

AUSTRALIAN VETERINARY EMERGENCY PLAN

AUSVETPLAN

Disease strategy

Classical swine fever

Version 4.0

AUSVETPLAN is a series of technical 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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DISEASE WATCH HOTLINE: 1800 675 888

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

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1 Introduction

1.1 Scope of this manual

This disease strategy for the management of an outbreak of classical swine fever (CSF) in Australia is an integral part of the **Australian Veterinary Emergency Plan**, or **AUSVETPLAN (Edition 4)**. AUSVETPLAN structures and functions are described in the [AUSVETPLAN **Overview Document** - in preparation] . The disease strategy provides information about the disease (Section 2); the relevant risk factors and their treatment, and the options for management of a disease outbreak, depending on the circumstances (Section 3); the starting policy and guidelines for agencies and organisations involved in a response to an outbreak (Section 4); declared areas and premises (Section 5); quarantine and movement controls (Section 6); and how to establish proof of freedom (Procedures for surveillance and proof of freedom). The key features of CSF are described in the CSF [**Fact Sheet** - under development].

This manual has been produced in accordance with the procedures described in the [AUSVETPLAN **Overview Document** - in preparation] and in consultation with Australian national, state and territory governments, and the relevant livestock industries, as well as public health authorities, where relevant.

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

1.2 Structure of AUSVETPLAN

Guidelines for the field implementation of AUSVETPLAN are contained in the disease strategies, response policy briefs, operational manuals and management manuals. Industry-specific information is given in the relevant enterprise manuals. The full list of AUSVETPLAN manuals that may need to be accessed in an emergency is shown below. The complete series of manuals is available on the Animal Health Australia website.¹

Table 1.1a AUSVETPLAN documents

Document type	Manuals
Summary document	Background information about AUSVETPLAN rationale, development and maintenance

¹ www.animalhealthaustralia.com.au/programs/emergency-animal-disease-preparedness/ausvetplan/

Table 1.1b AUSVETPLAN documents

Document type	Manuals
Disease strategies	Individual disease and policy information for most of the diseases listed in the EADRA
	Bee diseases and pests
Response policy briefs	Summary disease and policy information for each EADRA disease not covered by individual disease strategies (see above)
Operational manuals	Decontamination
	Destruction of animals
	Disposal
	Livestock welfare and management
	Valuation and compensation
	Wild animal response
Enterprise manuals	Artificial breeding centres
	Feedlots
	Meat processing
	Saleyards and transport
	Pig industry
	Poultry industry
	Zoos
Management manuals	Control centres management (Parts 1 and 2)
	Laboratory preparedness
Outbreak manuals	Collations of individual disease, operational and enterprise information for use in an emergency disease outbreak

EADRA =

Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Responses
(see www.animalhealthaustralia.com.au/programs/emergency-animal-disease-preparedness/ead-response-agreement)

1.3 Nationally agreed standard operating procedures

Nationally agreed standard operating procedures (NASOPs)² have been developed for use by jurisdictions during responses to emergency animal disease (EAD) incidents and emergencies. These procedures underpin elements of AUSVETPLAN and describe in detail specific actions undertaken during a response to an incident.

1.4 World Organisation for Animal Health listing

The World Organisation for Animal Health (OIE) includes CSF on its list of notifiable diseases as a swine disease.

OIE-listed diseases are diseases with the potential for international spread, significant mortality or morbidity within the susceptible species, and/or zoonotic spread to humans.³ OIE member countries that have been free from a notifiable disease are obliged to notify the OIE within 24 hours of confirming the presence of the disease.

The strategies in this document for the diagnosis and management of an outbreak of CSF are based on the recommendations in the OIE *Terrestrial Animal Health Code* (Chapter 15.2) and the OIE *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals* (Chapter 2.8.3). The strategies and policy guidelines are for emergency situations, and are not applicable to quarantine policies for imported livestock or livestock products.

1.5 Australian emergency animal disease listing

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* (EADRA).⁴ Category 3 diseases are those for which costs will be shared 50% by government and 50% by industry.

1.6 Manner and risk of introduction to Australia

CSF has been eradicated from most of western Europe, but foci of infection persist in Germany, France, Spain and eastern Europe. Transmission occurs via pork and pork products, body secretions, semen, insect vectors and fomites.

The most likely source of CSF infection is pork and pork products, genetic material or incursions by infected pigs. The most significant risk of entry of the virus to Australia is via illegally imported

² www.animalhealthaustralia.com.au/programs/emergency-animal-disease-preparedness/nasops

³ These criteria are described in more detail in Chapter 1.2 of the OIE *Terrestrial Animal Health Code* (www.oie.int/index.php?id=169&L=0&htmfile=chapitre_1.1.2.htm)

⁴ Information about the EAD Response Agreement can be found at www.animalhealthaustralia.com.au/programs/emergency-animal-disease-preparedness/ead-response-agreement

infected pig products or genetic material. The disease could enter Australia via illegally imported contaminated pigmeat and other products that are swill fed to domestic pigs or accessed by feral pigs. (Swill feeding in Australia is prohibited.) Such products could be brought in by passengers on aircraft or ships, or via the post. There is also a risk from garbage discarded by fishing vessels or yachts. Pigmeat products, introduced legally or illegally, and ships' garbage are believed to have been the source of most of the incursions of CSF into Australia.

CSF has the potential to become established in Australian feral pig populations, with secondary spread to backyard, small commercial and medium–large piggeries.

In 2004, Australia released a final Import Risk Analysis report for pigmeat. Quarantine requirements to manage the risk of CSF include sourcing meat only from pigs that have been kept since birth in a country or zone free from CSF or on premises free from CSF in an area where CSF is compulsorily notifiable, or processing the meat by canning or dry curing. There is no policy for the importation into Australia of live pigs, porcine genetic material or offal, all of which are illegal.

1.7 Social and economic effects

Losses caused by CSF include mortalities, which can be very high, and loss of income from reduction of meat production and increased feed costs. An uncontrolled outbreak in Australia would result in severe losses and unemployment at the farm, processor and retail levels. Prices of alternative animal products might rise due to increases in demand. If eradication is achieved, there is unlikely to be continuing damage to the industry beyond the need to recover its market share.

If CSF were to occur in Australia and no compulsory control measures were taken by government authorities, the disease could spread rapidly throughout the pig industry. Without any government control, it is not unreasonable to suggest that CSF could spread in one year to piggeries holding up to 15% of the nation's pigs. If there were a 50% mortality rate, high abortion rate and chronic ill-thrift in those pigs that survive, the annual output of these units would decrease by 80%.

Based on Garner et al (2001), an outbreak of CSF in the Darling Downs area of southeast Queensland or an outbreak in northern Victoria would result in at least a 28% loss in gross income for the regional pig industry in these areas. An epidemic in either of these regions would cost, on average, \$57 million or 9% of the gross income of the national pig industry, an industry worth \$867 million in 2005–06. Furthermore, if the disease were to become endemic in either area, opportunity losses of up to 11% per year would occur in the national pig industry. Establishment of CSF would lead to rapid structural change in the pig industry, with concomitant social and economic dislocation.

