

REPORT TO
AUSTRALIAN PORK LIMITED
14 AUGUST 2019

ECONOMIC ANALYSIS OF AFRICAN SWINE FEVER INCURSION INTO AUSTRALIA

FINAL REPORT





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ABBREVIATIONS

APL	Australian Pork Limited
ASF	African Swine Fever
AUSVETPLAN	Australian Veterinary Emergency Plan
GDP	Gross Domestic Product
MARA	Ministry of Agriculture and Rural Affairs
MARD	Ministry of Agriculture and Rural Development
MOAC	Ministry of Agriculture and Cooperatives
OIE	Organisation mondiale de la santé animale
USDA	United States Department of Agriculture
VPSS	Veterinary and Phytosanitary Surveillance Service



EXECUTIVE SUMMARY

ACIL Allen Consulting (ACIL Allen) has been engaged by Australian Pork Limited (APL) to estimate the likely economic impact of an African Swine Fever (ASF) incursion in Australia. Australia is currently free from ASF.

If an outbreak of ASF occurs there would be a major impact on the pork industry and regional economy. Assessing the extent of these consequences will provide important information to the pork sector and the Australian Government. This information may assist in planning and preparedness for such an outbreak and managing a response. In this context, APL requested ACIL Allen to develop and provide an indicative economic impact assessment of two scenarios of ASF incursion in Australia.

What is modelled in this analysis

The modelling focused on the economic impact of ASF to industry and the supply chain. The analysis modelled the impact on trade and revenue resulting from: stamping out; export market closures; and retail demand reductions.

What is not modelled in this analysis

There are other impacts which may be important to consider in the future but were not modelled due to the uncertain nature of the costs or the lack of suitable data upon which to arrive at a justifiable conclusion. These include:

- control and eradication costs
- social impacts (mental health and relationship costs associated with the revenue losses)
- monitoring and surveillance activities for infected sites and other regions following an outbreak
- the persistence of pathogens in the composting process of mass mortalities
- costs associated with treatment of whole effluent pond systems, along with loss of revenue in offset organic fertiliser costs
- environmental costs in terms of soil contamination and treatment if burial is used as a treatment option.

An ASF incursion in the feral pig population and subsequent risk of the virus becoming endemic was also out of scope for this analysis.

This means that ACIL Allen's analysis of the impact of ASF is inherently conservative and the total impact could be greater if other (especially, government) costs were to be included.

ASF outbreak scenarios

In order to assess the potential economic impacts of ASF on Australia, the size, duration and the control strategies of the outbreak must be identified. The two ASF outbreak scenarios are:

- *a low spread scenario*: a small, single point outbreak within a small number of piggeries, and contained within four weeks.
- *a high spread scenario*: a large, multi-point outbreak across the eastern seaboard, and contained within three months.

Key features considered under each outbreak scenario are provided in **Table ES 1**.

TABLE ES 1 KEY FEATURES OF SCENARIOS

Assumptions	A single point outbreak (low spread scenario)	A large multi-point outbreak (high spread scenario)
1. Geography	Victoria	QLD, NSW, Vic and SA
2. Duration:		
– standstill	7 days across Victoria	4 weeks across the eastern seaboard
– outbreak from infection and control	4 weeks	12 weeks
– recovery from control	52 weeks (1 year)	156 weeks (36 months)
3. Piggeries and pigs		

Assumptions	A single point outbreak (low spread scenario)	A large multi-point outbreak (high spread scenario)
– Infected piggeries	30 “small holder” and “medium commercial”	Numerous “large commercial” and “very large commercial”
– No of sows destroyed	2,845	52,111
– No of pigs destroyed	20% of monthly slaughtering, which is around 20,487 pigs in Victoria	30% of monthly slaughtering, which is around 109,178 pigs in eastern seaboard
– Infected abattoirs	0	1
4. Exports	Exports will be banned from Australia (with the exception of WA which will continue to trade with Singapore) for 1 year and will take 3 years to fully recover	Exports will be banned from Australia for 1 year and will take 5 years to fully recover
5. Imports	A 5% reduction in imports is assumed in the first 6 months	A 5% reduction in imports is assumed in the first 6 months
6. Domestic retail and household consumption	It is assumed that there will be a 25% decrease in domestic retail in Victoria and a 15% decrease in domestic retail nationally in the first six weeks	It is assumed that there will be a 25% decrease in domestic retail in eastern seaboard in the first six weeks

Note: APL defines piggery between 8 and 50 sows as “small holder”, between 51 and 150 as “small commercial” and between 151 and 500 as “medium commercial”, between 501 and 1000 as “large commercial”, and above 1001 sows as “very large commercial”.

SOURCE: ACIL ALLEN IN CONSULTATION WITH THE AUSTRALIAN PORK LIMITED

AUSVETPLAN manuals provide the nationally agreed approach for the response to emergency animal disease incidents in Australia, and these manuals have been used to inform the design of each scenario.

An ASF outbreak would result in the immediate closure of export markets (with the exception of Singapore in the minimal spread scenario, which would continue trade with WA), and it could then take some time rebuild those export markets.

This study estimates the potential indicative direct and indirect economic impacts of these two scenarios of ASF incursion in Australia based on input-output multiplier analysis.

Direct revenue effects

The estimated direct impacts of incursion are summarised in **Table ES 2**. The estimated stamping out effect is relatively smaller than the domestic retail and export demand effects.

TABLE ES 2 DIRECT REVENUE EFFECTS OF ASF INCURSION

Estimated revenue effects	Low spread scenario	High spread scenario
	Over a 3-year period	Over a 5-year period
	A\$m	A\$m
Pig production effect (stamping out effect)	(18.2)	(237.1)
Pigmeat demand effect		
– Export demand effect (left shift in demand curve)	(307.6)	(340.6)
– Domestic demand effect (further left shift in demand curve)	(83.7)	(261.7)
Total revenue effect to pig farming	(409.4)	(839.5)
Primary processing	(256.6)	(671.6)
Secondary processing	(92.8)	(247.6)

Note: Undiscounted revenue losses

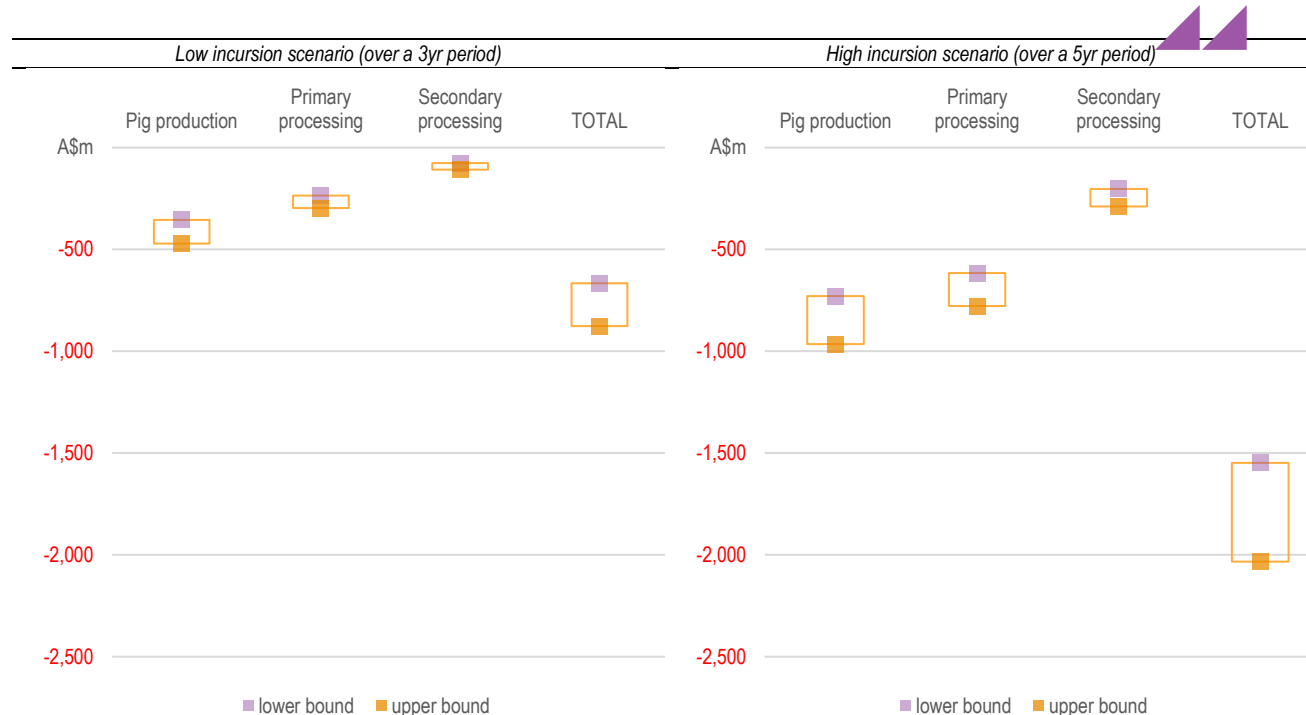
SOURCE: ACIL ALLEN

Total impact

The estimated total value-add impact under the two scenarios is provided in **Figure ES 1**. Adding the direct and indirect economic impacts as a result of an ASF incursion under the two scenarios provides lower and upper bound estimates of the total national economic losses in GDP equivalent terms. It is estimated that total economic losses in the:

- low spread scenario range between A\$667 million and A\$877 million
- high spread scenario range between A\$1,548 million and A\$2,033 million.

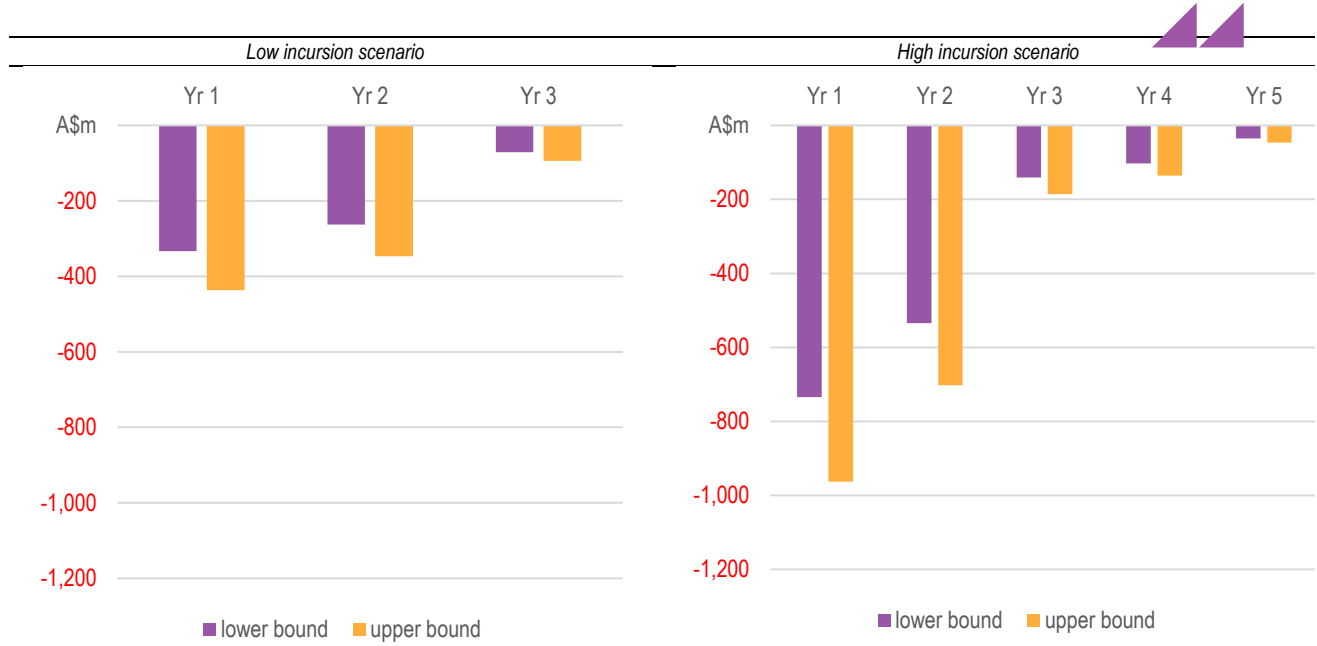
FIGURE ES 1 TOTAL IMPACT OF ASF INCURSION ON THE AUSTRALIAN ECONOMY



Note: The lower and upper bounds are calculated using the Simple and Total multipliers, respectively. Totals may not add due to rounding.

SOURCE: ACIL ALLEN

FIGURE ES 2 TOTAL IMPACT OF ASF INCURSION ON THE AUSTRALIAN ECONOMY BY YEAR



Note: The lower and upper bounds are calculated using the Simple and Total multipliers, respectively. Totals may not add due to rounding.
 SOURCE: ACIL ALLEN

INTRODUCTION

1

ACIL Allen Consulting (ACIL Allen) has been engaged by Australian Pork Limited (APL) to estimate the likely economic impact of an African Swine Fever (ASF) incursion in Australia.

Australia is currently free from ASF. If an outbreak of ASF occurred there would be a major impact on the pork industry and regional economy. Assessing the full extent of these consequences will provide important information to the industry and the Australian Government. This information may assist in planning and preparedness for such an outbreak and managing a response.

