AUSTRALIAN VETERINARY EMERGENCY PLAN

AUSVETPLAN

Response strategy

Classical swine fever

Version 5.0

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

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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 classical swine fever (CSF) 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 classical swine fever (CSF) caused by classical swine fever virus.

This response strategy provides information about:

- the disease (Section 2)
- the implications for Australia, including potential pathways of introduction; social, environmental, human health and economic effects; and the critical factors for a response to the disease (Section 3)
- the agreed policy and guidelines for agencies and organisations 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).

1.1.3 Development

The strategies in this document for the diagnosis and management of an outbreak of CSF are based on risk assessment. They are informed by the recommendations in the World Organisation for Animal Health (WOAH) *Terrestrial Animal Health Code* (Chapter 15.2) and the WOAH *Manual of diagnostic tests and vaccines for terrestrial animals* (Chapter 3.9.3). The strategies and policy guidelines are for emergency situations and are not applicable to policies for imported animals or animal products.

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. NASOPs have been developed for use by jurisdictions during responses to emergency animal disease (EAD) incidents and emergencies
- relevant jurisdictional or industry policies, response plans, standard operating procedures and work instructions
- relevant Commonwealth and jurisdictional legislation and legal agreements (such as the Emergency Animal Disease Response Agreement – EADRA[2]), where applicable.

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

[2] https://animalhealthaustralia.com.au/eadra/

1.3 Training resources

EAD preparedness and response arrangements in Australia

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

[3] https://animalhealthaustralia.com.au/online-training-courses/

2 Nature of the disease

Classical swine fever (CSF), also known as hog cholera, is a highly contagious disease resulting in a range of clinical signs and variable case mortality rates in infected pigs. Affected animals may suffer from acute, chronic or subclinical disease, depending on a number of factors, including the virulence of the virus and the age of the pig. Clinical signs and postmortem lesions are not unique to CSF, making it a difficult disease to diagnose without confirmatory laboratory tests. The clinical signs and postmortem lesions of CSF are the same as those of African swine fever (ASF) and some endemic diseases.

2.1 Aetiology

CSF is caused by an RNA (ribonucleic acid) virus of the family Flaviviridae, genus *Pestivirus*. *Pestivirus* diseases that are endemic in Australia are border disease of sheep and type 1 bovine viral diarrhoea/mucosal disease of cattle (BVD/MD). There is only one serotype of CSF virus. It has three major genotypes that vary considerably in virulence and antigenicity.

2.2 Susceptible species

Pigs are the only natural host for CSF virus. All domestic, feral and wild pigs, including European wild boar, peccaries, bush pigs and warthogs are susceptible.

2.2.1 Zoonotic potential

CSF is not zoonotic.

2.3 World distribution

For the latest information on the distribution of CSF, refer to the World Organisation for Animal Health (WOAH) World Animal Health Information System (WAHIS).[4]

2.3.1 Distribution outside Australia

CSF is found in Asia, parts of Central and South America, and Africa, and in some countries in the European Union. Numerous countries, including Australia and New Zealand are recognised by WOAH as free of CSF. Brazil, Colombia and Ecuador are recognised as having free zones.[5] In 2018 Japan experienced a CSF outbreak, following 26 years of freedom from the disease (Shimizu et al 2020). While vaccination of both domestic pigs and wild boar has been undertaken, outbreaks were still reported in Japan in 2025 (ProMED 2025a). Taiwan was seeking country freedom status late in 2025 (ProMED 2025b). In the 1990's large CSF outbreaks occurred in the Netherlands (1997), Germany (1993-2000), Belgium (1990, 1993, 1994) and Italy (1995, 1996, 1997).[6]

[4] https://wahis.woah.org/#/home

[5] www.woah.org/en/disease/classical-swine-fever/#ui-id-2

[6] https://wahis.woah.org/#/home

2.3.2 Occurrence in Australia

Outbreaks of CSF occurred in Australia in 1903, 1927–28, 1942–43 and 1960–61. In each case, the disease was eradicated. The first three outbreaks were the acute form of the disease, resulting from prohibited pig feed (swill feeding) via either imported pigmeat or food refuse from ships. The origin of the 1960–61 outbreak is unknown, but probably the same as previous incidents. This outbreak was caused by a viral strain of low virulence and only came to official attention as a result of a higher than normal condemnation rate for 'septicaemia' of pig carcases in abattoirs (Geering et al 1995).

2.4 Epidemiology

2.4.1 Incubation period

Pigs exposed to CSF virus prenatally may be persistently infected throughout life; there may be an incubation period of several months before they show signs of disease. In pigs exposed postnatally, the incubation period is usually 2–6 days.

WOAH incubation/infective period

For the purposes of the Terrestrial Code and this manual, the incubation period is 14 days.

The WOAH *Terrestrial Animal Health Code* (2024) describes the longest incubation period of pigs exposed to CSF virus prenatally as several months, noting that these animals may not show clinical signs at birth and may be persistently infected throughout life. Pigs exposed to CSF virus postnatally have an infective period of up to three months (WOAH 2024).

2.4.2 Persistence of agent and modes of transmission

General properties

The CSF virus is stable at a pH range of 5 to 10, is sensitive to heat, and lipid solvents quickly inactivate the virus. The ability of CSF virus to remain infective for months in chilled or frozen pork and pig-derived products is a major factor in long-distance spread and introduction of the disease into free areas. The epidemiological significance of pig products is particularly high because pigs ingesting contaminated meat or products can initiate outbreaks, especially the first incursion into a new country or area (van Oirschot 1992).

The virus is very resistant at temperatures below 0°C, but sensitive to temperatures above this. It can survive 3 days at 50°C, 7 to 15 days at 37°C and years at -70^{0}C (Farez and Morley 1997).

While much of the primary research on CSF virus was undertaken in the 1900s and many widely cited references are inaccessible, major reviews undertaken by Edwards (2000) and Kramer et al (2009) concluded that the stability of CSF virus is variable dependent on temperature, pH, time, and the media it is stored in. These reviews concluded that:

- virus survival is favoured when the temperature is low (<4°C), the environment is rich in proteins, is moist and pH is at the lower end of its stable range. It survives freezing but freeze-thaw cycles are deleterious (Farez and Morley 1997)
- the half-life of the virus between 4°C and 37°C is dependent on both temperature and pH, with the effect of low pH (<4) being more marked at 4°C than at 21°C (Depner et al 1992)
- viral strain may be a factor in thermal and pH stability (Depner et al 1992).

CSF virus has a lipid-containing envelope and is susceptible to dehydration and a wide range of chemicals including detergents, chlorine-based disinfectants, phenolics, quaternary ammonium compounds and aldehydes (Edwards 2000). See also **AUSVETPLAN Operational manual: *Decontamination***.

Environment (including windborne spread)

While it is not possible to give definitive guidelines for the survival time of CSF virus in the environment (Edwards 2000), it is considered not to persist in the environment, and is sensitive to drying and ultraviolet radiation (WOAH 2020).

The virus has been detected in the air in rooms housing experimentally infected pigs and disease has been seen to spread within those rooms to pigs with no direct contact (Weesendorp et al 2014).

Airborne transmission over short distances (up to 1km) has been reported, particularly during outbreaks in areas of high pig farm density (WOAH 2020). The overall epidemiological significance of such airborne spread and the possibility of longer-distance airborne or windborne transmission between herds have been debated but not reliably proven (Ribbens et al 2004, Terpstra 1987). Epidemiological studies of the Belgian and the Dutch epidemics in the 1990s demonstrated some distance dependent effects on spread, but could not prove a wind related effect (Ribbens et al 2004).

Live animals

Live domestic animals

Pigs are most commonly infected by the oral or oronasal routes and primary viral replication is in the tonsils (MacLachlan et al 2011). Virus may also enter via other mucous membranes and skin abrasions. Transmission of CSF virus is by direct contact with infected pigs, ingestion of products from infected pigs or indirectly through contaminated fomites (Spickler 2015). Movement of infected pigs is the most important method of spread of the disease to new locations.

Infected pigs may shed virus during the incubation period, with viral shedding continuing until death or, in surviving pigs, until specific antibodies have developed.

CSF virus-infected pigs shed virus from all mucosal surfaces (Weesendorp et al 2009), with large amounts of virus shed in oral, nasal and lacrimal fluids, but also in urine and faeces. Pigs infected with low virulence strains shed virus mainly via the oronasal route (Spickler 2015).

Much higher levels of virus are shed in nasal fluid and saliva than in urine and faeces and may contribute to spread between and within pens and fomite spread. Aerosol transmission may be possible over short distances (WOAH 2020).

The survival of the virus in urine and faeces derived from experimentally infected pigs varies with the strain of the virus for faeces but not urine. Viral infectivity in both faeces and urine is inversely related to temperature. Average half-life values have been reported to be between 2 and 4 days at 5 °C and between 1 and 3 hours at 30 °C (Weesendorp et al 2008).

Congenital and neonatal CSF infection

Two types of persistently infected piglets are described in the literature:

- congenital persistent CSF infection due to transplacental transmission in sows infected during mid-gestation (historically called “carrier sows”) (van Oirschot and Terpstra 1977, Kaden et al 2005, Bohorquez et al 2020).
- neonatal persistent CSF infection in piglets infected from birth up to 3 weeks of age (Bohorquez et al 2019).

Persistently infected piglets do not develop an antibody response and may shed virus continuously or intermittently while remaining undetected in serological tests. These piglets may contribute to ongoing virus circulation, especially in endemic regions (van Oirschot and Terpstra 1977, Coronado et al 2019, Bohorquez et al 2019). Low and moderate virulence strains are considered to play a role in transplacental infection leading to persistently infected piglets (Munoz-Gonzalez et al 2015). Inefficient vaccination programs in some endemic areas have been suggested to have contributed to virus evolution to low virulence in these areas (Ganges et al 2020, Coronado et al 2019).

The epidemiological importance of transplacental and neonatal viral persistence in piglets to CSF establishment and spread in Australia is unlikely to be significant. This is because the preferred response policy in Australia is eradication rather than implementation of a control program with vaccination.

Live wild (including feral) animals

Feral pigs are susceptible to CSF virus and may act as reservoirs. Infection can persist in wild boar populations, with the presence of chronic and/or subclinical infections (Coronado et al 2019, Rossi et al 2015). Many international outbreaks in domestic pigs have been attributed to transmission from wild boars (Rossi et al 2015).

It is therefore necessary to avoid contact between feral pigs and infected domestic pigs, as well as contact between domestic pigs and infected feral pigs, to prevent transmission in either direction. If possible, feral pigs in the area should be controlled, destroyed, and be included in surveillance programs to help define the extent of any infection in the feral pig population (see **Appendix 3**).

Oral vaccination of wild boar has been successfully practised in a number of European countries since the 1990s, with official support via a European Community Council Directive on community measures for the control of CSF (Rossi et al 2015, Kirkland et al 2019) (see also **Appendix 3a**).

CSF virus is less resistant in the environment than ASF virus or swine vesicular disease virus, and there is no evidence of vector involvement in its maintenance. Both of these factors may decrease the likelihood of CSF spread or maintenance in feral pigs when the feral pigs occur at low density.

Carcasses

Virus reportedly persists 3–4 days in decomposing organs and up to 15 days in decomposing blood and bone marrow (WOAH 2020). CSF virus may be transmitted indirectly by movement or manipulation of infected carcasses, especially considering interactions of contaminated carcass and associated vehicles/equipment and domestic pigs, related to feral pig hunting (Kaden et al 2003).

Meat and meat products

With infectivity of CSF virus in slaughtered pigmeat reported as early as 1917 (Birch 1917), survival of the virus in slaughter products and its inactivation was extensively studied in the 1900s. Helwig and Keast (1966) noted that pigs fed infective material showed early clinical signs consistent with classical swine fever when slaughtered on the sixth day post exposure, but could have passed postmortem inspection at an abattoir. The meat from the slaughter of those pigs was experimentally proven to cause infection when fed to pigs in trials.

