Farm share and price spread in Australia's beef supply chain

Tim Goesch, Nga Nguyen and Breeana Sandley

Research by the Australian Bureau of Agricultural and Resource Economics and Sciences

Research report 17.3
July 2017
Ownership of intellectual property rights
Unless otherwise noted, copyright (and any other intellectual property rights, if any) in this publication is owned by the Commonwealth of Australia (referred to as the Commonwealth).

Creative Commons licence
All material in this publication is licensed under a Creative Commons Attribution 3.0 Australia Licence, save for content supplied by third parties, logos and the Commonwealth Coat of Arms.

Creative Commons Attribution 3.0 Australia Licence is a standard form licence agreement that allows you to copy, distribute, transmit and adapt this publication provided you attribute the work. A summary of the licence terms is available from creativecommons.org/licenses/by/3.0/au/deed.en. The full licence terms are available from creativecommons.org/licenses/by/3.0/au/legalcode.

Cataloguing data
Goesch, T, Nguyen, N, & Sandley, B 2017, Farm share and price spread in Australia’s beef supply chain, ABARES research report 17.3, Canberra, July. CC BY 3.0.

ISSN 978-1-74323-334-4
ISBN 1447-8358
ABARES project 43434

Internet
Farm share and price spread in Australia’s beef supply chain is available at agriculture.gov.au/abares/publications/publications.

Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)
Postal address GPO Box 858 Canberra ACT 2601
Switchboard +61 2 6272 3933
Email info.abares@agriculture.gov.au
Web agriculture.gov.au/abares

Inquiries about the licence and any use of this document should be sent to copyright@agriculture.gov.au.

The Australian Government acting through the Department of Agriculture and Water Resources, represented by the Australian Bureau of Agricultural and Resource Economics and Sciences, has exercised due care and skill in preparing and compiling the information and data in this publication. Notwithstanding, the Department of Agriculture and Water Resources, ABARES, its employees and advisers disclaim all liability, including for negligence and for any loss, damage, injury, expense or cost incurred by any person as a result of accessing, using or relying on information or data in this publication to the maximum extent permitted by law.

Acknowledgements
The authors thank Haydn Valle, David Mobsby and Richard Green for their assistance in compiling the data, Trish Gleeson and Jack Mullumby for reviewing various stages of the analysis and David Galeano and Peter Gooday for their comments on this report. The authors would also like to thank Ben Thomas and Tim Ryan from Meat & Livestock Australia for their comments.
Contents

Summary 5

1 Introduction 7

2 Background 8
   The Australian beef industry 8
   The beef value chain 8

3 Data sources 12

4 Price movements 13
   Movements in real farmgate, export and retail prices 13
   Price indices 14

5 Farm share and price spread 16
   Methodology 16
   Farm share of retail price 18
   Farm share of export price 20
   Comments on farm share 21
   Farm-to-retail price spread 22
   Farm-to-export price spread 22
   Comments on price spreads 23
   Further research 23

References 25

Tables

Table 1 Weight of beef from a 450 kilogram trade steer along the value chain 16
Table 2 Farm share of retail dollar for beef in the US, France and South Africa 19

Figures

Figure 1 Australian beef value chain 8
Figure 2 Real prices for beef and cattle, 1970–71 to 2015–16 13
Figure 3 Real beef price indices, 1970–71 to 2015–16 15
Figure 4 Farm share of retail price, beef, 1970–71 to 2015–16 19
Figure 5 Farm share of export price, beef, 1996–97 to 2015–16 21
Figure 6 Farm-to-retail price spread, beef, 1970–71 to 2015–16
Figure 7 Farm-to-export price spread, beef, 1996–97 to 2015–16

Maps

Map 1 Beef regions in Australia
Summary

Some farmers and consumers are concerned that consolidation in the food supply chain could lead to farmers receiving lower prices and consumers paying higher prices than in perfectly competitive markets. For example, some farmers are concerned that increasing consolidation in beef processing activities could lead to lower cattle prices.

Several studies have examined the issue of market power in Australia's food supply chains. Two studies relevant to beef were conducted by the Australian Competition and Consumer Commission (ACCC). In 2007, the ACCC released a report stating that there appeared to be sufficient competition at both ends of the supply chain, and that it was unlikely any buyer or seller could unduly suppress the price of livestock or set domestic retail red meat prices without regard to competitors (ACCC 2007). In 2008, the ACCC released another report stating that there was no evidence that supermarkets were abusing their position in the market. Specifically, the Commission found no across-the-board evidence to suggest that retail prices for fresh products (including meat) were increasing at a faster rate than farmgate prices, or that the major supermarket chains were acting in an anti-competitive way in their dealings with suppliers of fresh products (ACCC 2008).

Despite these findings, farmers remain concerned about the impact of consolidation in the beef supply chain, with these concerns recently reflected in the terms of reference of the Senate Inquiry into the red meat processing sector and in ACCC investigations into JBS Australia’s acquisition of Primo Foods and allegations that meat processors collectively boycotted a prime cattle sale at Barnawartha saleyard on 17 February 2015 (SSCRT 2015; ACCC 2015a,b). The Senate Committee is due to report in August 2017, and is to pay particular attention to the impact of consolidation in red meat processing activities on market competition and farmgate returns. While the ACCC found no evidence to suggest that processors had entered into an arrangement to not attend the Barnawartha sale or that the JBS-Primo transaction would substantially lessen competition, these matters prompted the ACCC to undertake another study, this time examining the industry in a broader context than the ‘specific provisions of the Competition and Consumer Act’ (ACCC 2017). During the consultation phase of this study, the ACCC heard that some producers were concerned about anti-competitive practices at saleyards and a lack of transparency in cattle pricing (particularly grid pricing) and carcase grading (ACCC 2017).