In this context, APL requested ACIL Allen to develop and provide an economic impact assessment of two scenarios of ASF incursion in Australia:

- *a low spread scenario*: a small, single point outbreak within a small number of piggeries and contained within four weeks.
- *a high spread scenario*: a large, multi-point outbreak across the eastern seaboard in Queensland, New South Wales, Victoria and South Australia, including at a major export abattoir, and contained within three months.

What is modelled in this analysis

The modelling focused on the economic impact of ASF to industry and the supply chain. The analysis modelled the impact on trade and revenue resulting from: stamping out; export market closures; and retail demand reductions.

What is not modelled in this analysis

There are other impacts which may be important to consider in the future but were not modelled due to the uncertain nature of the costs or the lack of suitable data upon which to arrive at a justifiable conclusion. These include:

- control and eradication costs
- social impacts (mental health and relationship costs associated with the revenue losses)
- monitoring and surveillance activities for infected sites and other regions following an outbreak
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- environmental costs in terms of soil contamination and treatment if burial is used as a treatment option.

An ASF incursion in the feral pig population and subsequent risk of the virus becoming endemic was also out of scope for this analysis.

This means that ACIL Allen's analysis of the impact of ASF is inherently conservative and the total impact could be greater if other (especially, government) costs were to be included.

2.2 Background on ASF

ASF is a highly contagious viral disease of domestic and wild pigs of all breeds. It is characterised by high fever, loss of appetite, haemorrhages in the skin and internal organs, and death in 2–10 days on average. The incubation period for ASF is usually 5–15 days.

ASF can occur in acute, sub-acute or chronic forms. The death rate is dependent on the severity of the symptoms, with the death rate in acute forms being up to 100 per cent. ASF does not affect public health or food safety.

Outbreaks of ASF have been reported in Africa, parts of Europe, South America, the Caribbean, and more recently in Asia and Western Europe. In some instances, the virus has been found in both domestic and wild pigs.

ASF is highly contagious and can survive in the environment and in a variety of swine products for months. It can persist in unprocessed frozen pork for three years or more, with some reports suggesting that it can persist indefinitely. The virus is found in all body fluids and tissues of infected domestic pigs. It can be spread by direct contact with infected feral or domestic pigs; people movement of contaminated meat products; contact with contaminated premises, vehicles, feed, farm equipment and clothing or

footwear; vectors such as biting flies and ticks (although there is no scientific data around this for Australian species); feeding infected swill or meat scraps to pigs; and contaminated effluent and water.

Pigs infected by mild virus strains or surviving acute disease may appear to recover quite rapidly and be clinically normal, however may continue to shed the virus for more than one month following recovery. It should be noted that the current strain in Asia, Europe and Russia is not one of these mild strains.

2.3 An overview of biosecurity arrangements in Australia

The most significant risk of the virus entering Australia is via illegally imported contaminated pork or pork products that are swill fed to domestic pigs and/or feral pigs. Swill feeding in Australia is prohibited.

Border inspection and screening for such products occur at ports, airports and mail centres; however, they could be brought in illegally by passengers on aircraft or ships, or via the post. There is also a risk from garbage discarded by fishing vessels or yachts.

The AUSVETPLAN¹ sets out the nationally-agreed approach for responding to emergency animal disease incursions in Australia. Information from the AUSVETPLAN manuals for ASF and the Pig Industry is provided below.

There are no published treatments or vaccines for ASF. Prevention in countries free of the disease is largely assisted by stringent import policies which seek to ensure that neither infected live pigs nor pork products are introduced into areas free of ASF. This includes ensuring proper disposal of waste food from aircraft, ships or vehicles coming from all countries.² The only form of control is through complete eradication of all pigs in affected areas.

Should there be an incursion of ASF in Australia, the default policy is to control and eradicate the disease in the shortest possible time using a combination of strategies, including:

- Movement controls over pigs, pig products and other potentially contaminated items in declared areas (control and restricted zones) to minimise the spread of infection. Declared areas allow authorities to determine those premises that are infected and those that are disease-free premises.
- Initiation of a region, state or national pig, pork and pork product standstill to allow the authorities to clarify the extent of the disease incursion, and to identify all potential premises of concern.
- Disposal of destroyed pigs, pork and pork products, and decontamination of premises.
- Decontamination of fomites (facilities, equipment and other items) to eliminate the pathogen.

Stamping out

Stamping out involves destroying all pigs on infected premises and is the only way to eradicate the disease. On dangerous contact premises, the following will be destroyed:

- pigs originating from an infected premise
- pigs that have access to the faeces, urine and/or secretions of pigs moved from an infected premise
- pigs that have been injected with hypodermic needles previously used on an infected premise
- pigs that have been handled by personnel immediately after they have handled pigs from an infected premise.

To avoid further spread of the virus, pigs will be usually destroyed and disposed of on site (depending on the site and EPA approval). Any further stamping out will be based on tracing and surveillance information, the controls in place and the likelihood of spread from suspect premises.

Movement controls

Movement controls and quarantine will be imposed immediately on all premises and areas in which ASF infection is either known or suspected. Movement controls will apply to pigs and input supplies for all premises within either the control or restricted zones as these may have become contaminated with ASF virus. Movement controls both into and out of the premises will apply to all animals, people, products and fomites. It may be several weeks before there can be any confidence that pigs on other properties in an area are not incubating the disease, and quarantine measures will be maintained during this time. As premises are cleared of ASF based on a risk-based approach, biosecurity controls will be removed, and the control and restricted zones should contract. Product from infected premises will be destroyed and disposed of in a safe manner. This could be by burial on the premise, composting or incineration.

¹ <https://www.animalhealthaustralia.com.au/our-publications/ausvetplan-manuals-and-documents/>

² OIE – World Organisation for Animal Health, *African swine fever*, accessed at <http://www.oie.int/doc/ged/D13953.pdf> 12 June 2019.

A restricted area (3km radius) and control area (10km radius) will be declared around infected and suspect premises. Movements in and out of these areas will be strictly controlled, with movements only allowed under official permit. A national standstill on all movements of pig livestock, pork and pork products may be implemented across Australia, generally for a minimum of 72 hours (which may be extended, depending on the scale of the incursion), following the declaration of restricted and controlled areas.

Tracing and surveillance

Tracing and surveillance (based on epidemiological assessment) will be undertaken to determine the source and extent of infection, and subsequently to provide proof of freedom from the disease.

Restocking

Properties that have been depopulated and thoroughly decontaminated will be restocked initially with only a small number of pigs. These pigs will act as sentinel animals and will be subject to surveillance to evaluate the efficacy of the decontamination procedure. Sentinel animals should not be introduced to a piggery until 6 weeks after the completion of all decontamination procedures because of the demonstrated ability of the virus to survive for prolonged periods in the environment. To minimise the risk of prolonging persistence of the virus in the piggery, a staged repopulation strategy (e.g. commencing with 25 per cent of full capacity and gradually building back up to 100 per cent) following the successful introduction of sentinel animals should be adopted.

Recovery of free status

According to World Organisation for Animal Health (OIE) guidelines,³ free status may be restored three months after the disinfection of the last infected establishment, provided that:

- a stamping-out policy has been implemented
- surveillance in accordance with OIE international guidelines has been carried out with negative results.

However, acceptance of ASF-free status following an outbreak will most likely have to be negotiated with individual trading partners and may take considerably longer than the minimum periods prescribed by the OIE.

³ OIE World Organisation for Animal Health, Terrestrial Animal Health Code, *Infection with African Swine Fever Virus*, Article 15.1.6.

AUSTRALIAN PORK SECTOR

2

The pork industry is an important part of Australia's 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 out-competing imports are opportunities for growth in the local industry. An outbreak of ASF in Australia would impact pig production and trade as well as its dependent industries.

This chapter provides key pig numbers and production statistics at the state and national levels to recent financial year. The information presents reference case figures for the Victorian and eastern seaboard pig industry, which will form the basis of the estimated economic impacts in the next chapter.

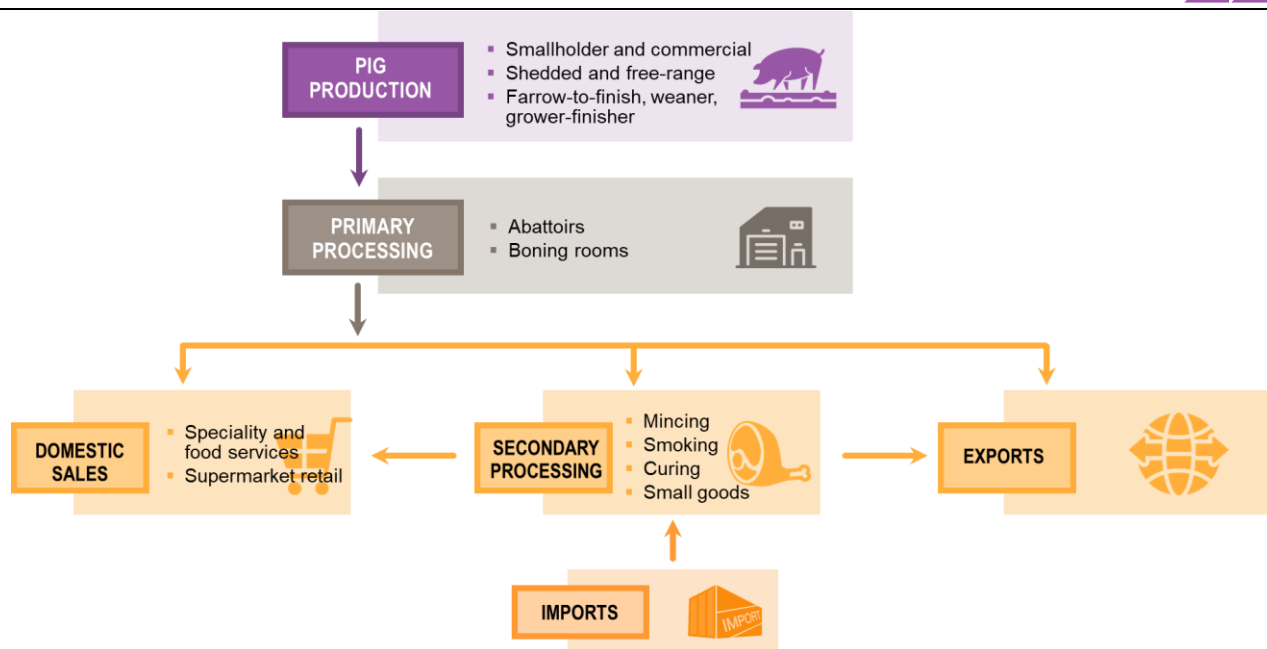
3.1 Australian pork sector

There are around 3,700 pig producers in Australia which produce around 420,000 tonnes of pigmeat per year. Around 10 per cent of pigmeat produced in Australia is exported.

The pork industry consists of three sectors: pig production, primary pigmeat processing in abattoirs and boning rooms, and secondary processing (manufacturing) of ham, bacon and smallgoods. Pig producers use several inputs to produce pigs for slaughter. These pigs are then an input into primary processing, which produces fresh meat for consumption or export, as well as pigmeat used in secondary processing (manufacturing). The manufacturer can use domestically produced and/or imported pigmeat to produce ham, bacon and smallgoods. These pigmeat products can then be consumed domestically or exported.⁴

Figure 2.1 illustrates the pork industry supply chain in Australia.

FIGURE 3.1 PORK SUPPLY CHAIN



SOURCE: ACIL ALLEN

⁴ Productivity Commission (2005), *Australian Pigmeat Industry*, No. 35, Melbourne, p 6.

Piggeries

There are several types of piggeries:

- **Farrow-to-finish:** conventional type of intensive pig farm, where breeding, farrowing, weaning and growing/finishing of pigs all occur on one farm until sale, at around 18–26 weeks of age.
- **Breeder:** production system in which only gilts, sows, boars and suckling piglets are farmed at the one site. Once piglets are weaned they are sent to a grow out site.
- **Weaner:** includes only weaner pigs, generally from 3–4 weeks to 8–10 weeks of age.
- **Grower–finisher:** includes grower pigs (about 10–16 weeks of age) and finisher pigs (from about 16 weeks to 22–26 weeks of age).

Most commercial pigs are sold under contractual arrangements. Pigs grow relatively quickly (with the time from when a sow is mated until her progeny are marketed being commonly about 40 weeks), so the pig producer has a small window in which to sell. Pigs kept even for a few days longer may get too big and be outside the specifications of slaughter. This situation has implications for the pig market, particularly for pig prices and the risks faced by pig producers.⁵

The size of enterprises varies from small non-commercial 'backyard' operations (pig keepers⁶) to very large fully integrated operations that house tens of thousands of pigs on multiple linked sites. Pig keepers present the greatest risk of an ASF outbreak as they may have less knowledge of pig diseases and swill-feeding bans, and minimal implementation of biosecurity measures. Many of them may have never had contact with a veterinarian.⁷

Many smaller piggeries are unknown to authorities or the industry. They are often located in peri-urban areas where they are unlikely to have direct contact with commercial piggeries. A large proportion of smallholder producers buy and sell pigs through online sales platforms or direct using substandard or no identification and keep minimal or no records, which makes tracing difficult. They may not recognise or report ASF or seek assistance.⁸ Whilst there are 3,700 registered producers which use the industry's traceability system, PigPass, this represents 25 per cent of producers who have indicated to state and territory governments that they own pigs (and therefore may not actually raise pigs).⁹

Abattoirs

There are 77 abattoirs in Australia that slaughter pigs. Seven of these are export abattoirs that only kill pigs, and account for approximately 88 per cent of pigs slaughtered in Australia.

