland



Figure 82. Sheep processor locations in Western Australia

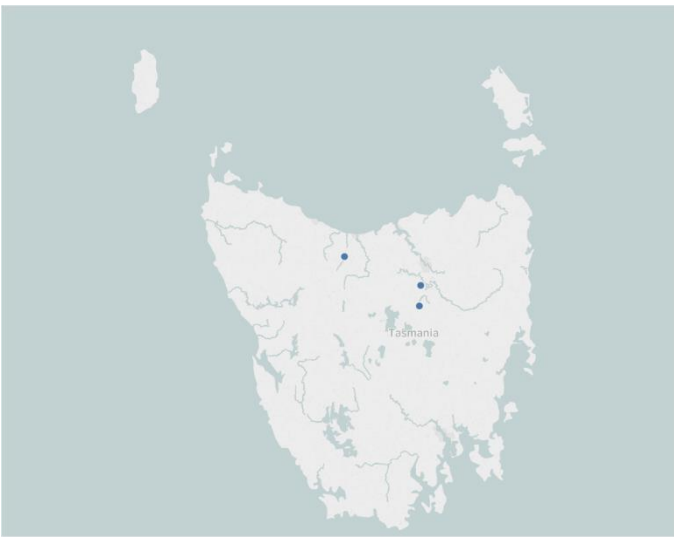


Figure 83. Sheep processor locations in Tasmania

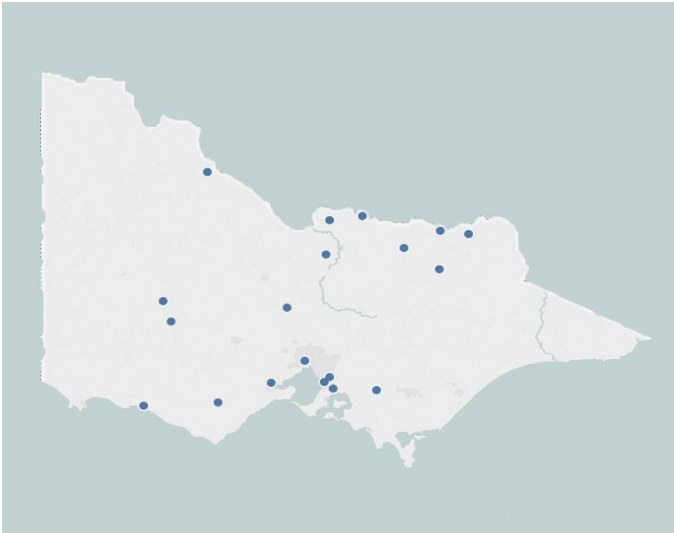


Figure 84. Sheep processor locations in Victoria

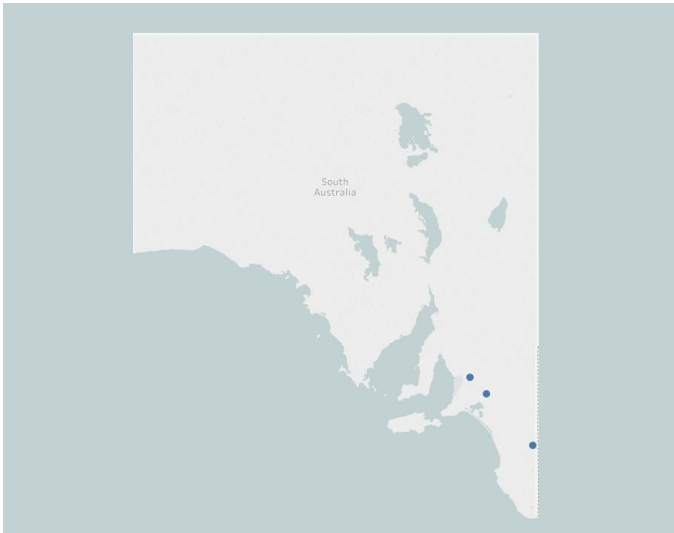


Figure 85. Sheep processor locations in South Australia

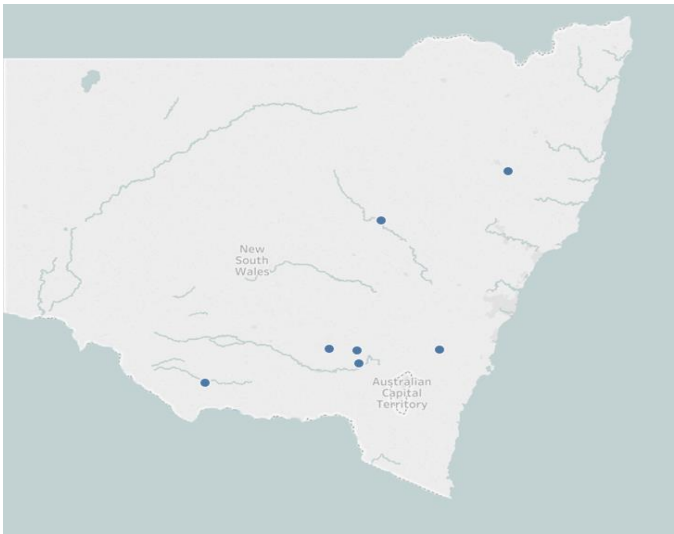


Figure 86. Sheep processor locations in New South Wales

## 6. Reported market price analysis

Table 17. List of saleyards used for analysis and their abbreviations.

Saleyard	Saleyard ID	State
Adelaide Plains	ADP	SA
Ballarat	BAL	VIC
Bendigo	BEN	VIC
Cootamundra	COT	NSW
Corowa	COR	NSW
Cowra	COW	NSW
CTLX Carcoar	CTL	NSW
Deniliquin	DEN	NSW
Dubbo	DUB	NSW
Forbes	FOR	NSW
Goulburn	GOU	NSW
Griffith	GRI	NSW
Guyra	GUY	NSW
Hamilton	HAM	VIC
Horsham	HOR	VIC
IRLX Inverell	INV	NSW
Katanning	KAT	WA
Kilmore	KIL	VIC
Mount Gambier	MOU	SA
Muchea / Midland	MUC	WA
Naracoorte	NAR	SA
Northern Tas Saleyards	NTS	TAS
Shepparton	SHE	VIC
SLX Yass	YAS	NSW
Swan Hill	SWA	VIC
TRLX Tamworth	TAM	NSW
Wagga	WAG	NSW

Table 18. The list of saleyards for which a full data set is available from 2010 to 2017

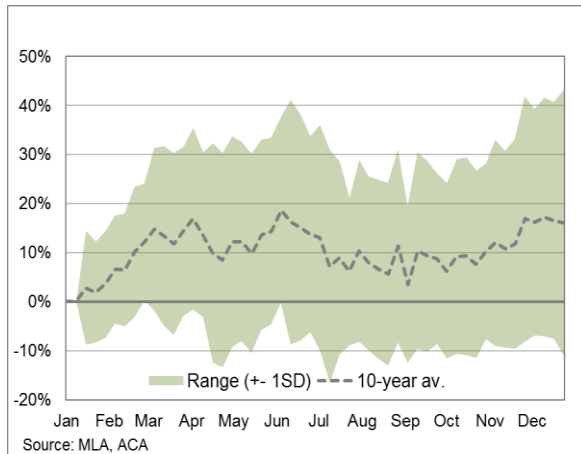
State	SaleYard	SaleYardID
NSW	Cowra	COW
NSW	CTLX Carcoar	CTL
NSW	Dubbo	DUB
NSW	Forbes	FOR

<b>NSW</b>	Griffith	GRI
<b>NSW</b>	IRLX Inverell	INV
<b>NSW</b>	TRLX Tamworth	TAM
<b>NSW</b>	Wagga	WAG
<b>SA</b>	Adelaide Plains	ADP
<b>SA</b>	Mount Gambier	MOU
<b>SA</b>	Narracoorte	NAR
<b>TAS</b>	Northern Tas Saleyards	NTS
<b>VIC</b>	Ballarat	BAL
<b>VIC</b>	Bendigo	BEN
<b>VIC</b>	Hamilton	HAM
<b>WA</b>	Katanning	KAT
<b>WA</b>	Muchea	MUC

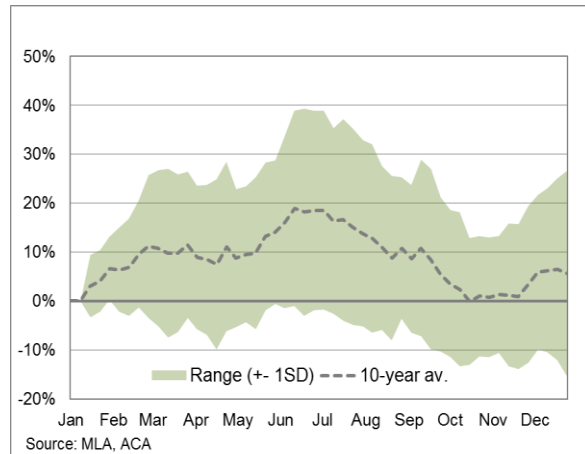
#### Calculation of price based seasonality

This section analyses the prices for several key lamb and mutton indicators over the past 10 years, to assess the impact of season. Each chart shows the average percentage change in price for each month from January, as well as the range around the average. The range is calculated as the average  $\pm 1$  Standard Deviation, and represents 68% of the seasonal prices movements observed from 2006 - 2016.