This study uses Australian price data to estimate farm share and price spread in the beef industry using a relatively simple methodology developed by the United States Department of Agriculture Economic Research Service (USDA ERS). Farm share is the proportion farmers receive of the price of a product sold to customers while price spread is the difference between the sale price of a product and the price received by farmers. An increase in price spread or a decrease in farm share could be an early indicator of competition issues in one or more sectors in a supply chain.

The analysis shows that despite some significant short-term variation, the overall trends in farm share of the retail price and the farm-to-retail price spread were relatively flat between 1970–71 and 2015–16. It also shows that trends in farm share of the export price and the farm-to-export price spread were flat between 1996–97 and 2015–16. If it is assumed that the emergence of market power beyond the farm gate is likely to be reflected in a sustained widening in price spread or a sustained decline in farm share, then these results suggest that there has been no obvious change in market power within the beef industry over these periods.
Given the availability of suitable data, continued monitoring of farm share and price spread may be a simple and relatively inexpensive option that could inform industry that a competition issue may be emerging in one or more sectors of the supply chain. While changes in farm share or price spread are not definitive indicators of competition issues, this type of analysis could be used to trigger more detailed analysis if it identified a significant change in trend, or a divergence in trends.

Two options for additional analysis include collecting data on costs and prices beyond the farm gate and input-output analysis. Collecting data on costs and prices beyond the farm gate could allow a more detailed investigation of costs within a supply chain (for example, differentiate between processing and retailing costs), and potentially facilitate the estimation of profit margins in different sectors within the beef supply chain. However, this type of data is commercially sensitive, and likely to be difficult to obtain.

Input-output analysis would involve interrogating Australian input-output data to decompose costs and profits between various sectors within the beef supply chain, and to estimate the returns to capital and labour in each sector. This option could be used for one-off analysis, or as a standalone on-going monitoring option. It would also lead to a more informed debate about the various factors influencing prices, including market power (see Nguyen, Mobsby & Goesch 2016 for more detail).
1 Introduction

Some farmers and consumers are concerned that consolidation in some sectors of the food supply chain could lead to farmers being paid lower prices and consumers paying higher prices than in perfectly competitive markets (see ACCC 2007, ACCC 2008, SSCRAT 2014 and Department of Agriculture 2015, ACCC 2017). There are several options for investigating whether market power is an issue in food supply chains. For example, it may be possible to use input-output analysis to investigate market power in some sectors, or to collect detailed data on costs and prices beyond the farm gate. One relatively inexpensive option is to monitor trends in the shares farmers receive from the sale of retail and export products and in spreads between farm and retail prices and farm and export prices. This study focuses on farm share and price spread in the Australian beef industry.

Farm share is the proportion farmers receive of the price of a product sold to customers while price spread is the difference between the sale price of a product and the price received by farmers. The farm-to-retail price spread includes payments for all services that add value to farm products beyond the farm gate to the point of sale to customers, including transporting, processing, storing and retailing.

A decrease in farm share or an increase in price spread may indicate imperfect price transmission. This can occur when there is a lack of competition in one or more sectors in the food supply chain. If some agents in the supply chain have more market power than others, they may be able to manipulate prices, which could lead to lower farmgate prices or higher retail prices.

There has been significant consolidation in the beef processing industry over the past 50 years. In 1972 there were 550 meat processing plants in Australia, while today around 133 plants account for over 97 per cent of Australia’s red meat processing capacity (Industry Commission 1994; AMPC 2017). Some farmers are concerned about how consolidation will affect cattle prices. Some of these concerns are reflected in the terms of reference of the Senate Inquiry (Rural and Regional Affairs and Transport References Committee) into market consolidation in the red meat processing sector (the committee is due to report in August 2017).

While it may be useful to monitor farm shares and farm-to-retail price spreads, as a change in trend could be an early indicator that competition issues are emerging within a supply chain, further research will always be needed to confirm whether this is the case. As noted in Nguyen et al. (2016), identifying inefficiency within food supply chains because of an increase in market power in one or more sectors is more complex than simply identifying an increase in price spread or a reduction in farm share. This is because these changes can occur for a number of reasons that are not related to market power.

This paper is organised as follows. Chapter 2 contains some background information on the Australian beef industry, while Chapter 3 provides a description of the price data used in the analysis. Some of the factors influencing beef prices over the past 45 years are identified in Chapter 4. Chapter 5 describes the methodology used to calculate farm share and price spread and contains estimates based on this methodology using Australian farmgate, export and retail price data. It also identifies some of the limitations of this analysis and proposes options for additional research that could improve the analysis.
2 Background

The Australian beef industry

The beef industry is one of Australia's most important agricultural industries, with nearly 60 per cent of all Australian farms carrying beef cattle (Martin 2015). In 2015, there were 66,601 beef cattle producers and 24.6 million beef cattle in Australia (ABS 2016a). In 2015-16, the industry produced $11.9 billion of beef and veal and $1.3 billion of live export cattle (for feeder and slaughter purposes) (ABS 2016b).

The industry is highly export focussed, with around two-thirds of Australia's beef (by volume, excluding live exports) being exported each year.

The beef value chain

The value chain shows the process by which value is added to a product through activities such as transport, processing, storing and marketing (Figure 1). In the beef value chain, the major stages of value-add beyond the farm gate are processing and retailing. A significant proportion of processed beef is exported, often undergoing additional processing overseas.

Figure 1 Australian beef value chain

Note: Adapted from Spencer and Kneebone (2012).