The remaining pigs are slaughtered at multispecies abattoirs. The top three of these (two in Victoria and one in New South Wales) slaughter approximately nine per cent of pigs. The remaining 67 abattoirs slaughter the remaining six per cent.

Movements associated with pig production

There are frequent movements of livestock transports on and off most multi-site piggeries. Breeding sows are moved, and other pigs are moved from breeder to nursery sites, and then to grower–finisher sites, and ultimately to a market or abattoir. Movements often occur across state borders.

Approximately 95 per cent of pigs are consigned directly for slaughter, less than one per cent are sold through saleyards and the remainder sold via some other arrangement (e.g. through the use of "amalgamators").

Inward movements include inputs such as veterinary medicines, grain supplies and other components of rations or prepared feed from a commercial feed mill, genetics supply companies, replacement gilts, empty transport vehicles and workers, farm equipment and contractors for building maintenance.

Outward movements include movement of pigs to other farms (including contract grower sites), abattoirs, saleyards via transport vehicles and workers and movement of effluent and deep litter from sheds for use as fertiliser.¹⁰ These movements could be off-site to other non-pig farms, creating opportunity for the infection of wild pigs, given the ASF virus' viability in the environment.

⁵ Productivity Commission (2005), *Australian Pigmeat Industry*, No. 35, Melbourne, p 6.

⁶ Own less than 8 sows

⁷ Animal Health Australia (2011). *Enterprise manual: Pig industry (Version 3.0)*. Australian Veterinary Emergency Plan (AUSVETPLAN), Edition 3, Primary Industries Ministerial Council, Canberra, ACT, pp 35-36.

⁸ Animal Health Australia (2016). *Disease strategy: African swine fever (Version 4.1)*. Australian Veterinary Emergency Plan (AUSVETPLAN), Edition 4, National Biosecurity Committee, Canberra, ACT, p 21.

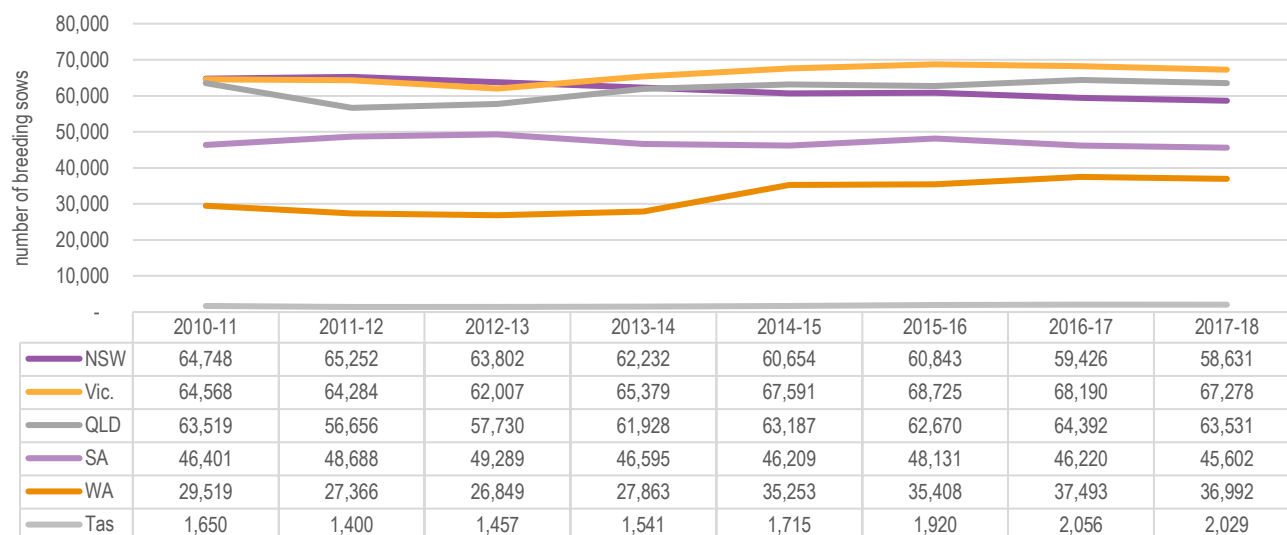
⁹ n.b. movement reporting is not mandatory in all states, which hinders the ability to trace the virus back or forward to identify possible infected properties if there is an outbreak.

¹⁰ Animal Health Australia (2011). *Enterprise manual: Pig industry (Version 3.0)*. Australian Veterinary Emergency Plan (AUSVETPLAN), Edition 3, Primary Industries Ministerial Council, Canberra, ACT, p 19.

3.2 Number of breeding sows

At the end of June 2011, there were some 270,405 breeding sows recorded in Australia. This increased to 274,062 by June 2018, an increase of 0.2 per cent a year over the past seven years (**Figure 3.2**).

FIGURE 3.2 NUMBER OF BREEDING SOWS BY STATE, 2010-11 TO 2017-18

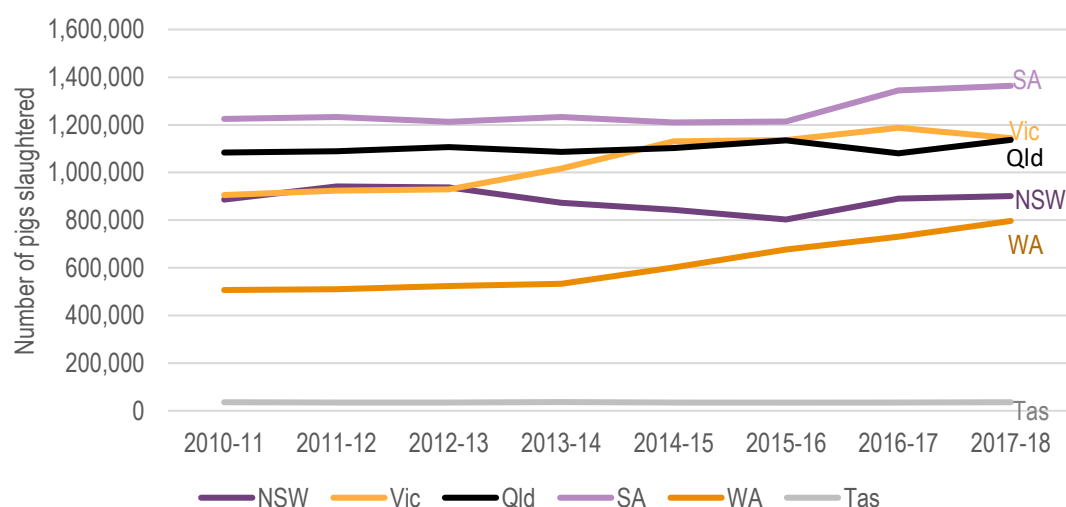


SOURCE: AUSTRALIAN PORK LIMITED (UNPUBLISHED)

3.3 Number of pigs slaughtered

The number of pigs slaughtered by state is presented in **Figure 3.3**. Between June 2011 and June 2018, the number of pigs slaughtered in Australia increased by 2.1 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 6.7 per cent over the past seven years, from 506,910 pigs in 2010-11 to 796,804 pigs in 2017-18. The number of pigs slaughtered in Victoria increased by an average of 3.4 per cent a year over the past seven years, while the increase in Queensland over the same period was 0.7 per cent a year.

FIGURE 3.3 NUMBER OF PIGS SLAUGHTERED IN AUSTRALIA, 2010-11 TO 2017-18



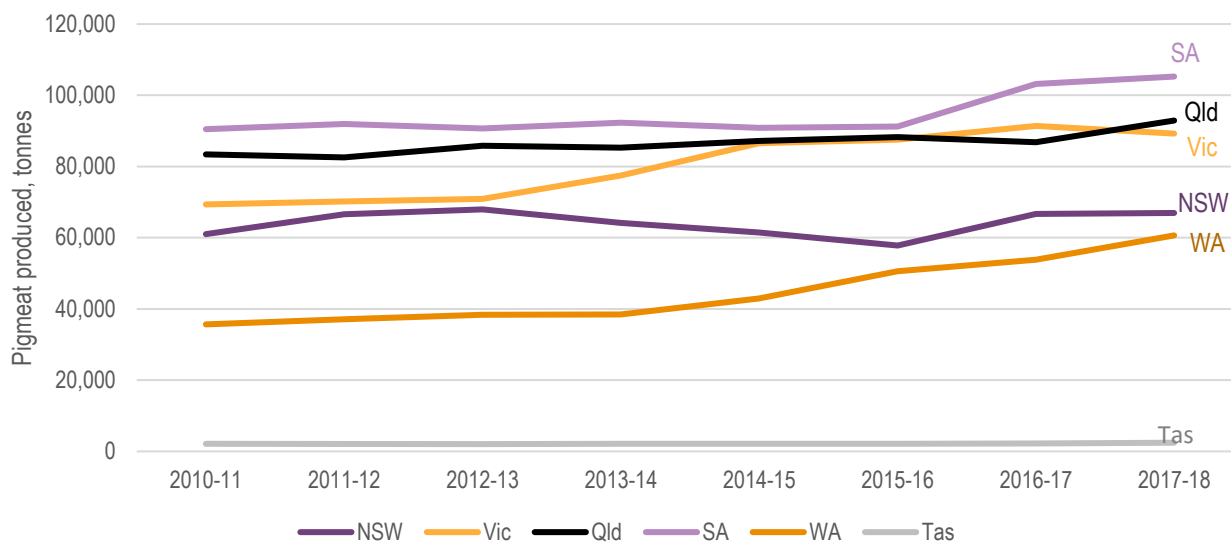
Note: Includes all pigs

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

3.4 Pig production

The historical tonnes of pigmeat produced by state is presented in **Figure 3.4**. South Australia had the highest share of production (25 per cent) in Australia in 2017-18, followed by Queensland (22 per cent) and Victoria (21 per cent). New South Wales' share of Australia's pig production declined to 16 per cent in 2017-18 from 18 per cent in 2010-11.

FIGURE 3.4 PIG PRODUCTION BY STATES, CARCASS WEIGHT (TONNES), 2010-11 TO 2017-18



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

3.5 Baconer and porker prices

Baconer and porker prices have recovered recently from their lows in mid-2018 (**Figure 3.5**). At June 2019, the average porker price was \$3.68/kg and the average baconer price was \$3.42/kg.

FIGURE 3.5 BACONER AND PORKER PRICES

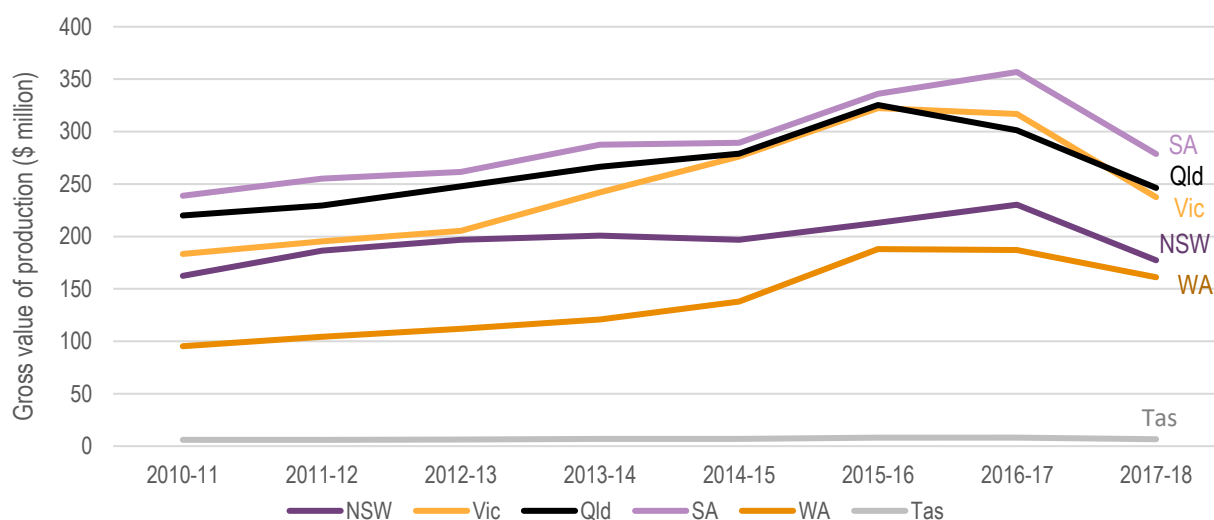


SOURCE: AUSTRALIAN PORK LIMITED

3.6 Gross value of pig production

As a result of the increased number of pigs slaughtered and the decreased prices to 2017-18, the gross value of pig production has to some extent increased in Australia over the past seven years (as shown in **Figure 3.6**.) In 2010-11, the gross value of Australian pig production was \$906 million, which increased to \$1,107 million by 2017-18 (n.b. there was a drop in 2016-17 caused by a pig price crash). Production is concentrated along the eastern seaboard (Queensland, Victoria, New South Wales and South Australia) which provided 85 per cent of Australia's gross value of pig production in 2017-18. Western Australia contributed 14.5 per cent and Tasmania contributed 0.6 per cent.