The virus can survive in fresh pigmeat and some processed pigmeat products. Edwards (2000) reviewed this area of the literature finding that the viability of the virus is variable depending on the treatments the products are subject to, with frozen meat being the most stable.

Heating or cooking infected 2 cm^3 cubes of fresh ham at 71°C for one minute inactivates the virus (Stewart et al 1978). Farez and Morely (1997) listed times for the apparent duration of survival of CSF virus in

specific pork products. They also stated that apparent thermal inactivation of the virus is obtained using the following procedures:

- pasteurisation of cured and canned hams at core temperatures over 67°C.
- exposure of cubes (2 cm^3) of ham to a "flash" temperature of 71°C for 1 minute
- heating to 69°C for 15 minutes.

Chilled fresh pork has been reported as being infectious for up to 85 days, while frozen pork has been reported as being infectious after 4 years (Edgar et al 1949). In salted and brined meat (ham), the virus may survive for 2–4 months (MacDiarmid 1991).

The virus is, however, susceptible to rapid changes in temperature such as thawing and refreezing (MacDiarmid 1991).

Survival times of CSF virus in a range of pork products have been collated (Farez and Morley 1997), ranging from 1 month in the meat of salt-cured pork to 252 days in Iberian hams.

McKercher et al (1978) showed that CSF virus in cured salami and pepperoni prepared according to traditional protocols and from CSF-infected tissues was still infective 15 days post curing but virus could not be isolated from the product 97 days post curing. Their conclusion was that the virus would not survive the curing period for either product.

Similar studies into virus survival in Parma hams (Prosciutto di Parma) which are required to be cured for at least 400 days found CSF virus was not isolated in samples after 313 days of the cure process (McKercher 1987).

Contemporary Australian pigmeat processing times and processes are not prescribed, but food safety related processes and outcomes are prescribed (MLA 2015). With process times for salami being up to 8 weeks, and for prosciutto and air-dried products being up to 8 months (Vaibhav Gole APL, pers comm), these timeframes are likely to inactivate the virus.

Retort heating muscle, lymph node tissue and bone marrow to 65°C for 15 minutes will also inactivate CSF virus.

The WOAH *Terrestrial Animal Health Code* Article 15.2.23 provides recommendations for inactivating CSF virus in pigmeat products.

Animal byproducts

Infective levels of CSF virus are known to persist in casings from pigs infected with CSF virus that have passed antemortem and postmortem examination (Helwig and Keast 1966).

Natural casings, used as sausage containers, are traded worldwide. The standard processing of natural casings is by salt treatment with a duration of 30 days before shipment. Recent work by Jelsma et al (2019) compared previous recommendations based on collagen modelling with *in vivo* trials and recommended an increase in storage times for standard salt processed casings derived from CSF virus endemic regions.

The WOAH *Terrestrial Animal Health Code* (Chapter 15.2) provides standards for the inactivation of CSF virus in some products.

Prohibited pig feed

The feeding of prohibited pig feed is illegal in Australia.[7]

[7] https://animalhealthaustralia.com.au/prohibited-pig-feed-compliance-and-awareness/

Pigs ingesting pigmeat or pigmeat products infected with the virus is an important method of spread of CSF, especially in the first outbreak in a new country or area. Inactivation of CSF virus in swill is described in the WOAH *Terrestrial Animal Health Code* Article 15.2.22.

Semen and embryos from live susceptible animals

Spread of CSF virus via semen is possible. In the 1997 outbreak in the Netherlands, CSF was introduced into a boar stud. Transmission of CSF by artificial insemination was implicated but difficult to assess due to lack of information (Hennecken et al 2000). Floegel (2000) infected boars and demonstrated a mild but detectable clinical infection with shedding of CSF virus into semen. de Smit et al (1999) experimentally inoculated 3 boars with CSF and the boar ejaculates were collected from day 5-18 post-inoculation. Sows were inseminated with extended semen on the same days 5-18 post-inoculation. The boars remained healthy and developed neutralising antibodies 14-21 days post-inoculation. Two of 6 sows inseminated with contaminated semen also seroconverted. CSF virus was detected in the foetuses of both infected sows approximately 35 days post-insemination, indicating that CSF infection in boars can lead to virus in semen which can infect sows and their foetuses. This method of transmission has been proposed as contributing to subclinical infection in sows that may lead to transplacental transmission and congenitally infected piglets.

Porcine pre-implantation embryos can become contaminated with CSF virus if they are in contact with a high enough concentration of the virus either *in vivo* or *in vitro* during processes involved in embryo collection or manipulation. Hatched embryos and micromanipulated embryos with a damaged zona pellucida will allow for virus replication in the embryonic cells (Schuurmann et al 2005).

Chapters 4.8 to 4.10 of the WOAH *Terrestrial Animal Health Code* (WOAH 2024) advise on the differing phytosanitary recommendations for international movement of oocytes, and *in vivo* and *in vitro* embryos in line with advice from the International Embryo Transfer Society (IETS). For embryos derived *in vivo*, CSF has been listed as a Category 2 disease. These are diseases for which substantial evidence has accrued to show that the risk of transmission via embryos is negligible provided that the embryos are properly handled between collection and transfer according to the IETS Manual, but for which additional transfers are required to further verify existing evidence.[8] However, with ongoing advances in embryo transfer research and commercial practices, the IETS recognises the need for the development of an updated categorisation system (Thibier and Perry 2024).

See also the **AUSVETPLAN Enterprise manual: *Artificial breeding centres*.**

Waste products and effluent

In the Netherlands, other than contact with infected pigs, livestock trucks contaminated with waste and effluent from infected pigs were considered to be the most important route of disease transmission during the 1997-1998 epidemic (Ribbens et al 2004).

Botner and Belsham (2012) determined that CSF virus can survive in liquid slurry kept at 5°C under anaerobic conditions for upwards of 6 weeks, however, at 20°C under the same conditions nearly all infectivity was lost within 6 days and CSF virus was undetectable by 15 days. CSF virus inactivation in slurry was much quicker at temperatures above 20°C. Infectivity of CSF virus was lost within 4 hours at 35°C and 5 minutes at 55°C. Intranasal inoculation of naive pigs with CSF virus-containing slurry treated at 35°C for one hour resulted in no clinical disease and no detection of anti-CSF virus antibodies at 6 weeks post-inoculation. Control pigs inoculated with non-treated, CSF virus-containing slurry exhibited clinical signs of disease and virus was isolated from blood samples collected at 3 and 7 days after inoculation. Pigs were also seropositive for CSF virus 4.5 weeks post-inoculation (Botner and Belsham 2012).

[8] Manual of the International Embryo Transfer Society, IETS, Savoy, IL, USA (www.iets.org/Publications/IETS-Manual)

Non-susceptible animals

Species other than pigs do not play a significant role in the epidemiology of the disease, but may play a role as a mechanical vector.

Crops, grains, hay, silage and mixed feeds

Virus contaminated vehicles transporting crops, grains, hay, silage and mixed feeds may act as fomites; however, crops, grains, hay, silage and mixed feed themselves are not important in the epidemiology of the disease.

Vehicles, including empty livestock transport vehicles

Vehicles that have carried infected pigs or are otherwise contaminated (e.g. hunting vehicles) can act as fomites and be a source of infection. Transportation vehicles significantly contributed to the transmission of the CSF virus during the 1997-1998 outbreak in the Netherlands (Elbers et al 1999).

People and equipment, including personal items

Ribbens et al (2004) reports that transmission of CSF virus by contaminated people is a possible route of virus spread. Lack of hygiene, for example not changing clothing between visiting infected and susceptible pigs, is considered a significant risk factor for this to occur. Transmission by contaminated clothing and footwear is generally believed to be rare because the amount of the virus transferred is usually below the minimum infective dose for pigs (Terpstra 1994). Ribbens et al (2004) also report that iatrogenic transmission has been historically described but the risk of this is also considered to be influenced by hygiene practices and hence less likely in current husbandry systems. Indirect contact with infected wild pigs through contaminated hunting items is also considered a potential route of transmission (Ribbens et al 2004).

Arthropod vectors

Experimental mechanical transmission of CSF virus by mosquitoes, muscidae and tabanid flies has been reported (Stewart et al 1975, Morgan and Miller 1976, Tidwell et al 1972). However, arthropods have not been definitively identified as mechanical vectors for CSF (Ribbens et al 2004, Schulz et al 2017).

Other relevant considerations

CSF virus can persist in contaminated pig pens and other fomites of farm origin for up to four weeks depending on environmental conditions and the amount of virus present (WOAH 2020).

2.5 Diagnostic criteria

2.5.1 Clinical signs

CSF is an extremely variable disease and cannot be diagnosed based on clinical signs and gross pathology alone. The course of disease is dependent on several factors such as viral virulence, virus dose, the host's immune response, and the age and health status of the pigs. In its acute or classical form, there is high morbidity and high mortality. However, disease can also be very mild or inapparent, with clinical signs limited to nonspecific ill-thrift. A range of clinical signs and disease characteristics can be identified with the acute, chronic and subclinical forms of the disease.

In the Netherlands outbreak of 1997–1998, the time between introduction of CSF virus into the country and diagnosis of the primary outbreak was estimated to be approximately 6 weeks (Elbers et al 1999). The observed clinical signs in the infected herds were vague, mainly atypical—mild fever, apathy, ataxia or a combination of these. Furthermore, while farmers in 76% of the outbreaks detected by clinical signs reported seeing clinical signs for less than 1 week prior to diagnosis, 22% saw signs for 1–4 weeks and 1% farmers saw clinical signs for more than 4 weeks prior to diagnosis (Elbers et al 1999).

Animals (pigs)

Acute (classical) form of CSF

Acute forms of disease are most commonly caused by highly virulent CSF virus strains, although strains of moderate virulence can also trigger this form of infection. Acute disease is more frequent in piglets up to 12 weeks of age, while milder forms are usually observed in older pigs (Moennig et al 2003, Muñoz-González et al 2015). After a short incubation period (2–6 days after exposure), pigs develop a sustained pyrexia (>40°C). Highly virulent CSF virus strains cause marked immunosuppression and high mortality (Gómez-Villamandos et al 2003, Susa et al 1992). Leukopenia appears rapidly, even before the animals show fever or viremia. The most characteristic presentation is the haemorrhagic syndrome, including petechiae of the skin, mucosae, and cyanosis of the abdomen, ears, snout and medial side of the extremities, conjunctivitis, constipation followed by severe diarrhoea ("cholera"). As a result of central nervous system infection, pigs show progressive depression and uncoordinated movements (Moennig 2000). In peracute/acute cases, however, pathologic lesions can often be inconspicuous or absent. The mortality rate of the acute form of disease is close to 100%, with death occurring between 10–20 days post-infection (Dunne 1975, Moennig et al 2003).

Subacute forms of the disease may also be caused by highly virulent strains of CSF virus, manifesting with pyrexia, diarrhoea and central nervous disorders, but the clinical signs are less severe and mortality rate is lower (Floegel-Niesmann et al 2009 and 2003, Ganges et al 2020). The surviving animals generate long-lasting and robust humoral immunity, characterized by the presence of neutralizing antibodies appearing after 2 weeks post-infection (Chander et al 2014, Moennig et al 2003).

Clinical signs observed with the acute and peracute forms of CSF

- incubation period of 2–6 days (most pigs die between 5 and 25 days of onset of clinical signs)
- found dead
- fever (> 40°C)
- inappetence
- lethargy, reluctance to walk, swaying gait, tremors
- respiratory signs – laboured breathing, coughing
- conjunctivitis
- petechiae of the skin or mucosa
- hyperaemia or cyanosis of extremities, particularly ears and snout
- constipation followed by severe diarrhoea

- mild to severe convulsions and prostration in the terminal state
- abortion, mummifications, stillbirth and foetal abnormalities
- case fatality rate up to 100%, particularly in young pigs.