Cattle production

Beef cattle production in Australia is typically divided into northern and southern systems. Northern Australia is defined as northern Western Australia, the Northern Territory and Queensland (Map 1). The remainder of Australia, including southern Western Australia, South Australia, New South Wales, Victoria and Tasmania, is defined as southern Australia (Martin 2015).
There are significant differences between the northern and southern beef cattle industries that have resulted in different production systems and market focus (see Goesch et al. 2015 for more detail). Some of these differences are the result of differences in climate, pastures, industry infrastructure and proximity to markets.

**Processing**

Processing adds value by transforming live cattle into a range of beef products. It involves killing, bleeding, removing the hide and internal organs, trimming excess fat, washing the carcase, chilling, boning and freezing or holding in cold storage. Boning involves cutting the carcase into smaller pieces called primals (for example, whole rump). Processing also leads to the production of by-products, such as edible offal, that have a commercial value.

Most processing facilities are located in Queensland, New South Wales and Victoria and tend to be concentrated near population centres and export terminals (Goesch et al. 2015). Abattoirs source cattle from farms, saleyards or feedlots, and there is an increasing trend for processors to be vertically integrated with these upstream sectors, especially the feedlot sector. After processing, chilled or frozen beef (depending on its final market) is transported to domestic outlets in refrigerated trucks, or to ports in refrigerated containers.

The major meat processing companies in Australia are JBS Australia, Teys Australia and NH Foods Australia. The ACCC estimates that these three companies account for 23 per cent, 16 per cent and 7 per cent of Australia’s slaughter capacity (ACCC 2017).

According to Lin (2015), the meat processing industry tends to operate on high volumes and low profit margins. Research by Witham (2013) suggests that Australia suffers a cost disadvantage, with the local processing industry not taking full advantage of economies of scale. Many local
abattoirs still operate single shifts, and ongoing industrial disputes inflate costs compared to overseas processors. The study also identifies utility costs for energy and water as being significant, since high levels of energy and water use in abattoirs are necessary to meet strict food safety requirements. JBS Australia indicates that the cost of processing cattle in Australia is twice that in Brazil and the United States (Witham 2013).

High costs and competition in the Australian processing sector have led to a reduction in the number and geographic distribution of abattoirs over a long period of time. While there were 550 meat processing plants in Australia in 1972, today around 133 plants account for over 97 per cent of Australia’s red meat processing capacity (Industry Commission 1994; AMPC 2017). With cost and competitive pressures likely to continue, so too is consolidation of the processing sector likely to continue.

There is some concern that continued consolidation in the meat processing sector could lead to farmers receiving lower prices for livestock, with the Senate Committee on Rural Affairs and Transport recently investigating its effect on market competition and farm returns. Previous studies show little evidence that consolidation is adversely affecting prices. This includes research by the ACCC (2007) and the Australian Department of Agriculture (2015), which indicate that there are a range of buyers who compete for Australian livestock to supply domestic and international red meat markets, with meat processors competing with large supermarkets (which may have direct supplier arrangements in place with some farmers), other producers (for lot feeding and restocking) and live exporters.

However, a more recent study by the ACCC revealed that some producers are concerned that a lack of transparency in cattle pricing and carcase grading could influence cattle prices (ACCC 2017). In particular, they are concerned about the integrity of the carcase grading auditing system and the difficulty in accessing and interpreting price grids. The study also identified concerns about saleyard auctions, including conflicts of interest in saleyard transactions when buyers bid for livestock on behalf of multiple clients, and the potential for collusion and bid rigging. The report contains a number of recommendations aimed at addressing some of the issues identified in the study, including making price grids publicly available; making price grids easier to interpret and compare; strengthening the carcase grading auditing system; adopting objective carcase measurement technology; and introducing a mandatory Buyers Register at physical auctions that includes details of commission buyers and livestock agents intending to bid at the sale and the principals commission buyers will be acting for (ACCC 2017).

The ACCC study was based on information provided voluntarily by industry. According to the ACCC, more detailed data would be needed to identify how profits are distributed throughout the industry, and to ‘identify the existence or exercise of market power’ (ACCC 2017).

**Major markets**

After processing, beef is distributed to domestic markets or to ports for export. Beef exports have increased from around 50 per cent of production in 1970 to over two-thirds of production today. Beef consumed in Australia is dominated by sales through retail outlets and the food service industry.

**Export markets**

In 2015, Australia exported around 1.9 million tonnes of beef and veal (carcase weight). This represented about 20 per cent of beef (including buffalo meat) traded worldwide. Other major beef exporters are India (includes buffalo meat), Brazil and the United States, making up 19 per cent, 18 per cent, and 11 per cent of world exports in 2015 (ABARES 2016).
Queensland is the main beef exporting state, followed by Victoria and New South Wales. The Port of Brisbane is Australia’s main beef exporting port, with others located in Melbourne, Sydney, Fremantle and Adelaide (MLA 2013).

The major export markets for Australian beef are Japan, the United States, the Republic of Korea and China. The most significant recent development in Australia’s beef export market has been the increase in beef and veal exports to China, from less than 5,000 tonnes in 2009–10 to more than 90,000 tonnes in 2012–13 and around 128,000 tonnes in 2015–16 (ABARES 2016). While demand for red meat is expected to continue to grow in Asia, and particularly in China, Australia faces growing competition to supply these markets, especially from South America (Goesch et al. 2015; Hyde et al. 2016).

**Domestic markets**

Domestic consumers purchase beef products mainly from retailers (including supermarkets and butchers) and the food service industry (including restaurants, hotels and caterers). According to Meat & Livestock Australia (MLA), 62 per cent of domestic beef sales were in the retail sector and 38 per cent in the food service sector in 2015 (MLA 2016). A Nielsen survey shows that Coles and Woolworths accounted for nearly 60 per cent of domestic retail sales in December 2014. It also shows that butchers accounted for just over 20 per cent and Aldi and IGA just under 20 per cent of retail sales over the same period (Condon 2015).