Note that the range width varies throughout the year, reflecting the volatility in market movements for particular months. A wide range suggests an increased chance of greater price movements, and vice versa.



**Figure 87. NSW Restocker Lamb Seasonality**



**Figure 88. NSW Trade Lamb Seasonality**

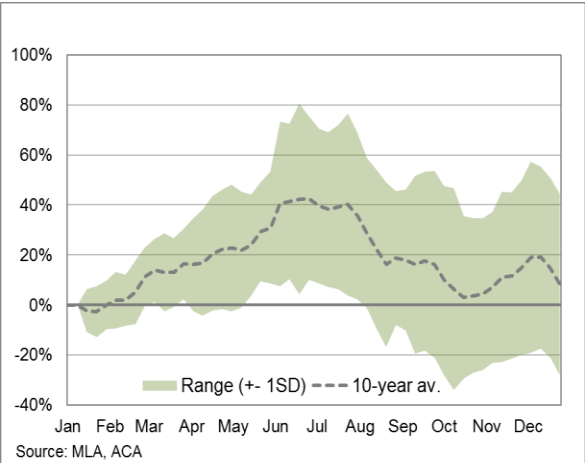


Figure 89. NSW Mutton- Seasonality

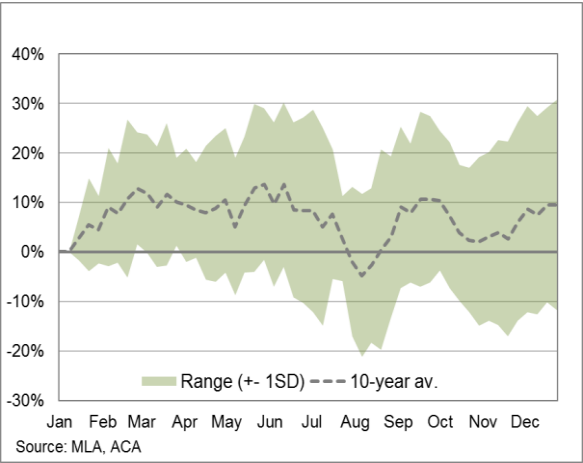


Figure 90. VIC Restocker Lambs- Seasonality

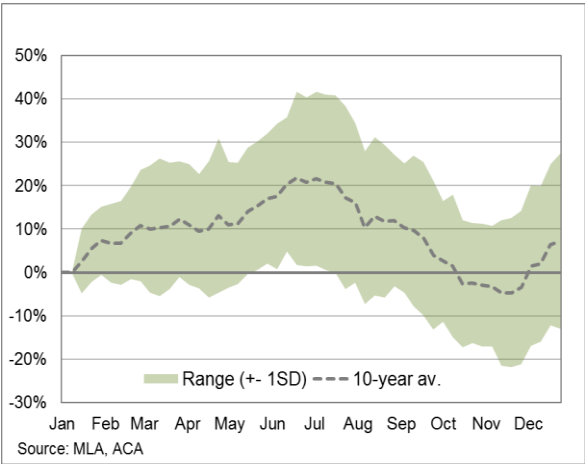


Figure 91. VIC Trade Lambs- Seasonality

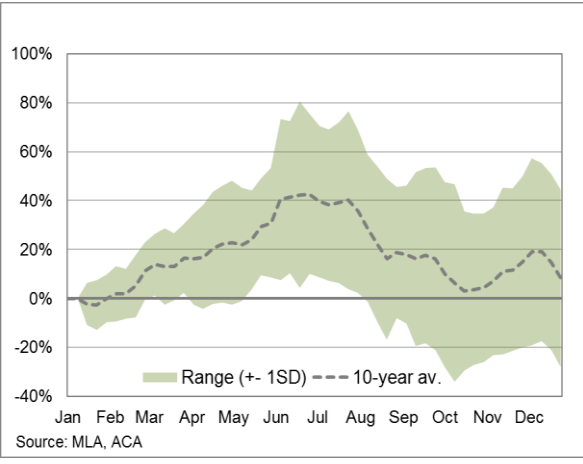


Figure 92. VIC Mutton- Seasonality

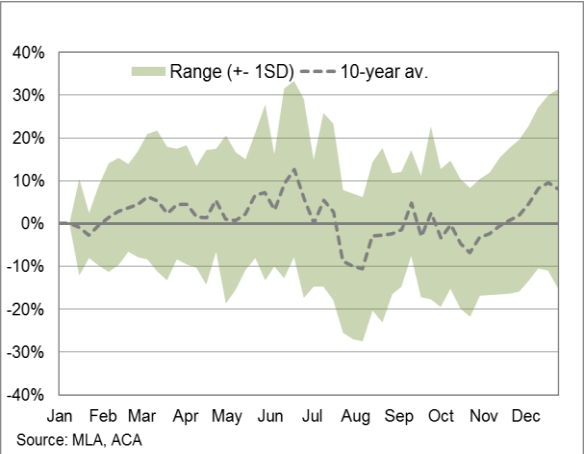


Figure 93. SA Restocker Lambs- Seasonality

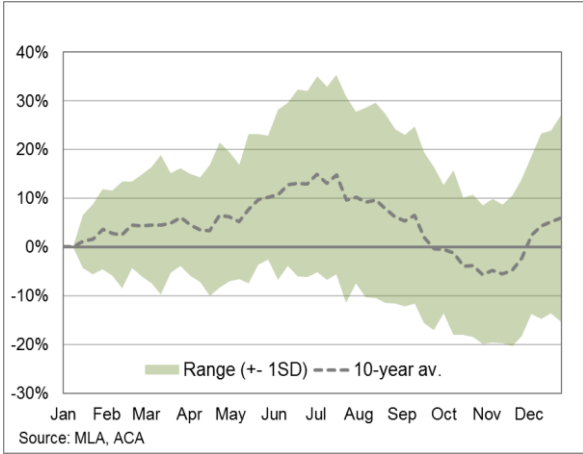


Figure 94. SA Trade Lambs- Seasonality

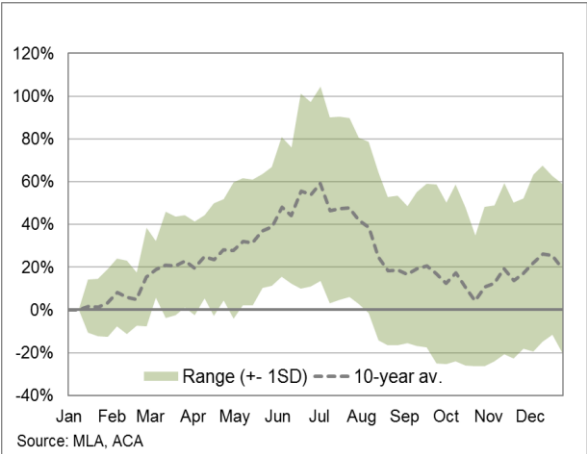


Figure 95. SA Mutton- Seasonality

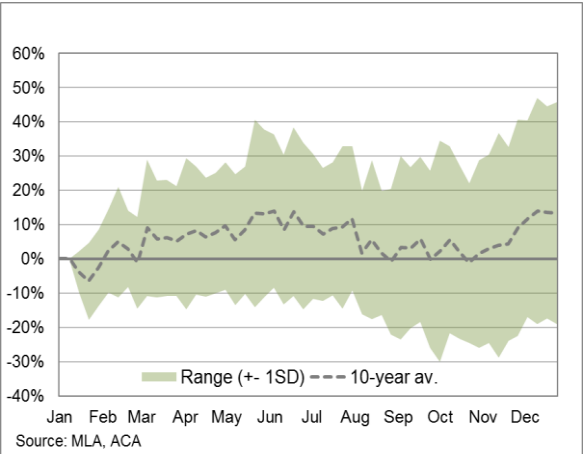


Figure 96. WA Restocker Lamb- Seasonality

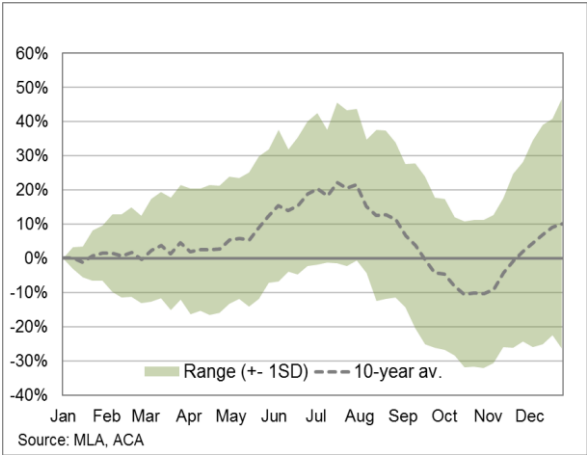


Figure 97. WA Trade Lambs- Seasonality

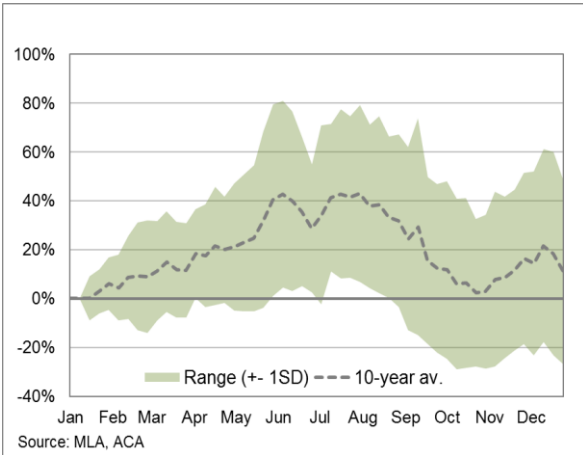


Figure 98. WA Mutton- Seasonality

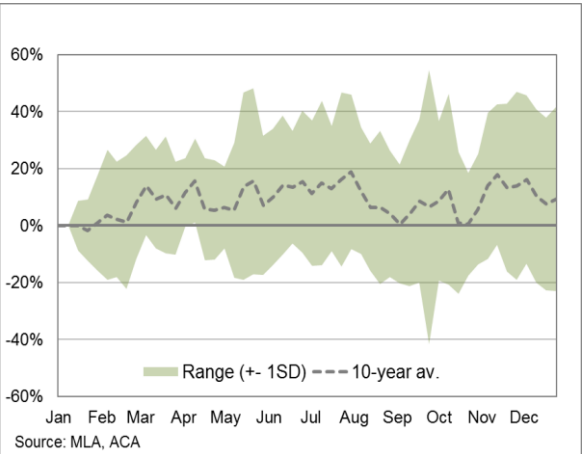


Figure 99. TAS Restocker Lamb- Seasonality

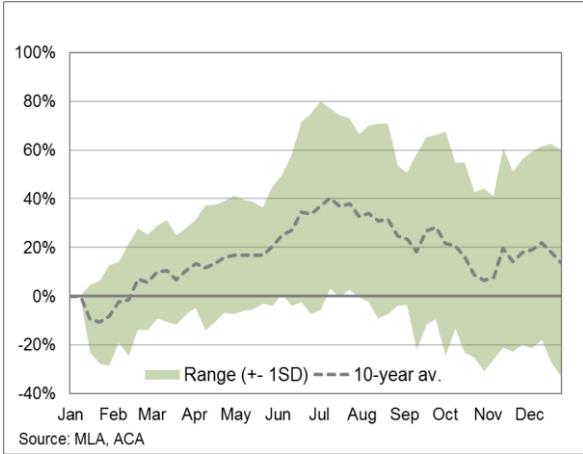
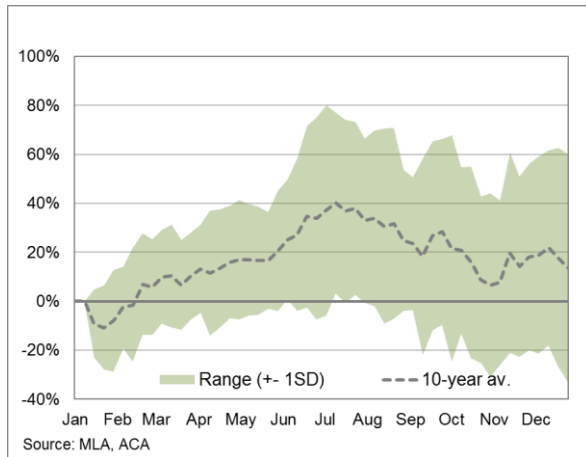


Figure 100. TAS Trade Lambs- Seasonality





**Figure 101. TAS Mutton- Seasonality**

### Calculation of lamb and sheep correlation returns between states and stock types

Analysis of the  $r^2$  correlation coefficient has been undertaken on the one hundred and five combinations of lamb/sheep stock types and states selected in this comparison. The purpose is to produce a colour coded monthly returns correlation matrix which can identify market segments within the broader lamb and sheep industry that are closely correlated to those that are not displaying any linear correlation, based on monthly changes to average price data going back two decades.

The strength of the correlation between stock categories has been measured by taking the change in the price between months for three stock types - restocker lambs, trade lambs and mutton, and comparing the correlation of these month on month changes to each other state/category by way of calculating a Pearson's R-squared correlation coefficient for each combination of stock type and state categories.