Most pigs die between 5 and 25 days of onset of clinical signs.

Chronic form of CSF

The chronic and subclinical forms of disease are observed mostly in endemic areas (Ganges et al 2020). In general terms, an infection is considered as chronic when the survival of infected animals exceeds 30 days (Dunne 1975, Liess 1987, Muñoz-González et al 2015). The chronic form of CSF usually occurs when the pigs are not able to develop an effective immune response against the infection (Petrov et al 2014, Tarradas et al 2014), allowing the virus to persist. Chronic infections can establish in the presence of neutralizing antibodies (Mengeling and Packer 1969). The chronic form of the disease manifests with stunted growth, anorexia, and intermittent pyrexia and diarrhoea. In a first phase, the clinical picture can be similar to the acute form of CSF. After overcoming the initial phase, clinical signs can disappear, and animals can appear apparently healthy (Mengeling and Cheville 1968). Over time, however, the disease progresses with nonspecific signs, with the re-occurrence of intermittent fever, diarrhoea and wasting, which are not always easy to identify on farm (Moennig et al 2003). CSF virus is shed from the onset of clinical signs until death. Affected animals can survive up to 2–3 months after exposure (Weesendorp et al 2011).

Clinical signs which may be observed with the chronic form of CSF

- as for the acute form, but generally milder
- fever which may fluctuate irregularly
- ill-thrift, dullness
- growth retardation
- poor reproductive performance
- pneumonia (laboured breathing/coughing)
- alopecia and dermatitis
- death — often due to secondary bacterial infections
- lower case fatality rate than the acute form.

Congenital form of CSF (transplacental infection)

Generally, CSF infection early or late in gestation may result in repeat breeding, abortion, stillbirth, mummifications or malformation of foetuses. CSF infection in mid-gestation (40–80 days) may result in the birth of congenital persistently infected piglet (van Oirschot and Terpstra 1977, Kaden et al 2005, Bohorquez et al 2020).

Clinical signs which may be observed with the congenital form of CSF

- foetal death, resorption, mummification, stillbirth
- abortion
- congenital tremor, weakness
- if born alive – may appear healthy but fail to thrive and remain persistently viraemic, with poor growth over weeks to months leading to death (van Oirschot & Terpstra 1977).

Post-natal form of CSF (neonates infected between birth and 3 weeks of age)

Piglets may show signs ranging from peracute or acute, highly fatal CSF infection, to clinically inapparent infection that progresses to late onset of disease and death at 6–12 months.

Due to immunosuppression, chronically infected piglets may demonstrate non-specific clinical signs or ineffective response to vaccination, with death occurring as a sequela to bacterial infection or other complications (Coronado et al 2019, Bohorquez et al 2019, Munoz-Gonzalez et al 2015).

Humans

There is no known risk of human infection with CSF virus.

2.5.2 Pathology

Gross lesions

Pathological changes in infected animals are variable and not specific to CSF. Therefore, a definitive diagnosis can only be made with further diagnostic testing.

The most frequently reported pathological findings during postmortem examination of pigs submitted in clinical cases where CSF was suspected were pneumonia, pleuritis, chronic bronchitis, pulmonary oedema, chronic gastric ulceration, dry faecal contents in the colon, conjunctivitis, renal (petechial) haemorrhages (including in the renal pelvis), splenic enlargement, petechial haemorrhages in the urinary bladder, and enlarged haemorrhagic lymph nodes (Elbers et al 2003).

Some of these pathological changes (pneumonia, pleuritis, chronic bronchitis and pulmonary oedema) are also commonly found in pigs that have died from unrelated causes that are not infected with CSF virus.

These pathological changes are defined in more detail below.

Acute (classical) form

- enlarged and haemorrhagic lymph nodes, often resembling blood clots — the gastrohepatic, renal, mesenteric and submandibular lymph nodes are most often affected
- pinpoint haemorrhages on the tonsils and tonsilitis — tonsils are frequently enlarged, with necrotic foci and pustules
- pyramidal splenic infarcts along the margin is characteristic but infrequent in currently circulating strains
- haemorrhages in most organs — most commonly on serosal membranes and in kidneys (as subcapsular petechiae), heart, urinary bladder, epiglottis, lung and gall bladder
- septal oedema of lungs
- fluid in body cavities.

Chronic form

- findings more variable in comparison to the acute form, as they are often complicated by secondary bacterial infections
- lymph node and renal haemorrhage
- mucosal intestinal haemorrhage
- enlarged lymph nodes
- lymphoid depletion
- thymic atrophy
- fibrinous pericarditis and pleurisy
- lobular consolidation of lungs — may progress to lobular necrosis and bronchopneumonia
- poor body condition
- ulceration of the large intestine — button ulcers, particularly near the ileocaecal valve.

Congenital form

- cerebellar hypoplasia
- microencephaly
- pulmonary hypoplasia
- hydrops
- other malformations

Microscopic lesions

Extensive necrosis of lymphatic tissue is common, particularly in lymph nodes, and may be accompanied by haemorrhage. This is more severe and frequent with acute ASF than acute CSF. The lymphatic necrosis is characteristically found in the margins of the spleen as 'infarcts', and in the tonsillar crypts as 'pustules'. There is vasculitis, with degeneration of endothelium and fibrinoid degeneration of artery walls in all organs. There is usually a pronounced acute nonsuppurative inflammation of the brain — the medulla, pons, midbrain and thalamus are consistently affected — with prominent mononuclear cell cuffing around affected vessels.

Pathogenesis

The pathogenesis of CSF virus was reviewed by Ganges et al (2020). The virus infects the epithelial cells of tonsillar crypts and invades the lymphoid tissues. From here the lymphoid capillaries carry the virus to regional lymph nodes and the virus then enters the efferent blood capillaries, leading to viraemia. The virus replicates in the bone marrow and secondary lymphoid organs, such as the spleen, lymph nodes and lymphoid structures associated with the small intestine. The kidneys, adrenal glands, liver and pancreas are also infected during the viraemic stage.

CSF virus targets dendritic cells and macrophages causing marked suppression of the immune system leading to severe lymphopaenia and thrombocytopaenia. Endothelial cells are also damaged resulting in petechiae and ecchymoses (Blome et al 2017).

The virulence of the virus variant does not affect the pattern of spread but influences the onset, intensity, duration and outcome of the disease Belak et al (2008).

2.5.3 Differential diagnosis

In the field, suspicion will be based on clinical signs, gross pathological lesions and in the context of known herd health parameters for the pigs in question. Several pigs should be necropsied and samples collected, as there may be great variability in lesions presented in individual animals. A composite picture of all lesions seen should be recorded. Pigs dying acutely may show no gross lesions. Many other viral and bacterial diseases that are often confused with CSF may cause concomitant infections. It is important to take into consideration that presence of other pathogens may mask the CSF infection.

The following diseases and conditions should be considered as differential diagnoses of CSF:

- *Actinobacillus* pleuropneumonia or pasteurellosis, for respiratory signs
- salmonellosis
- porcine circovirus associated disease
- swine dysentery
- acute ileitis (*Lawsonia intracellularis)*
- acute septicaemias due to erysipelas or *Streptococcus suis*
- Glasser's disease caused by *Glaesserella parasuis*
- salt toxicity (water deprivation), for nervous convulsions
- any cause of abortion, mummification, stillbirths or weak piglets (Menangle virus, porcine myocarditis virus, Japanese encephalitis virus)
- various poisons, including warfarin
- thrombocytopenia purpura
- African swine fever
- Aujeszky's disease
- viral encephalomyelitis
- porcine reproductive and respiratory syndrome.

2.5.4 Laboratory tests

Samples required

Specimens required for detection and characterisation of the agent, serological testing and histopathology are as follows:

Detection and characterisation of agent

- whole blood in EDTA anticoagulant (7-10 mL/animal) from live, clinically affected animals
- fresh tissues (approximately 2 g of each tissue) collected aseptically post-mortem and submitted unpreserved: spleen, tonsils, lymph nodes, kidney and distal ileum; other tissues such as lung and liver may be included principally for differential diagnostic workup. Post-mortem samples should be taken from clinically affected pigs euthanised immediately prior to a post-mortem examination and from pigs that have recently died (including stillborn piglets and aborted foetuses).

Serological testing

- sera: for chronic or recovered cases, serological testing is particularly useful. Samples should be taken from pigs suspected of having disease or of having recovered from disease (including sows suspected to have had piglets with disease) and pigs that have been in contact with suspected cases. Virus-specific antibodies to CSF may be slow to appear due to the immunosuppressive nature of the disease and cannot be detected with certainty until at least 21 days post-infection.

Histopathology

- a full range of tissues (including the brain and tonsils) in neutral-buffered formalin. Histopathology findings are not pathognomonic for CSF but histopathology can provide additional support for differential diagnoses.

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.

CSF virus is a security sensitive biological agent (SSBA). Entities handling and transporting samples known or suspected to contain CSF virus should ensure that they meet their obligations under the SSBA Regulatory Scheme. 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.

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

Packing specimens for transport

Unpreserved tissue and blood specimens should be sent with water ice or frozen gel packs (dry ice or if possible liquid nitrogen if a delay of more than 48 hours is expected) in a specimen transport container specified under the International Air Transport Association Dangerous Goods Regulations.

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

2.5.5 Laboratory diagnosis

The initial approach to CSF diagnosis is by screening with real-time PCR (qPCR), as this method is rapid and sensitive, and can be scaled up readily if required. Virus isolation and sequencing would be performed on any positive qPCR results to confirm and further characterise the virus. Virus isolation may also be completed as a primary test for cases of high suspicion, or for the initial cases in an outbreak.

Serological testing is available using a commercial antibody ELISA. Although not recommended for confirmation of clinical cases, it may be useful for defining the nature and extent of an outbreak, and in the proof-of-freedom stage. Cross-reactivity of antibodies against other closely related pestiviruses is possible. Any positive ELISA results must be followed up using the confirmatory virus neutralisation test (NPLA).

Immunohistochemistry staining is also available for agent detection in formalin-fixed tissues.

LEADDR network

The Laboratories for Emergency Animal Disease Diagnosis and Response (LEADDR) network consists of the jurisdictional animal health laboratories from all states and the Northern Territory; CSIRO-ACDP; and the Australian Government Department of Agriculture, Fisheries and Forestry. It does not currently include private, university or industry animal health laboratories. The network reports to the Sub-Committee on Animal Health Laboratory Standards under the Animal Health Committee.

The role of the 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 method used by CSIRO-ACDP is shown in Figure 2.1. Further details of tests currently available at CSIRO-ACDP, some of which are supported through the LEADDR network, are shown in Table 2.1.

