AUSTRALIAN VETERINARY EMERGENCY PLAN

# AUSVETPLAN

---

## Response strategy

# African swine fever

**Version 5.3**

AUSVETPLAN is a series of response plans that describe the proposed Australian approach to an emergency animal disease incident. The documents provide guidance based on sound analysis, linking policy, strategies, implementation, coordination and emergency management plans.

**National Biosecurity Committee**

**This manual may contain text under development**

In this manual, text in square brackets and greyed out [xxx] indicates that that aspect of the manual remains unresolved or is under development. This text is not part of the official manual. The issues will be further worked on by experts and relevant text included at a future date.

**Contact information**

If you have any requests or inquiries concerning reproduction and rights, or suggestions or recommendations, you should address these to:

AUSVETPLAN – Animal Health Australia
PO Box 998
Dickson ACT 2602
ausvetplan@animalhealthaustralia.com.au

**EMERGENCY ANIMAL DISEASE HOTLINE: 1800 675 888**

The Emergency Animal Disease Hotline is a toll-free telephone number that connects callers to the relevant state or territory officer to report concerns about any potential emergency disease situation. Anyone suspecting an emergency disease outbreak should use this number to get immediate advice and assistance.

## Approved citation

Animal Health Australia (2025). *Response strategy: African swine fever* (version 5.3). Australian Veterinary Emergency Plan (AUSVETPLAN), edition 5, Canberra, ACT.

---

## Publication record

**Edition 1**

- Version 1.0, 1991

**Edition 2**

- Version 2.0, 1996 (major update)

**Edition 3**

- Version 3.0, 2007 (major update and inclusion of new cost-sharing arrangements)

**Edition 4** – none

**Edition 5**

- Version 5.0, 2020 (major update and new format)
- Version 5.1, 2022 (major update)
- Version 5.2, 2024 (update incorporating outcomes from Exercise Razorback; noting Sections 6.1.1 and 6.1.4 are greyed out and placed in square brackets pending further review)
- Version 5.3, 2025 (update to Sections 6.1.1 - 6.1.10; new Appendix 8)

# Contents

# 1 Introduction

## 1.1 This manual

### 1.1.1 Purpose

As part of AUSVETPLAN (the Australian Veterinary Emergency Plan), this response strategy contains the nationally agreed approach for the response to an incident — or suspected incident — of African swine fever (ASF) in Australia. It has been developed to guide decision making to ensure that a fast, efficient and effective response can be implemented consistently across Australia with minimal delay.

### 1.1.2 Scope

This response strategy covers ASF caused by ASF virus.

The response strategy provides information about:

- the disease (Section 2)
- the implications for Australia (potential pathways of introduction; expected social, environmental, human health and economic effects; and critical factors for a response to the disease) (Section 3)
- the agreed default policy, and guidelines for agencies, organisations and other stakeholders involved in a response to an outbreak (Section 4)
- declared areas and premises classifications (Section 5)
- biosecurity controls, including quarantine and movement controls (Section 6)
- response surveillance and establishing proof of freedom (Section 7).

The key features of ASF are described in the **African swine fever fact sheet** (Appendix 1).

### 1.1.3 Development

The strategies in this document for the diagnosis and management of an outbreak of ASF are based on risk assessment. They are informed by the recommendations in the World Organisation for Animal Health (WOAH) *Terrestrial animal health code* (Chapter 15.1) and the WOAH *Manual of diagnostic tests and vaccines for terrestrial animals* (Chapter 3.9.1). The strategies and policy guidelines are for emergency situations, and are not applicable to policies for imported animals or animal products.

This manual has been produced in accordance with the procedures described in the **AUSVETPLAN *Overview***, and in consultation with Australian national, state and territory governments; the relevant livestock industries; nongovernment agencies; and public health authorities, where relevant.

## 1.2 Other documentation

This response strategy should be read and implemented in conjunction with:

- other AUSVETPLAN documents, including the operational, enterprise and management manuals; and any relevant guidance and resource documents. The complete series of manuals is available on the Animal Health Australia website[1]
- relevant nationally agreed standard operating procedures (NASOPs). These procedures complement AUSVETPLAN and describe in detail specific actions undertaken during a response to an incident.

1 https://animalhealthaustralia.com.au/ausvetplan

NASOPs have been developed for use by jurisdictions during responses to emergency animal disease (EAD) incidents and emergencies

- relevant jurisdictional and industry policies, response plans, standard operating procedures and work instructions
- relevant Commonwealth, and state and territory legislation and legal agreements (such as the Emergency Animal Disease Response Agreement,[2] where applicable).

## 1.3 Training resources

### 1.3.1 EAD preparedness and response arrangements in Australia

The EAD Foundation online course[3] provides livestock producers, veterinarians, veterinary students, government personnel and emergency workers with foundation knowledge for further training in EAD preparedness and response in Australia.

2 https://animalhealthaustralia.com.au/eadra
3 https://animalhealthaustralia.com.au/online-training-courses

# 2 Nature of the disease

African swine fever (ASF) is a contagious disease of pigs that may result in high or low case mortality rates, fever, hyperaemia of the skin and a variety of other clinical signs, including incoordination, diarrhoea and pneumonia.

It is clinically indistinguishable from classical swine fever (CSF), and similar lesions are seen at postmortem examination. The diagnosis must be confirmed by laboratory identification and characterisation of the causative virus.

***WOAH listing***

ASF is a World Organisation for Animal Health (WOAH)–listed disease.[4]

## 2.1 Aetiology

The causative agent of ASF is ASF virus, an enveloped, double-stranded DNA virus. It is classified as the only member of the genus *Asfivirus* in the family *Asfarviridae*. ASF virus is the only DNA virus known to be transmitted by arthropods.

ASF virus isolates can be divided into more than 20 different genotypes, reflecting their geographical relatedness. Genotype does not usually indicate virulence (Malogolovkin et al 2015, Beltrán-Alcrudo et al 2017), although genotype 2 strains are typically associated with higher virulence. However, virulence is characterised by pathotype, and strains within the same genotype can range from low to high virulence. Genetically modified vaccine strains have appeared recently, and have been demonstrated to increase the risk of disease spread due to less severe clinical signs.

## 2.2 Susceptible species

All Suidae may be susceptible to infection, but disease is associated with domestic and feral pigs (*Sus scrofa*), and the Eurasian wild boar (*Sus scrofa scrofa*) (Beltrán-Alcrudo et al 2017).

In Africa, the African warthog (*Phacochoerus aethiopicus* and *P. africanus*), African bush pig (*Potamochoerus porcus*) and African giant forest hog (*Hylochoerus meinertzhageni*) are important in the epidemiology of ASF because they can be subclinically infected and may act as reservoirs of infection (Beltrán-Alcrudo et al 2017). The Timorese warty pig (*Sus celebensis timoriensis*) is also susceptible to infection with ASF virus (G Rawlin, Adjunct Professor Veterinary Science, AgriBio, La Trobe University, pers comm, 2019).

Although there are differing reports on the susceptibility of South American peccaries (especially the collared peccary, *Pecari tajacu*, and the white-lipped peccary, *Tayassu pecari*) to infection and disease (Viñuela 1985), they are considered not susceptible to infection and therefore not important in disease spread (Spickler 2018).

### 2.2.1 Zoonotic potential

ASF is not zoonotic.

---

4 WOAH-listed diseases are diseases with the potential for international spread, significant mortality or morbidity within the susceptible species, and/or potential for zoonotic spread to humans. WOAH member countries that have been free from a notifiable disease are obliged to notify WOAH within 24 hours of confirming the presence of the disease.

## 2.3 World distribution

For the latest information on the distribution of ASF, refer to the WOAH World Animal Health Information System.[5]

### 2.3.1 Distribution outside Australia

ASF is endemic in most of sub-Saharan Africa. In the latter half of the 20th century, ASF was reported in parts of South and Central America, and in Europe. The disease has since been eradicated from most of these countries, but remains endemic in feral pigs (wild boar) in Sardinia (an island of Italy).

Since 2007, ASF has become endemic in parts of eastern Europe and western Asia. In 2018, ASF was reported for the first time in China and recurred in western Europe. ASF continues to spread worldwide.

Genotype 1 strains have been associated with disease in Sardinia, and genotype 2 strains have been associated with the epizootics in Europe and Asia. The remaining genotypes are associated with disease in Africa.

The spread of the disease has become more complex with the appearance of vaccine strains of the virus.

### 2.3.2 Occurrence in Australia

There have been no outbreaks of ASF in Australia.

## 2.4 Epidemiology

### 2.4.1 Incubation period

The incubation period for ASF is said to be 4–19 days (Beltrán-Alcrudo et al 2017) and may be less than 5 days after exposure to ticks (Spickler 2018).

***WOAH incubation period***

For the purposes of the WOAH *Terrestrial animal health code*, the incubation period[6] for ASF is 15 days.

### 2.4.2 Persistence of agent and modes of transmission

***General properties***

ASF virus is an enveloped virus and is stable at a wide range of pH levels in serum-free medium (approximately pH 3.9–11.5); serum increases the stability of the virus (WOAH 2018a). The virus remains viable for extended periods when frozen but can be inactivated by heat.

Viability of ASF virus has been recorded in a number of different substrates (Appendix 2); however, this information needs to be carefully interpreted because degradation/inactivation of ASF virus is influenced by a number of environmental factors in both field and laboratory settings (see 'Environment (including windborne spread)', below).

ASF virus has been reported as being susceptible to a limited number of disinfectants, such as sodium hydroxide, citric acid, calcium hypochlorite, and glutaraldehyde in combination with a quaternary ammonium compound (Plowright et al 1994, Krug et al 2012, WOAH 2018a, Juszkiewicz et al 2019). For

---

5 https://wahis.woah.org/#/home

6 In the WOAH *Terrestrial animal health code*, 'incubation period' means the longest period that elapses between the introduction of the pathogenic agent into the animal and the occurrence of the first clinical signs of the disease (see www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/?id=169&L=1&htmfile=glossaire.htm**)**.

information on chemical agents and relevant concentrations for inactivation of ASF virus, refer to the Australian Pesticides and Veterinary Medicines Authority website.[7]

### ***Environment (including windborne spread)***

*Factors in the environment affecting ASF virus viability*

ASF virus will degrade or be inactivated in the environment. The time in which inactivation is achieved is influenced by a number of factors, including:

- matrix or substrate within which the ASF virus exists — protein and lipid substrates favour ASF virus longevity; accordingly, ASF virus may remain viable for prolonged periods in body tissues, blood and serum
- ambient temperature — ASF virus viability is favoured in cooler conditions and may be very prolonged in frozen conditions
- water content — ASF virus is susceptible to desiccation; urine and water sources favour longer-term viability
- ASF virus virulence and viral shedding — ASF virus virulence varies with genotype; more virulent viruses typically result in larger amounts of virus shedding, leading to an initial high viral titre in the environment.

These factors are summarised in Table 2.1.

**Table 2.1 Summary of factors in the environment that affect ASF virus viability**

| | Time for virus inactivation | |
|---|---|---|
| **Factor** | **Longer** | **Shorter** |
| Protein or lipid content of substrate | Higher | Lower |
| Ambient temperature | Cooler | Warmer |
| Water content | Greater | Lesser |
| Virus virulence and viral shedding | More virulent, more shedding | Less virulent, less shedding |

*ASF virus virulence and half-life*

Reduction in the quantity of virus in the environment is based on log reductions; therefore, a higher viral load initially will result in the virus persisting for longer. The half-life of the virus determines the viral load reductions, and has been documented primarily by Davies et al (2017) using the moderately virulent ASF virus isolate Ken05/Tk1 and small sample sizes.

Davies et al (2017) specifically noted differences between detection of viable (infectious) ASF virus and ASF viral DNA. For the purposes of decontamination through natural or chemical means, ASF virus rather than ASF viral DNA is more informative.

By using the half-life data provided by Davies et al (2017), the expected times that viable ASF virus may remain infectious and ASF DNA may remain detected in an indoor environment were calculated (Table 2.2) (refer also to Appendixes 2 and 3).

---

[7] https://portal.apvma.gov.au/permits

**Table 2.2 Expected times for which viable ASF virus may remain infectious and ASF DNA may remain detectable in an indoor environment**

| ASF source | Time (days) | | | |
|---|---|---|---|---|
| | 4 °C | 12 °C | 21 °C | 37 °C |
| Viable virus | 57 | 28 | 18 | 11 |
| Detection of DNA | 846 | 728 | 629 | 506 |

ASF virus titres have been reported to be significantly higher ($10^6$–$10^8$ $HAD_{50}$/mL[8]) in blood than in faeces and urine (Guinat et al 2014).

In highly contaminated cool and moist environments (e.g. pig pens with faeces, blood and urine from pigs infected with highly virulent virus) that are not cleaned and disinfected, environmental degradation of ASF virus is expected to take longer than under drier and hotter conditions. By estimating the mean initial titre of virus and extrapolating the time required to reach a titre less than 10 $HAD_{50}$/mL (the indicative infectious dose required via the oronasal route (Gallardo et al 2013)), the likely time that ASF virus will be inactivated under the specific environmental condition(s) can be determined. A reference tool is available from Animal Health Australia's emergency animal disease repository.

In one of the very few studies looking at environmental transmission (Olesen et al 2018a), very small groups of pigs were introduced into pens that had been vacated by ASF virus–infected pigs at 3, 5 and 7 days. During the time the ASF virus–infected pigs were in the pens, faeces and wet bedding were removed each day except on the day of their euthanasing (Olesen et al 2018a), and, following their removal, visible blood contamination was washed away using Virkon S. The environmental virus titre that introduced pigs were exposed to was small, as indicated by high values for Cq (quantification cycle, in real-time PCR assay). The introduced pigs did not develop clinical signs of ASF, and viral DNA was not detected in blood samples taken from the introduced pigs during the following 3 weeks. The absence of infection in the introduced pigs may be a result of low virus exposure levels. Olesen et al (2018a) noted that, had blood contamination not been washed away before introducing the pigs, the period of infectiousness from the environment may have been longer.

Contact with contaminated water (e.g. from dumping of infected carcasses into waterways) could contribute to spread of ASF in some countries (McCullough 2018). Although ASF virus may remain viable in water, it is likely to be rapidly diluted in large bodies of water and is not expected to be present at infective levels (Beltrán-Alcrudo et al 2017).

Virus has been detected in air samples collected in rooms with experimentally infected pigs from day 4 post-inoculation to day 70 post-inoculation (de Carvalho Ferreira et al 2013a). This supports the concept that aerosols may play a role in transmission within herds (aerosol infection can occur over distances up to about 2–3 m), but windborne spread is not considered likely to contribute to spread of ASF virus between herds (Beltrán-Alcrudo et al 2017, Olesen et al 2017).

***Susceptible animals***

*Live domestic animals*

The primary route of infection is oronasal. The infectious dose of ASF virus via the oronasal route is estimated to be 10 $HAD_{50}$/mL (Gallardo et al 2013).[9] ASF virus may spread to pigs through sylvatic and tick–pig cycles (see 'Arthropod vectors', below). Direct and indirect mechanisms (e.g. biting insects) may spread the virus between domestic pigs and between herds.

8 $HAD_{50}$ = 50% haemadsorbing doses

9 $HAD_{50}$ = 50% haemadsorbing doses

Results from experimental and field studies support the finding that the overall rate of spread of outbreaks of ASF in wild boar and domestic pigs is constant, but relatively slow (Schulz et al 2019), suggesting relatively low infectiousness.

Movement of infected pigs is the most important means of spread between piggeries. Spread can also occur by the movement of carcasses, contaminated products (as prohibited pig feed), aerosols, mechanical vectors and fomites (including feed, vehicles, equipment, clothing, people and insects). Within herds, direct contact with the excretions and secretions of infected pigs, and ingestion of contaminated products, are the main mechanisms of spread (Olesen et al 2017).

Infected pigs shed virus in secretions and excretions, particularly blood, as well as in saliva, lachrymal discharges, nasal discharges, faeces and urine. Virus is also reported to be in tissues and secretions from the genital tract in experimentally infected boars (Thacker et al 1984, Roszyk et al 2022). Transmission via naturally collected extended semen to gilts through artificial insemination from intramuscularly infected boars has been demonstrated to cause infection and abortions in gilts (Friedrichs et al 2022) (see also 'Semen and embryos from live susceptible animals', below).

Viral shedding reportedly occurs up to 2 days before clinical signs of disease appear (Penrith & Vosloo 2009). The reported period of viral shedding following infection varies from up to 1 month (Wilkinson 1986) to more than 70 days (Beltrán-Alcrudo et al 2017).

Animals surviving ASF infection may have ASF virus persisting for prolonged periods in tissues or blood; these animals are known as carriers or survivors. Survivors is the term used in this manual (also refer to Section 2.6). Survivors may remain persistently infected for several months (Wilkinson 1984, Oura et al 2005) and have been demonstrated to be able to transmit infection to susceptible animals for all that time (de Carvalho Ferreira et al 2013b, Gallardo et al 2015). Pregnancy does not appear to cause reactivation of virus excretion.

There is no evidence of transmission from sows to fetuses (Penrith et al 2004). Infected sows, however, may abort (Sánchez-Vizcaíno et al 2012).

*Live wild (including feral) animals*

Wild boar have been associated with disease overseas. Feral pig populations may serve as reservoirs of infection, with the possibility of secondary spread to domestic pigs.

There is no indication that a density threshold exists for ASF, or that density would reflect sustainability of an infection in feral pigs (EFSA AHAW Panel 2018). Rather, density may be one of many contributors to ASF spread in feral pigs. Indirect transmission from infected carcasses, mechanical vectors and small-scale social structures of host populations may modulate transmission dynamics (e.g. young wild boar contact many individuals within a population and may contribute to transmission (EFSA AHAW Panel 2018)).

Spread of virus via carcasses is more important than spread via infected live animals for wild boar in Europe (Chenais et al 2019) (see 'Carcasses', below).

Most backyard pigs in rural and remote northern Australia are likely to be wild-caught feral pigs, which creates another means for human-assisted spread and spread across the feral–domestic pig interface.

Extrapolating from a disease-modelling study (O'Neill et al 2020), the following elements apply in relation to infection with the highly virulent Georgia 2007 ASF virus in feral pigs:

- The feral pig population in an affected area will likely decline sharply by 60–70%.
- Current feral pig densities and population sizes may not be large enough to sustain the disease.
- Survivor pigs may play a role in persistence of ASF within feral pig populations, especially where the transmission rate is low.

- In the hot northern Australian environment, ASF virus in carcasses is unlikely to remain viable for extended periods.
- In the cooler southern states, ASF virus may remain viable longer in infected feral pig carcasses. However, in general, the feral pig population is much smaller and less dense in the south than in northern New South Wales and Queensland, so disease persistence within these populations is less likely.

*Carcasses*

ASF virus persists in blood and tissues for long periods after death. It is not inactivated by postmortem autolysis, putrefaction or changes in pH (Beltrán-Alcrudo et al 2017).

Probst et al (2017) suggested that the behaviour of wild boar towards pig carcasses may contribute to the spread of disease. They found that, in Germany, rooting and foraging behaviours around and underneath wild boar carcasses are more likely to contribute to disease transmission to susceptible wild boar than was scavenging. Wild boar, regardless of their age, were possibly more interested in the soil surrounding and underneath the carcasses than in the carcasses themselves. These authors also indicated that ASF virus transmission from contact with an infected carcass does not necessarily occur within the first days after the death of an infected wild boar, but may occur from carcasses in a more advanced state of decomposition.

Dead pigs drifting ashore in China (FAO 2019a) and Taiwan (FAO 2019b) tested positive to ASF virus, with 100% sequence matching to the ASF virus found in mainland China. Accordingly, contaminated dead pigs (very unlikely) and pig products (unlikely) that wash up onto Australian shores represent a potential pathway of introduction to feral pigs that may scavenge them, or root and forage in contaminated soil and material around and under them.

***Animal products***

*Meat and meat products, casings — including use as animal feed*

ASF virus can remain viable for many months in a protein environment, such as raw, unprocessed, frozen meat (Penrith & Vosloo 2009). The virus has been recovered after 150 days from contaminated meat kept at 4 °C, after 104 days from meat kept at –4 °C, and after 188 days from bone marrow stored at –4 °C (MacDiarmid 1991). Dee et al (2018) simulated the intercontinental transport of ASF virus–contaminated materials, including moist cat and dog food and pork casings, and found that ASF virus remained viable following the 37-day trial at both 4–14 °C and 10–20 °C. Other studies have shown that ASF virus is sensitive to some combined treatments using heat, alkaline pH and peroxide that could be used during the production of spray-dried porcine plasma, which is used in the production of some animal feeds (Kalmar et al 2018).

Brining alone is insufficient to inactivate ASF virus in hams (MacDiarmid 1991). However, cooking pork to a well-done stage may inactivate the virus, provided it has been heated throughout to 100 °C for at least 30 minutes. Although dry-cured hams are not cooked, the amount of ASF virus in Parma, Serrano and Iberico hams dry-cured under specific conditions is significantly reduced by the 9–12-month curing process (Mebus et al 1997).

Viable virus has been recovered from putrefied serum stored at room temperature for 15 weeks, and from blood stored at 4 °C for 18 months to 6 years (Sánchez-Vizcaíno et al 2009, 2012).

In the 1985 outbreak in Belgium (Biront et al 1987), the European Union required that pig meat produced in the infected area be placed in hermetically sealed containers and held at a temperature of at least 60 °C for 4 hours, with at least 30 minutes of this period above 70 °C.

***Animal byproducts***

*Hides, skins and trophies*

ASF virus may be present in bristles and skin (including trophies) from infected pigs.

ASF virus in bristles may be inactivated by boiling for at least 30 minutes, or immersion for at least 24 hours in a solution of 1% formaldehyde (WOAH 2018b).

ASF virus in skins may be inactivated by:

- boiling in water for long enough that matter other than bone, tusks and teeth are removed
- soaking with agitation in a 4% (w/v) solution of sodium carbonate (washing soda) maintained at pH 11.5 or above for at least 48 hours
- soaking with agitation in a formic acid solution (100 kg salt (NaCl) and 12 kg formic acid per 1000 L of water) maintained below pH 3.0 for at least 48 hours (wetting and dressing agents may be added)
- treating raw hides for at least 28 days with salt (NaCl) containing 2% sodium carbonate (washing soda), or treating with 1% formalin for a minimum of 6 days (WOAH 2018b).

*Prohibited pig feed*

Ingestion of pig meat or pig meat products infected with ASF virus is an important means of ASF virus spread, especially in the first outbreak in a country. Many ASF outbreaks that have occurred in ASF-free countries or zones were caused by feeding waste food products derived from infected pigs to domesticated pigs (Sánchez-Vizcaíno 2010). The first cases of ASF in Malta, Brazil and Sardinia were in pigs fed on prohibited pig feed and were close to international airports or seaports. The 2007 introduction of ASF to Georgia is thought to have occurred from feeding waste at international harbours as swill (Rowlands et al 2008).

The nationally agreed prohibited pig feed definition lists 100 °C for 30 minutes as an approved process for treatment of prohibited pig feed.[10] This exceeds the WOAH requirements for inactivation of ASF virus.

#### ***Semen and embryos from live susceptible animals***

Semen collection centres supply many sow herds with fresh semen, creating the potential for widespread dissemination of ASF virus through semen. High biosecurity standards in major commercial boar studs may offset this risk. With evidence of infection pathways through artificial insemination (Friedrichs et al 2022), controls around the use and movement of genetic materials are included in this manual.

The International Embryo Transfer Society has indicated that there is not enough information to reach a conclusion about the risk of transmission of ASF virus via embryos.

#### ***Specimens***

ASF virus may remain viable in laboratory specimens (e.g. frozen tissue samples from infected animals). However, these are not expected to play a role in the transmission of ASF.

#### ***Waste products and effluent***

While specific information on ASF virus in waste and effluent is limited, the section 'Environment (including windborne spread)', above, contains general information on the viability of ASF virus in blood, urine and faeces.

#### ***Equipment, including personal items***

Transfer of ASF virus by fomites, including bedding, feed, equipment, clothes and footwear, is a proven method of spread of ASF (Penrith & Vosloo 2009). People, especially those handling pigs or pig products (e.g. farm workers, abattoir workers, veterinarians), veterinary instruments (especially hypodermic needles) and vehicles that have carried infected pigs have all been implicated in transfer of virus (Wilkinson

[10] https://animalhealthaustralia.com.au/?s=prohibited+pig+feed

1986). There is also the risk of disease spread through fomite transfer through vehicle movements, including stock trucks, feed trucks and visitor vehicles that drive through contaminated roadways.

Krug et al (2018) explored the disinfection of ASF virus on steel, plastic and concrete surfaces, which are commonly found in pork packing plants. They found that dried blood on equipment strongly reduced the efficacy of sodium hypochlorite. This reinforces the need for surfaces to be adequately cleaned to remove organic material before being disinfected.

***Arthropod vectors***

In Africa, ASF virus is maintained in a sylvatic cycle involving warthogs and argasid (soft) ticks of the *Ornithodoros moubata* complex (which are found in warthog burrows). Trans-stadial and transovarial transmission of the virus occurs in these ticks (Bellini et al 2016, Spickler 2018). Transmission between *O. moubata* complex ticks and domestic pigs is also known to occur in parts of Africa (as a tick–pig cycle). The same may apply to transmission of ASF virus in wild boar in Europe (Costard et al 2013; Guinat et al 2016a, cited in Schulz et al 2017). *Ornithodoros* ticks play an important role in maintaining infection but are not thought to contribute to the geographical spread of the virus (Bellini et al 2016).

On the Iberian Peninsula, the soft tick *Carios erraticus* (formerly *O. erraticus*) contributed to transmission of the disease in outdoor pig production systems and served as a reservoir of virus for 1 year in previously infected areas that had been depopulated. This resulted in persistence of the virus for 5 years (Boinas et al 2011). Trans-stadial, but not transovarial, transmission has been demonstrated in *C. erraticus* (EFSA AHAW Panel 2010).

The role of argasid ticks in other regions is either less important or has not been demonstrated. The only *Ornithodoros* ticks known to be present in Australia are the kangaroo soft tick (*O. gurneyi*), the penguin tick (*O. capensis*) and *O. macmillani*, which has been found in tree hollows and the nests of Australian cockatoos (Barker et al 2014). None of these ticks is known to feed on pigs.

Although the ornate kangaroo tick (*Amblyomma triguttatum*) is found on pigs, there is no evidence that ixodid (hard) ticks such as this are involved in transmission of ASF virus (de Carvalho Ferreira et al 2014, Spickler 2018).

Bloodsucking insects such as mosquitoes and biting flies (e.g. tabanids, *Stomoxys calcitrans*) may be involved in disease transmission. Olesen et al (2018b) suggested that *S. calcitrans* feeding on viraemic pigs may cause the mechanical spread of ASF within herds, and possibly between herds as a result of its flight range of 3.2 km, which may extend to 29 km, based on laboratory extrapolations (Bailey et al 1973). Such insects can carry high levels of virus for 2 days (Mellor et al 1987). *S. calcitrans* can transport infectious virus for at least 12 hours, and DNA can be detected in fly bodies up to 36 hours after feeding (Olesen et al 2018b).

Oleson et al (2018c) found that, in addition to *S. calcitrans* acting as a mechanical vector of ASF virus (Mellor et al 1987), infection may occur in pigs orally ingesting flies fed blood contaminated with ASF virus. In this experiment, pigs that ingested 20 blood-fed flies transmitted the disease.

The laboratory study findings of Oleson et al (2018c) and Bailey et al (1973) suggest that ingestion of biting flies that had fed on contaminated blood serves as a potential source of infection between naive pig herds and infected populations.

A strong seasonality of ASF outbreaks in domestic pigs, with a peak in summer, was observed in Estonia, Latvia, Lithuania and Poland. A similar seasonal activity of biting insects was seen, raising the question of whether biting insects have a role in ASF transmission (Miteva et al 2020). More research is required to understand the role of biting insects in ASF transmission.