The Pearson's correlation coefficient is a commonly used statistical measure of the strength of a linear association between two data sets. It is represented by  $r^2$  and can range between negative 1 to positive 1.

Furthermore, a positive  $r^2$  value indicates a positive correlation which means that the two data sets being compared will vary in the same direction, that is they follow each other by both increasing or both decreasing from the previous period.

In contrast, a negative  $r^2$  value suggests a negative correlation which means that the two data series will tend to vary in the opposite direction, that is if one data set increases from the previous period the other data set will decrease from the previous period.

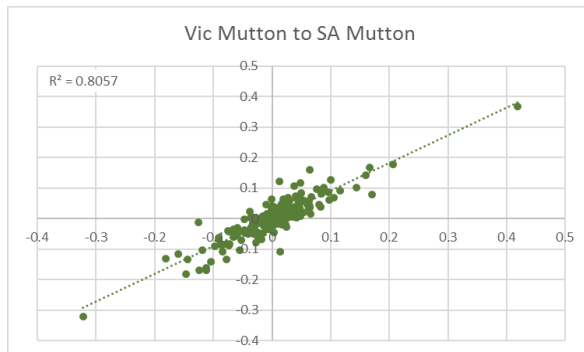
An  $r^2$  value that is close to or at zero denotes no linear correlation, while the closer the  $r^2$  value is to 1 or -1, the stronger the linear correlation.

As a rule, when describing the strength of a correlation based on the calculated  $r^2$  value the following methodology can be used. Values between;

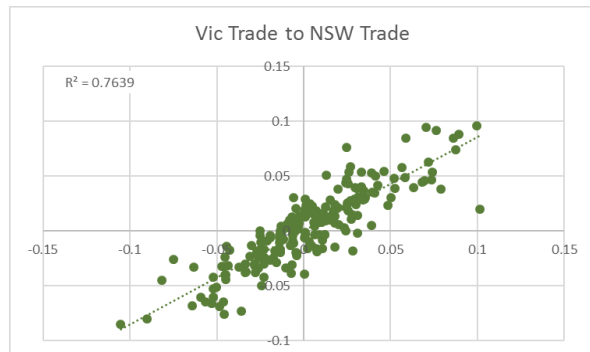
- 1.0 to 0.80, very strong positive correlation
- 0.79 to 0.60, strong positive correlation
- 0.59 to 0.40, moderate positive correlation

- 0.39 to 0.20, weak positive correlation
- 0.19 to 0.00, very weak positive correlation
- 0.00 to -0.19, very weak negative correlation
- 0.20 to -0.39, weak negative correlation
- 0.40 to -0.59, moderate negative correlation
- 0.60 to -0.79, strong negative correlation
- 0.80 to -1.0, very strong negative correlation

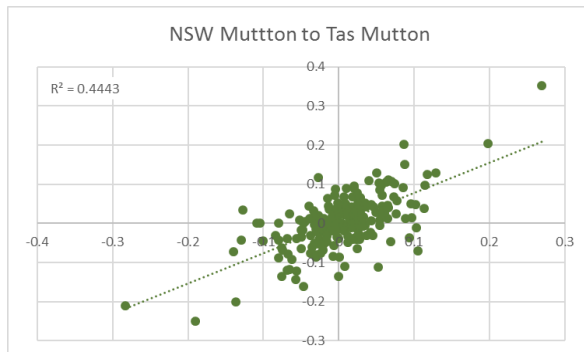
In the figures displayed below there are a sample selection of data returns from the analysis undertaken on the restocker lamb, trade lamb and mutton month to month returns for each state and their corresponding sample correlation coefficient.



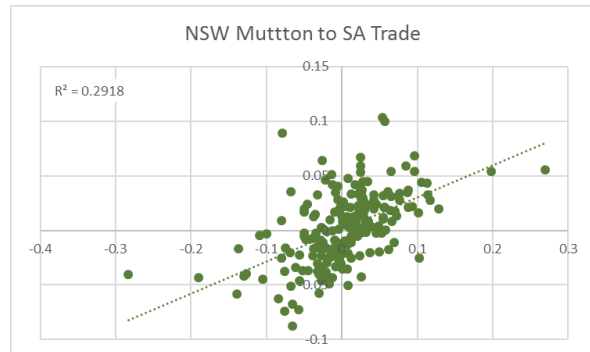
**Figure 102. Returns correlation VIC mutton to SA mutton**



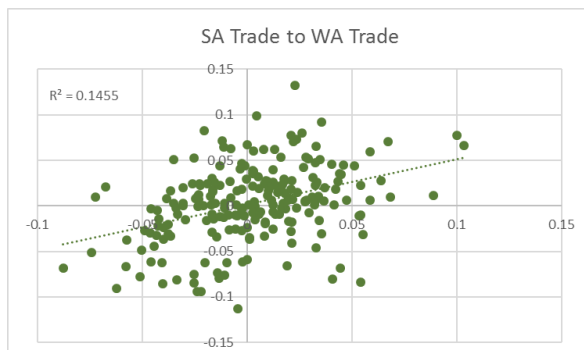
**Figure 103. Returns correlation Vic trade to NSW trade**



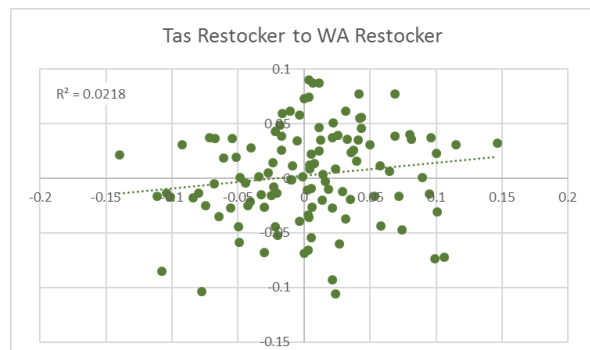
**Figure 104. Returns correlation NSW mutton to TAS mutton**