The above estimates of loss include only the loss of sales and disposal costs associated with disease control. The cost to transport, processing and marketing industries is not included.

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 document to their own piggeries could escape the infection. It is therefore difficult to assess the cost of living with CSF.

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 (see Section 4.3.1) may cause the destruction of some genetically important herds, even though special efforts would be taken by their owners to protect them.

The selected strategies (see Section 4.3) 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**).

2 Nature of the disease

Classical swine fever (CSF), also known as hog cholera, is a highly contagious disease resulting in variable case mortality rates and a range of clinical signs 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 confirmative laboratory tests. The clinical signs and postmortem lesions of CSF are the same as those of African swine fever (ASF).

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 virus diarrhoea/mucosal disease of cattle (BVD/MD).

2.2 Susceptible species

Pigs (*Sus scrofa*), both domestic and feral, are the only susceptible species in Australia.

2.3 World distribution and occurrence in Australia

2.3.1 World distribution

CSF occurs in much of Asia (the Indian subcontinent, China, east Asia and Southeast Asia), Central and South America, and parts of Europe and Africa. CSF is present in the southern part of West Papua, Indonesia. Many countries are free from the disease, including Australia, Canada, Ireland, New Zealand, Scandinavian countries and the United States.

Most member states of the European Union (EU) were free, or had become free, from CSF during the past decade, with the exception of Slovakia. The last major epizootics of CSF in domestic pigs in the EU were in 1997–98, mainly in the Netherlands and to a lesser extent in Belgium, Germany, Switzerland, Italy and Spain. CSF in feral pigs has been eradicated in all member states, except for Slovakia, Germany and France. The use of oral CSF vaccines in feral pigs has assisted the eradication of CSF.

For the latest information on the distribution of CSF, refer to the website of the OIE World Animal Health Information Database.⁵

⁵ <http://web.oie.int/wahis/public.php?page=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 swill feeding to pigs of 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 carcasses 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.

2.4.1.1 OIE incubation period

The OIE Terrestrial Code (2014) describes the longest incubation period of pigs exposed to CSF virus prenatally as several months, noting that these animals may be persistently infected throughout life. The Code describes the incubation period of pigs exposed to CSF virus postnatally as 2–14 days, noting that these animals are usually infective between post-infection days 5 and 14 but up to 3 months in cases of chronic infections.

2.4.2 Persistence of agent and modes of transmission

2.4.2.1 General properties

CSF virus is stable over a wide pH range, but below pH 4 and above pH 10 its infectivity is quickly lost.

- The virus is heat stable, but the effect of heat treatment on the virus is influenced by the physical medium in which it is heated. Virus in a protein-rich environment such as defibrinated blood (of relevance to soups, broths and extracts) is not inactivated after 30 minutes at 68 °C, and inactivation requires heating at 66 °C for 60 minutes, 68 °C for 45 minutes or 69 °C for 30 minutes.
- Thermal inactivation curves may be derived for the virus at different temperatures, but resistance to heating may vary among different strains of virus. Survival times above 100 °C are less than 1 minute. Inactivation occurred in 1 minute at 90 °C, 2 minutes at 80 °C, and

5 minutes at 70 °C. Some strains are relatively resistant to 56 °C, with only a small fall in titre after 30 minutes, whereas others are inactivated by similar treatment (Edwards 2000).

CSF virus has a lipid-containing envelope and is susceptible to a range of disinfectants, including detergents and alkalis. It is rapidly inactivated by solvents such as chloroform and ether. Recommended disinfectants include sodium hypochlorite (2.3% available chlorine) and alkali wash (sodium hydroxide and sodium citrate) (Geering 1979). Sodium hydroxide (2%) is considered most suitable for disinfecting premises contaminated with the virus (Van Oirschot 1992).

The OIE Terrestrial Code recommendations for inactivating CSF virus in swill are as follows:⁶

- the swill should be maintained at a temperature of at least 90 °C for at least 60 minutes, with continuous stirring; or
- the swill should be maintained at a temperature of at least 121 °C for at least 10 minutes at an absolute pressure of 3 bar.

2.4.2.2 Environment (including windborne spread)

CSF virus is sensitive to the action of ultraviolet radiation (Moennig 1988).

2.4.2.3 Susceptible animals

Live domestic animals

Transmission of CSF virus is by direct contact with infected pigs or by ingestion of products from infected pigs. Movement of infected pigs is the most important method of spread of the disease to new locations.

In acute and subclinical infections, the virus is shed for a relatively short period, but persistently infected pigs shed virus continually or intermittently (Van Oirschot and Terpstra 1989). Infected pigs may shed the virus during the incubation period. Viral excretion continues until death or, in pigs that survive, until specific antibodies have developed.

CSF virus is excreted in the highest concentration in oral fluid, with smaller quantities in urine, faeces, and nasal and lachrymal fluids. Large quantities of virus may be disseminated when carrier sows farrow. Aerosol transmission may be possible over short distances.

The survival of the virus in urine and faeces derived from experimentally infected pigs varied with the strain of the virus in the case of faeces but not urine. Average half-life values were between 2 and 4 days at 5 °C and between 1 and 3 hours at 30 °C (Weesendorp et al 2008).

Pregnant sows exposed to viral strains of moderate or low virulence can pass the virus in utero. The piglets born to these 'carrier sows' may shed large quantities of the virus for months without showing signs of disease or developing an immune response (Terpstra 1994).

⁶ www.oie.int/index.php?id=169&L=0&htmfile=chapitre_1.15.2.htm

Pigs incubating the acute form of the disease can shed virus before showing clinical signs. Chronic carriers (pregnant carrier sows and immunotolerant pigs born to carrier sows) are particularly important in the epidemiology of an outbreak, as they are clinically normal. In infected herds, up to 43% of pregnant sows may be carriers. Sales of breeding stock have been important in the spread of CSF overseas. However, there are very few movements of pregnant sows from one farm to another in Australia.

Live wild (including feral) animals

Feral pigs can be infected by CSF virus, and it is therefore necessary to minimise contact between feral pigs and infected domestic pigs. Feral pigs in the area should be controlled and destroyed if possible, and should be included in surveillance programs to help define the extent of any infection in the feral pig population (see Appendix 1).

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 these factors may decrease the likelihood of CSF spread in feral pigs when the feral pigs occur at low density.

2.4.2.4 Animal products

CSF virus can survive in fresh pigmeat and some processed pigmeat products. Survival can be prolonged for months when meat is stored cool, or even for years when it is stored frozen (Terpstra 1994).

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).