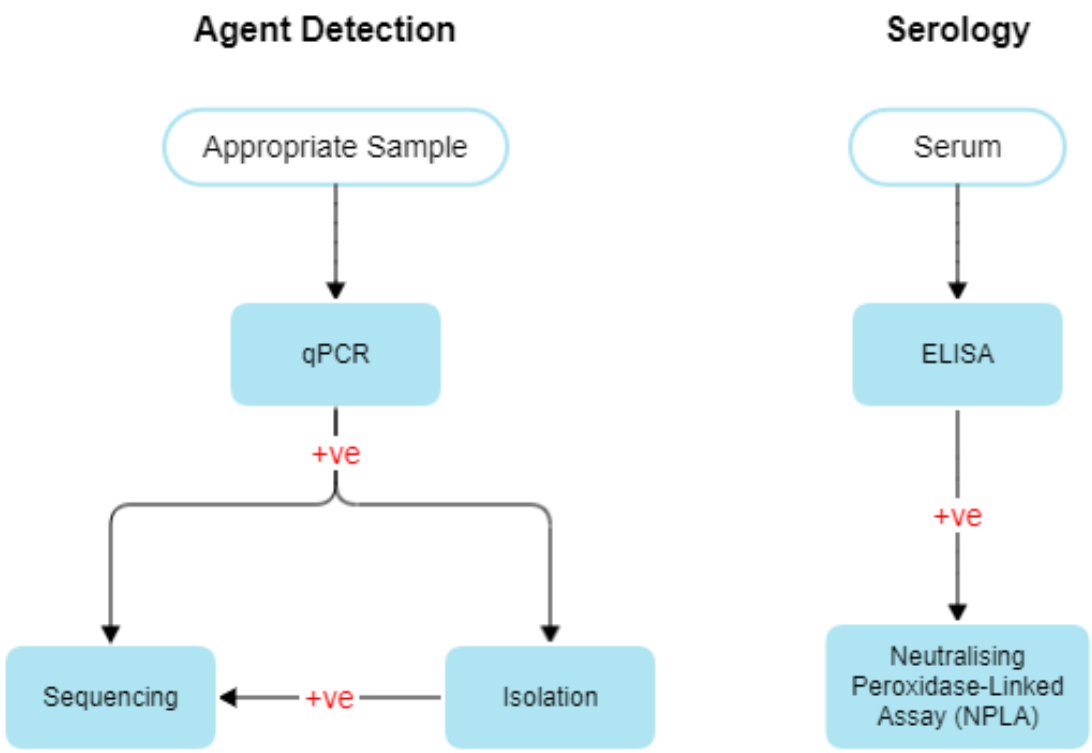

Figure 2.1 **The current approach to diagnostic testing at CSIRO-ACDP**

Table 2.1 **Laboratory tests currently available at CSIRO-ACDP for the diagnosis of classical swine fever**

Test	Specimen required	Test detects	Time taken to obtain result
Agent detection			
qPCR[a]	Fresh tissue, whole EDTA blood or serum	Viral RNA	4 hours
Immunohistochemistry	Formalin-fixed tissues	Viral antigen	2-5 days
Agent characterisation			
Virus isolation and identification	Fresh tissue or whole EDTA blood	Virus	Up to 10 days
Sequencing	Fresh tissue, whole EDTA blood or virus isolate	Viral RNA	2–3 days
Serology			
ELISA[a]	Serum	Antibody	6–8 hours
NPLA	Serum	Antibody	4–5 days

EDTA = ethylenediaminetetraacetic acid; ELISA = enzyme-linked immunosorbent assay; NPLA = neutralising peroxidise-linked assay; qPCR = quantitative real-time polymerase chain reaction

[a] Test also supported as part of the LEADDR network

Source: Information provided by CSIRO-ACDP, 2024 (refer to CSIRO-ACDP for most up-to-date information)

Other tests

Commercial antigen ELISA assays are also available for agent detection, allowing rapid results without specialised equipment. It can be used at the herd level for confirmation of cases or demonstrating proof-of-freedom, but is not recommended for testing of individual animals. It is however becoming less used as it has lower sensitivity and specificity than other diagnostic methods, such as qPCR, and can cross react with other pestiviruses.

Diagnostic methods available for differentiation of infected from vaccinated animals (DIVA) include molecular DIVA and serological DIVA tests. Genetic DIVA tests can detect genetic differences of the virus by PCR, allowing differentiation between live vaccine and wild-type CSF strains. Different serological DIVA tests have also been developed which can allow discrimination between antibodies induced by some vaccines and CSF virus infection (Wang et al 2020)

2.6 Resistance and immunity

2.6.1 Innate immunity

Seropositive sows transmit antibodies via the colostrum to their offspring. The passive immunity generally protects piglets during the first 8-12 weeks of life, depending on the level of antibodies in the colostrum. Maternally derived antibodies do not prevent CSF virus replication and excretion completely (van Oirschot 2003). The presence of maternally derived antibodies has also been demonstrated to inhibit vaccine efficacy. Viral replication was reduced in piglets vaccinated in the presence of high maternal antibody titres, but was completely inhibited in piglets vaccinated in the presence of low maternal antibodies (Bironte et al 1987, Kirkland et al 2019).

2.6.2 Adaptive immunity

Some strains of BVD/MD virus give some immunity to CSF virus, but the proportion of Australian pigs that have been infected with these strains of BVD/MD virus is not known. Uninfected pigs are fully susceptible. Pigs that have recovered from CSF develop immunity or may become persistent shedders of virus. The duration of shedding appears to be related to the virulence of the strain of the virus; animals infected with a moderately virulent strain excrete virus for a long period of time (Weesendorp et al 2009). Where immunity develops, measurable antibody titres are detectable by days 14 to 21 post infection and are thought to persist for the life of the pig (Schulz et al 2017).

The large variation in the clinical and pathological picture of CSF in different parts of the world is generally due to differences in virulence between strains of the virus and the age of the pig, rather than to the immune status of the pig population. Older pigs are less likely to show severe clinical signs than younger pigs.

The virus is immunosuppressive, and virus-specific antibodies are slow to appear. This allows secondary bacterial infections to occur, resulting in the wide spectrum of nonspecific clinical and pathological findings seen in the chronic form of the disease.

2.7 Vaccination

There are two types of CSF vaccine: modified live (attenuated) and subunit (marker). Effective inactivated, conventional whole virus vaccines are not available. Attenuated vaccines are used by many countries to control CSF where it is endemic and are also used orally in wild boar. Attenuation has been achieved by passage through cell cultures or through a suitable host species that is not of the family Suidae. Examples of such attenuated vaccines are the C-strain, of which there were more than 13 commercial vaccines at the end of 2020, the Lapinised Philippines Coronel (LPC) strain, the Japanese guinea pig cell culture–adapted (GPE-) strain, and the Thiveral strain (the French PK-15 cell–adapted strain) (Li et al 2022, Blome et al 2017).

Live vaccines are considered to be very safe and stable (demonstrating no reversion to virulence), and are suitable for use in pregnant sows and newborn piglets. They induce protective immunity from clinical disease, which appears to be lifelong, within a few days after a single vaccination. These vaccines are used in situations in which eradication of the disease is not possible. In an outbreak of CSF, they can help to prevent the spread of the disease on properties.

However, vaccination is restricted in some countries because it may not align with eradication strategies. Immunised pigs can be infected with virulent CSF virus strains and spread the disease, and traditionally it has been difficult to differentiate between vaccine and wild virus (particularly the less virulent forms of CSF), even by laboratory methods. More recently, C-strain marker vaccines that provide differentiation of infected animals from vaccinated animals (DIVA) have been developed.

Subunit 'marker' vaccines (usually based on the expression of the E2 gene in a baculovirus system or a recombinant parapoxvirus-Orf virus) enable vaccination to be used confidently in the face of a disease outbreak, as they allow the differentiation of infected animals from vaccinated animals (DIVA). However, although marker vaccines provide good protection against clinical disease, some do not protect absolutely against infection with the virus. Incomplete protection may allow the virus to spread via transplacental transmission. More recently developed vaccines provide complete protection (Li et al 2022).

Subunit or marker vaccines based on the E2 glycoprotein of the virus have been shown to be effective in challenge studies overseas (de Smit et al 2000, Beer et al 2007, Dortmans et al 2008, Li et al 2022). The immunity induced by these vaccines is thought to last for more than a year, but immunity may begin to wane after this time. The advantage of such vaccines is their safety and the ability to readily distinguish between immunised and infected animals; immunised animals have antibody to only certain protective viral antigens, whereas infected pigs have antibody to other viral antigens as well. Such tests have been described for both E2 and C-strain vaccines (Moormann et al 2000 and Zhao et al 2008, respectively), with DIVA tests for E2 subunit vaccines now available commercially (Wang et al 2020). Reliable serological discrimination between infected and vaccinated animals following DIVA vaccine use remains a challenge. A robust DIVA test is an important prerequisite for effective control strategies based on emergency vaccination (Ganges et al 2020).

No CSF vaccine is currently approved for use in Australia.

2.8 Treatment of infected animals

There is no specific treatment for CSF. Supportive treatment may alleviate clinical signs but will not prevent the spread of infection and may make the detection of infected animals more difficult.

2.9 Control overseas

In areas free of CSF, control is based on early detection and eradication activities, with or without emergency vaccination, to re-establish freedom from disease. Where CSF is endemic, vaccination of domestic and wild pigs has been used to assist control.

3 Implications for Australia

3.1 Potential pathways of introduction

Potential routes for the introduction of classical swine fever (CSF) 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 CSF 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, economic and environmental effects

Losses caused by CSF include pig mortalities, which can be very high, production losses, costs and losses resulting from domestic market disruptions, decreased consumer confidence, export market losses and disease control costs such as welfare slaughter or destruction. An uncontrolled outbreak in Australia would result in severe losses and unemployment at the farm, processor and retail levels.

If CSF were to occur in Australia and no control measures implemented, the disease could spread rapidly throughout the pig industry and to feral pigs. Endemicity in feral pigs would reduce the likelihood of successful containment or eradication, leading to significant, long-term impacts on the domestic pig industry.

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

Virulent CSF is a disease of such severity that control measures would be adopted by most individual pig producers even if there were no compulsory control program. Piggery owners who impose some of the control strategies outlined in this manual to their own piggeries would significantly reduce the likelihood of CSF infection on their properties.

Prolonged loss of income for producers whose herds are destroyed would have a serious social and economic effect on these producers and their families. Movement controls would cause severe disruptions to the marketing of slaughter-weight pigs and breeding stock. There is no compensation for lost market opportunities for uninfected farms included in a control area. The stamping-out strategy may result in destruction of some genetically important herds.

Social impacts of an outbreak may arise from the disease or 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.

The selected strategies have been formulated to keep the social effects to an absolute minimum, compatible with the goal of eradication. Social effects will be further minimised if media reporting is rational and not sensationalised. Sensational reporting could lead to reduced consumption of pigmeat. The desired message to be conveyed in the popular media would be that control is being achieved in an efficient and humane manner (see the Biosecurity Incident Public Information Manual[9]).

3.3 Critical factors for an Australian response

Features of the disease

- All domestic and feral pigs in Australia are susceptible to infection.
- CSF virus may be transmitted in semen.
- CSF is highly variable in its clinical appearance. In its acute (classical) form, CSF causes high morbidity and mortality rates, but it can be a very mild to inapparent disease, with clinical signs of nonspecific ill-thrift.
- Given its similarity to endemic and other emergency diseases, it cannot be diagnosed on clinical signs and gross pathology alone. Laboratory confirmation is required for diagnosis.
- Laboratory diagnosis may be delayed due to mild or inapparent clinical signs and therefore delayed sample collection and submission to certified diagnostic laboratories.
- The frequency and volume of regular pig movements in the pork industry are sufficiently high that a delay in early detection and diagnosis may be associated with spread of the disease, including across jurisdictions and involving processing facilities.
- CSF virus is less likely to be spread over long distances without human assistance. Spread of CSF in Australia will most likely occur via the movement of animals, animal products and fomites spread by vehicles and people with accessibility to pigs. Whilst CSF virus transmission by contaminated clothing and footwear is generally believed to be rare, it should not be completely discounted.
- Transmission may be rapid and is principally by direct contact with infected pigs or by ingestion of carcass material from infected pigs.
- In acute infections, the virus is shed for a relatively short period; shedding may commence during the incubation period and continue until death.
- Persistently infected pigs may shed virus continually or intermittently.
- Congenitally infected piglets may shed large quantities of the virus following birth without showing signs of disease or developing an immune response. The epidemiological significance of these piglets is unknown in Australian domestic and feral pig populations.
- CSF virus is unlikely to persist for long periods in the environment and suitable decontaminants are available, however persistence of the virus in meat products (particularly chilled and frozen products) is of epidemiological importance in the spread of this disease.
- Aerosol transmission of CSF virus may be possible over short distances.
- There is no approved vaccine available in Australia at this time. An effective vaccine is available overseas which can induce protective immunity, although it does not necessarily prevent virus shedding.
- There are no public health implications.
- Trade in animal products will be affected.