**Figure 105. Returns correlation NSW mutton to SA trade**



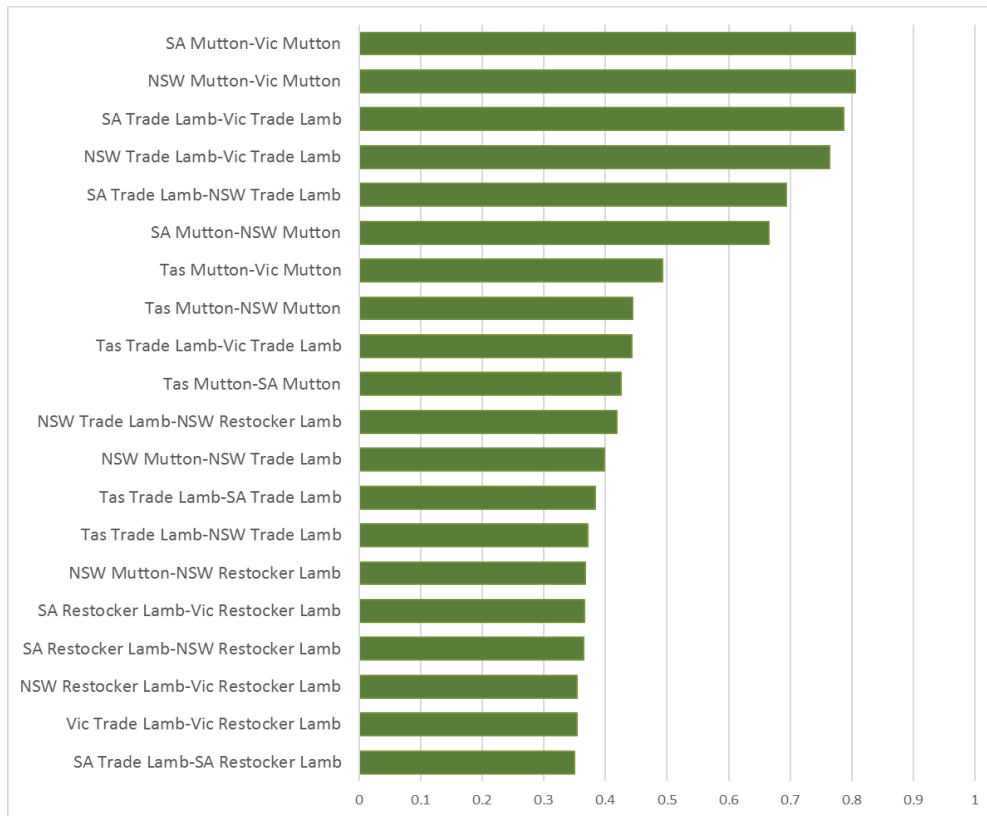
**Figure 106. Returns correlation SA trade to WA trade**



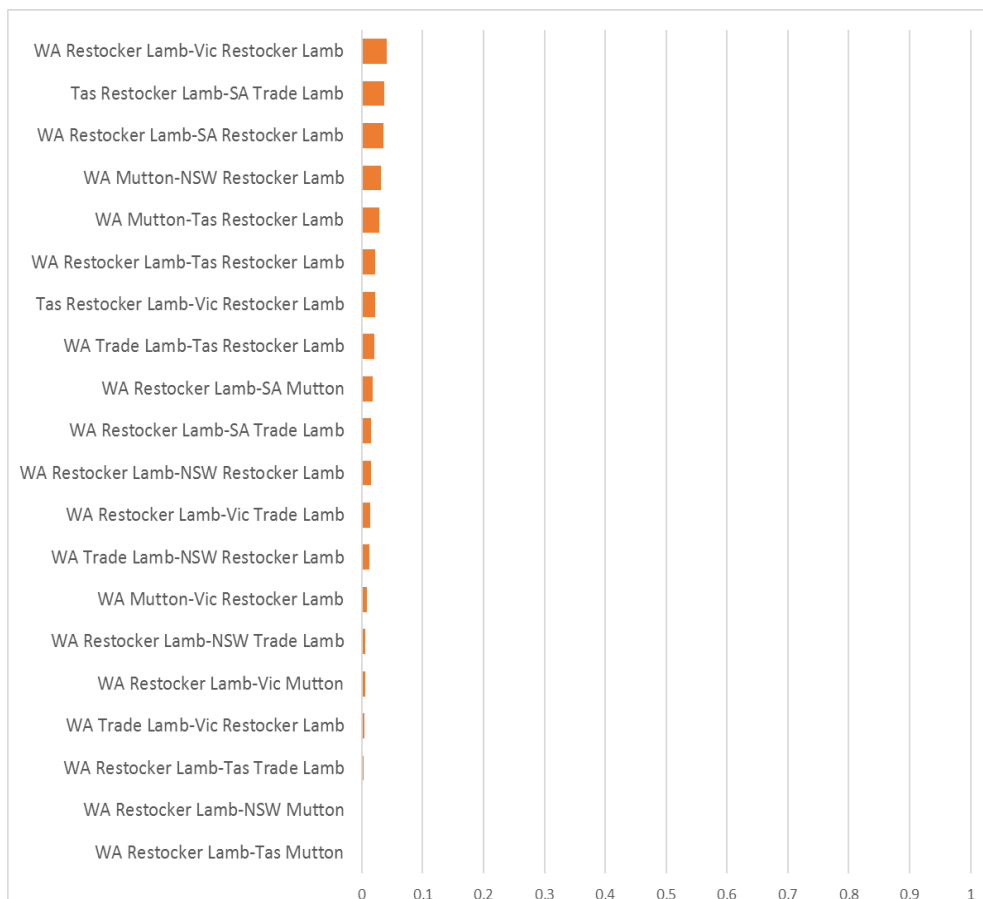
**Figure 107. Returns correlation TAS restocker to WA restocker**

As examples, Figure 102 and Figure 103 are reflective of markets that have shown a strong positive correlation between monthly returns based on their  $r^2$  calculation. Figure 104 and Figure 105 are

indicative of markets displaying a moderate and weak positive correlation, respectively. While Figure 106 and Figure 107 demonstrate markets that have very weak or virtually no linear correlation at all present.



**Figure 108. Strongest 20 correlations of returns price matrix**

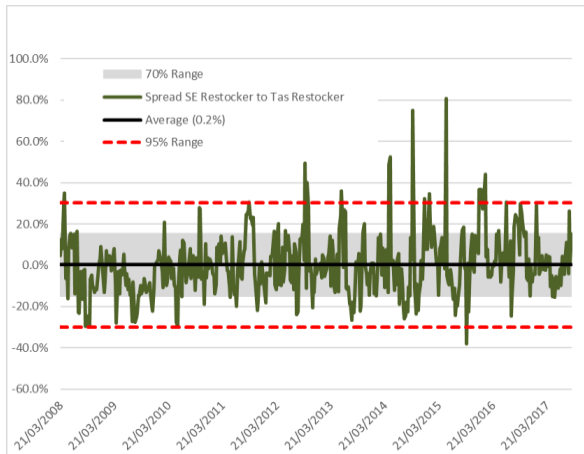


**Figure 109. Weakest 20 correlations of returns price matrix**

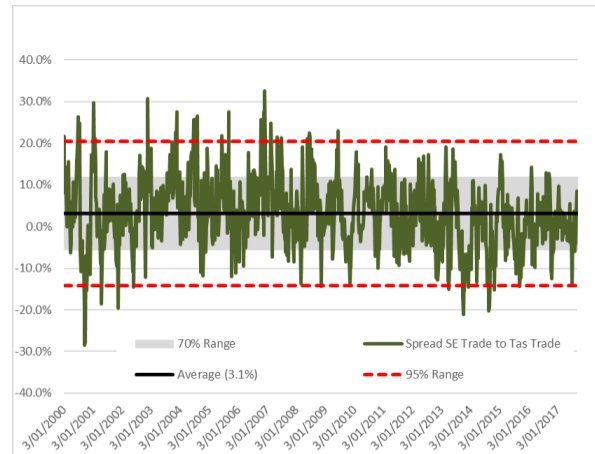
#### Calculation of South Eastern market price spreads to remote regions

The following series of percentage price spread charts displays the historic discount/premium spread of South Eastern lamb/sheep categories to their corresponding Tasmanian and Western Australian categories. Overlaid on each chart is a black line showing the long term average percentage spread discount/premium along with a 70% range and 95% range boundary. The 70% range boundary (grey shaded area) demonstrates where the spread has fluctuated for 70% of the time, providing an approximate range for what may be considered “normal” for that spread. The 95% range (red dotted lines) highlights where the spread has fluctuated for 95% of the time, therefore giving an idea of movements in spread that may be considered to be extreme, when extending beyond the 95% region.