FIGURE 3.6 GROSS VALUE OF PIG PRODUCTION IN AUSTRALIA, 2010-11 TO 2017-18

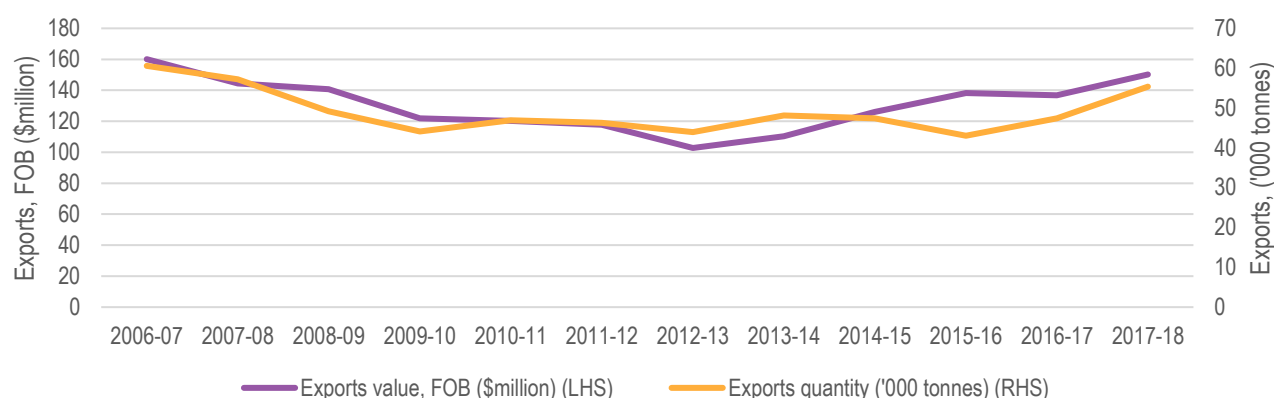


SOURCE: ACIL ALLEN ESTIMATES BASED ON AUSTRALIAN PORK LIMITED DATA

3.7 Trade

3.7.1 Exports

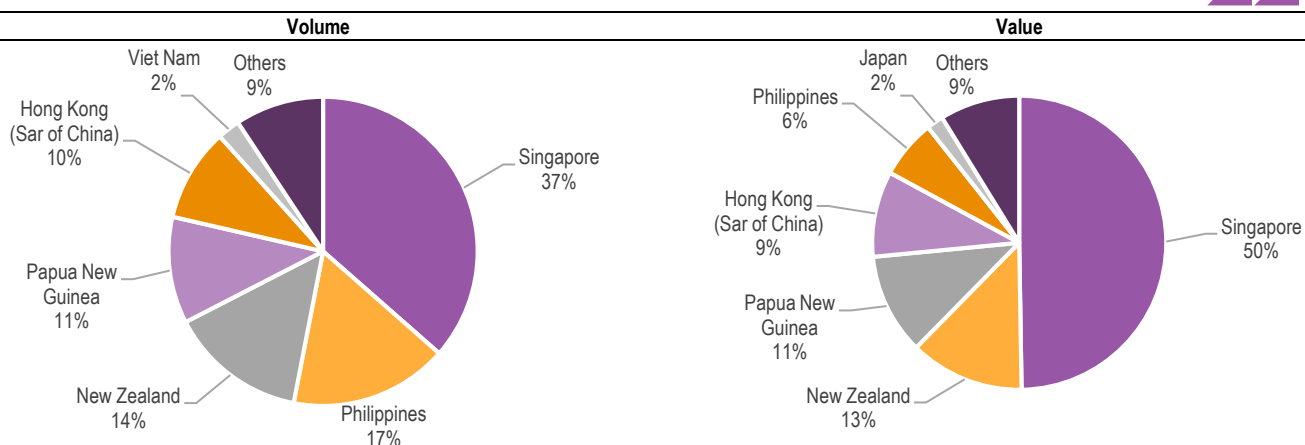
Australian exports of pigmeat products in both value and quantity terms improved over the past five years. The value of exports increased from \$102.8 million in 2012-13 to \$150.3 million in 2017-18, while the quantity increased from 43,000 tonnes in 2012-13 to 55,400 tonnes in 2017-18 (**Figure 3.7**). Favourable changes in the exchange rate since 2012-13 have provided some improvement in value.

FIGURE 3.7 PIGMEAT PRODUCT EXPORTS, 2006-07 TO 2017-18

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

SOURCE: AUSTRALIAN PORK LIMITED

Australia's key export markets are provided in **Figure 3.8**. In 2017-18 the main export markets for Australian pigmeat were Singapore, New Zealand, Papua New Guinea and Hong Kong, which together accounted for 83 per cent of exports by value and 72 per cent of exports by volume.

FIGURE 3.8 AUSTRALIAN PIGMEAT EXPORTS, BY VOLUME AND VALUE, 2017-18

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

3.7.2 Imports

There were approximately 296,283 tonnes (CWE)¹¹ of imported pigmeat in Australian in 2017-18.

As shown in **Table 3.1**, almost all of this was primary processed meat (destined for local ham and bacon manufacture) rather than secondary (96 per cent by tonnage and 90 per cent by value). While secondary processed products include speciality products such as Iberian hams, the majority of imported products have minimal processing and compete directly with Australian producers.

¹¹ CWE is carcass equivalent weight, an average 0.56 factor was employed to convert shipping weight to carcass weight.

TABLE 3.1 VOLUME AND VALUE OF PIGMEAT IMPORTS BY LEVEL OF PROCESSING, 2017-18

	Volume (shipped weight) '000 tonnes	Value \$ million
Primary processed meat		
– Boneless frozen	153.0	593.7
– Chilled and other frozen	5.7	25.1
Secondary processed meat		
– Dried	2.9	41.6
– Preserved	4.3	25.2
Total	165.9	685.6
Primary share	96%	90%
Secondary share	4%	10%

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

SOURCE: ACIL ALLEN

3.8 Production and usage of pigmeat and pigmeat products

Production and consumption of pigmeat products in Australia are reported in **Table 3.2**.

TABLE 3.2 PRODUCTION AND USAGE OF PIGMEAT PRODUCTS, AUSTRALIA

	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Production ('000 tonnes)	342.0	350.5	355.8	359.8	371.2	377.6	404.2	417.4
Imports ('000 tonnes) ^a	236.0	253.4	272.0	243.7	290.5	297.4	300.3	296.3
Exports ('000 tonnes) ^a	46.9	46.3	43.9	48.1	47.4	43.0	47.4	55.4
Net domestic consumption ('000 tonnes)	531.2	557.6	583.9	555.4	614.2	632.0	657.0	658.3
Consumption per person (kg)	23.8	24.5	25.3	23.7	25.8	26.1	26.7	26.3
Import share (%)	44	45	47	44	47	47	46	45

^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 BASED ON APL DATA

Australian production of pigmeat has increased over the past seven years. One key characteristic of usage of pigmeat products in Australia is a significant share of imports in the net Australian domestic consumption, which was 45 per cent in 2017-18. Australian exports have increased over the past seven years.

After allowing for net trade of pigmeat and processed pork products, apparent consumption of pigmeat domestically has increased from 23.8 kg per person in 2010-11 to 26.3 kg per person in 2017-18, representing an increase in overall consumption of almost 2.5 kg per person. As noted, much of this increased usage was sourced from imported pigmeat and processed pork products. An incursion of ASF has a temporary and a permanent impact on the consumption of pigmeat and processed pork products. While some of the imported pigmeat products (including cured meat and smallgoods) may not be in direct competition with domestically produced pigmeat products, the vast majority of imports are competing with locally grown pigs, particularly in the processed pork segment (i.e. hams and bacons).

ECONOMIC IMPACTS OF AN ASF INCURSION IN AUSTRALIA

3

The economic impacts of an ASF incursion have been assessed in this study through scenario analysis. Key economic impacts of an ASF incursion include:

- Revenue losses to pig producers and processors
 - As a result of stamping out
 - As a result of export market closures
 - As a result of retail demand reductions
 - Control and eradication costs (costs to producers, processors and the Government)
 - Environmental impacts (costs associated with the disposal of carcasses, effluence and straw)
 - Social impacts (mental health and relationship costs associated with the revenue losses).
- Only revenue and trade impacts on Australia are quantified in this study.

4.1 An assessment of previous ASF incursions

A summary of recent and past ASF incursions outside of Australia are reported in **Table 3.1**. These studies did not estimate the economic impacts *per se*, but provided some indicative revenue losses, compensation payments, short term price and quantity impacts observed in the market as a result of ASF.

TABLE 4.1 ASF IMPACTS IN VARIOUS COUNTRIES

Source and country	Key findings
1. RaboBank (2019), African Swine Fever Affects China's Pork Consumption	<ul style="list-style-type: none"> – China's pork consumption has dropped by 10% to 15%, year-to-date – The losses in China's pig herd range from 20% to 70% – Data from the Chinese Ministry of Agriculture and Rural Affairs (MARA) has the sow herd down by 22% – Pork prices in China during this period are flat – Distributional channels responded differently: <ul style="list-style-type: none"> – Food processing and food service have seen the strongest response to ASF, shifting to imported pork or other proteins – Chicken meat prices have risen sharply in response to ASF, with chicken breast prices increasing by 44% – The prices of beef, sheep and chicken meat in food retail markets have increased more modestly, and are up by 6%, 11%, and 8% respectively in May.
2. USDA (2019a) ¹² Second African Swine Fever Case in Hong Kong, GAIN Report Number: HK1925	<ul style="list-style-type: none"> – Hong Kong confirmed the second case of African Swine Fever in the city's largest slaughterhouse on 31 May 2019 just three weeks after confirmation of the first case – The Hong Kong government indicated that the pig came from a farm in Meichow, a city in the northeast of Guangdong province in mainland China – The incident led to the culling of the 4,100 pigs in the slaughterhouse and the closing of the facility for disinfection, which is expected to take four days – China has suspended all live pig supplies to Hong Kong for the time being – The compensation amount is expected to reach HK\$18 million or US\$2.3 million. The compensation budget for the first ASF case three weeks before was about HK\$20 million or US\$2.6 million for the culling of 6,000 pigs – Given the drastic shortage of fresh pork, retail prices have spiked between 60% to 100% in various districts – Many market stalls have planned to stop doing business for several days and consumers have switched to buying chilled/frozen meats due to their relative affordability. – Some shops have indicated about a 20% increase in the sales of chilled/frozen meats.

¹² https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Second%20African%20Swine%20Fever%20Case%20in%20Hong%20Kong_Hong%20Kong_Hong%20Kong_6-3-2019.pdf

Source and country	Key findings
3. USDA (2019b) ¹³ African Swine Fever in Vietnam GAIN Report Number: VM9027	<ul style="list-style-type: none"> – Vietnam announced its first detection of ASF on 19 February 2019. As of 17 June 2019, the disease spread to 58 out of 63 municipalities and provinces across the country, with 2,637,051 pigs depopulated (equal to nearly 9.4% of the country's total swine population) – As of 4 June 2019, Vietnam's Ministry of Agriculture and Rural Development (MARD) estimated ASF damage at VND 3.6 trillion (US\$154.8 million) – ASF will have significant impacts on the production and trade in pork, other meats and livestock feed ingredients. As projected in the 9 April 2019 Netherlands-based Rabobank Group report, Vietnam's pork production will likely decrease by more than 10% this year. Other sources are forecasting that Vietnam may have to import meats of all kinds to make up for the deficiency in domestic production – ASF outbreaks have decreased the global pork supply, leading to potentially higher pork prices and greater demand for non-pork meat products, such as beef and poultry. Sources are stating that Vietnam's ASF outbreaks and the possible declining demand from China due to China's tariffs imposed on U.S. pork (62%) and beef (37%) may lead to greater U.S. pork and other meat exports to Vietnam. Statistics showed that U.S. poultry exports to Vietnam have already surged by 24% in value and 48% in quantity in the first quarter of 2019, as compared to the same period last year. Hong Kong, Russia and Brazil are other important exporters of pork and poultry to Vietnam.
4. USDA (2019c) ¹⁴ Thailand's Plan for a Potential African Swine Fever Outbreak GAIN Report Number: TH9052	<p>The Ministry of Agriculture and Cooperatives (MOAC) recently published research showing the economic damage that would accrue if an ASF outbreak occurs in Thailand. MOAC estimates that if the disease infects:</p> <ul style="list-style-type: none"> – 30% of the swine population, economic damage will total 21.17 billion baht (US \$672 million) – 50% of the swine population, the economic damage will climb to 35.28 billion baht (US \$1.1 billion) – 80% of the swine population, the economic damage will reach 56.45 billion baht (US \$1.8 billion)
5. USDA (2016) ¹⁵ Expansion of African Swine Fever in Poland and Baltic Countries	<p>After the outbreak of ASF, several countries banned imports of pork from Poland and the Baltics.</p> <p>In order to estimate the economic impact of ASF in Poland and the Baltic countries on exports of pork and pork products, the 2013 value of exports was taken as a reference period and the decrease of value of exports in 2014 and 2015 below the 2013 level were attributed to the impact of ASF. The decrease in the value of pork exports was as follows:</p> <ul style="list-style-type: none"> – Poland 25% (US\$ 833 million) – Lithuania 50% (\$US 65 million) – Latvia 44% (\$US 22 million) – Estonia 42% (\$US 41 million)
6. Halasa et al (2016) ¹⁶	<p>This study estimated that the introduction of ASF into Denmark could result in losses of US\$12 million in direct costs and US\$349 million in exports.</p>
7. Pig333 ¹⁷	<p>This website reported that "according to Russia's Federal Veterinary and Phytosanitary Surveillance Service (VPSS), ASF outbreaks have resulted in more than 500 deaths and more than 12,000 head being slaughtered during stamping-out activities in 2011. However, VPSS forecasts that continued spread of ASF could result in an economic impact as high as RUR8 billion (\$267 million) by year's end – RUR700 million (\$23 million) in direct losses (culling 200,000 head) and RUR6.7 billion (\$223 million) in indirect losses".</p>

SOURCE: VARIOUS

4.2 ASF outbreak scenarios

In order to assess the potential economic impacts of ASF on Australia, the size, duration and the control strategies of the outbreak must be identified. Two outbreak scenarios identified in this study are:

- *a low spread scenario*: a small, single point outbreak within a small number of piggeries and contained within four weeks.