- Helwig and Keast (1966) found that sausage casings held at 39 °C and salted according to one commercial procedure remained infective for up to 86 days. Casings salted using another (commercial) procedure remained infective for 17 days.
- In another early study, Leresche (1956, results cited in Torrey and Prather 1963) showed that CSF virus could be inactivated by heating 29–31mm Bratwurst to 80–82 °C for 10 minutes, by smoking 22–33 mm Vienna at 80 °C for 45 minutes and scalding at 80 °C for 8 minutes, and by smoking 59–62 mm Lyonerwurst at 82–85 °C for 50 minutes and scalding at 81–82 °C for 45 minutes.
- Certain smoked lactic-cured products, such as salami and Parma hams, and pigmeat products heated to an internal temperature of 70 °C, should be considered as presenting no risk of transmitting CSF (MacDiarmid 1991). The earlier work of McKercher et al (1987) showed that pepperoni and Italian salamis prepared according to traditional protocols and from CSF-infected tissues were inactivated after 15 days of curing. This was significantly less than the curing period for either product.

The OIE Terrestrial Code recommendations for inactivating CSF virus in pigmeat products are as follows:⁷

- *Heat treatment*

⁷ www.oie.int/index.php?id=169&L=0&httmfile=chapitre_1.15.2.htm

- heat treatment in a hermetically sealed container with an F_0 value⁸ of 3.00 or more; or
- heat treatment at a minimum temperature of 70 °C, which must be reached throughout the meat.
- Natural fermentation and maturation
 - A treatment consisting of natural fermentation and maturation with either an aw value⁹ of not more than 0.93, or a pH value of not more than 6.0. Hams should be subjected to a natural fermentation and maturation process for at least 190 days and loins for 140 days.
- Dry cured pork meat
 - Italian-style hams with bone in should be cured with salt and dried for a minimum of 313 days.
 - Spanish-style pork meat with bone in should be cured with salt and dried for a minimum of 252 days for Iberian hams, 140 days for Iberian shoulders, 126 days for Iberian loin, and 140 days for Serrano hams.

2.4.2.5 Animal byproducts

Swill and meatmeal

The ingestion by pigs of pigmeat or pigmeat products infected with the virus is an important method of spread of CSF, especially in the first outbreak in a country. The feeding of swill (food scraps containing material of placental mammal origin) is illegal in Australia.

2.4.2.6 Semen and embryos from live susceptible animals

The virus is present in semen and is likely to be transmitted in this way.

For embryos derived in vivo, CSF has been listed by the International Embryo Transfer Society (IETS) 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.¹⁰

See also the **Artificial Breeding Centres Enterprise Manual**.

2.4.2.7 Equipment, including personal items

CSF virus has been transmitted by farmers, veterinarians, inseminators and castrators through the use of contaminated instruments. Use of hypodermic needles on more than one pig or more than one farm is a very important method of spread. CSF can also spread when vaccinating teams do

⁸ F_0 is a measure of the heat treatment the product has undergone; it is defined as equivalent to heating for 1 minute at 121.1 °C.

⁹ An aw value is a measure of water availability in a product ('water activity').

¹⁰ Manual of the International Embryo Transfer Society, IETS, Savoy, IL, USA (www.iets.org/pubs_educational.asp)

not discard partially used bottles of vaccine when moving from farm to farm. Vehicles that have carried infected pigs can also be a source of infection.

Transmission by contaminated clothing and footwear is believed to be rare because the amount of the virus transferred is usually below the minimum infective dose for pigs (Terpstra 1994).

2.4.2.8 Vectors

CSF virus is not transmitted biologically by any arthropod vectors, but it may be spread mechanically by pets, birds and arthropods. Three species of Muscidae (house flies), two Tabanidae (horse flies) and the mosquito *Aedes aegypti* are capable of transmitting CSF mechanically; this may justify an insect vector control program.

2.4.3 Factors influencing transmission

Latent infection influences transmission. Pigs infected with virulent strains of CSF generally shed virus in large quantities for a short period of time until they die or become immune. Some pigs with chronic disease are viraemic for longer. Sows infected with less virulent strains of CSF may infect their progeny in utero for several gestations. Some of their progeny can be immunotolerant and excrete virus for long periods.

2.5 Diagnostic criteria

2.5.1 Case definition

For the purposes of this manual, the case definition for CSF is clinical signs of CSF in a pig accompanied by a confirmed laboratory diagnosis (for the first case), or clinical signs in a susceptible animal after an outbreak has been confirmed.

2.5.2 Clinical signs

CSF is an extremely variable disease and cannot be diagnosed based on clinical signs and gross pathology alone. In its acute or classical form, there are high morbidity and high case mortality. However, it can also be a very mild to inapparent disease, 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.

Acute (classical) form:

- fever (39.5–42 °C)
- hyperaemia or cyanosis of extremities, particularly ears and snout
- loss of appetite or irregular appetite
- inability or unwillingness to stand up, convulsions
- incoordination, stiff gait

- huddling together, piling one on top of another
- laboured breathing, coughing
- dysentery or diarrhoea
- conjunctivitis
- nasal discharge
- vomiting
- abortion, mummifications, stillbirth and fetal abnormalities
- severe leucopenia
- case fatality rate up to 100%
- incubation period of 2–6 days (most pigs die between 10 and 20 days).

Chronic form:

- clinical signs as for the acute form, but generally milder and persisting longer (3–4 weeks)
- fever (>40.5 °C), which may fluctuate irregularly
- ill-thrift
- pneumonia (laboured breathing/coughing)
- loss of appetite
- diarrhoea
- alopecia and dermatitis
- death — often due to secondary bacterial infections
- lower case fatality rate than the acute form.

In the subclinical form of the disease, pigs may become chronic carriers without showing any of the clinical signs listed above. This is most likely to occur when strains of low virulence infect older breeding animals or when piglets are infected in utero.

2.5.3 Pathology

2.5.3.1 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, haemorrhagic lymph nodes and enlarged lymph nodes (Elbers et al 2003).

Some of these pathological changes (pneumonia, pleuritis, chronic bronchitis and pulmonary oedema) are also commonly found in pigs from noninfected herds.

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 — tonsils are frequently enlarged, with necrotic foci and pustules
- pyramidal splenic infarcts along the margin
- haemorrhages in almost any organ — 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 than for the acute form, as they are often complicated by secondary bacterial infections
- lymph node and renal haemorrhage
- mucosal intestinal haemorrhage
- enlarged lymph nodes
- 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.

2.5.3.2 Microscopic lesions (histopathology)

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 can be 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.

2.5.4 Differential diagnosis

In the field, suspicion will be based on clinical signs, gross pathological lesions and a failure of animals to respond to antibiotic therapies. Several pigs must be submitted for postmortem examination, 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 isolation of other pathogens may mask the CSF infection.

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

- acute septicaemias due to erysipelas, *Streptococcus suis* or *Haemophilus parasuis*
- *Actinobacillus* pleuropneumonia or pasteurellosis, for respiratory signs

- salmonellosis
- salt poisoning (water deprivation), for nervous convulsions
- any cause of abortion, mummification, stillbirths or weak piglets (Menangle virus, porcine myocarditis virus)
- various poisons, including warfarin
- thrombocytopenia purpura
- African swine fever
- Aujeszky's disease
- viral encephalomyelitis
- porcine reproductive and respiratory syndrome
- porcine circovirus associated disease (including porcine dermatitis and nephropathy syndrome, PDNS).

