ACIL ALLEN CONSULTING

REPORT TO
AUSTRALIAN PORK LIMITED

17 NOVEMBER 2017

ECONOMIC CONTRIBUTION REPORT

PORK INDUSTRY IN AUSTRALIA 2015-16

FINAL REPORT

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C O N T E N T S

CONTENTS

FIGURES

C O N T E N T S

TABLES

CONTENTS

BOXES

EXECUTIVE SUMMARY

The Australian pork industry is an important component of the Australian agricultural, food manufacturing and distribution sectors. As a trade-exposed industry, competition with foreign producers is an ever-present threat to the local industry. Conversely, access to foreign markets and outcompeting imports are opportunities for growth in the local industry.

In this context, Australian Pork Limited (APL) commissioned ACIL Allen Consulting to prepare an assessment of the economic contribution of pig production and pig meat processing in Australia for 2015-16. This report does not include the price decline in the past six months and its impact on the Australian pig producers and the industry. It provides a snapshot of the economic contribution of the Australian pork industry to the Australian, state and regional economies in 2015-16.

Overall footprint of the pork industry

Table ES 1 and **Figure ES 1** present the estimated economic contribution of the Australian pork industry in 2015-16, including the contribution by three component sectors: pig production, primary processing, and secondary processing and wholesaling. The estimates have been provided as lower and upper bounds. The lower bound estimate of the economic contribution includes the direct contribution made by the industry to Australia's GDP, income and employment along with the contribution embodied in the industry's supply chain. The upper bound estimates of the economic contribution embodies the lower bound contribution as well as the economic contribution made by the workers throughout the pork industry's supply chain (including processing costs) spending their after-tax incomes on other Australian goods or services (such as hairdressers, restaurants, retail traders etc.). The lower and upper bound estimates are generated through the use of Simple and Total multipliers, respectively.

When properly calculated[1], the lower bound estimates of the pork industry are additive with the lower bound estimates for other non-overlapping industries (such as beef, beverages, petroleum, aluminium, etc.) and will never add to more than Australia's total GDP, household income or employment. While the lower bound estimates of the industry footprint are useful for many contexts, they are a conservative estimate of the total economic activity or employment that could be affected by a change in the industry. In light of this, the upper bound estimates provide a useful upper bound on the total amount of economic activity or employment that is touched by the pork industry in some manner (and therefore could be affected in some way if there was a shock to the industry).

The economic contribution elements of the three sub-sectors are reported on an additive basis. That is, the indirect value-added associated with primary processing does not include the value-added

[1] In particular, it is important to avoid double counting related to the intra-sectoral purchases and vertical supply chain activities. For example, when adding the impact of related industries (where industry A supplies to industry B, for example) it is necessary to not include the value of A's sales to B when calculating industry B's contribution. In reality, ensuring that industries are completely non-overlapping is complex and certain simplifying assumptions would generally need to be made.

embodied in the pig production sub-sector, nor does the indirect value-added embodied in the secondary processing sub-sector include that embodied in the primary processing sub-sector.

In 2015-16, the activities of the Australian pork industry as a whole is estimated to have resulted in:

- a *lower bound* economic contribution of $3,270 million to Australian GDP, comprising:
  - $1,209 million from the direct and indirect contributions of pig production
  - $542 million from the direct and indirect contributions of primary processing
  - $1,520 million from the direct and indirect contributions of secondary processing and wholesaling
  - as a whole, the Australian pork industry contributed a minimum of 0.20 per cent to Australian GDP in 2015-16
- an *upper bound*[2] economic contribution of $5,201 million to Australian GDP, comprising:
  - $1,888 million from the direct and indirect contributions of pig production
  - $893 million from the direct and indirect contributions of primary processing
  - $2,420 million from the direct and indirect contributions of secondary processing and wholesaling
  - as a whole, the Australian pork industry contributed a maximum of 0.31 per cent to Australian GDP in 2015-16.

TABLE ES 1 ESTIMATED OVERALL ECONOMIC CONTRIBUTION OF THE PORK INDUSTRY TO AUSTRALIA, 2015-16

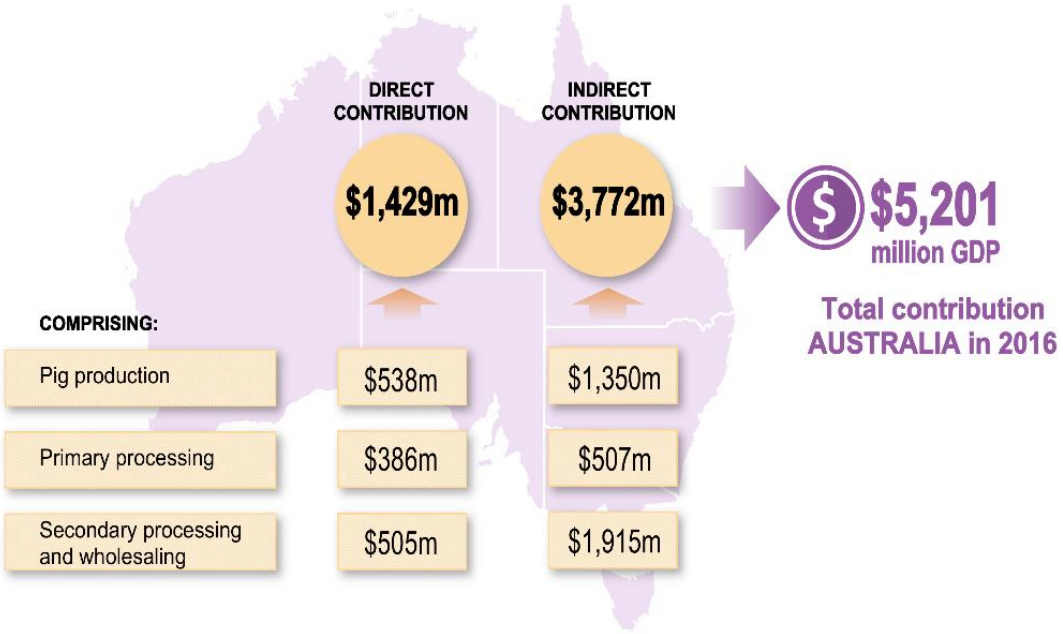
	GDP (value-added)		Household income		Employment	
	$ million	% GDP	$ million	% COE	FTE jobs	% total
Lower bound						
Pig production	1,208.8	0.073	617.6	0.077	7,823	0.073
Primary processing	541.5	0.033	332.4	0.041	4,240	0.040
Secondary processing and wholesaling	1,520.0	0.092	812.1	0.101	12,669	0.118
Total	**3,270.3**	**0.198**	**1,762.1**	**0.218**	**24,732**	**0.231**
Upper bound						
Pig production	1,888.0	0.114	911.3	0.113	11,809	0.110
Primary processing	893.1	0.054	481.3	0.060	6,261	0.059
Secondary processing and wholesaling	2,420.2	0.146	1,202.9	0.149	17,973	0.168
Total	**5,201.3**	**0.314**	**2,595.5**	**0.322**	**36,043**	**0.337**

Notes: The lower and upper bounds are calculated using the Simple and Total multipliers, respectively. Indirect economic activity due to interstate trade is included in the regional contribution estimates based on their share of underlying activity. Totals may not add due to rounding.
COE = compensation of employees. FTE = full-time equivalent.

SOURCE: ACIL ALLEN CONSULTING

[2] 2011 report estimated the economic contribution based on the total multiplier analysis rather than simple multiplier analysis. Therefore the upper bound estimates presented in this study are comparable with the 2011 study estimates.

FIGURE ES 1 OVERALL VALUE-ADD ECONOMIC CONTRIBUTION OF THE AUSTRALIAN PORK INDUSTRY TO AUSTRALIA, 2015-16



Note: The estimates in this figure represent the upper bound of the economic contribution (calculated using Total multipliers). Totals may not add due to rounding.

SOURCE: ACIL ALLEN CONSULTING

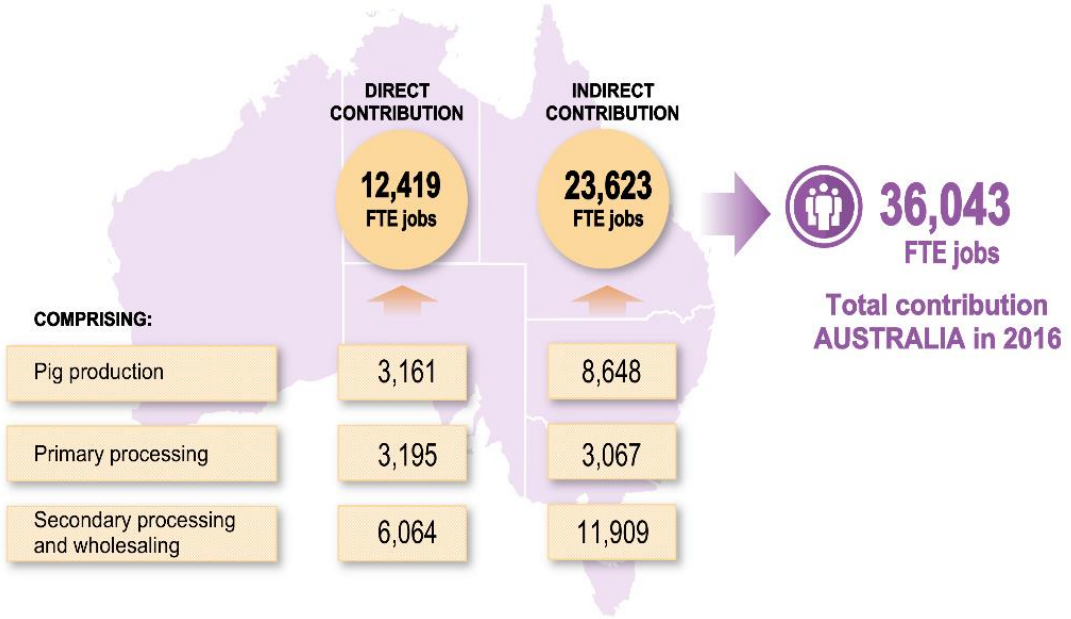
The employment contribution of the pork industry in Australia is estimated for 2015-16 and provided in **Table ES 1** and summarised in **Figure ES 2**.

In understanding the estimated number of jobs supported by the industry, it should be noted that they are presented as full-time-equivalent (FTE) jobs for convenience. In reality they represent the summation of many shares of individual jobs or include part-time and casual jobs.

The key industry sectors benefiting from flow-on employment as a result of pork industry in Australia are:

- Wholesale and retail trade (3,593)
- Food and beverage manufacturing (3,590)
- Agriculture, forestry and fishing (2,292)
- Transport, postal and warehousing (2,086)
- Professional, scientific and technical services (1,888)
- Accommodation and food services (1,370)
- Other services, which include repairs (1,389).

FIGURE ES 2 OVERALL EMPLOYMENT CONTRIBUTION OF THE AUSTRALIAN PORK INDUSTRY TO AUSTRALIA, 2015-16



Note: The estimates in this figure represent the upper bound of the economic contribution (calculated using Total multipliers). Totals may not add due to rounding.

SOURCE: ACIL ALLEN CONSULTING

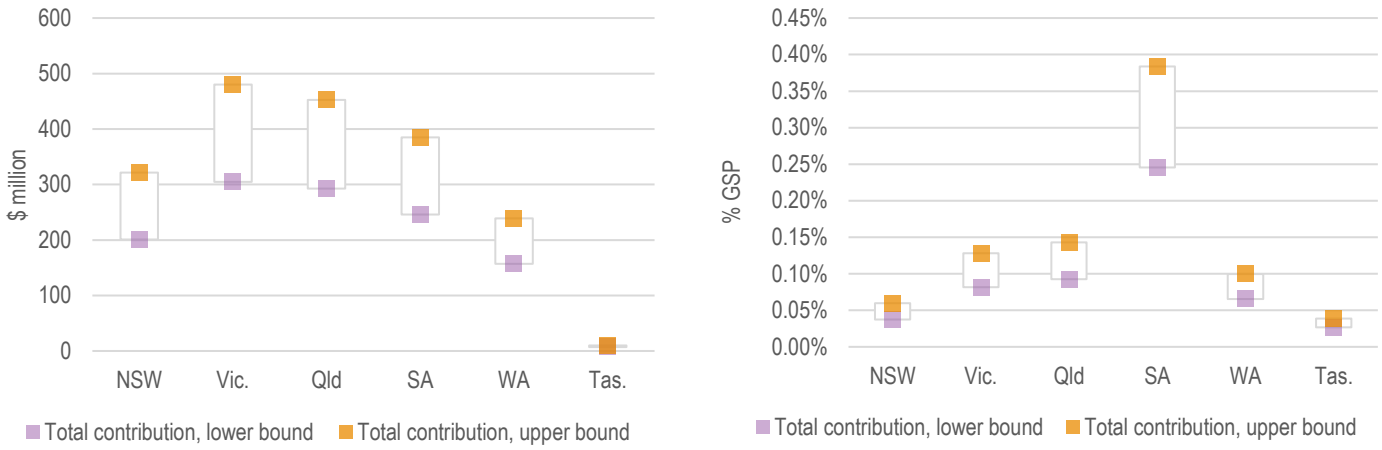
It is estimated that, in 2015-16, the activities of the Australian pork industry as a whole resulted in:

- a *lower bound* employment contribution of 24,732 full-time equivalent employment to Australian employment, comprising:
  - 7,823 from the direct and indirect contributions of pig production
  - 4,240 from the direct and indirect contributions of primary processing
  - 12,669 from the direct and indirect contributions of secondary processing and wholesaling
  - as a whole, the Australian pork industry employment contributed a minimum of 0.231 per cent to Australian employment in 2015-16
- an *upper bound* employment contribution of 36,043 full-time equivalent employment to Australian employment, comprising:
  - 11,809 from the direct and indirect contributions of pig production
  - 6,261 from the direct and indirect contributions of primary processing
  - 17,973 from the direct and indirect contributions of secondary processing and wholesaling
  - as a whole, the Australian pork industry employment contributed a maximum of 0.337 per cent to Australian employment in 2015-16.

Footprint of the pig production sector by state

The contribution of the pig production sector to GSP in each state is reported in **Figure ES 3** and **Table ES 2**.

FIGURE ES 3 ESTIMATED ECONOMIC CONTRIBUTION OF PIG PRODUCTION SECTOR BY STATES, 2015-16



Notes: The lower and upper bounds are calculated using the Simple and Total multipliers, respectively. Indirect economic activity due to interstate trade is included in the regional contribution estimates based on their share of underlying activity.

SOURCE: ACIL ALLEN CONSULTING

TABLE ES 2 ESTIMATED ECONOMIC CONTRIBUTION OF PIG PRODUCTION TO MAJOR PIG PRODUCING STATES, 2015-16

	GSP (value-added)		Household income		Employment	
	$ million	% GSP	$ million	% COE	FTE jobs	% total
New South Wales						
Lower bound	200.7	0.037	108.1	0.040	1,316	0.038
Upper bound	321.4	0.060	160.4	0.060	1,960	0.057
Victoria						
Lower bound	305.0	0.081	152.7	0.083	2,041	0.075
Upper bound	480.2	0.128	228.3	0.124	3,099	0.114
Queensland						
Lower bound	292.8	0.093	146.2	0.096	1,869	0.089
Upper bound	452.2	0.143	216.0	0.141	2,854	0.135
South Australia						
Lower bound	246.1	0.245	126.7	0.249	1,635	0.229
Upper bound	385.0	0.384	188.0	0.370	2,485	0.348
Western Australia						
Lower bound	157.2	0.066	80.6	0.077	914	0.076
Upper bound	239.0	0.100	114.0	0.108	1,340	0.112
Tasmania						
Lower bound	7.0	0.027	3.3	0.026	49	0.023
Upper bound	10.2	0.039	4.6	0.037	71	0.034
Australia						
Lower bound	1,208.8	0.073	617.6	0.077	7,823	0.073

	GSP (value-added)		Household income		Employment	
Upper bound	1,888.0	0.114	911.3	0.113	11,809	0.110

Notes: The lower and upper bounds are calculated using the Simple and Total multipliers, respectively. Indirect economic activity due to interstate trade is included in the regional contribution estimates based on their share of underlying activity. Totals may not add due to rounding.
COE is compensation of employees, FTE is full-time equivalent

SOURCE: ACIL ALLEN CONSULTING

Import replacement

Table ES 3 below presents the estimated economic contribution to Australia that the Australian pork industry would have made in the absence of imported fresh or frozen pig meat. In summary, if domestic producers were to supply the entire domestic demand, the contribution of the Australian pork industry to Australian GDP, including flow-on effects, would increase by approximately 33 per cent, with the upper bound estimate increasing from $5.2 billion to $6.9 billion. Similarly the upper bound estimate of total FTE employment throughout the pork industry supply chain, including flow-on effects, would increase by 30 per cent from just over 36,000 to nearly 47,100.

TABLE ES 3 COMPARISON OF THE CONTRIBUTION OF THE PORK INDUSTRY WITH AND WITHOUT IMPORTS, AUSTRALIA, 2015-16

	Value added	Household income	Employment
	$ million	$ million	FTE jobs
CURRENT (WITH IMPORTS)			
Lower bound			
Pig producers	1,208.8	617.6	7,823
Primary processing	541.5	332.4	4,240
Secondary processing and wholesaling	1,520.0	812.1	12,669
Total	**3,270.3**	**1,762.1**	**24,732**
Upper bound			
Pig producers	1,888.0	911.3	11,809
Primary processing	893.1	481.3	6,261
Secondary processing and wholesaling	2,420.2	1,202.9	17,973
Total	**5,201.3**	**2,595.5**	**36,043**
WITHOUT IMPORTS			
Lower bound			
Pig producers	1,920.6	981.3	12,430
Primary processing	893.6	548.5	7,010
Secondary processing and wholesaling	1,520.0	812.1	12,669
Total	**4,334.2**	**2,341.9**	**32,109**
Upper bound			
Pig producers	2,999.7	1,447.9	18,762
Primary processing	1,473.8	794.3	10,345
Secondary processing and wholesaling	2,420.2	1,202.9	17,973
Total	**6,893.6**	**3,445.0**	**47,080**

SOURCE: ACIL ALLEN CONSULTING

Changes in the contribution of pig production sector

Direct comparison of 2010-11 economic contribution estimates with the 2015-16 estimates is difficult due to the changes in trends and patterns of pig numbers, production technologies and the methodology used.

Changes in economic contribution of pig production sector between 2010-11 and 2015- 16 are provided in **Table ES 4** and **Figure ES 4**.

Apart from New South Wales, where pig production maintained its economic contribution as a percentage of GSP, all pig producing states have increased their economic contribution both in terms of overall value-add and employment over the past five years. This indicates that the pig production sector growth is higher than the economic growth in those states in nominal terms between 2010-11 and 2015-16.

Victoria is the largest pig-producing state in Australia, accounting for 25.4 per cent of total Australian value-add contribution. This is followed by Queensland (24 per cent), South Australia (20.4 per cent) and New South Wales (17 per cent).

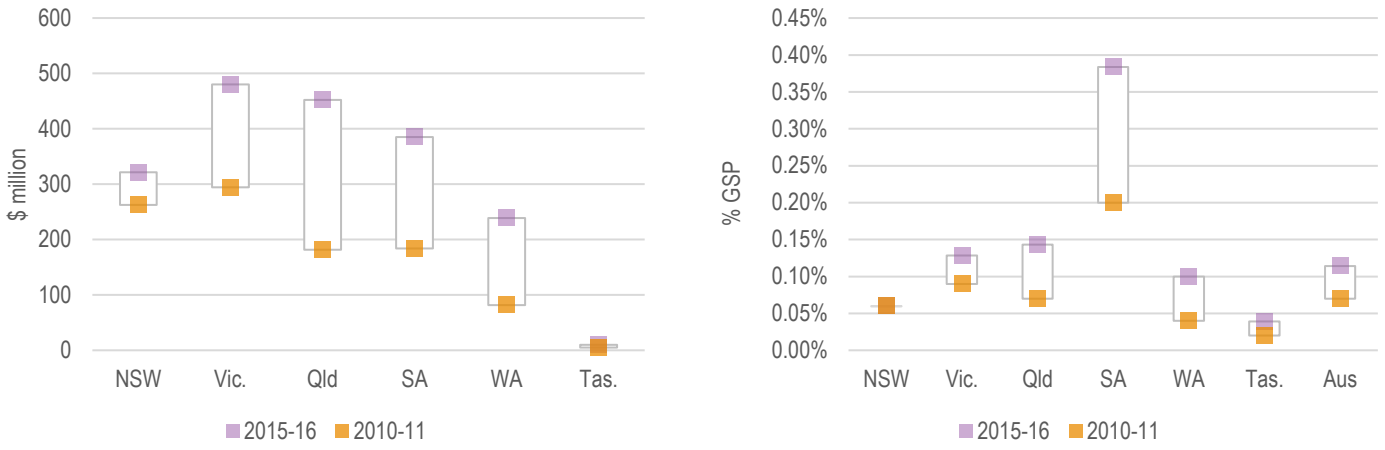
TABLE ES 4 CHANGES IN THE CONTRIBUTION OF PIG PRODUCTION SECTOR BETWEEN 2010-11 AND 2015-16

	Value add				Employment			
	2015-16[a]		2010-11[b]		2015-16[a]		2010-11[b]	
	$ million	% GSP	$ million	% GSP	FTE jobs	% total	FTE jobs	% total
New South Wales	321.4	0.06	262.5	0.06	1,960	0.06	2,013	0.07
Victoria	480.2	0.13	294.1	0.09	3,099	0.11	2,218	0.09
Queensland	452.2	0.14	181.7	0.07	2,854	0.14	1,415	0.07
South Australia	385.0	0.38	184.1	0.20	2,485	0.35	1,255	0.18
Western Australia	239.0	0.10	81.5	0.04	1,340	0.11	611	0.06
Tasmania	10.2	0.04	4.96	0.02	71	0.03	35	0.02
Australia	1,888.0	0.11	1,019.3	0.07	11,809	0.11	7,594	0.08

[a] ACIL Allen 2015-16 upper bound estimates. [b] Western Research Institute 2010-11 estimates.