In a 2020 review, Blome et al considered that biting insects have limited involvement in disease transmission between holdings or areas. Nevertheless, within a pen or shed on the same farm, or a smaller affected region, their role cannot be excluded (although it is unlikely).

***People***

ASF is not zoonotic, but people may contribute to the mechanical transmission of ASF virus between pigs by the movement of contaminated clothing, footwear, equipment and so on, as well as by shedding virus particles from the skin (including nasal passages).

In addition, human-assisted movements of live infected pigs and contaminated pig products are key transmission pathways between domestic pig herds and feral pig populations.

### 2.4.3 Factors influencing transmission

In Europe, ASF was reported to spread at a rate of approximately 1–3 km per month in wild boar (ProMED-mail 2019), but it is not known if this is relevant under Australian conditions. Human-associated movements of infected pigs and/or contaminated pork products, and subsequent feeding of them to pigs in Europe and China, are believed to have contributed to the spread of ASF over large distances in short timeframes.

Transmission by indirect contact appears to be less effective than by direct contact with infected animals (Pietschmann et al 2015, Guinat et al 2016a,b).

## 2.5 Diagnostic criteria

### 2.5.1 Clinical signs

ASF is a highly variable disease, with several forms. The variability is largely due to differences in virulence among the many strains of the virus, but may also be influenced by host age, the amount of virus and the level of herd immunity.

Clinical findings of the various forms of the disease are drawn from the published literature and presented below. Extreme mortality rates and fever in pigs of all ages signal a highly virulent disease in a naive herd.

Large numbers of pigs may become infected simultaneously and display a range of clinical signs depending on the stage of infection, severity of the disease process and virulence of the virus.

Early diagnosis of an outbreak may be delayed if ASF is present in the mild form, or if the initial infections are in small pig herds or feral pigs.

***Peracute form***

Pigs may be found dead with no prior clinical signs.

***Acute form***

Clinical signs include high fever (40.5–42.0 °C), abortion in pregnant sows, depression, listlessness, cyanosis, anorexia, vomiting, diarrhoea, haemorrhages in the skin (redness of skin on ears, abdomen and legs), death in 6–13 days (but sometimes up to 20 days) and mortality rates up to 100%.

***Subacute and chronic forms***

- Moderately virulent or low-virulent viruses may show less intense clinical signs for much longer (5–30 days).
- Clinical signs include weight loss, arthritis, intermittent fever, death in 15–45 days, respiratory signs, mortality rates in the range 30–70% and chronic skin ulcers.

### 2.5.2 Pathology

***Peracute form***

There may not be many postmortem findings because the pigs may die before any gross pathology is seen.

***Acute form (not all lesions are seen, depending on the virus strain)***

Findings may include:

- pronounced haemorrhages in the gastrohepatic and renal lymph nodes
- perirenal oedema
- petechiae of the renal cortex, medulla and pelvis
- congestive splenomegaly
- oedematous areas of cyanosis in hairless parts
- cutaneous ecchymoses on the legs and abdomen
- excess of pleural, pericardial and/or peritoneal fluid
- petechiae in the mucous membranes of the larynx and bladder, and on visceral surfaces of organs
- oedema in the wall of the gall bladder and mesenteric structures of the colon, and adjacent to the gall bladder.

***Subacute and chronic form***

Findings may include:

- focal caseous necrosis and mineralisation of the lungs
- enlarged lymph nodes.

***Microscopic lesions***

Extensive necrosis of lymphatic tissue is common and may be accompanied by haemorrhage and karyorrhexis of granular lymphocytes (nuclear fragmentation and degeneration). Necrosis is more severe and frequent with ASF than with CSF. There is vasculitis, with degeneration of endothelium and fibrinoid degeneration of artery walls in all organs. There is nonsuppurative inflammation of the brain, spinal cord and spinal nerves.

***Pathogenesis***

The pathogenesis of ASF virus was reviewed by Blome et al (2013). In pigs, the virus replicates in the mononuclear phagocyte system,[11] particularly in monocytes and macrophages. Massive destruction of macrophages is thought to play a major role in the pathogenesis of the disease. Different virus isolates show no general differences in cell tropism or organ distribution; however, a significant increase in the severity of tissue destruction is seen with increasing virulence (Oura et al 1998).

### 2.5.3 Differential diagnosis

The following diseases and conditions should be considered in a differential diagnosis of ASF:

- CSF
- Aujeszky’s disease
- *Actinobacillus pleuropneumoniae* infection
- erysipelas

---

[11] Previously known as the reticuloendoethelial system.

- salmonellosis
- various poisons, including warfarin
- pasteurellosis/pneumonia
- mulberry heart disease
- isoimmune thrombocytopenic purpura
- viral encephalomyelitis
- porcine reproductive and respiratory syndrome
- porcine dermatitis and nephropathy syndrome.

### 2.5.4 Laboratory tests

Because of the considerable overlap in the clinical and pathological signs seen in ASF and many other pig diseases, the diagnosis must be confirmed by identification and characterisation of the causative virus. Laboratory tests should be done to exclude the principal differential diagnoses.

If an outbreak is confirmed to be caused by ASF virus, regulatory requirements (e.g. for handling and reporting) apply because this agent is classified as a Security Sensitive Biological Agent (SSBA).[12] However, emergency situations, including emergency animal disease outbreaks, can be exempted from some SSBA regulatory requirements. Clarification should be sought from the SSBA officer at the facility concerned.

***Samples required***

Specimens required for identifying the agent, serological testing and histopathology are as follows:

- identifying the agent
  - whole blood from live, suspect animals in EDTA anticoagulant
  - unpreserved tissues collected aseptically at postmortem — tonsils, spleen, lymph nodes, lung, kidney and bone marrow
  - swabs from the oral cavity, tonsils and nasal cavity (from either live or dead pigs), placed in viral transport media
- serological testing
  - sera from animals suspected of having subacute or chronic disease
- histopathology
  - a full range of tissues in neutral-buffered formalin.

Tissue samples should be taken from affected pigs that have been killed and from pigs that have recently died. To minimise the risk of contamination, tissue samples should be taken during postmortem examination as aseptically as possible and without delay.

***Sampling feral pigs***

Sampling wild or feral animals can present several challenges that make the usual approach to sampling impracticable. Remote locations, lack of a cold chain, animals found dead and in varying states of decomposition, and untrained operators are all potential limitations.

Conventional approaches to sampling are always preferred where possible. However, to ensure that testing can proceed under challenging circumstances, alternative approaches can be used. Sampling of blood or peritoneal fluid from animals found (recently) dead or killed is expected to be enough to detect acute

12 www.health.gov.au/SSBA

infection. Intact long bones from dead or decomposed animals can also be submitted for extraction and testing of bone marrow, in which the virus can remain viable for long periods.

The alternative methods have performed adequately in surveillance of wild suids in several countries (Randriamparany et al 2016, Carlson et al 2018), but lack the full validation of conventional methods and may lack some sensitivity in practice. If conventional approaches to sampling are not available, use of swabs placed in viral transport media is preferred to card-based methods.

Proprietary swabs such as those from PrimeStore, COPAN eNAT, COPAN FLOQSwab and GenoTube Livestock, or Whatman FTA cards, provide a method for sample collection that may inactivate, stabilise and preserve viral DNA without the need to refrigerate the sample.

Some swabs are used dry, and others contain a liquid chemical preservative.

The manufacturer of the GenoTube swab recommends that samples be stored between 15 °C and 30 °C, which can be a challenge in field environments with temperatures consistently over 30 °C.

It is important to be aware that, although some of these sampling systems claim inactivation of the agent (some do not), this capability should not be assumed to be 100% effective. Adequate biosecurity measures must be taken in transporting all samples, regardless of whether the sampling system claims inactivation.

***Transport of specimens***

Specimens should be submitted in accordance with agreed state or territory protocols. Specimens should initially be forwarded to the state or territory laboratory for appropriate analysis, and assessment of whether further analysis will be required by the CSIRO Australian Centre for Disease Preparedness (CSIRO-ACDP), Geelong.

If the state or territory laboratory deems it necessary, duplicate samples of the specimens should be forwarded to CSIRO-ACDP for emergency disease testing, after the necessary clearance has been obtained from the chief veterinary officer (CVO) of the state or territory of the suspect case, and after the CVOs of Victoria and Australia have been informed about the case and the transport of the specimens to Geelong (for the first case). Sample packaging and consignment for delivery to CSIRO-ACDP should be coordinated by the relevant state or territory laboratory.

For further information, see the **AUSVETPLAN Management manual: *Laboratory preparedness***.

*Packing specimens for transport*

Blood samples and unpreserved tissue specimens should be chilled and transported with frozen gel packs. Samples submitted as GenoTube swabs or FTA cards will not require chilling. For further information, see the **AUSVETPLAN Management manual: *Laboratory preparedness***.

### 2.5.5 Laboratory diagnosis

The initial approach to ASF diagnosis is screening by real-time PCR (qPCR), as this method is rapid and sensitive, and can be scaled up readily if required. An antigen enzyme-linked immunosorbent assay (ELISA) is also available, although rarely used. Virus isolation will be attempted on PCR positive specimens. Further characterisation and genotyping by sequence analysis can be carried out on primary samples or on isolates.

Serology is also available. Although antibody serology generally plays a minor role in the initial diagnosis, it is likely to be used to define the nature and extent of any outbreak, and in the proof-of-freedom phase.

*LEADDR*

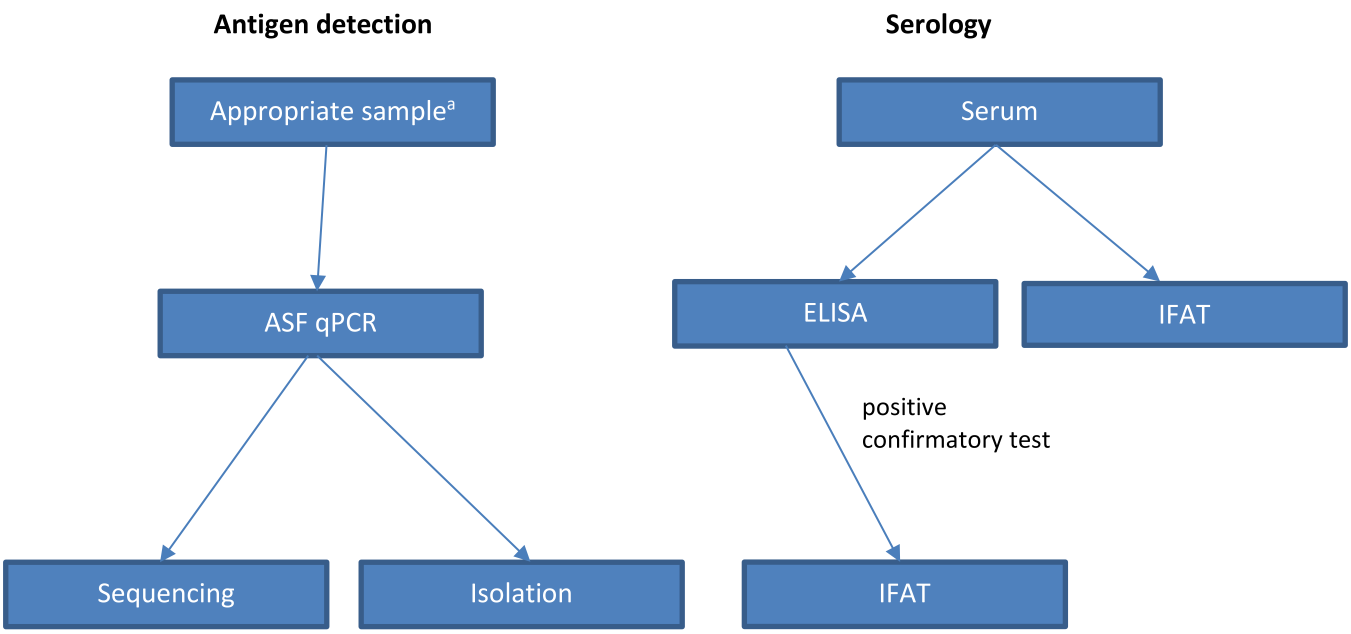
The role of the Laboratories for Emergency Animal Disease Diagnosis and Response (LEADDR) network is to provide frontline screening capability at jurisdictional laboratories. The network will also play a role in reviewing initial and ongoing laboratory findings, including test results, and providing advice to the

Consultative Committee on Emergency Animal Diseases and its working groups on follow-up laboratory needs and strategies.

*CSIRO-ACDP tests*

The testing algorithm used by CSIRO-ACDP is shown in Figure 2.1. Further details of tests currently available at CSIRO-ACDP are shown in Table 2.3.

**Figure 2.1 Current approach to diagnostic testing for ASF at CSIRO-ACDP**




ASF = African swine fever; ELISA = enzyme-linked immunosorbent assay; IFAT = immunofluorescent antibody test; qPCR = real-time polymerase chain reaction

a Ideally, EDTA blood or postmortem samples (spleen, lymph node, tonsil, kidney). Other possible samples include tissue- or swab-based sampling systems such as PrimeStore and GenoTube, or paper-based approaches such as FTA cards and 3MM filter paper.

**Table 2.3 Laboratory tests currently available at CSIRO-ACDP for diagnosis of African swine fever**

| Test | Specimen required | Test detects | Time taken to obtain result |
|---|---|---|---|
| **Agent detection** | | | |
| qPCR | EDTA blood/tissue | Viral genome | <1 day |
| Virus isolation | EDTA blood/tissue | Virus | 1–2 weeks |
| ELISA | EDTA blood/tissue | Antigen | 1 day |
| **Agent characterisation** | | | |
| PCR and sequencing (genotyping) | EDTA blood/tissue/virus isolate | Viral genome | 2–3 days |
| **Serology** | | | |
| ELISA | Serum | Antibody | 1 day |
| IFAT | Serum | Antibody | 1 day |

EDTA = ethylenediaminetetraacetic acid; ELISA = enzyme-linked immunosorbent assay; IFAT = immunofluorescent antibody test; PCR = polymerase chain reaction; qPCR = real-time PCR

Source: Information provided by CSIRO-ACDP, 2021 (refer to CSIRO-ACDP for most up-to-date information).

## 2.6 Resistance and immunity

The large variation in the clinical and pathological picture of ASF in different parts of the world is mainly due to variations in virulence of different strains of the virus, rather than to differences in the immune statuses of the pig populations.

Approximately 40% of the pig population surveyed in Mozambique demonstrated some degree of innate resistance; however, this was highly variable (Penrith et al 2004). This may simply be a function of virus evolution in a population over a sustained period.

Infection with ASF virus genotype 2 (currently circulating in Eurasia) typically leads to a peracute or acute infection, with close to 100% individual mortality 1–10 days after exposure (EFSA 2014, Sánchez-Vizcaíno et al 2015). A less common form of infection is possible, where individuals develop a persistent infection that may be accompanied by signs of subacute or chronic disease, invariably leading to death. Animals have the potential to excrete virus in association with the resurgence of viraemia several months post-infection (Ståhl et al 2019).

Infection with the low-virulent or moderately virulent Netherlands ’86 strain of ASF virus showed a 70% mortality rate (Eblé et al 2019). Eblé et al (2019) and Gallardo et al (2015) found that both clinical and subclinical chronically infected domestic pigs could transmit the infection through contact with susceptible pigs, leading to acute infection up to 72 days post-inoculation. However, other studies (Gallardo et al 2018, Petrov et al 2018) found that infection could not be transmitted from survivors to sentinels.

### 2.6.1 Survivor pigs

There is no definition in the literature of an ASF virus carrier pig. Rather, the term ‘carrier’ seems to have been used to imply ‘survivor’. Ståhl et al (2019) applied the term ‘survivor’ to individuals that survive the initial ASF infection. Survivor is the term adopted by this AUSVETPLAN response strategy.

According to Ståhl et al (2019), there are 2 types of survivors:

- ‘… chronically infected pigs which eventually succumb to the disease, and which may excrete virus in association with resurgence of viraemia and, in most cases, reappearance of clinical signs of the disease. These infections have generally been associated with low virulent, often non-haemadsorbing viruses.
- pigs which clear the infection independently of virulence of the virus. These pigs are not persistently infected and will not present with prolonged virus excretion beyond 30 to 40 days in the majority of cases...’

The proportion of survivors is variable and is higher with less virulent viruses (Sánchez Botija 1962, Hess 1981).

In reviewing both epidemiological and experimental studies, Ståhl et al (2019) could find no evidence for any significant role for survivors of ASF virus infection in the epidemiology of the disease.

However, a recent study on ASF virus transmission and persistence in wild boar (O’Neill et al 2020) used modelling to demonstrate 2 key factors: that environmental transmission from infected carcasses is important in producing a disease outbreak, and that the rate of transmission is important to the disease persisting in low-density wild boar populations. To explain the persistence of the disease in the wild boar population in the field, in the face of highly virulent ASF virus challenge, the disease model had to be adjusted to include survivors at a rate of 1–3%.

It is possible that there are other explanations for why the model did not fit the data unless survivor pigs were included in the modelling. Further research is required to better understand the role of survivor pigs in the epidemiology of the disease.

Based on a study in Spain, and extrapolating to the Australian context, outbreaks in the wild will likely be driven by environmental contamination from infected feral pig carcasses. However, a rapid decrease in population numbers may result in reduced spread of ASF virus (O'Neill et al 2020). Disease modelling suggests that scavengers are more likely to help the degradation of carcasses than to assist the spread of ASF virus (O'Neill et al 2020).

## 2.7 Vaccination

There is currently no commercially available vaccine for ASF. This is primarily due to the complexity of the immune response to this virus (Sánchez-Vizcaíno et al 2009).

## 2.8 Treatment of infected animals

There is no effective treatment for infected animals. Palliative treatment may alleviate the clinical signs, but will not prevent the spread of infection and may make the detection of infected animals more difficult. Infected animals will be triaged for destruction.

## 2.9 Control overseas

In Malta and the Dominican Republic, ASF was eradicated by the total elimination of pigs from both countries (Geering et al 1995).

Other measures used and recommended for successful eradication overseas include destruction of infected and in-contact animals, sanitary carcass disposal, disinfection of infected premises and contaminated items, quarantine and movement controls, and prevention of contact between wild suids and domestic pigs (FAO 2009).

Preventive measures to mitigate the spread of ASF in pig farming systems were reviewed by Bellini et al (2016). The study identified the following disease pathways for transmission of ASF:

- direct pig-to-pig contact
- consumption of contaminated feed (feeding of prohibited pig feed)
- vehicles and other fomites, such as clothing, footwear and surgical equipment
- workers and visitors
- slurry
- genetic materials
- bites from ticks.

Although not included by Bellini et al (2016), bloodsucking insects such as mosquitoes and biting flies (e.g. tabanids, *Stomoxys calcitrans*) have been suggested as being involved in disease transmission (see 'Arthropod vectors' in Section 2.4.2).

To address and mitigate these disease pathways, the following measures have been used in eradication programs:

- physical isolation of infected herds
- appropriate movement controls on animals, products, people, vehicles and equipment
- appropriate disposal of carcasses, manure, bedding material and slurry
- ban on feeding prohibited pig feed.

Where ASF virus was present in ticks (on the Iberian Peninsula), eradication of the virus from domestic pig populations took decades. Pig housing that was identified to contain infected ticks was destroyed or isolated as part of this eradication campaign (Spickler 2018).

In the 2018 outbreak in the Czech Republic, authorities managed to prevent introduction of ASF to their domestic pig population, and to control and eradicate the disease from wild boar. Measures implemented included compulsory notification of all dead pigs in the infected area, movement controls, a ban on backyard pigs in the infected area, active search and removal of wild boar carcasses, intensive hunting of wild boar by trained hunters, laboratory investigation of all dead and hunted wild boar, and safe disposal of dead wild boar using rendering (Czech Republic State Veterinary Administration 2018).

Belgium declared its first cases in wild boar in 2018. The cases were thought to be linked to human-mediated activity related to the Czech Republic. Belgium’s preventive and control measures led to there being no confirmed cases in domestic pigs, and after 26 months, Belgium regained its ASF-free status at the European level in 2020 (Licoppe et al 2023).

The European Food Safety Authority Panel on Animal Health and Welfare suggested using wild boar management strategies specific to the different stages of an ASF outbreak (EFSA AHAW Panel 2018). The authors proposed the following:

- In the early stages of an outbreak, keep populations in the infected area undisturbed (e.g. ban hunting, stop harvesting crops) to minimise dispersal of animals, and drastically reduce the wild boar population in surrounding uninfected areas. Passive surveillance (through collection of carcasses) should be used to monitor the epidemic.
- As the epidemic subsides, reconsider more active population management measures such as culling to reduce populations.

# 3 Implications for Australia

## 3.1 Potential pathways of introduction

Potential routes for the introduction of African swine fever (ASF) into Australia include the importation or arrival of:

- contaminated pork and pork products
- contaminated porcine genetic material
- contaminated fomites
- infected pigs or pig carcases.

Since Australia has strict import conditions in place, the introduction of ASF through the legal importation of these commodities is very unlikely. However, the illegal introduction of contaminated pork or pork products that are illegally fed to pigs or accessed by pigs poses a significant risk.

## 3.2 Social and economic effects

Economic impacts from an incident of ASF in Australia would result from disease-induced mortalities, production losses, costs and losses resulting from domestic market disruptions, decreased consumer confidence, export market losses and disease control costs such as welfare destruction and abattoir disruption.

Disease control measures, particularly movement controls, will disrupt supply chains, with potential severe impacts. Industries associated with the pig production supply chain (e.g. grain production industry) or related industries (e.g. game meat industry) would be affected. It has been estimated that:

- a small-scale outbreak of ASF in domestic pigs followed by eradication of the disease would cost $117 million to $263 million
- a small-scale outbreak of ASF in feral pigs followed by eradication of the disease would cost $101 million to $127 million
- endemic ASF would cost about $0.4 billion to $2.5 billion (Slatyer et al 2023).

Trade in products from non-ASF-susceptible species (e.g. beef, sheep meat, horse meat, some rendered meals) may be jeopardised because of ASF in feral or domestic pig populations and international phytosanitary measures requiring freedom from ASF.

Social impacts of an outbreak may arise from the disease, and from the response measures imposed. This includes loss of livelihoods, loss of animals, loss of recreational activities (e.g. pig hunting), uncertainty around future earnings and the stigma associated with the disease. There will also be concerns about the welfare of affected animal populations, the ethics of destroying large numbers of uninfected pigs and the humaneness of the response measures applied to them. These factors may affect the mental health of individuals and lead to substantial economic impacts in areas with a heavy reliance on pig production. Indigenous communities that use feral pigs as a source of food may also be affected.

## 3.3 Critical factors for response

The critical factors for a response to ASF in Australia include the following (refer to Appendix 4 for more detail):

- ASF is a highly variable disease. It can vary from a disease with high morbidity and high case mortality to a very mild disease.
- Given the similarity of ASF to many endemic diseases, laboratory confirmation is required for diagnosis.
- During the acute phase of the disease, ASF virus is shed in high concentrations in secretions and excretions containing blood.
- Pigs infected by mild virus strains or that have survived acute disease may shed virus for more than 1 month following recovery.
- All domestic and feral pig species present in Australia are susceptible to infection.
- Early diagnosis will be limited by
  - early detection in cases of mild genotypes that may not display obvious clinical signs
  - slow recognition or response to clinical signs
  - speed of sampling and dispatch to certified diagnostic laboratories.
- The frequency and volume of national pig movements in the pork industry are sufficiently high that a delay in early detection and diagnosis may be associated with substantial spread of the disease, including across jurisdictions and involving processing facilities.
- Transmission of ASF in Australia will most likely occur via the movement of animals, animal products and fomites spread by vehicles and people with accessibility to pigs. ASF virus is less likely to be transmitted over long distances without human assistance.
- No vaccine or effective treatment is available.
- There are no public health implications.
- ASF virus may remain viable for extended periods under some Australian environmental conditions (e.g. in cooler, wetter areas).
- Cleaning of pig pens and removal of all animal secretions and excretions (e.g. faeces, urine, blood) is essential if the pens are to be disinfected. Conversely, natural degradation of the virus can be expected without cleaning and disinfection; however, the time for this to occur is highly variable.
- Aerosols do not play a significant role in disease transmission between herds, but are important for transmission within herds and between animals in close contact.
- Trade in animal products will be affected.

# 4 Policy and rationale

## 4.1 Introduction

African swine fever (ASF) is a World Organisation for Animal Health (WOAH)–listed disease that has the potential for rapid spread, causing significant production losses. It is of major importance in international trade in pigs and pig products.

### 4.1.1 Summary of policy

The default policy is to contain, control and eradicate ASF in the shortest possible time, while minimising social and financial disruption, using a stamping-out policy.

This approach will be supported by a combination of strategies, including:

- an *immediate epidemiological assessment* of the situation
- *rapid recognition* and *laboratory confirmation* of cases
- *implementation of legislated declared areas* for disease control purposes
- *application of biosecurity (including quarantine) and movement controls* over susceptible animals, animal products and byproducts, and fomites — supported by a robust permit system — to minimise spread of infection
- *tracing and surveillance* to help determine the source and extent of infection (including, as necessary, in feral pigs)
- *valuation for compensation*, followed by destruction and disposal of pigs, property and things on infected premises (IP), and of other high-risk pigs, property and things, based on a *risk assessment*
- *sanitary disposal* of infected pigs, products and byproducts that are not suitable for treatment to inactivate the virus
- *decontamination* of IP, dangerous contact premises (DCP), dangerous contact processing facilities (DCPFs) and approved disposal sites (ADSs)
- *decontamination and/or disposal of fomites* to eliminate the virus
- proactive *management of animal welfare issues* that arise from the disease or the implementation of disease control measures
- *recall* of animal products likely to be contaminated (unless deemed unnecessary by a risk assessment)
- *surveillance and control* of feral animal populations, as appropriate
- *surveillance of tick vector populations*, if implicated in the epidemiology of the incident
- *relief and recovery programs* to minimise animal welfare and human socioeconomic issues that could inhibit the effectiveness of the response
- a *public awareness campaign*, including food safety messaging
- *industry support* to improve understanding of the issues, facilitate cooperation and address animal welfare issues.

Additional measures that may be used, if warranted, to minimise impacts on industry and manage the outbreak include zoning and compartmentalisation.

### 4.1.2 Case definition

For the purpose of this manual, a case of ASF is defined as laboratory-confirmed infection with ASF virus in a pig.

**Notes:**

- Positive serology in the absence of genome or antigen does not constitute a case but warrants further investigation to determine if there is evidence of infection.
- AUSVETPLAN case definitions guide when a response to an emergency animal disease (EAD) incident should be undertaken. AUSVETPLAN case definitions do not determine when international reporting of an EAD incident is required.
- At the time of an outbreak, revised or subsequent case definitions may be developed with the agreement of the Consultative Committee on Emergency Animals Diseases (CCEAD).

Information on the laboratory confirmation of infection is provided in Section 2.5.4.

### 4.1.3 Cost-sharing arrangement

In Australia, ASF is a Category 3 EAD in the Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Responses (EAD Response Agreement — EADRA).[13] When cost sharing of the eligible response costs of an incident is agreed, Category 3 diseases are those for which costs will be shared 50% by government and 50% by industry.

### 4.1.4 Criteria for proof of freedom

Any approach to declaring proof of freedom should be based on the WOAH *Terrestrial animal health code* chapters on ASF (Chapter 15.1) and animal health surveillance (Chapter 1.4).

See Section 7 for details on establishing proof of freedom.

### 4.1.5 Governance

Governance arrangements for the response to EADs are outlined in the **AUSVETPLAN *Overview***.

Information on the responsibilities of a state coordination centre and local control centre is available in the **AUSVETPLAN Management manual: *Control centres management* (Part 1 and Part 2)**.