2.5.5 Laboratory tests

2.5.5.1 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 (approx. 2 g of each tissue) collected aseptically post-mortem and forwarded 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 killed immediately before a post-mortem examination and from pigs that have recently died (including stillborn piglets and aborted fetuses).
- Serological testing
 - sera (30 samples). 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) in neutral-buffered formalin. Histopathology findings are not pathognomonic for CSF but histopathology can provide additional support for differential diagnoses.

2.5.5.2 Transport of specimens

Specimens should be forwarded to the CSIRO Australian Animal Health Laboratory (CSIRO-AAHL), Geelong, 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. Sample packaging and consignment for delivery to CSIRO-AAHL should be coordinated by the relevant state or territory laboratory.

For some diseases (bluetongue, Hendra virus infection, influenza (any species), Newcastle disease), the state or territory diagnostic laboratory may conduct initial screening under the Laboratories for Emergency Animal Disease Diagnosis and Response (LEADDR) program. LEADDR is a coordinated laboratory network that provides a collaborative program of test harmonisation and quality assurance. Specimens will be forwarded to CSIRO-AAHL for confirmation of non-negative results and for further testing and characterisation.

For further information, see the **Laboratory Preparedness Manual**.

Packing specimens for transport

Blood samples and unpreserved tissue specimens should be chilled and transported with frozen gel packs. However, specimens collected on farm should be frozen and forwarded with dry ice if the journey is expected to last more than 24 hours (Geering et al 1995). For further information, see the **Laboratory Preparedness Manual**.

2.5.5.3 Laboratory diagnosis

The virus neutralisation (NPLA) test would be used to confirm positive results from antibody ELISA. Polymerase chain reaction (PCR) and sequencing, or virus isolation, would be used to confirm positive results from antigen-capture ELISA.

Commercial enzyme-linked immunosorbent assay (ELISA) kits are available for detection of CSF antigen and antibody. The commercial tests are rapid, highly sensitive and useful for screening large numbers of samples.

CSIRO-AAHL tests

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

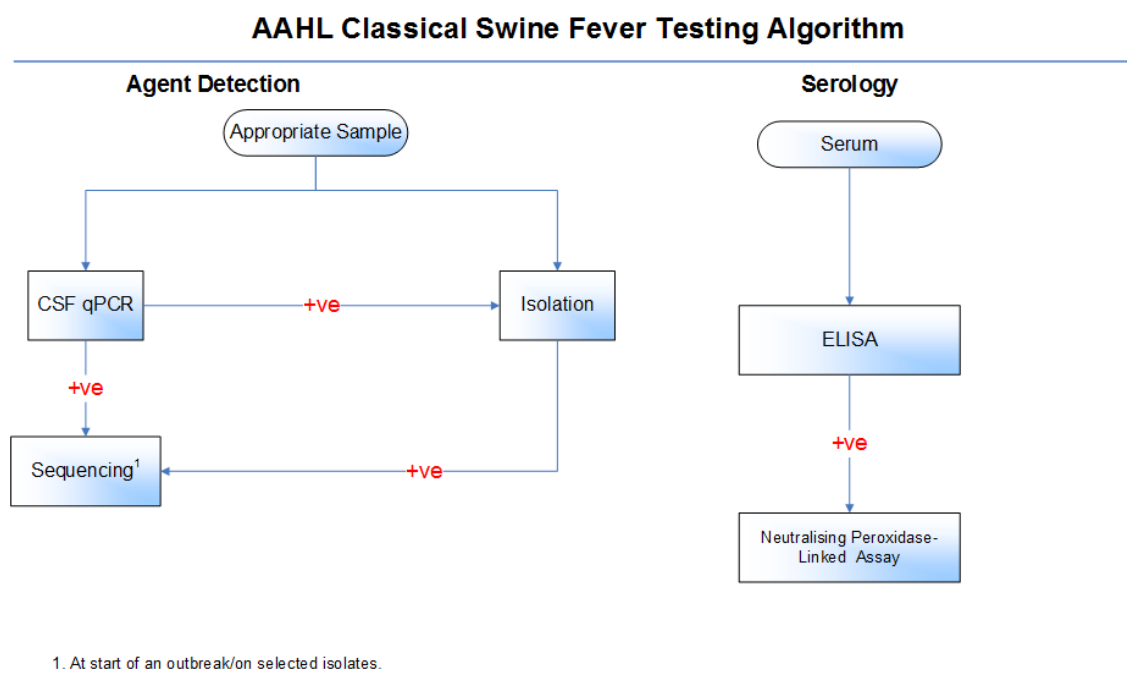


Figure 2.1 The current approach to diagnostic testing at CSIRO-AAHL

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

Test	Specimen required	Test detects	Time taken to obtain result
Agent detection			
qPCR	Fresh tissue, whole EDTA blood or serum	Viral RNA	4 hours
Antigen-capture ELISA	Fresh tissue or whole EDTA blood	Viral antigen	6–8 hours
Agent characterisation			
Virus isolation and identification	Fresh tissue or whole EDTA blood	Virus	Up to 10 days

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

Test	Specimen required	Test detects	Time taken to obtain result
Sequencing	Fresh tissue, whole EDTA blood or virus isolate	Viral RNA	2–3 days
Serology			
ELISA	Serum	Antibody	6–8 hours
NPLA	Serum	Antibody	4–5 days

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

Source: Information provided by CSIRO-AAHL, 2015 (refer to CSIRO-AAHL for most up-to-date information)

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 against mortality during the first 5 weeks of life, but does not protect against virus replication and shedding (Terpstra 1977).

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 totally susceptible. Pigs that have recovered from CSF 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).

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 and/or treatment of infected animals

Vaccines against CSF that use inactivated whole virus are not efficacious. Attenuated ('live') virus vaccines are used by many countries to control CSF. Attenuation has been achieved by passage in rabbits (lapinised) and/or by serial passage in various types of cell cultures. Examples of such attenuated vaccines are the Chinese lapinised strain (CLS), sometimes called the C, K or LPC strain; the Japanese guinea pig cell culture-adapted (GPE-) strain; and the Thiveral strain (the French PK-15 cell-adapted strain).

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 help to prevent the spread of the disease on properties.

However, immunisation is restricted in some countries because it may not be compatible with eradication. Immunised pigs can be infected with virulent CSF virus strains and spread the disease, and it is difficult to differentiate between vaccine and wild virus (particularly the less virulent forms of CSF), even by laboratory methods. 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 the current marker vaccines provide good protection against clinical disease, they do not protect absolutely against infection with the virus. There is a risk of virus spreading after vaccination via transplacental transmission.