SOURCE: ACIL ALLEN CONSULTING AND WESTERN RESEARCH INSTITUTE

FIGURE ES 4 ECONOMIC CONTRIBUTION CHANGES, 2010-11 — 2015-16



SOURCE: ACIL ALLEN CONSULTING AND WESTERN RESEARCH INSTITUTE

1 INTRODUCTION

The Australian pork industry is an important component of the Australian agricultural, food manufacturing and distribution sectors. As a trade-exposed industry, competition with foreign producers is an ever-present threat to the local industry. Conversely, access to foreign markets and outcompeting imports are opportunities for growth in the local industry.

With the Australian dollar now stabilising at lower levels, the industry finds itself in a more competitive position. Recently completed free trade agreements provide an expanded level of opportunity the Australian pork industry is eager to understand and exploit.

In this context, Australian Pork Limited (APL) commissioned the ACIL Allen to prepare an assessment of the economic impact of pig production and pig meat processing in Australia for 2015-16.

This is an update of previous economic impact reports undertaken for 2010-11, 2007-08 and 2001-02. Previous reports have focussed on the Australian industry and its impact on the national and state economies. The 2010-11 report considered the economic opportunities lost to Australian states, and the country as a whole, because of imports supplanting local production.

While previous work has considered half of the competitive equation — replacing imports — APL intended this study to include the economic opportunities arising from increased exports. This study includes analysis of export opportunities created by the recent free trade agreements with the northeast Asian economics of China, Japan and Republic of Korea.

The broader flow-on economic effects for a community from a piggery development, production, processing and wholesaling, including potential 'multiplier effects', are estimated to provide the economic footprint of industry at state and national levels.

The report examines:

— Trends in pig production in Australia (see **Chapter 2** of the Report). The Chapter updates all the statistics and figures that appeared in the 2010-11 report.

— The ACIL Allen approach to economic footprint analysis is provided in **Chapter 3**. The definitions of direct and indirect contributions, lower bound and upper bound estimates are provided in this chapter. This chapter also includes major data sources for pig production, primary processing, and secondary processing and wholesaling.

— The economic contribution of the pig production sector, where pigs are grown commercially, and the overall contribution to the Australian economy are reported in **Chapter 4** of the Report. The economic footprint analysis includes contributions to GDP/GSP, household income, and employment.

— The economic contribution of the primary processing sector at the national level is provided in **Chapter 5**. Estimates for processing are provided at national level only, this is due to small number of processors in each state and related confidentiality of data sources.

- The economic contribution of the secondary processing and wholesaling sector at the national level is provided in **Chapter 6**.
- The overall economic footprint, which includes production, primary processing, and secondary processing and wholesaling, is provided in **Chapter 7**.
- Analysis of the importance of the pork industry to local regional communities is provided in **Chapter 8**.
- The economic footprint analysis of replacing imports of pork are provided in **Chapter 9**.
- An overview of the economic impact of exports, potential for export growth, export demand and readiness is provided in **Chapter 10**. The chapter also considers the potential for long-term industry growth stemming from expanded Asian trade.

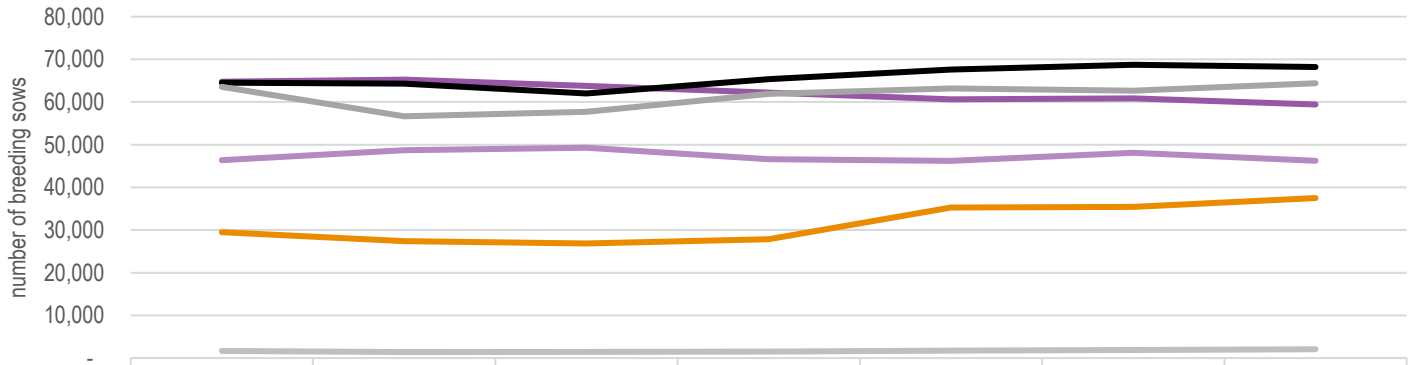
2 TRENDS IN PIG PRODUCTION IN AUSTRALIA

The Australian pork industry has faced a number of challenges and opportunities over the past five years. To provide a context for the economic footprint analysis for 2015-16, this chapter provides key pig numbers and production statistics at the state and national levels.

2.1 Number of breeding sows

At the end of June 2011, there were some 270,405 breeding sows recorded in Australia (**Figure 2.1**). This increased to 277,697 by June 2016, an increase of 0.5 per cent a year over the past five years. The two major states — New South Wales and Queensland — reported decreased number of breeding sows while Victoria, South Australia, Western Australia and Tasmania increased their sow numbers between June 2011 and June 2016.

FIGURE 2.1 NUMBER OF BREEDING SOWS BY STATE, 2010-11 TO 2016-17



	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
NSW	64,748	65,252	63,802	62,232	60,654	60,843	59,426
Vic.	64,568	64,284	62,007	65,379	67,591	68,725	68,190
QLD	63,519	56,656	57,730	61,928	63,187	62,670	64,392
SA	46,401	48,688	49,289	46,595	46,209	48,131	46,220
WA	29,519	27,366	26,849	27,863	35,253	35,408	37,493
Tas	1,650	1,400	1,457	1,541	1,715	1,920	2,056

SOURCE: AUSTRALIAN PORK LIMITED (UNPUBLISHED)

2.2 Number of pigs slaughtered

The number of pigs slaughtered by state are presented in **Figure 2.2**.

Between June 2011 and June 2016, the number of pigs slaughtered in Australia increased by 1.5 per cent a year.

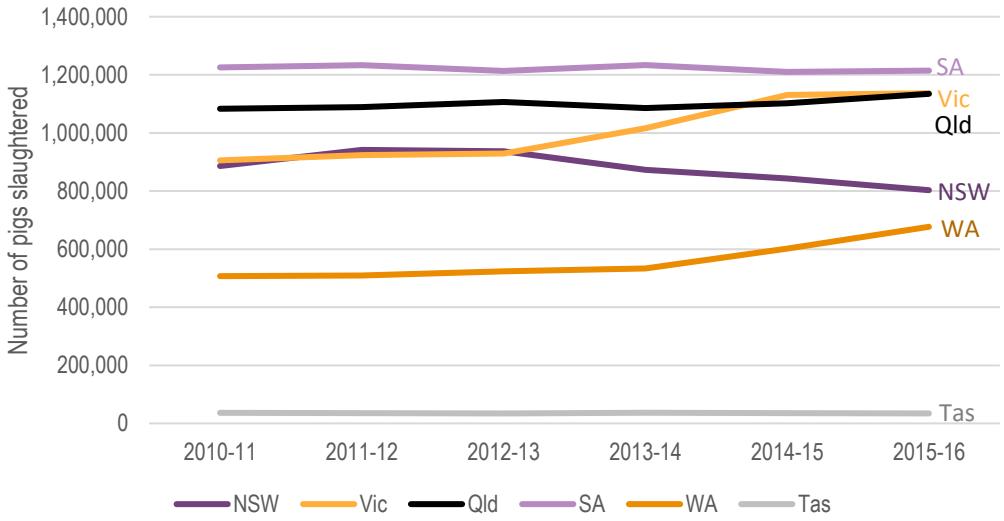
The most significant increase in the number of pigs slaughtered was in Western Australia, with an average annual increase of nearly 6 per cent over the past five years, from 506,910 pigs in 2010-11 to 676,806 pigs in 2015-16.

The number of pigs slaughtered in Victoria increased by an average of 4.7 per cent a year over the past five years, while the increase in Queensland over the same period was 0.9 per cent a year.

New South Wales is the only state that reported a reduction in the number of pigs slaughtered over the last five years. In 2010-11, New South Wales reported 886,072 pigs slaughtered, this decreased to 802,883 by 2015-16.

Over the five year period to 2015-16, the most significant decrease in the number of pigs slaughtered was found in New South Wales. An increase in pigs slaughtered was found in Western Australia and Victoria.

FIGURE 2.2 NUMBER OF PIGS SLAUGHTERED IN AUSTRALIA, 2010-11 TO 2015-16



Note: Includes baconer, porker, sow and other pigs slaughtered

SOURCE: AUSTRALIAN PORK LIMITED (UNPUBLISHED)

A key reason for the decline in the number of pigs slaughtered in NSW was the closure of major abattoirs in the state.

Some pigs produced in Southern NSW travel to Victoria for slaughter, especially where pork is export-bound, requiring export-licensed abattoirs that are not available locally. Victoria charges a sales tax, the Victorian Swine Duty (up to 16¢ per pig),[3] on all pigs slaughtered on top of the slaughter levy. Some processors offer transport subsidies to their producers if there is a long journey to the abattoir to offset transport costs.

Pork production on the North Coast of NSW has been declining, and the Northern Co-operative Meats Booyong Service Processing plant relies on pigs from Queensland to maintain throughput. A recent investigation revealed that this abattoir is operating at about 70 per cent of capacity. A strategic plan for the potential for industry expansion in the Northern Rivers area was released in July 2015.[4]

The Rivalea abattoir at Corowa is a private abattoir that slaughters only Rivalea pigs. Rivalea produces approximately 18 per cent of Australia's pork; 30 per cent of this is exported, mainly to Singapore. In 2010, the export-licensed Burrangong abattoir at Young went into receivership and closed. It had processed pigs, sheep and cattle. It reopened in 2014 but only for sheep and cattle.

[3] http://www.sro.vic.gov.au/sale-livestock-current-rates

[4] http://ncmc-co.com.au/wp-content/uploads/2015/07/Northern-Rivers-Pork-Industry-Strategic-Plan-May-2015-3.pdf

Pigs were excluded as the site was constrained by its proximity to homes, and its Halal certification required separate kill facilities for pigs. Producers in the region requiring export-licensed abattoirs must now send their pigs to Victoria. In November 2012, the abattoir at Coonabarabran closed.[5]

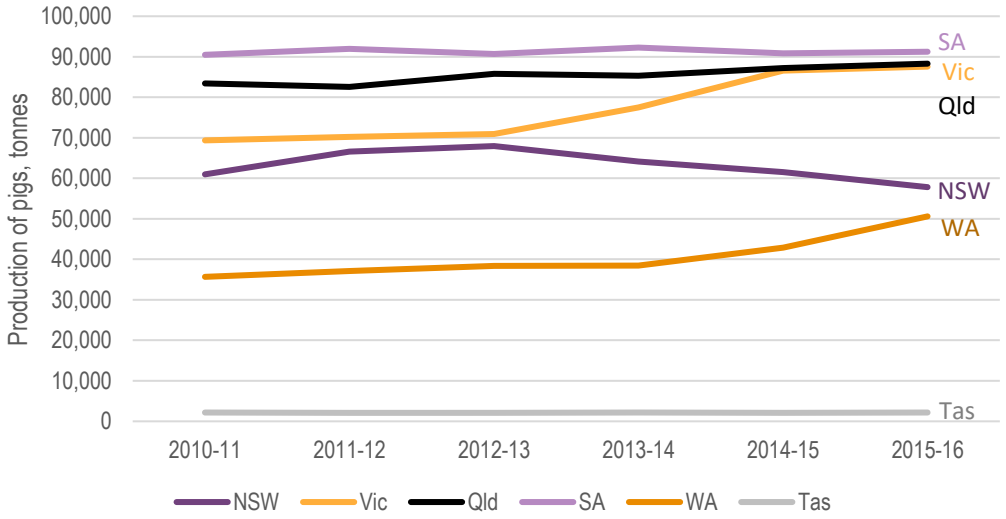
2.3 Pig production

The historical tonnes of pigs produced by state is presented in **Figure 2.3**.

South Australia has the highest share of pig production (24 per cent) in Australia in 2015-16 followed by Victoria and Queensland (equal to 23 per cent each). New South Wales' share of Australia's pig production declined to 15 per cent in 2015-16 from 18 per cent in 2010-11.

NSW's share has principally been captured by Victoria, which has increased its share from 20 per cent to 23 percent over the past five years.

FIGURE 2.3 PIG PRODUCTION BY STATES, CARCASS WEIGHT (TONNES), 2010-11 TO 2015-16



SOURCE: ACIL ALLEN ESTIMATES BASED ON AUSTRALIAN PORK LIMITED (UNPUBLISHED)

2.4 Baconer and porker prices

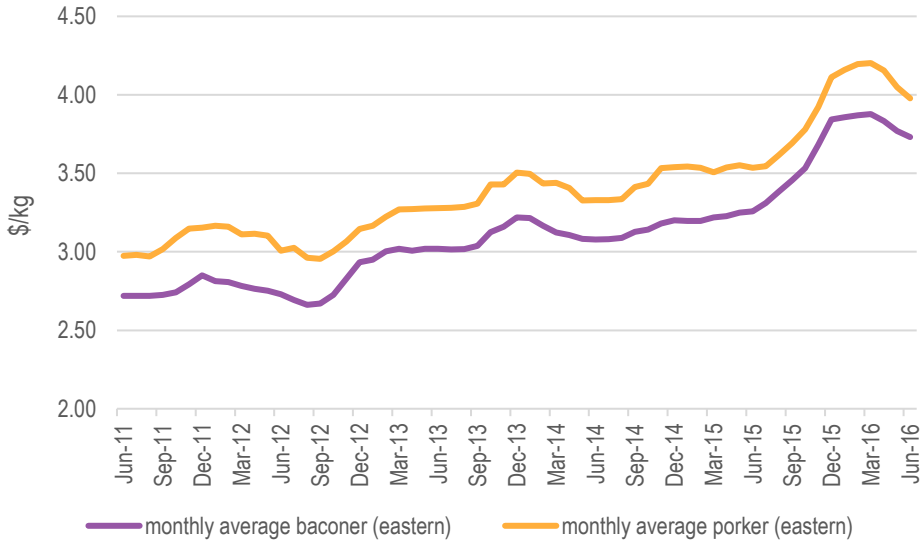
Baconer and porker prices have increased significantly over the last five years (as shown in **Figure 2.4** up to June 2016, please note that prices have declined in the six months prior to this report's completion).

More specifically, in June 2011, the monthly average eastern porker prices were $2.98/kg and they increased to $3.98/kg in June 2016, an increase of 33.7 per cent.

Similarly, in June 2011, the monthly average eastern baconer prices were $2.72/kg and they increased to $3.73/kg in June 2016, an increase of 37.1 per cent.

[5] http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0011/578747/pork-industry-overview-2015.pdf

FIGURE 2.4 MONTHLY AVERAGE PRICES – PORKER AND BACONER ($/KG) 2011 TO 2016



SOURCE: AUSTRALIAN PORK LIMITED

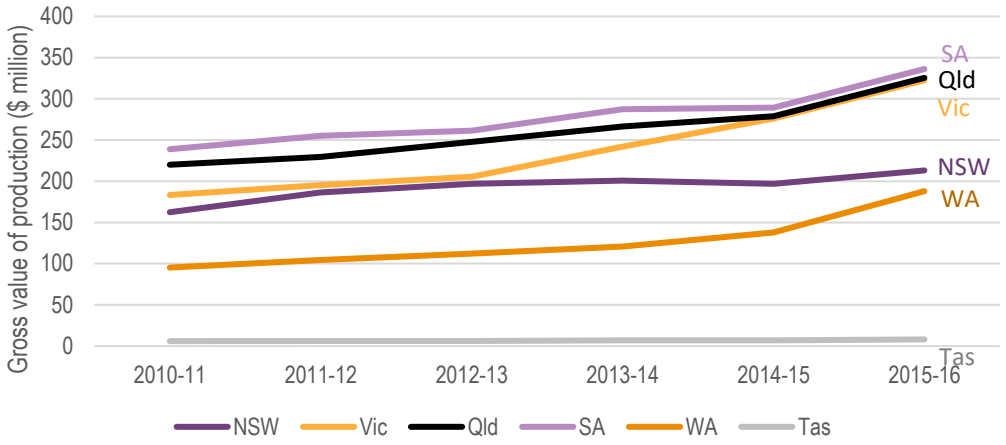
2.5 Gross value of pig production

As a result of the increased number of pigs slaughtered and the increased prices to 2015-16, the gross value of pig production has increased in Australia over the past five years as shown in **Figure 2.5**.

In 2010-11, the gross value of Australian pig production was $906 million and this increased to $1,393 million by 2015-16, an increase of 53.8 per cent or an average annual growth of 9 per cent in nominal terms (current prices). Western Australia reported the highest average annual growth (14.5 per cent) between 2010-11 and 2015-16, followed by Victoria with an average annual growth of 12 per cent a year. In 2015-16:

- South Australia's share of Australia's gross value of pig production was 24.1 per cent
- Queensland's share of Australia's gross value of pig production was 23.4 per cent
- Victoria's share of Australia's gross value of pig production was 23.1 per cent
- New South Wales's share of Australia's gross value of pig production was 15.3 per cent
- Western Australia's share of Australia's gross value of pig production was 13.5 per cent
- Tasmania's share of Australia's gross value of pig production was 0.6 per cent

FIGURE 2.5 GROSS VALUE OF PIG PRODUCTION IN AUSTRALIA



SOURCE: ACIL ALLEN ESTIMATES BASED ON AUSTRALIAN PORK LIMITED DATA

2.6 Production and usage of pig meat and pig meat products

Production and consumption of pig meat products in Australia are reported in **Table 2.1**.

TABLE 2.1 PRODUCTION AND USAGE OF PIG MEAT PRODUCTS, AUSTRALIA

	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Production ('000 tonnes)	342.1	350.5	355.8	359.8	371.2	377.6
Imports ('000 tonnes)[a]	236.0	253.4	272.0	243.7	290.5	297.4
Exports ('000 tonnes)[a]	46.9	46.3	43.9	48.1	47.4	43.0
Net domestic consumption ('000 tonnes)	531.2	557.6	583.9	555.4	614.2	632.0
Consumption per person (kg)	23.8	24.5	25.3	23.7	25.8	26.2
Import share (%)	44	45	47	44	47	47

[a] Carcass weight. Conversion factors were used to estimate the carcass weight equivalent (CWE). APL has suggested the conversion factor of 0.56 for imports and 0.8 for exports to convert shipped weight imports and exports respectively into carcass weight equivalent.

SOURCE: ACIL ALLEN ESTIMATES BASED ON APL DATA

Australian production of pig meat has increased over the past five years. One key characteristic of usage of pig meat products in Australia is an increasing share of imports in the net Australian domestic consumption, which increased from 44 per cent in 2010-11 to almost 47 per cent in 2015-16. Imports have increased at an average of 4.7 per cent a year over the past five years. Australian exports on the other hand have decreased over the past five years.

After allowing for net trade of pig meat and processed pork products, apparent consumption of pig meat domestically has increased from 23.8 kg per person in 2010-11 to 26.2 kg per person in 2015-16, representing an increase in overall consumption of almost 2.4 kg per person. As noted, much of this increased usage was sourced from imported pig meat and processed pork products.

While some of the imported pig meat products (including cured meat and smallgoods) may not be in direct competition with domestically produced pig meat products, the vast majority of imports are competing with locally grown pigs, particularly in the processed pork segment (i.e. hams and bacons).

3 MEASURING ECONOMIC CONTRIBUTION

As per the methodology used in the 2010-11 report, ACIL Allen has used input-output multiplier analysis to estimate the economic footprint (economic contribution) of the Australian pork industry. This is a robust methodology that is frequently used to understand the full linkages of an industry throughout the economy. The economic footprint analysis describe:

- the *direct* contributions the Australian pork industry makes to the economies of each state and to Australia as a whole, plus
- the full extent of the *indirect* contributions the pork industry makes to each economy through their demand for intermediate inputs from other industries (feed, packaging materials, electricity, machinery, freight etc.) as well as through demand stimulated by the wages and salaries of employees.

In addition to the reporting undertaken in the 2010-11 analysis, this report also presents information on the direct and indirect economic contributions rather than just the totals. This is generally standard practice for this type of analysis.

As per the previous analysis, this report also provides the economic contribution of the pork industry to gross value added, household income and employment.

Details of direct and indirect contribution (footprint) analysis are provided below.

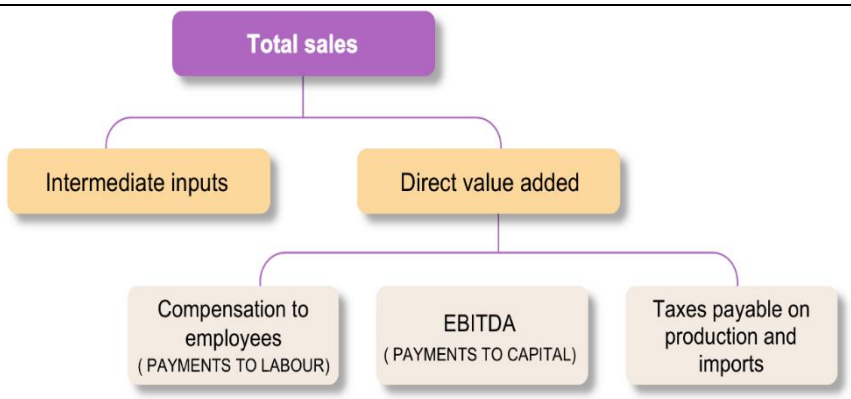
3.1 Direct economic contribution

The standard measure of economic contribution is the extent to which the pig industry supply chain increases the value of goods and services generated by the economy as a whole – in other words, the extent to which it increases economic activity as measured by gross domestic product (GDP). An economy has a range of factors of production (including labour and capital stock) and access to various intermediate inputs. By using the factors of production appropriately industries add value to intermediate inputs by converting them into a range of goods and services more suited for use by consumers or other industries. An industry or business' contribution to GDP measures the total value added generated and is defined as the income that an industry or business generates, less the cost of the inputs that it uses to generate that income, plus certain taxes paid.