## 4.2 Public health implications

ASF virus does not infect humans. Pork products remain safe for human consumption.

[13] Information about the EAD Response Agreement can be found at https://animalhealthaustralia.com.au/eadra.

## 4.3 Control and eradication policy

The policy is to contain, control and eradicate ASF through stamping out, and to re-establish the ASF-free status of Australia as quickly as possible. Destruction, disposal and decontamination activities will be carried out in association with movement controls, tracing and surveillance. Zoning and compartmentalisation (see Section 4.3.4) may be used, where appropriate. The selected strategies will take into account that the disease is spread by direct contact with infected pigs and ingestion of contaminated products, indirectly through contact with contaminated fomites, mechanical vectors (including insects such as biting flies and mosquitoes), and, in some environments, by biological vectors such as ticks.

A stamping-out policy is preferred because international experience has shown it to be effective. This approach also enables a more rapid return to freedom from ASF under the guidelines of the WOAH *Terrestrial animal health code.*

Within this overall policy, the strategies selected will depend on a thorough assessment of the epidemiological situation at the time. They will need to be reassessed during an outbreak and altered if necessary.

### 4.3.1 Epidemiological assessment

Epidemiological investigation or assessment draws on multiple sources of information to build understanding of the disease and how it is behaving in an outbreak. This helps inform response decision making.

In the initial response to ASF, the key objectives for an epidemiological assessment will be to identify:

- the spatial distribution of infected and noninfected (domestic and feral) animal populations
- potential vectors involved
- virulence and phylogenetics of the virus strain present (to aid identification of the source)
- the likely or confirmed source of infection
- pathways of spread and their risk profiles
- traceability data of pigs, pig products and fomites
- the likely silent spread phase, the likely extent of spread, the size of the outbreak and the slope of the epidemic curve (and estimated dissemination ratio), using modelling where available
- risk factors for the presence and likelihood of infection, disease spread and susceptibility to disease (e.g. weather, vectors, feral pig populations, interactions between feral pig populations and kept pig populations, on-farm biosecurity, quality of movement records).

Epidemiological assessment, and tracing and surveillance activities (see Section 4.3.3) in an EAD response are interrelated activities. Early findings from tracing and surveillance will be inputs into the initial epidemiological assessment (e.g. considering the spatial distribution of infection). The outcomes of the initial epidemiological assessment will then guide decisions on subsequent tracing and surveillance priorities.

The outcomes of the epidemiological assessment will also be used to guide the selection of other appropriate response measures (including the application of movement controls) and assess the progress of disease control measures.

Ongoing epidemiological assessment is important for any EAD response to aid evaluation of the continued effectiveness and value of response measures. Ongoing epidemiological assessment will consider the outcomes of tracing and surveillance activities, and will contribute evidence to support any later claims of disease freedom.

### 4.3.2 Biosecurity (including quarantine) and movement controls

Detailed guidelines for classifying (and reclassifying) declared areas and premises are provided in the **AUSVETPLAN Guidance document: *Declared areas and allocation of premises definitions in an EAD response***.

In a response to ASF, biosecurity (including quarantine) and movement controls will be immediately imposed on all premises and declared areas on which infection or contamination with ASF virus is either known or suspected.

In accordance with Section 6, controls may be placed on the movement of infected or potentially infected pigs, and contaminated or potentially contaminated things (including pig semen and embryos; pig products and byproducts; vehicles; equipment; people; nonsusceptible animals; crops, grains, hay, silage and mixed feeds; and manure/effluent).

Biosecurity controls to prevent contact between feral and domestic pigs should be implemented to avoid infection of domestic pigs from feral pigs and vice versa.

Human-assisted movements of feral pig and associated fomites (e.g. hunting equipment) will be controlled to prevent transfer of ASF virus from infected areas to uninfected areas.

Aggregations of live pigs at pig shows and pig saleyards will be prohibited in the restricted area (RA). Operation of saleyards in the control area (CA) and outside area (OA) should be at the discretion of the jurisdiction.

Pig scale operations should not operate in the RA. Those within the CA and the OA should be at the discretion of the jurisdiction. If they are allowed to operate, the pigs must be for 'slaughter only'. Abattoirs that do not meet minimum standards will not be allowed to operate in any of the declared areas (RAs and CAs), or to receive pigs from declared areas (see also the **AUSVETPLAN Resource document: *African swine fever response operational guidelines for pig abattoirs***).

Optimal biosecurity controls and enhancements will be encouraged on all pig premises, including those outside declared areas (RA and CA) and infected areas. The *National farm biosecurity manual for pork production*[14] provides guidelines for pig producers on both routine and high-risk biosecurity procedures. The **AUSVETPLAN Enterprise manual: *Pork industry*** provides additional details on the biosecurity and other response measures that may be used on pig premises in an EAD response.

The **AUSVETPLAN Guidance document: *Declared areas and allocation of premises definitions in an EAD response*** provides details on the use of declared premises and areas, and on reclassifying premises and areas.

Section 6 provides details on movement controls to prevent further spread of ASF virus.

***Biosafety and biosecurity for personnel***

Specific human biosafety measures are not required for ASF because it is not a zoonotic disease.

Stringent biosecurity measures to manage the movements of people onto and off premises will be important for controlling ASF. Movements of personnel onto or off high-risk premises (IPs, DCPs, DCPFs, suspect premises — SPs, trace premises — TPs, and ADSs) should be limited, where possible.

Personnel involved in handling pigs and/or potentially contaminated items or areas (e.g. people involved in sampling pigs, or their products or byproducts, or in destruction, disposal and decontamination activities)

---

14 https://www.farmbiosecurity.com.au/toolkit/plans-manuals/

on high-risk premises (IPs, DCPs, DCPFs, SPs, TPs and ADSs) should be considered contaminated. These may include response personnel, farm personnel and truck drivers.

All potentially contaminated personnel should shower (including washing hair) and completely change clothing before entering and after leaving premises. If showering facilities are not available onsite, showering may occur elsewhere but should occur as soon as practicable after leaving the premises.

Farm-specific boots and overalls should be used. Decontamination of farm-specific footwear after each use and hot laundering (≥60 °C) of used overalls is required. These requirements should also be met by workers and drivers entering and leaving processing facilities that handle pigs from IPs, DCPs, SPs and TPs (i.e. approved processing facilities — APFs, and DCPFs).

On farm, personnel should work a 'one-way flow' from clean areas to dirtier areas within a production shed. Sharing of personnel between production sheds (or production units within a shed) is not recommended.

***Biosecurity for equipment***

Stringent biosecurity measures to manage the movements of equipment, vehicles and other things onto and off premises will be important for controlling ASF.

Movements of vehicles and equipment onto or off high-risk premises (IPs, DCPs, DCPFs, SPs, TPs and ADSs) should be limited, where possible. Where possible, loading facilities and feed bins should be near perimeter fencing (with shuttles to the main feed storage, etc), to limit vehicles moving onto premises.

Equipment to be used in handling pigs and/or potentially contaminated items or areas (e.g. in sampling of pigs, or their products and byproducts; or in destruction, disposal and decontamination activities) on high-risk premises (IPs, DCPs, DCPFs, SPs, TPs and ADSs) should be considered contaminated and either disposed of onsite (see Section 4.3.10) or decontaminated (see Section 4.3.11).

Nonreusable equipment should be disposed of in a biosecure manner (e.g. incineration, commercial hazardous biological waste program). Reusable equipment (including vehicles) should be decontaminated (see the **AUSVETPLAN Operational manual: *Decontamination***) on exit from the premises (or at an approved 'receiving' premises).

### 4.3.3 Tracing and surveillance — domestic pigs

Guidance on tracing and surveillance can be found in the **AUSVETPLAN Guidance document: *Tracing and surveillance***.

***Tracing***

Rapid trace-forward (spread tracing) and trace-back (source tracing) of risk animals and items from IPs will help identify the source of the disease, the primary case(s), and the location of potentially infected animals and contaminated items. This will help identify the origin of the outbreak and define the potential extent of disease spread.

It is important to estimate the date when ASF virus is likely to have been introduced onto each IP, because this date will be used for forward and backward tracing. In the initial stages of an outbreak, an estimated date of introduction to a premises may not yet have been determined or the epidemiological investigation may be inconclusive. In these cases, tracing should consider movements onto and off IPs from a minimum of 15 days before the first appearance of clinical signs on the IP (representing the WOAH incubation period and the priority timeframe) up until the time that effective quarantine was imposed on the IP.

*Identification and risk assessment*

Traces should be identified, with emphasis on the following movements:

- Off the IP (i.e. trace-forward). This should be prioritised for the 2 days before the first appearance of clinical signs on the IP for fomites (recognising that animals may shed virus for 2 days before demonstrating clinical signs) and 15 days (1 incubation period) before the first appearance of clinical signs on the IP for live pigs; tracing should cover the period up until the time that effective quarantine was imposed on the IP. Where resources are limited, these periods may be shortened based on a risk assessment. For example, if the date of onset of clinical signs is accurately known, the emphasis will be on trace-forward of fomites from 2 days before the onset of signs. As resources allow, and as a precautionary measure, further trace-forward of live pig movements off the IP for 30 days (i.e. 2 incubation periods) before the first appearance of clinical signs on the IP up until the time that effective quarantine was imposed on the IP is ideal.
- Onto the IP (i.e. trace-back). This should be for 15 days (1 incubation period) before the first appearance of clinical signs on the IP up until the time that effective quarantine was imposed on the IP. Where resources are limited, this period may be shortened based on a risk assessment. For example, if the date of onset of clinical signs is accurately known, the emphasis will be on trace-back from 2 days before the onset of signs. Trace-back to 30 days (i.e. 2 incubation periods) before the first appearance of clinical signs on the IP up until the time that effective quarantine was imposed in the IP is ideal.

Follow-up of TPs should be prioritised by the likelihood of transmission and the potential consequences for disease control activities. Investigation and reclassification of TPs should recognise the time sensitive impact of movement controls on pig welfare.

The following TP or movements should be prioritised:

- premises associated with higher risk movements (live animals, fomites and animal products)
- premises with higher frequency or volume of high-risk trace movements (live animals)
- premises with the greatest animal welfare risk
- movements that occurred within the period of highest risk of viral excretion or contamination.

TPs with a lower likelihood of disease transmission include:

- farms that are certified as compliant with the APIQ VEBS ASF and that are processing at high-level biosecurity abattoirs or abattoirs that have been classified as an APF (refer to the **AUSVETPLAN Resource document: *African swine fever response operational guidelines for pig abattoirs***)
- high-level biosecurity abattoirs (refer to the **AUSVETPLAN Resource document: *African swine fever response operational guidelines for pig abattoirs***).

Premises with lower likelihood of disease transmission may be able to be rapidly reclassified following investigation, thereby reducing the risk of adverse animal welfare outcomes due to movement restrictions. Furthermore, rapid reclassification will likely allow abattoirs to have sufficient throughput to avoid their closure, that would exaggerate adverse outcomes.

TPs may be reclassified after risk assessment and deemed to be of low risk. However, TPs may be required to undertake surveillance (herd-health monitoring and/or testing) and/or observe a designated time frame (1–2 incubation periods) in order to be resolved. Risk assessment criteria should include consideration of the following:

- the type, volume and frequency of commodity moved and the biosecurity practices on the premises of origin and destination (refer to the **AUSVETPLAN Resource document: *African swine fever response operational guidelines for pig abattoirs*** and Australian Pork Industry Quality Assurance Voluntary Enhanced Biosecurity Standards for ASF (APIQ VEBS ASF))

- potential for further disease spread due to location of the premises of origin and destination, due to contact with feral pigs or for other reasons (e.g. vector involvement).

*Abattoirs and forward tracing of product and product recall*

In the event of an ASF incursion, due to the small number of pig abattoirs in Australia, it is likely that pigs that are infected with ASF, or may have been exposed to it, may have been transported to an export-registered abattoir.

Many TPs are likely to arise from vehicle movements from abattoirs, as opposed to live animal movements (e.g. movements of vehicles (fomites) that are empty, having offloaded pigs). Where high-level biosecurity practices on farms and at abattoirs are in place, the likelihood of ASF transmission via the movement of fomites is reduced.

The period of interest for tracing products from an abattoir relates to when viraemic pigs first arrived at the abattoir, rather than the date when ASF was first detected or diagnosed on the source farm.

Tracing, but not necessarily recall of meat and byproducts that have been transported from an export-registered abattoir, will occur if there is suspicion or knowledge that the product is contaminated with ASF virus. Products and byproducts from a pig that has passed antemortem inspection, and carcase and offal that have passed postmortem inspection at an export-registered abattoir, are unlikely to be sources of ASF transmission, especially as prohibitions on the feeding of prohibited pig feed are in place nationally. A product recall would only be considered for whole carcases and would only be implemented when a risk assessment identifies that it is critical to manage the risk of transmission and the benefits would outweigh the socioeconomic costs.

Further information is included in the **AUSVETPLAN Resource document:** ***Tracing and product recall from export-certified abattoirs affected by African swine fever***.

*Information management systems and resourcing*

Information management systems should be used to support tracing activities, as well as examination of farm, abattoir and other facility records, and interviews with farm workers and/or managers. The PigPass database and documents such as National Vendor Declarations (NVDs) should be used to assist with tracing.

***Surveillance***

Surveillance in an ASF outbreak will initially be aimed at:

- identifying the source of infection
- determining the extent of spread, including identifying whether vector and feral pig populations are involved and, if so, their distribution
- providing data to inform risk analyses and selection of appropriate control measures.

The surveillance aims will be achieved by prioritising surveillance:

- of premises where animals are showing clinical signs consistent with ASF (SPs), and where animals are not showing clinical signs but are considered highly likely to contain an infected animal and/or contaminated animal carcasses, pig products, wastes or things (DCPs)
- of other premises found to be epidemiologically linked to a case (identified through tracing) to determine whether they may be infected and/or contaminated
- to identify premises containing infected animals that have not been identified through tracing, for further investigation and testing.

Field surveillance should be prioritised based on risk, as indicated by the premises classification categories (SPs, TPs and DCPs are the highest priority for investigation). Further prioritisation of surveillance should be based on risk and consider the likelihood that subclinical infection may be present, and the risks of further disease transmission and dissemination. For example, SPs and TPs in areas otherwise believed to be free from infection (the OA and CA) may be a higher priority for investigation than premises in the area where infection is known to be present (the RA).

Surveillance in wild animal and vector populations is discussed in Sections 4.3.12 and 4.3.13, respectively.

Section 7 provides further guidance on surveillance for ASF, including recommendations for surveillance on premises of different classifications, and proof of freedom.

### 4.3.4 Zoning and compartmentalisation for international trade

Where it is not possible to establish and maintain disease freedom for the entire country, establishing and maintaining disease-free subpopulations, through zoning and/or compartmentalisation,[15] may be considered.

In the case of a limited disease outbreak, a containment zone[16] may be established around the areas where the outbreak is occurring, with the purpose of maintaining the disease-free status of the rest of the country outside the containment zone.

All zoning applications would need to be prepared by the Australian Government in conjunction with the relevant jurisdiction(s) and agreed to by the CCEAD. Compartmentalisation applications would require input from the relevant industries. Recognition of both zones and compartments must be negotiated between the Australian Government and individual overseas trading partners. Zoning and compartmentalisation would require considerable resources that could otherwise be used to control an outbreak. Careful consideration will need to be given to prioritising these activities, because the resulting competition for resources could delay the quick eradication of the disease and recognition of disease freedom.

Agreements between trading partners take time to develop, consider and finalise, because of the need to provide detailed information on activities such as biosecurity, surveillance, traceability and diagnostics to support the approach that is developed. An importing country will need assurance that its animal health status is not compromised if it imports from an established disease-free zone in Australia. Trading partners may not accept a zoning or compartmentalisation proposal, regardless of the information provided. Eradication of disease may be achieved before zoning or compartmentalisation applications are finalised.

The WOAH general guidelines for zoning and compartmentalisation are in Chapter 4.4 of the WOAH *Terrestrial animal health code*; guidelines for ASF are in Chapter 15.1.

### 4.3.5 Animal welfare

Guidance on managing livestock welfare can be found in the **AUSVETPLAN Operational manual: *Livestock welfare and management***.

Because morbidity and mortality resulting from ASF may be high, close monitoring and careful management of animal welfare on affected premises will be required.

---

15 With zoning, disease-free subpopulations are defined primarily based on geography. With compartmentalisation, disease-free subpopulations are defined primarily by management practices (such as the biosecurity plan and surveillance practices of enterprises or groups of enterprises).

16 The WOAH defines a 'containment zone' as an infected zone defined within a previously free country or zone, which includes all suspected or confirmed cases that are epidemiologically linked and where movement control, biosecurity and sanitary measures are applied to prevent the spread of, and to eradicate, the infection or infestation.

The imposition of movement controls on live pigs may result in the development of animal welfare issues, particularly as a result of overcrowding. This can occur within days to weeks, depending on the production system in use (East et al 2014).

Overcrowding of pigs due to temporary cessation of movement will likely result in welfare issues unless culling is introduced as part of the emergency response. Where culling for welfare purposes is to be considered for cost sharing, see the EADRA guidance document *Livestock welfare management and compensation principles for Parties to the Emergency Animal Disease Response Agreement*.[17]

### 4.3.6 Vaccination

There is no commercially available vaccine against ASF registered for use in Australia. Vaccines are being developed internationally, and some have achieved commercial registration in a small number of countries; however, further review would be needed before these could be considered for use in Australia.

### 4.3.7 Treatment of infected animals

The treatment of infected animals is not effective and will not be undertaken. Severely affected animals may be triaged and euthanased on welfare grounds.

### 4.3.8 Treatment of animal products and byproducts

A risk assessment should be undertaken of product and byproducts held by an abattoir or cold store at the time of the abattoir's designation as an IP or a DCPF. This should include an epidemiological assessment of the IP or the DCP supplying the pigs used in the product to determine the likelihood that pigs were exposed, contaminated or infected at the time of movement to the abattoir. It should also include an assessment of the likelihood that exposed, contaminated or infected pigs may have been shipped from contaminated premises to the abattoir before detection of ASF.

If any movement of pigs from an IP or a DCP to the abattoir, including movements before confirmation of disease, is determined to present a risk of virus or disease transmission, the **AUSVETPLAN Resource document: *African swine fever response operational guidelines for pig abattoirs*** should be used to determine the product disposition and resultant action. An approach consistent with the precautionary principle should be applied. Any product movement should be commensurate with Section 6.1.4, noting that product derived from IPs and DCPs sent to an abattoir for destruction as part of the agreed response plan should be destroyed and disposed of.

Where an abattoir is designated as an IP based on confirmation of ASF in animals on antemortem inspection, and where the risk of any infected animals being processed during that line or from former shipments from the same premises is extremely low, previously processed product may be permitted to move offsite, subject to risk assessment.

Products and byproducts from pigs on SPs and TPs should be risk assessed to determine whether they need to be held and secured until the classification of the premises of origin is clarified or until the product can be tested.

Section 2.4.2 outlines the minimum level of treatment expected to inactivate ASF virus in pig products and byproducts.

Various types of rendering processes used in Australia will inactivate ASF virus. However, there is concern that low-temperature rendering, which is a wet-rendering process, will produce product that is treated but not rendered, and which does not meet the inactivation requirements outlined in this manual.

---

[17] https://animalhealthaustralia.com.au/ausvetplan

Rendered pig products from declared premises will not be allowed back into the pig food chain as a feed ingredient on the rare occasion that quality controls of rendered product are not met and ASF virus is not inactivated.

#### 4.3.9 Destruction of animals

Timely investigation, assessment and classification or reclassification of premises will support the identification of pigs requiring destruction. It will also support decision making on timing and method of destruction, and allocation of resources for destruction activities.

Guidance on destruction methods, including choosing the appropriate method, can be found in the **AUSVETPLAN Operational manual: *Destruction of animals.*** Destruction plans should be developed for each premises on which animals may be destroyed.

On IPs, all pigs will be destroyed.

On DCPs, based on a risk assessment which may include sample collection and testing, high-risk pigs may be destroyed. These could include:

- pigs originating from an IP (within the trace-back window)
- pigs that have had direct contact with pigs on an IP or in an IA
- pigs that have had access to, or are suspected of having access to, the faeces, urine or secretions of pigs from an IP or IA
- pigs exposed to contaminated feed or water
- pigs on which any equipment that has previously been used on an IP has been used (unless the equipment was subject to an approved decontamination process before leaving the IP)
- pigs that have been handled by personnel immediately after they have handled pigs from an IP.[18]

The management of other pigs on DCPs should be based on the findings of the risk assessment, taking into consideration the likelihood of exposure to ASF virus and the potential risks of disease transmission (within the premises and from or to other premises).

Operational activities for feral pigs, including destruction, are addressed in the **AUSVETPLAN Operational manual: *Wild animal response strategy***.

***Welfare destruction***

Pig destruction onsite may be considered on any premises where pigs are experiencing welfare issues, such as overcrowding, and where transport to processing facilities presents an unacceptable risk of disease transmission. Strategic management of TPs may help reduce the number of animals at risk of welfare destruction.

Refer also to the **EADRA Guidance document *Livestock welfare management and compensation principles for parties to the Emergency Animal Disease Response Agreement*.**

#### 4.3.10 Disposal of animals, and animal products and byproducts

Guidance on disposal options and methods can be found in the **AUSVETPLAN Operational manual: *Disposal***.

---

18 Assuming that personal decontamination has not occurred or has been insufficient to destroy ASF virus or prevent human-assisted transmission of ASF virus.

Disposal plans should be developed for each premises where disposal is to take place (e.g. IPs, DCPs, DCPFs, ADSs). Disposal of potentially high-risk materials from SPs and TPs may also be required before the investigation of their status is complete.

High-risk materials from quarantined premises should be disposed of in a biosecure manner onsite or at an ADS. Similarly, and where practical, feral pig carcasses should be transported under permit and disposed of in a sanitary manner, which may include at an ADS.

High-risk materials include carcasses, culled pigs, pig products and byproducts, wastes, effluent, and contaminated fomites (e.g. clothing, equipment) that cannot be adequately decontaminated.

Feed and other items may be high-risk materials if, based on epidemiological assessment, they may be implicated in the spread of disease or may otherwise be potentially contaminated with ASF virus.

The method chosen for disposal will be influenced by the type and volume of material to be disposed of, the resources available, the local environment, the prevailing weather, legislative requirements (including environmental protection legislation) and the risk of spreading the virus.

Risk material should be disposed of in a way that prevents feral pigs and mechanical vectors (such as rodents and biting insects) from gaining access to contaminated material. Deep burial, composting, burning, incineration or above-ground burial may be considered.

Decontamination of all equipment and machinery involved in disposal will be required. Disposal must be auditable in terms of biosecurity, traceability and financial requirements.

Where disposal onsite is not feasible, an approved site for disposing of risk material (i.e. an ADS) may be used, subject to risk assessment and taking into consideration the risk of transmission of ASF virus during transport of the risk material to the disposal site. Movements of risk material should be in accordance with the recommended movement controls in Section 6.

Disposal of feral pigs is addressed in the **AUSVETPLAN Operational manual: *Wild animal response strategy***.

#### 4.3.11 Decontamination

Decontamination of contaminated premises (IPs, DCPs, DCPFs and ADSs) and fomites (e.g. clothing, footwear, nondisposable equipment) is a critical part of the response to ASF. Decontamination plans should be developed for each premises to be decontaminated.

Decontamination of domestic piggeries requires:

- pretreatments to reduce the level of, and preferably eliminate, organic matter (e.g. combinations of physical removal methods such as scrubbing, scraping, soaking, detergent use and high-pressure water)
- adequate contact time and concentration of the active ingredients of the disinfectant
- temperature and pH within the effective range for the disinfectant being used.

Guidance on decontamination can be found in the **AUSVETPLAN Operational manual: *Decontamination***.

IPs should be decontaminated following depopulation and disposal of contaminated material.

Staged decontamination may be required on DCPs where complete depopulation of the premises is not undertaken (see Section 4.3.9).

ASF virus is susceptible to a variety of disinfectants (refer to Section 2.4.2 and the **AUSVETPLAN Operational manual: *Decontamination***).

Decontamination of IAs is unlikely to be practical. However, decontamination of known contaminated substrates (e.g. soil, feral pig carcasses) can be achieved by sanitary disposal of the substrate and chemical decontamination of fomites (e.g. equipment).

#### 4.3.12 Wild animal management

Guidance on the management of wild animals in an EAD response is provided in the **AUSVETPLAN Operational manual: *Wild animal response strategy***.

ASF virus may be spread by feral pigs, other pest animals (e.g. rodents) and biting insects (e.g. flies, mosquitoes).

***Feral pigs***

Surveillance of feral pig populations near IPs will be required. If feral pigs are infected, measures to manage the disease in these populations may need to be considered. A surveillance and control program, including destruction, disposal and decontamination, should be developed in consultation with experts on the ecology and control of feral pigs. European experience of a staged approach to wild boar control should be considered (see Section 2.9).[19]

Where eliminating infection from the feral pig population is not feasible, compartmentalisation of the commercial pig industry may need to be pursued (see Section 4.4).

#### 4.3.13 Vector management

Early epidemiological investigation into potential tick vector species will be important to inform vector management because it is currently unknown whether tick species in Australia will play a role in disease spread. With input from an entomologist, a vector monitoring program should be implemented to identify whether ticks are implicated in the epidemiology of ASF in Australia and, if so, the species involved.

If tick species are implicated in the spread of ASF in Australia, a targeted approach to vector control to break the transmission cycle should be developed, with entomological advice.

Rodents and other pests and vermin (e.g. cats, birds), and insect control measures should be implemented to minimise the risk of contamination of these vectors with ASF virus, and minimise the risk of transmission to and from neighbouring feral and domestic pig populations.

Control of stable fly (*Stomoxys calcitrans*), which has been identified as a theoretical mechanical vector of field transmission of ASF virus (Mellor et al 1987), will be difficult to achieve.

#### 4.3.14 Public awareness and media

Guidance on managing public information can be found in the ***Biosecurity incident public information manual*** (NBCEN 2021).

Public awareness and industry engagement will support a cohesive response. The communications strategy should include mechanisms for raising awareness in pig hunters, owners of petting zoos and school farms, urban and peri-urban pig owners, and managers of smaller commercial piggeries (who may not be engaged with the industry peak body, for example). Consumers of pork products should be informed via food safety messaging.

---

[19] The Czech experience is reported on the WOAH website **https://rr-europe.woah.org/app/uploads/2019/11/5_sge-asf12_eradication-wild-boar_free-status_czech.pdf**

Key topics to be covered in public information messaging will include advice on:

- the safety of food and other products derived from pigs
- signs of ASF in domestic and feral pigs, and how to report suspect cases
- reporting suspicion of disease
- modes of transmission of ASF virus, including spread by people
- prohibited pig feed restrictions
- biosecurity (including quarantine) and movement controls for domestic and feral pig populations, pig products and contaminated items
- biosecurity measures to minimise the presence of feral pigs, and their proximity and access to domestic pigs, thereby preventing entry of ASF virus to pig production premises
- where to find more information on the response and the control measures being used.

National coordination of public information and engagement messaging, both in the event of an ASF incident and in preparation for a potential outbreak in Australia, may occur through activation of the National Biosecurity Communication and Engagement Network.[20] The network will coordinate animal health information from jurisdictional departments of agriculture, and liaise with Australian Pork Limited and other government agencies, including public health, emergency services and environment.

#### 4.3.15 Other strategies

Feeding of prohibited pig feed to pigs carries a high risk of introducing ASF to domestic or feral pig herds. In the event of an ASF incident and during preparation for a potential incursion of ASF into Australia, a multi-agency approach is needed to reinforce, enforce and heighten awareness of current feeding bans and restrictions for domestic and feral pigs. Security at municipal waste transfer and waste facilities should be improved to prevent feral pigs gaining access to domestic food scraps. A widespread, multilingual public awareness campaign should support these controls.