¹³ https://gain.fas.usda.gov/Recent%20GAIN%20Publications/African%20Swine%20Fever%20in%20Vietnam_Hanoi_Vietnam_6-20-2019.pdf

¹⁴ https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Thailand's%20Plan%20for%20a%20Potential%20African%20Swine%20Fever%20Outbreak_Bangkok_Thailand_4-19-2019.pdf

¹⁵ https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Expansion%20of%20African%20Swine%20Fever%20in%20Poland%20and%20Baltic%20Countries_Warsaw_Poland_11-7-2016.pdf

¹⁶ Halasa et al (2016), Simulating the epidemiological and economic effects of an African swine fever epidemic in industrialized swine populations. *Veterinary Microbiology* 193, 7-16.

¹⁷ https://www.pig333.com/latest_swine_news/russia-economic-impact-of-african-swine-fever_5019/

- *an high spread scenario*: a large, multi-point outbreak across the eastern seaboard, including at a major export abattoir, and contained within three months.

The scenarios have been constructed within the context of state borders to reflect the fact that each state, though its Chief Veterinary Officer, is responsible for instituting control action in its jurisdiction, which may include imposing movement controls on the entire state.¹⁸ More details setting out each scenario are provided in **Appendix A**.

Key features considered under each scenario are provided in **Table 3.2**.

TABLE 4.2 KEY FEATURES OF SCENARIOS

Assumptions	A single point outbreak (low spread scenario)	A large multi-point outbreak (high spread scenario)
1. Geography	Victoria	QLD, NSW, Vic and SA
2. Duration:		
– standstill	7 days across Victoria	4 weeks across the eastern seaboard
– outbreak from infection and control (assuming 90% probability of control)	4 weeks	12 weeks
– recovery from control	52 weeks (1 year)	156 weeks (36 months)
3. Piggeries and pigs		
– Infected piggeries	30 “small holder” and “medium commercial”	Numerous “large commercial” and “very large commercial”
– No of sows destroyed	2,845	52,111
– No of pigs destroyed	20% of monthly slaughtering, which is around 20,487 pigs in Victoria	30% of monthly slaughtering, which is around 109,178 pigs in eastern seaboard
– Infected abattoirs	0	1
4. Exports	Exports will be banned from Australia (with the exception of WA which will continue to trade with Singapore) for 1 year and will take 3 years to fully recover	Exports will be banned from Australia for 1 year and will take 5 years to fully recover
5. Imports	A 5% reduction in imports is assumed in the first 6 months	A 5% reduction in imports is assumed in the first 6 months
6. Domestic retail and household consumption	It is assumed that there will be a 25% decrease in domestic retail in Victoria and a 15% decrease in domestic retail nationally in the first six weeks	It is assumed that there will be a 25% decrease in domestic retail in eastern seaboard in the first six weeks

Note: APL defines piggery between 8 and 50 sows as “small holder”, between 51 and 150 as “small commercial” and between 151 and 500 as “medium commercial”, between 501 and 1000 as “large commercial”, and above 1001 sows as “very large commercial”.

SOURCE: ACIL ALLEN IN CONSULTATION WITH THE AUSTRALIAN PORK LIMITED

4.2.1 A single point outbreak scenario (low spread scenario)

Geography

The low spread scenario assumes that ASF is introduced at a smallholder piggery in one state with a relatively high level of production intensity which is geographically clustered in a way which allows the disease to spread easily between farms. For this scenario, the state of Victoria is chosen for the point of ASF’s introduction.

This scenario assumes that ASF is introduced at a smallholder piggery through swill feeding of contaminated pork product. It then spreads to around 20 per cent of ‘small holder producers’ and ‘small and medium commercial piggeries’ in the state through farm movements, as well as people and vehicle movements, and direct contact with other pigs at saleyards. The scenario assumes that

¹⁸ Animal Health Australia (2016). Disease strategy: African swine fever (Version 4.1). Australian Veterinary Emergency Plan (AUSVETPLAN), Edition 4, National Biosecurity Committee, Canberra, ACT, p 24 and p 33.

the virus is contained to these piggeries and does not spread further up the production chain, for example to abattoirs; nevertheless, it models the impact that will be felt all the way up the supply chain.

Standstill

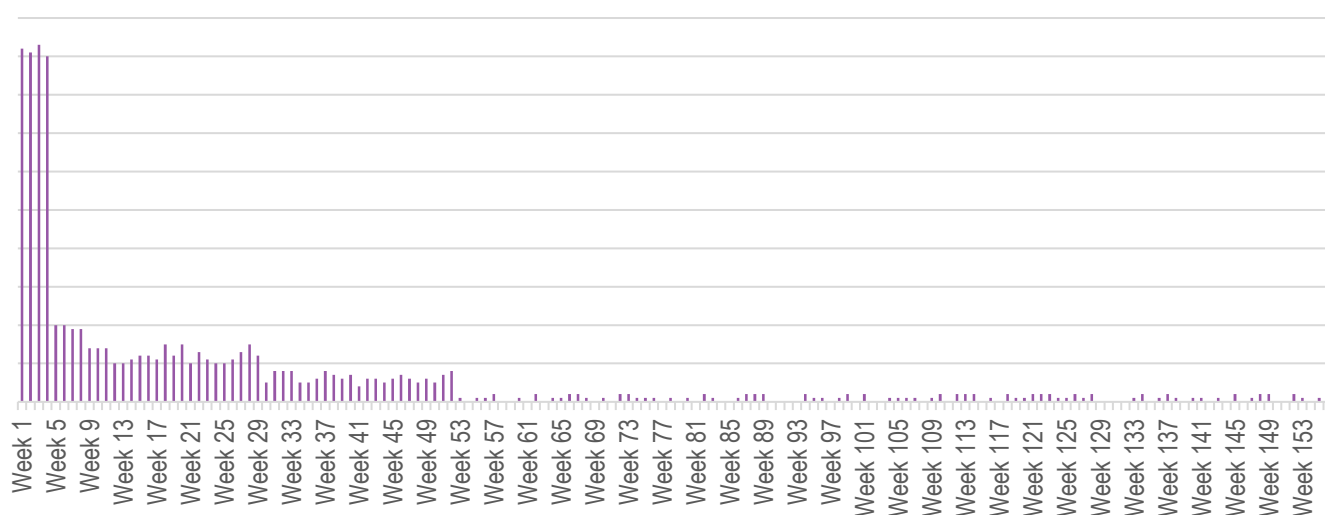
Standstill costs vary with outbreak location, pig prices, standstill duration and the proportion of movement restrictions attributable to the controls. The 7-day standstill across Victoria in this scenario has some economic impact not quantified in this study. This is mainly due to the absorptive capacity of the abattoirs in the state, limited value reduction of the slaughter ready pigs in 7 days and the significance of control strategies in infected areas.

Duration from outbreak to recovery

An indicative probability distribution of the duration of outbreak to recovery when the strategy of stamping out of infected pigs and sows and dangerous contact slaughter is successful is set out below, and depicted in **Figure 3.1**.

- **Within one month:** At least 2,845 infected sows and 20,487 saleyard ready pigs will be destroyed in Victoria. By weeks three and four of the first month, primary processors will be forced to reduce their production below the reference case due to state-wide restrictions placed on animal movements and the fact that pigs will not be available for slaughter at the state's abattoirs or boning facilities in infected regions. Movement restrictions at this stage will not significantly see secondary processors experience supply-side constraints in this scenario. Even though production levels will be reduced, it is assumed that there will be no impact on the workforce at this stage, with the sector trying to retain its staff in the expectation that the industry will recover quickly. In addition, some of the workforce may be temporarily engaged by the government during this period to assist with the control and eradication of the virus.
- **Two to six months:** It is assumed that between two and six months after the incursion, the herd stock will start to recover.
- **Seven to twelve months:** Much of Victoria's production will be restored. Primary processing activity, feed supply and transport will rise to 90 – 95 per cent of pre-incursion levels, and secondary processing activity will rise to 95 per cent of the reference case.
- **One to three years:** Between one to three years after the incursion, 100 per cent of Victoria's production, primary and secondary processing industries will be restored to pre-incursion levels and exports from Victoria fully recovered.

FIGURE 4.1 PROBABILITY DISTRIBUTION OF THE DURATION OF OUTBREAK TO RECOVERY UNDER LOW SPREAD SCENARIO



SOURCE: ACIL ALLEN

Number of sows and pigs destroyed

It is assumed that 20 per cent of pigs at smallholder piggeries are infected and destroyed in the first four weeks.¹⁹ Based on the current data on Victoria's piggeries by size, this equates to around 2,845 sows and around 20,487 slaughter ready pigs at 30 piggeries. Destroying breeding sows has a lagged impact on the production in the region (**Table 3.3**).

¹⁹ This analysis models a percentage of pigs destroyed, but in reality all pigs on an infected premise would be destroyed. This may mean that modelled impacts are conservative.

TABLE 4.3 VICTORIAN PIGGERIES BY SIZE

Size	Classification	No. of producers	20% of producers	No. of sows	20% of sows
<8 sows	Pig keeper	502		1,060	
8-50 sows	Small holder or small producer	96	19	1,880	376
51-150 sows	Small commercial	24	5	2,408	481
151-500 sows	Medium commercial	31	6	9,939	1988
501-1000 sows	Large commercial	19		13,362	
1001+ sows	Very large commercial	18		36,487	
0 sows	Grow out only	47		0	
TOTAL		737	30	65,136	2,845

Note: APL defines piggery between 8 and 50 sows as "small holder", between 51 and 150 as "small commercial" and between 151 and 500 as "medium commercial", between 501 and 1000 as "large commercial", and above 1001 sows as "very large commercial".

SOURCE: AUSTRALIAN PORK LIMITED

It is estimated that on average, around 95,000 pigs per month are slaughtered in Victoria. This gives around 38,000 slaughter ready pigs which must be destroyed in four weeks. On average each animal produces around 80kg of meat, which would result in over 3,000 tonnes of pigmeat production loss in the state as a result of an ASF incursion. In addition, it may take several months to return to normality, creating some additional production losses during the recovery. This scenario assumes that the virus is contained to these piggeries and does not spread further up the production chain, for example, to abattoirs; nevertheless, it models the impact that will be felt all the way up the supply chain in terms of reduced carcass to primary processing and cut meat to the secondary processing sector.

Exports

Export markets will be closed to all pigmeat and pigmeat products from Australia within the first month of detection, with the exception of Singapore which will continue to trade with WA.²⁰ Noting that only around 10 per cent of Australian pigmeat and pigmeat products are exported, it is assumed that the uninfected pig only export abattoirs will continue to operate and the pigmeat intended for export will be supplied to the domestic market.

Imports

The scenario assumes there will be a 5 per cent decrease in imports in the first 6 weeks.

Retail demand

Retail activity will be impacted by the 'yuck' factor which will place downward pressure on domestic demand. There will also be downward pressure from the oversupply of products that would otherwise have been exported. This scenario assumes there will be a 25 per cent decrease in domestic retail in Victoria and 15 per cent decrease in domestic retail nationally in the first six weeks, which will rise to 5-10 per cent below pre-incursion levels between 2-6 months and gradually return to normal after one to three years.

4.2.2 A large multi-point outbreak scenario (high scenario)

Geography

The high spread scenario is based on an incursion of ASF across the eastern seaboard. This scenario includes incursions of ASF in multiple "large and very large commercial piggeries" across Queensland, New South Wales, Victoria and South Australia, and one export abattoir, with the virus being spread through the large number of transport movements throughout these states. It is assumed that the virus spreads rapidly during the first two weeks of detection and appears at many major large and very large commercial piggeries along the eastern seaboard and an export abattoir in Melbourne. All existing infected stock along the supply chain will be destroyed within a 4-week period.

²⁰ This scenario assumes the existence of an agreed biosecurity zoning/compartimentalisation protocol between the governments of Singapore and Australia. This agreement is not currently in place.