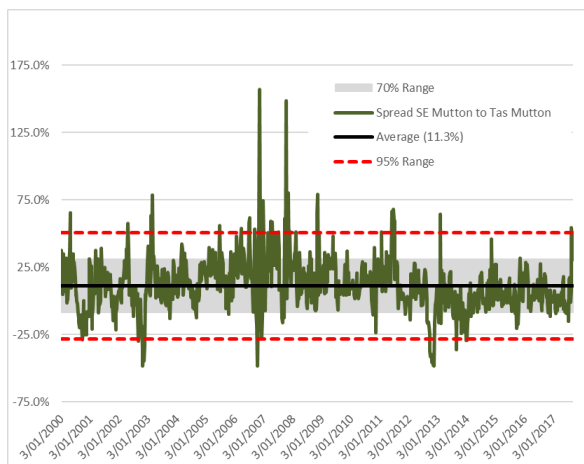
The following series of percentage price spread charts displays the historic discount/premium spread of South Eastern lamb/sheep categories to their corresponding Tasmanian and Western Australian categories. Overlaid on each chart is a black line showing the long term average percentage spread discount/premium along with a 70% range and 95% range boundary. The 70% range boundary (grey shaded area) demonstrates where the spread has fluctuated for 70% of the time, providing an approximate range for what may be considered “normal” for that spread. The 95% range (red dotted lines) highlights where the spread has fluctuated for 95% of the time, therefore giving an idea of movements in spread that may be considered to be extreme, when extending beyond the 95% region.



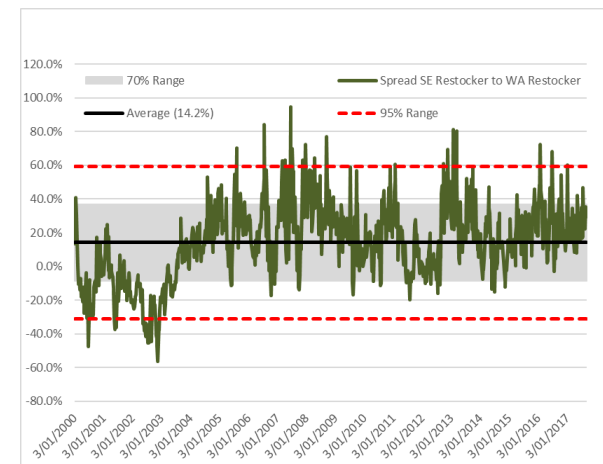
**Figure 110. Restocker lamb spreads- South east to Tasmania**



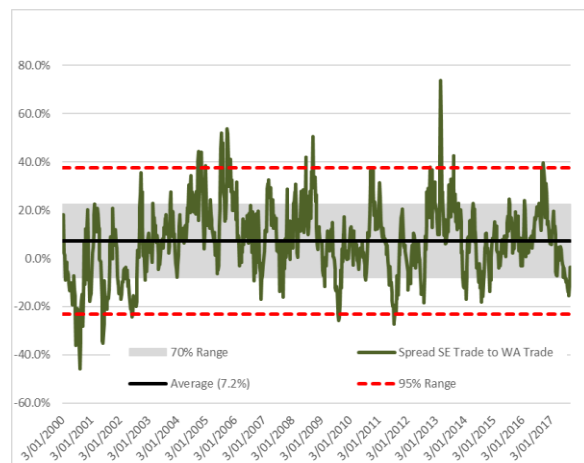
**Figure 111. Trade lamb spread- South east to Tasmania**



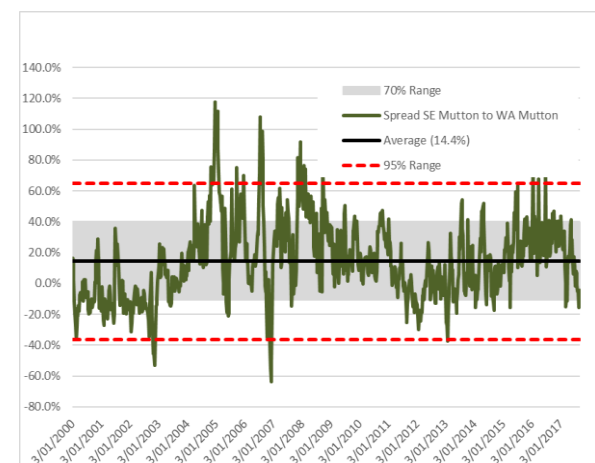
**Figure 112. Mutton spreads- South east to Tasmania**



**Figure 113. Restocker spread- South east to WA**



**Figure 114. Trade lamb spreads- South east to WA**



**Figure 115. Mutton Spreads- South east to WA**

### Skin value analysis:

In Figure 116, the normal range of prices received for sheep skins in each state from 2000 to 2017 have been plotted, with a line denoting the average in each. A normal range of 70% of total prices received during this period has been applied to this calculation.

The matrix below shows that while the South-eastern states enjoy some level of interdependence of price movement over the period, the correlation scores are not representative of strong correlation. Indeed, Victorian to South Australian skin values share the highest correlation with a moderate level of interdependence at an  $r^2$  of 0.5824.

	VIC	NSW	SA	WA	TAS
VIC		0.4261	0.5824	0.0281	0.1085
NSW	0.4261		0.3458	0.1102	0.0666
SA	0.5824	0.3458		0.0338	0.1732
WA	0.0281	0.1102	0.0338		0.00002
TAS	0.1085	0.0666	0.1732	0.00002	

Figure 116. Monthly Returns Correlation - Skins by State

The remaining South-eastern state combinations share a weak correlation in average skin price movement over the month, between 0.3458 to 0.4261. Western Australian and Tasmanian skin price movements appear to share little to no interdependence with any other state.

## 8 Direct sales vs saleyards

### OTH to saleyard correlation ranking map comments

The correlation ranking map for OTH to saleyard Trade Lamb returns (Figure 117) reinforces the peculiarity of the Western Australian OTH and Tasmanian OTH calculations. Indeed, the Victorian OTH correlation to WA OTH is ranked 7<sup>th</sup> highest, followed by SA OTH to WA OTH in 8<sup>th</sup> place and NSW OTH to WA OTH in 9<sup>th</sup> place. This high WA OTH ranking is despite fact that the Vic saleyard to WA saleyard ranking comes in much lower, at 26<sup>th</sup> place. Similarly, the SA Saleyard to WA Saleyard ranks 26<sup>th</sup>, while the NSW saleyard to WA saleyard is placed in 30<sup>th</sup> position out of a possible forty-five combinations.

The ranking map also highlights the relatively weak performance of the Tasmanian OTH correlation figures with eight of the bottom twenty combinations of correlation comparisons having one side of the combination consisting of a Tasmanian OTH section.

Interestingly, within the top third section of ranking map for Trade Lambs there are only three combinations out of a possible fifteen that are not comparing saleyard to saleyard or OTH to OTH price movements. In addition, these three combinations come in at 13<sup>th</sup>, 14<sup>th</sup> and 15<sup>th</sup> spot, namely Vic OTH to Vic Saleyard at an  $r^2$  of .3709, Vic OTH to SA Saleyard at 0.3097 and Vic Saleyard to SA OTH at 0.2968.

The middle third section of the ranking map is predominantly made up of saleyard to OTH combinations among the South-eastern regions, consisting of ten out of a possible fifteen combinations. The lowest five ranked within the middle third section include combinations that are saleyard to saleyard or OTH to OTH, but these either have WA saleyard or TAS OTH as one of the combination sections. All combinations in the lowest third section on the ranking map have either a Tasmanian and/or a WA section as part of the combination.

The correlation ranking map for Mutton (Figure 118) shows a reasonably similar ranking pattern to what was shown by the Trade Lamb ranking map, except for the performance of the WA OTH

figures. Indeed, the highest ranking for any combination that includes a WA OTH or WA saleyard is at 25<sup>th</sup> position with the Vic Saleyard to W.A Saleyard combination scoring an  $r^2$  of 0.2392.

The top third section of the ranking map consists of nine combinations out of a possible fifteen that are made up of a Victorian, SA or NSW OTH to OTH or saleyard to saleyard combinations, reflecting the close interdependence of the South-eastern regions. The remaining six combinations all feature saleyard to OTH combinations consisting of a mixture of the three South-eastern mainland states and TAS saleyards within the respective combinations sections.

Within the middle third of the ranking map there are only six out of a possible fifteen that have either a WA saleyard or WA OTH measure as one of the combinations sections. While, in a similar fashion to the Trade Lamb ranking map, all combinations in the lowest third section on the ranking map have either a Tasmanian and/or a WA section as part of the combination.