The direct contribution of an industry or a company to the Australian economy can therefore be estimated by determining their payments to the factors of production plus the taxes (less subsidies) payable on production and imports. This is shown graphically in **Figure 3.1**.

Box 3.1 provides a summary of the definitions used by the ABS as part of the System of National Accounts 1993 (SNA93).

FIGURE 3.1 CALCULATION OF DIRECT VALUE ADDED



Note: EBITDA is equivalent to the SNA93 definition of gross operating surplus

SOURCE: ACIL ALLEN CONSULTING

BOX 3.1 ABS DEFINITIONS OF VALUE ADDED

An industry's direct contribution to Gross Domestic Product or Gross State Product is well defined under the standard national accounting framework used by the Australian Bureau of Statistics (ABS), which is known as the System of National Accounts 1993 (SNA93). SNA93 recognises three different measures of value added:

a) Value added at Purchasers' Prices. This is defined as output valued at purchasers' prices, less intermediate consumption valued at producer prices. This measure is equivalent to the traditional measure of value added at market prices.
b) Value added at Basic Prices. In this measure, the output is valued at basic prices while intermediate consumption is valued at producer prices. In the case of beer production this measure excludes beer excise as they are viewed as production taxes levied on output.
c) Value added at factor Cost. This measure excludes all production taxes net of subsidies. In other words it excludes all production taxes – such as payroll taxes, fringe benefit taxes etc – and not just those that are levied on output.

The measure of value added to be used depends on the nature of the analysis that is to be conducted. When presenting an industry view of GDP for example, the ABS uses value added at basic prices and adds an aggregate estimate of net taxes on products in question to give a total measure of GDP at purchasers' prices (ABS 1999).

SOURCE: ACIL ALLEN CONSULTING

3.2 Indirect economic contribution

Indirect effects are a broader notion of the economic contribution that includes supply-side. For example, when an employee of pig farming buys a restaurant meal, indirect effects are generated for the businesses supplying the produce, the transporter who made deliveries to the restaurant, the electricity company and other businesses that provided the inputs required to make the meal. To fully measure the indirect effects, account should also be taken of changes in incomes which may feed through to further changes in domestic demand.

The intermediate inputs used by pork industry can be sourced either from within the Australian economy or from foreign economies. If purchased from within the Australian economy, then the portion of value added embodied in the intermediate input is indirectly associated with the activity of the purchaser. The calculation of the indirect contribution quickly becomes difficult as one considers that value-added embodied in the intermediate inputs of the intermediate input. For example, to raise

pigs, consider the feed grains, fertiliser used in farming, the feedstock used in the fertiliser manufacturing, and so on.

In a global context, the value-added chain can simply be measured by the value of the final goods and services consumed. In a national context, input-output tables and the associated 'input-output multipliers' can be used to estimate the indirect economic contributions. Input-output multipliers are summary measures generated from input-output tables that can be used for predicting the total impact on all industries in the economy of changes in demand for the output of any one industry. The tables and multipliers can also be used to measure the relative importance of the production chain linkages to different parts of the economy.

It should be noted that some of the assumptions underpinning input-output multipliers can be an impediment to credible analysis. Understanding these assumptions is necessary to prevent the inappropriate application of input-output multipliers – for example, in situations where economic constraints are present or when the profile of a business or project differs substantially from the industry average. We do not consider that these conditions apply for the purpose of this analysis and that the use of input-output multipliers to estimate the economic footprint of the pork sector is appropriate. Further information on input-output tables and the calculation of multipliers can be found in ABS Catalogue number 5246.0.

3.2.1 Lower and upper bounds

This report provides estimates of the lower and upper bounds of the indirect economic contribution of the pork sector's activities.

The lower bound estimate, derived from simple multipliers, captures only the value added and employment associated with the supply chain of each purchase stream (see Appendix A for details). Consequently, they provide a conservative estimate – or lower level bound – of the indirect economic contribution of intermediate inputs. The difference between these estimates and the direct economic contribution are commonly referred to as the production induced contribution. When calculated properly, the embodied economic contribution of alternative production chains are additive and should sum to the national accounts estimates of gross state product and gross domestic product.

The upper bound estimate of the contribution of the pork sector, derived from total multipliers, captures all of the effects of inter-industry interactions and also captures the impacts of the purchasing decisions made by workers employed throughout the pork sector's supply chain. This secondary effect is commonly referred to as the consumption induced effect and provides a better estimate of the total amount of economic activity or jobs that will be potentially affected by changes to the pork sector.

3.2.2 Additivity

Unless otherwise stated, all economic contribution elements of the three sub-sectors are reported on an additive basis. That is, the indirect value-added associated with primary processing does not include the value-added embodied in the pig production sub-sector, nor does the indirect value-added embodied in the secondary processing sub-sector include that embodied in the primary processing sub-sector.

3.3 Data sources

Two types of data sources are used for this study to provide a robust economic footprint analysis:

1. Primary data sources: tailored survey was developed for collecting information from producers and processors.
2. Various secondary data sources to estimate the size, exports, imports and domestic consumption of the pig production, primary processing, and secondary processing and wholesaling sub-sectors.

The survey data provided details on costs while the secondary data sources provide an indicative size of the sector. By using various data sources with bottom-up and top-down information, ACIL Allen estimated the size of the pork industry in Australia including a breakdown of the contributions made by pig production, primary processing, and secondary processing and wholesaling components.

3.3.1 Survey methodology and data items

The APL has provided ACIL Allen with a list of pig producers — single site and multisite — and major processors including both domestic and export abattoirs, wholesalers and small good manufacturers. APL contacted all processors listed prior to commencement of the survey to inform them of the purpose of the study. ACIL Allen dispatched the questionnaires with the APL covering letter which also explained the purpose of the study.

The following questions were asked from producers for the financial year 2015-16 ending 30 June:

- Number of breeding sows
- Number of pigs sold by category — weaners, growers, finishers, porkers and breeders
- Revenue derived from sale of pigs by location — states — and type of purchaser — abattoir, wholesaler, meat processors/small goods manufacturing, super market chain, retail butcher, restaurant and other food outlets, sale of breeds and other
- Details on employment — part time and full time — and total wages and salaries
- Non-labour operating expenditure by category
  - Pigs
  - Feed purchased
  - Feed grown on own property (please estimate the value of this feed)
  - Bedding (hay, straw etc.)
  - Inspection, veterinary and nutritionist costs
  - Nutritional supplements
  - Medications
  - Chemicals
  - Semen
  - Breeding fees
  - Slaughter/kill fees
  - Power (including, electricity, gas and other)
  - Water
  - Waste disposal
  - Freight costs (excluding direct purchase of diesel/fuel)
  - Diesel and other fuels
  - Accounting
  - Plant and equipment leasing/rental
  - Property leasing/rental
  - Mechanical repairs and maintenance
  - Local government rates and taxes and government levies (do not include company taxes, PAYG or payroll taxes)
  - Other non-labour operating costs

The data provided by respondents was aggregated by state with expenditure information distributed across the industry categories of input-output tables to provide the cost structure of the producers.

The following questions were asked from processors for the year 2015-16:

- Number of pigs processed by location
- Details on employment — part time and full time — and total wages and salaries
- Non-labour operating expenditure by category
  - Pigs
  - Feed purchased
  - Inspection costs
  - Chemicals
  - Power (including, electricity, gas and other)
  - Water
  - Waste disposal
  - Packaging
  - Freight costs (excluding direct purchase of diesel/fuel)

- Diesel and other fuels
- Accounting
- Property leasing/rental
- Mechanical repairs and maintenance
- Local government rates and taxes and government levies (do not include company taxes, PAYG or payroll taxes)
- Other non-labour operating costs

— Export readiness of the processor

— Current facilities approval for exports

— Barriers to seeking export approval

3.3.2 Secondary data sources

Data sources outlined in **Table 3.1** were used to estimate the size of various supply chain components of the pork industry in Australia.

TABLE 3.1 KEY SECONDARY DATA SOURCES

Pork supply chain	Data sources	Details and comments
Pig production by state	APL ,ABS, IBISWorld 2017 a	Number of sows, growers, weaners, breeders, finishers, porkers, tonnes of production, porker and baconer prices. Monthly data is aggregated to provide 2015-16 annual data. The production estimates by state are provided in **Figure 2.5**. Based on this data, the gross value of pig production in Australia in 2015-16 was $1,393 million. State production details are: NSW $213.1 million Victoria $322.4 million Queensland $325.4 million South Australia $336.1 million Western Australia $187.9 million Tasmania $8.1 million ABS publishes data on gross value agricultural commodities produced, preliminary for year ending 30 June (Cat No: 7501.0). For confidentiality reasons, the ABS has not released the data for Western Australia and Tasmania. For 2015-16, the ABS estimate for Australia is $1,353.1 million and estimates for states are below: NSW $212.4 million Victoria $318.41 million Queensland $320.5 million South Australia $326.6 million IBISWorld[6] has reported the revenue of pig farming in Australia in 2015-16 was $1,284.7 million. For this study ACIL Allen has used estimates based on the APL data as it is more comprehensive than the two other data sources.
Primary processing	IBISWorld 2017 b , ABS	Detailed total revenue data for the primary processors was unavailable from official published data sources. The APL doesn't compile data related to processors. To obtain the size of the primary processing sector. ACIL Allen has relied on the IBISWorld[7]. IBISWorld report has provided 8.4 per cent of the meat processing sector in Australia constitutes primary processing of pig meat. This share was applied to obtain the revenue of the primary processing sector in Australia, which is $1,843.3 million. The ABS publishes data on 4-digit ANZSIC manufacturing industries through its annual publication of Australian Industry (Cat No.8155.0). Applying the same share to the ABS meat processing industry provide a revenue estimate of $1,644 million. Since ABS hasn't provided the various meat shares in its meat manufacturing, ACIL Allen decided use the IBISWorld revenue estimate of $1,843.3 million.

[6] IBISWorld (2017)a Industry Report A0192, Pig farming in Australia, January 2017.
[7] IBISWorld (2017)b Industry Report C1111, Meat Processing in Australia, January 2017.

Pork supply chain	Data sources	Details and comments
Secondary processing and wholesaling	IBISWorld 2017 c , ABS	Detailed total revenue data for the secondary processors was unavailable from official published data sources. The APL doesn't compile data related to secondary processors. To obtain the size of the secondary processing sector. ACIL Allen has relied on the IBISWorld[8]. IBISWorld report on Cured Meat and Smallgoods Manufacturing has provided following shares related to secondary processing sector in Australia: Bacon 40.0 per cent Ham 16.5 per cent Salami and sausages 14.5 per cent (50 per cent of this is assumed pork related) Other products 21.3 per cent (50 per cent of this is assumed pork related) Sliced poultry 7.7 per cent Based on the above shares, it is assumed that 74 per cent of Cured Meat and Smallgoods Manufacturing sector is related secondary processing of pig meat. This share indicates a revenue of $2,820.2 million. The ABS publishes data on 4-digit ANZSIC manufacturing industries through its annual publication of Australian Industry (Cat No.8155.0). Applying the same share to the ABS Cured Meat and Smallgoods Manufacturing sector provide a revenue estimate of $2,731 million.

SOURCE: ACIL ALLEN CONSULTING

3.4 Scope of the pork industry

The following three major sub-sectors of the pork industry are covered in this study to estimate the overall economic contribution of pork industry:

- Pig production — enterprises primarily engaged in pig farming and pig raising.
- Primary processing — slaughtering and boning of pigs. Applies only to domestically grown pigs and generates primary cuts and carcasses for secondary processing and direct sale.
- Secondary processing and wholesaling — further value adding through activities such as cooking, curing, brining, smoking, fermenting or slicing creating a range of products including hams, bacon, sausages and other smallgoods. Secondary processing also includes packaging of products. Secondary processing can utilise domestically produced pig meat, imported pig meat or a combination of the two. Wholesaling enterprises mainly engaged in the purchase and on selling, the commission based buying, and the commission based selling of goods, without significant transformation, to businesses.

[8] IBISWorld (2017)c Industry Report C1113, Cured Meat and Smallgoods Manufacturing in Australia, November 2016.

4 ECONOMIC FOOTPRINT OF THE PIG PRODUCTION SECTOR

This chapter provides estimates of direct and indirect contributions of the pig production sector to the Australian and states economies.

The direct contribution of an activity in terms of value added is confined to the initial impacts of the activity. However, in turn, purchases of intermediate inputs or spending of incomes made as a result of an activity will lead to further economic impacts and these are estimated as the indirect contribution as described in **Chapter 3**.

In addition to the direct value added by pig farming through its employment, profits, and taxes, there is a key indirect channel through which the pig farming sector contributes to the Australian and state economies. That is purchases of intermediate inputs by the pig production sector. To produce pigs, pig producers purchase goods and services from various businesses in the region. This creates demand for those services and further stimulates the economic activity in the region.

This effect is captured by supply chain information which is embodied in input output tables of the Australian and state economies.

As noted in **Chapter 3**, the indirect economic contribution can be measured using the relevant multipliers. Based on information from the ABS, ACIL Allen has developed (and regularly updates) detailed input output tables for Australia and each State and Territory (along with various regional areas, when necessary). From these tables, ACIL Allen has calculated a range of multipliers to facilitate economic footprint analysis of Australian pork industry in Australia.

4.1 Direct economic contribution of pig production

4.1.1 Australia

The total estimated revenue of the Australian pig production sector in 2015-16 was $1,393 million. The direct economic contribution (value-add) embodied in the revenue is estimated to have been $538 million, mostly comprising employee wages and mixed farm income. The industry is thus a low value-adding industry with a value-add to revenue ratio of 0.39.

In 2015-16, Australian Gross Domestic Product (GDP) was $1,655 billion[9] implying that the direct economic contribution of the pig production sector accounted for 0.033 per cent of Australia's 2015-16 GDP.

[9] ABS (2016), Australian System of National Accounts, 2015016, Cat No: 5204.0, Table 1. http://www.abs.gov.au/ausstats/abs@.nsf/PrimaryMainFeatures/5204.0?OpenDocument

The direct income contribution (household income) from the revenue is estimated to have been $278.6 million. In 2015-16, the Australian Compensation of Employees (COE)[10] was $807.1 billion[11] implying that the direct economic contribution of the pig production sector accounted for 0.035 per cent of Australia's household labour income.

The direct employment contribution from pig production is estimated at 3,161 full-time equivalent (FTE) persons in 2015-16. Total FTE employment in the Australian economy was 10.7 million[12] implying that the direct employment contribution of the pig production sector accounted for 0.03 per cent of Australia's total employment.

4.1.2 New South Wales

The total estimated revenue of the New South Wales pig production sector in 2015-16 was $213.1 million. The direct economic contribution (value-add) from the revenue is estimated to have been $82.3 million, mostly comprising total remuneration to labour and mixed farm income.

In 2015-16, New South Wales Gross State Product (GSP) was $538.5 billion[13] implying that the direct economic contribution of the pig production sector accounted for 0.015 per cent of New South Wales's 2015-16 GSP.

The direct income contribution (household income) from the revenue is estimated to have been $42.6 million in New South Wales. In 2015-16, New South Wales Compensation of Employees (COE) was $269.3 billion[14] implying that the direct economic contribution of the pig production sector accounted for 0.016 per cent of New South Wales's household income.

The direct employment contribution from pig production in New South Wales is estimated at 484 persons. Total employment in New South Wales in 2015-16 was 3.42 million[15] implying that the direct employment contribution of the pig production sector accounted for 0.014 per cent of New South Wales's total employment.

4.1.3 Victoria

The total estimated revenue of the Victorian pig production sector in 2015-16 was $322.4 million. The direct economic contribution (value-add) from the revenue is estimated to have been $124.5 million, mostly comprising remuneration to labour. In 2015-16, Victoria's Gross State Product (GSP) was $374.4 billion[16] implying that the direct economic contribution of the pig production sector accounted for 0.033 per cent of Victoria's 2015-16 GSP.

The direct income contribution (household income) from the revenue is estimated to have been $64.5 million in Victoria. In 2015-16, Victoria COE was $183.billion[17] implying that the direct economic contribution of the pig production sector accounted for 0.035 per cent of Victoria's household income.

The direct employment contribution from pig production in Victoria is estimated at 732 persons. Total employment in Victoria in 2015-16 was 2.72 million[18] implying that the direct employment contribution of the pig production sector accounted for 0.027 per cent of Victoria's total employment.

[10] Total remuneration, in cash or in kind, payable by an enterprise to an employee in return for work done by the employee during the accounting period. It is further classified into two sub-components: wages and salaries; and employers' social contributions. Compensation of employees is not payable in respect of unpaid work undertaken voluntarily, including the work done by members of a household within an unincorporated enterprise owned by the same household. Compensation of employees excludes any taxes payable by the employer on the wage and salary bill (e.g. payroll tax).

[11] ABS (2016), Australian System of National Accounts, 2015016, Cat No: 5204.0, Table 8. http://www.abs.gov.au/ausstats/abs@.nsf/PrimaryMainFeatures/5204.0?OpenDocument

[12] ABS (2017), Labour Force Australia, Detailed, Electronics Delivery, Cat No: 6291.0.55.001, Table 8.

[13] ABS (2016), Australian National Accounts, State Accounts, 2015-16t, Cat No: 5220.0, Table 1. http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/5220.02015-16?

[14] ABS (2016), Australian National Accounts, State Accounts, 2015-16t, Cat No: 5220.0, Table 2.

[15] ABS (2017), Labour Force Australia, Detailed, Electronics Delivery, Cat No: 6291.0.55.001, Table 8.

[16] ibid

[17] ABS (2016), Australian National Accounts, State Accounts, 2015-16t, Cat No: 5220.0, Table 3.

[18] ABS (2017), Labour Force Australia, Detailed, Electronics Delivery, Cat No: 6291.0.55.001, Table 8.

4.1.4 Queensland

The total estimated revenue of the Queensland pig production sector in 2015-16 was $325.4 million. The direct economic contribution (value-add) from the revenue is estimated to have been $125.7 million, mostly comprising employee remuneration and mixed farm income. In 2015-16, Queensland Gross State Product (GSP) was $316.2 billion[19] implying that the direct economic contribution of the pig production sector accounted for 0.04 per cent of Queensland's 2015-16 GSP.

The direct income contribution (household income) from the revenue is estimated to have been $65.1 million in Queensland. In 2015-16, Queensland COE was $152.8 billion[20] implying that the direct economic contribution of the pig production sector accounted for 0.043 per cent of Queensland's household income.

The direct employment contribution from pig production in Queensland is estimated at 738 persons. Total employment in Queensland in 2015-16 was 2.11 million[21] implying that the direct employment contribution of the pig production sector accounted for 0.035 per cent of Queensland's total employment.

4.1.5 South Australia

The total estimated revenue of the South Australian pig production sector in 2015-16 was $336.1 million. The direct economic contribution (value-add) from the revenue is estimated to have been $129.8 million, mostly comprising employee remuneration and mixed farm income. In 2015-16, South Australia's Gross State Product (GSP) was $100.3 billion[22] implying that the direct economic contribution of the pig production sector accounted for 0.129 per cent of South Australia's 2015-16 GSP.

The direct income contribution (household income) from the revenue is estimated to have been $67.2 million in South Australia. In 2015-16, total state COE was $50.8 billion[23] implying that the direct economic contribution of the pig production sector accounted for 0.132 per cent of South Australia's household income.

The direct employment contribution from pig production in South Australia is estimated at 763 persons. Total employment in South Australia in 2015-16 was 713,817[24] implying that the direct employment contribution of the pig production sector accounted for 0.107 per cent of South Australia's total employment.

4.1.6 Western Australia

The total estimated revenue of the Western Australian pig production sector in 2015-16 was $187.9 million. The direct economic contribution (value-add) from the revenue is estimated to have been $72.6 million, mostly employee remuneration and mixed farm income. In 2015-16, Western Australia's Gross State Product (GSP) was $239.7 billion[25] implying that the direct economic contribution of the pig production sector accounted for 0.030 per cent of Western Australia's 2015-16 GSP.

The direct income contribution (household income) from the revenue is estimated to have been $37.6 million in Western Australia. In 2015-16, total state COE was $105.4 billion[26] implying that the direct economic contribution of the pig production sector accounted for 0.036 per cent of Western Australia's household income.

The direct employment contribution from pig production in Western Australia is estimated at 426 persons. Total employment in Western Australia in 2015-16 was 1.2 million[27] implying that the

[19] ibis
[20] ABS (2016), Australian National Accounts, State Accounts, 2015-16t, Cat No: 5220.0, Table 3.
[21] ABS (2017), Labour Force Australia, Detailed, Electronics Delivery, Cat No: 6291.0.55.001, Table 8.
[22] ibid
[23] ABS (2016), Australian National Accounts, State Accounts, 2015-16t, Cat No: 5220.0, Table 3.
[24] ABS (2017), Labour Force Australia, Detailed, Electronics Delivery, Cat No: 6291.0.55.001, Table 8.
[25] ibid
[26] ABS (2016), Australian National Accounts, State Accounts, 2015-16t, Cat No: 5220.0, Table 3.
[27] ABS (2017), Labour Force Australia, Detailed, Electronics Delivery, Cat No: 6291.0.55.001, Table 8.

direct employment contribution of the pig production sector accounted for 0.036 per cent of Western Australia's total employment.

4.1.7 Tasmania

The total estimated revenue of the Tasmanian pig production sector in 2015-16 was $8.1 million. The direct economic contribution (value-add) from the revenue is estimated to have been $3.1 million, mostly comprising employee remuneration and mixed farm income. In 2015-16, Tasmania's Gross State Product (GSP) was $26.2 billion[28] implying that the direct economic contribution of the pig production sector accounted for 0.012 per cent of Tasmania's 2015- 16 GSP.