Standstill

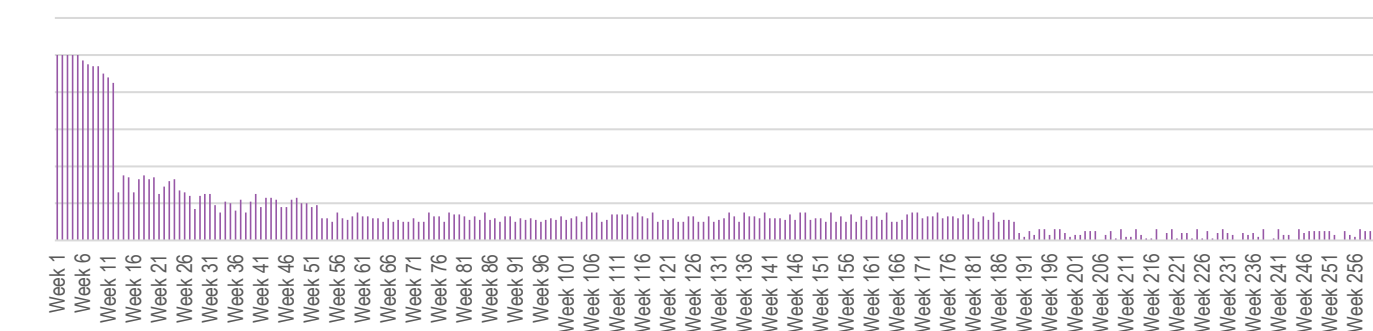
As a result of the 4-week standstill in this scenario, slaughtering, processing (both primary and secondary), feed and transport activities across the eastern seaboard will be reduced (it is assumed that pigs already at unaffected abattoirs and boning houses will still be processed). From week two, some stock will be euthanised on welfare grounds as well as large number of uninfected animals from grower finisher producers. The 4-week standstill across the eastern main land states has a cost and is quantified through the cost of holding market ready pigs and reducing their market value.

Duration from outbreak to recovery

An indicative probability distribution of the duration of outbreak to recovery when the strategy of stamping out of infected pigs and sows and dangerous contact slaughter is successful under high scenario is depicted in Figure 3.2.

- **Within four weeks:** All existing infected stock along the supply chain will be destroyed within a month. It is assumed that around 30 per cent of the sow herd (around 52,111) and saleyard ready pigs (around 109,178) on the eastern seaboard would be destroyed at this stage.
- **Two to six months:** Herd stock on the eastern seaboard will be depleted on average by around 20 per cent,²¹ resulting in a decrease in slaughter, production and primary processing activity.
- **Seven to eighteen months:** It is assumed that between seven and eighteen months after the incursion, the herd will start to recover.
- **Two to five years:** Exports start to recover from the third year and will fully recover by the end of the fifth year.

FIGURE 4.2 PROBABILITY DISTRIBUTION OF THE DURATION OF OUTBREAK TO RECOVERY UNDER HIGH SPREAD SCENARIO



SOURCE: ACIL ALLEN

Number of sows and pigs destroyed

It is assumed that 30 per cent of sow herd of “large and very large commercial” piggeries and 30 per cent of saleyard ready pigs of these piggeries are infected and destroyed in the first four weeks. Based on the current data shown in Table 3.4, this equates to around 52,111 sows and around 109,178 pigs at 32 piggeries in the eastern seaboard. Destroying breeding sows has a lagged impact on the production of baconer and porkers.

TABLE 4.4 EASTERN SEABOARD PIGGERIES BY SIZE

Size	Classification	No. of producers	30% of producers	No. of sows	30% of sows
<8 sows	Pig keeper	2,455		4,516	
8-50 sows	Small holder or small producer	510		9,607	
51-150 sows	Small commercial	124		12,148	
151-500 sows	Medium commercial	112		33,634	
501-1000 sows	Large commercial	51	15	36,961	11,088
1001+ sows	Very large commercial	56	17	136,743	41,023
0 sows	Grow out only	158		0	

Size	Classification	No. of producers	30% of producers	No. of sows	30% of sows
TOTAL		3,466	32	233,609	52,111

Note: APL defines piggery between 8 and 50 sows as "small holder", between 51 and 150 as "small commercial" and between 151 and 500 as "medium commercial", between 501 and 1000 as "large commercial", and above 1001 sows as "very large commercial".

SOURCE: AUSTRALIAN PORK LIMITED

Exports and imports

Export markets will be closed to all pigmeat and pigmeat products from Australia for one year. Exports will take five years to recover. The scenario assumes there will be a 5 per cent decrease in imports in the first 6 months.

Consumer demand

The scenario assumes there will be a 25 per cent decrease in domestic retail demand in eastern seaboard in the first 6 weeks. Although ASF is not harmful to human health, this is unlikely to be reflected in retail demand and consumer behaviour. The magnitude of consumption decline would depend on the responsiveness of pigmeat demand to changes in its price (movement along the demand curve) and shifts in the demand curve. As a result, the volume of pigmeat and pigmeat products consumed could initially fall, however, estimating the extent of fall is difficult due to the 'yuck' factor. The outbreaks summarised in **Table 3.1** did not provide a sound guide to changes in pigmeat and pigmeat products consumption.

A recent review of responsiveness of consumer demand for meat to changes in price is summarised in **Box 4.1**.

BOX 4.1 RESPONSIVENESS OF CONSUMER DEMAND FOR PIGMEAT AND PIGMEAT PRODUCTS

There has been considerable data analysis and consumer demand responsiveness to price changes undertaken in Australia. The results are usually reported as elasticities:

- 'Own-price' elasticities of demand indicate the extent to which buyers vary their purchases as the price of a product rises and falls.
- 'Cross-price' elasticities describe how a change in the price of one product, say pork, affects the quantity demanded of another substitute product, say chicken.

The own-price elasticity of demand estimates indicate that consumption of beef and lamb is much more sensitive (responsive) to changes in their respective prices than pigmeat and chicken. While there is a large range in the estimates of own price elasticities of demand for pigmeat and pigmeat products, typical values tend to be around -0.3. This means that a 1 per cent increase in the price of pigmeat will lead to a 0.3 per cent fall in consumption of pigmeat, and vice versa. The empirical studies also indicate the extent to which meats can substitute with each other. Beef is shown to be a strong substitute for lamb, Similarly, pork and chicken can substitute for lamb and beef, although the relationships are weaker (cross-price elasticities are typically lower). While there is a large range in the estimates of cross price elasticities of demand for pigmeat products with chicken, typical values tend to be around -0.05, implying that a 1 per cent change in the price of pigmeat may lead to a 0.05 change in the quantity of chicken consumed. The negative weak cross price elasticities imply the pigmeat and chicken meat are weak complements in consumption.

SOURCE: BASED ON MEAT AND LIVESTOCK AUSTRALIA (2012), UPDATING A MODEL OF MEAT DEMAND IN AUSTRALIA TO TEST FOR THE IMPACT OF MSA AND PRODUCTIVITY COMMISSION (2002), IMPACT OF A FOOT AND MOUTH DISEASE OUTBREAK ON AUSTRALIA

4.3 Quantifying the economic impacts

Economic impacts are quantified based on several plausible assumptions. Therefore, the estimated impacts should be interpreted as broad orders of magnitude rather than as precise impacts, if ASF eventuates in Australia.

4.3.1 Direct impacts

The direct impacts of ASF are loss of revenue to pig farming as a result of culling, loss of revenue associated with export sales and domestic sales. There are other direct costs such as government and industry control and the standstill, and surveillance costs not considered in this study. The methodology to estimate the direct and indirect impacts are based on ACIL Allen's input-output multiplier analysis developed for the APL in 2017 to estimate the economic footprint (economic contribution) of the Australian pork industry.²² This is a methodology that is frequently used to understand the full linkages of an industry throughout the economy. The economic analysis provides:

²² ACIL Allen Consulting (2017), *Pork Industry in Australia 2015-16: Economic Contribution Report*.

- the *direct* impact of an ASF incursion on the Australian pork industry (pig farming, primary processing and secondary processing), plus
- the full extent of the *indirect* impacts of an ASF incursion on the pork industry to each state 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.

As shown in **Table 4.5**, an outbreak of ASF of any length of duration would have an impact on the revenue. Revenue losses associated with the foregone exports are higher than the domestic retail demand and production losses associated with the stamping out.

TABLE 4.5 DIRECT REVENUE EFFECTS OF ASF INCURSION

Estimated revenue effects	Low spread scenario	High spread scenario
	Over a 3-year period	Over a 5-year period
	A\$m	A\$m
Pig production effect (stamping out effect, left shift in the supply curve)	(18.2)	(237.1)
Pigmeat demand effect		
– Export demand effect (left shift in the demand curve)	(307.6)	(340.6)
– Domestic demand effect (further left shift in the demand curve)	(83.7)	(261.7)
Total revenue loss to pig farming	(409.4)	(839.5)
Primary processing	(256.6)	(671.6)
Secondary processing	(92.8)	(247.6)

Note: Undiscounted revenue losses

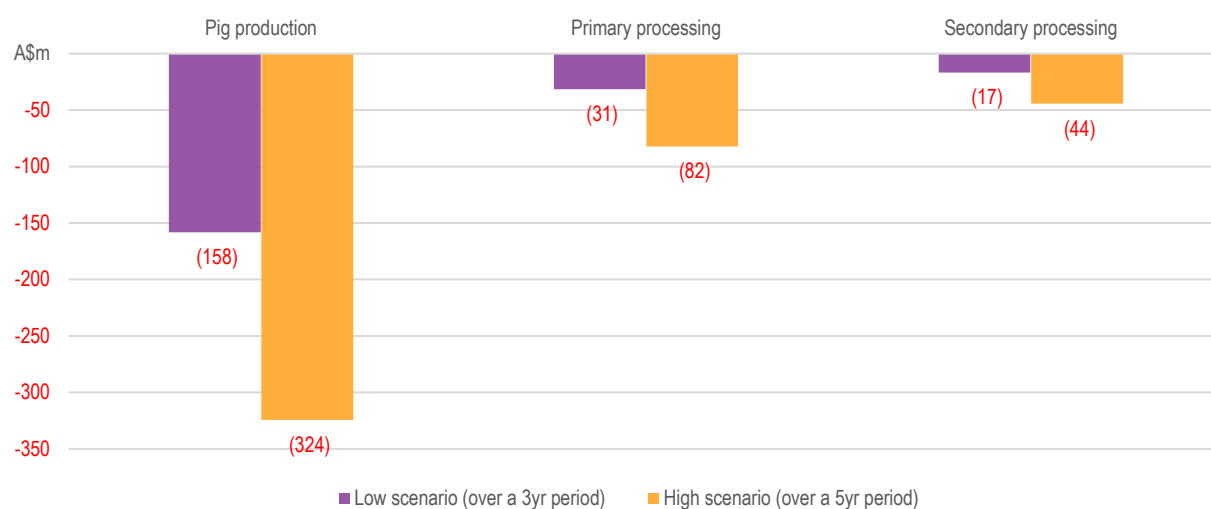
SOURCE: ACIL ALLEN

It is estimated that total sales revenue loss to the pig farming over three years would be \$409.4 million for a single point outbreak, and \$839.5 million over five years for a large multi-point outbreak. While the longer outbreak would involve the highest costs, a key difference between the outbreaks is the length of time it would take to recover to pre-incursion levels and the assumptions related to the export markets and retail demand assumptions. For the low spread scenario, the majority of the total losses would occur in the first year, but it would take up to 3 years for exports to recover. For the high spread scenario, the majority of the total losses would occur in the first few years, but it would take up to 5 years for exports to recover. The longer recovery time for this scenario is due to:

- the longer outbreak in multiple locations
- the longer export markets remain closed
- the longer it would take for herd numbers and production to recover to pre-incursion levels.

It should be noted that the economic effect of reduction in domestic sales revenue is different to a reduction in export revenue. Loss of export revenue represents a direct loss of national income. However, the losses the industry suffers from ASF on the domestic market are broadly to some extent transferred to other meat consumers in terms of availability of other meats at lower prices.²³ The estimated total direct value-add impact under two scenarios are provided in **Figure 4.3**. The direct impact to the pork sector was estimated by determining reduced losses to their factors of production (including gross operating surplus) plus the taxes (less subsidies) payable on production and imports.

²³ This effect is not captured using input-output multiplier analysis but can be captured adequately using the computable general equilibrium modelling.