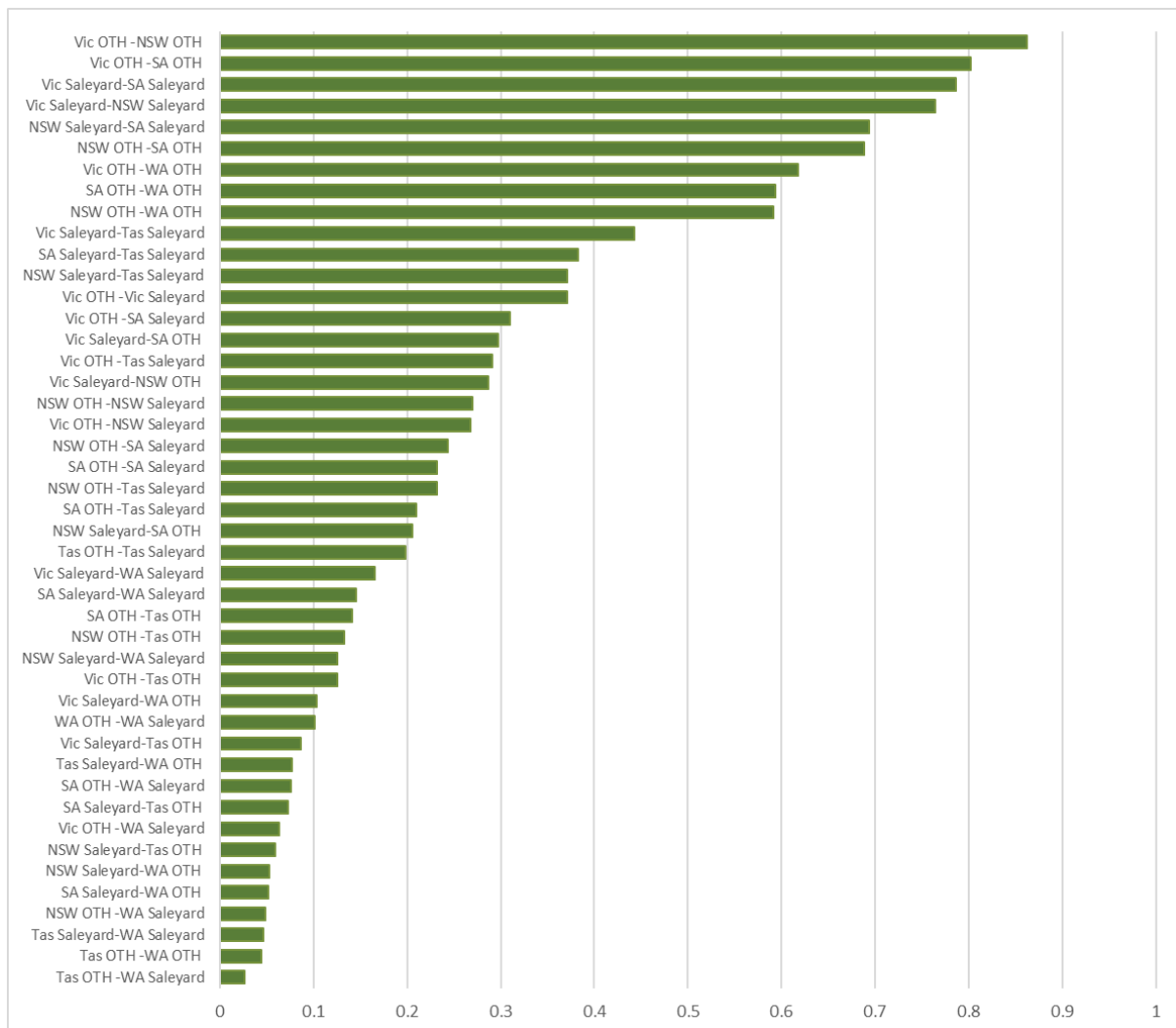


Figure 117. Correlation ranking map for OTH to saleyard Trade Lamb returns

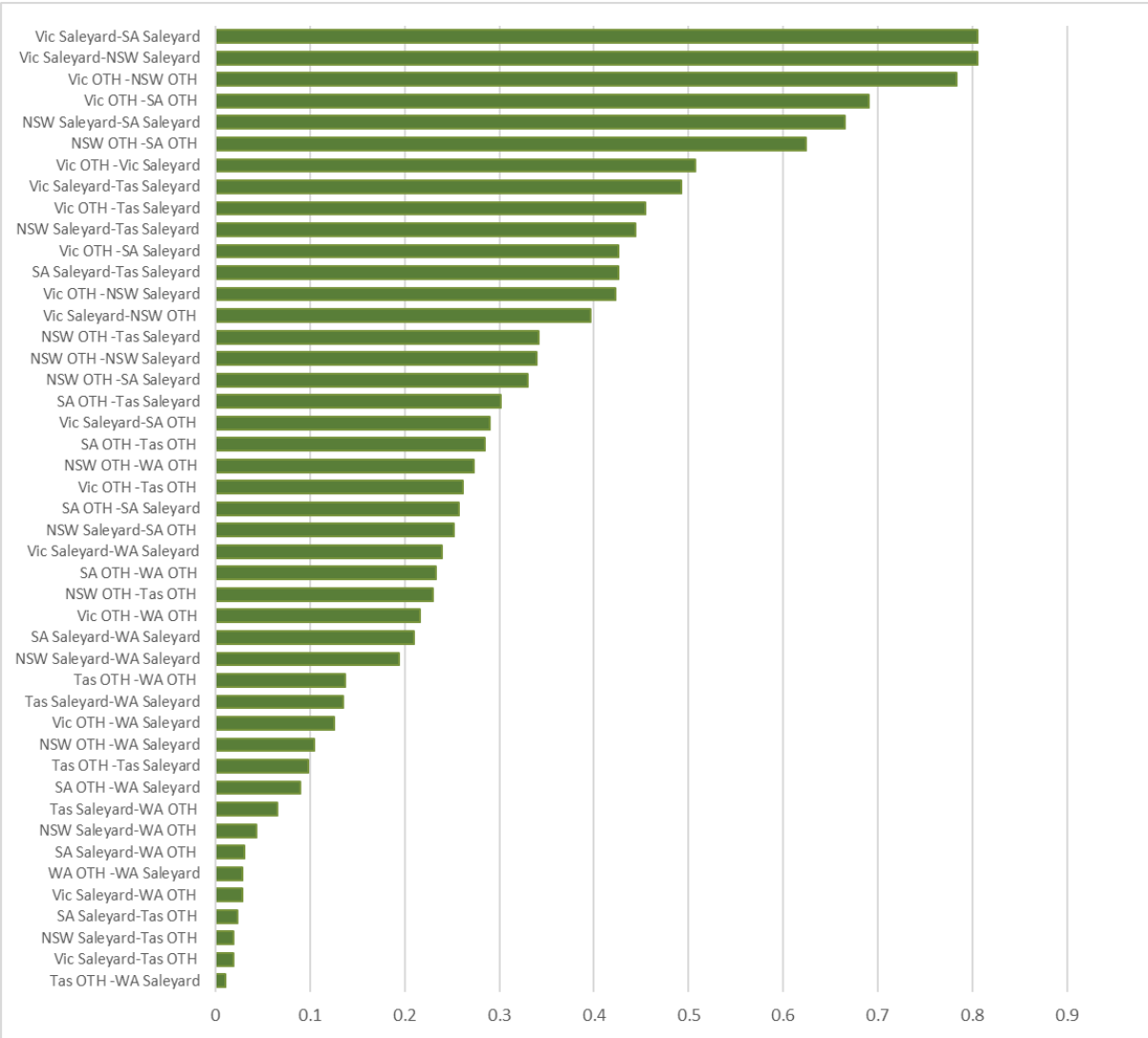


Figure 118. Correlation ranking map for Mutton OTH and Saleyard prices

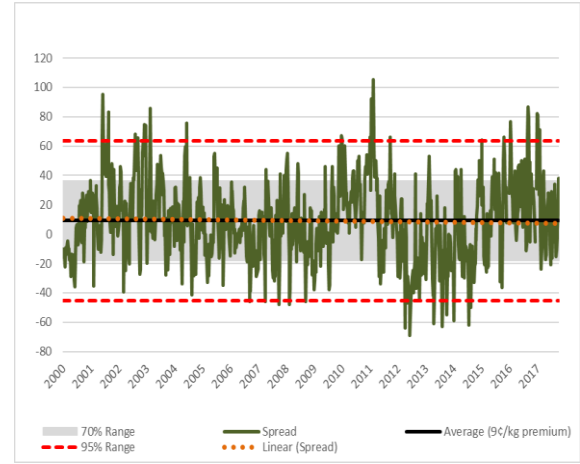


Figure 119. Saleyard NSW trade lamb to OTH NSW trade lamb

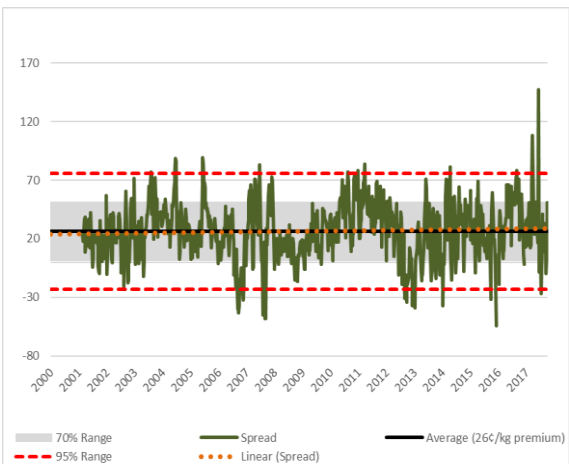
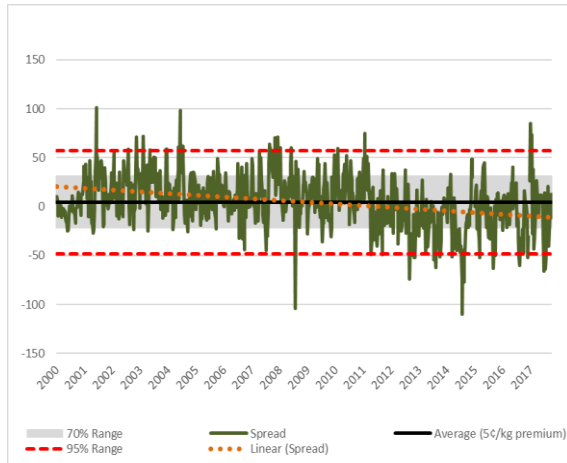
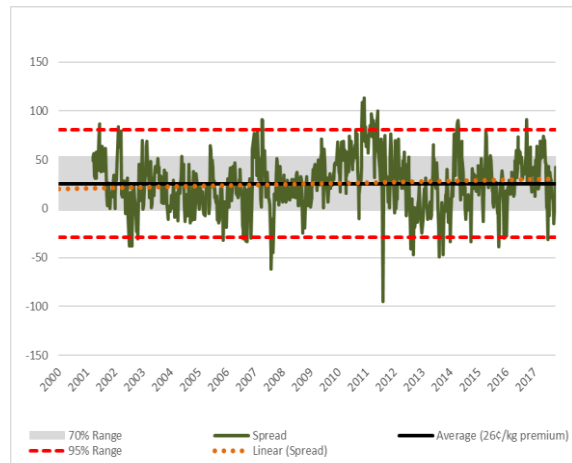