#### 4.3.16 Stand-down

Stand-down of the response will occur when the National Management Group (NMG) formally declares that the outbreak is over. This may be when it decides (on advice from the CCEAD) that:

- ASF has been eradicated or
- eradication is no longer considered feasible or
- after completion of the ‘transition to management’ (T2M) phase.

Controls may still be in place at the jurisdictional level during the T2M. Additional information on T2M can be found in the **EADRA**.[21]

Additional information on the stand-down of EAD responses can be found in the **AUSVETPLAN Management manual: *Control centres management* (Part 1)**.

## 4.4 Other control and eradication options

If it is not feasible to eradicate ASF, a T2M and/or long-term control program (outside of EADRA mechanisms) may need to be developed through consultation between Australian governments and the pig

[20] https://www.outbreak.gov.au/our-role/response-outbreak/national-biosecurity-communication-engagement-network
[21] https://animalhealthaustralia.com.au/eadra/

industry. The T2M may be an interim step before progressing to a long-term control program, or the eradication program can move directly to the long-term control program.

T2M may be considered an option when the implementation of an Emergency Animal Disease Response Plan (EADRP) has failed to eradicate ASF, and eradication is no longer considered technically or practically feasible, cost beneficial or desirable.

The T2M phase commences when the NMG agrees (on advice from the CCEAD) that it is no longer technically feasible, cost beneficial or desirable to eradicate ASF and that the response should enter a T2M phase.

The T2M commences when the NMG approves a revised EADRP that includes provisions for a T2M phase. The T2M ends when the activities under the revised EADRP are completed, but it must be completed within the agreed timeframe, which is notionally 12 months.

Should ASF virus become established in feral or domestic pig populations, the control program may include compartmentalisation of the various parts of the commercial pig industry, supported by accredited industry quality assurance and/or government accreditation programs.

## 4.5 Funding and compensation

Details of the cost-sharing arrangements can be found in the EADRA.[21] Details of the approach to the valuation of, and compensation for, livestock and property in disease responses can be found in the **AUSVETPLAN Operational manual: *Valuation and compensation***.

# 5 Areas and premises classifications

Information on declared areas and premises classifications is provided in the **AUSVETPLAN Guidance document: *Declared areas and allocation of premises definitions in an EAD response***.

The size and boundaries of the declared areas should be risk-based, considering the epidemiology of the disease and a risk assessment. Criteria for risk assessment include but are not limited to: known human assisted and natural movements of pigs and risk materials (e.g. tracing data); the location, distribution and where known premises/area classification of populations of susceptible animals (including feral pigs); biosecurity practices; the location of key elements of the industry supply chain; and the impacts of disease control measures compared with the expected benefits of disease control.

A precautionary approach should be taken when defining declared areas where only feral pigs are infected because there is likely to be uncertainty in the distribution of ASF in feral pig populations. Areas should be reassessed frequently as more information is obtained on locations of infected feral pigs and likely areas of infection.

## 5.1 Reclassifying premises and previously declared areas

Detailed guidelines for reclassifying previously declared areas and premises are provided in the **AUSVETPLAN Guidance document: *Declared areas and allocation of premises definitions in an EAD response***.

### 5.1.1 Reclassification or resolution of abattoirs

Detailed operational guidelines for reclassifying abattoir premises are provided in the **AUSVETPLAN Resource document: *African swine fever response operational guidelines for pig abattoirs***.

# 6 Movement controls

## 6.1 Principles

General principles for quarantine practices and movement controls for managing emergency animal diseases (EADs) are provided in the **AUSVETPLAN Guidance document: *Movement controls***.

The following are additional principles for movement controls in an African swine fever (ASF) context:

- In an EAD event, movement controls must strike a balance between quick and effective disease control, welfare and business continuity. Therefore, it is not appropriate to simply prohibit all movement of animals and products. On the other hand, diligence must be applied to minimise the risk of further spread of the disease, as containment and eradication of ASF is a priority.
- Live pigs pose the greatest risk of disease spread; therefore, their movements from all premises within the infected area (IA), restricted area (RA) and control area (CA) must be strictly controlled.
- To minimise the risk of spread of ASF to areas where disease is not known to be present (the outside area, OA), movement of animals and products from the RA to the OA is generally prohibited. Movement of animals and products from the CA to the OA will also be restricted.

### 6.1.1 Recommended movement controls for live pigs

Table 6.1 describes the recommended movement controls for live pigs within and between declared areas.

**Table 6.1 Recommended movement controls for live pigs within and between declared areas**

| To→ | | RA | | | | | | | | CA | | | | | | OA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| From ↓ | | IP | DCP | SP | TP | DCPF | APF | UPF[a] | ARP | SP | TP | DCPF | APF | UPF[a] | POR | |
| RA | IP | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited (except under SpP — conditions a, b, c, d, e, h, i, k, l) | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited (except under SpP — conditions a, b, c, d, e, h, i, k,-l, n) | Prohibited | Prohibited | Prohibited | Prohibited |
| | DCP | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited (except under SpP — conditions c, d, e, h, i, j, k, l) | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited (except under SpP — conditions-c, d, e, h, i, j, k, l, n) | Prohibited | Prohibited | Prohibited | Prohibited |
| | SP | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited (except under SpP — conditions c, d, e, h, i, k, l) | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited (except under SpP — conditions c, d, e, h, i, k, l, n) | Prohibited | Prohibited | Prohibited | Prohibited |
| | TP | Prohibited | Prohibited | Prohibited | Prohibited (except under SpP — conditions c, d, e, g, i, j, k, l, m, o) | Prohibited (except under SpP — conditions c, d, e, h, i, j, k, l) | Prohibited (except under SpP — conditions c, d, e, g, i, j, k, l) | Prohibited | Prohibited | Prohibited | Prohibited (except under SpP — conditions c, d, e, g, i, j, k, l, m, o) | Prohibited (except under SpP — conditions c, d, e, h, i, j, k, l, n) | Prohibited (except under SpP — conditions c, d, e, g, i, j, k, l, n) | Prohibited | Prohibited | Prohibited |
| | ARP | Prohibited | Prohibited | Prohibited | Prohibited (except under SpP — conditions c, d, f, g, i, j, k, l, m, o) | Prohibited (except under SpP — conditions c, d, f, h, i, j, k, l) | Prohibited (except under GP — conditions c, f, h, i, j, k, l) | Prohibited | Prohibited (except under GP — conditions c, f, g, i, j, k, l, m) | Prohibited | Prohibited except under SpP — conditions c, d, f, g, i, j, k, l, m, o) | Prohibited (except under SpP — conditions, c, d, f, h, i, j, k, l, n) | Prohibited (except under SpP — conditions, c, d, f, h, i, j, k, l, n) | Prohibited | Prohibited (except under SpP — conditions c, d, f, g, i, j, k, l, m) | Prohibited (except under SpP — conditions, c, d, f, g, i, j, k, l, n) |

| To→ | | RA | | | | | | | | CA | | | | | | OA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| From ↓ | | IP | DCP | SP | TP | DCPF | APF | UPF[a] | ARP | SP | TP | DCPF | APF | UPF[a] | POR | |
| CA | SP | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited (except under SpP — conditions c, d, e, h, i, k, l, n) | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited (except under SpP — conditions c, d, e, h, i, k, l) | Prohibited | Prohibited | Prohibited | Prohibited |
| CA | TP | Prohibited | Prohibited | Prohibited | Prohibited (except under SpP — conditions c, d, f, g, i, j, k, l, m, o) | Prohibited (except under SpP — conditions c, d, f, h, i, j, k, l, n) | Prohibited (except under SpP — conditions c, d, f, g, i, j, k, l, n) | Prohibited | Prohibited | Prohibited | Prohibited (except under SpP — conditions c, d, f, g, i, j, k, l, m, o) | Prohibited (except under SpP — conditions c, d, f, h, i, j, k, l) | Prohibited (except under SpP — conditions c, d, f, g, i, j, k, l) | Prohibited | Prohibited | Prohibited |
| CA | POR | Prohibited | Prohibited | Prohibited | Prohibited (except under SpP — conditions c, d, f, g, i, j, k, l, m, o) | Prohibited (except under SpP — conditions c, d, f, h, i, j, k, l, n) | Prohibited (except under GP — conditions c, f, h, i, j, k, l, n) | Prohibited | Prohibited (except under SpP — conditions c, d, f, g, i, j, k, l, m) | Prohibited | Prohibited (except under SpP — conditions c, d, f, g, i, j, k, l, m, o) | Prohibited (except under SpP — conditions c, d, f, h, i, j, k, l) | Prohibited (except under GP — conditions c, f, h, i, j, k, l) | Prohibited | Prohibited (except under GP — conditions c, f, g, i, j, k, l, m) | Prohibited (except under SpP — conditions c, d, f, g, i, j, k, l, n) |
| OA | | Prohibited | Prohibited | Prohibited | Prohibited (except under SpP — conditions c, d, f, g, i, j, k, l, m, o) | Prohibited | Prohibited (except under GP — conditions c, f, g, i, j, k, l, n) | Prohibited | Prohibited (except under SpP — conditions c, d, f, g, i, j, k, l, m) | Prohibited | *Suggest* - Prohibited (except under SpP — conditions c, d, f, g, i, j, k, l, m, o) | Prohibited (except under SpP — conditions c, d, f, h, i, j, k, l, n) | Prohibited (except under GP — conditions c, f, g, i, j, k, l, n) | Prohibited | Prohibited (except under GP — conditions c, f, g, i, j, k, l, m) | Allowed under normal jurisdictional and interstate movement requirements |

APF = approved processing facility; ARP = at-risk premises; CA = control area; DCP = dangerous contact premises; DCPF = dangerous contact processing facility; GP = general permit; IP = infected premises; OA = outside area; POR = premises of relevance; RA = restricted area; SP = suspect premises; SpP = special permit; TP = trace premises; UPF = unclassified processing facility

a A UPF is an abattoir, knackery, milk- or egg-processing plant or other such facility where the current presence of susceptible animals and/or risk products, wastes or things is unknown. UPF can be used as a default status in a response until there is sufficient information to reclassify it. UPFs cannot receive live animals.

Permit conditions for Table 6.1:

a) Direct movement to abattoir for destruction and disposal.
b) Only if on-farm destruction is not the preferred option.
c) Single consignment per load.
d) A risk assessment — under approval from Chief Veterinary Officer (CVO), or CVO-authorised delegate — after assessment[22] indicates that the risk associated with the movement is acceptable within the response.
e) Travel by approved routes and no stopping en route.
f) Travel by main roads and highways and not transiting through a property or stopping en route adjacent to a known pig production area.
g) The dispatching and receiving premises must meet minimum biosecurity standards[23] and or as relevant the **AUSVETPLAN Resource document:** ***African swine fever response operational guidelines for pig abattoirs.***
h) The receiving premises must meet minimum biosecurity standards[24]
i) Vehicles carrying livestock are decontaminated (i.e. cleaned and disinfected) after unloading and the decontamination process can be verified. Decontamination must occur before entry to a new pig premises within the destination declared area or before leaving the destination declared area.
j) Absence of clinical signs consistent with ASF in all pigs on the premises of origin.
k) Any suspicious or clinically consistent clinical signs of ASF in pigs proposed to be moved are immediately reported to the relevant jurisdiction or through the Emergency Animal Disease Hotline (1800 675 888).
l) All pig movements must comply with state and territory legislation related to traceability requirements and standards, and be accompanied by a PigPass National Vendor Declaration (NVD) or waybill. Traceability must be maintained for a minimum of 30 days for consignments moved to another farm.
m) Introduced pigs are kept separate (‘quarantined’) for a minimum of 15 days before introduction to the herd, unless they have originated from a premises that is epidemiologically linked and with the same biosecurity status as the destination premises. Biosecurity controls are applied to personnel, equipment (fomites) and feed to eliminate contact between different biosecurity units as per the minimum biosecurity standards[24], together with specific biosecurity enhancements agreed by the CVO.
n) Only where there is no capacity to process in the declared area of origin.
o) In exceptional cases, to ameliorate animal welfare issues between epidemiologically linked premises and where the trace premises (TP) (origin or destination) are assessed as low risk.

---

22 This may include clinical surveillance and/or diagnostic testing of pigs scheduled for movement, or background surveillance testing of ‘normal’, sick and dead pigs to exclude ASF.

23 ‘Minimum biosecurity standards’ – Relevant standards from the AHC ASF Voluntary Enhanced Biosecurity Standards (Appendix 8) applicable to the premises and the movement

24 Refer to the **AUSVETPLAN Resource document:** ***African swine fever response operational guidelines for pig abattoirs***

### 6.1.2 Recommended movement controls for fresh pig semen

90% of Australian sows are artificially bred using fresh semen. There are 1 to 2 commercial pig semen providers (boar studs) in each state that collectively supply the majority of fresh pig semen in Australia. These providers are responsible for semen collection, processing, and distribution and delivery to customers. Delivery is generally on established routes that recur 2–3 times each week.

Given their responsibility for semen distribution and delivery, it is expected that in an outbreak of ASF semen providers will be applying for movement permits on behalf of their customers. It is also expected that there will be collaboration between the providers and government authorities in the coordination of permitted movements to properties that are likely to be located in different declared areas and of different premises classifications. Reflecting this, the movement control conditions applied to fresh semen movements are consistent across destination types.

Key controls common to all movements of fresh pig semen include that:

- semen dispatch will only be allowed from very low risk properties
- semen delivery and receival procedures must ensure that the courier/transporter does not enter clean areas of the destination piggery's biosecurity management area.

***Frozen semen***

Porcine semen is much less viable when frozen compared to other species due to several physiological and biochemical factor, including that porcine sperm are less cryotolerant than sperm from other species. Accordingly, frozen semen is rarely used and will be handled on a case-by-case basis.

Table 6.2 describes the recommended movement controls for pig semen within and between declared areas.

**Table 6.2 Recommended movement controls for fresh pig semen within and between declared areas**

| **To→** | | **RA** | | | | | **CA** | | | **OA** |
|---|---|---|---|---|---|---|---|---|---|---|
| **From ↓** | | **IP** | **DCP** | **SP** | **TP** | **ARP** | **SP** | **TP** | **POR** | |
| **RA** | **IP, DCP, SP, TP** | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited |
| | **ARP** | Prohibited | Prohibited (except under SpP — | Prohibited (except under SpP — | Prohibited (except under SpP — | Prohibited (except under SpP — | Prohibited (except under SpP — | Prohibited (except under SpP — | Prohibited (except under SpP — | Prohibited (except under SpP — |

| To→ | | RA | | | | | CA | | | OA |
|---|---|---|---|---|---|---|---|---|---|---|
| From ↓ | | IP | DCP | SP | TP | ARP | SP | TP | POR | |
| | | | conditions a, b, c, d) | conditions a, b, c, d) | conditions a, b, c, d) | conditions a, b, c, d) | conditions a, b, c, d) | conditions a, b, c, d) | conditions a, b, c, d) | conditions a, b, c, d) |
| CA | SP, TP | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited |
| | POR | Prohibited | Prohibited (except under SpP — conditions a, b, c, d) | Prohibited (except under SpP — conditions a, b, c, d) | Prohibited (except under SpP — conditions a, b, c, d) | Prohibited (except under SpP — conditions a, b, c, d) | Prohibited (except under SpP — conditions a, b, c, d) | Prohibited (except under SpP — conditions a, b, c, d) | Prohibited (except under SpP — conditions a, b, c, d) | Prohibited (except under SpP — conditions a, b, c, d) |
| OA | | Prohibited | Prohibited (except under SpP — conditions a, b, c, d) | Prohibited (except under SpP — conditions a, b, c, d) | Prohibited (except under SpP — conditions a, b, c, d) | Prohibited (except under GP — conditions b, c, d) | Prohibited (except under SpP — conditions a, b, c, d) | Prohibited (except under SpP — conditions a, b, c, d) | Prohibited (except under GP — conditions b, c, d) | Allowed in accordance with jurisdictional movement requirements |

ARP = at-risk premises; CA = control area; DCP = dangerous contact premises; GP = general permit; IP = infected premises; OA = outside area; POR = premises of relevance; RA = restricted area; SP = suspect premises; SpP = special permit; TP = trace premises

Permit conditions for Table 6.2:

a) A risk assessment — under approval from CVO, or CVO-authorised delegate, which may include an appropriately skilled independent registered veterinarian — after assessment[25] indicates that the risk associated with the movement is acceptable within the response.
b) Boar stud meets minimum biosecurity standards – Relevant standards from the AHC ASF Voluntary Enhanced Biosecurity Standards (Appendix 8) applicable to the premises and the movement
c) Laboratory testing of sick or dead pigs at the boar collection facility is undertaken to exclude ASF. (If clinical signs are observed, unused collected semen and semen already dispatched should not be used, and further dispatch of semen must not occur until absence of ASF is confirmed.)
d) Semen delivery procedures of the receiving premises ensure the courier/transporter does not enter clean areas of the biosecurity management area (i.e. buildings, sheds, feed storage, load out and other facilities used for pig production, including any land immediately surrounding these facilities that is managed through defined and controlled access points)

[25] Diagnostic testing by a testing regime/method approved by the CVO or Animal Health Committee (www.agriculture.gov.au/agriculture-land/animal/health/committees/ahc) may be required, depending on the risk assessment.

### 6.1.3 Recommended movement controls for pig embryos

The International Embryo Transfer Society has indicated that there is not enough information to reach a conclusion about the risk of transmission of ASF virus via embryos.

Movements of pig embryos are expected to be infrequent (mainly for research purposes) and low risk; however, a precautionary approach is taken.

Table 6.3 describes the recommended movement controls for pig embryos within and between declared areas.

**Table 6.3 Recommended movement controls for pig embryos within and between declared areas**

| To→ From ↓ | | RA | | | | CA | | OA |
|---|---|---|---|---|---|---|---|---|
| | | IP | DCP | SP, TP | ARP | SP, TP | POR | |
| RA | IP, DCP, SP, TP | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited |
| RA | ARP | Prohibited | Prohibited (except under SpP — conditions a, b, c, d, e, f, g, h) | Prohibited (except under SpP — conditions a, b, c, d, e, f, g, h) | Prohibited (except under SpP — conditions a, b, c, d, e, f, g, h) | Prohibited (except under SpP — conditions a, b, c, d, e, f, g, h) | Prohibited (except under SpP — conditions a, b, c, d, e, f, g, h) | Prohibited (except under SpP — conditions a, b, c, d, e, f, g, h) |
| CA | SP, TP | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited | Prohibited |
| CA | POR | Prohibited | Prohibited (except under SpP — conditions a, b, c, d, e, f, g, h) | Prohibited (except under SpP — conditions a, b, c, d, e, f, g, h) | Prohibited (except under SpP — conditions a, b, c, d, e, f, g, h) | Prohibited (except under SpP — conditions a, b, c, d, e, f, g, h) | Prohibited (except under SpP — conditions a, b, c, d, e, f, g, h) | Prohibited (except under SpP — conditions a, b, c, d, e, f, g, h) |
| OA | | Prohibited | Prohibited (except under SpP — conditions a, b, c, d, e, f, g, h) | Prohibited (except under SpP — conditions a, b, c, d, e, f, g, h) | Prohibited (except under GP — conditions b, c, d, e, f, g, h) | Prohibited (except under SpP — conditions a, b, c, d, e, f, g, h) | Prohibited (except under GP — conditions b, c, d, e, f, g, h) | Allowed in accordance with jurisdictional movement requirements |

ARP = at-risk premises; CA = control area; DCP = dangerous contact premises; GP = general permit; IP = infected premises; OA = outside area; POR = premises of relevance; RA = restricted area; SP = suspect premises; SpP = special permit; TP = trace premises

Permit conditions for Table 6.3:

a) For the dispatch of embryos from an at-risk premises (ARP) or a premises of relevance (POR) or premises with susceptible species (PSS) in the OA (i.e. an embryo collection centre), the CVO or CVO-authorised delegate, which may include an appropriately skilled independent registered veterinarian, is to undertake a risk assessment of site infection risks on the embryo collection premises and conclude that the risks are acceptable within the response. The risk assessment will include whether the embryo collection premises can meet the permit conditions listed below and demonstrate maintenance of minimum biosecurity standards.[26]
b) Donor sows/gilts are present for at least 30 days (2 incubation periods) on the premises before embryos are collected for dispatch.
c) A daily health monitoring program is in place to observe all pigs on the premises and to detect and investigate clinical signs of ASF in pigs on the farm.
d) Any high suspicion of ASF is immediately reported to the Emergency Animal Disease Hotline (1800 675 888).
e) Laboratory testing of highly suspicious sick or dead pigs at the embryo collection facility is undertaken to exclude ASF. (If highly suspicious clinical signs are observed, unused collected embryos and embryos already dispatched should not be used, and further dispatch of embryos must not occur until absence of ASF is confirmed).
f) Farm records of all disease investigations and diagnoses are maintained.
g) Records of all embryo dispatches are maintained to enable traceability of embryo dispatches to individual farms.
h) Embryo dispatching procedures ensure that couriers and transporters do not enter the pig production area.

[26] 'Minimum biosecurity standards' – Relevant standards from the AHC ASF Voluntary Enhanced Biosecurity Standards (Appendix 8) applicable to the premises and the movement

### 6.1.4 Recommended movement controls for meat and meat products of domestic animals from abattoirs

This section does not cover movements of wild harvested meat or meat products (see Section 6.1.5). The recommendations outlined below apply to meat and meat products from domestic animals only and do not extend to imported meat or meat products, which are out of scope of AUSVETPLAN (see Section 1.1.3). However, guidance provided in this manual may be used to inform a risk assessment by the responding jurisdiction where required.

Risk assessments for permit applications for movements of meat or meat products must consider:

- the likelihood that the consignment of pigs was infected at the time of processing. This will include consideration of the classification of the premises of origin of the animals, and may include testing of any animal or carcase suspected of being infected with ASF to confirm or exclude ASF[27]
- the likelihood that meat or meat product has been cross-contaminated by infected or contaminated pigs or product during processing, including aggregated product that may contain material from multiple premises. This may include testing of meat or meat products suspected of being contaminated to confirm or exclude ASF. Where abattoirs process both pigs and other species, the likelihood of ASF virus cross-contamination of meat and meat products derived from the other species must also be assessed
- whether product that is likely to be contaminated can be identified and traced among other product at the abattoir premises[28] to the source premises
- the destination or intended use of the product (including the potential for exposure of pigs)
- biosecurity during transport of the product.

The movement of meat and meat products other than those derived from, or contaminated by, meat or meat products from an infected premises (IP), dangerous contact premises (DCP) or suspect premises (SP) is considered low risk in terms of likelihood of being contaminated prior to arriving at the abattoir, and low consequence because other controls (e.g. prohibited pig feed feeding controls) will be in place.

Movement controls should be applied on a risk-assessed basis where:

- there is suspicion that an animal was infected when received by the abattoir, or
- the meat or meat products may have been cross-contaminated at the abattoir premises, or
- identification and tracing processes, including consideration of the date and time of processing, cannot preclude that the processed product was infected or the product was cross-contaminated by infective material.

All product that may have been contaminated is designated to the highest risk premises classification.

Table 6.4 shows the recommended movement controls for meat and meat products of domestic animals from abattoir premises within and between declared areas.

***Management of product at an abattoir premises***

The following is for management of animal product or byproduct derived from pigs moving under permit (or moving under normal jurisdictional or interstate movement requirements for OA-to-OA movements), as well as product or byproduct that is held onsite at an abattoir premises at the time it is classified as an IP, dangerous contact processing facility (DCPF), SP or TP.

[27] If test results are pending, it is possible that pigs or product suspected of being contaminated with ASF may need to be destroyed and/or disposed of if it is impractical to hold product until test results are available.

[28] For the purposes of this manual, an abattoir premises is a premises where the abattoir is located. It may include additional structures on the same site such as chillers and cold storage facilities.

The following does not apply to animal product or byproducts that have moved off the abattoir premises at the time it is classified as an IP, DCPF, SP or TP.

Further restrictions on movement are unlikely once product is released into the market (refer to the **AUSVETPLAN Resource document:** ***Tracing and product recall from export-certified abattoirs affected by African swine fever***.

**Table 6.4 Recommended movement controls for meat and meat products of domestic animals from abattoir premises within and between declared areas**

| To → | | RA/CA/OA |
|---|---|---|
| From ↓ | | |
| Area where abattoir located | Abattoir classification | |
| RA/CA | APF | Allowed under GP — conditions d, f, g, h, i |
| | DCPF | If pigs originated from the OA, a POR, ARP or TP, prohibited (except under GP — conditions d, e, f, g, h, i) |
| | | If pigs originated from an SP or DCP, prohibited (except under SpP – conditions a, d, e, f, g, h, i) |
| | | If pigs originated from an IP, prohibited (except under SpP — conditions a, b, c, g, h, i) |
| | IP | If pigs originated from an IP, prohibited (except under SpP — conditions a, b, c, g, h, i)<br>If pigs originated from the OA, a POR, ARP, SP, TP or DCP, prohibited (except under SpP – conditions a, d, e, f, g, h, i) |
| | SP, TP, UPF | Prohibited (except under SpP — conditions a, d, e, f, g, h, i) |
| OA | Abattoir premises | If pigs originated from the OA, meat derived from those pigs is allowed to move under normal jurisdictional or interstate movement requirements |
| | | If pigs originated from a POR or ARP, prohibited (except under GP conditions d, f, g, h, i) |

APF = approved processing facility; ARP = at-risk premises; CA = control area; DCP = dangerous contact premises; DCPF = dangerous contact processing facility; GP = general permit; IP = infected premises; OA = outside area; POR = premises of relevance; RA = restricted area; SP = suspect premises; SpP = special permit; TP = trace premises UPF = Unclassified processing facility

Permit conditions for Table 6.4:

a) Documented risk assessment that indicates that the risk associated with the meat or meat products movement is acceptable within the response.
b) For disposal or treatment that inactivates the ASF virus.
c) Biosecure transport of meat or meat products by approved routes only to an approved disposal or treatment facility.
d) Consigned pigs passed ante- and postmortem inspection.
e) Consigned animals were not processed after pigs from an IP unless an appropriate decontamination process had occurred after processing pigs from the IP and before processing the consigned animals.
f) Abattoir is verified by an abattoir biosecurity expert as operating in accordance with Sections 5, 8, 9, 10 and 20 of AS 4696:2023 Australian standard for the hygienic production and transportation of meat and meat products for human consumption,[29] to mitigate the likelihood of cross-contamination during processing.
g) The meat or meat product is not brought into direct or indirect contact with susceptible animals.
h) Transport vehicles are appropriate to ensure that fluids or materials do not leak or fall out of the transport vehicle.
i) The transport vehicle and driver are not brought into direct or indirect contact with susceptible animals or stock trucks unless there is no meat or meat product on board and the vehicle and driver have been decontaminated.

### 6.1.5 Recommended movement controls for feral pig meat and meat products

Feral pig meat and meat products may include whole carcases, meat, raw offal, blood, bone, sausage casings, skin, fat, pig ears, snouts, trotters, trophies and skins.

Meat excludes any carcase or item that has not been passed for human consumption, or that has been consigned for rendering or discarded as a waste product during dressing or processing (e.g. hair, bone and trimmings).

Permit applications for movements of feral pig meat or meat products must consider the likelihood that the product is contaminated with viable ASF virus, the destination or intended use of the product (including the potential for exposure of pigs), and biosecurity during transport.

Note: Once product is released into the market, there are unlikely to be further restrictions on movement within or between declared areas.

Table 6.5 describes the recommended movement controls for feral pig meat (including whole carcases) within and between declared areas.