[9] https://animalhealthaustralia.com.au/bipim/

4 Policy and rationale

4.1 Introduction

Classical swine fever (CSF) is a World Organisation for Animal Health (WOAH)-listed disease that has the potential for rapid spread with significant production losses. It is of major importance in the international trade of pigs and pig products.

4.1.1 Summary of policy

The default policy is to contain, control and eradicate CSF in the shortest possible time using a stamping out policy, while minimising social, animal welfare, environmental, and economic impacts.

This approach will be supported by a combination of strategies, which may include:

- 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 to minimise spread of infection
- *tracing and surveillance* to help determine the source and extent of infection (including, as necessary, in feral pigs)
- *valuation and compensation* for animals that have died or been destroyed, or property that has been destroyed for disease control purposes
- *destruction* of susceptible animals, property and things on infected premises (IPs), and other premises on a risk-assessed basis
- *biosecure disposal* of carcasses, property, products and byproducts, as required, and when 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
- *recall* of pig products likely to be contaminated (unless deemed unnecessary by a risk assessment)
- *collaboration with industry* to support understanding of and response to the issues, facilitate cooperation, address animal welfare issues and for subject matter expertise
- proactive *management of animal welfare issues* that arise from the disease or the implementation of disease control measures
- *surveillance and control* of feral pig populations, as appropriate
- *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
- *zoning/compartmentalisation* to define infected and disease-free areas and premises and to support trade
- surveillance to support *proof of freedom* from disease

Vaccination may be used in certain circumstances, especially if stamping out is failing to control the spread of infection.

The response policy for a CSF outbreak will depend on factors such as the timing of detection, outbreak extent, location of affected premises, virus virulence, and involvement of feral pigs. The default policy

applies when the disease is not widespread, the infected or suspect population is discrete and controllable, and destruction and disposal of infected animals is feasible.

Some low-virulence strains of CSF may cause negligible production loss. If such a strain were to be identified in Australia, modified stamping out (using slaughter for human consumption) may be applied based on the outcome of risk assessment. Modified stamping out is supported by similar strategies to those listed above.

If CSF is considered to be widespread when diagnosed or continues to spread despite the application of stamping out or modified stamping out, the policy for long-term control (and possible eradication) of the disease will be determined following consultation between the government and the pig industry. The policy adopted may involve increased requirements for on-farm biosecurity and movement conditions, long-term compartmentalisation and vaccination.

4.1.2 Case definition

For the purpose of this manual, a case of CSF is defined as laboratory-confirmed infection with CSF virus in a susceptible animal with or without clinical signs.

Notes:

- Positive serology in the absence of detection of CSF virus, with no clinical or epidemiological evidence supporting infection, does not constitute a definition of a case.
- 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 Animal Diseases (CCEAD).

4.1.3 Cost-sharing arrangement

In Australia, CSF is included as a Category 3 emergency animal disease in the Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Responses (EAD Response Agreement – EADRA).[10] 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* sections on CSF (Chapter 15.2)[11] and general surveillance (Chapter 1.4)[12].

See Section 7 for further information on 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).**

[10] https://animalhealthaustralia.com.au/eadra/

[11] www.woah.org/fileadmin/Home/eng/Health_standards/tahc/2018/en_chapitre_csf.htm

[12] www.woah.org/fileadmin/Home/eng/Health_standards/tahc/2018/en_chapitre_surveillance_general.htm

4.2 Public health implications

CSF has no public health implications.

4.3 Control and eradication policy

The default policy for an outbreak of CSF is to control and eradicate the disease through stamping out and to re-establish the CSF-free status of Australia as quickly as possible.

The preferred strategy for domestic pigs, where possible, is stamping out without the use of vaccination, however, in certain outbreak situations one or more strategies involving vaccination may be considered to support containment and eradication objectives. Vaccination may prevent pigs from becoming infected and can assist in the reduction of spread from affected regions to unaffected regions or farms, and reduce viral replication on infected premises. However, the use of vaccination must be balanced against the cost, capacity to deploy, and potential effectiveness of a vaccine campaign. Section 4.3.6 outlines potential vaccination strategies for domestic pigs and Table 4.1 describes factors that may influence choice of response strategy.

The preferred strategy for feral pigs is also stamping out without use of vaccination, however vaccination of feral pigs by baiting is a possibility and has been applied in some countries (see Section 4.3.6).

The default policy will apply if the disease is not known to be widespread, and the infected or suspect population is discrete and able to be controlled.

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.

Within this policy, the selection of strategies to support stamping out (such as quarantine and movement controls, decontamination, product recall, and tracing and surveillance) will depend on a thorough assessment of the epidemiological situation at the time, and will need to be continually reassessed during the course of the outbreak and altered if necessary. The selected strategies will consider that the disease can spread rapidly by direct contact between animals and often appears in a mild form, and that early detection may be difficult. Potential spread by semen and fomites should also be considered.

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.

The key objectives for an epidemiological assessment will be to identify:

- the spatial distribution of infected and noninfected animal populations
- virulence and phylogenetics of the virus strain (to aid identification of the source and understanding of the expected disease profile)
- the source of infection
- the prevalence of infection
- the likely silent spread phase, extent of spread, size of the outbreak and estimated dissemination ratio
- pathways of spread and the likely size of the outbreak

- traceability data for pigs, pig products and fomites
- risk factors for the presence of infection and likelihood of infection, disease spread and susceptibility to disease (including domestic and feral pig populations, on-farm biosecurity, direct and indirect contact between feral and domestic pigs, weather and insect populations)
- potential involvement of fomite or mechanical vectors.

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 spatial distribution of infection).

Epidemiological assessment will then guide decisions on subsequent tracing and surveillance priorities.

Outcomes of the epidemiological assessment will also be used to determine the feasibility of eradication versus long-term control and 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, and assessment of the progress of disease control 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

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

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***.

As a general principle, the aim of movement controls is to reduce the spread of disease by preventing the movement of infected or potentially infected animals and contaminated or potentially contaminated things (including pig semen and embryos; pig products and byproducts; vehicles; equipment; people; nonsusceptible animals; animal feeds; and manure/effluent) and by allowing movements that pose a minimal risk. Movements that are permitted may have conditions imposed to further reduce the risk of virus spread.

Section 6.4 provides details on movement controls to prevent further spread of CSF virus.

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 movement of feral pig and associated fomites (e.g. hunting equipment) will be controlled to prevent transfer of CSF 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) will be at the discretion of the jurisdiction.

Abattoirs that do not meet minimum biosecurity standards may not be allowed to operate in any of the declared areas (RAs and CAs), or to receive pigs from declared areas.[13] Pig sale 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'.

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] and Australian Pork Industry Quality Assurance Program (APIQ) provide guidelines for pig producers on both routine and high-risk or enhanced 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.

Biosafety and biosecurity for personnel

Specific human biosafety measures are not required for CSF 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 CSF. Movements of personnel onto or off higher-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) on higher-risk premises should be considered contaminated. These may include response personnel, farm personnel and truck drivers.

All potentially contaminated personnel should shower (including washing hair) before entering and after leaving premises, with complete clothing changes. If showering facilities are not available on-site, 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).

Sharing of personnel between different production units 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 CSF.

Movements of vehicles and equipment onto or off higher-risk premises (IPs, DCPs, DCPFs, SPs, TPs and ADSs) should be limited, where possible. Where possible, pig receival and loadout facilities and feed receival bins/silos should be near perimeter fencing 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 higher-risk premises (IPs, DCPs, DCPFs, SPs, TPs and ADSs) should be considered contaminated and either disposed of on-site (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

[13] Whilst the **AUSVETPLAN Resource document: *African swine fever response operational guidelines for pig abattoirs*** was developed specifically for ASF, the principles and guidance it contains may help to inform considerations when making decisions regarding abattoir premises in a CSF outbreak.

[14] www.farmbiosecurity.com.au/toolkit/plans-manuals

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. The objective is to define the potential extent of disease spread, and identify the origin of the outbreak if possible.

It is important to estimate the date when CSF 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 14 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 14 days (one 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. As resources allow, and as a precautionary measure, further trace-forward of live pig movements off the IP for 28 days (i.e. two 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 14 days (one 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. Trace-back to 28 days (i.e. two 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.

Risk assessment criteria should include consideration of the following (not in priority order):

- the type, volume and frequency of commodity moved
- biosecurity practices on the premises of origin and destination[15]
- 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.

Follow-up of TPs should be prioritised by the likelihood of transmission and the potential consequences for disease control activities.

[15] Whilst these are ASF-specific resources, the **AUSVETPLAN Resource document: *African swine fever response operational guidelines for pig abattoirs*** and the Australian Pork Industry Quality Assurance Voluntary Enhanced Biosecurity Standards for ASF (APIQ Option C VEBS ASF) provide useful guidance in assessing biosecurity practices.

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)
- movements that occurred within the period of highest risk of viral excretion or contamination.
- premises with the greatest animal welfare risk.

When assessing the risk associated with TPs, those with a high level of biosecurity will have a lower likelihood of disease transmission.

Assessment of biosecurity for pig premises may include consideration of whether the farm is certified as compliant with the APIQ Option C Voluntary Enhanced Biosecurity Standards (VEBS) for ASF and whether they are processing at high level biosecurity abattoirs or abattoirs that have been classified as an APF. While the VEBS and the associated **AUSVETPLAN Resource document: *African swine fever response operational guidelines for pig abattoirs*** are ASF-specific, the principles they outline may provide useful guidance for evaluating biosecurity standards in the case of a CSF outbreak.

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, it will likely provide for sufficient throughput through abattoirs to avoid their closure, as closure would exacerbate adverse outcomes.

TPs may be reclassified after risk assessment and deemed to be a 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.

Abattoirs and forward tracing of product and product recall

In the event of a CSF incursion, due to the small number of pig abattoirs in Australia, it is likely that pigs that are infected with, or have potentially been exposed to CSF, 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 upstream 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 CSF 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 that CSF was first detected or diagnosed on the source farm.

Tracing, but not necessarily recall of meat and by-products that have been transported from an export-registered abattoir, will occur if there is suspicion or knowledge that the product is contaminated with CSF virus. A product recall would only be considered when a risk assessment identifies that it is critical to manage the risk of transmission, and the benefits would outweigh the socioeconomic costs.

Information management systems and resourcing

Information management systems should be used to support tracing activities, as well as examination of farm, abattoir or 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 activities are important throughout a response to establish the extent of infection (delimiting surveillance); in the investigation of infected, suspect and trace premises; in the reclassification of premises; and in the determination and review of declared areas. Surveillance is also important to demonstrate freedom after an outbreak (see Section 7).

Surveillance in an CSF outbreak will initially be aimed at:

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

The surveillance aims will be achieved by prioritising surveillance:

- of premises where animals are showing clinical signs consistent with CSF (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 (TPs)
- to identify premises containing infected animals that have not been identified through tracing or reporting, for further investigation and testing.

Field surveillance should be prioritised based on risk, as indicated by the premises classification categories (SPs, DCPs and TPs 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 and monitoring of wild animal and possible vector populations is discussed in Sections 4.3.12 and 4.3.13, respectively.