Figure 120. Saleyard NSW mutton to OTH NSW mutton

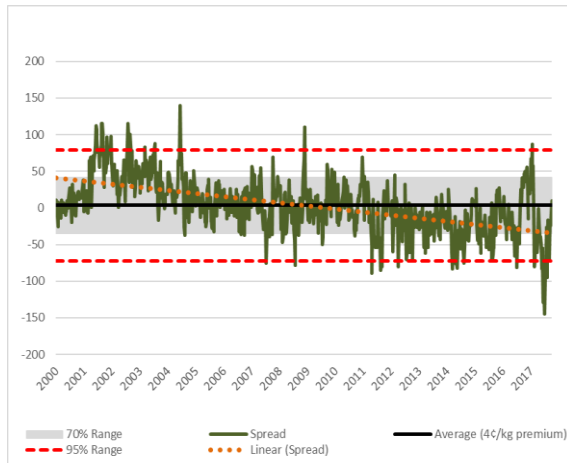




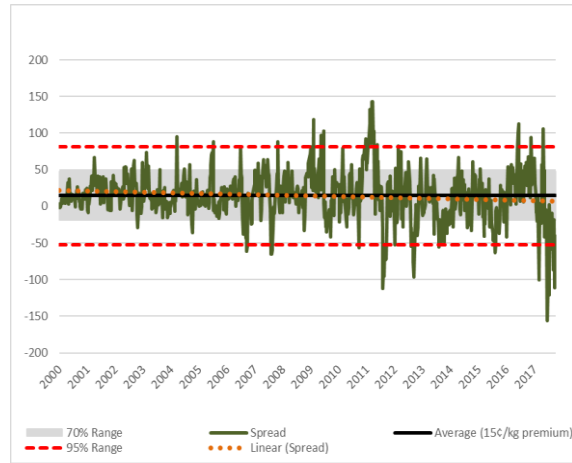
**Figure 121. Saleyard VIC trade lamb to OTH VIC trade lamb**



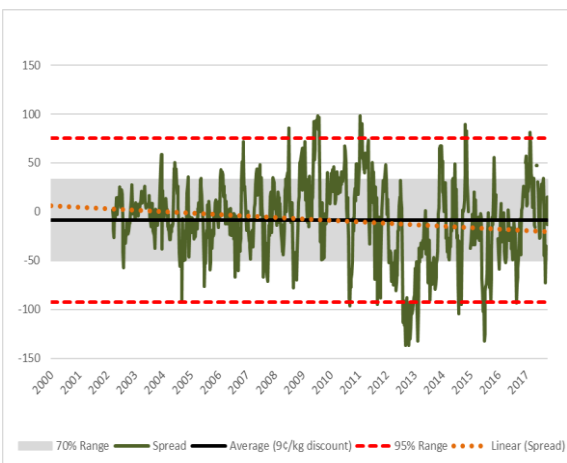
**Figure 122. Saleyard VIC mutton to OTH VIC mutton**



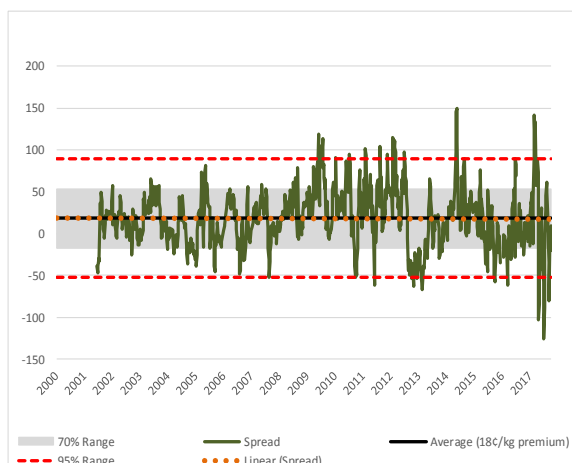
**Figure 123. Saleyard SA trade lamb to OTH SA trade lamb**



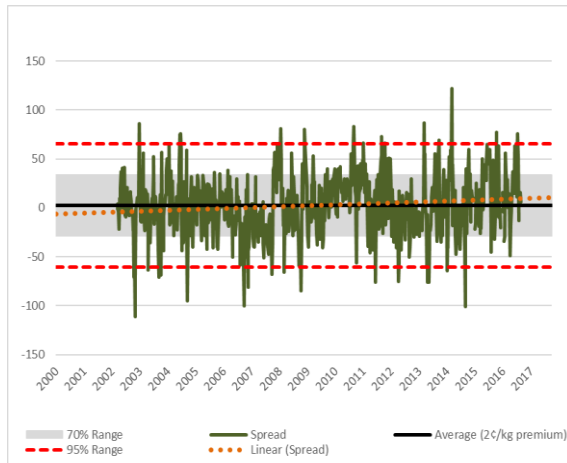
**Figure 124. Saleyard SA mutton to OTH SA mutton**



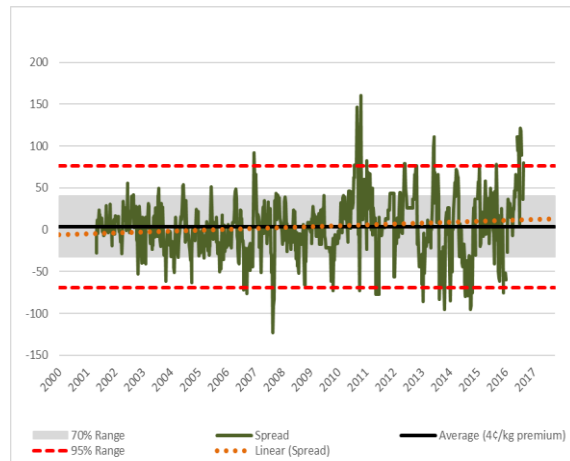
**Figure 125. Saleyard WA trade lamb to OTH WA trade lamb**



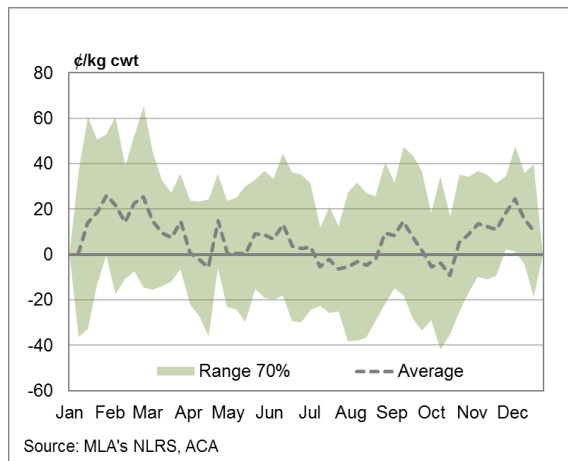
**Figure 126. Saleyard WA mutton to OTH WA mutton**



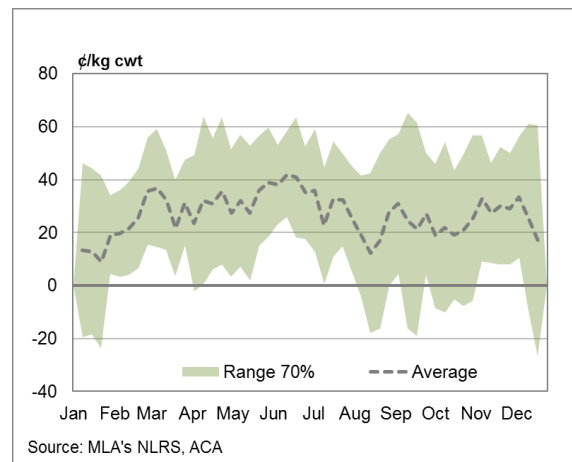
**Figure 127. Saley TAS trade lamb to OTH TAS trade lamb**



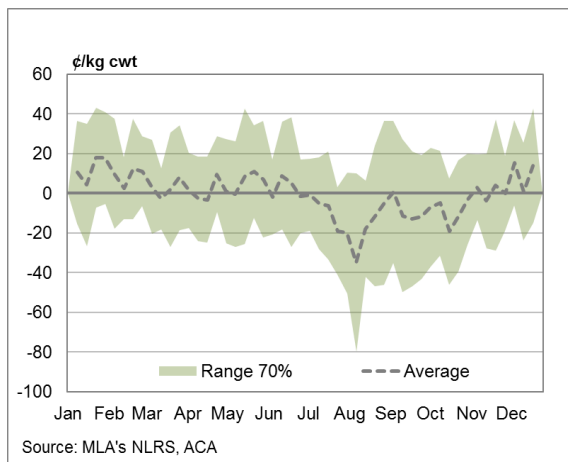
**Figure 128. Saley TAS mutton to OTH TAS mutton**