Retailers purchase beef direct from processors or through wholesalers (who also on-sell to the foodservice industry). Increasingly, however, the wholesaling function is being absorbed, as supermarkets vertically integrate their supply chains and enter into service agreements with large producers, feedlots and processors to reduce costs and secure consistent supply (Lin 2015).

While the major supermarkets (Woolworths and Coles) have a significant share of domestic retail sales, their ability to influence beef prices along the value chain is limited by upstream competition from the larger export market (export prices are an important determinant of returns to producers and processors) and downstream competition from butchers and other supermarkets (ACCC 2007). These outlets also need to price beef to be competitive with other meat products, such as lamb and chicken (Spencer 2004). The 2007 ACCC study also suggests that profits earned by the major supermarkets from red meat sales are not excessive. Using data supplied by Coles, the ACCC estimated that this margin was around 3 per cent for retail beef sales in 2007, with livestock acquisition, processing and retailing costs accounting for 53 per cent, 14 per cent and 30 per cent of the retail price (ACCC 2007). The ACCC was unable to repeat this analysis in its 2016 study due to insufficient data (ACCC 2017).
3 Data sources

Time series data on farmgate, export and retail prices are needed to systematically investigate long-term trends in price spread and farm share. This chapter provides a description of the data used in this study (see Chapter 5 for some of the limitations of this data). Despite the limitations of existing data, time series data were compiled to enable an examination of movements in beef prices between 1970–71 and 2015–16.

Retail price is the price consumers pay for a kilogram of beef at a retail store. The weighted average retail price of beef is derived from data in ABS Average Retail Prices of Selected Items (cat. no. 6403.0). The series is calculated from quarterly retail price data for primal cuts (rib without bone, roast beef, rump steak, T-bone steak and chuck steak). Prices are averages across a range of cuts, qualities, brands and retailers in capital cities in Australia.

Farmgate price is the price farmers receive for beef cattle. Two farmgate prices have been used in this analysis, one representing beef sold to the domestic retail market and one representing beef sold to the export market. The farmgate price of beef sold through domestic retail outlets (expressed in $ per kilogram) has been calculated using average saleyard prices for 450 kilogram (live weight) trade steers (the analysis was also undertaken using over the hooks price for trade steers, however this made little difference to the farm share and price spread estimates). Trade steer prices were used because they are most representative of the type of cattle destined for the domestic market. The farmgate price of beef sold to the export market was calculated using over the hooks prices for heavy steers and US cows in Queensland (Queensland typically accounts for around 50 per cent of Australia's beef exports [by volume] and exports over 80 per cent of its production). These prices were converted into live weight prices by using factors reflecting the historical relationship between carcase weight and live weight prices for steers and cows in Queensland. A single weighted farmgate price was then constructed by applying weights to the two live weight price series reflecting the historical composition of adult cattle slaughter in Queensland (60 per cent steers, 40 per cent cows between 1996–97 and 2015–16). The cattle price and slaughter data used in this analysis were provided by MLA.

Export price is the price exporters receive per kilogram of beef. Note that the major beef processors are also major exporters of beef. The export unit value of beef is obtained from ABS International Trade (cat. no. 5465.0). These values are provided on a shipped weight basis, and may consist of a variety of bone–in or bone–out cuts or carcases (frozen and chilled) from a range of animals.

All price series were converted to real prices using the ABS Consumer Price Index (cat. no. 6401.0).
4 Price movements

This chapter investigates movements in farmgate, export and retail prices for beef between 1970-71 and 2015–16. As mentioned in the previous chapter, two farmgate prices are used in this analysis. To simplify the discussion, only farmgate prices for beef destined for the domestic retail market are referred to below. Figure 2 shows that while there are differences in live weight prices for trade steers and cattle destined mainly for export markets, movements in these two price series are similar.

Movements in real farmgate, export and retail prices

Figure 2 shows that farmgate, export and retail prices for beef are highly correlated. It also shows that the trends in these prices (expressed in cents per kilogram, 2015–16 dollars) were relatively flat between 1970–71 and 2015–16, albeit with some significant short-term fluctuations.

For example, in 1973–74 the real weighted average retail price of beef and the farmgate price of Australian trade steers were very high in real terms (1826 cents per kilogram and 383 cents per kilogram respectively). By 1975–76 the retail price had fallen to 1168 cents per kilogram while the farmgate price was 129 cents per kilogram. The major driver of this decline was the collapse in world beef prices. Very high world beef production in the early 1970s coincided with a global economic downturn (triggered in part by the 1973 oil price shock), which led to oversupply in the United States and other major cattle producing countries, and the imposition of trade restrictions in Australia’s major export markets (Matthews & Ryan 2015) (ABS 2005). Another factor was Britain’s entry into the European Economic Community (EEC), which led to the termination of the United Kingdom/Australia Trade Agreement in January 1973. Together these events significantly reduced demand for Australian beef exports, leading to a significant increase in supply on the domestic market.

Figure 2 Real prices for beef and cattle, 1970–71 to 2015–16
By 1980, farmgate, export and retail prices had recovered due to the reopening of major export markets, improved industry confidence, and the reduced size of Australia's cattle herd (Matthews & Ryan 2015). However, this recovery was short-lived as severe drought in 1982–83 forced producers to turnoff stock early, again resulting in oversupply and lower prices.

Several opposing factors influenced beef prices during the 1990s. According to Matthews & Ryan (2015), an increase in productivity put downward pressure on prices during the first half of the 1990s. Some of these gains were attributed to the transition to Bos indicus breeds and the eradication of brucellosis and tuberculosis in the northern herd; improved reproductive performance, genetic selection and mortality rates; and an expansion in the feedlot and live export trade sectors (Matthews & Ryan 2015). Trade liberalisation in Japan and Korea, three years of favourable seasonal conditions and a depreciating Australian dollar in turn put upward pressure on farmgate prices in the late 1990s, with prices remaining strong until the drought in 2002–03 (Matthews & Ryan 2015).