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). The immunity from these vaccines is thought to last for more than a year, but immunity is not always complete beyond this time. Use of the E2 vaccine provides the ability to differentiate between antibody resulting from natural infection and vaccine-derived antibody in pigs, although this requires the development of specialised diagnostic ELISA tests (Van Oirschot 2003). 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).

No CSF vaccine is currently approved for use in Australia.

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

3 Principles of control and eradication

3.1 Critical factors for formulating response strategy

3.1.1 Features of the disease

- Classical swine fever (CSF) is an extremely variable disease and cannot be diagnosed on clinical signs and gross pathology alone.
- 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.
- 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, until specific antibodies have developed.
- Pregnant sows exposed to strains of moderate or low virulence can pass the virus in utero. The piglets born to these ‘carrier sows’ may shed large quantities of the virus for months without showing signs of disease or developing an immune response.
- Tests are available for rapid detection but the initial diagnosis may be delayed due to mild or inapparent clinical signs.
- CSF virus is very persistent in the environment and in meat products — it is relatively stable to heat and pH changes. Decontaminants are available.
- Spread may be rapid and is principally by direct contact with infected pigs or by ingestion of carcass material from infected pigs (including fresh pigmeat).
- CSF virus may be transmitted in semen.
- CSF virus has been transmitted through the use of contaminated instruments, but transmission by contaminated clothing and footwear is believed to be rare.
- An effective vaccine is available overseas for protective immunity, but it does not prevent viral shedding.
- There are no public health implications.

3.1.2 Features of susceptible populations

- Feral pig and smallholder pig populations are not easily identified.
- Smallholders have variable knowledge and application of disease control issues, including farm biosecurity, swill-feeding regulations and the need to report illness in their pigs.
- Animals owned by such smallholders are more likely than those owned by commercial livestock producers to be exposed to emergency animal diseases, due to their locations, biosecurity practices, relative lack of quality assurance programs, and so on (Perkins et al 2010).
- Overall, most of the risk of emergency animal disease outbreaks is associated with commercial livestock producers, rather than smallholders, because of their far greater numbers of animals and animal movements (Perkins et al 2010).
- Fear of repercussions may deter smallholders from reporting disease.

- The first infected premises identified may not be the index case.
- Market fluctuations due to public health perceptions or product withdrawals would reduce the value of the industry.
- Intensive production systems are prone to rapid overcrowding if output is disrupted, with resultant animal welfare issues.
- CSF is believed to be present in the region to the near north of Australia. Although the disease may be introduced to the Australian mainland through traditional trade routes, northern Australian populations are generally aware of illegal animal movements and would be likely to report such movements to government authorities as a matter of urgency. There is some risk that CSF may be introduced into the feral pig population through infected animals or contaminated product via traditional trade routes.
- Trade in animal products may be jeopardised because of disease in feral pig populations.

3.2 Options for control and eradication based on the critical factors

Based on the assessed critical factors, managing an incursion of CSF disease may require the use of some or all of the following options:

- registration of all commercial and small pig holdings (or another method of assuring the location of domestic pigs, particularly those in smallholdings)
- application of mandatory biosecurity programs
- the early determination of the extent of infection through the rapid identification of infected and potentially infected premises (including piggeries, saleyards, meatworks and cold stores) using quickly instituted serosurveillance and tracing of pigs and pig products, based on an epidemiological assessment
- the swift declaration and effective policing of control areas and the rapid imposition of quarantine and movement controls on infected and potentially infected premises, to prevent the movement of pigs, pig products and fomites carrying virus or potentially carrying virus, to minimise the exposure of susceptible pigs
- heightened swill-feeding prevention and assurance activities to prevent the recycling of infection
- elimination of infection from infected premises and/or infected pig populations by the rapid destruction of pigs, the sanitary disposal of carcasses and fomites, and decontamination
- the implementation of appropriate zones and compartments
- the recall of pigmeat and offal originating from infected domestic pig premises, and game meat and offal sourced from possibly infected feral pig populations
- the use of vaccination with movement controls — DIVA (a strategy for differentiating infected from vaccinated animals) may need to be employed to distinguish infected from vaccinated pigs
- the gaining of smallholder support
- feral pig population surveillance and management.

The policy options for the control or eradication of CSF are:

- **stamping out** — the prompt destruction and sanitary disposal of pigs infected with or exposed to CSF virus
- **modified stamping out** — some pigs allowed to be slaughtered for human consumption
- **long-term control** — recognition of endemic status, using compartmentalisation, vaccination and enhanced biosecurity in the commercial pig industry.

The policy to be implemented is described in Section 4.

4 Policy and rationale

4.1 Introduction

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

4.1.1 Summary of policy

The response policy with regard to an outbreak of CSF will be determined by how early the outbreak is detected, the extent of the outbreak, the location of affected premises, virus virulence factors, and whether feral pigs are involved.

The default policy is to control and eradicate the disease in the shortest possible time using *stamping out*, supported by a combination of strategies, including:

- *early recognition* and laboratory confirmation of cases
- *movement controls* over pigs, pig products and other potentially contaminated items in declared areas, to minimise spread of infection
- *tracing and surveillance* (based on epidemiological assessment) to determine the source and extent of infection (including, as necessary, in feral pigs), and subsequently to provide proof of freedom from the disease
- *disposal* of destroyed pigs and *decontamination* of premises
- *treatment or destruction and disposal* of pig products likely to be contaminated, to reduce the source of infection
- *decontamination* of fomites (facilities, equipment and other items) to eliminate the pathogen
- *recall* of suspect pig products
- *zoning/compartmentalisation* to define infected and disease-free areas and premises
- *industry support* to increase understanding of the issues, facilitate cooperation and address animal welfare issues
- *a public awareness campaign*.

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

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

Some low-virulence strains of CSF cause negligible production loss. If such a strain were to be identified in Australia, modified stamping out (using slaughter for human

consumption) will be applied. This policy will be 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 biosecurity, long-term compartmentalisation and vaccination.

4.1.2 Case definition

For the purposes of this manual, the case definition for CSF is clinical signs of CSF in a pig accompanied by a confirmed laboratory diagnosis (for the first case), or clinical signs in a susceptible animal after an outbreak has been confirmed.

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 (EADRA)*.¹¹ 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 OIE Terrestrial Code sections on CSF (Chapter 15.2)¹² and general surveillance (Chapter 1.4).¹³

A serological survey should be undertaken based on sound epidemiological principles. Sera should be collected from all infected premises and dangerous contact premises after repopulation, and from a statistically significant sample from piggeries that were in a restricted area. High-risk herds should be specifically targeted for sampling. These are herds where pig abattoir workers and pig transport drivers work, and herds that buy weaners or stores at saleyards. A lower intensity of testing should apply in nonaffected areas and states.

Any serological survey may need to include the feral pig population, particularly in the restricted area and adjacent areas.

See Section 7 for further information on proof of freedom.