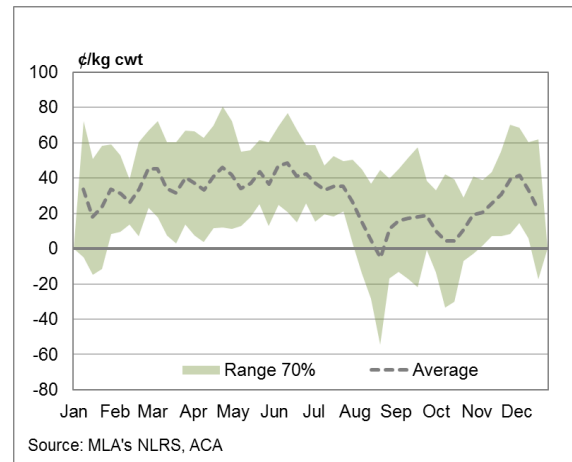
**Figure 129. NSW trade lamb spread to OTH trade lamb**



**Figure 130. NSW mutton spread to OTH mutton**



**Figure 131. VIC trade lamb spread to OTH trade lamb**



**Figure 132. VIC mutton spread to OTH mutton**

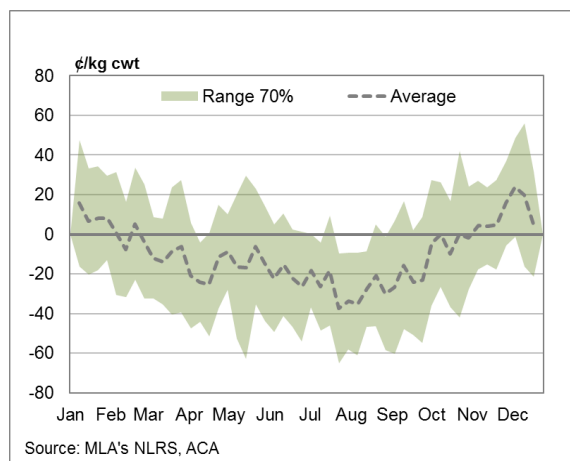


Figure 133. SA trade lamb spread to OTH med. trade

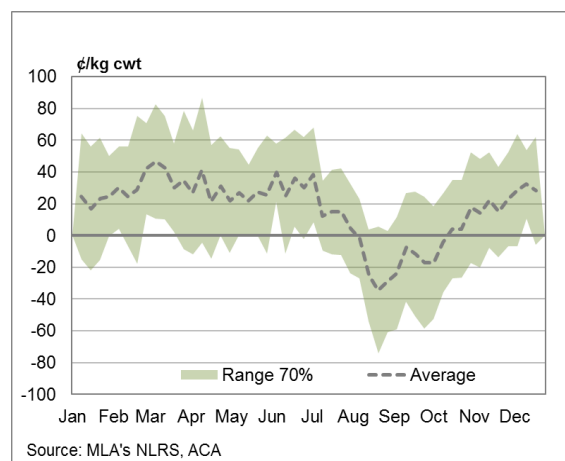


Figure 134. SA mutton spread to OTH mutton

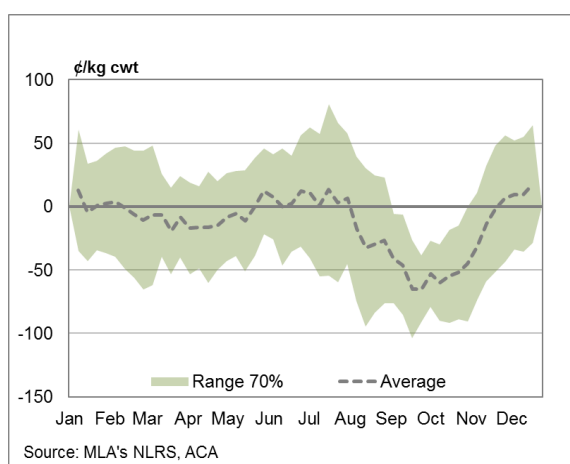


Figure 135. WA trade lamb spread to OTH med. trade

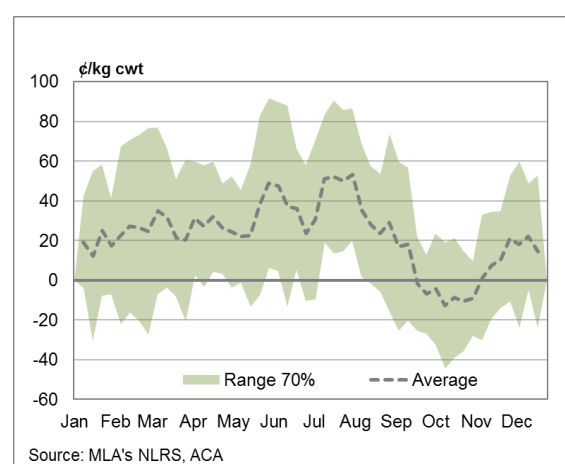


Figure 136. WA mutton spread to OTH mutton

## 9 Structural differences in the supply chain

### Method and data for causality network analysis

The econometric method applied in this analysis is known as the Granger causality test (Granger, 1969). Granger causality is based on assessing the improvement in the prediction of prices at Saleyard Y, produced by the inclusion of the price histories of Saleyard X and Y — than it the prediction made by using the history of Y alone. In this case, saleyard X is dominant and saleyard Y is the satellite market. Such a pairwise comparison of saleyard prices is applied across pairs to build up a full price of dominant and satellite markets.

The 1% significance level is used in the Granger test result, meaning that there is only a 1% chance of rejecting the null hypothesis of there being no causal link in the direction indicated.

The data set used in this analysis is as follows:

- Lamb prices are for lots with a carcass weight of range 18 through 22kgs and fat scores 2 through 4. This filtered data set aims to eliminate price variations across saleyards due to mix changes in the lots on offer.
- Weekly prices for the period from January 2010 to August 2017 were used.
- The lamb prices converted into a stationary time series, using a log of price returns series =  $\log(P(t) / P(t-1))$ , where  $t$  represents the (weekly) time period.
- Current week and previous week prices are used, although longer lags of prices were also tested.
- Sixteen saleyards across mainland Australia are analysed, since full data sets are available for these markets: Adelaide Plains, Ballarat, Bendigo, Cowra, Carcoar, Dubbo, Forbes, Griffith, Hamilton, Inverell, Katanning, Mount Gambier, Muchea, Naracoorte, Tamworth and Wagga.

The same method was applied to MLA's State-level weekly lamb prices series:

- Trade lamb prices for State-level saleyard price series
- Medium lamb OTH (Over-the-Hooks) for State-level processor prices
- Time series cover NSW, South Australia, Tasmania, Victoria and Western Australia
- Weekly prices for the period from January 2010 to August 2017 (converted into stationary time series using logs of price returns).

Table 19. Record of industry consultations used for this investigation

Name	Location	Organisation	Date of Contact	Contact Method
Michael Craig	Harrow, VIC	Producer & VFF Livestock Group, Sheepmeat Council Australia	21/08/2017	Meeting - Presentation as Nuffield Scholar
Darren Gordon	Dunkeld, VIC	Livestock logic	21/08/2017	Meeting
Greg Easton	Mundaring, WA	Farmanco	22/08/2017	Phone
Mark Ferguson	New Zealand	NZ Merino		
Tim Delany	Ballarat, VIC	NLRS officer	22/08/2017	Meeting
Kim Heywood	WA	WAFF	11/09/2017	Meeting
Jeff Murray	WA	WAFF	11/09/2017	Phone conference
John Wallis	WA		12/09/2017	Meeting
Nathan Scott	VIC	AgChieve	8/09/2017	Meeting
David Locke	WA	WAMIA (Muchea)		
Charlie de Fegely	VIC		30/08/2017	
David Slade	WA	WAFF Livestock	8/09/2017	
Bruce Mullin	WA	DPIRD	11/09/2017	Meeting
Kate Pritchard	WA	DPIRD	11/09/2017	Phone conference
Daniel Marshall	WA	Sheep CRC	11/09/2017	Phone
Todd Quinlivan	WA	Producer	12/09/2017	Meeting
Neil Brindley	WA	Livestock Agent	12/09/2017	
Paul Keenan	WA	Livestock Shipping Service	20/09/2017	Phone Conference
Rob Davidson	WA	WAMMCO	20/09/2017	Phone Conference
Brad Gosling	WA	Wellards	20/09/2017	Phone Conference
John Edwards	WA	Emanuel Exports	20/09/2017	Phone Conference
Mike Gordon	WA	Rural Export & Trading	20/09/2017	Phone Conference
Geoff Shipp	WA	Elders	20/09/2017	Phone Conference
Tim O'Donnell	WA	Wellard	20/09/2017	Phone Conference
Samuel Kelly	NSW	Producer	25/09/2017	Phone Conference
David Monk	NSW	MLA/LMO	09/10/2017	Saleyard Meeting
Leanne Dax	NSW	MLA/LMO	18/10/2017	Saleyard Meeting
Rodger Fletcher	NSW	Processor	18/10/2017	Meeting
Geoff Duddy	QLD	Advisor	23/10/2017	Phone Conference
Andy Williams	WA	WAMIA	28/10/2017	Phone Conference
Mick Keogh	NSW	ACCC	25/10/2017	Phone Conference
Anna Speer	NSW	AuctionsPlus	06/11/2017	Meeting
	WA	V&V Walsh	22/11/2017	Q&A document