The direct income contribution (household income) from the revenue is estimated to have been $1.6 million in Tasmania. In 2015-16, total state COE was $12.4 billion[29] implying that the direct economic contribution of the pig production sector accounted for 0.013 per cent of Tasmania's household income.

The direct employment contribution from pig production in Tasmania is estimated at 18 persons. Total employment in Tasmania in 2015-16 was 208,046 implying that the direct employment contribution of the pig production sector accounted for 0.009 per cent of Tasmania's total employment.

4.2 Indirect economic contribution of pig production

4.2.1 Australia

The key industry sectors benefiting from flow-on FTE employment as a result of pig production in NSW are:

- *Food and beverage manufacturing (195)*
- *Agriculture, forestry and fishing (116)*
- *Wholesale trade and retail trade (200)*
- *Transport, postal and warehousing (103)*
- *Professional, scientific and technical services (100)*
- *Other services (87)*

Allocating Australian intermediate inputs to their corresponding input-output industries and applying the appropriate multipliers for the Australian value added, household income and employment, it is possible to estimate the total Australian value added and employment embodied in the Australian produced inputs and services demanded by the pig production sector.

It is estimated that Australian pig farmers spent $855 million on goods and services in raising or fattening pigs in 2015-16. Of this, it is estimated that $793.3 million was on domestically produced goods and services, comprising:

- $412.3 million on feed grains and other feeds
- $25.5 million on utilities, including electricity, gas, water and waste water treatment
- $53.2 million on transport
- $45.5 million on wholesale and retail trade
- $318.5 million on other inputs and services

The estimated indirect impacts at the national level with lower and upper bounds are provided in **Table 4.1**

It is estimated that:

- The domestic spend of $855 million by pig producers, indirectly contributed between $670.8 million and $1,350 million to the Australian economy, which is between 0.041 and 0.082 per cent of GDP in 2015-16. This is in addition to the direct contribution of 0.033 percent reported in **Section 4.1.1**.
- Between $339 million and $632.7 million in household income was indirectly supported by pig farming activities in the Australian economy.
- Between 4,662 and 8,648 FTE jobs were indirectly supported by pig farming activities in the Australian economy.

[28] ibid
[29] ABS (2016), Australian National Accounts, State Accounts, 2015-16t, Cat No: 5220.0, Table 3.

TABLE 4.1 ESTIMATED INDIRECT ECONOMIC CONTRIBUTION OF THE PIG PRODUCTION SECTOR TO AUSTRALIA, 2015-16

	GDP (value-added)		Household income		Employment	
	$ million	% GDP	$ million	% total COE	FTE jobs	% total employment
Lower bound	670.8	0.041	339.0	0.042	4,662	0.044
Upper bound	1,350.0	0.082	632.7	0.078	8,648	0.081

SOURCE: ACIL ALLEN CONSULTING

4.2.2 New South Wales

The key industry sectors benefiting from flow-on FTE employment as a result of pig production in NSW are:

- *Food and beverage manufacturing (195)*
- *Agriculture, forestry and fishing (116)*
- *Wholesale trade and retail trade (200)*
- *Transport, postal and warehousing (103)*
- *Professional, scientific and technical services (100)*
- *Other services (87)*

It is estimated that New South Wales pig farmers spent $130.8 million on goods and services in raising or fattening pigs in 2015-16. Of this it is estimated that $119.8 million was on domestically produced goods and services, comprising:

- $62.7 million on feed grains and other feeds
- $3.6 million on utilities, including electricity, gas, water and waste water treatment
- $8.1 million on transport
- $7.0 million on wholesale and retail trade
- $49.5 million on other inputs and services

The estimated indirect impacts at New South Wales state level with lower and upper bounds are provided in **Table 4.2**.

It is estimated that the domestic spend of $119.8 million by pig producers in New South Wales contributed between $118.4 million and $239.1 million to the New South Wales economy, which is between 0.022 and 0.044 per cent of GSP in 2015-16. This is in addition to the direct contribution of 0.015 percent reported in **Section 4.1.2**.

It was estimated that between $65.5 million and $117.7 million in household income was indirectly generated by pig farming activities in the New South Wales economy.

It was estimated that between 832 and 1,477 FTE jobs were indirectly supported by pig farming activities in the New South Wales economy.

TABLE 4.2 ESTIMATED INDIRECT ECONOMIC CONTRIBUTION OF THE PIG PRODUCTION SECTOR TO NSW, 2015-16

	GSP (value-added)		Household income		Employment	
	$ million	% GSP	$ million	% total COE	FTE jobs	% total employment
Lower bound	118.4	0.022	65.5	0.024	832	0.024
Upper bound	239.1	0.044	117.7	0.044	1,477	0.043

SOURCE: ACIL ALLEN CONSULTING

The key industry sectors benefiting from flow-on FTE employment as a result of pig production in Victoria are:

- *Food and beverage manufacturing (338)*
- *Agriculture, forestry and fishing (186)*
- *Wholesale trade and retail trade (320)*
- *Transport, postal and warehousing (162)*
- *Professional, scientific and technical services (171)*
- Other services (126)

4.2.3 Victoria

It is estimated that Victorian pig farmers spent $197.9 million on goods and services in producing pigs in 2015-16. Of this it is estimated that $178.7 million was on domestically produced goods and services, comprising:

- $94.4 million on feed grains and other feeds
- $5.7 million on utilities, including electricity, gas, water and waste water treatment
- $12.2 million on transport
- $10.5 million on wholesale and retail trade
- $75.2 million on other inputs and services

The estimated indirect impacts at Victoria state level with lower and upper bounds are provided in **Table 4.3**.

It is estimated that the domestic spend of $178.7 million by pig producers, contributed between $180.5 million and $355.6 million to the Victorian economy, which is between 0.048 and 0.095 per cent of GSP in 2015-16. This is in addition to the direct contribution of 0.033 percent reported in **Section 4.1.3**.

It was estimated that between $88.2 million and $163.8 million in household income was indirectly generated by pig farming activities in the Victorian economy.

It was estimated that between 1,309 and 2,367 FTE jobs were indirectly supported by pig farming activities throughout the Victorian economy.

TABLE 4.3 ESTIMATED INDIRECT ECONOMIC CONTRIBUTION OF THE PIG PRODUCTION SECTOR TO VICTORIA, 2015-16

	GSP (value-added)		Household income		Employment	
	$ million	% GSP	$ million	% total COE	FTE jobs	% total employment
Lower bound	180.5	0.048	88.2	0.048	1,309	0.048
Upper bound	355.6	0.095	163.8	0.089	2,367	0.087

SOURCE: ACIL ALLEN CONSULTING

The key industry sectors benefiting from flow-on FTE employment as a result of pig production in Queensland are:

- *Food and beverage manufacturing (271)*
- *Agriculture, forestry and fishing (151)*
- *Wholesale trade and retail trade (293)*
- *Transport, postal and warehousing (146)*
- *Professional, scientific and technical services (142)*
- Other services (139)

4.2.4 Queensland

It is estimated that Queensland pig farmers spent $199.7 million on goods and services in producing pigs in 2015-16. Of this it is estimated that $162.8 million was on domestically produced goods and services, comprising:

- $83.1 million on feed grains and other feeds
- $6.0 million on utilities, including electricity, gas, water and waste water treatment
- $11.8 million on transport
- $9.3 million on wholesale and retail trade
- $89.6 million on other inputs and services

The estimated indirect impacts at Queensland state level with lower and upper bounds are provided in **Table 4.4**.

It is estimated that the domestic spend of $162.8.5 million by pig producers, contributed between $167.1 million and $326.6 million to the Queensland economy, which is between 0.053 and 0.103 per cent of GSP in 2015-16. This is in addition to the direct contribution of 0.04 percent reported in **Section 4.1.4**.

It was estimated that between $81.1 million and $150.9 million in household income was indirectly generated by pig farming activities in the Queensland economy.

It was estimated that between 1,131 and 2,115 FTE jobs were indirectly supported by pig farming activities throughout the Queensland economy.

TABLE 4.4 ESTIMATED INDIRECT ECONOMIC CONTRIBUTION OF THE PIG PRODUCTION SECTOR TO QUEENSLAND, 2015-16

	GSP (value-added)		Household income		Employment	
	$ million	% GSP	$ million	% total COE	FTE jobs	% total employment
Lower bound	167.1	0.053	81.1	0.053	1,131	0.054
Upper bound	326.6	0.103	150.9	0.099	2,115	0.100

SOURCE: ACIL ALLEN CONSULTING

4.2.5 South Australia

The key industry sectors benefiting from flow-on FTE employment as a result of pig production in South Australia are:

- *Food and beverage manufacturing (194)*
- *Agriculture, forestry and fishing (178)*
- *Wholesale trade and retail trade (238)*
- *Transport, postal and warehousing (128)*
- *Professional, scientific and technical services (105)*
- Other services (119)

It is estimated that South Australian pig farmers spent $206.3 million on goods and services in producing pigs in 2015-16. Of this it is estimated that $114.9 million was on domestically produced goods and services, comprising:

- $49.5 million on feed grains and other feeds
- $5.6 million on utilities, including electricity, gas, water and waste water treatment
- $12 million on transport
- $5.3 million on wholesale and retail trade
- $133.9 million on other inputs and services

The estimated indirect impacts at South Australia state level with lower and upper bounds are provided in **Table 4.5**.

It is estimated that the domestic spend of $114.9 million by pig producers, contributed between $116.3 million and $255.2 million to the South Australian economy, which is between 0.116 and 0.254 per cent of GSP in 2015-16. This is in addition to the direct contribution of 0.129 percent reported in **Section 4.1.5.**

It was estimated that between $59.5 million and $120.8 million in household income was indirectly generated by pig farming activities in the South Australian economy.

It was estimated that between 872 and 1,722 FTE jobs were indirectly supported by pig farming activities throughout the South Australian economy.

TABLE 4.5 ESTIMATED INDIRECT ECONOMIC CONTRIBUTION OF THE PIG PRODUCTION SECTOR TO SOUTH AUSTRALIA, 2015-16

	GSP (value-added)		Household income		Employment	
	$ million	% GSP	$ million	% total COE	FTE jobs	% total employment
Lower bound	116.3	0.116	59.5	0.117	872	0.122
Upper bound	255.2	0.254	120.8	0.238	1,722	0.241

SOURCE: ACIL ALLEN CONSULTING

4.2.6 Western Australia

The key industry sectors benefiting from flow-on FTE employment as a result of pig production in Western Australia are:

- *Food and beverage manufacturing (96)*
- *Agriculture, forestry and fishing (52)*
- *Wholesale trade and retail trade (145)*
- *Transport, postal and warehousing (68)*
- *Professional, scientific and technical services (65)*
- Other services (67)

It is estimated that Western Australian pig farmers spent $115.3 million on goods and services in producing pigs in 2015-16. Of this it is estimated that $81.6 million was on domestically produced goods and services, comprising:

- $33.4 million on feed grains and other feeds
- $3.4 million on utilities, including electricity, gas, water and waste water treatment
- $7.1 million on transport
- $6.1 million on wholesale and retail trade
- $65.3 million on other inputs and services

The estimated indirect impacts at Western Australia state level with lower and upper bounds are provided in **Table 4.6**.

It is estimated that the domestic spend of $81.6 million by pig producers in Western Australia, contributed between $84.7 million and $166.4 million to the Western Australian economy, which is between 0.035 and 0.069 per cent of GSP in 2015-16. This is in addition to the direct contribution of 0.03 percent reported in **Section 4.1.6**.

It was estimated that between $43.1 million and $76.4 million in household income was indirectly generated by pig farming activities in the Western Australian economy.

It was estimated that between 488 and 913 FTE jobs were indirectly supported by pig farming activities throughout the Western Australian economy.

TABLE 4.6 ESTIMATED INDIRECT ECONOMIC CONTRIBUTION OF THE PIG PRODUCTION SECTOR TO WESTERN AUSTRALIA, 2015-16

	GSP (value-added)		Household income		Employment	
	$ million	% GSP	$ million	% total COE	FTE jobs	% total employment
Lower bound	84.7	0.035	43.1	0.041	488	0.041
Upper bound	166.4	0.069	76.4	0.073	913	0.076

SOURCE: ACIL ALLEN CONSULTING

4.2.7 Tasmania

The key industry sectors benefiting from flow-on FTE employment as a result of pig production in Tasmania are:

- *Food and beverage manufacturing (6)*
- *Agriculture, forestry and fishing (6)*
- *Wholesale trade and retail trade (7)*
- *Transport, postal and warehousing (4)*
- *Professional, scientific and technical services (3)*
- Other services (3)

It is estimated that Tasmanian pig farmers spent $5 million on goods and services in producing pigs in 2015-16. Of this it is estimated that $3.8 million was on domestically produced goods and services, comprising:

- $1.7 million on feed grains and other feeds
- $0.1 million on utilities, including electricity, gas, water and waste water treatment
- $0.3 million on transport
- $0.3 million on wholesale and retail trade
- $2.5 million on other inputs and services

The estimated indirect impacts at Tasmania state level with lower and upper bounds are provided in **Table 4.7**.

It is estimated that the domestic spend of $3.8 million by pig producers in Tasmania, contributed between $3.9 million and $7 million to the Tasmanian economy, which is between 0.015 and 0.027 per cent of GSP in 2015-16. This is in addition to the direct contribution of 0.012 percent reported in **Section 4.1.7**.

It was estimated that between $1.7 million and $3.0 million in household income was indirectly generated by pig farming activities in the Tasmanian economy.

It was estimated that between 31 and 53 FTE jobs were indirectly supported by pig farming activities throughout the Tasmanian economy.

TABLE 4.7 ESTIMATED INDIRECT ECONOMIC CONTRIBUTION OF THE PIG PRODUCTION SECTOR TO TASMANIA, 2015-16

	GSP (value-added)		Household income		Employment	
	$ million	% GSP	$ million	% total COE	FTE jobs	% total employment
Lower bound	3.9	0.015	1.7	0.013	31	0.015
Upper bound	7.0	0.027	3.0	0.024	53	0.025

SOURCE: ACIL ALLEN CONSULTING

4.3 Total economic contribution of pig production

Adding the direct and indirect economic contributions for the pig production sector from sections **4.1** and **4.2**, provides lower and upper bound estimates of the total economic footprint of the Australian pig production sector.

4.3.1 Australia

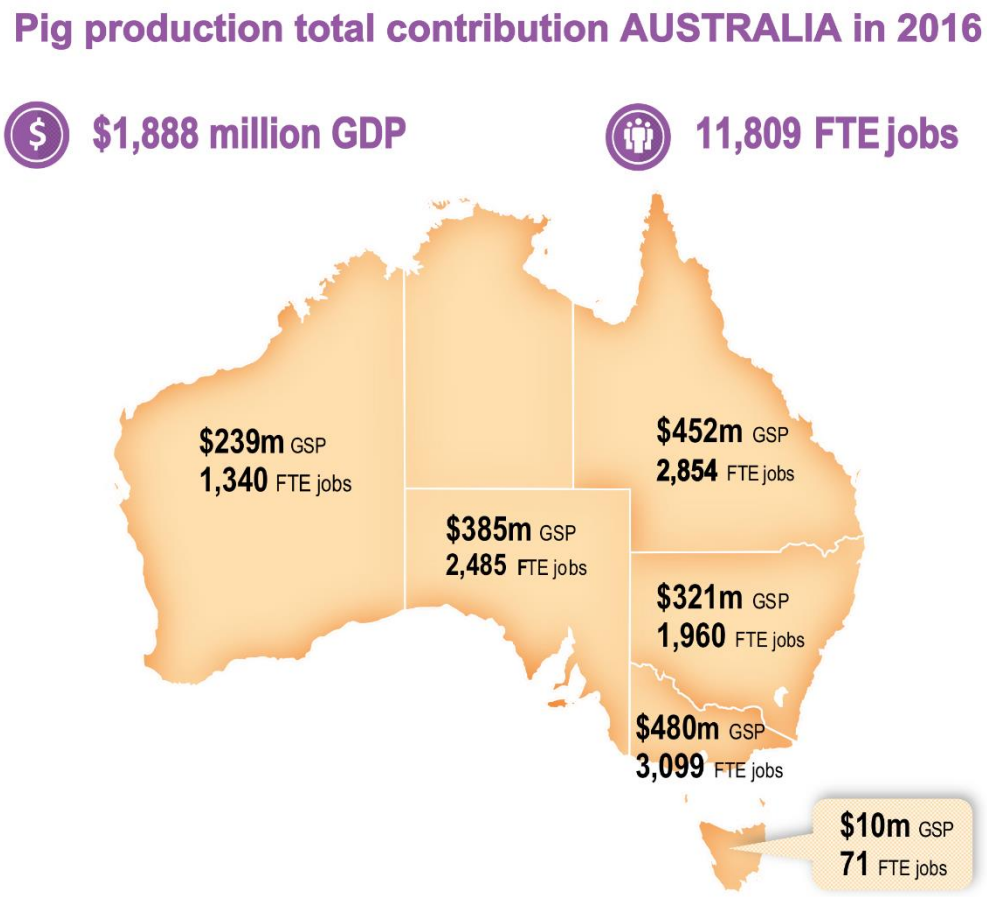
As shown in **Figure 4.1**, in 2015-16, it is estimated that the pig production sector in Australia resulted in:

- a *lower bound* contribution of $1,208.8 million to Australian GDP, comprising:
  - $538 million directly from the industry (direct contribution)
  - $670.8 million indirectly from demand generated through pig producers purchases of inputs and services (indirect contribution)
  - as a whole, the pig production sector contributed a minimum of 0.073 per cent to Australian GDP in 2015-16
- an *upper bound* contribution of $1,888 million to Australian GDP, comprising:
  - $538 million directly from the industry (direct contribution)
  - $1,350 million indirectly from demand generated through pig producers purchases of inputs and services (indirect contribution)
  - as a whole, the pig production sector contributed a maximum of 0.114 per cent to Australian GDP in 2015-16.

In 2015-16, it is estimated that the pig production sector in Australia supported up to 11,809 FTE jobs. To put this estimate another way, for every one million dollars of revenue received by pig producers, there are up to 8 FTE jobs that are supported elsewhere in the Australian economy (this includes an estimate of the own labour supplied by pig producers).

In understanding the estimated number of jobs supported by the industry, it should be noted that they are presented as full-time-equivalent (FTE) jobs for convenience. In reality they represent the summation of many shares of individual jobs or include part-time and casual jobs. Consequently the number of people whose employment is supported (partially or wholly) by the activities of the pig production sector will actually be greater than the estimated number of FTE jobs.

FIGURE 4.1 TOTAL VALUE ADD ECONOMIC CONTRIBUTION OF PIG PRODUCTION SECTOR BY STATE, 2015-16 (UPPER BOUND)



SOURCE: ACIL ALLEN CONSULTING

4.3.2 Major pig producing states

Value-added

The total economic footprint of the pig production sector in terms of GSP by state are provided in **Table 4.8**.

In absolute terms, the pig production sector makes the largest contribution to the Victorian economy, contributing between $305 and $480.2 million to the state's GSP.

Pig production makes the largest contribution, relative to GSP, in the South Australian economy, contributing between 0.245 per cent and 0.384 per cent of GSP.

TABLE 4.8 TOTAL VALUE-ADD ECONOMIC CONTRIBUTION OF THE PIG PRODUCTION SECTOR BY STATE, 2015-16

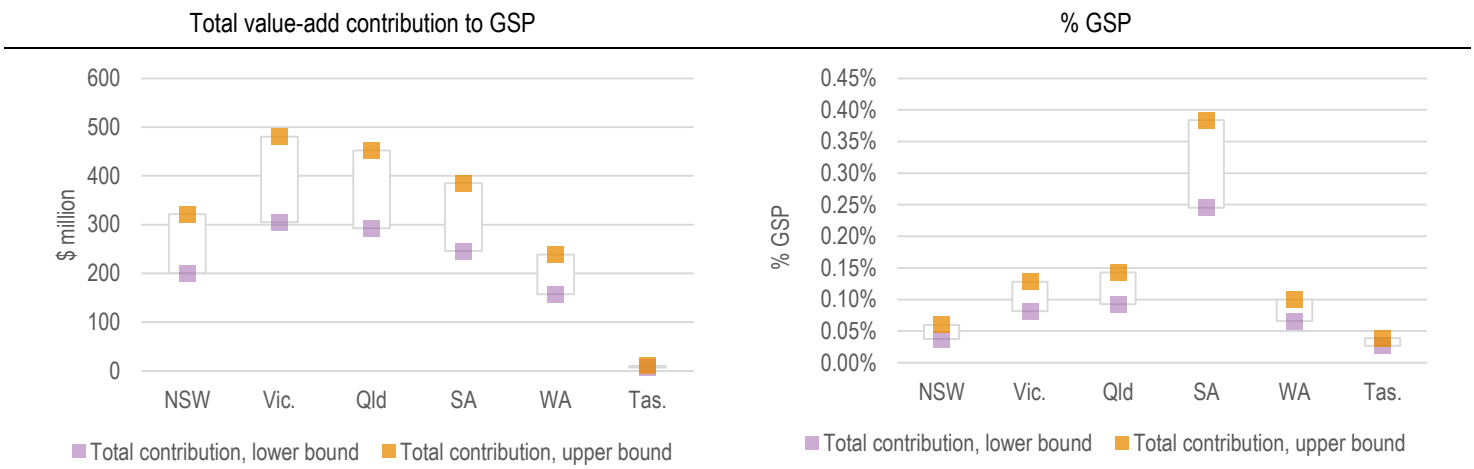
	Direct	Indirect		Total		Total as a share of GSP	
State		*Lower bound*	*Upper bound*	*Lower bound*	*Upper bound*	*Lower bound*	*Upper bound*
	$ million	$ million	$ million	$ million	$ million	% of GSP	% of GSP
New South Wales	82.3	118.4	239.1	200.7	321.4	0.037	0.060
Victoria	124.5	180.5	355.6	305.0	480.2	0.081	0.128
Queensland	125.7	167.1	326.6	292.8	452.2	0.093	0.143
South Australia	129.8	116.3	255.2	246.1	385.0	0.245	0.384
Western Australia	72.6	84.7	166.4	157.2	239.0	0.066	0.100
Tasmania	3.1	3.9	7.0	7.0	10.29	0.027	0.039
Australia	538.0	670.8	1,350.0	1,208.8	1,888.0	0.073	0.114

Notes: The lower and upper bounds are calculated using the Simple and Total multipliers, respectively. Indirect economic activity due to interstate trade is included in the regional contribution estimates based on their share of underlying activity. Totals may not add due to rounding.