¹¹ Information about the EAD Response Agreement can be found at www.animalhealthaustralia.com.au/programs/emergency-animal-disease-preparedness/ead-response-agreement

¹² www.oie.int/index.php?id=169&L=0&htmfile=chapitre_1.15.2.htm

¹³ www.oie.int/index.php?id=169&L=0&htmfile=chapitre_1.1.4.htm

4.1.5 Governance

4.1.5.1 Chief veterinary officer

The chief veterinary officer (CVO) in the state or territory in which the outbreak occurs and, where relevant (for zoonotic diseases), the chief medical officer (CMO) are responsible for instituting control action within the state or territory. Where the jurisdiction plans to seek cost sharing of the response under the EADRA, the CVO is also responsible for recommending an Emergency Animal Disease Response Plan (EADRP) for the particular outbreak to the Consultative Committee on Emergency Animal Diseases (CCEAD).

For cost-shared responses, CVOs will implement disease control measures as agreed in the EADRP and in accordance with relevant legislation. They will make ongoing decisions on follow-up disease control measures in consultation with the CCEAD and, where applicable, the National Management Group (NMG), based on epidemiological information about the outbreak.

Unaffected jurisdictions may also need to develop response plans to address jurisdictional activities that are eligible for cost sharing. Overall operational management of the incident rests with the CVO of the affected jurisdiction, with oversight by the CCEAD.

4.1.5.2 Consultative Committee on Emergency Animal Diseases

For diseases covered by the EADRA, the CCEAD, convened for the incident, has specific responsibilities (as per Schedule 8 of the EADRA), as follows:

- Receive formal notifications from governments on suspected emergency animal disease (EAD) incidents.
- Advise the NMG if an EADRP is required.
- Recommend to the NMG an EADRP.
- Consider regular reports on progress of an EAD response and develop a consensus on further actions required.
- Provide regular consolidated reports to the affected governments and industries, and to the NMG, on the status of an EAD response.
- In circumstances where rapid eradication of an EAD is judged no longer feasible, provide advice and recommendations to the NMG on when the EAD response should be terminated, when cost sharing should no longer apply, and options for alternative arrangements.
- Determine when a disease has been controlled or eradicated under an EADRP.
- Recommend when proof of freedom has been achieved following the successful implementation of an EADRP.

The CCEAD reports to the NMG when appropriate.

4.1.5.3 National Management Group

If convened for the specific incident, the NMG decides on whether cost sharing will be invoked (following advice from the CCEAD) (see Funding and compensation) and approves the EADRP.

It also has responsibility for authorising an order for vaccine (if relevant), on advice from the CCEAD. Also refer to Schedule 8 of the EADRA.

For further details, refer to the **Summary Document**.

For information on the responsibilities of the state coordination centre and local control centre, see the **Control Centres Management Manual (Parts 1 and 2)**.

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. Stamping out will be used because international experience has shown it to be effective, and cost–benefit analyses have shown it to be justifiable.

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.

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 take into account that the disease can spread rapidly by direct contact and often appears in a mild form, and that early detection may be difficult.

An important factor in success of this policy is knowledge of the location of all commercial and small pig holdings (preferably through formal premises registration). Any premises registration program would need to have been implemented before the outbreak.

4.3.1 Stamping out

Stamping out will be undertaken on all infected premises (IPs) and dangerous contact premises (DCPs) through the rapid destruction of pigs. On DCPs, it may involve all pigs or only selected pigs, depending on the size of the pig holding, the level of contact among pigs on the holding and the risk of spread of disease. Destruction of pigs on DCPs provides an opportunity to destroy exposed herds and pigs before they develop clinical disease and begin to excrete virus.

It may well be several weeks before there can be any confidence that no other properties in the area are incubating the disease. During this time, quarantine measures will be maintained.

On IPs, all pigs will be destroyed. On DCPs, the following will be immediately destroyed (as a minimum):

- pigs originating from an IP within the incubation period
- pigs having contact with pigs from an IP, or the faeces, urine and/or secretions of such pigs, or equipment used with such pigs
- pigs that have been handled by personnel immediately after they have handled pigs from an IP.

All pigs on a DCP should be destroyed if more than 66% of pigs on a commercial holding are to be destroyed on the basis of the above guidelines. This guideline should not necessarily be followed for very large units, containing more than 500 sows. However, strong reasons must exist to justify not destroying all animals. All pigs on smallholdings (IPs and DCPs) will be destroyed.

All pig products (meat and offal) on IPs will be destroyed, and pig products originating from IPs will be recalled and destroyed. Product on DCPs and suspect premises (SPs) may be destroyed or may be retained for an agreed period of time (depending on the agreed incubation period) and released for further heat processing following negative results from monitoring. Game products (meat and offal) from possibly infected feral pig populations may need to be recalled and destroyed, depending on the known extent of infection.

Efficient and humane procedures will be employed to kill pigs, without moving them from the site (see the **Destruction of Animals Manual**).

4.3.2 Quarantine and movement controls

See Section 6 for details on declared premises and areas, and recommended quarantine and movement controls.

4.3.2.1 Quarantine

Quarantine will be immediately imposed on all premises and areas on which infection is either known or suspected.

Premises will be declared (see Section 5.2). A restricted area (RA) and control area (CA) will be declared around the infected premises (see Section 5).

4.3.2.2 Movement controls

Movement controls are best implemented through the declaration of declared areas and linking permitted movements to each area. As a general principle, the aim of movement controls is to reduce the spread of disease by preventing the movement of infected animals, infected animal

products and infected vectors (where relevant for the disease), and by allowing movements that pose a minimal risk.

Section 6.4 provides details on movement controls for live animals, reproductive material (semen and in vivo-derived embryos), animal products and byproducts, waste products and effluent, and other items that might be contaminated.

4.3.3 Tracing and surveillance

The early determination of the extent of infection through rapid identification of infected and potentially infected premises (including piggeries, saleyards, meatworks and cold stores), using quickly instituted serosurveillance and animal tracing, based on an epidemiological assessment, is essential. This will involve detailed tracing of the movement of pigs, pig products and wastes to and from IPs and DCPs, as a priority, at the beginning of an outbreak of CSF.

Ongoing and regular tracing and surveillance will be very important because the disease may be present in the mild form and therefore difficult to detect. Regular inspections of pigs on SPs and DCPs to detect subclinical or mild cases will be necessary to ensure that the extent of infection (including in feral pig populations) is known.

4.3.3.1 Tracing

Due to the variable incubation periods found in some CSF outbreaks, trace-back procedures should apply to all movements that took place during an agreed period (depending on the form of CSF present) before the first appearance of clinical signs. The trace-back period may be extended on the basis of disease investigation, history or serology. Trace-back and trace-forward investigations may involve clinical examination of live pigs, postmortem examinations, serology and history taking. Tracing should also include checking of saleyard, abattoir and veterinary laboratory records. Live animals, products, people, vehicles and other fomites need to be traced if they have been in contact with an IP, or with items from an IP, during the tracing period.