Between 2000–01 and 2015–16, beef prices were influenced by drought and disease, with bovine spongiform encephalopathy (BSE) having significant implications for world trade flows. For instance, farmgate prices fell following droughts in 2002–03, 2006–07 and 2013–14 as the number of cattle sent for slaughter increased. Interestingly, the retail price did not fall following the 2002–03 drought and declined more slowly than the farmgate price after the 2006–07 drought. This may indicate some stickiness in retail beef prices (retail prices can also be sticky on the upside, with farmgate prices increasing by 3.2 per cent in 1984–85 while retail prices declined by 1.3 per cent). Moreover, export prices increased in 2013–14. This was largely due to an increase in demand in the United States where improved seasonal conditions led to a decline in cow slaughter and a shortage in the supply of manufacturing beef.

Farmgate prices increased between 2003–04 and 2005–06, with Australian beef exports to Japan increasing by around 45 per cent between 2003 and 2005 as imports from the United States and Canada were banned following the detection of BSE in 2003. Farmgate prices also increased in 2010–11 and 2011–12 as farmers began restocking following the millennium drought. Farmgate prices are also currently very high, with farmers beginning to restock following widespread rainfall in eastern Australia.

**Price indices**

To more easily detect trends in beef prices and examine their movements relative to one another, the price data underlying Figure 2 (with the exception of farmgate prices for export beef) have been converted into price indices using 1990–91 as the base year (that is, all series are set to 100 in 1990–91) (Figure 3). These price indices show that farmgate, export and retail prices for beef have trended down slightly over the past 45 years. There was also a substantial dip in all price indices in the mid-1970s, reflecting the impact of oversupply in the major beef producing countries and a downturn in the world economy.

There are a number of factors that have contributed to the overall decline in prices between 1970-71 and 2015-16. One factor is likely to have been Australia's increasing focus on export markets, with lower value beef tending to be exported. Beef has also faced significant competition from other meats in the domestic market, with chicken and pork consumption increasing from 9.8 and 13.6 kilograms a head in 1970 to 45.3 and 26.1 kilograms in 2014-15.
Farm share and price spread in Australia’s beef supply chain

(Australian Chicken Meat Federation 2017). Over the same period, beef consumption declined from 39.6 kilograms to 26.1 kilograms a head. There has also been some improvement in farm level productivity, with total factor productivity on beef farms increasing by 1.3 per cent a year between 1977-78 and 2012-13 (Jackson & Valle 2015).

While the price trends are similar, the magnitude of the fluctuation within each price series is different. The average farmgate price has been most variable, with drought contributing to dips in farmgate prices in 1982–83, 1996–97, 2002–03, 2006–07 and 2013–14. The weighted average retail price followed a similar, albeit less volatile, pattern to the farmgate and export price series. This is not unexpected given that live cattle are only one input to the sale of retail beef, and that the price of some other inputs such as labour are likely to be far less volatile.

Figure 3 Real beef price indices, 1970–71 to 2015–16

The prices presented in this chapter have been used to derive estimates for farm share of retail and export prices and farm-to-retail and farm-to-export price spreads for beef. In the following chapter, the methodology, assumptions and findings on beef price spread and farm share in Australia are discussed.
5 Farm share and price spread

The objective of this chapter is to identify long-term trends in farm share and price spread in the Australian beef industry. A sharp declining trend in farm share or a widening in price spread could signal inefficiencies in the food supply chain, such as the existence of market power. A high-level analysis such as this can alert policy makers to the possibility of competition issues in one or more sectors in a supply chain. However, additional analysis would be needed to confirm the existence of imperfect competition because changes in farm share or price spread can occur for a number reasons that are not related to market power.

Methodology

The methodology used in this analysis is based on the USDA ERS methodology outlined in the ABARES background paper on local and international experience in monitoring farm share and price spread in food supply chains (Nguyen, Mobsby & Goesch 2016). More detail can be found in USDA ERS (2015) and Hahn (2004).

In brief, the USDA ERS methodology starts with a standard animal. This animal is transformed into standard wholesale cuts at a beef processing plant, and these wholesale cuts are turned into standard retail cuts at the retail level. In this way, the total value of the animal at the farm level can be compared with the total value of the animal at the wholesale and retail levels.

The USDA ERS methodology splits the retail price of a food product into its farm value and farm-to-retail price spread. Farm value is a measure of the payment farmers receive for farm commodities used to produce the retail product while the retail price is the price consumers pay for the food item at a grocery store. Farm share is the proportion farmers receive of the price of a retail product, and is calculated by dividing farm value by the retail price.

The farm-to-retail price spread is the difference between the retail price of a food item and farm value at a particular point in time. It includes payments for all services that add value to farm products beyond the farm gate to the point of sale to customers, including transporting, processing, storing and retailing.

Assumptions

The first step in calculating farm share and price spread is to estimate farm value. MLA provided ABARES with data on the dressed weight of carcases and retail cuts from a 450 kilogram steer (see Table 1). According to this data a live 450 kilogram trade steer yields a 239 kilogram carcase, which is 53 per cent of the live weight (the other 47 per cent includes the hide, head, feet and guts). The carcase in turn yields 164 kilograms of primal retail cuts, which is 68.7 per cent of the carcase weight (the other 31.3 per cent includes bone and trimmable fat).