29 https://store.standards.org.au/product/as-4696-2023

**Table 6.5 Recommended movement controls for feral pig meat (including whole carcases) within and between declared areas, assuming the source of the feral pig meat is the same as the location from which the movement is proposed to occur**

| To→ From ↓ | | RA | | CA | | OA |
|---|---|---|---|---|---|---|
| | | **APF** | **All other premises** | **APF** | **All other premises** | **All premises** |
| **RA** | **All premises** | Prohibited (except under SpP — conditions a, b, c, d, e) | Prohibited | Prohibited (except under SpP — conditions a, b, c, d, e) | Prohibited | Prohibited |
| **CA** | **All premises** | Prohibited (except under SpP — conditions a, b, c, d, e) | Prohibited | Prohibited (except under SpP — conditions a, b, c, d, e) | Prohibited | Prohibited |
| **OA** | **All premises** | Prohibited (except under SpP — conditions a, b, c, d, e) | Prohibited (except under SpP — conditions a, b, c, d, e) | Prohibited (except under SpP — conditions a, b, c, d, e) | Prohibited (except under SpP — conditions a, b, c, d, e) | Allowed under jurisdictional and interstate movement requirements |

APF = approved processing facility; CA = control area; GP = general permit; IA = infected area; OA = outside area; RA = restricted area; SpP = special permit

Permit conditions for Table 6.5:

a) Documented risk assessment that indicates that the risk associated with the movement is acceptable within the response.
b) For disposal or treatment (e.g. burial, composting, incineration, landfill, rendering).
c) Biosecure transport by approved routes only.
d) The material is not brought into direct or indirect contact with susceptible animals.
e) Transport vehicles and containers are cleaned and disinfected after unloading. Drivers must shower, change and avoid contact with pigs for 24 hours after delivery.

### 6.1.6 Recommended movement controls for domestic pig carcasses, stillborn piglets, placentas, other waste products and effluent for disposal off farm, and waste products and effluent from abattoirs

Note: The movement of feral pig carcasses is prohibited within, between and from the RA and the CA except under SpP.

Waste products from farms include manure, bedding, composted material (which may include composted carcasses) and used husbandry items.

Waste products from abattoirs include manure, effluent, skins, hair, blood, rendered product and offal (products that have not been inspected or have not been declared fit for human consumption) as well as used packaging.

Table 6.6 describes the recommended movement controls for domestic pig carcasses, stillborn piglets, placentas, other waste products and effluent off farm, and waste products and effluent from abattoirs within and between declared areas.

**Table 6.6 Recommended movement controls for domestic pig carcasses, stillborn piglets, placentas, other waste products and effluent off farm, and waste products and effluent from abattoirs within and between declared areas**

| To→ From ↓ | | RA | CA | OA |
|---|---|---|---|---|
| RA | IP, SP, DCPF | Prohibited (except under SpP – conditions a, b, c, d, e, h, i) | Prohibited (except under SpP – conditions a, b, c, d, e, h, i) | Prohibited |
| | DCP, TP | Prohibited (except under SpP – conditions a, b, c, d, e, f, g, h, i) | Prohibited (except under SpP – conditions a, b, c, d, e, f, g, h, i) | Prohibited |
| | ARP, APF | Prohibited (except under SpP – conditions a, b, c, d, e, f, g, k) | Prohibited (except under SpP – conditions a, b, c, d, e, f, g, k) | Prohibited |
| CA | SP, DCPF | Prohibited (except under SpP – conditions a, b, c, d, e, h, i) | Prohibited (except under SpP – conditions a, b, c, d, e, h, i) | Prohibited |
| | TP | Prohibited (except under SpP – conditions a, b, c, d, e, f, g, h, i) | Prohibited (except under SpP – conditions a, b, c, d, e, f, g, h, i) | Prohibited |
| | POR, APF | Prohibited (except under SpP –conditions a, b, c, d, e, f, g, h) | Prohibited (except under GP – conditions a, c, d, e, f, g, h) | Prohibited (except under SpP – conditions a, b, c, d, e, f, g, h) |
| OA | | Allowed under normal jurisdictional requirements | Allowed under normal jurisdictional requirements | Allowed under normal jurisdictional requirements |

ARP = at-risk premises; CA = control area; DCP = dangerous contact premises; EP = emergency permit; GP = general permit; IP = infected premises; OA = outside area; POR = premises of relevance; RA = restricted area; SP = suspect premises; SpP = special permit; TP = trace premises; APF = Approved Processing Facility

Permit conditions for Table 6.6:

| | |
|---|---|
| a) | Direct movement from premises of origin to approved disposal site. |
| b) | Risk assessment - Under approval from CVO, or CVO-authorised delegate, after assessment indicates that the risk associated with the movement is acceptable within the response, including any conditions required to manage the product at the receiving premises. This may include laboratory testing of sick and dead pigs to exclude ASF. |
| c) | Travel by approved routes and no stopping en route. |
| d) | Must be transported in leakproof trucks, vehicle trays or containers. |
| e) | Vehicles must be decontaminated (i.e. cleaned and disinfected) after unloading. |
| f) | Absence of clinical signs consistent with ASF in all pigs on the premises before and on the day of dispatch. |
| g) | Any clinical signs in pigs suspicious for, or consistent with, ASF are immediately reported to the local control centre, state coordination centre or Emergency Animal Disease Hotline (1800 675 888). |
| h) | Any material permitted for movement must not be brought into direct or indirect contact with susceptible livestock. |
| i) | The receiving premises must implement biosecurity standards that minimise the risk of contaminated product contributing to viral spread and must have mechanisms that minimise the likelihood of wild/feral animals accessing the waste product material. |

### 6.1.7 Recommended movement controls for empty livestock transport vehicles and associated equipment

Vehicles that have been used to transport live pigs, and equipment used with live pigs or their products must be thoroughly decontaminated after use and between loads.

Decontamination applies to movements of vehicles and equipment that have had, or may have had, direct contact with pigs or their products into, within and out of RAs and CAs. Movement of these vehicles and equipment should be as per the relevant movement control matrix.

Further information on decontamination procedures and site preparation is available in the **AUSVETPLAN Operational manual: *Decontamination*** and nationally agreed standard operating procedure (NASOP) *Decontamination of large equipment*.

### 6.1.8 Recommended movement controls for people and nonsusceptible animals

Movements of people and nonsusceptible animals, including working/hunting dogs, off IAs, IPs, DCPs, SPs and TPs will be controlled and subject to appropriate decontamination procedures to prevent mechanical spread of ASF virus. Within the RA and the CA, people and working/hunting dogs that regularly travel from location to location and come into contact with high-risk items (e.g. domestic or feral pigs, pig products, waste, property and things that could become contaminated with virus — see also Section 4.3.11) will be required to undergo appropriate decontamination of themselves, and their overgear, equipment and vehicles between locations, and keep detailed records of their movements. Unnecessary movements of people and nonsusceptible animals, including working/hunting dogs, onto and off premises in the IA and the RA should be prevented.

Further information is available in NASOP 01: *Personal decontamination — entry and exit procedures* and NASOP 26: *Decontamination of groups of people — entry and exit procedures*.**Error! Bookmark not defined.**

### 6.1.9 Recommended movement controls for vehicles and equipment used to destroy or transport feral pig carcasses

Biosecurity requirements in Sections 6.1.7 and 6.1.8 also apply to hunters, their equipment and their vehicles.

### 6.1.10 Recommended movement controls for feed and bedding

The term feed includes a single material or more than one material intended to be fed to an animal or animals for the purposes of maintaining the animals' life, normal growth, productivity, work capacity and reproductive capacity. Feed may be made up of one or more ingredients, where an ingredient is a substance (organic or inorganic) that is nutritive for animals. Typically, pig feed is delivered in bulk to piggeries as mixed finished feed in pellet or mash form, from a commercially operated or private feed mill. Private feed mills, which include home mixers, are often operated from the same property as a piggery, leading to biosecurity considerations in respect to separation from piggery activities. Commercial feed mills are usually operated from properties where no pigs are housed or handled.

The term bedding refers to materials used for bedding for pigs and which may be consumed by pigs. Some bedding materials are also used for nesting and enrichment purposes. Materials used for bedding in Australia include straw, hay, sawdust and rice hulls.

Movements of feed and bedding onto and off pig premises other than movements described below are considered low risk and should continue in accordance with jurisdictional movement requirements.

Movements of feed and bedding onto and off IP, DCP, SP and TP pig premises in declared areas and infected areas will be subject to a risk assessment. Factors for consideration are described below.

***General considerations for movements of feed and bedding onto and off IP, DCP, SP and TP pig premises in declared areas and infected areas***

- origin location and premises classification, and relevant disease surveillance activities
- destination location and premises classification, and relevant disease surveillance activities
- intended end use of the feed or bedding
- transport (including driver) entry and exit biosecurity requirements including vehicle decontamination
- proposed consignment details including origin and destination, commodity type, ingredients, date of dispatch, and, where applicable, date of harvest, whether the product originated from a paddock treated with pig effluent or manure, and if treated, the date treatment was applied
- record keeping of all feed and bedding movements.

***Movement of feed from a feed mill on the same property as an IP, DCP, SP or TP piggery in declared areas or that is within an infected area, to another premises***

The risk assessment for movement of feed from a feed mill situated on a pig premises should also consider, in addition to general considerations:

- premises classification and location of the piggery
- the position of the feed mill and feed storage relative to the pig production area and the risk of physical or functional overlap and potential for virus cross-contamination
- whether feed mill staff also work in the pig production area, and biosecurity and decontamination protocols for movements between these areas
- whether vehicles or other equipment are shared between the feed mill and pig production area
- potential movements of rodents or other vectors that act as fomites between the pig production area and the feed mill
- whether the same road is used to access the feed mill and pig production area
- the source/origin of feed ingredients
- how long and under what conditions the feed has been stored at the feed mill
- vehicle and equipment decontamination practices into and out of the property and between deliveries
- any other potential cross-contamination by material of pig origin including effluent/manure, or by vectors such as rodents or other fomites (e.g. contaminated machinery) and time when this occurred.

***Movement of feed and bedding grown and harvested on properties that have an IP, DCP, SP or TP pig premises on them or that are within an infected area***

The risk assessment for movement of feed or bedding grown and harvested from paddocks on a property with pig premises on it should consider, in addition to general considerations:

- premises classification and location of the piggery
- where the feed or bedding has been grown in relation to the pig production area (proximity, segregation, security and risk of cross-contamination)
- whether paddocks from which the feed or bedding was harvested were treated with pig effluent/manure, and the period between treatment and harvest
- how long and under what conditions the feed or bedding have been stored on the property post-harvest

- the confirmation of, or uncertainty of, ASF virus in feral pigs in the area where the feed or bedding has been grown, harvested or handled
- likelihood of paddock, feed or bedding contamination by infected feral pigs
- further processing of the feed or bedding (e.g. pelleting)
- any other potential contamination of growing, harvested or stored feed or bedding by material of pig origin including effluent/manure, or by vectors such as rodents or other fomites (e.g. contaminated machinery) and time when this occurred.

# 7 Surveillance and proof of freedom

## 7.1 Surveillance

The key objectives and priorities for surveillance in response to an outbreak of African swine fever (ASF) are outlined in Section 4.3.3.

### 7.1.1 Specific considerations

Specific considerations for surveillance for ASF include the following:

- The presentation of ASF may vary considerably with the virulence of the virus strain.
- ASF may present similarly to many endemic diseases, and laboratory investigation is required for diagnosis.
- Captive pig populations include those that are part of commercial, smallholding and backyard production; domestic pets; and pigs held in educational farms, petting zoos, zoos and so on.
- Surveillance of feral pig populations will be important because they may act as reservoirs of infection, and to provide evidence to support proof of freedom.
- Surveillance of potential tick vector species and other vectors (e.g. biting insects), as appropriate, will be required.

The types of surveillance that are most appropriate for ASF are:

- active surveillance of premises identified through tracing to determine whether they contain infected animals and/or contaminated items — this may include field surveillance (i.e. property visits), telephone surveillance and regular review of herd records
- active surveillance at congregation points (e.g. saleyards, abattoirs, scales) to identify pigs showing clinical signs that have not been identified through tracing
- enhanced passive surveillance to detect premises and feral pig populations containing infected animals showing clinical signs that were not identified through tracing — this will involve encouraging producers, animal health professionals, other members in the pig supply chain, pig hunters, local government, zoos and so on to report pigs showing signs consistent with ASF.

Active surveillance of healthy pigs and other pigs with no known links to the outbreak (e.g. at slaughter, during field visits to premises with pigs) is unlikely to be an efficient way of detecting cases of ASF. However, it could be considered in some situations — for example, if producer-led reporting is not adequate for the population at risk (e.g. feral pigs), for a widespread outbreak or for proof of freedom.

Other activities to complement the above surveillance techniques include retrospective examination of abattoir records for high condemnation rates for findings consistent with ASF, and retrospective examination of samples submitted to laboratories from instances of disease that could have been ASF.

Using ropes to collect oral fluids has been demonstrated to be effective for ASF (Grau et al 2015) and may have a place for in-herd surveillance. It is not a recommended approach to investigating suspect cases.

### 7.1.2 Premises surveillance

***Domestic animals***

Surveillance activities (e.g. field visits, telephone surveillance[30]) should be prioritised based on risk, as indicated by the premises classification. Where the number of these premises is large and available resources are limited, further prioritisation may be required. This should take into consideration the likelihood that infection may be present, and the risk of further disease transmission and dissemination in both domestic and feral pig populations.

*Surveillance on infected premises (IPs)*

Surveillance on IPs may be useful to:

- confirm that infection is present, if the premises was classified as an IP without laboratory confirmation
- confirm the infection status of any rare and valuable animals (particularly if alternative disease control measures are being considered)
- aid epidemiological understanding of the outbreak, including on large premises — for example
  - clinical monitoring if the presentation of ASF is atypical
  - genetic mapping or other characterisation of the virus present — for example, if the IP is not linked to other areas of infection, or periodically throughout the outbreak to monitor for changes in virus virulence or characterisation.

Where laboratory investigation is required, the selection of animals to sample should be based on risk, and consider the presence of distinct epidemiological units or groups of animals on the premises. It should include enough animals to be representative of each distinct population present. Animals to target for sampling include:

- dead animals
- animals showing clinical signs consistent with ASF
- animals most likely to be severely affected (considering risk factors such as age, or exposure to a high viral load environment, etc)
- animals introduced to the premises in the tracing window of interest (as these may be a source of infection)
- animals more likely to be infected (e.g. those with a history of recent exposure to other animals, such as breeding males with higher numbers of matings recently; those returned from aggregation points, such as saleyards)
- rare and valuable animals.

*Surveillance on suspect premises (SPs)*

Veterinary investigation of SPs is a priority and should occur as soon as practical after suspicious signs are recognised and reported.

Given the range of clinical presentations of ASF, it is possible that many SPs will require investigation. As a general guide, SPs with epidemiological links to IPs should be investigated as the highest priority; those with no epidemiological links to IPs should be considered a lower priority. (There are many endemic causes of clinical signs similar to ASF, and therefore many reports will not be due to ASF. However, to ensure that producers are not discouraged from reporting, it is important that authorised government officers or personnel directed by the jurisdictional authority conduct surveillance to resolve these cases in a timely manner, as far as possible.)

---

[30] A clinical assessment proforma may be emailed or telephoned in at the nominated frequency, summarising mortalities, removals to a hospital pen and treatments.

SPs in the outside area (OA) are a higher priority for investigation than those in the control area (CA) or restricted area (RA).

SPs in the CA are a higher priority for investigation than those in the RA.

SPs with rare and valuable animals are a higher priority for investigation than those of equivalent risk status but without such animals.

On SPs, the approach should be as follows:

- An epidemiologically representative sample of pigs on the premises should be examined for clinical signs that could be consistent with ASF.
- Samples should be taken from all pigs found to be showing (even vague) clinical signs or from recent mortalities. Appropriate samples should also be collected to enable testing for differential diagnoses.
- Healthy pigs should be sampled for molecular and serological testing. Detection of virus may identify preclinical but shedding animals. Detection of seroconversion will help indicate how long ASF virus may have been present on the premises and provide data for epidemiological investigations.
- If not already done, an investigation should be conducted to determine whether the premises may be epidemiologically linked to the outbreak.

The timing of laboratory testing and the period of observation/quarantine may be affected by:

- the virulence of the circulating virus strain — for example, a shorter period between laboratory testing rounds or a shorter period of observation may be enough if highly virulent virus is circulating with more acute presentation and dramatic clinical signs
- proximity to other cases in the area — for example, if there are other cases nearby, a more extended period of observation may be preferable
- the strength of epidemiological links to other cases
- potential involvement of feral pigs — for example, if ongoing contact with feral pigs cannot be ruled out, a more extended period of observation may be preferable.

If negative test results are reported, but there remains an epidemiological link to an IP, the property status may revert to DCP, and measures for this new status will need to be completed.

*Surveillance on trace premises (TPs)*

Prioritisation of TP surveillance (e.g. field visits, telephone surveillance) should be based on risk, and informed by advice on mortalities and production records on the premises. It should consider the likelihood that infection may be present, and the risk of further disease transmission and dissemination if the animals are infected.

The approach to surveillance of live pigs on TPs should be consistent with the guidance for surveillance on SPs. In addition, where the premises was identified through tracing of contaminated animal products, wastes or things, consideration should be given to surveillance, including sampling for laboratory investigation, where warranted (e.g. using molecular techniques such as PCR testing where the presence of ASF virus contamination cannot be otherwise ascertained).

Producer-led reporting of any clinical signs consistent with ASF or changes in production statistics may be used on lower-priority TPs while awaiting further assessment from authorised officers.

If live pigs on the premises show clinical signs consistent with ASF, the premises should be considered an SP, and the guidance on surveillance and assessment of SPs followed.

If the TP has no live pigs, the premises may be considered as assessed negative if the investigation shows no evidence of ASF virus. For example, this might occur if the potentially contaminated items are no longer on the premises, laboratory investigation of potentially contaminated items returns negative results or the potentially contaminated items are decontaminated.

If live pigs on the premises do not show clinical signs of ASF, the premises may be considered for ongoing surveillance over a 15-30-day period (1–2 incubation periods) or may be resolved to ARP/POR status.

*Surveillance on dangerous contact premises (DCP) and dangerous contact processing facilities (DCPFs)*

Surveillance activities (e.g. field visits, telephone surveillance) should be prioritised based on risk. Surveillance of live pigs on DCPs and DCPFs should be consistent with the guidance for surveillance on SPs.

Where the premises has been allocated a DCP or DCPF classification because of the potential presence of contaminated animal products, wastes or things (e.g. the environment, feed), these items should also be subject to decontamination and/or disposal, or sampling for laboratory investigation, where warranted (e.g. using molecular techniques such as PCR testing where the presence of ASF virus contamination cannot be otherwise ascertained).

The approach to assessing DCPs or DCPFs as negative, following completion of control activities, is outlined in the **AUSVETPLAN Guidance document: *Declared areas and allocation of premises definitions in an EAD response*** and **AUSVETPLAN Resource document: *African swine fever response operational guidelines for pig abattoirs.***

*Surveillance on other premises with live pigs (at-risk premises (ARPs) in the RA, premises of relevance (PORs) in the CA, and premises in the OA)*

The aim of surveillance on ARPs, PORs and premises in the OA will be to detect infection (new IPs) as early as possible, while minimising opportunities for inadvertent spread of ASF virus through field visits.

Methods of surveillance may include:

- inspection of all at-risk herds or groups by owners or managers
- veterinary investigation of mortality or abortion events
- monitoring and review of production records and producer health reports[31]
- phone interviews
- field inspection and sampling by veterinary or animal health surveillance teams.[32]

The frequency and method(s) of surveillance chosen for individual premises will depend on the assessed risk (including from vector and feral pig transmission), the number of premises to monitor and the available resources.

The initial approach to surveillance on ARPs, PORs and other premises with pigs in the OA would include raising awareness of the range of clinical presentations of ASF and using producer (or owner)-led reporting of clinical signs or changes in production statistics. This should be accompanied by the provision of biosecurity advice, to help prevent the introduction and/or further spread of disease.

Surveillance activities would be based on risk; for example, ARPs may be considered a higher priority for such visits, particularly ARPs close to IPs where uncontrolled transmission pathways (e.g. feral pigs) could

---

31 This may include diagnostic testing on pigs scheduled for movement, or background surveillance testing of 'normal' sick and dead pigs to exclude ASF.

32 The commercial pig industry has a network of specialist pig veterinarians and most commercial operations have a consulting veterinarian. Engagement with this network would play a key role in commercial operation surveillance.

create a significant means of disease spread. Abattoir surveillance may also be useful for monitoring the status of pigs from these premises.

The timing and frequency of active surveillance visits in the CA and the OA may differ from those in the RA. For logistical purposes (and to minimise the risk of disease spread), it may be useful to separate management and resourcing of surveillance in the CA from that in the RA.

Additional surveillance activities on these premises may subsequently be required to provide evidence to support proof of freedom.

*Surveillance of sentinels used in restocking*

Use of sentinel pigs when restocking premises following depopulation and decontamination may be considered. Use of sentinels, including staged repopulation using sentinels, will only occur on the presumption that it does not create additional risk that cannot be effectively and efficiently managed.

The decision to use sentinels should take into consideration:

- confidence in the decontamination process
- consequences for disease control if decontamination was incomplete
- the potential involvement of tick vectors.

Sentinel pigs may be introduced as a staged approach to repopulation — that is, introducing sufficient numbers to all relevant areas to ensure confidence in the decontamination process. Where sentinel pigs are introduced before full restocking, the following guidance should be considered:

- Sentinel pigs should not be placed until it is considered that there is no viable virus in the environment to which pigs are to be introduced. The actual time before placement should consider a range of factors, including those described in Section 2.4.2 and Appendixes 2 and 3, including
  - the matrix or substrate in which ASF virus exists
  - ambient temperature
  - water content
  - ASF virulence and vial shedding
  - the potential involvement of tick vectors
  - confidence in the decontamination process (e.g. types of surfaces and substrates that were decontaminated).
- Sentinel pigs should be PCR-negative and seronegative for ASF before placement.
- Based on advice from the Food and Agriculture Organization of the United Nations, it is recommended that sentinels should make up approximately 10% of the normal stocking rate (FAO 1999) and that, ideally, enough sentinels are in each pen on the farm where pigs with clinical ASF were found. Where multiple pens in multiple sheds were infected, groups of sentinels will be held in each pen of each infected shed and monitored daily for clinical signs of disease.
- Laboratory investigation should be undertaken on
  - any pigs that show clinical signs of ASF
  - any mortalities occurring during the sentinel period (including postmortem examination and collection of appropriate tissue samples; see Section 2.5.4)
  - sentinels every 2 weeks (molecular diagnostics and serology) for 40 (Beltrán-Alcrudo et al 2017), 42 (FAO 1999) or 45 (Official Journal of the European Communities 2002, Dzhailidi et al 2014) days.
- Where sentinels are used as part of a premises repopulation process, sample numbers may be determined based on epidemiology.
- If the epidemiological assessment indicates that ticks are suspected or known to be involved in the epidemiology of the disease, the World Organisation for Animal Health (WOAH) specifies a sentinel period of 2 months for IPs (WOAH 2018b). This 2-month period may be included wholly or partly within

the 3-month proof-of-freedom phase. Testing should be done every 2 weeks (as above) for the duration of the sentinel period.

- If any sentinel pigs are confirmed as infected with ASF virus, the premises should be considered an IP and relevant control measures undertaken.
- If all sentinel pigs remain negative for the presence of ASF virus throughout the sentinel period, the premises may be assessed negative. Full restocking could then proceed, provided that restocking does not create additional risk that cannot be effectively and efficiently managed — for example, use of sentinels and restocking are not likely to be permitted in declared areas of active infection (e.g. the RA).

***Other surveillance***

Surveillance of feral pig populations and any implicated vector species (soft ticks, biting insects) will also be required; see Sections 4.3.12 and 4.3.13, respectively.

## 7.2 Proof of freedom

Providing confidence that ASF is no longer present in Australia will be important to satisfy trading partners and regain access to international markets, and to underpin import controls to prevent the reintroduction of ASF.

Chapter 15.1 of the WOAH *Terrestrial animal health code* lists the criteria by which a country, zone, compartment or establishment may be considered free from ASF. The surveillance framework must meet these requirements, and must provide sufficient evidence that there is no detectable ASF virus infection in domestic and feral pigs at a selected prevalence of disease, and that statistical confidence limits are robust enough to satisfy the WOAH and trading partners. The recommended approach to surveillance in feral pigs is provided in Appendix 7.

The role of *Ornithodoros* or other soft-bodied ticks in the transmission and persistence of ASF will need to be elucidated and explained in a dossier to demonstrate freedom. The WOAH requires 3 months of negative surveillance after the disinfection of the last infected premises and implementation of an appropriate surveillance program in domestic and feral pigs for a country to regain ASF freedom. If ticks are involved, the surveillance program must use sentinel pigs for 2 months, as per Article 15.1.7 of the Terrestrial Code. Given that this measure could only be used on domestic pig premises, there is a need for further research on the role of existing species of *Ornithodoros* and other soft-bodied ticks in Australia in relation to feral pigs and potential ASF transmission.

Finding evidence of infection at any prevalence in the feral pig population automatically invalidates any freedom claim unless otherwise stated in the relevant chapters of the Terrestrial Code.

Although the WOAH provides guidelines for recovering ASF-free status, acceptance of this status following an outbreak will have to be negotiated with individual trading partners and may take considerably longer than the minimum periods prescribed in the Terrestrial Code.

A key requirement for the WOAH and trading partners will be evidence of an effective surveillance program capable of detecting infection if it is present in the population, and analysis of data to support the case for disease freedom. Descriptions of the veterinary services, demographics of susceptible populations and relevant industry structures should be included to justify the design of the surveillance program.

Specific recommendations for this surveillance will be developed using the technical expertise of competent and experienced epidemiologists, and will be based on the characteristics of the outbreak. The surveillance program will need to be carefully designed and followed to ensure that it produces sufficient data that are reliable and acceptable to the WOAH and international trading partners, while avoiding being excessively costly and logistically complicated. The surveillance program will include clinical, serological and molecular surveillance of relevant susceptible domestic and feral pig populations. It will include targeted and random components, and will build on the surveillance, diagnostic testing, tracing and epidemiological assessment conducted during the response phase.

In addition to the recommendations in the Terrestrial Code, the design of the program will consider the general and specific considerations for ASF surveillance outlined in Section 7.1.

# Appendix 1 African swine fever fact sheet

**Disease and cause**

African swine fever (ASF) is a viral disease of pigs that is clinically indistinguishable from several other important emergency and endemic pig diseases, including classical swine fever, Aujeszky's disease, erysipelas and salmonellosis. Depending on strain virulence, infection can result in high morbidity and mortality. The disease is caused by a virus belonging to the genus *Asfivirus*. It has been responsible for serious economic and production losses overseas.

**Occurrence in Australia**

There have been no outbreaks of ASF in Australia.

**Species affected**

ASF is not a zoonotic disease.

ASF only infects domestic and feral pigs — including warthogs, other African wild hogs and Timorese warty pigs. There are no known human health risks associated with eating meat and pork products from affected animals.

**Key signs**

ASF can have a number of clinical presentations, depending on the virulence of the virus strain. Pigs can be found dead with no prior clinical signs. They can have acute clinical signs, including fever, depression, anorexia, hyperaemia or cyanosis of extremities (particularly the ears and snout), incoordination and laboured breathing. Mortality rates vary but can reach up to 100%, depending on the strain virulence. A chronic form of the disease can occur in pigs that survive, resulting in transient fever, weight loss, pneumonia and arthritis. These pigs may become persistent shedders of the virus.

Clinical signs alone cannot be used to differentiate ASF from some other diseases of pigs; laboratory testing must be used to diagnose the disease.

**Spread**

ASF virus is shed in faeces, urine, semen and haemorrhagic secretions of infected pigs. Artificial insemination with semen from experimentally infected boars has been demonstrated to infect sows.