SOURCE: ACIL ALLEN CONSULTING

The relativities of the total economic contribution (value-add) by states is provided in **Figure 4.2**. This illustrates the importance of the pig production sector to the overall state economies in terms of magnitude and importance.

FIGURE 4.2 TOTAL VALUE-ADD ECONOMIC CONTRIBUTION OF PIG PRODUCTION SECTOR TO THE AUSTRALIAN STATES, 2015-16



SOURCE: ACIL ALLEN CONSULTING

Household income

The total economic footprint of the pig production sector, in terms of household income related to the compensation of employees (COE) by state, is provided in **Table 4.9**.

In absolute terms, similar to GSP contribution, the pig production sector makes the largest household income contribution to the Victorian economy, contributing between $152.7 and $228.3 million to the household income.

Pig production makes the largest contribution to the South Australian economy's COE, contributing between 0.249 per cent and 0.370 per cent of COE.

TABLE 4.9 TOTAL HOUSEHOLD INCOME CONTRIBUTION OF THE PIG PRODUCTION SECTOR BY STATE, 2015-16

	Direct	Indirect		Total		Total as a share of COE	
State		*Lower bound*	*Upper bound*	*Lower bound*	*Upper bound*	*Lower bound*	*Upper bound*
	$ million	$ million	$ million	$ million	$ million	% of COE	% of COE
New South Wales	42.6	65.5	117.7	108.1	160.4	0.040	0.060
Victoria	64.5	88.2	163.8	152.7	228.3	0.083	0.124
Queensland	65.1	81.1	150.9	146.2	216.0	0.096	0.141
South Australia	67.2	59.5	120.8	126.7	188.0	0.249	0.370
Western Australia	37.6	43.1	76.4	80.6	114.0	0.077	0.108
Tasmania	1.6	1.7	3.0	3.3	4.6	0.026	0.037
Australia	278.6	339.0	632.7	617.6	911.3	0.077	0.113

Notes: The lower and upper bounds are calculated using the Simple and Total multipliers, respectively. Indirect economic activity due to interstate trade is included in the regional contribution estimates based on their share of underlying activity. Totals may not add due to rounding.

SOURCE: ACIL ALLEN CONSULTING

Employment

The total economic footprint of the pig production sector in terms of total employment by state is provided in **Table 4.10**.

In absolute terms, the pig production sector makes the largest employment contribution in Victoria, contributing between 2,041 FTE and 3,099 FTE to the state's total FTE employment.

TABLE 4.10 TOTAL EMPLOYMENT CONTRIBUTION OF THE PIG PRODUCTION SECTOR BY STATE, 2015-16

	Direct	Indirect		Total		Total as a share of state FTE employment	
State		*Lower bound*	*Upper bound*	*Lower bound*	*Upper bound*	*Lower bound*	*Upper bound*
	FTE jobs	FTE jobs	FTE jobs	FTE jobs	FTE jobs	% of employment	% of employment
New South Wales	484	832	1,477	1,316	1,960	0.038	0.057
Victoria	732	1,309	2,367	2,041	3,099	0.075	0.114
Queensland	738	1,131	2,115	1,869	2,854	0.089	0.135
South Australia	763	872	1,722	1,635	2,485	0.229	0.348
Western Australia	426	488	913	914	1,340	0.076	0.112
Tasmania	18	31	53	49	71	0.023	0.034
Australia	**3,161**	**4,662**	**8,648**	**7,823**	**11,809**	**0.073**	**0.110**

Notes: The lower and upper bounds are calculated using the Simple and Total multipliers, respectively. Indirect economic activity due to interstate trade is included in the regional contribution estimates based on their share of underlying activity. Totals may not add due to rounding.

SOURCE: ACIL ALLEN CONSULTING

5 ECONOMIC FOOTPRINT OF THE PRIMARY PROCESSING SECTOR

The economic contribution of the primary and secondary processing sectors have only been assessed at the national level to maintain confidentiality of data provided by processors and data sources.

The pig processing sector may be divided into two parts:

- The primary processing sector which involves the activities of abattoirs and boning rooms producing dressed carcasses and cuts for direct sale.
- Secondary processing which involves further value adding through activities such as cooking, curing, brining, smoking, fermenting or slicing creating a range of products including hams, bacon, sausages and other smallgoods.
  - This also includes packaging of pig meat products.
  - This can use domestically produced pig meat, imported pig meat or a combination of domestic and imported pig meats.

The economic contribution of each part of the processing sector has been estimated in this study. To avoid double counting related to the intra-sectoral purchases and vertical supply chain activities, the primary intermediate input used from one sector to the other is excluded in the estimation of contribution. This means that two parts of the processing sector can be added to obtain the overall economic contribution of the pig processing sector.

5.1 Direct economic contribution of primary processing sector

The total estimated revenue of the Australian primary processing sector in 2015-16 was $1,843.3 million. The direct economic contribution (value-add) embodied in the revenue is estimated to have been $386.1 million.

In 2015-16, Australian Gross Domestic Product (GDP) was $1,655 billion[30] implying that the direct economic contribution of the Australian primary processing sector accounted for 0.023 per cent of Australia's 2015-16 GDP.

The direct income contribution (household income) from the revenue is estimated to have been $257.3 million. In 2015-16, Australian Compensation of Employees (COE) was $807.1 billion[31] implying that the direct economic contribution of the Australian primary processing sector accounted for 0.032 per cent of Australia's COE income.

The direct employment contribution from the primary processing sector is estimated at 3,195 persons in 2015-16. Total FTE employment in the Australian economy was 10.7 million[32] implying that the

[30] ABS (2016), Australian System of National Accounts, 2015016, Cat No: 5204.0, Table 1. http://www.abs.gov.au/ausstats/abs@.nsf/PrimaryMainFeatures/5204.0?OpenDocument
[31] ABS (2016), Australian System of National Accounts, 2015016, Cat No: 5204.0, Table 8. http://www.abs.gov.au/ausstats/abs@.nsf/PrimaryMainFeatures/5204.0?OpenDocument
[32] ABS (2017), Labour Force Australia, Detailed, Electronics Delivery, Cat No: 6291.0.55.001, Table 8.

direct employment contribution of the pig production sector accounted for 0.03 per cent of Australia's total employment.

5.2 Indirect economic contribution of primary processing sector

It is estimated that Australian primary processors spent $207.3 million on goods and services in preparing pig meat for domestic consumption and exports in 2015-16. This is after purchasing $1,250 million of pigs for processing. Of the $207.3 million, it is estimated that $183.2 million was on domestically produced goods and services, comprising:

- $24.6 million other feed grains
- $30.9 million feed supplements
- $31.7 million on utilities, including electricity, gas, water and waste water treatment
- $7.4 million on transport
- $12.9 million on wholesale and retail trade
- $99.7 million on other inputs and services

The estimated indirect impacts at the national level with the lower and upper bounds are provided in **Table 5.1**

It is estimated that:

- The domestic spend of $183.2 million on non-pig inputs by primary processors, contributed between $155.4 million and $507 million to the Australian economy, which is between 0.009 and 0.031 per cent of GDP in 2015-16.
  - This is in addition to the direct contribution of 0.023 percent reported in section **5.1**.
- Between $75.1 million and $224 million in household income was indirectly supported by primary processing activities in the Australian economy.
- Between 1,045 and 3,067 FTE jobs were indirectly supported by the primary processing sector throughout the Australian economy.

TABLE 5.1 ESTIMATED INDIRECT ECONOMIC CONTRIBUTION OF THE PRIMARY PROCESSING SECTOR IN AUSTRALIA, 2015-16

	GDP (value-added)		Household income		Employment	
	$ million	% GDP	$ million	% total COE	FTE	% Australia
Lower bound	155.4	0.009	75.1	0.009	1,045	0.010
Upper bound	507.0	0.031	224.0	0.028	3,067	0.029

SOURCE: ACIL ALLEN CONSULTING

5.3 Total economic contribution of the primary processing sector

Adding the direct and indirect economic contributions for the primary processing sector from sections **5.1** and **5.2**, provides lower and upper bound estimates of the total economic footprint of the Australian primary processing sector.

It is estimated that the primary processing sector in Australia resulted in:

- a *lower bound* value-add contribution of $541.5 million to Australian GDP, comprising:
  - $386.1 million directly from the primary processing sector (direct contribution)
  - $155.4 million indirectly from demand generated through primary processors purchases of inputs and services (indirect contribution)
  - as a whole, the primary processing sector contributed a minimum of 0.033 per cent to Australian GDP in 2015-16.
- an *upper bound* value-add contribution of $893.1 million to Australian GDP, comprising:
  - $386.1 million directly from the industry (direct contribution)

- $507.0 million indirectly from demand generated through primary processors purchases of inputs and services (indirect contribution)
- as a whole, the primary processing sector contributed a maximum of 0.054 per cent to Australian GDP in 2015-16.

In 2015-16, it is estimated that the primary processing sector in Australia resulted in:

— a *lower bound* household income contribution of $332.4 million to Australian COE, comprising:
  - $257.3 million directly from the primary processing sector (direct contribution)
  - $75.1 million indirectly from demand generated through primary processors purchases of inputs and services (indirect contribution)
  - as a whole, the primary processing industry contributed a minimum of 0.041 per cent to Australian COE in 2015-16.

— an *upper bound* household income contribution of $481.3 million to Australian COE, comprising:
  - $257.3 million directly from the industry (direct contribution)
  - $224 million indirectly from demand generated through primary processors purchases of inputs and services (indirect contribution)
  - as a whole, the primary processing sector contributed a maximum of 0.06 per cent to Australian COE in 2015-16.

In 2015-16, it is estimated that the primary processing sector in Australia supported up to 6,261 FTE jobs. To put this estimate another way, for every one million dollars of revenue received by primary processors, there are up to 3 FTE jobs that are supported elsewhere in the Australian economy.

6 ECONOMIC FOOTPRINT OF THE SECONDARY PROCESSING AND WHOLESALING SECTOR

The economic contribution of the secondary processing and wholesaling sector drew on information from a range of sources including:

- primary data regarding the pigs produced in 2015-16 in terms of ratio of porkers and baconers
- APL data regarding the imported pig meat
- IBISWorld 2016, C1113 Cured Meat and Smallgoods Manufacturing in Australia.

The estimates of the economic contribution of the secondary processing and wholesaling sector in Australia are provided in this chapter.

6.1 Direct economic contribution of secondary processing and wholesaling sector

The total estimated revenue of the Australian secondary processing and wholesaling sector in 2015-16 was $2,820.0 million. The direct economic contribution (value-add) from the revenue is estimated to have been $505.3 million.

In 2015-16, Australian Gross Domestic Product (GDP) was $1,655 billion[33] implying that the direct economic contribution of the Australian secondary processing sector accounted for 0.031 per cent of Australia's 2015-16 GDP.

The direct income contribution (household income) from the revenue is estimated to have been $310.2 million. In 2015-16, Australian Compensation of Employees (COE) was $807.1 billion[34] implying that the direct economic contribution of the Australian secondary processing sector accounted for 0.038 per cent of Australia's COE income.

The direct employment contribution from the secondary processing sector is estimated at 6,064 persons in 2015-16. Total FTE employment in the Australian economy was 10.7 million[35] implying that the direct employment contribution of the secondary processing sector accounted for 0.057 per cent of Australia's total employment.

6.2 Indirect economic contribution of secondary processing sector

It is estimated that Australian secondary processors spent $1,420.7 million on goods and services (excluding primary pig meat processed) in preparing the pig meat products for domestic consumption

[33] ABS (2016), Australian System of National Accounts, 2015016, Cat No: 5204.0, Table 1. http://www.abs.gov.au/ausstats/abs@.nsf/PrimaryMainFeatures/5204.0?OpenDocument
[34] ABS (2016), Australian System of National Accounts, 2015016, Cat No: 5204.0, Table 8. http://www.abs.gov.au/ausstats/abs@.nsf/PrimaryMainFeatures/5204.0?OpenDocument
[35] ABS (2017), Labour Force Australia, Detailed, Electronics Delivery, Cat No: 6291.0.55.001, Table 8.

and exports in 2015-16. Of this it is estimated that $1,165 million was on domestically produced goods and services, comprising:

- $75.1 million other feed supplements
- $127.8 million on utilities, including electricity, gas, water and waste water treatment
- $115.8 million on transport
- $58.9 million on wholesale and retail trade
- $1,043.2 million on other inputs and services of which $439.4 million on milled grains and cereal products

The estimated indirect impacts at the national level with lower and upper bound are provided in **Table 6.1**

It is estimated that:

- The domestic spend of $1,165 million by secondary processors and wholesalers, contributed between $1,014.7 million and $1,914.9 million to the Australian economy, which is between 0.061 and 0.116 per cent of GDP in 2015-16.
  - This is in addition to the direct contribution of 0.031 percent reported in **Section 6.1**.
- Between $501.8 million and $892.7 million household income was indirectly supported by secondary processing and wholesaling activities in the Australian economy.
- Between 6,605 and 11,909 FTE jobs were indirectly supported by secondary processing and wholesaling activities in the Australian economy.

TABLE 6.1 ESTIMATED INDIRECT ECONOMIC CONTRIBUTION OF THE SECONDARY PROCESSING AND WHOLESALING SECTOR IN AUSTRALIA, 2015-16

	GDP (value-added)		Household income		Employment	
	$ million	% GDP	$ million	% total COE	FTE jobs	% total employment
Lower bound	1,014.7	0.061	501.8	0.062	6,605	0.062
Upper bound	1,914.9	0.116	892.7	0.111	11,909	0.111

SOURCE: ACIL ALLEN CONSULTING

6.3 Total economic contribution of secondary processing and wholesaling sector

Adding the direct and indirect economic contributions for the secondary processing sector from **Sections 6.1** and **6.2**, provides lower and upper bound estimates of the total economic footprint of the Australian secondary processing and wholesaling sector.

It is estimated that secondary processing and wholesaling in Australia resulted in:

- a *lower bound* value-add contribution of $1,520 million to Australian GDP, comprising:
  - $505.3 million directly from the secondary processing and wholesaling sector (direct contribution)
  - $1,014.7 million indirectly from demand generated through secondary processors and wholesalers purchases of inputs and services, excluding the primary processed pig meat (indirect contribution)
  - as a whole, the secondary processing and wholesaling sector contributed a minimum of 0.092 per cent to Australian GDP in 2015-16.
- an *upper bound* value-add contribution of $2,420.2 million to Australian GDP, comprising:
  - $505.3 million directly from the secondary processing and wholesaling sector (direct contribution)
  - $1,914.9 million indirectly from demand generated through secondary processors and wholesalers purchases of inputs and services (indirect contribution)
  - as a whole, the secondary processing and wholesaling sector contributed a maximum of 0.146 per cent to Australian GDP in 2015-16.

In 2015-16, it is estimated that secondary processing and wholesaling in Australia resulted in:

- a *lower bound* household income contribution of $812.1 million to Australian COE, comprising:
  - $310.2 million directly from the secondary processing and wholesaling sector (direct contribution)
  - $501.8 million indirectly from demand generated through secondary processors and wholesalers purchases of inputs and services (indirect contribution
  - as a whole, the secondary processing and wholesaling sector contributed a minimum of 0.101 per cent to Australian COE in 2015-16.
- an *upper bound* household income contribution of $1,202.9 million to Australian COE, comprising:
  - $310.2 million directly from the secondary processing and wholesaling sector (direct contribution)
  - $892.7 million indirectly from demand generated through secondary processors and wholesalers purchases of inputs and services (indirect contribution
  - as a whole, the secondary processing and wholesaling sector contributed a maximum of 0.149 per cent to Australian COE in 2015-16.

In 2015-16, it is estimated that the secondary processing and wholesaling sector in Australia supported up to 17,973 FTE jobs. To put this estimate another way, for every one million dollars of revenue received by secondary processors and wholesalers, there are up to 6 FTE jobs that are supported elsewhere in the Australian economy (this includes an estimate of the own labour supplied by owner operator).

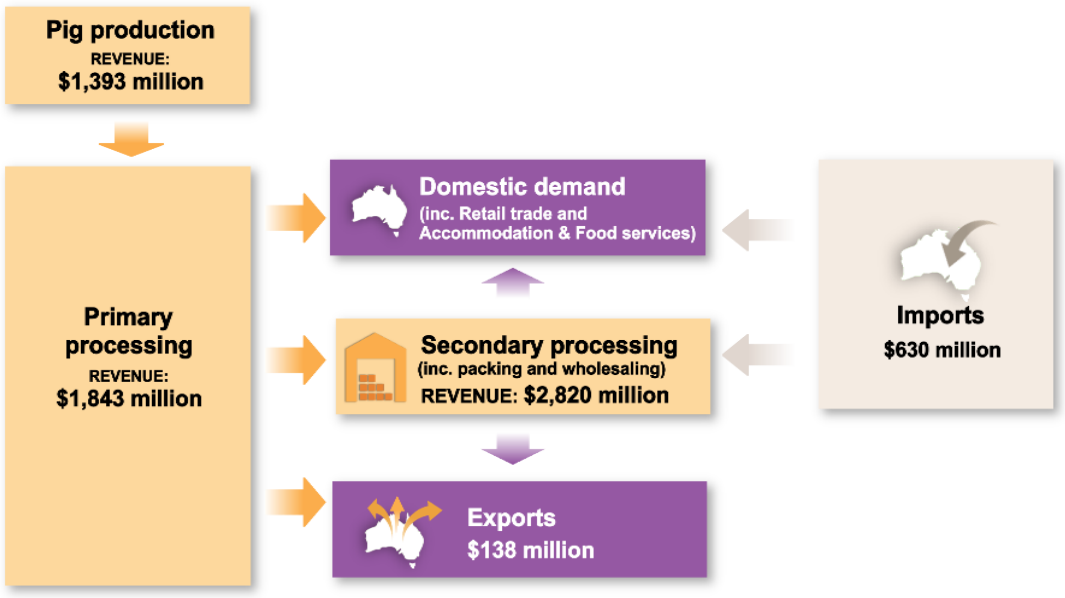
7 OVERALL FOOTPRINT OF THE AUSTRALIAN PORK INDUSTRY

The footprint analysis of the different stages of pork meat and meat products production in the previous chapters can be aggregated to provide an overall footprint of the pork industry in Australia in 2015-16.

7.1 Overall pork industry contribution 2015-16

A summary of pork value chain are provided in **Figure 7.1** and **Table 7.1**.

FIGURE 7.1 PORK INDUSTRY VALUE CHAIN, 2015-16



SOURCE: ACIL ALLEN CONSULTING

TABLE 7.1 ESTIMATED TOTAL ECONOMIC CONTRIBUTION OF THE PORK INDUSTRY IN AUSTRALIA, 2015-16

	GDP (value-added)		Household income		Employment	
	$ million	% GDP	$ million	% total COE	FTE jobs	% total employment
Lower bound						
Pig production	1,208.8	0.073	764.2	0.095	7,823	0.073
Primary processing	541.5	0.033	332.4	0.041	4,240	0.040
Secondary processing and wholesaling	1,520.0	0.092	812.1	0.101	12,669	0.118
Total	**3,270.3**	**0.198**	**1,762.1**	**0.218**	**24,732**	**0.231**
Upper bound						
Pig production	1,888.0	0.114	911.3	0.113	11,809	0.110
Primary processing	893.1	0.054	481.3	0.060	6,261	0.059
Secondary processing and wholesaling	2,420.2	0.146	1,202.9	0.149	17,973	0.168
Total	**5,201.3**	**0.314**	**2,595.5**	**0.322**	**36,043**	**0.337**

Note: Totals may not add due to rounding.

SOURCE: ACIL ALLEN CONSULTING

7.2 Overall total value-add contribution 2015-16

Adding the direct and indirect value-add economic contributions for the pig production sector, primary processing sector, and secondary processing and wholesaling sector provides lower and upper bound estimates of the total economic footprint of the Australian pork industry.

It is estimated that the pork industry as a whole contributed between $3,270 million and $5,201 million to the Australian economy, which was between 0.20 and 0.31 per cent of GDP in 2015-16.

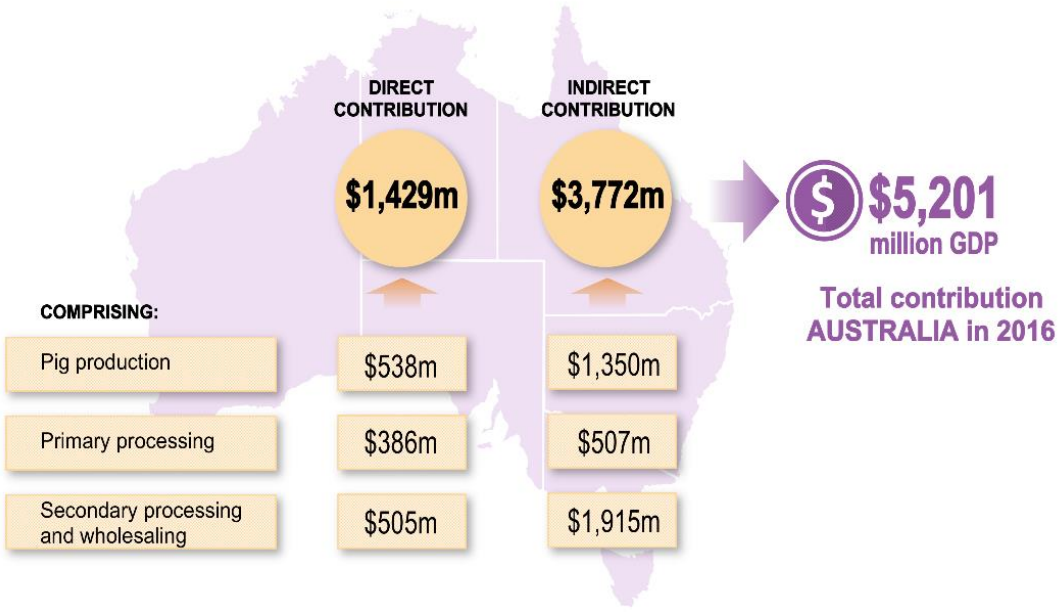
As shown in **Figure 7.2**, in 2015-16, it is estimated that the pork industry as whole in Australia resulted in:

- a *lower bound* value-add contribution of $3,270 million to Australian GDP, comprising:
  - $1,429 million directly from the pig production, primary and secondary processing and wholesaling sector (direct contribution)
  - $1,841 million indirectly from demand generated through the pork industry's purchases of inputs and services from other sectors of the economy (indirect contribution)
  - as a whole, the Australian pork industry contributed a minimum of 0.20 per cent to Australian GDP in 2015-16.
- an *upper bound* value-add contribution of $5,201.3 million to Australian GDP, comprising:
  - $1,429 million directly from the pig production, primary and secondary processing and wholesaling sectors (direct contribution)
  - $3,772 million indirectly from demand generated through the pork industry's purchases of inputs and services from other sectors of the economy including induced consumption effects (indirect contribution)
  - as a whole, the secondary processing and wholesaling sector contributed a maximum of 0.31 per cent to Australian GDP in 2015-16.