Table 1 Weight of beef from a 450 kilogram trade steer along the value chain

<table>
<thead>
<tr>
<th></th>
<th>Average dressing percentage (%)</th>
<th>Weight (kilograms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>live weight</td>
<td></td>
<td>450</td>
</tr>
<tr>
<td>carcase/dressed</td>
<td>53.1</td>
<td>239</td>
</tr>
<tr>
<td>retail</td>
<td>68.7a</td>
<td>164</td>
</tr>
</tbody>
</table>

Note: a This refers to the retail yield of a carcase. The retail yield of a 450 kilogram trade steer is 36.4 per cent.
Source: MLA, 2015, pers. comm., 14 August
Based on this data it takes around 2.75 kilograms of a trade steer (live weight) to produce one kilogram of 'standard' retail beef (derived by dividing the live weight of a trade steer by the weight of primal cuts at a retail store). It is worth noting that this conversion rate is higher than the USDA ERS's conversion rate, which is 2.4 kilograms per kilogram of retail beef.

This conversion factor is multiplied by the farmgate price of a trade steer (per kilogram) to estimate the gross farm value of a kilogram of retail beef. The next step is to estimate the net farm value of a kilogram of retail beef. Net farm value (simply referred to as farm value elsewhere in the paper) is the gross farm value less the value of co-products derived from an animal. In Australia, it is a matter of contention as to whether the value of co-products are included in the farmgate price of cattle. In this analysis it is assumed that these values are included in farmgate prices, and that the value of offal and other co-products is equivalent to 24.3 per cent of the gross farm value. This proportion has been calculated by dividing the average value of co-products for trade steers in the March quarter of 2014 ($203.79) (Levonian 2014) by the average gross farm value of trade steers in 2013–14 ($839.35). Net farm value is then calculated by multiplying the gross farm value by 0.757 (that is, 1-0.243).

Farm share and price spread estimates have also been derived for exports using a farmgate price that is more reflective of the type of cattle producing beef that is exported (cattle destined for the domestic market tend to be higher quality cattle, and to attract a higher price). Using the same farmgate price as beef destined for the retail market would have biased farm share and price spread estimates, overstating farm share of export prices and understating the farm-to-export price spread. Unfortunately there was no data available on the yield of an animal where the beef from that animal is exported, so ABARES used the same conversion factor that was used for retail beef to estimate farm share and price spread for export beef. The analysis also uses the same co-product value that was used for trade steers ($203.79 in the March quarter of 2014). This value is equivalent to 26.8 per cent of the estimated gross farm value of an animal where the beef was likely to be exported in 2013–14 ($760.84 assuming a live weight of 500 kilograms). The net farm value of export beef is calculated by multiplying the gross farm value by 0.732 (that is, 1-0.268).

Limitations

There are a number of issues with the data and assumptions used in this analysis, some of which were discussed in the background paper on price margins in Australia's food supply chains (Nguyen, Mobsby & Goesch 2016).

- Annual price series data are aggregated from either monthly or quarterly data, which may result in some loss of information and variation.
- The farmgate prices for retail and export beef are based on saleyard and over the hooks prices. Significant numbers of cattle are sold outside of these sales channels. For example, the major supermarkets tend to use contracts with long-term suppliers to source cattle. While there will be differences in prices paid for cattle sold through different sales channels, the trends in the data series should be valid.
- The period for which data is available to construct a farmgate price series for beef that is exported is relatively short (20 years compared to 45 years for the saleyard price series).
- The retail price time series created with data from the ABS Average Retail Prices of Selected Items series may include some inconsistencies. For example, the quality or specification of retail beef cuts may have changed over time. Despite this, the time series should provide a reasonable indication of beef retail price movements.
• Export prices are approximated by unit values. Again, this may mean that absolute prices are not completely accurate, but trends in the data series should be valid.

• The analysis assumes that it takes 2.75 kilograms of a trade steer to produce 1 kilogram of retail beef. However, recovery rates for retail beef are likely to change over time. Ideally the retail yield factor would vary over time to reflect these changes.

• There is no data on the yield of an animal where the beef from this animal is exported. In the absence of this data the analysis used the retail yield as a proxy for export yield (advice received from MLA suggests that there may be little difference between retail and export yields (Ben Thomas [MLA] 2016, pers. comm., 19 December)). While this will have implications for the level of farm value estimates, and hence farm share and price spread, the trends in farm share and price spread for export beef should remain valid.

• The co-product percentage estimate (the value of co-products as a proportion of gross farm value) used to calculate net farm value is likely to be an overestimate for much of the period analysed. This is because the value of co-products was historically high in the March quarter of 2014 while cattle prices were historically low in 2013–14. For years where this is an overestimate, farm share is likely to be underestimated. Ideally the co-product percentage used to calculate net farm value would vary over time with changes in the value of co-products and cattle. MLA stopped reporting the full potential co-product value indicator due to missing data, and removed it from its producer share calculation (Tim Ryan [MLA] 2017, pers. comm., 24 February). Some co-product price data are still available on MLAs statistics database (MLA 2017).

• Measures such as farm share and price spread (that compare prices along the value chain) may be decreasingly useful as indicators of market efficiency as increased integration and use of service agreements along the supply chain mean that transactions occur less through traditional market channels (Spencer 2004).

While not a limitation, it is worth noting that the export unit value time series is not directly comparable to the retail price series. While export products may consist of a variety of bone–in or bone–out cuts or carcasses (frozen and chilled) from a range of animals, only primal cuts (which incorporate a further component of value–add) are included in the retail price series.

While farm share and price spread have been estimated for the Australian beef industry over the period for which data are available, estimates are sensitive to the data and assumptions used. The use of different data and assumptions could lead to significantly different estimates.