Disease transmission occurs via direct contact with infected pigs; ingestion of infected pig products; or contact with contaminated premises, equipment or people — including contaminated livestock transporters, and other vehicles such as cars and feed trucks travelling on contaminated routes.

Feral pigs can become an important reservoir for the virus, and may lead to secondary spread to domestic piggeries. Control practices involve strict biosecurity management, with sanitary destruction and disposal of pig carcasses.

**Persistence of the agent**

ASF virus is an enveloped virus and is stable at a wide range of pH levels in serum-free medium (approximately pH 3.9–11.5); serum increases the stability of the virus. The virus remains viable when frozen but may be inactivated by heat.

**Incubation period**

The incubation period is 4-19 days. More virulent strains generally cause disease faster than the more benign strains. For the purposes of the WOAH code the incubation period is 15 days.

# Appendix 2 Viability of African swine fever virus under different scenarios

**Expected African swine fever (ASF) virus inactivation times under varying environmental temperatures**

Davies et al (2017) have determined the half-life of ASF virus in blood, urine and faeces (Table A2.1).

**Table A2.1 Half-life of viable ASF virus**

| Substrate | Half-life (days) | | | |
|---|---|---|---|---|
| | **4 °C** | **12 °C** | **21 °C** | **37 °C** |
| Faeces (solid) | 0.65 | 0.50 | 0.39 | 0.29 |
| Urine | 2.19 | 1.07 | 0.68 | 0.41 |

Source: Davies et al (2017)

Indicative times for environmental degradation or inactivation of viable virus in a scenario where highly virulent virus is present in blood, urine and faeces in contaminated indoor areas; the initial virus titre of blood is assumed to be high ($10^{8.7}$) (Guinat et al 2014); and the desired end titre is low ($<10^{1}$) (Gallardo et al 2013) are as follows, using the half-life in urine (as the longest half-life for blood, urine and faeces) (Davies et al 2017):

- At 4 °C ambient temperature
  - half-life of 2.19 days
  - time would be 57 days.
- At 12 °C ambient temperature
  - half-life of 1.07 days
  - time would be 28 days.
- At 21 °C ambient temperature
  - half-life of 0.68 days
  - time would be 18 days.
- At 37 °C ambient temperature
  - half-life of 0.41 days
  - time would be 11 days.

Beltrán-Alcrudo et al (2017) proposed exposure to sunlight as a means of decontaminating equipment that cannot be decontaminated by other means; however, they did not provide guidance on the time needed to inactivate ASF virus.

# Appendix 3 Detection times for African swine fever virus DNA under different scenarios

**Expected African swine fever (ASF) virus DNA detection times under varying environmental temperatures**

Davies et al (2017) have determined the half-life of ASF DNA in faeces, urine and oral fluid (Table A3.1).

**Table A3.1 Half-life of ASF virus DNA**

| Substrate | Half-life (days) | | | |
|---|---|---|---|---|
| | 4 °C | 12 °C | 21 °C | 37 °C |
| Faeces (solid) | 9.95 | 9.48 | 9.00 | 8.25 |
| Urine | 32.54 | 27.99 | 24.18 | 19.48 |
| Oral fluid | 2.75 | 2.72 | 2.67 | 2.60 |

Source: Davies et al (2017)

Indicative times for finding ASF virus DNA in a scenario where highly virulent virus is present in blood, urine and faeces in contaminated indoor areas; the initial virus titre of blood is assumed to be high ($10^{8.7}$) (Guinat et al 2014); and the desired end titre is low ($<10^1$) (Gallardo et al 2013), are as follows, using the half-life in urine (as the longest half-life for oral fluids, urine and faeces) (Davies et al 2017):

- At 4 °C ambient temperature
    - half-life of 32.54 days
    - time would be 846 days.
- At 12 °C ambient temperature
    - half-life of 27.99 days
    - time would be 728 days.
- At 21 °C ambient temperature
    - half-life of 24.18 days
    - time would be 629 days.
- At 37 °C ambient temperature:
    - half-life of 19.48 days
    - time would be 506 days.

# Appendix 4 Factors for a response to African swine fever in Australia

The critical factors for a response to African swine fever (ASF) in Australia include the following in terms of domestic pigs, feral pigs or both:

| Factors | Deduction and implication | Relevant to: Domestic pigs | Relevant to: Feral pigs |
|---|---|---|---|
| **Susceptible species**<br>• All domestic and feral pig species are susceptible to infection in Australia. Suid species kept under zoological conditions may also be susceptible. In this manual, the term 'pig' is used to refer to all susceptible species in Australia. | **Susceptible species**<br>• All suids are susceptible and must be considered for control purposes. | ✓ | ✓ |
| • There are no public health implications. | **Human health**<br>• Community must be reassured that pork is safe to eat. | ✓ | ✓ |
| **Clinical signs**<br>• ASF is a highly variable disease. It can vary from disease with high morbidity and high case mortality to a very mild disease, depending on the genotype involved. | **Diagnostic testing**<br>• Genotyping will be critical to understanding the expected syndromes to be observed clinically. | ✓ | ✓ |
| • Given the similarity of ASF to many endemic and exotic diseases, laboratory confirmation is required for diagnosis. | • Differential diagnoses include exotic and endemic diseases. | ✓ | ✓ |
| | • A wide spectrum of diseases should be tested for to ensure their detection. | ✓ | ✓ |
| **Persistence of agent and modes of transmission**<br>• ASF virus is shed in high concentrations in secretions and excretions during the acute phase of the disease. | **Disposal and decontamination**<br>• The quantum of virus directly influences the decontamination requirements. Less decontamination will require longer timeframes to ensure that sufficient virus log reductions have occurred to reduce the infection pressure and risk. | ✓ | ✓ |
| | **Tracing**<br>• Tracing must be undertaken to rapidly identify trace premises (TPs) and conduct investigations | ✓ | ✓ |

| Factors | Deduction and implication | Relevant to | |
|---|---|---|---|
| | | Domestic pigs | Feral pigs |
| | to determine source and spread of disease. This includes human-assisted movements of live animals and fomites. | | |
| | **Surveillance**<br>• Surveillance of pig populations must be undertaken to ensure early detection before a response; rapid detection during a response, delimiting the distribution and extent of disease spread; and proof of freedom following eradication efforts. | ✓ | ✓ |
| | **Biosecurity controls**<br>• Biosecurity controls must be implemented on declared premises and in declared areas to minimise the risk of virus transmission. | ✓ | ✓ |
| • ASF virus may remain viable for extended periods under some Australian environmental conditions (e.g. in cooler, wetter areas). | **Disposal and decontamination**<br>• Disposal and decontamination measures must be undertaken commensurate with risk. | ✓ | ✓ |
| • ASF virus may remain viable under some heat treatments. Heat treatment of meat and meat products to 100 °C for 30 minutes is thought to inactivate the virus. | **Biosecurity controls**<br>• Rendered pig product from declared premises requires consideration of the likelihood of virus transmission in the rare case that quality controls of rendered product are not being met and ASF virus is not being inactivated. | ✓ | |
| • Aerosols do not play a significant role in disease transmission between herds, but are important for transmission within herds and between animals in close contact. | **Declared areas**<br>• The size of the restricted area does not need to account for windborne spread. | ✓ | ✓ |
| • The virus remains viable for extended periods in suitable substrates (i.e. urine, faeces, protein) and when frozen. | **Disposal and decontamination**<br>• Total cleaning and removal of all animal secretions and excretions (e.g. faeces, urine, blood) are essential before disinfection begins. | ✓ | ✓ |

| Factors | Deduction and implication | Relevant to | |
|---|---|---|---|
| | | Domestic pigs | Feral pigs |
| | **Biosecurity controls**<br>• As above | ✓ | ✓ |
| • The quantum of virus within the environment will influence decontamination procedures. | **Disposal and decontamination**<br>• The persistence of ASF virus in the environment may present challenges in decontaminating some premises in a timely manner. | ✓ | ✓ |
| | **Declared areas**<br>• Determination of an infected area (IA) will assist with identifying potentially contaminated lands. | | ✓ |
| • ASF virus may persist in the environment (e.g. contaminated ground/death sites) and in carcasses, resulting in a prolonged source of infection for feral pigs. | **Disposal and decontamination**<br>• Removal and sanitary disposal of feral pig carcasses should be undertaken, where feasible.<br>• Decontamination of the immediate death site should be undertaken, where feasible. | | ✓ |
| | **Biosecurity controls**<br>• As above | ✓ | ✓ |
| • Pigs infected by less virulent virus strains or surviving acute disease may shed virus for more than 1 month following recovery. | **Epidemiology and policy amendments**<br>• Infection with mild virus strains may require modifications to the approach provided here, as the approach provided is for more virulent strains. | ✓ | ✓ |
| | • Infection with less virulent virus will require heightened clinical and laboratory surveillance, test and slaughter campaigns, and potentially wider eradication campaigns in feral animals. | ✓ | ✓ |
| **Laboratory tests**<br>• Tests are available for rapid detection of ASF virus, but early diagnosis of an outbreak may be delayed if ASF is present in the mild form, or if initial infections are in | **Diagnostic testing**<br>• ASF should be considered in differential diagnoses even where clinical signs are vague or nonspecific. | ✓ | ✓ |

| Factors | Deduction and implication | Relevant to | |
|---|---|---|---|
| | | Domestic pigs | Feral pigs |
| small, noncommercial pig herds or feral pigs. | | | |
| | • With any suspicion, diagnostic testing is recommended. | ✓ | ✓ |
| **Factors influencing transmission**<br>• Transmission of ASF in Australia will most likely occur via the movement of animals, animal products and fomites when this results in contact with other pigs. ASF virus is unlikely to be transmitted over long distances without human assistance. | **Disease prevention**<br>• Australian border controls are the critical first step in preventing disease entry. Efforts must be made to reduce the likelihood of disease entry through communications, interceptions and regular testing of confiscated product. | ✓ | ✓ |
| | • Feeding prohibited pig feed must be prohibited before, during and after a response. | ✓ | ✓ |
| | **Movement controls**<br>• Human-assisted movements of live animals, pork, pork products and contaminated items must be managed. | ✓ | ✓ |
| | • Aggregations of live pigs at pig shows, pig saleyards and pig scales must be managed. | ✓ | |
| | **Biosecurity controls**<br>• As above | ✓ | ✓ |
| • Movement of the virus by fomites (including trucks) has been proven. | **Movement controls**<br>• Human-assisted movements of live animals, pork, pork products and contaminated items must be managed. | | |
| | • Movement controls will be applied to fomites. | ✓ | ✓ |
| | • Arthropod vectors, including biting insects and ticks, will require assessment and management, as appropriate. | ✓ | ✓ |
| **Vaccination and treatment**<br>• No vaccine or effective treatment is available. | **Stamping-out policy**<br>• Other controls must be applied, including destruction, disposal and decontamination. | ✓ | |
| | **Animal welfare** | ✓ | |

| Factors | Deduction and implication | Relevant to | |
|---|---|---|---|
| | | Domestic pigs | Feral pigs |
| | • Animal welfare needs must be addressed. | | |
| **Demographics and populations**<br>• Smallholder pig populations may not be easily identified or located. | • Control measures should support self-identification, and verification of premises details with jurisdictional governments and industry. | ✓ | |
| • Feral pig populations may not be easily identified or located. | **Surveillance**<br>• Surveillance to identify pig populations may be undertaken pre-emptively or 'just in time' to inform control activities. | | ✓ |
| **Early detection surveillance**<br>• Any delay in notification from pig owners or hunters will lead to delays in response and prolonged response activities.<br>• People may not recognise or report the disease, or seek assistance. | **Public information**<br>• A public information campaign about domestic and feral pigs must be targeted towards relevant stakeholders. | ✓ | ✓ |
| | **Compensation and public information**<br>• Compensation payments may aid early reporting. | ✓ | |
| **Social and economic effects**<br>• Market fluctuations due to public health perceptions or product withdrawals would likely reduce the value of the industry. | **Control policies**<br>• Control actions need to be undertaken rapidly to reduce disease spread, and prolonged impacts on domestic and export markets. | ✓ | ✓ |
| • Trade in pig products will be affected. | • Control actions need to be undertaken rapidly to reduce disease spread, and prolonged impacts on domestic and export markets. | ✓ | ✓ |
| | • Compartmentalisation and zoning need to be considered. | ✓ | ✓ |
| • Destruction and disposal of culled pigs may require substantial resources and may cause community concerns. | **Public information**<br>• A public information campaign must address the need for the agreed strategy. | ✓ | ✓ |
| | • **Disposal**<br>• Disposal is typically the rate-limiting step. Disposal must keep | ✓ | ✓ |

| Factors | Deduction and implication | Relevant to | |
|---|---|---|---|
| | | Domestic pigs | Feral pigs |
| | up with destruction to avoid disposal backlogs. | | |
| | **Disposal and decontamination**<br>• Culled feral pigs should ideally be removed and disposed of in a sanitary manner. | | ✓ |
| • Loss of animals in herds and zoos may result in loss of important genetics and species (including rare breeds). | **Stamping-out policy — rare and valuable animals**<br>• Development of a policy for rare and valuable animals will need to be considered. | ✓ | ✓ |
| | • A risk-based case-by-case approach must be taken to managing these animals. | ✓ | ✓ |
| **Animal welfare**<br>• Animal activists may influence public perceptions around animal welfare. | **Destruction**<br>• Mass animal destruction decisions (i.e. the decision to destroy or not) and methodology may affect the implementation of control strategies (e.g. destruction, welfare slaughter). | ✓ | ✓ |
| | **Public information**<br>• A public information campaign needs to address the rationale for the planned strategy. | ✓ | ✓ |
| | • Feed stores will need to be managed appropriately for the duration of control. | ✓ | |
| **Response surveillance**<br>• Feral pig surveillance and control measures, where warranted, may be difficult to implement. This may be due to difficulty in finding and destroying pigs, mobilising resources into a region, undertaking ground control once arrived in the region, and undertaking aerial control and/or carcass removal. | **Stamping-out policy**<br>• Finding feral pigs for control purposes can be challenging and may not be complete. | | ✓ |
| | • Feral pig destruction and disposal, and decontamination of sites may only be appropriate in certain areas. | | ✓ |

| Factors | Deduction and implication | Relevant to | |
|---|---|---|---|
| | | Domestic pigs | Feral pigs |
| | • Feral pigs that are infected but not controlled may remain as a reservoir of infection. | | ✓ |
| **Destruction**<br>• Most large abattoirs kill a single species, so accessing pig abattoirs may have some logistical issues because they may not be willing to accept pigs from potentially infected premises. Multispecies domestic abattoirs may also be unwilling to accept pigs during an outbreak. | **Destruction**<br>• Both situations may result in difficulties finding slaughter pathways for some sectors of the industry. | ✓ | |
| | • Alternatives will need to be explored. | ✓ | |
| | • Incentives may need to be provided. | ✓ | |

# Appendix 5 Declared area considerations for domestic and feral pigs

High priority considerations may include:

1. Potential spread prior to detection should be considered when estimating the area of risk for initial declared areas.
2. For domestic pigs, biosecurity practices and supply chain locations will be an important consideration in determining the likelihood of actual or potential spread by pigs or fomites and hence the size of declared areas.
3. For feral pigs, the predicted roaming range, particularly during the silent spread phase, will be an important consideration in determining the size of the restricted area (RA) or Infection Area (IA, if used).
4. The number and type of domestic pig premises and feral pig populations in combination with the known or estimated distribution of the virus should also be considered.

For both domestic and feral pigs the following criteria may also be considered:

1. characteristics of ASF virus
   - strain and virulence
   - environmental stability and persistence
   - chemical susceptibility
2. epidemiology of ASF
   - incubation period
   - pre-clinical virus shedding
   - expected silent spread phase
   - ease and speed of transmission (e.g. the estimated dissemination ratio)
   - expected transmission pathways (e.g. no aerosol spread)
   - expected environmental persistence of ASF virus, based on season and prevailing weather conditions
   - vectors:
     - local active insect and tick vector species, and their distribution and dispersal
     - location, distribution and dispersal of populations of non-susceptible animals (e.g. rodents) and insects, which may act as mechanical vectors
   - expected rate of local and long range spread of ASF associated with susceptible animals, humans and other fomites (see Section 2.4.3). Spread of ASF is primarily by direct pig-to-pig contact and fomites, so attention to these pathways is important.
3. location, distribution, number and type of susceptible animals in the area, including
   - number and type of domestic pig premises (Bradhurst et al 2021)
     - very large commercial — pigs typically housed indoors with good routine biosecurity and multiple pig movements per week to export and domestic processing plants
     - medium to large commercial — pigs typically housed indoors with good to moderate routine biosecurity and weekly pig movements to export and domestic processing plants
     - specialist gene transfer — boars typically housed indoors with very good biosecurity and multiple weekly movement of semen
     - small commercial — pigs typically housed indoors or outdoors with low routine biosecurity and regular movements to domestic processing plants
     - smallholder — pigs typically kept outdoors with low routine biosecurity and occasional movements to domestic abattoirs

        - pig keepers (including pet pigs) — pigs typically kept outdoors with low routine biosecurity and infrequent or unrecorded movements, and lower likelihood of exposure to other domestic pigs.
    - feral pig environment including
        - habitat suitability and seasonality for pigs and potential vectors
        - density of feral pigs
        - age/sex and fecundity of any infected animals
        - expected and maximum range of feral pigs
        - terrain and barriers to movement
        - feral pig population overlap or continuity
        - feral pig proximity to domestic pigs, including smallholdings, free-range piggeries and intensively housed piggeries
        - modelling may assist determination of feral pig environment considerations.
4. known or expected geographic distribution of the virus
    - known or estimated index case or source of the infection
    - length of time infection is thought to have been present in the area (e.g. the silent spread phase), and therefore where subclinical infection may be present
    - biosecurity practices, for domestic pigs
    - patterns of pig movements, including:
        - domestic pig flows to processing and property-to-property
        - seasonal movements and predicted roaming range of feral pigs.
    - known human-assisted and natural movements of pigs and other risk materials (e.g. tracing and surveillance data)
    - known active and passive surveillance data, including data from abattoirs, local government control programs (baiting, trapping, hunting), veterinarians, hunters, chiller boxes, local producers and ad hoc sources such as vehicle collisions involving feral pigs
    - likelihood of direct and indirect contact between live and dead domestic and feral pigs and pig products including pig feed, bedding, piggery equipment and waste. Consider the type of production (e.g. indoors, outdoors, commercial, smallholder, pig keeper), husbandry and biosecurity practices
    - in consultation with feral pig experts, consideration of potential disturbance or dispersal of animals that may be caused by response activities (e.g. hunting).
5. supply chain considerations
    - location, operational and biosecurity considerations of key components of industry supply chains (e.g. piggeries, abattoirs, renderers, artificial breeding centres (boar studs))
    - potential impact on international trade and domestic supply
    - impacts on the industry of the disease control measures compared with the expected benefits of disease control. In particular, the impact of movement controls within and between declared areas, and from/to the outside area.
6. local land use (e.g. presence of national parks, heritage sites, agricultural use) and associated considerations including
    - feral pig and hunting / control activity in the area
    - visitation rates
    - accessibility for response-related activities
7. accepted or recognised international practices, including protection zones around infected areas (feral pigs)
8. confidence in the accuracy of available information
9. tolerance for unknown information such as unknown pig holdings or pig movements.

# Appendix 6 Recommended technical and disease risks to be assessed when deciding movement permits

**Table A6.1 Risks identified and addressed through movement control permit conditions**

| Category of risk | Risk | Commodity/matrix[a] | | | | |
|---|---|---|---|---|---|---|
| | | **Live pigs (see Section 6.1.1)** | **Semen (see Section 6.1.2)<br><br>(=semen — reviewed)** | **Embryos** | **Domestic pig carcasses, stillborn piglets and placentas for disposal off farm (see Section 6.1.6)** | **Waste products and effluent off farm (see Section 6.1.6)** |
| Movement of infected or contaminated commodity | Infected or contaminated commodities or vehicles may be moved and spread ASF virus. | a, b, c, d, e, f, g, h, i, j, k, l, m, n | a, b, c | a, b, c, d, e, f | a, b, c, d, e, f, g, h, i | a, b, c, d, e, f, g, h, i |
| Movement of infected/contaminated commodity | Decontamination measures (e.g. rendering, composting, disinfection) are ineffective and commodities may be released, leading to further spread of ASF virus. | i | c | | f, g | b, h |
| Movement across declared areas or jurisdictions | Moved commodities do not meet the receiving jurisdiction's import requirements and/or intrastate declared area movement requirements. | Underlying general principle | Underlying general principle | | Underlying general principle | Underlying general principle |
| Aggregations | Multiple consignments per load may lead to spread of ASF virus. | c | c | | a, c, d | |
| Traceability | Commodities are not traceable. | l | b | f, g | b | |
| Travel routes | The route travelled (including premises entry/exit practices) may contribute to ASF virus spread. | a, e, f | c | | a, c, d | b, c, d, e |
| Biosecurity standards/controls | Disease may spread if source and/or destination premises do not meet minimum biosecurity standards.[b] | g, h | b | a, b, c, f | b | g |

| Category of risk | Risk | Commodity/matrix[a] | | | | |
|---|---|---|---|---|---|---|
| | | **Live pigs (see Section 6.1.1)** | **Semen (see Section 6.1.2)<br><br>(=semen — reviewed)** | **Embryos** | **Domestic pig carcasses, stillborn piglets and placentas for disposal off farm (see Section 6.1.6)** | **Waste products and effluent off farm (see Section 6.1.6)** |
| Biosecurity standards/controls | Moved commodities are not segregated at the destination premises or premises en route, leading to spread of ASF virus. | m | c | h | c | f |
| Biosecurity standards/controls | Vehicles may spread ASF virus if not decontaminated. | i | c | h | f, g | b, c, e |
| Further risk assessment | Conditions identified in the matrices do not consider all risks (see also Section 2). | d, o | a | a | b | a |

a Letters refer to movement permit conditions for respective commodity movements.
b 'Minimum biosecurity standards' — – Relevant standards from the AHC endorsed biosecurity standard (Appendix 8) applicable to the premises and the movement

**Table A6.2 Risks not identified or addressed through movement control permit conditions that may need to be assessed**

| Category of risk | Risk |
|---|---|
| Biosecurity standards/controls | Pigs incubating infection may have been recently introduced to the premises.<br>This requires consideration of both domestic and feral pigs. Consider:<br>• abundance in the area<br>• known movement patterns<br>• biosecurity controls (e.g. exclusion fencing; controls (baiting, trapping, hunting)), which inform the likelihood of interaction between feral and domestic pigs. |
| Biosecurity standards/controls | ASF virus may have been introduced to, and/or spread from, the premises on fomites (e.g. people, vehicles, equipment) in the period when the virus may remain viable on the contaminated fomite (if it is not decontaminated).<br>This requires consideration of:<br>• vehicles (trucks and trailers) for movement of pigs (live or dead), waste, semen, feed and other goods<br>• vehicle decontamination procedures and facilities on premises of origin and destination<br>• people involved in the movements (e.g. drivers, animal handlers)<br>• equipment, personal items and other goods being moved into or out of the piggery production area<br>• personal hygiene and personnel biosecurity (e.g. clean clothes and footwear)<br>• decontamination procedures and facilities on premises of origin and destination for all people movements<br>• piggery cleaning and disinfection program<br>• facilities and protocols for loading and unloading of pigs and other commodities (e.g. semen), including level of segregation from pig production areas. |
| Biosecurity standards/controls | Vectors (other than feral pigs), including *Stomoxys* flies, may introduce ASF virus to the premises.<br>This requires consideration of farm pest/vermin control programs. |
| Biosecurity standards/controls | Sufficient biosecurity controls are not in place on the source or destination (as appropriate) premises (e.g. fencing in good repair, gates that shut, closed doors on sheds, insect controls, loading ramps, decontamination facilities) or with transporters (e.g. proposed transport route is defined, vehicles, equipment and personnel are decontaminated). |
| Biosecurity standards/controls | Pork products (cooked or uncooked) or pet food are introduced to the production area and available for pigs to eat. |

| Category of risk | Risk |
|---|---|
| Biosecurity standards/controls | Movement, production and biosecurity records may not be available or accurate.<br>This requires consideration of:<br>• movements of live pigs (including fate of animals at destination premises), semen, staff, visitors and contractors<br>• feed deliveries<br>• other deliveries<br>• daily pig inspections<br>• mortalities and morbidities<br>• inventory and production data<br>• laboratory reports<br>• vermin control<br>• feral pig activities<br>• cleaning and disinfection. |
| Early detection | ASF may be present in the herd but not yet detected due to vague clinical signs or low contagiousness, in combination with an expected level of mortality or morbidity in a herd, or due to inadequate recording and monitoring of pig ill-health and mortalities. This requires close consideration of:<br>• pig health (clinical inspection of animals)<br>• pig health and production records<br>• veterinary and laboratory reports. |

# Appendix 7 Recommended approach to surveillance in feral pigs

The World Organisation for Animal Health (WOAH) recognises that surveillance in feral pigs has potential challenges associated with feral pig behaviour, habitat, accessibility and associated logistics. It recommends (Article 15.1.32 of the *Terrestrial animal health code*) that a passive surveillance program for African swine fever (ASF) should include feral pigs found dead, road kills, animals showing abnormal behaviour and hunted animals, and should also include awareness campaigns targeted at hunters and farmers.

There may be situations where a more targeted surveillance program can provide additional assurance. The most suitable approach will depend on the size and type of disease outbreak, and associated available response resources and budget, but is most likely to consist of a surveillance system analysis using a scenario tree constructed from multiple surveillance types with associated sensitivity calculations.

**Surveillance approaches**

***Representative survey of feral pig population within country, zone or compartment***

The ability to complete a representative proof-of-freedom survey will depend on the cost and resources available and, by inference, the size of the area in question, the population of feral pigs and logistical factors. The time taken to complete the survey and the time for which the survey will be relevant are also considerations, because a single survey only provides information about a defined period of time. Unless the outbreak is relatively small and/or isolated, this method on its own is likely to be cost- and resource-prohibitive in Australia.

***Complex surveillance system analysis using multiple data sources and scenario trees***

Possible data sources include:

- passive surveillance (e.g. samples from feral pigs found dead or sick, or shot by hunters or land managers, land management groups completing feral pig culls)
- reports from hunters, land managers and the general public
- previous surveillance and samples from infected areas (IAs), restricted areas (RAs) and feral pig destruction areas
- previous surveillance samples
- historical records
- environmental sampling (e.g. faeces, soil around feral pig carcasses, sites identified through exposure assessment as being potential high visitation)
- use of sentinel animals (e.g. collared feral pigs and subsequent sample collection).

*Targeted surveillance programs*

Targeted surveillance programs can provide additional assurance and increase the sensitivity of a surveillance design. The criteria to define high-risk areas for targeted surveillance include:

- areas with a history of ASF, such as the IA, RA and feral pig destruction areas
- subregions with large populations of wild or feral pigs (informed through habitat suitability and subject matter expertise)
- regions that have borders with ASF-infected areas
- interfaces between feral pig and domestic pig populations

- areas with farms with free-ranging and outdoor pigs
- areas with a high level of hunting activity, where animal dispersion and feeding, as well as inappropriate disposal of waste, can occur
- other risk areas determined by the jurisdiction, such as seaports, airports, garbage dumps, and picnic and camping areas, where there may be unsanitary disposal of risk materials
- arthropod surveys in areas of feral pig populations.

***Disease prevalence estimates***

Proof-of-freedom surveillance will require an estimate of disease prevalence to calculate the system sensitivity and associated confidence intervals. The disease prevalence estimate can provide important information about the success of disease control measures, and the likely success of any eradication campaign versus a move to disease mitigation or transition to management.