The key industry sectors benefiting from flow-on FTE employment as a result of pork industry in Australia are:

- *Wholesale and retail trade (3,522)*
- *Food and beverage manufacturing (3,383)*
- *Agriculture, forestry and fishing (2,145)*
- *Transport, postal and warehousing (1,961)*
- *Professional, scientific and technical services (1808)*
- *Accommodation and food services (1,364)*
- *Other services (1,366)*

FIGURE 7.2 OVERALL VALUE ADD ECONOMIC CONTRIBUTION OF THE AUSTRALIAN PORK INDUSTRY TO AUSTRALIA, 2015-16



Note: Totals may not add due to rounding.

SOURCE: ACIL ALLEN CONSULTING

7.3 Overall total household income contribution 2015-16

Adding the direct and indirect household income contributions for the pig production sector, primary processing sector, and secondary processing and wholesaling sector provides a lower and upper bound estimate of the total household income footprint of the Australian pork sector.

It is estimated that the pork value chain as a whole contributed between $1,762.1 million and $2,595.5 million to the household's wage income, which is between 0.218 and 0.322 per cent of Australian wage income in 2015-16.

In 2015-16, it is estimated that the pork sector as whole in Australia resulted in:

- a *lower bound* household income contribution of $1,762 million to Australian households wage income, comprising:
  - $846 million directly from the pig production, primary and secondary processing and wholesaling sector (direct contribution)
  - $916 million indirectly from demand generated through the pork industry's purchases of inputs and services from other sectors of the economy (indirect contribution)
  - as a whole, the Australian pork industry contributed a minimum of 0.22 per cent to Australian wage income in 2015-16.
- a *upper bound* household income contribution of $2,595 million to Australian households wage income, comprising:
  - $846 million directly from the pig production, primary and secondary processing and wholesaling sector (direct contribution)
  - $1,749 million indirectly from demand generated through the pork industry's purchases of inputs and services from other sectors of the economy (indirect contribution)
  - as a whole, the Australian pork industry contributed a minimum of 0.32 per cent to Australian wage income in 2015-16.

7.4 Overall total employment contribution 2015-16

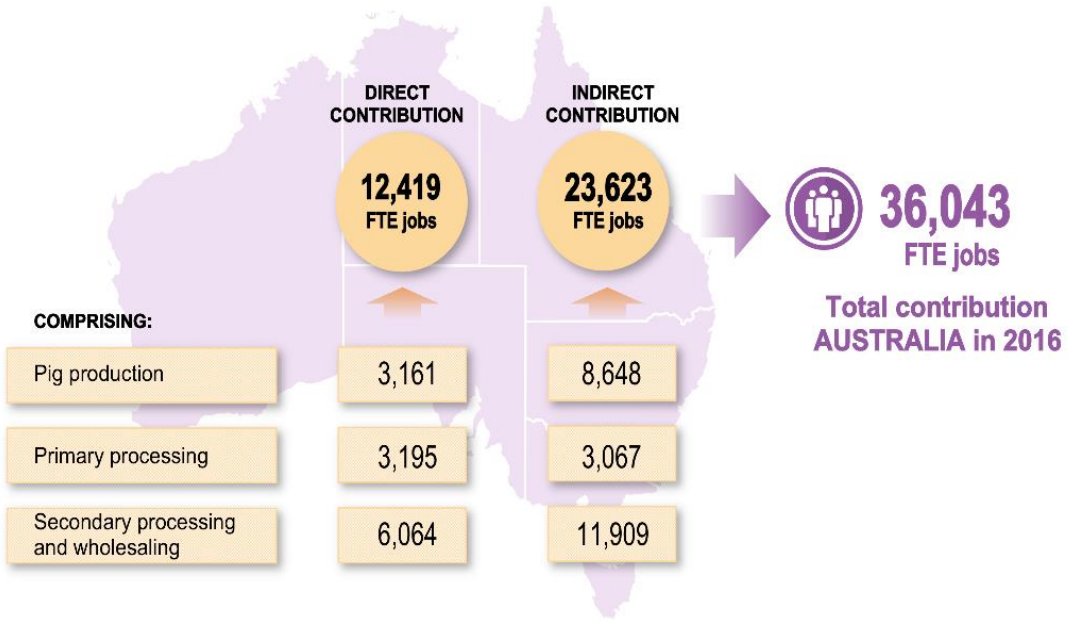
Adding the direct and indirect employment contributions for the pig production sector, primary processing sector, and secondary processing and wholesaling sector provides lower and upper bound estimates of the overall employment footprint of the Australian pork industry.

It is estimated that the pork industry as a whole contributed between 24,732 and 36,043 FTE employment to the Australian economy, which is between 0.23 and 0.34 per cent of Australian FTE employment in 2015-16.

In 2015-16, it is estimated that the pork industry as whole in Australia resulted in:

- a *lower bound* employment contribution of 24,732 FTEs to Australian employment, comprising:
  - 12,419 directly from the pig production, primary and secondary processing and wholesaling sector (direct contribution)
  - 12,313 indirectly from demand generated through the pork industry's purchases of inputs and services from other sectors of the economy (indirect contribution)
  - as a whole, the Australian pork industry contributed a minimum of 0.21 per cent to Australian employment in 2015-16.
- an *upper bound* employment contribution of 36,043 FTEs to Australian employment, comprising:
  - 12,419 directly from the pig production, primary and secondary processing and wholesaling sector (direct contribution)
  - 23,623 indirectly from demand generated through the pork industry's purchases of inputs and services from other sectors of the economy including consumption induced effects (indirect contribution)
  - as a whole, the Australian pork industry contributed a maximum of 0.34 per cent to Australian employment in 2015-16.

FIGURE 7.3 OVERALL EMPLOYMENT CONTRIBUTION OF THE AUSTRALIAN PORK INDUSTRY TO AUSTRALIA, 2015-16



Note: The estimates in this figure represent the upper bound of the economic contribution (calculated using Total multipliers).

SOURCE: ACIL ALLEN CONSULTING

In understanding the estimated number of jobs supported by the industry, it should be noted that while they are presented as FTE jobs, they represent the summation of many shares of individual jobs or include part-time and casual jobs. Hence, the number of people whose employment is supported (partially or wholly) by the activities of the pork industry will be greater than the number of FTE jobs.

8 REGIONAL CONTRIBUTION ANALYSIS

This section presents the indicative economic contribution of a piggery to a local community. Although there are many differences between regional economies throughout Australia, there are also many similarities. For the purpose of this analysis, ACIL Allen have generated a stylised representation of a piggery operation in a 'typical' local regional community where the region comprises an area encompassing one major town of 8,000-15,000 people and a surrounding regional area of approximately 60 km. For each major state, ACIL Allen selected regions[36] with these characteristics and which had known piggeries and at least one medium-large primary processing facility.

8.1 Local contribution per sow and per kilogram production

The economic contribution for the stylised local cost structure for a pig producer and a primary processor was estimated and converted into a number of metrics including the average economic contribution per sow and per kilogram of primary processed pork (see **Table 8.1** and **Table 8.2**).

The metrics are presented as the midpoint of the overall range of the various regional economies that were estimated. Overall there were only small variations between regions to the estimated contribution of a piggery to the local economy. Consequently, the estimated economic contributions should be applicable across most regions of Australia. (The full ranges are presented in Appendix B.)

To interpret the metrics, **Table 8.1** shows that the contribution of a piggery to a local community has:

— A lower bound contribution of $2,681 per sow to value-added (or the Gross Regional Product) in the regional economy. This contribution embodies the direct value-added by the pig producer as well as the local value-added embodied in the piggeries supply chain.

— An upper bound contribution of $3,406 per sow to value-added (or the Gross Regional Product) in the regional economy. This contribution embodies the lower bound contribution as well the economic contribution made by the piggery and supply chain workers spending their after-tax incomes on other local goods or services (such as local hairdressers, restaurants, retail traders etc).

If the local region also contains a primary processing facility, then the economic contribution made by the piggery operations will be greater. More specifically, as per **Table 8.1** a piggery in a region with a primary processing facility has:

— A lower bound contribution of $4,219 per sow to value-added (or the Gross Regional Product) in the regional economy. This contribution embodies the direct value-added by the pig producer as well as the local value-added embodied in the piggeries supply chain and the value added embodied in the primary processor's purchases of the average piggeries production per sow.

[36] Comprising two ABS Statistical Area Level 2 (SA2) geographies with such characteristics (one SA2 for the town and one regional SA2 surrounding the town).

— An upper bound contribution of $5,416 per sow to value-added (or the Gross Regional Product) in the regional economy. This contribution embodies the lower bound contribution as well the economic contribution made by the workers throughout the piggery supply chain (including processing costs) spending their after-tax incomes on other local goods or services (such as local hairdressers, restaurants, retail traders etc).

It should be noted that these estimates are for the 2015-16 financial year and, because pig and pig meat prices fluctuate considerably (which affects profit margins), may not be applicable in other years.

TABLE 8.1 LOCAL AND NATIONAL ECONOMIC CONTRIBUTION PER BREEDING SOW AND GILT, 2015-16

	Local community			Australia		
	Value added (GRP)	Household income	Employment	Value added (GDP)	Household income	Employment
	$/sow	$/sow	FTE jobs per thousand sows	$/sow	$/sow	FTE jobs per thousand sows
Lower bound						
Pig producers	2,681	1,402	17.4	4,477	2,288	29.0
Primary processing	1,539	1,005	12.7	2,006	1,231	15.7
Total primary processed pork	**4,219**	**2,408**	**30.1**	**6,483**	**3,519**	**44.7**
Secondary processing and wholesaling	n.e.	n.e.	n.e.	5,630	3,008	46.9
Total pork industry	**n.e.**	**n.e.**	**n.e.**	**12,112**	**6,526**	**91.6**
Upper bound						
Pig producers	3,406	1,664	21.4	6,992	3,375	43.7
Primary processing	2,054	1,186	15.6	3,308	1,783	23.2
Total primary processed pork	**5,461**	**2,850**	**37.0**	**10,300**	**5,158**	**66.9**
Secondary processing and wholesaling	n.e.	n.e.	n.e.	8,964	4,455	66.6
Total pork industry	**n.e.**	**n.e.**	**n.e.**	**19,264**	**9,613**	**133.5**

Note: n.e. = not estimated. GRP = Gross Regional Product. GRP is equivalent to GDP except for the regional economy.

SOURCE: ACIL ALLEN CONSULTING

TABLE 8.2 LOCAL AND NATIONAL ECONOMIC CONTRIBUTION PER UNIT OF PRIMARY PROCESSED PORK

	Local community			Australia		
	Value added (GRP)	Household income	Employment	Value added (GDP)	Household income	Employment
	$/kg CW	$/kg CW	FTE jobs per thousand tonnes	$/kg CW	$/kg CW	FTE jobs per thousand tonnes
Lower bound						
Pig producers	1.93	1.01	12.5	3.23	1.65	20.9
Primary processing	1.11	0.73	9.2	1.45	0.89	11.3
Total primary processed pork	**3.05**	**1.74**	**21.7**	**4.68**	**2.54**	**32.2**
Secondary processing and wholesaling	n.e.	n.e.	n.e.	4.06	2.17	33.9
Total pork industry	**n.e.**	**n.e.**	**n.e.**	**8.74**	**4.71**	**66.1**
Upper bound						
Pig producers	2.46	1.20	15.5	5.05	2.44	31.6
Primary processing	1.48	0.86	11.2	2.39	1.29	16.7
Total primary processed pork	**3.94**	**2.06**	**26.7**	**7.43**	**3.72**	**48.3**
Secondary processing and wholesaling	n.e.	n.e.	n.e.	6.47	3.22	48.0
Total pork industry	**n.e.**	**n.e.**	**n.e.**	**13.90**	**6.94**	**96.3**

Note: n.e. = not estimated. GRP = Gross Regional Product. GRP is equivalent to GDP except for the regional economy. CW = carcass weight

SOURCE: ACIL ALLEN CONSULTING

8.2 Local and national multipliers

Table 8.3 presents the local and national multipliers for value-added, household income and employment implied by the analysis in this report. These multipliers are all presented on a per million dollars of gross revenue basis. Hence, if a piggery produces enough pigs for, say, $5 million of primary processed pork, there will be up to 22.3 FTE jobs (5 x 4.4693) supported throughout the local economy and up to 40.4 FTE jobs (5 x 8.0814) nationally. Note that an FTE job may actually comprise the summation of more than one part-time or casual jobs. Hence, the number of people whose employment is affected is likely to be more than the number of FTE jobs.

When using the multipliers in **Table 8.3** it should be noted that, unlike most other metrics throughout this report (including those presented in **Table 8.1** and **Table 8.2** above), they are not additive. That is, the multiplier for Primary processing includes the indirect effects associated with domestic Pig production and the multiplier for Secondary processing and wholesaling includes the indirect effects associated with domestic Primary processing.

TABLE 8.3 LOCAL AND NATIONAL PORK INDUSTRY MULTIPLIERS

	Local community			Australia		
	Value added (GRP)	Household income	Employment	Value added (GDP)	Household income	Employment
	$m GRP per $m revenue	$m income per $m revenue	FTE jobs per $m revenue	$m GRP per $m revenue	$m income per $m revenue	FTE jobs per $m revenue
Simple multipliers (for Lower bound)						
Pig producers	0.5196	0.2718	3.3670	0.8678	0.4434	5.6162
Primary processing (including pig input costs)	0.5095	0.2907	3.6366	0.7828	0.4249	5.3951
Secondary processing and wholesaling (including primary processing costs)	n.e.	n.e.	n.e.	0.7927	0.4271	5.9948
Total pork industry	**n.e.**	**n.e.**	**n.e.**	0.7927	0.4271	5.9948
Total multipliers (for Upper bound)						
Pig producers	0.6602	0.3225	4.1571	1.3553	0.6542	8.4770
Primary processing (including pig input costs)	0.6594	0.3441	4.4693	1.2438	0.6228	8.0814
Secondary processing and wholesaling (including primary processing costs)	n.e.	n.e.	n.e.	1.2607	0.6291	8.7363
Total pork industry	**n.e.**	**n.e.**	**n.e.**	**1.2607**	**0.6291**	**8.7363**

Note: n.e. = not estimated. GRP = Gross Regional Product. GRP is equivalent to GDP except for the regional economy. CW = carcass weight

SOURCE: ACIL ALLEN CONSULTING

9 IMPORT REPLACEMENT

As shown in Section 2.6, there were approximately 297,400 tonnes (CWE)[37] of imported pig meat in Australian in 2015-16.

As shown in **Table 9.1**, almost all of this was primary processed meat rather than secondary (96 per cent by tonnage and 90 per cent by value). While secondary processed products include speciality products such as Jamón ibérico (Iberian ham) that are not easily substitutable with domestic equivalents, the majority of imported products have minimal processing that competes directly with Australian producers. If Australian producers were able to competitively replace fresh or frozen imported pig meat with domestic pigs it would represent an increase in domestic pig production of nearly 60 per cent, which in turn would have a significant impact on the local economy.

TABLE 9.1 VOLUME AND VALUE OF PIG MEAT IMPORTS BY LEVEL OF PROCESSING

	Volume (shipped weight)	Value
	'000 tonnes	$ million
Primary processed meat		
– Boneless frozen	146.9	516.7
– Chilled and other frozen	12.3	49.9
Secondary processed meat		
– Dried	3.2	39.2
– Preserved	4.2	24.5
Total	**166.6**	**630.3**
Primary share	96%	90%
Secondary share	4%	10%

Note: Value is customs value. Volume is shipped weight not carcass weight equivalent.

SOURCE: ACIL ALLEN CONSULTING

9.1 Assumptions

There are many possible drivers for import replacement including changes in consumer preferences, exchange rate movements, changes in production costs (either domestically or internationally), changes in the relative returns to pig farmers compared to other farmers or the imposition of trade barriers. Some drivers will have positive impacts on the Australian economy while others will have negative or neutral impacts. Rather than modelling specific scenarios, this section provides estimates

[37] CWE is carcass equivalent weight, an average 0.56 factor was employed to convert shipping weight to carcass weight.

of how the economic contribution of the pork industry will change if all primary processed meat was supplied through domestic supply chains. For the purposes of the modelling, it has been assumed that the increased pig production is undertaken by large producers rather than small or medium producers. This in turn is assumed to impact the primary processing sector by increasing the amount of stock that needs to be slaughtered and boned in Australia. No impact, however, has been assumed to occur in the secondary processing sector as the additional pig meat supplied through domestic supply chains replaces meat that is currently imported (although in practice there may be some implications through changes in the price structure and product mix).

9.2 Economic contribution without imports

Table 9.2 below presents the estimated economic contribution to Australia that the Australian pork industry would have made in the absence of imported fresh or frozen pig meat.

In summary, if domestic producers were to supply the entire domestic demand, the contribution of the Australian pork industry to Australian GDP, including flow-on effects, would increase by approximately 33 per cent, with the upper bound estimate increasing from $5.2 billion to $6.9 billion.

Similarly the upper bound estimate of total FTE employment throughout the pork industry supply chain, including flow-on effects, would increase by 30 per cent from just over 36,000 to nearly 47,100.

TABLE 9.2 COMPARISON OF THE PORK INDUSTRY WITH AND WITHOUT IMPORTS, AUSTRALIA, 2015-16

Heading	Value added	Household income	Employment
	$ million	$ million	FTE jobs
CURRENT (WITH IMPORTS)			
Lower bound			
Pig producers	1,208.8	617.6	7,823
Primary processing	541.5	332.4	4,240
Secondary processing and wholesaling	1,520.0	812.1	12,669
Total	**3,270.3**	**1,762.1**	**24,732**
Upper bound			
Pig producers	1,888.0	911.3	11,809
Primary processing	893.1	481.3	6,261
Secondary processing and wholesaling	2,420.2	1,202.9	17,973
Total	**5,201.3**	**2,595.5**	**36,043**
WITHOUT IMPORTS			
Lower bound			
Pig producers	1,920.6	981.3	12,430
Primary processing	893.6	548.5	7,010
Secondary processing and wholesaling	1,520.0	812.1	12,669
Total	**4,334.2**	**2,341.9**	**32,109**
Upper bound			
Pig producers	2,999.7	1,447.9	18,762
Primary processing	1,473.8	794.3	10,345
Secondary processing and wholesaling	2,420.2	1,202.9	17,973
Total	**6,893.6**	**3,445.0**	**47,080**

SOURCE: ACIL ALLEN CONSULTING

10 WORLD TRADE IN PORK

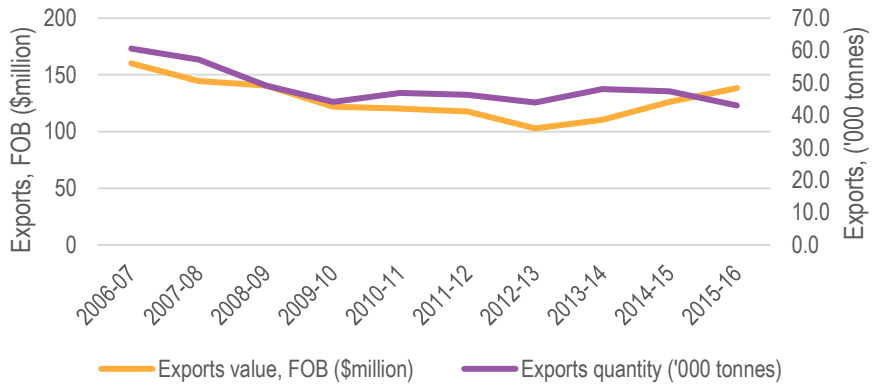
World pig meat trade is driven by demands for specific types of cut and by producers' abilities to deliver products of a given quality at a given price. Australian producers, like producers in other countries, are displaying an increasing capacity to maximize their return on each specific cut or pig meat product by identifying niche (or specialised) markets in which demand for certain products is high or their products have price or quality advantages. World markets will continue to be subject to uncertainties that can create both opportunities and setbacks for domestic producers and processors. Three important factors influencing the volume and pattern of Australian exports have been disease outbreaks in other countries, reduced trade and quarantine barriers, and fluctuations in exchange rates.

This chapter provides an overview of Australian pork industry exports and the general opportunities to increase them. It also discusses the potential role of recently signed free trade agreements (FTA) in improving the Australian pork export opportunities.

10.1 Pig meat product exports

Australian exports of pig meat products in both value and quantity terms, declined over the past decade. The value of exports declined from $160.1 million in 2006-07 to $138.3 million in 2015-16 while the quantity declined from 60,600 tonnes in 2006-07 to 43,000 tonnes in 2015-16 (**Figure 10.1**). Favourable changes in the exchange rate since 2012-13 has provided some improvement in value.