Specific considerations for a CSF surveillance program

When determining a surveillance program, the following elements should be considered in conjunction with the WOAH *Terrestrial Animal Health Code* recommendations on surveillance for CSF:

- the CSF clinical syndrome/s being seen in the outbreak, as well as the potential for variable clinical presentations, including age related severity and lack of pathognomonic gross lesions and clinical signs
- the possibility of clinically inapparent infection
- the role of persistent and chronic infection and the effect of these on surveillance and interpretation of test results (see Sections 2.4.2, 2.5.1, 3.3)
- CSF virus strain variability including in virulence
- the populations of domestic and feral pigs in the area
- the number of properties detected as infected during the outbreak, and the degree of spread
- the role of prohibited pig feed
- the role of semen in transmission of the virus
- the number, type and location of properties that are epidemiologically linked to infected properties
- the estimated time the virus could have been present in Australia
- the agreed incubation period (14 days) to establish tracing windows

- the number of samples needed for suspect farms may be smaller compared to surveillance to detect disease in trace farms
- the value of serological and virological surveillance in addition to primary clinical surveillance. Note for serosurveillance, antibodies may not be detectable until at least 21 days post-infection
- whether vaccine has been used and if so, what type of vaccine (DIVA capability, Live Attenuated Vaccines (C strain)) has been used and which animals it has been administered to
- the accuracy, cost and availability of laboratory tests to examine a large number of animals
- the resources available to undertake surveillance and testing. However, limited resources should not compromise achieving a scientifically acceptable result. For example, outcomes may still be accomplished by:
    - collecting material from aggregation points such as abattoirs, even though material may only be available from selected age groups or types of pig
    - applying less labour or time-intensive sample collection methods, for example group-level oral fluid sampling rather than collecting blood from individual pigs
    - organising the program over a slightly longer period.

The approach to and timing of testing will depend on the specific circumstances of the outbreak, and the aim of the surveillance being undertaken.

Types of surveillance that are appropriate for CSF include:

- Active surveillance of suspect premises, i.e. those with animals showing clinical signs or reporting significant mortalities. This may include clinical field surveillance (i.e. property visits) and involve serological and virological surveillance (e.g. necropsy and collection of appropriate samples*). Telephone surveillance and review of herd mortality, disease and treatment records may also occur, before reclassification can be undertaken.
- Active surveillance of premises identified through tracing to determine whether they contain infected animals and/or contaminated items. This may include clinical field surveillance (i.e. property visits), telephone surveillance, review of herd mortality, disease and treatment records, and serological and virological surveillance (e.g. necropsy and collection of appropriate samples*) before reclassification can be undertaken.
- Active surveillance at congregation points (e.g. saleyards, abattoirs, scales) to identify pigs showing clinical signs and post-mortem lesions that have not been identified through reporting or tracing.
- Enhanced passive surveillance to detect premises and feral pig populations containing infected animals showing clinical signs that were not identified through reporting or tracing. This will involve raising awareness of the clinical signs of CSF and encouraging pig producers, animal health professionals, other members of the pig supply chain, pig hunters, local government, zoos and other stakeholders to report pigs showing signs consistent with CSF.

*Appropriate samples to collect from live and/or dead pigs are detailed in section 2.5.4. On-farm sample collection techniques may include producer-facilitated sampling, through the use of ropes to collect oral fluids, or the collection of spleen samples.

Using ropes to collect oral fluids has been demonstrated to be effective for the detection of CSF and positive oral fluids have been shown to precede viraemia and in the absence of clinical signs in pigs sampled (Robert et al, 2024). Testing of tonsil swabs and spleen samples has proven to be useful in detecting both ASF and CSF (USDA, 2022).

Other activities to complement surveillance techniques include retrospective examination of abattoir condemnation records for findings consistent with CSF, particularly abattoirs where a veterinarian is not

routinely involved in ante and post-mortem inspection activities, and retrospective examination of samples submitted to laboratories from cases where CSF was a differential diagnosis.

Recommendations for surveillance in feral pigs are provided in **Appendix 3b**.

Surveillance of sentinels used in restocking

Use of sentinel pigs should be considered as part of a surveillance program, following depopulation and decontamination, with a view to reducing the time interval to restocking (DEFRA 2020, UDSA 2013). Where sentinels are used, including for staged repopulation, consideration must be given to ensuring that sufficient numbers of pigs will be introduced to all relevant areas to ensure confidence in the decontamination process. Use of sentinels will only occur on the presumption that their use does not create additional risk that cannot be effectively and efficiently managed.

Under the UK policy (DEFRA 2020) sentinel pigs must be confirmed PCR-negative and seronegative for CSF less than 7 days before placement and pass a clinical examination within 24 hours prior to placement. Placement should commence 30 days after satisfactory completion of decontamination, and the sentinel animals should stay in place for 40 days after the placement of the last of the animal/s.

Surveillance during the sentinel period is based on monitoring health and welfare, clinical examination and laboratory testing of samples taken from:

- any pigs that show clinical signs of CSF
- any mortalities occurring during the sentinel period (including post-mortem examination and collection of appropriate samples; see Section 2.5.4)
- an epidemiologically sound number of serological samples collected 40 days after the arrival of the last sentinel pig/s onto the premises (DEFRA 2020).

4.3.4 Zoning and compartmentalisation for international trade

The WOAH sets international standards for the improvement of animal health and welfare, and veterinary public health worldwide, including standards for safe international trade in animals and their products.

According to the WOAH *Terrestrial Animal Health Code*,[14] establishing and maintaining a disease-free status throughout the country should be the final goal for WOAH Members. However, given the difficulty of establishing and maintaining a disease-free status for an entire territory, especially for diseases whose entry is difficult to control through measures at national boundaries, there may be benefits in establishing and maintaining a subpopulation with a distinct health status within its territory. Subpopulations may be separated by natural or artificial geographical barriers ('zoning') or, in certain situations, by the application of appropriate management practices ('compartmentalisation'). In practice, spatial considerations and good management, including biosecurity plans, play important roles in the application of both concepts.

Compartmentalisation is based on biosecurity provisions of specific enterprises and is a joint industry–government undertaking. Zoning is based on geographic areas and is a government responsibility.

The WOAH guidelines for zoning and compartmentalisation are in Chapters 4.3 and 4.4 of the WOAH *Terrestrial Animal Health Code;* guidelines for CSF are in Chapter 15.2.

A zoning application would need to be prepared by the Australian Government in conjunction with the relevant jurisdiction(s) and agreed to by the CCEAD. The recognition of zones must be negotiated bilaterally with trading partners and is not an overarching international agreement. Zoning will require considerable resources and may influence response-related activities and decisions including movement controls. Careful consideration will need to be given to prioritising these activities and to balancing benefits and risks to the response and to industry. Compartmentalisation applications would require input from the relevant industries.

Agreements between trading partners will take time to develop, consider and finalise, because of the need for provision of detailed information on activities such as biosecurity, surveillance, traceability and diagnostics, as well as, and national frameworks to underpin 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 CSF-free zone in Australia. Trading partners may not accept a zoning or compartmentalisation proposal, regardless of the information provided. Eradication may be achieved before a decision on a free-zone application is reached. Managing disease-free zones is a responsibility of veterinary authorities.

4.3.5 Animal welfare

Because morbidity and mortality resulting from CSF may be high and may be complicated by secondary infections, close monitoring and careful management of animal welfare on affected premises will be required.

The imposition of movement controls on live pigs to delay high numbers of regular property-to-property and property-to-abattoir movements is likely to result in the rapid 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*.[16]

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

[16] https://animalhealthaustralia.com.au/eadra/eadra-guidance/

4.3.6 Vaccination

General considerations

Importation of CSF vaccines is subject to the issuing of import permit(s) from the Australian Government Department of Agriculture, Fisheries and Forestry. Supply and use of the vaccine in Australia will require an emergency permit and consent to import from the Australian Pesticides and Veterinary Medicines Authority. Importation, distribution, use and disposal of a vaccine that is a genetically modified organism must also be licensed by the Office of the Gene Technology Regulator (OGTR), or permitted under an Emergency Dealing Determination by the minister responsible for gene technology, or other relevant and appropriate processes.

Vaccination would need to be approved by the National Management Group (NMG) based on the recommendation of the Consultative Committee on Emergency Animal Disease (CCEAD), and if vaccine is approved for use, all vaccinated domestic pigs must be identifiable.

Vaccination may be used to support the default stamping out policy in an outbreak of CSF. Three outbreak response strategies including vaccination may be considered for domestic pigs. These strategies are not mutually exclusive (i.e. multiple strategies may be used concurrently).

1. *modified stamping-out with emergency suppressive vaccination to remove* – destruction of clinically affected and in-contact susceptible animals, and targeted vaccination of at-risk animals followed by their humane destruction and disposal at a later date when feasible. This approach is appropriate to suppress virus replication in high-risk susceptible animals. This includes animals on infected premises to reduce viral build-up whilst culling is being undertaken. It may be accompanied by movement and traceability controls.
2. *stamping-out modified with emergency suppressive vaccination to slaughter* – destruction of clinically affected and in-contact susceptible animals, and targeted vaccination of at-risk animals followed by their slaughter and processing at a later date. This approach aims to suppress virus replication in high-risk susceptible animals. It may be accompanied by movement and traceability controls. DIVA testing may be required for movements between declared areas and for trade purposes.
3. *stamping-out modified with emergency protective vaccination to live* – destruction of clinically affected and in-contact susceptible animals, and targeted vaccination of at-risk animals without subsequent destruction. This approach aims to protect susceptible animals using vaccination, allowing them to live because of their vaccination status. It may be accompanied by movement and traceability controls. DIVA testing may be required for movements between declared areas and for trade purposes. Over time as these animals are processed or live out their lives, these animals will leave the population.

Factors influencing the choice of response strategy that include vaccination include the scale, rate of spread, duration and consequences of the outbreak; resources available to support a response; and the impact and acceptance of the response. Table 4.1[17] outlines some of the factors influencing choice of response strategy that includes vaccination in domestic pigs.

Oral mass vaccination of feral pigs by deployment of palatable baits containing vaccine has been applied to assist disease control by limiting spread in countries including Japan (Bazarragchaa et al 2021) and in Europe (Rossi et al 2015).

[17] Modified from Table 4-1, Classical swine fever response plan, FAD PReP/NAHEMS, 2013.

Table 4.1. Factors influencing choice of CSF response strategy (or strategies) and role for vaccination in domestic pigs

Source: Modified from Table 4-1, Classical swine fever response plan, FAD PReP/NAHEMS, 2013

Factor	Stamping out	Stamping out modified with emergency suppressive vaccination to kill	Stamping out modified with emergency suppressive vaccination to slaughter	Stamping out modified with emergency protective vaccination to live
Availability of appropriate vaccine	Not available	Available	Available	Available
Location of the outbreak	Isolated pig premises, few feral pigs	Pig producing area or high feral pig density	Pig producing area or high feral pig density	Pig producing area or high feral pig density
Size / density of susceptible population	Small/Low	Medium/Moderate	Large/High	Large/High
Extent of movement of infected animals or other items	None or limited	Moderate known movements	Extensive known movements	Extensive known movements
Source of the outbreak	Known or unknown	Known or unknown	Unknown	Unknown
Spread of the outbreak	Slow	Moderate	Fast	Fast
Distribution of the outbreak	Limited	Moderate	Wide	Wide
Duration of the outbreak	Early/short	Early/short	Prolonged	Prolonged
Virus strain virulence	High	High	Low	Low
Risk to high value, rare or endangered pigs	High	High	High	Moderate
Likelihood of infection in feral pigs	High	High	High	Moderate

Factor	Stamping out	Stamping out modified with emergency suppressive vaccination to kill	Stamping out modified with emergency suppressive vaccination to slaughter	Stamping out modified with emergency protective vaccination to live
Public acceptance of stamping out	Accepting or minor opposition	Accepting or minor opposition	Minor opposition	Strong opposition
Trading partner/third-party acceptance of vaccination to slaughter	-	-	Accepted	-
Trading partner/third-party acceptance of vaccination to live	-	-	Accepted	Accepted
Resources available for stamping out	Sufficient	Sufficient	Sufficient or limited	Limited
Resources for vaccination, including testing, tracing, identification and permitting capabilities	Limited	Sufficient	Sufficient	Sufficient
Modelling and cost benefit of different strategies	Stamping out will reduce impact or duration of outbreak	Stamping out modified with emergency vaccination to kill will reduce impact or duration of outbreak	Stamping out modified with emergency vaccination to slaughter will reduce impact or duration of outbreak	Stamping out modified with emergency vaccination to live will reduce impact or duration of outbreak

4.3.7 Treatment of infected animals

The treatment of infected animals is ineffective and will not be undertaken. However, consideration should be given to minimising negative welfare impacts by timely destruction of clinical animals.