**Farm share of retail price**

Farm share of the retail price of beef averaged 33 per cent between 1970–71 and 2015–16. It was highest in 1972–73, at 46 per cent, and lowest in 1974–75, at 22 per cent (Figure 4). In 2015–16, it was 43 per cent. The MLA estimate for 2015–16 was similar to ABARES’ estimate, at 45 per cent (MLA 2017)). Figure 4 shows that farm share of the retail price has trended down slightly over the past 45 years. The average year on year decrease in farm share is relatively small, at 0.08 percentage points a year (note, this estimate is sensitive to the time period selected for analysis). Figure 4 also shows that farm share tends to dip in drought years. This is because drought typically leads to an increase in the number of animals sold for slaughter. As stated in Chapter 4, the retail price did not fall following the 2002–03 drought and declined more slowly than the farmgate price after the 2006–07 drought, which may indicate some price stickiness in beef retail prices. There were also instances when increases in farmgate prices were not reflected in increases in retail prices.
Table 2 shows that Australia's share of the retail price of beef is lower than in some other countries where similar data is available. Between 1999–2000 and 2013–14, farm share in Australia averaged 32 per cent. This compares to 47 per cent in the United States between 2000 and 2013, 45 per cent in France between 2001 and 2014 and 44 per cent in South Africa between 2009 and 2013.

Table 2 Farm share of retail dollar for beef in the US, France and South Africa

<table>
<thead>
<tr>
<th>Year</th>
<th>Australia</th>
<th>US a</th>
<th>France b</th>
<th>South Africa c</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>34</td>
<td>49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>39</td>
<td>46</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>37</td>
<td>44</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>31</td>
<td>48</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>33</td>
<td>45</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>35</td>
<td>47</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>34</td>
<td>47</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>30</td>
<td>48</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>28</td>
<td>46</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>29</td>
<td>43</td>
<td>42</td>
<td>44</td>
</tr>
<tr>
<td>2010</td>
<td>28</td>
<td>47</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>2011</td>
<td>33</td>
<td>50</td>
<td>46</td>
<td>44</td>
</tr>
</tbody>
</table>
Farm share and price spread in Australia’s beef supply chain

<table>
<thead>
<tr>
<th>Year</th>
<th>Farm Share</th>
<th>Retail Share</th>
<th>Average Share</th>
<th>Average Price Spread</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>34</td>
<td>52</td>
<td>51</td>
<td>46</td>
</tr>
<tr>
<td>2013</td>
<td>31</td>
<td>50</td>
<td>52</td>
<td>43</td>
</tr>
<tr>
<td>2014</td>
<td>31</td>
<td>48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average*</td>
<td>32</td>
<td>47</td>
<td>45</td>
<td>44</td>
</tr>
</tbody>
</table>

Source: a USDA ERS 2015, b FranceAgrimer 2015, c NAMC 2014
Note: The average farm share is calculated for the period in which data is available in each country.

There are several reasons why Australia’s farm share would be expected to be lower than in the United States. First, US beef production is largely grain fed whereas Australian production is mainly pasture fed. This means that farm production costs tend to be higher in the United States than in Australia (Deblitz & Dhuyvetter 2013). The difference may also be partially attributed to higher labour costs in Australia’s processing and retailing sectors.

According to the ACCC, the Australia-US comparison is complicated by a number of factors, including the US measure using the average price paid for grain finished slaughter ready cattle (a large number of cattle in Australia are grass fed), and the cost of processing, distributing and retailing beef being lower in the United States, reflecting cheaper labour, utility and regulatory costs, and greater efficiency because of economies of scale. These ‘lower costs mean that retailers can profitably sell beef at lower price points, which has the effect of increasing the producer share of the retail dollar’ (ACCC 2017).

It is also possible that the farm share estimates for retail beef have been understated in this study. According to a Nielsen survey, Coles and Woolworths account for nearly 60 per cent of domestic beef sales. They acquire cattle under contract with long-term suppliers, only resorting to saleyard auctions when contracted suppliers cannot meet demand. Directly contracted cattle tend to be light weight yearling steers and heifers with limited Bos Indicus genetics finished on grain (ACCC 2017). Many of these cattle are also graded to meet Meat Standards Australia (MSA) guidelines. Grain fed cattle tend to attract a premium, while supermarkets are likely to pay a premium for cattle sourced through contracts due to increased security of supply and increased consistency in quality. MSA approved cattle also attract a premium. In 2015-16, this premium was around 5 per cent for 240-260 kilogram (carcase weight) trade steers (MLA 2017).

Unfortunately, the prices the major supermarkets pay for cattle is confidential, so ABARES was unable to factor this into the analysis.

**Farm share of export price**

Farm share of the export price of beef averaged 66 per cent between 1996–97 and 2015–16 (note, the retail conversion factor has been used here). It was highest in 2015–16, at 73 per cent, and lowest in 2013–14, at 58 per cent. Figure 5 shows that farm share of the export price has been flat between 1996–97 and 2015–16.
The dip in farm share in 2013–14 coincided with a significant increase in supply (cattle slaughter increased 12 per cent in 2013–14 due to drought), which contributed to a 3.3 per cent decrease in farmgate prices. The impact on farm share was compounded by an increase in export prices (up 7.3 per cent) due to strong international demand for Australian beef. This strong demand continued in 2014–15, contributing to a 26 per cent increase in farmgate prices. However, there was also a significant increase in export prices (up 22 per cent), largely offsetting the increase in farmgate price, ultimately translating into only a small increase in farm share. Farm share increased to 73 per cent in 2015–16 as farmers began restocking following the drought (farmgate prices increased by 31 per cent while export prices increased by 6.2 per cent).