FIGURE 4.3 DIRECT ECONOMIC IMPACT OF ASF ON THE PORK INDUSTRY UNDER TWO SCENARIOS

Note: Direct impact measures the impact on industry gross value-add of each component of the pork sector

SOURCE: ACIL ALLEN

4.3.2 Indirect impacts

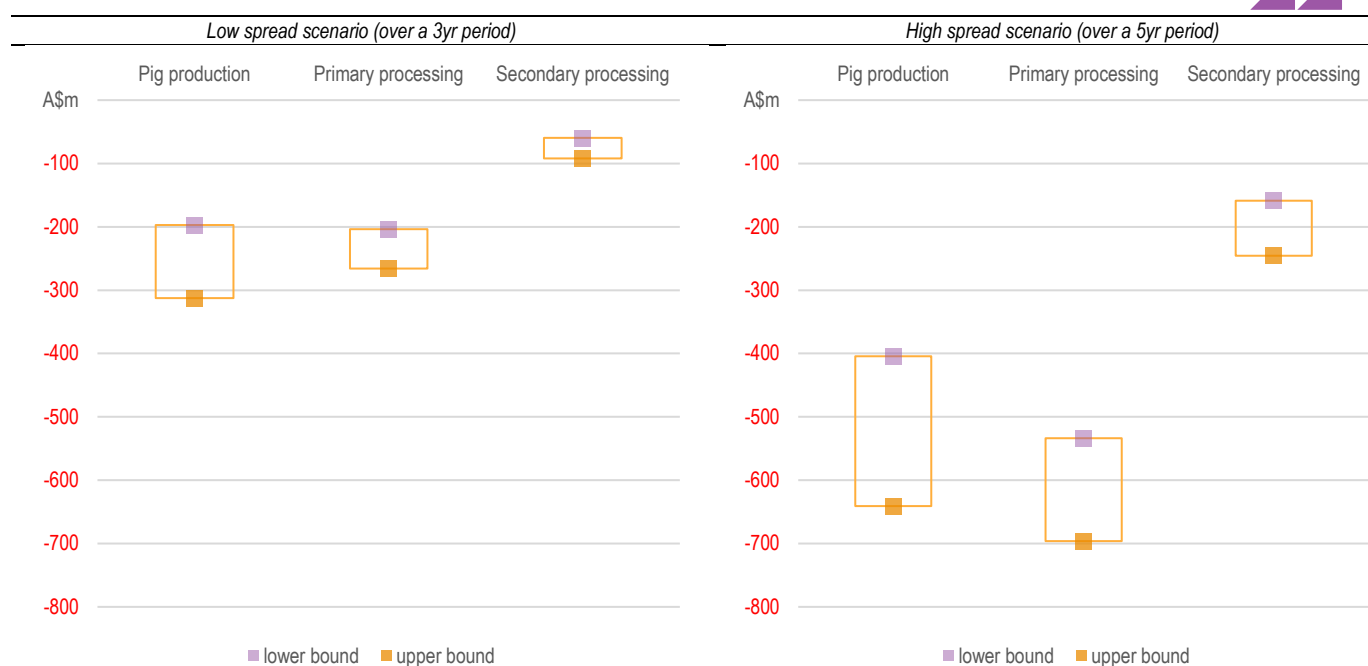
The estimated total indirect value-add impact under the two scenarios is provided in **Figure 3.4**. This shows the indirect impact of an ASF incursion on the supply chain of the pork sector, being inputs purchased by the pork sector (lower bound) plus the changes in employees spend on goods and services as a result of an ASF outbreak (upper bound).

It is estimated that indirect economic losses in the:

- low spread scenario range between A\$461 million and A\$671 million
- high spread scenario range between A\$1,097 million and A\$1,582 million.

There are also several other costs that have not been modelled, which would have additional but unknown costs. These are:

- the persistence of pathogens in the composting process of mass mortalities. ASF can survive for long periods following this process. Depending on the method used, the entire composting process itself for pigs can take more than 9 months
- costs associated with treatment of whole effluent pond systems, along with loss of revenue in offset organic fertiliser costs if used to irrigate and fertilise cropping systems that grow grain to feed pigs for multiuse farms. The Anaerobic conditions that are required to treat effluent take years to set up properly (up to 3 years) costs are enormous.
- environmental costs in terms of soil contamination and treatment if burial is used as a treatment option, for example, potential groundwater contamination and ongoing monitoring requirements and logistics involved in that process — loss of income associated with the alternate use of that land.

FIGURE 4.4 INDIRECT IMPACT OF ASF ON THE AUSTRALIAN ECONOMY

Note: 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

4.3.3 Total impacts

The estimated total value-add impact under the two scenarios is provided in **Table 3.6**, **Figure 3.5** and **Figure 3.6**. Adding the direct and indirect economic impacts as a result of an ASF incursion under the two scenarios provides lower and upper bound estimates of the total national economic losses in GDP equivalent terms. It is estimated that total economic losses in the:

- low spread scenario range between A\$667 million and A\$877 million
- high spread scenario range between A\$1,548 million and A\$2,033 million.

TABLE 4.6 ESTIMATED DIRECT, INDIRECT AND TOTAL IMPACTS

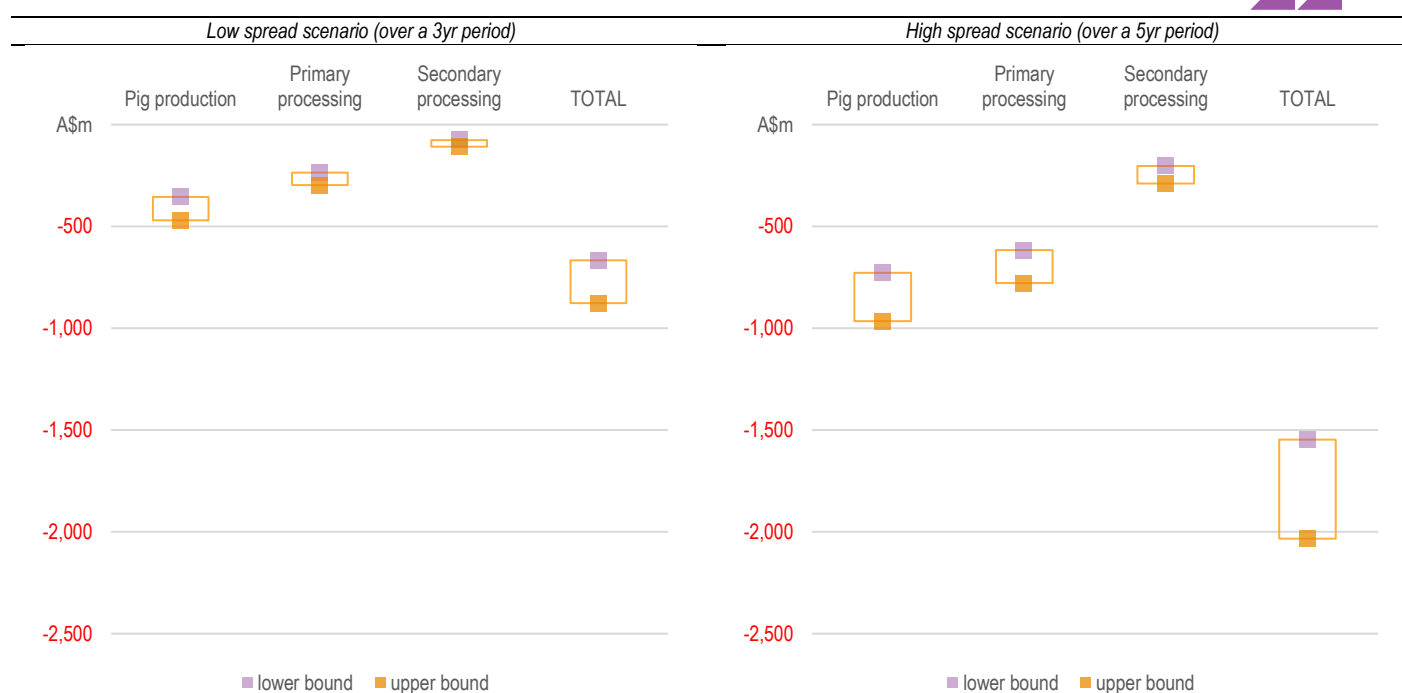
	Low spread scenario				High spread scenario					
	Yr 1	Yr 2	Yr 3	Total	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total
	A\$m	A\$m	A\$m	A\$m	A\$m	A\$m	A\$m	A\$m	A\$m	A\$m
Pig farming										
Revenue	(237)	(136)	(37)	(409)	(408)	(287)	(73)	(53)	(18)	(840)
Direct	(91)	(53)	(14)	(158)	(158)	(111)	(28)	(21)	(7)	(324)
Indirect (lower)	(114)	(66)	(18)	(197)	(197)	(138)	(35)	(26)	(9)	(404)
Indirect (upper)	(181)	(104)	(28)	(313)	(312)	(219)	(56)	(41)	(14)	(641)
Total lower	(205)	(118)	(32)	(355)	(354)	(249)	(63)	(46)	(16)	(729)
Total upper	(272)	(156)	(42)	(471)	(469)	(329)	(84)	(61)	(21)	(965)
Primary processing										
Revenue	(118)	(109)	(29)	(257)	(327)	(229)	(58)	(43)	(15)	(672)
Direct	(14)	(13)	(4)	(31)	(40)	(28)	(7)	(5)	(2)	(82)
Indirect (lower)	(94)	(87)	(23)	(204)	(260)	(182)	(46)	(34)	(12)	(534)
Indirect (upper)	(123)	(113)	(31)	(266)	(339)	(238)	(60)	(44)	(15)	(696)

	Low spread scenario				High spread scenario					
	Yr 1	Yr 2	Yr 3	Total	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total
Total lower	(108)	(100)	(27)	(235)	(300)	(210)	(54)	(39)	(13)	(616)
Total upper	(137)	(126)	(34)	(297)	(379)	(266)	(68)	(50)	(17)	(778)
Secondary processing										
Revenue	(24)	(54)	(15)	(93)	(98)	(92)	(29)	(21)	(7)	(248)
Direct	(4)	(10)	(3)	(17)	(18)	(16)	(5)	(4)	(1)	(44)
Indirect (lower)	(15)	(35)	(9)	(60)	(63)	(59)	(19)	(14)	(5)	(159)
Indirect (upper)	(23)	(54)	(15)	(92)	(97)	(91)	(29)	(21)	(7)	(245)
Total lower	(19)	(45)	(12)	(76)	(80)	(75)	(24)	(18)	(6)	(203)
Total upper	(28)	(64)	(17)	(109)	(115)	(107)	(34)	(25)	(9)	(290)
TOTAL										
Total lower	(333)	(263)	(71)	(667)	(734)	(534)	(141)	(103)	(35)	(1,548)
Total upper	(437)	(346)	(94)	(877)	(963)	(703)	(186)	(136)	(47)	(2,033)

Note: The lower and upper bounds are calculated using the Simple and Total multipliers, respectively. Totals may not add due to rounding

SOURCE: ACIL ALLEN

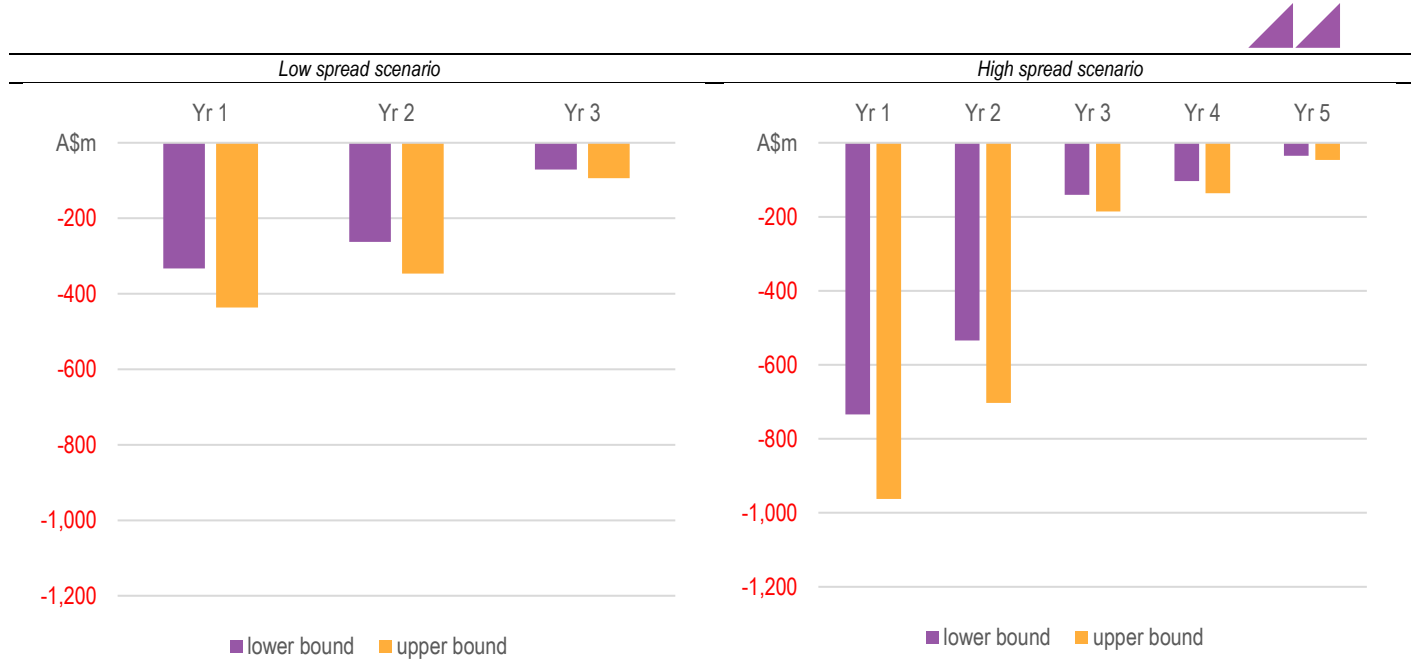
FIGURE 4.5 TOTAL IMPACT OF ASF ON THE AUSTRALIAN ECONOMY



Note: The lower and upper bounds are calculated using the Simple and Total multipliers, respectively. Totals may not add due to rounding

SOURCE: ACIL ALLEN

FIGURE 4.6 TOTAL IMPACT OF ASF ON THE AUSTRALIAN ECONOMY BY YEAR



Note: The lower and upper bounds are calculated using the Simple and Total multipliers, respectively. Totals may not add due to rounding
 SOURCE: ACIL ALLEN

DETAILED SCENARIOS



A.1 Low spread scenario

The low spread scenario assumes that ASF is introduced at a smallholder piggery in one state with a relatively high level of production intensity which is geographically clustered in a way which allows the disease to spread easily between farms. For this scenario, we have chosen the state of Victoria as the point of ASF's introduction and spread.