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 CSF.

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, a determination needs to be made of the product disposition and resultant action. An approach consistent with the precautionary principle should be applied. Any product movement should be commensurate with Section 6.2.4, 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 in accordance with the **AUSVETPLAN Operational manual: *Disposal***.[18]

An abattoir would be designated as an IP based on confirmation of CSF in animals on antemortem inspection. Where the risk of any infected animals having been 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.

Various types of rendering processes used in Australia will inactivate CSF virus.

Section 2.4.2 outlines other considerations relevant to the inactivation of CSF virus in pig products and byproducts. Guidance on decontamination can also be found in the **AUSVETPLAN Operational manual: *Decontamination***.

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, the default position is to destroy all pigs.

[18] Whilst the **AUSVETPLAN Resource document: *African swine fever response operational guidelines for pig abattoirs*** was developed specifically for ASF, the principles and guidance it contains may help to inform considerations when making decisions regarding abattoir premises in a CSF outbreak.

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 having contact with pigs on an IP or in an infected area (IA)
- pigs that have had 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.[19]

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 CSF 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 risk assessment determines that 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*.[20]

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***.

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 CSF virus.

[19] Assuming that personal decontamination has not occurred or has been insufficient to destroy CSF virus or prevent human-assisted transmission of CSF virus.

[20] https://animalhealthaustralia.com.au/eadra/eadra-guidance/

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 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 CSF 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, non-disposable equipment) is a critical part of the response to CSF. To support effective decontamination, pests, vermin and other animals that may act as mechanical vectors must be controlled (see Section 4.3.13).

Decontamination plans should be developed for each premises to be decontaminated.

Decontamination of infected areas (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.

Refer to Section 2.4.2 and the **AUSVETPLAN Operational manual: *Decontamination***.

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***.

Feral pigs can be infected with CSF, act as reservoirs and spread the virus. Because of the difficulty of eradicating CSF from a feral pig population, it is important to take actions to mitigate contact between susceptible feral pigs and infected domestic pigs, contaminated fomites, and infective pork or pork products.

Surveillance of feral pig populations near IPs will be required to determine the extent of spread. If feral pigs are infected, measures to manage the disease in these populations will 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.

Where eliminating infection from the feral pig population is not feasible, compartmentalisation of the commercial pig industry may need to be pursued (see Section 4.3.4).

4.3.13 Vector management

Although CSF virus is not transmitted biologically by species other than pigs, it may be spread mechanically by vermin, domestic pets, birds and potentially insects. Monitoring for these potential vectors should be undertaken. Domestic animal and pest management, bird deterrents and an insect control program may be required to minimise the likelihood of their contamination and the risk that they may transmit CSF to and from neighbouring feral and domestic pig populations.

4.3.14 Public awareness and media

A considered public information campaign will help to address any public health and consumer concerns, foster engagement and support for response activities, and support minimising trade impacts.

The communications strategy should include mechanisms for raising awareness in stakeholders, including commercial producers, veterinarians, 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.

Animal welfare concerns will need to be considered in any disease response. An aggressive stamping-out strategy may cause concerns that apparently healthy animals are being slaughtered, especially given that there are effective vaccines that could be used in a control campaign. Misinformation and misunderstanding about the use of vaccination would need to be addressed.

Key public information messages in an outbreak of CSF will include but are not limited to:

- CSF only affects pigs
- advice that CSF is not zoonotic
- the safety of food and other products derived from pigs
- signs of CSF in domestic and feral pigs, to support early recognition and reporting of the disease
- how to report suspicion of disease
- modes of transmission of CSF virus, including spread by people, vehicles, equipment and mechanical vectors
- prohibited pig feed restrictions
- biosecurity (including quarantine) and movement controls for domestic pigs, feral pigs where possible, pig products and other potentially contaminated items
- biosecurity measures to minimise the presence of feral pigs, and their proximity and access to domestic pigs, thereby preventing entry of CSF 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 a CSF incident and in preparation for a potential outbreak in Australia, may occur through activation of the National Biosecurity Communication and Engagement Network.[21] 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.

Guidance on managing public information can be found in the *Biosecurity incident public information manual*.[22]

[21] www.outbreak.gov.au/our-role/response-outbreak/national-biosecurity-communication-engagement-network

[22] https://animalhealthaustralia.com.au/bipim/

4.3.15 Other strategies

Feeding of prohibited pig feed to pigs carries a high risk of introducing CSF to domestic or feral pig herds. In the event of a CSF incident and during preparation for a potential incursion of CSF 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 NMG formally declares that the outbreak is over. This may be when it decides (on advice from the CCEAD) that:

- CSF 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.[23]

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

4.3.17 Transition to management

If it is not feasible to eradicate CSF, a transition to management (T2M) and/or long-term control program (outside of EADRA mechanisms) may need to be developed through consultation between Australian governments and the pig 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 CSF, 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 CSF 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 CSF 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 (see Section 4.3.4).

[23] https://animalhealthaustralia.com.au/eadra/

4.4 Funding and compensation

Details of the cost-sharing arrangements can be found in the EADRA.[24] 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***.

[24] https://animalhealthaustralia.com.au/eadra/

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 CSF 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

Operational guidelines specific to a CSF outbreak are not available at the time of writing. However, detailed guidelines for reclassifying abattoir premises have been developed for ASF[25], and these could provide the initial basis for decision-making in a CSF outbreak.

[25] **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 CSF 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 needs to be applied to minimise the risk of further spread of the disease, as containment and eradication of CSF 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 CSF 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.

6.2 Guidelines for issuing permits

Recommended biosecurity and movement controls provide guidance on which movements can be allowed and under what conditions. This is based on an analysis of the disease risks that are presented by a specific movement, of a specific commodity, at a specific time during the EAD response phase. This response strategy indicates whether a proposed movement is:

- allowed (under normal jurisdictional, including interstate, requirements)
- prohibited – except under the conditions of a general, special or emergency permit
- prohibited.

Permits may not be available until the relevant CVO provides approval for movements, and this may not be available in the early stages of a response.

Guidelines for issuing permits are provided in the **AUSVETPLAN Guidance document: *Movement controls***.

Movements not reflected within this manual may be considered by the relevant jurisdictional CVO on a risk-assessed case-by-case basis.

6.3 Types of permits

Permits are either general or special. Emergency permits are a form of special permit (see also Glossary).

They are legal documents that describe the animal(s), commodities or things to be moved, the origin and destination, and the conditions to be met for the movement. Both general and special permits may be in addition to documents required for routine movements between or within jurisdictions (e.g. health certificates, waybills, consignment notes, National Vendor Declarations – NVDs).

Details on permit types are provided in the **AUSVETPLAN Guidance document: *Movement controls***.

6.4 Recommended movement controls

6.4.1 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

To→		RA								CA						OA
From ↓		IP	DCP	SP	TP	DCPF	APF	UPF[a]	ARP	SP	TP	DCPF	APF	UPF [a]	POR	
	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)
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
	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
	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	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 jurisdic-tional and interstate movement require-ments

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[26] indicates that the risk associated with the movement is acceptable within the response. Diagnostic testing by an AHC or CVO approved testing regime/method may be required, depending on the risk assessment.

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.[27]

h) The receiving premises must meet minimum biosecurity standards.

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 CSF in all pigs on the premises of origin.

k) Any suspicious or clinically consistent clinical signs of CSF 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 14 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.

[26] 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 CSF.

[27] Whilst these are ASF-specific resources, the **AUSVETPLAN Resource document:** ***African swine fever response operational guidelines for pig abattoirs*** and the Australian Pork Industry Quality Assurance Voluntary Enhanced Biosecurity Standards for ASF (APIQ Option C VEBS ASF) provide useful guidance in assessing biosecurity practices.

6.4.2 Recommended movement controls for fresh pig semen

The transmission of CSF virus infection via semen is described in Section 2.4.2.

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 CSF, 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 factors, 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
	ARP	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)
CA	SP, TP	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[28] indicates that the risk associated with the movement is acceptable within the response. Diagnostic testing (e.g. semen; serology) by an AHC or CVO approved testing regime/method may be required, depending on the risk assessment

b) Donor boar facilities meet minimum biosecurity standards – Relevant standards from the AHC ASF Voluntary Enhanced Biosecurity Standards[29] applicable to the premises and the movement

c) Diagnostic testing of sick or dead pigs at the boar collection facility is undertaken to exclude CSF. (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 CSF 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).

[28] 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.

[29] While ASF-specific, these standards provide a useful framework for assessing biosecurity practices.

6.4.3 Recommended movement controls for pig embryos

The transmission of CSF virus infection via embryo transfer is described in Section 2.4.2.8.

Movement of embryos onto and off pig premises in declared areas and infected areas is generally prohibited; however, movement may be considered on a case-by-case basis subject to a risk assessment. Movement of pig embryos is expected to be infrequent (mainly for research purposes) and low risk; however, a precautionary approach is taken.

General considerations for risk assessment of movements of embryos onto and off pig premises in declared areas and infected areas

- embryo donor premises location, history, premises classification, biosecurity practices and relevant disease surveillance activities
- where the embryo is not stored or collected at the premises where the embryo donor is located, embryo location, history, premises classification, biosecurity practices and relevant disease surveillance activities
- destination location and premises classification, biosecurity practices and relevant disease surveillance activities
- date and place of embryo collection/manipulation events, embryo storage conditions
- embryo collection, processing, packaging and transfer procedures
- intended end use of the embryo
- transport (including driver) entry and exit biosecurity requirements including vehicle decontamination
- 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.

General recommendations for movements of embryos onto and off pig premises in declared areas and infected areas

- embryos must be collected and transferred according to the IETS Manual to prevent the transmission of CSF virus.
- embryo processing and packaging procedures must manage the risk of CSF cross-contamination by direct contact or by fomite spread
- embryo donors are/were present for at least28 days (2 incubation periods) on their premises of origin before embryos were/are collected for dispatch.
- embryo donor origin premises and any premises where embryos are stored must meet minimum biosecurity standards - for pig premises relevant standards from the AHC ASF Voluntary Enhanced Biosecurity Standards applicable to the premises and the movement
- embryo donor origin premises and any pig premises where embryos are stored quarantines new pig introductions for at least 28 days (2 incubation periods) irrespective of whether they are entering from sites deemed to have a shared biosecurity status. Quarantine must occur at a separate site/shed/airspace, with appropriate biosecurity measures to ensure CSF cannot enter the main piggery by direct contact or fomite spread from the quarantined pigs.
- diagnostic testing by an AHC or CVO approved testing regime/method may be required, depending on the risk assessment
- a daily health monitoring program is in place to observe all pigs on the premises and to detect and investigate clinical signs of CSF in pigs on the embryo donor origin premises and any pig premises where embryos are stored.
- any high suspicion of CSF is immediately reported to the Emergency Animal Disease Hotline (1800 675 888).
- embryo delivery procedures at 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)

- records of all embryo dispatches are maintained to enable traceability of embryo dispatches to individual farms.

6.4.4 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 6.4.5).

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 CSF to confirm or exclude CSF[30]
- 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 CSF. Where abattoirs process both pigs and other species, the likelihood of CSF 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[31] 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 low 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 addresses these considerations.

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

[31] 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.

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.

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.

Whilst the following document was developed specifically for an ASF outbreak, the principles and guidance in contains may help inform considerations in a CSF outbreak (see 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 or ARP, prohibited (except under GP — conditions d, e, f, g, h, i)
		If pigs originated from an SP, TP 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) 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 CSF 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,[32] 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.

6.4.5 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 CSF 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.

[32] 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; 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.

6.4.6 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, h)	Prohibited (except under SpP – conditions a, b, c, d, e, f, g, h)	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. Diagnostic testing by an AHC or CVO approved testing regime/method may be required, depending on the risk assessment.

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 CSF in all pigs on the premises before and on the day of dispatch.

g) Any clinical signs in pigs suspicious for, or consistent with, CSF 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.