Other activities to determine the extent of infection include retrospective examinations of abattoir records for high condemnation rates for fever, and retrospective examinations of samples submitted to laboratories from outbreaks of disease that could have been CSF.

4.3.3.2 Sentinel animals

Tracing and surveillance will identify the DCPs and SPs and show the extent of infection so that an appropriate RA and CA can be declared. Surveillance will include serological testing, examination of farm records and examination of sick and dead animals, particularly on DCPs, SPs and other properties in the RA.

Since the ban on unlicensed swill feeding is important to prevent the spread of disease, heightened swill-feeding prevention and assurance activities will be undertaken, and any suspected illegal swill feeding will be rigorously investigated.

After eradication has been completed, surveillance will be required to provide proof of freedom.

See Section 7 for further details on surveillance.

4.3.4 Zoning and compartmentalisation for international trade

4.3.4.1 General considerations

The OIE 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 OIE *Terrestrial Animal Health Code*,¹⁴ establishing and maintaining a disease-free status throughout the country should be the final goal for OIE 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 to a Member 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 OIE guidelines for CSF are in Chapter 15.2 of the OIE Terrestrial Code.

If desired, a zoning application would need to be prepared by the Australian Government in conjunction with the relevant jurisdiction(s). The recognition of zones must be negotiated bilaterally with trading partners and is not an overarching international agreement. Zoning will also require considerable resources that could otherwise be used to control an outbreak, and careful consideration will need to be given to prioritising these activities.

Agreements between trading partners will take time to develop, consider and finalise, as a result of the need for provision of detailed information, costing and resourcing, 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. It is not known how Australia's trading partners would react to a zoning proposal; some countries might not accept 'zone freedom'.

Eradication may be achieved before a decision on a free-zone application is reached.

Managing disease-free zones is a responsibility of veterinary authorities.

¹⁴ www.oie.int/index.php?id=169&L=0&htmfile=chapitre_1.4.3.htm

4.3.5 Vaccination

4.3.5.1 General considerations

Importation of CSF vaccines is subject to the issuing of import permit(s) from the Australian Government Department of Agriculture. 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, or permitted under an Emergency Dealing Determination by the minister responsible for gene technology, or other relevant and appropriate processes.

Vaccination will be approved by the NMG based on the recommendation of the CCEAD.

4.3.5.2 Specific considerations

The use of vaccination will depend on the epidemiology of the specific outbreak and the resources required to combat the outbreak. If the disease is found to be widespread, if eradication is calculated to cost more than 1% of gross value of production, or if stamping out is failing to control the spread of CSF, then vaccination will be considered. Vaccination will be confined to the minimum number of properties, because it is likely that vaccinated pigs will need to be destroyed towards the end of a successful eradication campaign in order for Australia to demonstrate freedom from the disease as quickly as possible.

A decision will need to be made early in an outbreak on whether a live or 'marker' vaccine, or even a combination of both, is to be used. Marker vaccines are the more attractive option, especially if a long-term vaccination campaign is required, as they would allow DIVA testing (to differentiate infected from vaccinated animals) to be used. Live vaccines currently are more efficacious, but they pose problems during surveillance due to the difficulty in differentiating between natural antibodies and vaccine-induced antibodies. Live vaccines may be used to control CSF disease on a property, reducing the number of sick animals that need to be disposed of immediately.

If vaccination is allowed so that animals can grow out to reach market weight, in contrast to the use of vaccination to help control the spread of the disease, consideration will be given to the impact this will have on the ultimate timing of a declaration of freedom.

In the event that vaccine is approved for use, all vaccinated pigs must be permanently identified because they may need to be destroyed, even if a marker vaccine is used. Should the disease become endemic in the feral pig population, vaccination of pigs in areas that are in close proximity to feral pigs using a marker vaccine may become necessary as a long-term strategy.

See Section 2.7 for further details on vaccination, including available vaccines.

4.3.6 Treatment of infected animals

The treatment of infected animals is ineffective and will not be undertaken.

4.3.7 Treatment of animal products and byproducts

CSF virus is susceptible to heat, and products may be made safe through heat treatment (see Section 2.4.2). However, the risk of disease spread posed by the transport and processing of contaminated products from subclinically infected animals will need to be taken into account, and these animals may have to be destroyed rather than slaughtered.

Certain smoked, lactic-cured products, such as salami and Parma hams, and products processed in a hermetically sealed container to an F_0 value of 3.00 or more, or heat treated at a minimum temperature of 70 °C (which must be reached throughout the meat), may be considered as presenting no risk of transmitting CSF (see Section 2.4.2).

4.3.8 Disposal of animals, and animal products and byproducts

One of the major objectives of the eradication program is prompt and effective disposal of infective material. Available methods include burial, composting, cremation and rendering. Disposal of products not destined for human consumption will normally be by burning or burial in a way that prevents them from being scavenged by feral pigs.

The disposal of very large numbers of pigs in a short time presents environmental and logistical problems (see the **Disposal Manual**).

If semen or embryos (not handled according to International Embryo Transfer Society guidelines) are on the property, they will be disposed of.

4.3.9 Decontamination

Decontamination is a most important strategy in controlling CSF because of the ability of the virus to spread via fomites, and due to its persistence in the environment and in pig products.

Infected animals and products will be disposed of in a hygienic manner, and premises and all items on IPs will be decontaminated. Since fomites acting as mechanical vectors represent a serious risk for transmission of the virus, vehicles, equipment and other fomites associated with IPs will be decontaminated before leaving the premises. People leaving declared premises will be appropriately decontaminated. Decontamination procedures must include the control of birds and insects. Pets will be confined, since they may be able to mechanically transmit the virus.

Yards and surroundings of IPs, burial or burning grounds and rendering plants must all be decontaminated as soon as possible. For the type, dose, method and application of disinfectants, see the **Decontamination Manual**.

Properties that have been depopulated should be restocked after decontamination is complete with only a small percentage of the normal capacity of the piggery. These pigs will act as

sentinel animals, and will be monitored serologically to evaluate the efficacy of the decontamination procedure.

4.3.10 Wild animal control

Feral pigs can be infected with CSF virus. Because of the difficulty of eradicating CSF from a feral pig population, it is necessary to ensure that feral pigs do not come into contact with infected domestic pigs. Feral pigs in the RAs will be controlled and destroyed if possible, and they may need to be included in surveillance programs to ensure that they are not infected.

The need for all commercial and small pig holdings to apply heightened biosecurity will be emphasised.

For further information, see the **Wild Animal Response Strategy**.

4.3.11 Vector control

Although CSF virus is not transmitted biologically by any arthropod vectors, it may be spread mechanically by pets, birds and arthropods (eg house flies, horse flies and mosquitoes [*Aedes aegypti*]), so an insect vector control program may be required.

4.3.12 Public awareness and media

The industry, the media and the public will need to be fully informed of the nature of the disease and the control programs that will be adopted, to allay any concerns and to attempt to maintain demand for pig products. There should be ongoing liaison with all groups to ensure the flow of correct information and to maintain confidence in the product. Some opposition to the eradication strategies and concerns about the safety of the product are likely and may affect consumption.