**Comments on farm share**

It is often difficult to explain short term movements in farm share because farm share can change year on year for many reasons. As such, it is likely to be more useful to look at general trends in the data. As mentioned previously, a decrease in farm share over time could indicate imperfect price transmission, and the existence of market power in the value chain. However, it could also be because of other factors such as differences in productivity in different sectors or an increase in value adding beyond the farm gate. For example, if the cost of producing beef cattle decreases relative to the cost of producing the retail product (which could include transport, processing and retailing), this is likely to be reflected in a decline in farm share.

For Australia, the initial findings of this analysis show that farm shares of retail and export prices have remained relatively stable, with farm share of the retail price trending down slightly between 1970–71 and 2015–16 and farm share of the export price remaining flat between 1996–97 and 2015–16.
It is also reasonable to expect farm share of the retail price of beef to be lower in Australia than in the United States, France or South Africa, where cattle are largely grain fed.

**Farm-to-retail price spread**

There is no clear trend in the farm-to-retail price spread for beef between 1970–71 and 2015–16 (Figure 6). The average price spread between farm value and the retail price of beef was 977 cents a kilogram. It was highest in 1979–80, at 1176 cents a kilogram, and lowest in 2000–01, at around 791 cents a kilogram. In 2015–16, the farm-to-retail price spread was 856 cents a kilogram.

Figure 6 Farm-to-retail price spread, beef, 1970–71 to 2015–16

![Farm-to-retail price spread graph](image)

Figure 6 shows that there was some widening in the spread between 1988–89 and 1992–93, which roughly coincided with the increase in total factor productivity that occurred in the cattle industry. There was also some widening in spread during the 2002–03 and 2006–07 droughts, although the spread decreased slightly during the 2013–14 drought.

**Farm-to-export price spread**

Similar to the trend in farm share of the export price, the trend in the farm-to-export price spread was flat between 1996–97 and 2015–16 (Figure 7). The average price spread over this period was 194 cents a kilogram. It was highest in 2014–15, at 271 cents a kilogram, and lowest in 2011–12, at 145 cents a kilogram. This was when many farmers began rebuilding their herds following the millennium drought. In 2015–16, the farm-to-export price spread was 190 cents a kilogram.
There has been a significant increase in variability in spread in some recent years. In 2013–14, the spread increased from 182 cents a kilogram to 230 cents a kilogram. This increase coincided with the onset of drought in eastern Australia in late 2013, which led to a substantial increase in cattle slaughter (the increase in slaughter was significantly higher in 2013–14 than in 2002–03 and 2006–07). At the same time, strong international demand led to an increase in export prices. This divergence in farmgate and export prices would have contributed to the significant widening in spread in 2013–14. The farm-to-export price spread increased again in 2014–15, to 271 cents a kilogram. However, in this instance the spread increased despite a significant increase in farmgate prices (export prices increased more than farmgate prices). The spread decreased to 190 cents a kilogram in 2015–16 as farmgate prices increased as farmers began to restock following widespread rainfall in eastern Australia.

**Comments on price spreads**

Farm-to-retail and farm-to-export price spreads capture the cost of services beyond the farm gate needed to transform raw products into the saleable products (in this analysis beef for export or beef for sale at retail outlets), plus profit margins. For export beef, the price spread includes transport, processing, storage and export costs, while for retail beef, retailing costs are also included.

While Figures 6 and 7 show significant short-term variation, they also show relatively flat trends in the farm-to-retail and farm-to-export price spreads over the periods analysed. If it is assumed that the emergence of market power beyond the farm gate is likely to be reflected in a sustained widening in price spread, then these results suggest that there has been no obvious change in market power within the beef industry over this period.

**Further research**

There are several options that could improve the analysis undertaken in this study. First, it may be possible to obtain data on the retail yield and value of co-products for trade steers over time.
It may also be possible to obtain a more accurate estimate of the yield of an animal where the beef from this animal is processed for export. Another option may be to substitute retail scanner data from supermarkets or homescan data from market research companies for ABS retail price data for beef. It is worth noting that while these options may improve the accuracy of farm value and price spread estimates, the issue of having to undertake additional analysis to confirm the existence of market power will remain because an increase in price spread or a decrease in farm share can occur for a number of reasons.

Another option is to collect cost and price data beyond the farmgate. This data could allow an analysis that differentiates between sectors (for example, the processing and retail sectors), and identifies the range of factors influencing costs and prices within these sectors. It could also potentially facilitate the estimation of profit margins in different sectors, which is a major indicator of market power. A problem with this approach is that the data is commercially sensitive, and likely to be difficult to obtain. The detailed nature of this type of analysis also suggests that the approach is likely to be only suitable for one-off analysis of a specific issue within a particular industry, and hence, unsuitable for ongoing monitoring and evaluation.

A better option may be to use Australian input-output data to decompose costs and profits between various sectors within the beef supply chain, and to estimate the returns to capital and labour in each sector. While this type of analysis would be more expensive than the high level analysis described in this paper, it would also be more informative in identifying factors influencing the competitiveness of Australia’s beef exports, and lead to a more informed debate about the various factors influencing prices, including market power. If the methodology was implemented so that it was consistent with that used by USDA ERS (see Nguyen, Mobsby & Goesch 2016 for more detail), it would allow comparisons with the United States and other countries adopting this methodology, including France and Canada.
References


—— 2005, Australia’s beef cattle industry, Year Book Australia, 2005, Canberra.


Department of Agriculture 2015, Submission to the Senate Rural and Regional Affairs and Transport References Committee Inquiry into Market consolidation and the red meat processing sector, July, available at
Farm share and price spread in Australia’s beef supply chain


FranceAgriMer 2015, Observatoire de la formation des prix et des marges des produits alimentaires, available at observatoire-prixmarges.franceagrimer.fr/Pages/default.aspx.


—— 2013, Volume of beef and veal exports by loading port, Meat & Livestock Australia, Sydney, unpublished data.