6.4.7 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.***

6.4.8 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 CSF 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.

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

Biosecurity requirements in Sections 6.4.7 and 6.4.8 apply to hunters, their equipment and their vehicles.

6.4.10 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, CSF 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 Classical swine fever (CSF) are outlined in Section 4.3.3. Factors for consideration in determining a surveillance program in the event of a CSF outbreak are also described in Section 4.3.3. All these factors will influence the testing regime required for Australia to claim freedom from disease. Articles 15.2.28 to 15.2.33 of the WOAH *Terrestrial Animal Health Code* define the principles and provide guidance on surveillance for CSF. Recovery of CSF free status requires that surveillance has been undertaken in accordance with Article 15.2.32, with an active surveillance program to demonstrate absence of infection with CSF virus. In addition to regular clinical, pathological, virological and serological surveillance as per the general WOAH provisions for CSF, the requirements for recovery of free status specify that a surveillance program should include:

- premises in the proximity of the outbreak(s)
- premises that are epidemiologically linked to the outbreak(s)
- animals that have been moved from or used to repopulate affected premises (see Section 4.3.3 – Surveillance of sentinels used in restocking)
- any premises where contiguous culling has been carried out (if applicable)
- feral pig populations in the area of the outbreak(s).

Epidemiological evidence of the infection status in feral pigs should also be compiled.

7.2 Proof of freedom

Providing confidence that CSF 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 CSF.

The WOAH *Terrestrial Animal Health Code* states that a country may be considered free from CSF when risk assessment and ongoing surveillance have been conducted (in accordance with Chapter 15.2 of the Code), and no infection has occurred for at least 12 months. This period may be reduced to 3 months after disinfection of the last infected premises where a stamping-out policy without vaccination is practised. If vaccination is practised, WOAH supports recovery of free status 3 months after the disinfection of the last infected premises and slaughter of all vaccinated pigs. Where a validated means of distinguishing between vaccinated and infected pigs, in accordance with Chapter 3.8.3 of the WOAH *Manual of diagnostic tests and vaccines for terrestrial animals*, is used, a 3-month period after disinfection of the last infected premises may also be used.

Surveillance activities must demonstrate these outcomes and must provide sufficient evidence that there is no detectable CSF virus infection in domestic and feral pigs at a selected prevalence of disease, and that statistical confidence limits are robust enough to satisfy both WOAH and individual trading partner expectations.

Although the WOAH provides guidelines for recovering CSF-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.

Appendix 1 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 CSF virus
    - strain and virulence
    - environmental stability and persistence

2. epidemiology of CSF
    - 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 CSF virus, based on season and prevailing weather conditions
    - mechanical vectors:
        - 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 CSF associated with susceptible animals, humans and other fomites (see Section 2.4.2). Spread of CSF is primarily by direct pig-to-pig contact and fomites, so attention to those 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 2 Links to classical swine fever factsheets

There are numerous online resources available that provide summaries of the features of CSF, of which some key ones are listed below for reference.

World Organisation for Animal Health:

- Classical swine fever - WOAH - World Organisation for Animal Health
    - WOAH Technical Disease Card: CLASSICAL SWINE FEVER

The Center for Food Security and Public Health (CFSPH):

- Classical Swine Fever

Department of Agriculture, Fisheries and Forestry:

- NAQS: Classical swine fever
- Emergency animal diseases: A field guide for Australian veterinarians | Outbreak (CSF)

Wildlife Health Australia:

- Classical swine fever May 2017

The features of CSF that would be critical in response to an outbreak specifically within the Australian context are detailed in Section 3.3. of this manual.

Appendix 3a Classical swine fever in feral pigs

Feral pigs in a CSF outbreak

Feral pigs may act as reservoirs for CSF virus and therefore consideration of feral pigs will be important in a response to an outbreak. Some of the factors to consider and strategies that may be utilised are outlined below. However, the final decisions on control of CSF in feral pigs should be made in consultation with feral pig experts and should include consideration of potential impacts of response activities including disturbance or dispersal of animals, or changes to population turnover, as well as the balance of available resources for the response as a whole. Modelling may assist considerations and decision-making.

The role feral pigs play in the epidemiology of CSF, and strategies to mitigate the spread risk posed by infected feral pigs, have been reported for a CSF outbreak in Japan, which was previously CSF-free (Shimizu et al 2020), and for persistent CSF in populations of European wild boar (Kaden et al 2000, Rossi et al 2015).

Feral pig numbers and population density in Australia

There are an estimated 3.2 million feral pigs in Australia (95% confidence interval 2.4 to 4.0 million) (Hone 2019). Hone's review of published pig population density estimates reports an estimated mean population density of 1.0 pig/km^2 across 142 populations. The highest population density reported was 10.9 pigs/km^2 near the Paroo River in the 1990's (Choquenot 1995). Gentle et al (2013) provided estimates of between 0.05 and 4.44 pigs/km^2 at sites surveyed in Queensland. Australia's feral pig population can increase by 86% in good seasons (Australian Feral Pig Report 2020) and reduce by 50% in drought conditions.

Feral pigs breed throughout the year in most parts of Australia. Seasonally restricted breeding seems to be mostly limited to elevated regions that experience snowy winters (Saunders 1993), although seasonal pulses in the background birth rate are common (Bengsen 2023).

Factors that may influence CSF in Australia's feral pig populations

There are a number of factors that may contribute to an increased prevalence of CSF in feral pig populations and to its likelihood of persisting or even becoming endemic, including:

- high population density (Vicente et al 2005)
- increases in the susceptibility of the population as new, naive animals are born. These animals may be infected by persistently infected young born the previous breeding season (Kern et al 1999)
- contact between domestic and wild pigs (Artois et al 2002, Pearson et al. 2016)
- contiguous populations (Cowled and Garner 2008, Shimizu et al 2020)
- the high rate of population growth when feed/water/shelter is abundant
- large groups around waterholes in drought conditions
- that disease spread is more likely if introduced at the start of the dry season
- poor management (e.g. inappropriate management units — see Zanardi et al 2003)
- the fact that feral pigs are opportunistic omnivores
- illegal translocations by hunters or flooding, drought or human interference forcing movements.

Control options

When considering management and control options for feral pigs, knowledge of local feral pig densities is of greater importance than estimates of feral pig numbers across the whole country. Hone (2019) provides guidance on feral pig densities for previously surveyed regions, however local expert knowledge of feral pig densities is likely to provide more reliable, current data to assist in preparing a feral pig control plan for a targeted area.

The main control options for CSF in feral pigs include containment, culling and vaccination. Containment involves isolating the infected population from contact with other feral or domestic pigs, while culling and vaccination both attempt to reduce the number of susceptible pigs, thus reducing disease transmission, which may lead to CSF dying out through a lack of hosts (see Pech and Hone (1988), and Cowled and Garner (2008) for a discussion of these concepts).

Containment

Containment would involve attempted isolation of the infected feral pig population to reduce contact. This could involve use of natural barriers, fencing and pig-free buffer areas. Cowled et al (2008a) and Hampton et al (2006) discuss the use of geographic features to establish management units for feral pigs in Australia to minimise disease spread. They recommended the use of water catchments to establish management units, since pig populations are often contained within distinct catchments, with little disease transmission between populations (and between catchments). Culling could be used to establish pig-free buffers. Although fencing is a theoretical means of containing infected feral pigs, it is generally considered to be prohibitively expensive (Cowled et al 2004).

Culling

Culling is likely to be the mainstay of a control program in Australia. This may include poisoning (aerial and ground), trapping and aerial shooting. Any culling should aim to reduce the feral pig population below a certain population density, leading to disease fadeout (the threshold density), rather than to try to eradicate feral pigs (which will be impossible). The population density required for fadeout is unknown, and possibly unknowable (Lloyd-Smith et al 2005), though future modelling studies may assist in determining an appropriate initial level of culling. The initial cull should be followed by surveillance to detect whether disease transmission has ceased and if further culling is required.

It is important that culling reduces the population density without leading to population changes that are likely to lead to continued infection with CSF. For example, culling that does not rapidly and substantially reduce population density can instead lead to greater population turnover through reduced competition and subsequently greater resource availability. This can lead to a higher proportion of younger susceptible animals, or persistently infected animals, which could lead to optimal conditions for CSF transmission and maintenance. For this reason, it is unlikely that hunting will be a major tool for the eradication of CSF in feral pigs in Australia (Artois et al 2002).

Vaccination

In parts of western Europe including Germany, France and Luxembourg, oral mass vaccination with a conventional live attenuated CSF virus vaccine has been trialled (Kaden et al 2000; Rossi et al 2015). Vaccine was originally delivered in baits by plane or hand delivered on the ground. The baits were not consumed well by younger pigs. However, during trials in Australia, young animals readily consumed baits with biomarkers in field situations where appropriate baiting strategies were used (Cowled et al 2008b). More recently in Europe, bait distribution is assisted by hunters.

It has been difficult to audit the effectiveness of vaccination programs in countries such as Germany because it is not possible to distinguish between naturally induced and vaccine-induced immunity (Artois et al 2002). There are also practical challenges associated with the implementation of an oral vaccination strategy, including the conduct of a census on the proposed vaccination area, vaccine-bait transport and storage logistics in isolated areas, hunter awareness and education. There are also significant secondary costs associated with the management of endemically infected areas including carcass testing and disposal. Costs of CSF management in wild boar in France in the 2000s were estimated at around 1500 euro per square kilometre of treated forest, per year (Rossi et al 2015).

In Australia, it is likely that vaccination would be less useful than culling, since, unlike in Europe, feral pigs in Australia are not a valuable native species. However, vaccination may have a role in eradication — for

example, to create buffers of immune animals around outbreaks, as an alternative to culling in areas of public sensitivity or as an additional tool if culling is not working. Drawbacks of vaccination include the expense and extensive resources required to demonstrate proof of freedom after vaccination has occurred in an area (and associated trade implications).

See also the **AUSVETPLAN Operational manual: *Wild animal response strategy***.

Appendix 3b Recommended approach to surveillance in feral pigs

The World Organisation for Animal Health (WOAH) recognises that surveillance in feral pigs has potential challenges including determining feral pig population distribution, size and movement patterns, practicalities of assessing for infection with CSF virus. It recommends (Article 15.2.33 of the *Terrestrial Animal Health Code*) that a surveillance program for Classical swine fever (CSF) should include feral pigs found dead, road kills, animals showing abnormal behaviour, hunted animals and pigs exhibiting gross lesions during dressing. This should also include awareness campaigns targeted at hunters and other relevant persons that may encounter feral pigs.

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
- 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 CSF, 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 CSF-infected areas or zones
- 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

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.

Glossary

Terms and definitions

Standard AUSVETPLAN terms

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

Manual-specific terms

Term	Definition
Infective period	The longest period of time during which an affected animal can be a source of infection.
Marker vaccine	A vaccine with a marker, which is a specific antigen (or the absence of one) that, in conjunction with a diagnostic test, enables differentiation of vaccinated animals from infected animal (see also *DIVA*).
Persistently infected	Where an individual harbors a pathogen for an extended period, often for life, without necessarily showing clinical signs, and continuously or intermittently sheds the pathogen, contributing to its transmission. In the context of Classical swine fever (CSF) this primarily refers to piglets that become infected with the CSF virus *in utero,* or as neonates, and fail to mount an effective immune response. The piglets are immunotolerant to the virus, do not produce antibodies, and continuously or intermittently shed the virus.
Retort heating	A thermal processing method used to sterilize food products (often in cans, pouches, or sealed containers) by subjecting them to high temperature and pressure in a retort (a sealed vessel).

Abbreviations

Standard AUSVETPLAN abbreviations

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

Manual-specific abbreviations

Abbreviation	Full title
ASF	African swine fever
CSF	classical swine fever
DIVA	differentiating infected from vaccinated animals
SSBA	security sensitive biological agent

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