FIGURE 10.1 PIG MEAT PRODUCT EXPORTS, 2006-07 TO 2015-16



[a] Quantity is carcass weight equivalent (CWE) and price is FOB based.

SOURCE: AUSTRALIAN PORK LIMITED

In 2006-07, nearly 16 per cent of domestic production was exported but declined to 11 per cent in 2015-16, with the higher Australian exchange rate over much of this time period being a key factor.

The APL 2015-2020 strategic plan has identified an increase of 37 per cent growth in Australian pork exports by 2020 is an important priority for the industry.[38] To increase this level, the export volumes (CWE) need to increase by nearly 16,000 tonnes from 2015-16 levels.

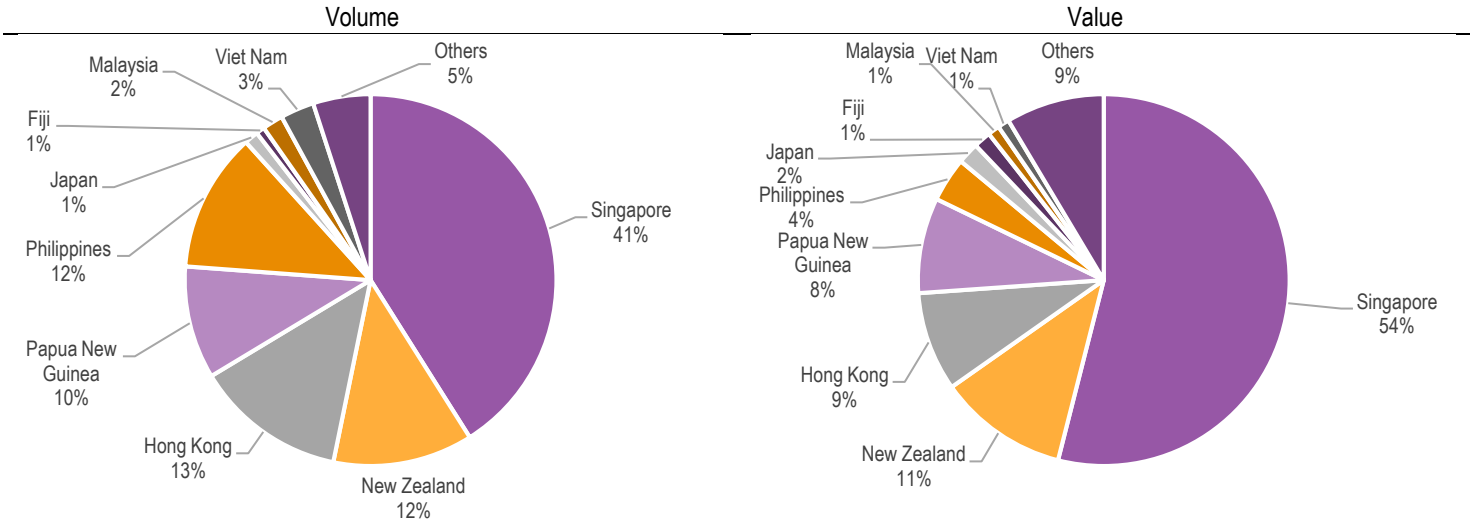
10.1.1 Australian export markets

Australia exported pig meat to 39 countries in 2015-16.

In 2015-16, the main export markets for Australian pig meat were Singapore, New Zealand and Hong Kong, which together accounted for 74 per cent of exports by value and 66 per cent of exports by volume as shown in **Figure 10.2**.

The main product sold to Singapore is chilled carcasses, while frozen swine meat is the primary product sold to New Zealand and Hong Kong. Other significant markets include Papua New Guinea, and the Philippines.

FIGURE 10.2 AUSTRALIAN PIG MEAT EXPORTS, BY VOLUME AND VALUE, 2015-16



Note: Export data includes small amounts of game meat (less than 3 per cent) which is not commercially produced by the Australian pork industry.

SOURCE: AUSTRALIAN PORK LIMITED

The relative size of different export markets for Australia's pig meat has changed over time as shown in **Table 10.1**.

- Singapore is the largest export market for Australia both in volume and value over the past decade and maintained its position as Australia's top export market despite large declines in volumes since 2006-07.
- Japan was third export market for Australia in value ten years ago but is now the seventh largest export market.
- Hong Kong has been Australia's fourth largest export market in value terms for most of the past decade but jumped ahead of Papua New Guinea in 2015-16 to become Australia's third largest export market in value.
- Australian exports to Philippines grew at an average of 10 per cent a year over the past five years, albeit from a lower base.
- Papua New Guinea was Australia's fourth largest export market in 2015-16.

[38] http://australianpork.com.au/wp-content/uploads/2013/10/Strategic-Plan-2015-2020-Final.pdf

TABLE 10.1 AUSTRALIAN PIG MEAT EXPORTS BY DESTINATION

	Singapore	New Zealand	Hong Kong	Papua New Guinea	Philippines	Japan	Republic of Korea	Others	TOTAL
	Volume ('000 tonnes)								
2006-07	23,705	10,618	2,387	905	1,387	2,148	1,673	5,643	48,466
2007-08	21,786	10,845	2,465	1,612	1,817	1,475	904	4,873	45,777
2008-09	18,280	8,803	3,104	1,321	1,931	968	532	4,414	39,353
2009-10	15,983	7,059	2,869	2,305	2,369	363	671	3,692	35,311
2010-11	14,675	5,679	3,073	4,062	3,232	324	1,408	5,083	37,537
2011-12	12,786	4,173	4,624	4,328	3,318	280	1,061	6,455	37,026
2012-13	11,162	5,297	4,197	3,984	5,205	322	389	4,576	35,132
2013-14	10,429	5,543	4,431	4,284	5,402	352	711	7,361	38,513
2014-15	13,620	4,936	3,260	4,744	3,657	384	872	6,463	37,937
2015-16	14,130	4,194	4,527	3,378	4,173	419	245	3,363	34,430
	Value ($million)								
2006-07	86.0	39.0	4.9	1.6	1.5	9.6	4.1	12.4	160.1
2007-08	75.7	40.2	4.9	3.7	1.9	4.9	1.8	10.1	144.4
2008-09	74.5	34.4	7.5	3.7	2.9	5.7	1.0	10.5	140.6
2009-10	68.4	23.8	6.7	5.1	2.3	2.3	0.9	10.2	121.9
2010-11	60.1	17.6	7.4	9.8	3.2	1.9	2.4	12.9	120.2
2011-12	50.5	12.5	11.0	13.4	4.0	1.5	1.8	14.6	117.8
2012-13	43.3	16.1	10.5	14.0	6.8	1.8	0.9	8.2	102.8
2013-14	44.5	18.3	12.6	12.2	7.1	2.0	1.1	11.8	110.2
2014-15	58.3	18.9	10.8	14.3	4.8	2.3	1.1	12.6	126.1
2015-16	74.6	15.6	11.9	11.5	5.3	2.6	0.5	11.1	138.3

SOURCE: AUSTRALIAN PORK LIMITED

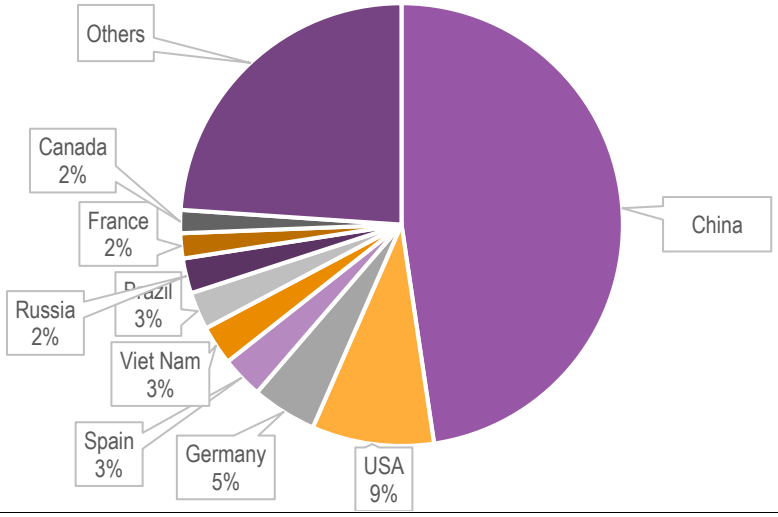
There are number of reasons for the decline of Australian pig meat exports beyond exchange rates. Potential impediments to Australian export competitiveness include:

- Market access in export markets and high trade barriers in some overseas markets. Australian exporters (along with exporters in other countries) are required to meet relevant quarantine arrangements in destination countries and, in some cases, non-quarantine requirements such as tariffs and quotas.
- Government assistance to pig production in major pig producing countries.
- Feed grain prices and availability.
- Limits on the ability of pig producers to increase returns by producing larger pigs, and issues with the current system that determines the payments for pigs.
- High cost of production in Australian

10.2 World pig meat production

World production of pig meat was approximately 120 million tonnes in 2014. As noted in **Figure 10.3**, pig meat production is dominated by China accounting for 47 per cent, followed by United States (9 per cent), Germany (5 per cent), Spain, Vietnam and Brazil (3 per cent each), Russia, France, and Canada (2 per cent each).

FIGURE 10.3 WORLD PIG MEAT PRODUCTION BY MAJOR COUNTRIES, 2014



SOURCE: FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, ACCESSED 9 JULY 2017.

10.3 World pig meat consumption per person

Consumption of pig meat per person varies considerably across countries as shown in **Table 10.2**.

TABLE 10.2 WORLD PER PERSON PORK CONSUMPTION, 2015, KG/PERSON

Country	Kg/person	Country	Kg/person	Country	Kg/person	Country	Kg/person
China/HK/Macau	40.9	Canada	24.9	Ukraine	15.7	Colombia	7.8
European Union	40.8	Australia	24.7	Philippines	15.3	Croatia	7.6
Montenegro	40.2	Singapore	22.9	Panama	14.7	Bosnia	6.2
Taiwan	39.7	Chile	22.5	Ecuador	14.3	Kazakhstan	5.4
Serbia	36.9	New Zealand	22.3	Brazil	14.2	Guatemala	5.2
Republic of Korea	36.9	Russia	21.2	Cuba	12.1	South Africa	4.9
Belarus	33.5	Japan	20.2	Macedonia	11.9	Armenia	4.9
United States	29.2	The Bahamas	18.5	Argentina	11.3	Honduras	4.6
Vietnam	25.5	Uruguay	18.2	Dominican Republic	9.5	Venezuela	4.4
Norway	25.1	Mexico	17.9	Angola	8.3	Haiti	4.2

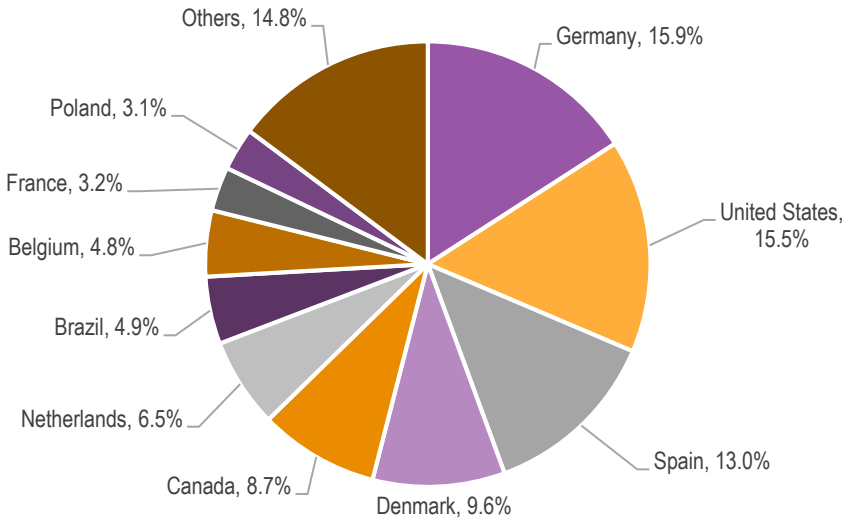
SOURCE: HTTP://WWW.PORK.ORG/PORK-QUICK-FACTS/HOME/STATS/U-S-PORK-EXPORTS/WORLD-PER-CAPITA-PORK-CONSUMPTION-2/, ACCESSED 9 JULY 2017

10.4 World trade in pig meat products

As shown in **Figure 10.4**, major exporters of pig meat include the European Union countries (mainly Germany, Spain, Denmark, Netherlands, Belgium, France and Poland) Canada, the United States and Brazil.

Australia's share of global exports was approximately 0.4 per cent in 2015-16.

FIGURE 10.4 WORLD PORK EXPORTS BY COUNTRY, 2016



SOURCE: HTTP://WWW.WORLDSTOPEXPORTS.COM/PORK-EXPORTS-BY-COUNTRY/

10.5 Free trade agreements

Australia has ten FTAs currently in force with New Zealand, Singapore, Thailand, US, Chile, the Association of South East Asian Nations (ASEAN) (with New Zealand), Malaysia, Korea, Japan and China. The countries covered by these FTAs account for 67 per cent of Australia's total trade.[39]

Free trade agreements are a central plank of Australia's trade policy. These are negotiated by the Department of Foreign Affairs and Trade (DFAT), in concert with the Department of Agriculture and Water Resources, with the aim to reduce tariff barriers to trade and investment.[40] There are currently ten FTAs in force, accounting for nearly 70 per cent of Australian trade, one concluded but not in force and a further seven under negotiation (see **Box 10.1** below for details).

The three most recently negotiated bi-lateral agreements are with China, Japan and Republic of Korea.

- China-Australia Free Trade Agreement (ChAFTA) came into force on 20 December 2015.[41]
- Japan-Australia Economic Partnership Agreement (JAEPA) entered into force on 15 January 2015.[42]
- Korea-Australia Free Trade Agreement (KAFTA) entered into force on 12 December 2014.[43]

All three of these countries are large producers, large consumers and large importers of pork but have had significant environmental, biosecurity issues affecting their domestic supplies. See below analysis on each market for further details.

10.5.1 Benefits of FTAs

The benefits of FTAs which could be realised by the Australian pork industry are largely in line with DFAT's reported benefits of FTAs which include:

- creating stronger ties with trading partners
- eliminating tariffs that impede the flow of goods and services
- encouraging investment

[39] DFAT website, accessed 9 July 2017.
[40] Non-tariff barriers include, for example, standards, professional qualifications, intellectual property rights and competition policies.
[41] See: http://dfat.gov.au/trade/agreements/chafta/Pages/australia-china-fta.aspx
[42] See: http://dfat.gov.au/trade/agreements/jaepa/Pages/japan-australia-economic-partnership-agreement.aspx
[43] See: http://dfat.gov.au/trade/agreements/kafta/Pages/korea-australia-fta.aspx

- enhancing cooperation
- increasing productivity and contribute to higher GDP growth by allowing domestic businesses access to cheaper inputs
- promoting regional economic integration
- building shared approaches to trade and investment, including through the adoption of common Rules of Origin and broader acceptance of product standards
- enhancing the competitiveness of Australian exports in the partner market.[44]

JAPEA specifically includes tariff reductions under a growing quota for pork meat, offal and prepared or preserved meat products and exemption from Japan's price safeguard.[45]

BOX 10.1 FREE TRADE AGREEMENTS

FTAs in force

- Australia - New Zealand
- Singapore – Australia
- Australia – USA
- Thailand – Australia
- Australia – Chile
- ASEAN – Australia – New Zealand
- Malaysia – Australia
- Korea – Australia
- Japan – Australia
- China – Australia

FTAs concluded but not in force

- Trans-Pacific Partnership

FTAs in negotiation

- Australia-Gulf Cooperation Council (GCC) FTA
- Australia-India Comprehensive Economic Cooperation Agreement
- Environmental Goods Negotiations
- Indonesia-Australia Comprehensive Economic Partnership Agreement
- Pacific Agreement on Closer Economic Relations (PACER) Plus
- Regional Comprehensive Economic Partnership
- Trade in Services Agreement

SOURCE: DEPARTMENT OF FOREIGN AFFAIRS AND TRADE

10.5.2 Tran-Pacific Partnership

Trans-Pacific Partnership Agreement (TPP) is a multinational regional FTA which includes Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, Peru, New Zealand, Singapore, the United States and Vietnam.[46] It is considered the largest negotiated trade agreement with the potential to create jobs and growth in Australia.

Expected outcomes include:

- new market access opportunities for Australian exporters of goods and services in addition to Australia's existing free trade agreements.
- new investment opportunities
- a more predictable and transparent regulatory environment.[47]

[44] See: http://dfat.gov.au/trade/agreements/pages/benefits-of-ftas.aspx
[45] Japan-Australia Economic Partnership Agreement Regulation Impact Statement, 12 May 2014.
[46] See: http://dfat.gov.au/trade/agreements/tpp/pages/trans-pacific-partnership-agreement-tpp.aspx
[47] See: http://dfat.gov.au/trade/agreements/tpp/pages/trans-pacific-partnership-agreement-tpp.aspx

The TPP aims to have commonly agreed rules and regulations across its 12 member countries which in turn will provide greater clarity for businesses, reduce costs and red tape and facilitate participation in regional supply chains.[48]

The TPP is different to the other bilateral FTAs that Australia has as it negotiated commitments on reducing state-owned enterprises to promote competition, trade and investment. The TPP allows for expanded membership over time.[49]

The negotiations concluded successfully on 6 October 2015. However, on 23 January 2017, US President Trump signed a presidential memorandum to withdraw from the TPP. The remaining 11 countries agreed in May 2017 to revive the deal without US participation.

10.5.3 Realising the benefits of FTAs

Realising all these benefits will depend on several key factors such as the degree to which trade was restricted prior to the FTA, consumer tastes and preferences and other demand drivers such as socio-economic impacts or changing demographics, local supplies and competition from other importers who may also have similar free trade arrangements. These issues are discussed below for the major FTA markets of China, Japan and Republic of Korea. These markets are also APL priority markets for export developments.

Other non-tariff barriers such as sanitary and phyto-sanitary requirements also restrict trade and need to be considered by governments in negotiations. As noted by the National Farmers Federation in their Submission to the Senate on China-Australia FTA:

While the China agreement reduces tariffs for Australian pork, further work is required to negotiate the import protocols and export processor accreditation before Australian producers can start to take advantage of the opportunities provided under the agreement.[50]

10.6 China

10.6.1 Demand and consumption drivers

China is the world leader in pork production and consumption, consuming over 40 million tonnes in 2016 with compound average growth rates of 1.5 per cent.[51] Pork accounts for more than 60 per cent of total meat consumption in volume terms in China.[52] China is also the world's largest importer of pork.

Consumer attitudes

Recent academic research on Chinese consumers' attitudes to pork suggests that Chinese consumers prefer:

- industrial pig production systems rather than small family farms
- traditional pig breeds
- high attention to food safety
- lean meat
- consistent quality [53]

Euromonitor International reports that Chinese consumers are making a conscious decision to consume less meat or shift to seafood as a protein source, this has been driven by price increases and new health trends. As well as reports of environmental concerns in local pork production.[54]

[48] See: http://dfat.gov.au/trade/agreements/tpp/pages/trans-pacific-partnership-agreement-tpp.aspx
[49] See: http://dfat.gov.au/trade/agreements/tpp/pages/trans-pacific-partnership-agreement-tpp.aspx
[50] See: http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Foreign_Affairs_Defence_and_Trade/China-Aust_Free_Trade/~/media/Committees/fadt_ctte/China-Aust_Free_Trade/c03.pdf
[51] Euromonitor International, 2017. Meat in China March 2017.
[52] Euromonitor International, 2017. Meat in China March 2017.
[53] Marcia Dutra de Barcellos, Klaus G. Grunert , Yanfeng Zhou, Wim Verbeke, F. J. A. Perez-Cueto, Athanasios Krystallis (2013) Consumer attitudes to different pig production systems: a study from mainland China, Agric Hum Values (2013) 30:443–455.
[54] Euromonitor International, 2017. Meat in China March 2017.

Euromonitor International estimates that the result of this public policy launch and education campaign that the volume of meat consumed is expected to slow to about 1 per cent compound average growth in the next period down from the previous period of 1.5 per cent.[55]

Socio economics and demographics

China has a large, aging and steadily growing population with increased spending power and until recently, a trend towards more meat consumption. However, coupling the shift in health trends outlined above with an increase in the proportion of Chinese over 60 years of age may lead to a further reduction in meat consumption per household.[56]

10.6.2 Local supply

In 2015, many Chinese pig farms were forced to shut down because they failed to meet the standards of the revised Environment Protection Law, this lead to a sharp decline in domestic pork production and a corresponding increase in the average per unit price.[57]

Rabobank recently reported that pork production will be reshaped in China where production will mainly occur in the north and north-east, of the country away from rivers and lakes in the south.[58]

10.6.3 Imports

China is increasingly reliant on imports to meet internal demand. Local Chinese processors use lower cost imports to produce products for the domestic market.

China sources its pork primarily from North America (USA and Canada) and Europe (Germany, Denmark, France, Netherlands, Ireland) including the UK, as well as Chile.[59]

10.7 Japan

In 2015, Japan was ranked sixth in pork consumption, ninth in pork production, and first in pork imports (a position now taken by China). Domestic production contributes around half of Japan's pork consumption. The other half is imported from foreign countries, such as the United States, Canada, and Denmark. Japan accounts for nearly one-fifth of the world's pork imports (note 2).