Under the scenario, ASF is introduced at a small holder piggery through swill feeding of contaminated pork product. It then spreads to around 20 per cent of 'small holder producers' and 'small and medium commercial piggeries' in the state through farm movements and direct contact with other pigs at saleyards (equating to around 30 piggeries and 2,845 sows). This scenario assumes that the virus is contained to these piggeries and does not spread further up the production chain, for example, to abattoirs; nevertheless, it models the impact that will be felt all the way up the supply chain.

The scenario assumes that in the first three months:

- An immediate pork, pork products and pig standstill will be imposed across Victoria for 72 hours. This will be extended to one week (7 days). It is assumed that permits will be issued to enable feed²⁴ to be supplied to piggeries during this time.
- Restricted and control areas will be declared around all infected and suspect premises, which will remain in place around each premise until it is declared virus free. Surveillance and movement controls will be imposed in these zones.
- All pigs from infected premises will be destroyed.
- The sale of all pigmeat and pigmeat products will decline as consumers turn away from pork. Pigmeat and pigmeat products from the infected and suspect properties will be recalled, including any exported from Australia.
- The export of all pigmeat and pigmeat products from Australia will be banned (with the exception of Singapore, which will continue to trade with WA) and will subsequently re-enter the domestic retail market. It is assumed that WA will continue to slaughter pigs for export to Singapore, and that Singapore's demand for pigmeat remains unaffected at 14,000 tonnes per annum (being 33 per cent of the pre-incursion export demand).

It is then assumed that following tracing and surveillance and the successful introduction of sentinel animals, no further cases of ASF are identified and quarantine and movement controls are lifted. After three months, herd stock and production activity will gradually be restored to full capacity when domestic trade returns to normal between one to three years later.

The scenario assumes that domestic retail activity will start to return to normal after three months, but that it will take at least one year before international markets regain enough confidence to allow the export of pigmeat or pigmeat products from Australia (even if Australia's ASF free status is restored after three months according to OIE guidelines).

This scenario assumes that the following levels of activity will apply to the Victorian pig industry following an incursion of ASF:

Detection to one month

Within the first month of detection it is assumed that there will be a reduction in the state's production, slaughtering and processing activities (including feed supply and transport associated with the industry).

Aggregate production levels will be maintained over the first month while containment and testing for the virus occurs at infected and suspect premises. Although testing is quick, it may be several weeks before there can be any confidence that no pigs on other properties are incubating the disease, and quarantine measures will be maintained during this time.²⁵ At least 2,845 infected sows and 20,487 saleyard ready pigs will be destroyed, however these destructions would be low compared to the total levels of production across the state (being around 4.5 per cent of Victoria's sow herd).

By weeks three and four of the first month, primary processors will be forced to reduce production by 10 – 20 per cent below the reference case due to state-wide restrictions placed on animal movements and the fact that pigs will not be available for slaughter at the state's abattoirs or boning facilities. Movement restrictions at this stage will see secondary processors experience supply-side

²⁴ Including maintenance feeds for slaughter weight pigs.

²⁵ Animal Health Australia (2016). Disease strategy: African swine fever (Version 4.1). Australian Veterinary Emergency Plan (AUSVETPLAN), Edition 4, National Biosecurity Committee, Canberra, ACT, p 43.

constraints, however these impacts will not be felt until the next period. In addition, from week two, pigs that are unable to be moved to abattoir for slaughter (e.g. those in a control or restricted area) may need to be destroyed on the basis of animal welfare grounds.

Even though production levels will be reduced, it is assumed that there will be no impact on the workforce at this stage, with the sector trying to retain its staff in the expectation that the industry will recover quickly. In addition, some of the workforce may be temporarily engaged by the government during this period to assist with the control and eradication of the virus.

By the end of month one, retail demand in Victoria will be reduced by 25 per cent as the “yuck” factor impacts pork’s appeal and consumers choose other forms of protein. On a national level, however, it is assumed that there will only be an impact of around 15 per cent on overall retail prices and activity.

Export markets will be closed to all pigmeat and pigmeat products from Australia within the first month of detection (with the exception of Singapore/WA). Noting that only 10 per cent of Australian pigmeat and pigmeat products are exported, it is assumed that the pig only export abattoirs will continue to operate, and the pigmeat intended for export will be supplied to the domestic market, creating an oversupply situation. The domestic supply of pigmeat intended for export will also impact storage capacity, which is assumed to be 50 per cent full²⁶ (resulting in half of the meat going into storage and the remaining half going into the market, adding to the oversupply).

Two to six months

It is assumed that between two to six months after the incursion, approximately 5 – 10 per cent (equivalent to 3 – 4 times the number of infected pigs destroyed in the first month) of Victoria’s herd stock will be destroyed due to ASF contamination or on welfare grounds arising from surplus stock that is unable to be sold due to weight/quality requirements. Production and primary processing will remain reduced by 10 – 20 per cent, but there will be a lesser impact (5 – 10 per cent) on secondary processing, as consumers may be more willing to eat bacon and ham given that it is removed from the pig and cooked.

It is assumed that the decrease in production will have a small impact on employment, with producers reducing their workforce by 5 – 10 per cent in total industry employment in Victoria by the end of month six.

By the six-month mark it is assumed that the consumption of pork will return to pre incursion levels. However, the industry will have experienced a further downturn due to oversupply from export market redirection to the domestic market. Nevertheless, it is assumed that the impact will not be felt as significantly at the national level, with average domestic sales and prices only reduced by 5 – 10 per cent.

Export markets will remain closed to Australia, and the meat intended for export (including meat from the Victorian export abattoir, which will re-open) will continue to lead to domestic oversupply, even after filling the gap caused by the reduced Victorian supply.

Seven to twelve months

Between seven to twelve months after the incursion, much of Victoria’s production will be restored. Primary processing activity, feed supply and transport will rise to 90 – 95 per cent of pre-incursion levels, and secondary processing activity will rise to 95 per cent of the reference case. Industry employment will also improve to around 95 per cent of pre-incursion levels.

Domestic retail activity in both the Victorian and national pig industry will improve, however the ‘yuck’ factor will still exist and place downward pressure on domestic demand. Downward pressure also remains from the oversupply of products that would otherwise have been exported (as export markets remain closed during this period). Nevertheless, Victorian prices will rise to 85 – 90 per cent of pre-incursion levels and national prices will rise to around 95 per cent of the average pre-incursion price.

One to three years

Between one to three years after the incursion, 100 per cent of Victoria’s production, primary and secondary processing industries (including feed and transport) and their employment will be restored to pre-incursion levels.

Domestic retail activity will return to 100 per cent, and export markets will re-open to Australia, with export value and activity also returning to 100 per cent. Domestic supply levels will return to normal, and the value of pigmeat and pigmeat products will be fully restored to reference case levels.

²⁶ We are not able to verify the validity of this assumption due to the lack of data on existing freezer stock levels/storage capacity.

A.2 High spread scenario

The high spread scenario is based on an incursion of ASF across the eastern seaboard. This scenario includes incursions of ASF in multiple large commercial piggeries across Queensland, New South Wales, Victoria and South Australia, and one export abattoir, with the virus being spread through the large number of transport movements throughout these states.

The scenario assumes that in the first three months:

- An immediate 72-hour standstill will be imposed on pork, pork products and pigs across the eastern seaboard. This is extended on a number of occasions, lasting a total of four weeks. It is assumed that permits will be issued to enable feed to be supplied to piggeries during this time.
- Restricted and control areas will be declared around all infected and suspect premises, which will remain in place around each premise until it is declared virus free. Surveillance and movement controls will be imposed in these zones.
- All pigs from infected premises will be destroyed.
- An export abattoir in Melbourne is found ASF positive and is closed for four weeks until declared virus free.
- Many pigs will be euthanised on animal welfare grounds from ASF free pig farms after two weeks.
- The sale of all pigmeat and pigmeat products from all four states for domestic retail will reduce.
- The export of all pigmeat and pigmeat products from Australia will be banned.

It is then assumed that following tracing and surveillance and the successful introduction of sentinel animals, no further cases of ASF are identified and quarantine and movement controls are lifted. After three months, herd stock and production activity will gradually be restored until they return to full capacity between three to five years later.

The scenario further assumes that domestic retail sales from these states will start to return to normal after three months, but that it will take one to two years before international markets regain enough confidence to permit the export of some pigmeat or pigmeat products from Australia, and three to five years before overseas market confidence is fully restored.

This scenario assumes that the following levels of activity will apply to the pig industry across the eastern seaboard following an incursion of ASF:

Detection to one month

It is assumed that the virus spreads rapidly during the first two weeks of detection and appears at many major commercial piggeries along the eastern seaboard and an export abattoir in Melbourne. All existing infected stock along the supply chain will be destroyed within the first month.

As a result of the four week standstill, slaughtering, processing (both primary and secondary), feed and transport activities across the eastern seaboard will be reduced by 90 per cent (it is assumed that pigs already at unaffected abattoirs and boning houses will still be processed). From week two, some stock will be euthanised on welfare grounds as well as large number of uninfected animals from grower finisher producers which will have passed their sale window and will have significantly diminished value. It is assumed that around 300 per cent of the sow herd on the eastern seaboard would be destroyed at this stage, with corresponding decreases in pigmeat production.

Farms on the eastern seaboard are likely to reduce production. This will have a minimal impact in the first month; however, given that mating to slaughter is around 9-10 months, there will be a lagged effect that will be felt between six months to 3 years later.

It is assumed that at this stage there will be minimal to no impact on employment on the eastern seaboard at the farm or secondary processing level, but a greater impact on the primary processing workforce due to the inability to get pigs to slaughter, resulting in an overall reduction in industry employment of around 5 – 10 per cent in these four states as employers shed casual, temporary or contract primary processing staff while activities are suspended (and in anticipation of a long downturn in the market). It is further assumed that there will be no impact to employment outside of the eastern seaboard at this stage.²⁷

Demand for pigmeat products will be depressed (due to the 'yuck factor'), resulting in prices across Australia declining by 30 – 40 per cent.

Export markets will be closed to all pigmeat and pigmeat products from Australia. Pigmeat from the remaining export abattoirs across Australia are redirected to the domestic market and will fill some of the domestic supply gap caused by the reduced supply from the eastern seaboard.

²⁷ It is likely that state employees from uninfected states would be brought in to assist with disease management.

Two to six months

At one month the livestock standstill is lifted. Slaughtering, processing, feed and transport activities will begin to return to normal. However, herd stock on the eastern seaboard will be depleted by 20 per cent,²⁸ resulting in a 25 – 35 per cent²⁹ decrease (against the reference case) in slaughter, production and primary processing activity (including feed and transport) across the supply chain. A lesser impact (15 – 25 per cent) will be felt at the secondary processing level, as consumers may be more willing to eat bacon and ham given that it is removed from the pig and cooked. Domestic retail demand will decrease by 25 per cent.

In the rest of Australia, herd stock, slaughtering and primary processing activity will be 5 per cent below reference case levels, while production, secondary processing, feed and transport activities will return to normal.

Industry employment on the eastern seaboard will further decrease to 10 – 20 per cent against the reference case by the end of month six.

Export markets will be closed to all pigmeat and pigmeat products from Australia. Pigmeat from the remaining export abattoirs across Australia are redirected to the domestic market and will fill some of the domestic supply gap caused by the reduced supply from the eastern seaboard.

Six to twelve months

Between six to twelve months after the incursion, the industry improves and herd stock on the eastern seaboard is restored to 75 - 85 per cent of pre-incursion levels by the end of the period. Slaughter, production, processing, feed, transport activity and domestic retail sales in these four states will correspondingly rise to 75 – 85 per cent of pre-incursion levels.

Employment in the eastern seaboard industry will rise to 85 – 95 per cent of pre-incursion levels throughout this period, with employers remaining cautious in the wake of uncertain market conditions.

Herd stock, slaughter and primary processing activities in the rest of Australia will return to pre-incursion levels.

One to two years

Between one to two years after the incursion, herd stock, slaughter, production (including feed and transport), processing, domestic sales, employment and value will increase to 90 per cent of the reference case. Industry employment will rise to 95 per cent of pre-incursion levels. However, the yuck factor still lingers amongst consumers which keeps the industry value and prices at levels which are on average 10 per cent below pre-incursion levels.

Export markets will re-open, however it is assumed that it will take longer to become re-established in these markets, with export value and activity sitting at 75 per cent of the reference case during the period.

Three to five years

It is assumed that domestic and export value and activity will return to normal within three to five years.

²⁸ This figure is based on the estimated decline in sow herd in the north and north-east of China by the end of 2018 (Rabobank Pork Quarterly Q1 2019). Even though Australia has stronger biosecurity arrangements, this figure represents a maximum impact resulting from ASF and animal welfare.

²⁹ This figure notes that the Rabobank Pork Quarterly Q1 2019 estimates that production in China will decline by 10%-20% due to ASF, however, assumes a greater decline in Australia which does not import fresh pigmeat.

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