# Appendix 8 African Swine Fever Voluntary Enhanced Biosecurity Standards

The voluntary enhanced biosecurity standards (VEBS) for ASF[33] were produced by the Animal Health Committee (AHC) ASF VEBS working group and endorsed by the AHC at AHC41, May 2022.

Note: It is assumed that farms meeting the VEBS also meet basic biosecurity requirements. For clarity, both the basic standards ('APIQ core') and the enhanced standards (VEBS) are included in this appendix. APIQ✓® (the Australian Pork Industry Quality Assurance Program) is one example of a pathway through which certification of the basic standards and VEBS may be achieved.

Tables A8.1–A8.9 show the APIQ core and VEBS standards for management, controlled entry and biosecurity management area, pig health and husbandry, stock and semen introductions, training and near-miss reporting, pest control, pig transport and traceability, and record-keeping.

[33] https://australianpork.com.au/apiq/certification-options

## A8.1 Management

<table>
<tr><th colspan="3">Standard</th></tr>
<tr><td colspan="2">APIQ core</td><td>The management system ensures that the enterprise demonstrates commitment to the Quality Assurance principles provided in APIQ✓® at all times.<br><br>APIQ Management (APIQM) is notified within 10 business days when there is a change of piggery ownership and/or a change in the nominated person responsible for the on-farm management of the APIQ✓® program.<br><br>Staff are trained to ensure that they are competent in their specific tasks and are familiar with the requirements of their role and the APIQ✓® system.<br><br>All APIQ✓® certified piggeries must have a client relationship with a registered veterinary practitioner.<br><br>Contingency procedures are in place to provide for stock movement restrictions in the event of an Emergency Animal Disease (EAD).</td></tr>
<tr><td colspan="2">VEBS</td><td>The management system demonstrates commitment to biosecurity at all times.<br><br>Risks to pigs from the introduction and spread of disease or disease-causing agents are minimised.<br><br>Current records and contingency plans exist to manage pigs and procedures in the event of an EAD incursion or response.</td></tr>
<tr><th colspan="2">Transmission pathway addressed or reason for biosecurity requirement</th><th>Performance indicators</th></tr>
<tr><td>Support materials to verify biosecurity practice</td><td>APIQ core</td><td>Within the organisation structure, the following are identified:<br>• key person(s) and their roles and responsibilities.<br>• supervisory positions or positions of authority.<br>• tasks for each person that are carried out as part of the APIQ✓® system.<br><br>A system is in place to ensure that records and documents, including Standard Operating Procedures (SOPs) or Work Instructions (WIs), are maintained and current.<br><br>The enterprise must conduct and record an annual Internal Audit approximately six (6) months but no later than eight</td></tr>
</table>

| | | |
|---|---|---|
| | | (8) months, after their APIQ/® Compliance Audit is conducted. The audit includes:<br>• review of the record keeping/SOP documentation to ensure they are maintained and current<br>• ensuring any non-conformances are identified and recorded<br>• ensuring the appropriate corrective and preventative actions are taken as required and are recorded<br>• ensuring outstanding non-conformances are scheduled to be addressed in a reasonable timeframe.<br><br>The piggery's nominated veterinary practitioner or practice will:<br>• have personal knowledge of the farm and have visited the site<br>• be responsible for prescribing any prescription animal remedies used<br>• investigate and advise on any animal welfare, biosecurity or disease management concerns.<br><br>An Emergency Animal Disease Contingency Plan has been identified for managing potential retention of stock on-farm that may be required due to an EAD outbreak.<br>• This must include documenting the maximum animal movement restriction period that the farm can adequately manage in number of days. |
| Support materials to verify biosecurity practice | VEBS | The herd veterinarian must approve the Biosecurity Management Plan in writing.<br><br>Farm records of all veterinary consultations, disease investigations and diagnoses are maintained.<br><br>The Biosecurity Management Plan includes documented contingency plans for:<br>• collection, packaging and storage of blood and tissue samples from pigs by a veterinarian or other trained person during an emergency response situation<br>• mass destruction, disposal and decontamination, which may be in the form of customised plans or industry guidance documents.<br><br>A property map is available that shows the controlled entry/exit points for people, vehicles and animals; the feed, bedding and waste disposal sites in relation to the clean and dirty areas of the biosecurity management area. |

## A8.2 Controlled entry and biosecurity management area

| **Standard** | | |
|---|---|---|
| APIQ core | | Risks to pigs from disease or disease-causing agents brought into the piggery by people, vehicles, or animal movements are minimised.<br><br>The risk of disease spread through pests is minimised.<br><br>The risk of contamination by pest control residues is minimised.<br><br>An appropriate pest management plan is in place that includes rodent/pest infestation monitoring, recording and control activities. |
| VEBS | | Entry of people, equipment, personal items, vehicles and other things to the biosecurity management area is controlled to minimise the risk of introduction or spread of disease or disease-causing agents.<br><br>The risk of spread of disease or disease-causing agents by site and piggery waste is minimised.<br><br>Records of waste product movements are kept. |
| ***Transmission pathway addressed or reason for biosecurity requirement*** | | ***Performance indicators*** |
| Virus introduction through human fomites | APIQ Core | Facilities and procedures as documented in the on-farm Biosecurity Plan are in place to minimise the risk of disease-causing contamination or disease spread from animals, people, or transport movements, including:<br>• Entry to the piggery is controlled with signage that is compliant with jurisdictional regulations at all piggery entrances, including 'Biosecure Area No Entry Unless Authorised' or similar wording, as well as directions for visitors.<br>• Records of visitor, animal, and transport movements are maintained.<br>• There is a written protocol that details biosecurity requirements for people who have recently arrived from overseas prior to entry to the piggery.<br>• If a person has had any contact with food-producing cloven-hoofed animals while travelling internationally, a minimum stand-down period of 48 hours is required before visiting the piggery.<br>• The on-farm biosecurity plan should specify verifiable procedures for people, vehicles, equipment, boots and outer clothing that must be followed in order to gain |

| | | |
|---|---|---|
| | | authorised access to the piggery. The plan should be authorised by the herd veterinarian.<br>• Handwashing and/or shower facilities and 'clean'[34] boots and outer clothing are provided to visitors prior to contact with pigs.<br>• All staff are aware of the piggery biosecurity procedures and have signed a Personnel Biosecurity Declaration.<br>• Hands are cleaned and/or sanitised before entering the production site and on leaving the production site.<br>• Boots and outer clothing that are worn in the production area are not worn or taken outside this area other than in accordance with the on-farm Biosecurity Plan.<br>• The farm Site Map clearly shows 'clean' areas where pigs live and access is restricted, and 'dirty' areas that are accessible to the outside environment. Quarantine areas should be shown on the farm Site Map, where relevant.<br>• Load outs for pigs are at the farm perimeter wherever possible. Where this is not possible, the on-farm Biosecurity Plan includes a Load-out Plan which is agreed with the herd veterinarian. |
| Virus introduction through human fomites | VEBS | Access of **people** to the biosecurity management area is controlled and this control can be verified.<br><br>Biosecurity signage compliant with jurisdictional biosecurity regulations is clearly displayed at all entry points to the biosecurity management area.<br><br>Entry points for people and personal items are controlled through:<br>• written protocols that detail clothing, footwear, personal items, and handwashing entry requirements for personnel that are accessible to all personnel<br>• a written protocol that details biosecurity requirements for people upon re-entry to Australia from overseas prior to entry to the biosecurity management area. This protocol can be verified.<br><br>Entry of drivers and passengers to the biosecurity management area is controlled as follows:<br>• Written protocols that detail clothing, footwear, personal items and personal decontamination requirements exist and are verifiable.<br>• Drivers must adhere to the farm's written farm biosecurity protocols, including clothing, footwear, |

[34] Definitions of 'clean' and 'dirty' areas should be specified in the on-farm Biosecurity Plan. In general, a 'clean' area will be a part of the production site with access restricted to people, animals and equipment of assured biosecurity status, and a 'dirty' area is any part of the production site outside the designated 'clean' areas.

| | | |
|---|---|---|
| | | personal item and personal decontamination requirements. |
| Virus introduction and spread through vehicle and/or equipment fomites | APIQ core | All equipment used with pigs or brought into pig housing is cleaned and, where practical, disinfected. |
| Virus introduction and spread through vehicle and/or equipment fomites | VEBS | Access of **vehicles** to the biosecurity management area is controlled and this control can be verified.<br><br>Protocols for cleaning and disinfection (suitable to destroy ASF virus) of transport/delivery vehicles (including for prime movers and trailers of livestock, feed, waste, semen (if applicable) and other commodities) exist and include the cabin of the vehicle.<br><br>Feed delivery trucks meet standards 17-20 of the *National Biosecurity Manual for Feed Mills (Manage Outgoing Product).*<br><br>Protocols for inspecting and risk assessing equipment that is brought into the biosecurity management area are in place and can be verified. |
| Virus introduction and spread through piggery waste | VEBS | Effluent ponds, burial sites, composting sites, and piggery waste sites are managed to control access by people, vehicles, livestock, feral pigs, other domestic animals and pests.<br><br>The biosecurity management plan contains a documented waste management plan that is approved by the herd veterinarian. |

## A8.3 Pig health and husbandry measures (including feed)

### 3a. Health and husbandry measures

| **Standard** | |
|---|---|
| APIQ Core | Animal health and care policies and practices designed to optimise the health and welfare status of the herd are in place, and routine husbandry practices are managed to minimise risks to pigs.<br><br>The risk of disease spread through pests is minimised.<br><br>An appropriate pest management plan is in place that includes rodent/pest infestation monitoring, recording and control activities. |
| VEBS | On-farm systems are in place to minimise the risk of introduction and spread of disease or disease-causing agents<br><br>The risk of introduction and spread of disease or disease-causing agents by other species and pests, including livestock and feral pigs, is minimised. |
| ***Transmission pathway addressed or reason for biosecurity requirement*** | ***Performance indicators*** |
| Virus introduction through live pigs — APIQ core | A Herd Health Plan (HHP) is in place to manage the risk of infectious diseases and includes SOPs and/or WIs. Producers may complete the HHP checklist in the *Pig Management Diary*.<br><br>Pigs are adequately inspected at least once daily and more frequently when required.<br><br>Pigs with injuries or illness are identified and treated with an appropriate treatment regime as soon as practically possible.<br><br>Domestic pigs are separated from feral pigs, domestic poultry, and other animals of risk, by secure containment in buildings and/or a secure piggery perimeter fence. |
| Virus introduction through live pigs — VEBS | Treatment records, illness and mortality records must be monitored.<br><br>Persons must immediately advise the herd veterinarian or EAD hotline if they become aware of any pig or group of pigs that is showing signs of disease, including death, where the cause of the disease cannot be plausibly explained and linked to another cause that has been previously confirmed by the herd veterinarian. |

| | | |
|---|---|---|
| Virus introduction through domestic species other than pigs as fomites | VEBS | Domestic species and pets on the property are kept outside the biosecurity management area and functionally separated from the pig operation as a distinct biosecurity unit (no physical or operational crossover). |

**3b. Feed practices**

| **Standard** | | |
|---|---|---|
| APIQ core | | Systems are in place to ensure that pigs are not exposed to contaminated feedstuffs or bedding to minimise the risk of chemical residues and biological contaminants and to comply with the prohibition of swill feeding.<br><br>Risks to pigs from disease or disease-causing agents brought into the piggery by people, vehicles, or animal movements are minimised. |
| VEBS | | Entry to clean areas of the piggery is controlled to minimise the risk of introduction or spread of disease or disease-causing agents. |
| ***Transmission pathway addressed or reason for biosecurity requirement*** | | ***Performance indicators*** |
| Virus introduction through pig feed | APIQ core | All purchased feed, feed ingredients, and bedding materials that may be consumed by pigs or may be in contact with pigs are accompanied by a Commodity Vendor Declaration (CVD) stating any product(s) used in production and their Withholding Period (WHP) status. Where CVDs are not available, sufficient feed or bedding samples[35] must be kept to enable residue testing when required. Samples must be kept for six (6) months.<br><br>There is a system in place that records all feed received and the medications in those feeds.<br><br>Feed storage facilities are identified and feed deliveries are checked to ensure that feed is placed in the correct facilities.<br><br>Feed mixing, storage, and delivery procedures prevent non-medicated feed from becoming contaminated by medicated feed or feed that contains hazardous risk materials (such as mouldy grains or other specified risk materials).<br><br>Pigs are not fed swill or any food scraps that contain meat or other matter from animals or other substances prohibited by State and Territory legislation. |

[35] Refer to the *APIQ✓® Reference Manual* for guidelines on sample storage and collection methods.

| | | |
|---|---|---|
| Virus introduction through pig feed | VEBS | A feed biosecurity program is in place that includes the following requirements:<br>• Prohibited pig feed is not supplied for feeding to pigs.<br>• All pig feed and/or feed ingredients are sourced from a FeedSafe-accredited manufacturer, OR a declaration that the source meets any applicable standards in the *National Biosecurity Manual for Feed Mills* has been obtained and kept.<br>• The on-farm Biosecurity Plan includes a Feed Delivery Plan which is agreed with the herd veterinarian. |

## A8.4 Stock and semen introductions

| **Standard** | | |
|---|---|---|
| APIQ core | | The risk of introducing diseases or disease-causing agents of significant importance through stock and semen is minimised, and stock and semen are sourced in compliance with biosecurity requirements and Australian law. |
| VEBS | | The risk of introducing disease or disease-causing agents through stock and semen is minimised, and stock and semen are sourced in accordance with farm biosecurity protocols authorised by the herd veterinarian. |
| ***Transmission pathway addressed or reason for biosecurity requirement*** | | ***Performance indicators*** |
| Virus introduction through live pigs | APIQ core | Policies and procedures are in place to ensure that introduced stock and semen comply with biosecurity requirements under Australian law and as outlined in the requirements of the *National Farm Biosecurity Manual for Pork Production*, version 2.1.[36] Records substantiate the origin of pigs and genetic material used for breeding purposes.<br><br>All introduced stock is inspected for signs of disease on arrival.<br><br>Introduced pigs are quarantined and observed for any signs of disease before being introduced to the breeding herd, as follows:<br>• The quarantine period should be the minimum period specified in the piggery's on-farm Biosecurity Plan and/or Herd Health Plan, developed in consultation with the herd veterinarian, or at least 30 days if no veterinary direction to the contrary has been obtained.<br>• This does not apply if there are documented biosecurity protocols, authorised by the herd veterinarian approving movements between sites deemed to have shared biosecurity status.<br>• The 30-day quarantine requirement also applies to pigs returning to the farm after being exhibited at pig shows.<br><br>On-farm quarantine facilities for introduced stock are in accordance with the documented biosecurity protocols as consulted with the herd veterinarian. |

[36] This manual can be found on the Farm Biosecurity website (https://www.farmbiosecurity.com.au/toolkit/plans-manuals/)

<table>
<tr><td>Virus introduction through live pigs</td><td>VEBS</td><td>Introduced pigs are quarantined and observed for any signs of disease before being introduced to the herd, as follows:<ul><li>The quarantine period should be at least 30 days.</li><li>With the exception of boars being introduced for the purpose of semen collection, this 30-day period does not apply if there are documented biosecurity protocols, authorised by the herd veterinarian approving movements between sites from the same enterprise deemed to have shared biosecurity status.</li><li>The 30-day quarantine requirement also applies to pigs returning to the farm after being exhibited at pig shows.</li><li>Quarantine must be conducted at a separate site / shed / airspace, with appropriate biosecurity measures to ensure that ASF cannot enter the main herd by direct contact or by fomite spread from the quarantined pigs.</li></ul>The following protocols apply to introduction of donor boars to a semen centre:<ul><li>The 30-day quarantine requirement applies to all boars being introduced for the purposes of semen collection, irrespective of whether they originate from sites deemed to have shared biosecurity status.</li><li>Quarantine must occur at a separate site/shed/airspace, with appropriate biosecurity measures to ensure ASF cannot enter the artificial insemination centre by direct contact or by fomite spread from the quarantined boars.</li></ul></td></tr>
<tr><td>Virus introduction through introduced semen</td><td>VEBS</td><td>Introduced semen is only sourced from a semen provider that is compliant with the VEBS.<br><br>There is a written protocol that details semen receival procedures to ensure the courier/transporter does not enter clean areas of the biosecurity management area. This protocol can be verified.</td></tr>
<tr><td>Virus introduction through dispatched semen</td><td>VEBS</td><td>If clinical signs highly suspicious of ASF are observed, unused collected / dispatched semen (including semen in transit) must be retained, and further dispatch must not occur until the absence of ASF is confirmed by laboratory testing.<br><br>Records of all semen dispatches are maintained to enable traceability of semen dispatches to individual farms.<br><br>Semen dispatching and delivery procedures ensure the courier / transporter does not enter clean areas of the biosecurity management area.<br><br>Semen processing and packaging procedures manage the risk of ASF cross-contamination by direct contact or by fomite spread.</td></tr>
</table>

| | | |
|---|---|---|
| | | The farm has been assessed by its jurisdiction as a semen provider. |

## A8.5 Training and near-miss reporting

| **Standard** | | |
|---|---|---|
| APIQ core | | Staff are aware of the procedures to identify, manage and report exotic and endemic diseases.<br><br>Staff are trained to ensure that they are competent in their specific tasks and are familiar with the requirements of their role and the APIQ✓® system.<br><br>Staff perform their required duties in accordance with the Model Code of Practice for the Welfare of Animals – Pigs.<br><br>Personnel managing and handling pigs are competent or are supervised by a competent person. |
| VEBS | | The enterprise must contemporaneously identify, record and take appropriate corrective action where non-conformances impacting compliance with VEBS are identified. |
| ***Transmission pathway addressed or reason for biosecurity requirement*** | | ***Performance indicators*** |
| Staff training in emergency disease awareness and biosecurity procedures | APIQ core | Staff are aware of important exotic and endemic diseases, are able to recognise the signs of ill health in pigs, and are aware of the procedures to follow when such signs are seen.<br><br>Emergency disease awareness information[37] showing signs of important emergency diseases and contact phone numbers to report any suspicious signs, is maintained in a prominent location that is readily accessible and visible to all staff.<br><br>Staff are aware of the procedures contained in the farm Biosecurity Plan and understand their importance.<br><br>Staff induction and training is conducted and recorded and ensures that:<br>• New staff are inducted[38] on commencement of employment and induction is completed within one (1) month. |

37 This may include the Emergency Disease Awareness and Action poster available on the APIQ✓® website (https://australianpork.com.au/apiq/apiq-resource-library). Producers may also use other information resources they find fit for this purpose.

38 Induction is the formal introduction of a new employee to a piggery's operations, policies, procedures and systems and the commencement of training to ensure that the individual is appropriately trained to perform the tasks for which they are employed.

| | | |
|---|---|---|
| | | • New and existing staff are trained and competent in their required tasks and ongoing training needs are identified.<br>• All staff are familiar with SOPs and WIs for their specific tasks.<br><br>Staff training is recorded, and evidence demonstrates that individuals are trained in or are being trained in their required tasks.<br>• Training must be ongoing as responsibilities and practices change. |
| Near-miss incident reporting | VEBS | Incidents resulting in compromised compliance with the VEBS are recorded and rectified in a timely fashion.<br><br>A register of incidents and actions to rectify them is available for assessments. This should use the APIQ✓® Record 15 – Corrective Action Request (CAR) template. |

## A8.6 Pest control

| **Standard** | | |
|---|---|---|
| APIQ core | | The risk of disease spread through pests is minimised.<br><br>The risk of contamination by pest control residues is minimised.<br><br>An appropriate pest management plan is in place that includes rodent/pest infestation monitoring, recording and control activities. |
| VEBS | | The risk of introduction and spread of disease or disease-causing agents by other species and pests, including livestock and feral pigs, is minimised. A Pest Management Plan is in place that includes pest monitoring, recording and control activities. |
| ***Transmission pathway addressed or reason for biosecurity requirement*** | | ***Performance indicators*** |
| Virus introduction through feral or pest species | APIQ core | Domestic pigs are separated from feral pigs, domestic poultry, and other animals of risk through secure containment in buildings and/or a secure piggery perimeter fence.<br><br>The Pest Management Plan includes:<br>• records[39] of rodent and pest infestation levels<br>• use of approved baits and pest control products, where deemed necessary<br>• handling baits according to the label and/or Emergency Permits, where applicable<br>• measures to restrict rodent access to feed and feeding infrastructure. |
| | VEBS | • A documented exposure assessment has been undertaken for feral pigs (see Appendix 8b) and is reviewed annually.<br>• Where the farm is in a moderate- or high-risk area action has been taken to prevent feral pigs from accessing the biosecurity management area, including vehicle and personnel access points. This action must be able to be verified.<br>• The exclusion method must prevent physical contact between domestic pigs and feral pigs.<br>• Monitoring of records for feral pigs are available for review. |

[39] Templates in Appendix 4 of the *Industry Rodenticide Stewardship Plan 2019* can be used.

| | | |
|---|---|---|
| | | • Reporting of feral pigs (unexpected in frequency or unusual in proximity to the property) should be undertaken according to the jurisdictional requirements.<br>• Control measures are in place to restrict the access of pests and other species to feed and feeding infrastructure, water, and effluent and waste located on the property.<br>• Persons must immediately advise the herd veterinarian if they become aware of any feral pig that has died in unusual or unexplained circumstances on the pig property. Note: If there is a reasonable suspicion of an EAD, the EAD Hotline must be notified on 1800 675 888. |

## A8.7 Pig transport and traceability

<table>
<tr><th colspan="3">Standard</th></tr>
<tr><td colspan="2">APIQ core</td><td>Pigs are identified according to state or territory regulator requirements when moved.<br><br>PigPass National Vendor Declarations (NVDs) are correctly completed when appropriate.<br><br>Movements of pigs are reported to the PigPass database such that pigs can be reliably traced to their previous location.<br><br>Records of movements are kept for a minimum of three (3) years.<br><br>Drivers and vehicles used to carry pigs follow the farm's Biosecurity Standards (as per the on-farm Biosecurity Plan).<br><br>Facilities promote effective and safe handling of pigs when loading or unloading.</td></tr>
<tr><td colspan="2">VEBS</td><td>Information and auditable procedures for pig /semen movements are in place to support assessment for issue of movement permits to mitigate biosecurity risks and enable business continuity and support animal welfare in an EAD outbreak.</td></tr>
<tr><th colspan="2">Transmission pathway addressed or reason for biosecurity requirement</th><th>Performance indicators</th></tr>
<tr><td>Support materials for traceability of stock</td><td>APIQ core</td><td>All pigs are clearly identified according to State legislation, as follows:<br>• Before moving from their property of birth and where ownership changes, all pigs are identified with a tag or brand that indicates (or is linked to, in the case of brands) the Property Identification Code (PIC) of birth.<br>• Where a movement occurs and ownership does not change (excluding movements to shows, events, and sale yards), pigs are exempt from being identified before movement, provided that movement is reported to the PigPass database.<br>• Tattoos/brands on pigs for delivery are legible.<br><br>All pig movements where pigs are sold, slaughtered, purchased, exhibited or moved to a PIC covered by a different APIQ✓® Certification are accompanied by a valid and correctly completed PigPass NVD.<br>• PigPass NVDs are completed correctly and in full, including the location of broken or suspected broken</td></tr>
</table>

| | | |
|---|---|---|
| | | needles at the time of treatment and the time pigs were removed from feed and water.<br>• Incoming stock must be accompanied by a correctly completed PigPass NVD from the property of origin (if not covered under the same APIQ✓® Certification).<br><br>Where pigs are moved to a different PIC, these movements are reported to the PigPass database within two (2) working days of their arrival:<br>• For movements originating outside the certification, details of the movement and its accompanying PigPass NVD are reported to the database.<br>• For movements between sites covered by APIQ✓® Certification (internal movements), details of these movements are reported to the PigPass database where the PIC changes.<br>• Records must be retained for three (3) years as a minimum, or longer if the pigs referred to in the PigPass NVD continue to reside on the property.[40]<br><br>Truck drivers complete Section 'D' of the PigPass NVD.<br><br>Drivers and other transport personnel do not enter designated 'clean areas'.<br><br>Vehicles are washed between consignments of animals that originate from properties with different biosecurity statuses in accordance with the on-farm Biosecurity Plan authorised by the herd veterinarian and are disinfected when required.[41] |
| Support materials for traceability of stock | VEBS | Transport/delivery vehicles travel by main roads/highways, do not transit through other properties, and do not stop *en route* to destination unless required to comply with transport regulations. Where stops are required, the location must not have other pigs present and must not be nearby to known pig aggregations.<br>• Maps or other records of travel routes for livestock vehicles are maintained.<br><br>The producer has compiled a list detailing routine movements for the site that would be required in an outbreak. This list would support applications for movement permits required under AUSVETPLAN. The list includes:<br>• the priority of each movement, with an explanation (no space; breeders etc) |

[40] Where scanned copies of incoming PigPass NVDs are uploaded to the PigPass database, this requirement is met, even if the paper copy is discarded.