10.7.1 Demand and consumption drivers

Pork is the most commonly consumed meat in the Japanese home corresponding to 46 per cent of retail sales of meat in 2016.[60] In 2016, the Japanese consumed 2.6 million tonnes of pork per year, this is projected to increase to 2.7 million tonnes by 2020.[61] Pork prices have been stable over the last 12 months, and pork is the cheapest red meat on a per kilogram basis.[62]

Consumer attitudes

The Japanese are health conscious and pork is considered to have significant health benefits being a good source of vitamin B1.[63]

[55] Euromonitor International, 2017. Meat in China March 2017.
[56] Euromonitor International, 2017. Meat in China March 2017.
[57] Euromonitor International, 2017. Meat in China March 2017.
[58] See: https://www.rabobank.com/en/press/search/2017/rabobank-chinas-animal-protein-outlook-to-2020-growth-in-demand-supply-and-trade.html
[59] See: http://www.agr.gc.ca/eng/industry-markets-and-trade/statistics-and-market-information/agriculture-and-food-market-information-by-region/asia/market-intelligence/sector-trend-analysis-pork-trends-in-china/?id=1481126666257
[60] Euromonitor International, 2017. Meat in Japan March 2017.
[61] See: https://www.mla.com.au/globalassets/mla-corporate/prices--markets/documents/os-markets/red-meat-market-snapshots/mla-global-snapshot-beef-2017.pdf
[62] Euromonitor International, 2017. Meat in Japan March 2017.
[63] Euromonitor International, 2017. Meat in Japan March 2017.

Socio economics and demographics

Japan has a declining (-0.19 per cent growth rate), and an aging (nearly 40 per cent of people are over the age of 55), population. The economy has been stagnant since 2012 and not showing signs of significant growth in the future.

10.7.2 Local supply

Japan produces around 1.3 million tonnes of pork per year[64], meaning at current consumption rates it is importing about 50 per cent of its pork.

Domestic pork production has declined by 8 per cent since 2014 primarily due to Porcine Epidemic Diarrhoea virus (PEDv)) with many small- and medium-scale operators leaving the industry. Over the same period, total pig numbers fell by 2 per cent. [65]

10.7.3 Imports

The Japanese Ministry of Finance reports the main pork importing countries in 2016 were the USA (30 per cent market share), Canada, Denmark, Spain, Mexico and Hungary.[66] Imports have risen 13 per cent in the first six months of 2016.

10.8 Republic of Korea

More pork is consumed in Republic of Korea than any other meat. In 2014, 1.08 million tonnes were consumed (60 per cent more than chicken and 100 per cent more than beef).[67]

10.8.1 Demand and consumption drivers

Korean pork consumption has continued to increase over the last two years, as growing economic pressures move consumers away from beef.

Consumer attitudes

Significant biosecurity and animal health concerns in domestic pork production have meant that consumers are more aware of production processes and some consumers are showing a preference for imported pork products. Contrary to this there is also reports of trends towards 'food sovereignty' which has led to a preference for Korean produced food where possible and has slowed the pace of liberalised trade.[68]

Growing consumer awareness of animal welfare issues lead to two abattoirs in Korea being certified in 2014. These abattoirs are required to limit injury or pain pigs in transport and slaughtering process. The process of slaughter has to be recorded by security camera. Following the certification of the abattoirs, Korea launched their first 'Animal Welfare-Certified Pork' in July 2016.[69]

Socio economics and demographics

Republic of Korea has a large and growing population of just over 50 million and in 2015 was the 15th largest economy in the world.[70] Republic of Korean economy has been growing at a slower rate since 2012 and this has driven the shift from more expensive meats such as beef.

[64] See: http://www.pigprogress.net/Finishers/Articles/2016/11/Japans-market-for-imported-pork-is-large-2909811W/
[65] See: http://www.pigprogress.net/Finishers/Articles/2016/11/Japans-market-for-imported-pork-is-large-2909811W/
[66] See: http://pork.ahdb.org.uk/prices-stats/news/2016/august/japanese-pork-imports-increasing-in-h1-2016/
[67] See: http://www.pigprogress.net/Finishers/Articles/2015/2/South-Korea-A-market-with-potential-and-problems-1692109W/
[68] See: http://www.pigprogress.net/Finishers/Articles/2015/2/South-Korea-A-market-with-potential-and-problems-1692109W/
[69] See: http://koreabizwire.com/first-animal-welfare-certified-pork-launches-in-korea/60489
[70] See: http://www.pigprogress.net/Finishers/Articles/2015/2/South-Korea-A-market-with-potential-and-problems-1692109W/

10.8.2 Local supply

Republic of Korea produces about one million tonnes of pork per year. The number of pig farmers and pig production units has reduced sharply from 24,000 in 2000 to 5,000 pig farms in 2015, however pig numbers are up 2 million over the same period.[71]

There have been significant issues with reliable biosecurity and animal health policy over the last decade. Food safety has been an increasing concern for local pork production since 2010 with major outbreaks of Foot and Mouth Disease (FMD) saw pork prices rise by 40 per cent. Outbreaks of PEDv and FMD occurred in 2015 and another FMD outbreak was identified in early 2017.

As a result of these food safety concerns there have been a number of changes to agriculture and food policy and the structure of the Korean pig industry.

10.8.3 Imports

The US has been Korea's top pork supplier for more than a decade holding 30 per cent of market share in 2016. In the first two months of 2017, US pork exports to Korea were up 18 per cent.

As well as Australia, Republic of Korea has FTAs in place with major pork producing markets such as Chile, the EU, the USA, and Canada.

10.9 Key findings

The above discussion shows there are possible export opportunities for Australian pork producers in North East Asia. There is little publically available and recent information in English on consumers' preferences for pork in Asian countries which makes a definitive assessment difficult.

However, further in depth research, such as replicating the 2013 consumer study prepared for Co-operative Research Centre for High Integrity Australian Pork, would likely shed more insight and would be recommended prior to making strategic decisions.[72] The findings of this study have not been reported as the data was collected in 2012 and consumer tastes and preferences change considerably in a relatively short period of time.

Table 10.3 below summarises the findings in each of the three markets.

TABLE 10.3 OVERVIEW OF FINDINGS FOR THE PORK INDUSTRY

Consideration	China	Japan	Republic of Korea
Number of months FTA in force	18 months	30 months	31 months
Australia a top ten importer?	No	No	No
Increasing demand for pork?	Yes	Yes	Yes
Growing population?	Yes	No	Yes
Focus on health?	Yes	Yes	Yes
Concerns with local supply?	Environmental concerns	Animal health concerns	Animal health and welfare concerns

Source: ACIL Allen Consulting, 2017

In China, consumers have a preference for health attributes and high quality 'clean' produce which Australia is in a good position to capitalise on. In Korea, the animal health concerns domestically and the strong growth in consumption suggests further growth in imports.

Both countries have growing populations and relatively stable economies. The Chinese market appears to offer the most long term potential. However, there is significant competition from North American and European countries and Australia does not yet have import protocols in place. Japan

[71] See: http://www.pigprogress.net/Finishers/Articles/2015/2/South-Korea-A-market-with-potential-and-problems-1692109W/

[72] Haydon, P. D'Souza, D.N. and Channon, H.A. 2013, Defining the relative importance of consumer drivers and perceptions of Australian pork in targeted export markets, Report 3c-105 1213.

has negative population growth and economic concerns which make it less attractive as a long term market prospect.

Within Australia, further advocacy on behalf of pork producers may help to reduce technical barriers to trade which are often outside FTAs.

10.9.1 Impacts of FTAs

The FTAs with China, Japan and Republic of Korea are relatively new, with ChAFTA having been in place for only 18 months. As a result, it is difficult to draw conclusions as to the impact that the FTAs may have had on trade.

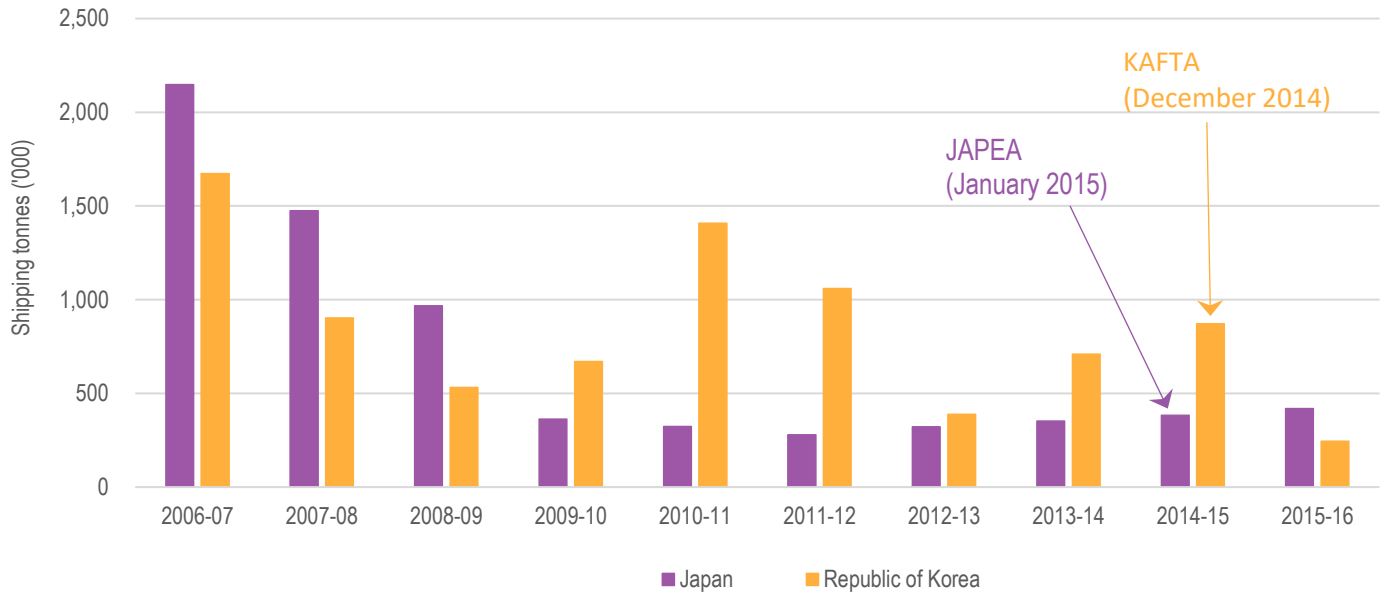
Australia does not export pork to mainland China, due to a lack of market access protocols, which were not negotiated as part of ChAFTA.

The latest available data from APL shows that volumetric trade in Japan has increased by 35,000 tonnes since the introduction of JAPEA in January 2015 (See **Table 10.1** and **Figure 10.5**). This translates to an increase in value of $0.3 million over the same period. This may or may not be attributable to the FTA and is likely related to exchange rate and other trade related issues external to the FTA.

For the Republic of Korea, using APL's latest data shows that, since the introduction of KAFTA in December 2014, there was a sharp decline in volumetric trade (down 621,000 tonnes) in 2015-16. This translates to a decline in value of $0.6 million in the same period (See **Table 10.1** and **Figure 10.5**).

Further research over the next few years, once enough data has become available to make a thorough assessment, will be crucial to investigate the impact of FTAs in pork exports.

FIGURE 10.5 VOLUME OF PORK SHIPPED (KILOTONNES) FROM 2006-07 TO 2015-16



SOURCE: AUSTRALIAN PORK LIMITED

10.10 Ability to increase exports

As part of the project, ACIL Allen asked processors of their ability to increase exports significantly in response to potential opportunities presented from the FTAs.

Of those surveyed, all had the capacity to increase the level of primary processing without incurring additional capital expenditure or affecting any other processing operations. There were, however,

some significant differences in the estimated size of the potential increase ranging from +1-10% to +51-75%. Weighted by production the average possible increase in processing without incurring additional costs is 28-45 per cent with most of this within export approved facilities.

10.11 Impact of export increase

Table 10.4 below presents the estimated economic contribution to Australia that the Australian pork industry would have made if exports were to increase by 100,000 tonnes (i.e. just over double current exports). Such an increase in volumes would require a 26 per cent increase in pig production.

In summary, if exports were to increase by 100,000 tonnes, the contribution of the Australian pork industry to Australian GDP, including flow-on effects, would increase by approximately 9 per cent, with the upper bound estimate increasing from $5.2 billion to $5.65 billion. Similarly the upper bound estimate of total FTE employment throughout the pork industry supply chain, including flow-on effects, would increase by 8 per cent from just over 36,000 to almost 39,000.

TABLE 10.4 COMPARISON OF THE PORK INDUSTRY WITH INCREASED EXPORTS, AUSTRALIA, 2015-16

Heading	Value added	Household income	Employment
	$ million	$ million	FTE jobs
CURRENT			
Lower bound			
Pig producers	1,208.8	617.6	7,823
Primary processing	541.5	332.4	4,240
Secondary processing and wholesaling	1,520.0	812.1	12,669
Total	**3,270.3**	**1,762.1**	**24,732**
Upper bound			
Pig producers	1,888.0	911.3	11,809
Primary processing	893.1	481.3	6,261
Secondary processing and wholesaling	2,420.2	1,202.9	17,973
Total	**5,201.3**	**2,595.5**	**36,043**
+100 KILOTONNES EXPORTS			
Lower bound			
Pig producers	1,397.8	714.2	9,046
Primary processing	635.9	390.3	4,979
Secondary processing and wholesaling	1,520.0	812.1	12,669
Total	**3,553.7**	**1,916.6**	**26,694**
Upper bound			
Pig producers	2,183.1	1,053.7	13,655
Primary processing	1,048.7	565.2	7,352
Secondary processing and wholesaling	2,420.2	1,202.9	17,973
Total	**5,652.0**	**2,821.8**	**38,980**

SOURCE: ACIL ALLEN CONSULTING

A INPUT-OUTPUT ANALYSIS

A.1 Overview

Input-output tables provide a snapshot of an economy at a particular time. The tables used in this study were for the 2015-16 financial year.

Input-output tables can be used to derive input-output multipliers. These multipliers show how changes to a given part of an economy impact on the economy as a whole. A full set of input-output multipliers for each state were estimated for the purpose of this analysis.

The input-output multipliers allow analysis of the economic footprint of a particular facility, industry or event for the region of interest. Although input-output multipliers may also be suitable tools for analysing the impact of various types of economic change, caution needs to be adopted in their application for this purpose. Misuse of input-output multipliers for the purpose of impact analysis has led to scepticism of their general use in favour of other tools such as computable general equilibrium (CGE) modelling. Notwithstanding this, they are still eminently suitable for understanding the economic linkages between a given facility or industry to gain an appreciation of the wider interactions of the industry beyond its direct contribution.

A.2 Multiplier types

Input-output multipliers estimate the economic impact on a region's economy from a one dollar change in the final demand for the output of one of the region's industries. Generally, four types of multipliers are used:

1. Output – measures the impact on the output of all industries in the economy
2. Income – measures the effect on the wages and salaries paid to workers within the economy
3. Employment – measures the jobs creation impact, and
4. Value-added – measures the impact on wages and salaries, profits and indirect taxes.

The sum of wages and salaries, profits and indirect taxes for a given industry provides a measure of its contribution to the size of the local economy – its contribution to gross regional product (GRP). The value added multiplier can therefore also be considered to be the GRP multiplier.

Input-output multipliers are a flexible tool for economic analysis. Their flexibility stems from the different forms of each multiplier type. For each region, multipliers were estimated in the following forms:

1. initial effects
2. first round effects
3. industrial support effects

4. production induced effects
5. consumption induced effects
6. simple multipliers
7. total multipliers
8. type 1A multipliers
9. type 1B multipliers
10. type 2A multipliers
11. type 2B multipliers.

The above multiplier types are defined in full in Johnson (2004) for output, income, employment and value-added multipliers; however, a brief overview of the different types of output multipliers is presented below.

A.2.1 Multiplier effects

When additional sales to final demand are made, for example through increased exports or sales to the public, production increases to meet the increased demand, and this is the initial effect. Since production increases to exactly match the increased final demand, the increase is always equal to one (noting that the multipliers are defined in terms of a one dollar increase in final demand).

The industry producing the additional output makes purchases to enable itself to increase production, these new purchases are met by production increases in other industries and these constitute the first round effect. These first round production increases cause other industries to also increase their purchases, and these purchases cause other industries to increase their production, and so on. These 'flow-on' effects eventually diminish, but when 'added together constitute the industrial support effect.

The industrial support effect added to the first round effect is known as the production induced effect. So far this chain of events has ignored one important factor, the effect on labour and its consumption. When output increases, employment increases, and increased employment translates to increased earnings and consumption by workers, and this translates to increased output to meet the increased consumption. This is the consumption effect.

A.2.2 Multipliers

The simple and total multipliers are derived by summing the effects. The simple multiplier is the sum of the initial and production induced effects. The total multiplier is larger, because it also adds in the consumption effect. So far all the effects and multipliers listed have had one thing in common, they all measure the impact on the economy of the initial increase in final demand.

The remaining multipliers take a different point of view, they are ratios of the above multiplier types to the initial effect. The type 1A multiplier is calculated as the ratio of the initial and first round effects to the initial effect, while the type 1B multiplier is the ratio of the simple multiplier to the initial effect. The type 2A multiplier is the ratio of the total multiplier to the initial effect, while the type 2B multiplier is the ratio of the total multiplier less the initial effect to the initial effect.

Given the large number of multiplier types to choose from, output, income, employment and value added multipliers, and each with numerous variations (simple, total, type 2A, etc) it is important that the analysis uses the most appropriate multipliers. Usually, the multipliers that include consumption effects (i.e. the added impact that comes from wage and salaries earners spending their income) are used. These are the total and type 2A multipliers. The total and type 2A multipliers will generally provide the biggest projected impact. Simple or type 1B (which omit the consumption effect) may be used to provide a more conservative result.

For this analysis, given that we were kindly provided with access to the detailed expenditure items for CCA and CCSP, the Simple and Total multipliers were used to calculate the lower and upper estimates of the total contribution the resorts make to their respective economies.

A.3 Limitations of input-output analysis

Although input-output analysis is valid for understanding the contribution a sector makes to the economy, when used for analysing the potential impacts of a change in production of a particular sector, input-output analysis is not without its limitations. Input-output tables are a snapshot of an economy in a given period, the multipliers derived from these tables are therefore based on the structure of the economy at that time, a structure that it is assumed remains fixed over time. When multipliers are applied, the following is assumed:

- prices remain constant;
- technology is fixed in all industries;
- import shares are fixed.

Therefore, the changes predicted by input-output multipliers proceed along a path consistent with the structure of the economy described by the input-output table. This precludes economies of scale. That is, no efficiency is gained by industries getting larger – rather they continue to consume resources (including labour and capital) at the rate described by the input-output table. Thus, if output doubles, the use of all inputs doubles as well.

One other assumption underpinning input-output analysis which is worth considering is that there are assumed to be unlimited supplies of all resources, including labour and capital. With input-output analysis, resource constraints are not a factor. It is thus assumed that no matter how large a development, all required resources are available, and that there is no competition between industries for these resources.

It is important to understand the limitations of input-output analysis, and to remember that the analysis provides an estimate of economic contribution of a facility or industry, not a measurement of economic impact if the facility or industry shut down or did not exist.

B REGIONAL CONTRIBUTION ANALYSIS – RANGES

The metrics presented in Chapter 8 for the economic contribution of a piggery to a local community were the midpoint estimates of lowest and highest estimates for the range of regions selected. For transparency, this section presents the full range.

TABLE B.1 LOCAL AND NATIONAL ECONOMIC CONTRIBUTION PER BREEDING SOW AND GILT, 2015-16

	Local community			Australia		
	Value added (GRP)	Household income	Employment	Value added (GDP)	Household income	Employment
	$/sow	$/sow	FTE jobs per thousand sows	$/sow	$/sow	FTE jobs per thousand sows
Lower bound						
Pig producers	2,631–2,730	1,394–1,410	16.9–17.8	4,477	2,288	29.0
Primary processing	1,489–1,588	979–1,032	12.3–13.2	2,006	1,231	15.7
Total primary processed pork	**4,121–4,318**	**2,374–2,442**	**29.2–31**	**6,483**	**3,519**	**44.7**
Secondary processing and wholesaling	n.e.	n.e.	n.e.	5,630	3,008	46.9
Total pork industry	**n.e.**	**n.e.**	**n.e.**	**12,112**	**6,526**	**91.6**
Upper bound						
Pig producers	3,272–3,541	1,604–1,724	20.2–22.7	6,992	3,375	43.7
Primary processing	1,935–2,173	1,120–1,252	14.4–16.7	3,308	1,783	23.2
Total primary processed pork	**5,207–5,714**	**2,724–2,976**	**34.6–39.4**	**10,300**	**5,158**	**66.9**
Secondary processing and wholesaling	n.e.	n.e.	n.e.	8,964	4,455	66.6
Total pork industry	**n.e.**	**n.e.**	**n.e.**	**19,264**	**9,613**	**133.5**

Note: n.e. = not estimated. GRP = Gross Regional Product. GRP is equivalent to GDP except for the regional economy.

SOURCE: ACIL ALLEN CONSULTING

TABLE B.2 LOCAL AND NATIONAL ECONOMIC CONTRIBUTION PER UNIT OF PRIMARY PROCESSED PORK

	Local community			Australia		
	Value added (GRP)	Household income	Employment	Value added (GDP)	Household income	Employment
	$/kg CW	$/kg CW	FTE jobs per thousand tonnes	$/kg CW	$/kg CW	FTE jobs per thousand tonnes
Lower bound						
Pig producers	1.90–1.97	1.01–1.02	12.2–12.8	3.23	1.65	20.9
Primary processing	1.07–1.15	0.71–0.74	8.9–9.5	1.45	0.89	11.3
Total primary processed pork	**2.97–3.12**	**1.71–1.76**	**21.1–22.4**	**4.68**	**2.54**	**32.2**
Secondary processing and wholesaling	n.e.	n.e.	n.e.	4.06	2.17	33.9
Total pork industry	**n.e.**	**n.e.**	**n.e.**	**8.74**	**4.71**	**66.1**
Upper bound						
Pig producers	2.36–2.56	1.16–1.24	14.5–16.4	5.05	2.44	31.6
Primary processing	1.40–1.57	0.81–0.9	10.4–12.1	2.39	1.29	16.7
Total primary processed pork	**3.76–4.12**	**1.97–2.15**	**25–28.5**	**7.43**	**3.72**	**48.3**
Secondary processing and wholesaling	n.e.	n.e.	n.e.	6.47	3.22	48.0
Total pork industry	**n.e.**	**n.e.**	**n.e.**	**13.90**	**6.94**	**96.3**

Note: n.e. = not estimated. GRP = Gross Regional Product. GRP is equivalent to GDP except for the regional economy. CW = carcass weight

SOURCE: ACIL ALLEN CONSULTING

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