[41] After washing with disinfectant, vehicles are ready for use. After washing without disinfectant, vehicles must be left to dry before any pigs are loaded.

| | | |
|---|---|---|
| | | • frequency of movements<br>• company name and contact details<br>• livestock details – number/journey, age/category, sex, tattoo,<br>• journey details – source and destination site type, rural street address or Google Maps reference, PIC and farm name, carrier name and contact details, day of the week, and trip frequency<br>• map of intended route, including any stops (if required by legislation) and demonstrating that they are not near known pig aggregations<br>• where known, a list of known other pig properties along the route<br>• details of current vehicle cleaning and disinfection procedures between trips. |

## A8.8 Record-keeping

| Premises type | APIQ core / VEBS | Required records |
|---|---|---|
| ***All farms*** | APIQ core | • visitor log<br>• individual staff induction and training records<br>• medication and treatment records<br>• deaths and losses record<br>• maintenance record<br>• pest control record<br>• vendor declarations for incoming stock and semen<br>• PigPass NVD |
| ***All farms*** | VEBS | • incident and corrective action ('near miss') records for any incidents resulting in compromised compliance with VEBS (e.g. description of issue; account of what action was taken when and by whom)<br>• farm records of all veterinary consultations, disease investigations and diagnoses<br>• stock movements onto and off the property<br>• waste animal products onto and off the property<br>• semen movements onto and off the property<br>• FeedSafe certification or a declaration that the feed/ingredient source meets any applicable standards in the National Biosecurity Manual for Feed Mills<br>• copy of semen provider assessment from jurisdiction to supply semen in an ASF outbreak<br>• vehicle / equipment register to capture entry to the clean areas of the biosecurity management area<br>• annual feral pig exposure assessments and feral pig monitoring records. |
| ***Semen provider*** | VEBS | • quarantine records, including boar source property details, date of entry to quarantine and subsequent date of entry to boar stud facility<br>• records of all disease investigations and diagnoses are maintained (including laboratory testing results)<br>• semen dispatch procedures<br>• semen dispatch records: donor boar/s IDs, date of collection, date of dispatch, shipment destination details (owner, address, PIC)<br>• valid assessment by their jurisdiction as operating at a high level of biosecurity for ASF in an outbreak. |

## A8.9 VEBS Glossary

| Terminology | Definition |
|---|---|
| Biosecurity management area | Buildings, sheds, feed storage, load out and other facilities used for pig production, including any land immediately surrounding these facilities that is managed through defined and controlled access points |
| Biosecurity unit (epidemiological unit) | A group of animals that share the same likelihood of exposure to a pathogen. This may be because they share the same environment, management practices, or transmission pathways. Transmission pathways vary according to pathogen and may include direct animal-to-animal contact; aerosol (by air), indirect contact with contaminated animal products, contaminated feed / water / housing / bedding / equipment / personnel, insects, vermin, and semen. |
| Feed | A material intended to be fed to an animal for the purposes of maintaining the animal's life, normal growth, productivity, work capacity and reproductive capacity.<br><br>Feed includes a lick, a premix, and medicated premix. It may be made up of one or more feed ingredients, one or more feed additives, or a combination of ingredients and additives.<br><br>A "feed ingredient" is a substance that is nutritive for food producing animals. A feed ingredient may be organic or inorganic.[42]<br><br>For the purposes of these standards, feed also includes bedding materials. |
| Feral pig | An unowned pig that lives in the wild and is descended from domesticated pigs of the species *Sus scrofa*, family Suidae.<br><br>Feral pigs are a declared pest in all states and territories of Australia. It is the responsibility of all managers of land (encompassing Commonwealth, state and territory governments, local government, Indigenous communities and private landholders) to comply with legislative requirements to control feral pigs and minimise the biosecurity risks that they present. |
| High suspicion of ASF | ASF testing should be conducted to exclude or diagnose ASF in any pig that has a fever 40.5°C or above and/or has clinical signs consistent with ASF that cannot plausibly be explained by another cause<br><br>Such as: if any pig dies suddenly, is identified with a fever (40.5 °C or above) or shows any of the other main clinical signs of ASF. |

[42] Taken from the Queensland Biosecurity Regulation 2016 Schedule 3 - Code of Practice for Feed for Food Producing Animals.

| Terminology | Definition |
| --- | --- |
| | Note: Clinical signs associated with genotype II of ASF are fever; anorexia (even mild anorexia), lethargy, weakness and recumbence; bluish-purple areas and haemorrhages on the ears and/or abdomen; ocular discharges; reddening of the skin; and bloody diarrhoea. The body temperature of a pig showing any of these clinical signs should be taken. A rectal temperature equal to or above 40.5 °C or above is considered significant (ASF infected pigs are reported to have body temperatures of 40.5 °C to 42 °C). Any other condition i.e. abscesses/wounds/lameness or fighting that may be associated with a rise in body temperature should be recorded. |
| Multisite biosecurity unit | An enterprise comprising separate sites for specific production phases that is closed to live pig introductions other than from a common breeding source. Sites within a multisite biosecurity unit may include, but are not limited to, breeder, nursery, weaner, grower and finishing sites. |
| Piggery waste | Any waste product originating from an area where pigs are housed or handled, or that may have had direct or indirect contact with susceptible livestock, including but not limited to:<br>• pig carcasses or any part thereof<br>• stillborn piglets, placentas, semen and blood<br>• manure, effluent and contaminated wash-water<br>• feed and bedding<br>• composted material (which may include composted carcasses)<br>• used husbandry items (e.g. gloves, needles, syringes, semen bags, artificial insemination catheters). |
| Pig loadout area | Designated part of pig production area from which pigs are loaded/unloaded by transport operators, and which is considered “dirty” and a risk point for disease transfer. |
| Prohibited pig feed | See **AUSVETPLAN *Glossary***. |
| Property | Land on which the piggery production area is located, and which typically includes buildings and land not used for pig production. This land extends beyond the production area to the limits of the property tenure. |
| Semen provider | A semen provider that has sought and been assessed by their jurisdiction as operating at a high level of biosecurity for ASF. |

# Appendix 8a Guidelines for a daily health monitoring program and trigger to initiate on-farm veterinary investigation and African swine fever testing

The following daily health program is to be implemented in a stud operating while Australia is ASF-free.

1. Daily observation of all pigs on site.

   Note: Clinical signs associated with genotype II of ASF are fever, anorexia (even mild anorexia), lethargy, weakness and recumbence, bluish-purple areas and haemorrhages on the ears and/or abdomen, ocular discharges, reddening of the skin and bloody diarrhoea. The body temperature of a pig showing any of these clinical signs should be taken. A rectal temperature equal to or above 40.5 °C is considered significant (ASF-infected pigs are reported to have body temperatures of 40.5 °C to 42.0 °C). Any other condition (e.g. abscesses, wounds, lameness or fighting) that may be associated with a rise in body temperature should be recorded.

2. The manager should provide a report on the daily health monitoring to the farm's herd veterinarian.

3. The farm's herd veterinarian should be advised immediately if any pig dies suddenly, is identified with a fever (40.5 °C or above) or any of the other main clinical signs of ASF.

4. Any high suspicion of ASF must be reported to the Emergency Animal Disease Hotline (1800 675 888) immediately.

5. ASF testing should be conducted to exclude or diagnose ASF in any pig that:
   a. has a fever 40.5 $^{o}$C or above, and/or
   b. has clinical signs consistent with ASF that cannot plausibly be explained by another cause.

# Appendix 8b Feral pig qualitative exposure likelihood rating tool

*The following is adapted from the Victorian risk assessment tool for feral pig qualitative exposure likelihood rating.*

**Primary determinants**

- presence of feral pigs in an area
- assumes transmission via direct contact, faeces or fomites.

Feral pigs in Victoria have been reported to have a daily home range of up to 10km.

**Exposure likelihood rating**

***1. Nil***
No record of feral pigs in the area

***2. Low***
Sporadic sightings of feral pigs in uncontrolled areas (parks, waterways, forests) more than 15 km away from piggeries

***3. Moderate to High***
Feral pigs endemic in the area (i.e. common or infrequent sightings in the area or in proximity to piggeries)

**Exclusion fencing recommendations**

Decisions on the type and extent of the exclusion fencing should be:

- based on risk assessment
- aimed at exclusion
- focused on the pig production areas.

# Glossary

## Terms and definitions

### Standard AUSVETPLAN terms

For definitions of standard AUSVETPLAN terms, see the **AUSVETPLAN *Glossary***.

### Manual-specific terms

| Term | Definition |
|---|---|
| Biosecurity management area | Buildings, sheds, feed storage, load out and other facilities used for pig production, including any land immediately surrounding these facilities that is managed through defined and controlled access points. |
| Cyanosis (adj. cyanotic) | Blueness of the skin and/or mucous membranes due to insufficient oxygenation of the blood. |
| Hyperaemia | An increase in the amount of blood in a tissue or organ due to dilation of the supplying arteries. |
| Infected area | The infected area may be legally declared around sites where feral animals are confirmed as infected and where the pathogen is thought to be present in the environment. |
| Petechiae | Tiny, flat red or purple spots in the skin or mucous membrane caused by bleeding from small blood vessels. |
| Pig production area | Sheds and paddocks used for pig production in both indoor and outdoor farming systems. |
| Rendering | Processing by heat to inactivate infective agents. Rendered material may be used in various products according to particular disease circumstances. |
| Scales operations | Livestock that are purchased based on a weight and grade system. Fixed (or depot) scale operations are locations where producers bring their animals to be assessed and purchased by the operator. Mobile scale operators visit farms, and assess and purchase animals on the farm on which the animals reside, typically on a weight and grade basis. |
| Transovarial transmission | Occurs in certain arthropod vectors as they transmit pathogens from parent arthropod to offspring arthropod. |
| Trans-stadial transmission | When a pathogen remains with the vector from one life stage (‘stadium’) to the next. |

# Abbreviations

### Standard AUSVETPLAN abbreviations

For standard AUSVETPLAN abbreviations, see the **AUSVETPLAN *Glossary***.

### Manual-specific abbreviations

| Abbreviation | Full title |
|---|---|
| ADS | approved disposal site |
| APIQ VEBS ASF | Australian pork industry quality voluntary enhanced biosecurity standards for African swine fever |
| ASF | African swine fever |
| CSF | classical swine fever |
| HAD | haemadsorbing dose |
| IA | infected area |

# References

Bailey DL, Whitfield TL & Smittle BJ (1973). Flight and dispersal of the stable fly. *Journal of Economic Entomology* 66:410–411.

Barker SC, Walker AR & Campelo D (2014). A list of the 70 species of Australian ticks; diagnostic guides to and species accounts of *Ixodes holocyclus* (paralysis tick), *Ixodes cornuatus* (southern paralysis tick) and *Rhipicephalus australis* (Australian cattle tick); and consideration of the place of Australia in the evolution of ticks with comments on four controversial ideas. *International Journal for Parasitology* 44:941–953.

Bellini S, Rutili D & Guberti V (2016). Preventive measures aimed at minimizing the risk of African swine fever virus spread in pig farming systems. *Acta Veterinaria Scandinavia* 58:82.

Beltrán-Alcrudo D, Arias M, Gallardo C, Kramer S & Penrith ML (2017). *African swine fever: detection and diagnosis — a manual for veterinarians*, FAO Animal Production and Health Manual 19, Food and Agriculture Organization of the United Nations, Rome.

Biront P, Castryck F & Leunen J (1987). An epizootic of African swine fever in Belgium and its eradication. *Veterinary Record* 120(18):432–434.

Blome S, Gabriel C & Beer M (2013). Pathogenesis of African swine fever in domestic pigs and European wild boar. *Virus Research* 173(1):122–130.

Blome S, Franzke K & Beer M (2020). African swine fever: a review of current knowledge. *Virus Research* 287:198099.

Boinas FS, Wilson AJ, Hutchings GH, Martins C & Dixon LJ (2011). The persistence of African swine fever virus in field-infected *Ornithodoros erraticus* during the ASF endemic period in Portugal. *PLoS ONE* 6(5):e20383.

Bradhurst R, Garner G, Roche S, Iglesias R, Kung N, Robinson B, Willis S, Cozens M, Richards K, Cowled B, Oberin M, Tharle C, Firestone S & Stevenson M (2021). Modelling the spread and control of African swine fever in domestic and feral pigs. Technical Report. Australian Government, Department of Agriculture, Water and the Environment.

Carlson J, Zani L, Schwaiger T, Nurmoja I, Viltrop A, Vilem A, Beer M & Blome S (2018). Simplifying sampling for African swine fever surveillance: assessment of antibody and pathogen detection from blood swabs. *Transboundary and Emerging Diseases* 65(1):e165–e172.

Chenais E, Depner K, Guberti V, Dietze K, Viltrop A & Ståhl K (2019). Epidemiological considerations on African swine fever in Europe 2014–2018. *Porcine Health Management* 5:6.

Costard S, Mur L, Lubroth J, Sanchez-Viscaino JM & Pfeiffer DU (2013). Epidemiology of African swine fever virus. *Virus Research* 173:191–197.

Czech Republic State Veterinary Administration (2018). *African swine fever in wild boars in the Czech Republic: current situation*, presentation to the Standing Committee on Plants, Animals, Food and Feed, sections Animal Health and Welfare and Controls and Import Conditions, Prague, 11-12 March 2019, https://rr-europe.woah.org/app/uploads/2019/11/c3_sge-asf12_czech.pdf

Davies K, Goatley LC, Guinat C, Netherton CL, Gubbins S, Dixon LK & Reis AL (2017). Survival of African swine fever virus in excretions from pigs experimentally infected with the Georgia 2007/1 isolate. *Transboundary and Emerging Diseases* 64:425–431.

de Carvalho Ferreira HC, Weesendorp E, Quak S, Stegeman JA & Loeffen WL (2013a). Quantification of airborne African swine fever virus after experimental infection. *Veterinary Microbiology* 165(3–4):243–251.

de Carvalho Ferreira HC, Backer JA, Weesendorp E, Klinkenberg D, Stegeman JA & Loeffen WLA (2013b). Transmission rate of African swine fever virus under experimental conditions. *Veterinary Microbiology* 165:296–304.

de Carvalho Ferreira HC, Tudela Zuquete S, Wijnveld M, Weesendorp E, Jongejan F, Stegeman A & Loeffen WL (2014). No evidence of African swine fever virus replication in hard ticks. *Ticks and Tick Borne Diseases* 5(5):582–589.

Dee SA, Bauermann FV, Niederwerder MC, Singrey A, Clement T, de Lima M, Long C, Patterson G, Sheahan MA, Stolan AMM, Petrovan V, Jones CK, De Jong J, Ji J, Spronk GD, Minion L, Christopher-Hennings J, Zimmerman JJ, Rowland RRR, Nelson E, Sundberg P & Diel DG (2018). Survival of viral pathogens in animal feed ingredients under transboundary shipping models. *PLoS ONE* 13(3):e0194509.

Dzhailidi GA, Chernykh OY, Kurinnov VV & Strizhakova OM (2014). Adaptation of sentinel method for biological control of African swine fever in pig farms. *Veterinaria Kubani* 5/14, www.vetkuban.com/en/num5_201402.html.

East IJ, Roche SE, Wicks RM, de Witte K & Garner MG (2014). Options for managing animal welfare on intensive pig farms confined by movement restrictions during an outbreak of foot and mouth disease. *Preventive Veterinary Medicine* 117(3–4):533–541.

Eblé PL, Hagenaars TJ, Weesendorp E, Quak S, Moonen-Leusen HW & Loeffen WLA (2019). Transmission of African swine fever virus via carrier (survivor) pigs does occur. *Veterinary Microbiology* 237:108345.

EFSA (European Food Safety Authority) (2014). Evaluation of possible mitigation measures to prevent introduction and spread of African swine fever virus through wild boar. *EFSA Journal* 12(3):3616.

EFSA AHAW Panel (European Food Safety Authority Panel on Animal Health and Welfare) (2010). Scientific opinion on African swine fever (ASF). *EFSA Journal* 8(3):1556.

EFSA AHAW Panel (European Food Safety Authority Panel on Animal Health and Welfare) (2018). Scientific opinion on African swine fever in wild boar. *EFSA Journal* 16(7):5344.

FAO (Food and Agriculture Organization of the United Nations) (1999). Early reaction contingency planning for an ASF emergency. In: *FAO animal health manual*, no. 8, *Manual on livestock disease surveillance and information systems*, FAO, Rome, www.fao.org/3/Y0510E/Y0510E06.htm.

FAO (Food and Agriculture Organization of the United Nations) (2009). *FAO animal production and health*, manual 8, *Preparation of African swine fever contingency plans*, Penrith ML, Guberti V, Depner K & Lubroth J (eds), FAO, Rome, www.fao.org/3/i1196e/I1196E.pdf.

FAO (Food and Agriculture Organization of the United Nations) (2019a). ASF: China situation update, FAO, Rome, www.fao.org/ag/againfo/programmes/en/empres/ASF/2019/Situation_update_2019_04_12.html.

FAO (Food and Agriculture Organization of the United Nations) (2019b). ASF: situation in Asia update, FAO, Rome, www.fao.org/ag/againfo/programmes/en/empres/ASF/2019/Situation_update_2019_11_14.html.

Friedrichs V, Reicks D, Hasenfuß T, Gerstenkorn E, Zimmerman JJ, Nelson EA, Carrau T, Deutschmann P, Sehl-Ewert J, Roszyk H, Beer M, Christopher-Hennings J & Blome S (2022). Artificial insemination as an alternative transmission route for African swine fever virus. *Pathogens* 11(12), 1539, DOI: 10.3390/pathogens11121539.

Gallardo C, Soler A, Nieto R, Carrascosa A, De Mia G, Bishop R, Martins C, Fasina F, Couacy-Hymman E & Heath L (2013). Comparative evaluation of novel African swine fever virus (ASF) antibody detection techniques derived from specific ASF viral genotypes with the OIE internationally prescribed serological tests. *Veterinary Microbiology* 162:32–43.

Gallardo C, Soler A, Nieto R, Sánchez MA, Martins C, Pelayo V, Carrascosa A, Revilla Y, Simón A, Briones V, Sánchez-Vizcaíno JM & Arias M (2015). Experimental transmission of African swine fever (ASF) low virulent isolate NH/P68 by surviving pigs. *Transboundary and Emerging Diseases* 62:612–622.

Gallardo C, Nurmoja I, Soler A, Delicado V, Simón A, Martin E, Perez C, Nieto R & Arias M (2018). Evolution in Europe of African swine fever genotype II viruses from highly to moderately virulent. *Veterinary Microbiology* 219:70–79.

Geering WA, Forman AJ & Nunn MJ (1995). *Exotic diseases of animals: a field guide for Australian veterinarians,* Australian Government Publishing Service, Canberra.

Grau FR, Schroeder ME, Mulhern EL, McIntosh MT & Bounpheng MA (2015). Detection of African swine fever, classical swine fever and foot-and-mouth disease viruses in swine oral fluids by multiplex reverse transcription real-time polymerase chain reaction. *Journal of Veterinary Diagnostic Investigation* 27(2):140–149.

Guberti V, Khomenko S, Masiulis M & Kerba S (2019). *FAO animal production and health*, manual 22, *African swine fever in wild boar ecology and biosecurity*, Food and Agriculture Organization of the United Nations, World Organisation for Animal Health & European Commission, Rome.

Guinat C, Reis AL, Netherton CL, Goatley L, Pfeiffer DU & Dixon L (2014). Dynamics of African swine fever virus shedding and excretion in domestic pigs infected by intramuscular inoculation and contact transmission. *Veterinary Research* 45:93.

Guinat C, Gogin A, Glome S, Keil G, Pollin R, Pfeiffer DU & Dixon L (2016a). Transmission routes of African swine fever virus to domestic pigs: current knowledge and future research directions. *Veterinary Record* 178:262–267.

Guinat C, Gubbins S, Vergne T, Gonzales JL, Dixon L & Pfeiffer DU (2016b). Experimental pig-to-pig transmission dynamics for African swine fever virus, Georgia 2007/1 strain. *Epidemiology and Infection* 144:25–34.

Hess WR (1981). African swine fever: a reassessment. *Advances in Veterinary Science and Comparative Medicine* 25:39–69.

Juszkiewicz M, Walczak M, Mazur-Panasuik N & Woźniakowski G (2019). Virucidal effect of chosen disinfectants against African swine fever virus (ASFV): preliminary studies. *Polish Journal of Veterinary Science* 22(4):777–780.

Kalmar D, Cay AB & Tignon M (2018). Sensitivity of African swine fever virus (ASFV) to heat, alkalinity and peroxide treatment in presence or absence of porcine plasma. *Veterinary Microbiology* 219:144–149.

Krug PW, Larson CR, Eslami AC & Rodriguez LL (2012). Disinfection of foot-and-mouth and African swine fever viruses with citric acid and sodium hypochlorite on birch wood carriers. *Veterinary Microbiology* 156(1–2):96–101.

Krug PW, Davis T, O'Brien C, LaRocco M & Rodriguez LL (2018). Disinfection of transboundary animal disease viruses on surfaces used in pork packing plants. *Veterinary Microbiology* 219:219–225.

Licoppe A, De Waele V, Malengreaux C, Paternostre J, Van Goethem A, Desmecht D, Herman M, Linden A. (2023). Management of a focal introduction of ASF virus in wild boar: the Belgian experience. *Pathogens*. 12(2):152, DOI: 10.3390/pathogens12020152.

MacDiarmid SC (1991). African swine fever. In: *The importation into New Zealand of meat and meat products: a review to the risks of animal health*, NZ Ministry of Agriculture and Fisheries, 47–50.

Malogolovkin A, Burmakina G, Titov I, Sereda A, Gogin A, Baryshnikova E & Kolbasov D (2015). Comparative analysis of African swine fever virus genotypes and serogroups. *Emerging Infectious Diseases* 21(2):312–315.

McCullough C (2018). African swine fever strikes Romania's largest pig farm. In: *The pig site*, www.thepigsite.com/news/2018/08/african-swine-fever-strikes-romanias-largest-pig-farm-1.

Mebus C, Arias M, Pineda JM, Tapiador J, House C & Sánchez-Vizcaíno JM (1997). Survival of several porcine viruses in different Spanish dry-cured meat products (Workshop on Mediterranean Aspects of Meat Quality as Related to Muscle Biochemistry, Segovia, Spain, 9 May 1996). *Food Chemistry* 59:489–582.

Mellor PS, Kitching RP & Wilkinson PJ (1987). Mechanical transmission of capripox virus and African swine fever virus by *Stomoxys calcitrans*. *Research in Veterinary Science* 43(1):109–112.

Miteva A, Papanikolaou A, Gogin A, Boklund A, Bøtner A, Linden A, Viltrop A, Schmidt CG, Ivanciu C, Desmecht D, Korytarova D, Olsevskis E, Helyes G, Wozniakowski G, Thulke H-H, Roberts H, Abrahantes JC, Ståhl K, Depner K, Villeta LCG, Spiridon M, Ostojic S, More S, Vasile TC, Grigaliuniene V, Guberti V & Wallo R (2020). Epidemiological analyses of African swine fever in the European Union (November 2018 to October 2019). *EFSA Journal* 18(1):e05996.

NBCEN (National Biosecurity Communication and Engagement Network) (2021). *Biosecurity incident public information manual: Part 1 public information policy*, NBCEN, Canberra, https://animalhealthaustralia.com.au/bipim.

Official Journal of the European Communities (2002). Council Directive 2002/60/EC of 27 June 2002 laying down specific provisions for the control of African swine fever and amending Directive 92/ 119/EEC as regards Teschen disease and African swine fever. *Official Journal of the European Communities* 20.7.2020:L192/27–L192/46, https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:192:0027:0046:EN:PDF.

WOAH (World Organisation for Animal Health) (2018a). *African swine fever*, technical disease card, WOAH, Paris, www.woah.org/en/document/african_swine_fever.

WOAH (World Organisation for Animal Health) (2018b). Infection with African swine fever virus. In: *Terrestrial animal health code*, Chapter 15.1, WOAH, Paris, www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/?id=169&L=1&htmfile=glossaire.htm.

Olesen AS, Lohse L, Boklund A, Halasa T, Gallardo C, Pejsak Z, Belsham GJ, Rasmussen TB & Bøtner A (2017). Transmission of African swine fever virus from infected pigs by direct contact and aerosol routes. *Veterinary Microbiology* 211:92–102.

Olesen AS, Lohse L, Boklund A, Halasa T, Belsham GJ, Rasmussen TB & Bøtner A (2018a). Short time window for transmissibility of African swine fever virus from a contaminated environment. *Transboundary and Emerging Diseases* 65(4):1024–1032.

Olesen AS, Hanse MF, Rasmussen TB, Belsham GJ, Bødker R & Bøtner A (2018b). Survival and localization of African swine fever virus in stable flies (*Stomoxys calcitrans*) after feeding on viremic blood using a membrane feeder. *Veterinary Microbiology* 222:25–29.

Olesen AS, Lohse L, Hansen MF, Boklund A, Halasa T, Belsham GJ, Rasmussen TB & Bøtner A (2018c). Infection of pigs with African swine fever virus via ingestion of stable flies (*Stomoxys calcitrans*). *Transboundary and Emerging Diseases* 65:1152–1157.

O'Neill X, White A, Ruiz-Fons F & Gortázar C (2020). Modelling the transmission and persistence of African swine fever in wild boar in contrasting European scenarios. *Scientific Reports* 10:5895.

Oura CA, Powell PP & Parkhouse RM (1998). African swine fever: a disease characterized by apoptosis. *Journal of General Virology* 79(6):1427–1438.

Oura CA, Denyer MS, Takamatsu H & Parkhouse RME (2005). In vivo depletion of CD8+ T lymphocytes abrogates protective immunity to African swine fever virus. *Journal of General Virology* 86:2445–2450.

Penrith ML & Vosloo W (2009). Review of African swine fever: transmission, spread and control. *Journal of the South African Veterinary Association* 80(2):58–62.

Penrith M-L, Thomson GR & Bastos ADS (2004). African swine fever. In: *Infectious diseases of livestock*, vol 2, Coetzer JA & Tustin RC (eds), 2nd edn, Oxford University Press, Cape Town, 1087–1119.

Petrov A, Forth JH, Zani L, Beer M & Blome S (2018). No evidence for long term carrier status of pigs after African swine fever virus infection. *Transboundary and Emerging Diseases* 65(5):1318–1328.

Pietschmann J, Guinat C, Beer M, Pronin V, Tauscher K, Petrov A, Keil G & Glome S (2015). Course and transmission characteristics of oral low-dose infection of domestic pigs and European wild boar with a Caucasian African swine fever virus isolate. *Archives of Virology* 160:1675–1667.

Plowright W, Thomson GR & Neser JA (1994). African swine fever. In: Coetzer JAW, Thomson GR & Tustin RC (eds), *Infectious diseases of livestock with special reference to southern Africa,* Oxford University Press, South Africa, 568–599.

Probst C, Globig A, Knoll B, Conraths FJ & Depner K (2017). Behaviour of free ranging wild boar towards their dead fellows: potential implications for the transmission of African swine fever. *Royal Society Open Science* 4(5):170054.

ProMED-mail (2019). African swine fever — Europe (03): Belgium (LX) wild boar, spread, OIE, 7 Jan, 20190107.6246825, www.promedmail.org.

Randriamparany T, Kouakou KV, Michaud V, Fernandez-Pinero J, Gallardo C, Le Potier MF & Albina E (2016). African swine fever diagnosis adapted to tropical conditions by the use of dried-blood filter papers. *Transboundary and Emerging Diseases* 63:379–388.

Roszyk H, Franzke K, Breithaupt A, Deutschmann P, Pikalo J, Carrau T, Blome S & Sehl-Ewert J (2022). The role of male reproductive organs in the transmission of African swine fever — implications for transmission. *Viruses* 14(1):31.

Rowlands RJ, Michaud V, Heath L, Hutchings G, Oura C, Vosloo W, Dwarka R, Onashvili T, Albina E & Dixon LK (2008). African swine fever virus isolate, Georgia 2007. *Emerging Infectious Diseases* 14:1870–1874.

Sánchez Botija C (1962). Estudios sobre Ia peste porcina Africana en España. *Bulletin de l'Office International des Epizooties* 58:707–727.

Sánchez-Vizcaíno JM (2010). *Early detection and contingency plans for African swine fever*, 24th Conference of the OIE Regional Commission for Europe, World Organisation for Animal Health, Astana, Kazakhstan.

Sánchez-Vizcaíno JM, Martínez-López B, Martínez-Avilés M, Martins C, Boinas F, Vial L, Michaud V, Jori F, Etter E, Albina E & Roger F (2009). *Scientific review on African swine fever*, scientific report submitted to the European Food Safety Authority, Parma, Italy, www.efsa.europa.eu/en/supporting/pub/5e.htm.

Sánchez-Vizcaíno JM, Mur L & Martínez-López B (2012). African swine fever: an epidemiological update. *Transboundary and Emerging Diseases* 59(Suppl 1):27–35.

Sánchez-Vizcaíno JM, Mur L, Gomez-Villamandos JC & Carrasco L (2015). An update on the epidemiology and pathology of African swine fever. *Journal of Comparative Pathology* 152:9–21.

Schulz K, Staubach C & Blome S (2017). African and classical swine fever: similarities, differences and epidemiological consequences. *Veterinary Research* 48:84.

Schulz K, Conraths FJ, Blome S, Staubach C & Sauter-Louis C (2019). African swine fever: fast and furious or slow and steady? *Viruses* 11(9):E866.

Slatyer R, Hafi A, Richards K, Cozens M, Addai D, Cao L, Mornement C, Keighley M & Arthur T (2023). Potential economic consequences of African swine fever in Australia, ABARES research report 23.07, Canberra, DOI: 10.25814/rznz-8y79.

Spickler AR (2018). *African swine fever*, Center for Food Security & Public Health, Iowa State University, Ames, www.cfsph.iastate.edu/DiseaseInfo/factsheets.php.

Ståhl K, Sternberg-Lewerin S, Blome S, Viltrop A, Penrith M & Chenais E (2019). Lack of evidence for long term carriers of African swine fever virus: a systematic review. *Virus Research* 272:197725.

Thacker BJ, Larsen RE, Joo HS & Leman AD (1984). Swine diseases transmissible with artificial insemination. *Journal of the American Veterinary Medical Association* 185(5):511–516.

Viñuela E (1985). African swine fever virus. *Current Topics in Microbiology and Immunology* 116:151–170.

Wilkinson PJ (1984). The persistence of African swine fever in Africa and the Mediterranean. *Preventative Veterinary Medicine* 2:71–82.

Wilkinson PJ (1986). Epidemiology of African swine fever. *OIE Scientific and Technical Review* 5(2):487–493.