Animal welfare concerns would need to be considered in any disease eradication campaign. An aggressive stamping-out strategy would cause concerns among some sectors of the public 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 vaccine would need to be addressed.

A media campaign must emphasise the importance of good farm biosecurity, of farmers inspecting susceptible animals regularly, and of reporting suspicious lesions and unusual deaths promptly. The ban on swill feeding should be reinforced, as well as the need to prevent contact between domestic and feral pigs.

4.4 Other strategies

A decision on the appropriate policy to be adopted following the **detection of low-virulence strains of CSF** will be made after an epidemiological investigation has determined whether there is a high likelihood that CSF has become established.

Stamping out will still be considered the most appropriate policy for low-virulence strains of CSF if the infected population is small or discrete and the outbreak is well contained. A policy

using modified stamping out with slaughter will be adopted following the widespread detection of low-virulence strains of CSF.

A modified stamping-out policy may involve the accreditation of CSF-free herds (in line with the OIE recommendations for a free zone or compartment) and extension efforts to encourage voluntary disease control measures. In larger herds, vaccination with a marker vaccine at the discretion of owners may provide protection to allow animals to be slaughtered and marketed in an orderly manner (see Sections 2.7 and 4.3.5).

The accompanying strategies described in Section 4.3 will be applicable.

If CSF (other than low-virulence strains) is considered to be present as a widespread infection in domestic pigs (commercial and/or smallholdings) and/or feral pigs when initially diagnosed, or if the disease continues to spread despite the application of a stamping-out policy, the **policy for long-term control** (and possible eradication) of the disease will be determined following consultation between the government and the pig industry. Possible approaches may be to continue to attempt eradication or to accept that CSF has become an endemic disease. If CSF is considered to have become endemic, vaccination at the discretion of owners may be an appropriate strategy, and the application of the OIE recommendations for free zones or compartments may also be appropriate (see Section 4.3.4).

In either case, intensified measures to control feral pig numbers, heightened swill-feeding prevention and assurance activities, and the application of mandatory biosecurity programs for all pig holdings would be appropriate.

If feral pigs become infected, a major effort would be required to eliminate the infected group(s) or to reduce their numbers to a manageable level in the hope that the infection may die out.

4.5 Funding and compensation

4.5.1 General considerations

Details of the cost-sharing arrangements can be found in the **Summary Document** and the **Valuation and Compensation Manual**.

4.5.2 Specific considerations

Due to the nature of CSF, the best option for disease control and eradication may not be immediately apparent. The costs of surveillance, initial movement controls and the provision of slaughter facilities will be shared under the EAD Response Agreement.

Under some circumstances, it will be important to manage the impacts on the first detected piggery if it is held in quarantine pending the outcomes of further investigation. If production continues, overcrowding may become a problem, along with financial hardship due to reduced cash flow. It will be necessary to factor these issues into the initial EAD Response Plan to ensure that they are endorsed as part of the cost-sharing response.

5 Guidelines for classifying declared areas and premises

5.1 Declared areas

A declared area is a defined tract of land that is subjected to disease control restrictions under emergency animal disease (EAD) legislation. There are two types of declared areas: restricted area (RA) and control area (CA).

Declared areas are risk based, with several areas or premises of higher risk nested within areas of lower risk.

All declared areas need to be clearly identified and easily understood, so that all affected parties can recognise which area they are in, and what regulations and control measures are applicable to them.

Declared areas are declared by a chief veterinary officer (CVO) or their delegate, or a ministerial declaration, according to the appropriate legislation of the states and territories involved.

5.1.1 Restricted area (RA)

An RA is a relatively small legally declared area around infected premises (IPs) and dangerous contact premises (DCPs) that is subject disease controls, including intense surveillance and movement controls.

An RA will be a relatively small declared area¹⁵ (compared with a CA) drawn with at least 3-km radius around all IPs and DCPs, and including as many suspect premises (SPs), trace premises (TPs) and dangerous contact processing facilities (DCPFs) as practicable. Based on risk assessment, the RA is subject to intense surveillance and movement controls. The purpose of the RA is to minimise the spread of the EAD. The RA does not need to be circular but can have an irregular perimeter, provided that the boundary is initially an appropriate distance from the nearest IP, DCP, DCPF, SP or TP. Multiple RAs may exist within one CA.

The boundaries will be modified as new information becomes available, including from an official surveillance program. The actual distance in any one direction will be determined by factors such as terrain, the pattern of livestock movements, livestock concentrations, the weather (including prevailing winds), the distribution and movements of relevant wild (including feral) animals, and known characteristics of the disease agent. In practice, major geographic features and landmarks, such as rivers, mountains, highways and roads, are frequently used to demarcate the boundaries of the RA. Although it would be convenient to declare the RA on the basis of local government areas, this may not be practical, as such areas can be larger than the particular circumstances require.

¹⁵ As defined under relevant jurisdictional legislation

5.1.2 Control area (CA)

A CA is a legally declared area where the disease controls, including surveillance and movement controls, applied are of lesser intensity than those in an RA (the limits of a CA and the conditions applying to it can be varied during an incident according to need).

A CA is a disease-free buffer between the RA and the outside area (OA). Specific movement controls and surveillance strategies will be applied within the CA to maintain its disease-free status and prevent spread of the disease into the OA.

An additional purpose of the CA is to control movement of susceptible livestock for as long as is necessary to complete tracing and epidemiological studies, to identify risk factors and forward and backward risk(s).

The CA will be a larger declared area around the RA(s) — initially, possibly as large as the state or territory in which the incident occurs — where restrictions will reduce the risk of disease spreading from the RA(s). The CA will have a minimum radius of 10 kilometres, encompassing the RA(s). It may be defined according to geography, climate and the distribution of relevant wild (including feral) animals. The boundary will be adjusted as confidence about the extent and distribution of the incident increases.

In general, surveillance and movement controls will be less intense in the CA than in the RA, and disease-susceptible animals and their products may be permitted to move under permit within and from the area.

5.1.3 Outside area (OA)

The OA is the area of Australia outside the declared (control and restricted) areas.

The OA is not a declared area but is used to describe the rest of Australia outside the declared areas. The OA will be subject to surveillance. Because it is highly desirable to maintain the OA as ‘disease free’, the movement of animals and commodities from the RA and CA into the OA will be restricted.

The OA will be of interest for ‘zoning’ and ‘compartmentalisation’ for purposes of trade access, as well as for disease control.

5.1.4 Other types of areas

It is possible that other types of areas (eg vaccination area or surveillance area), which are not legally declared, may be used for disease control purposes in some jurisdictions.

5.2 Declared premises

The status of individual premises will be declared after an epidemiological risk assessment has been completed.

Based on the disease risk they present, the highest priorities for investigations are IPs, DCPs, DCPFs, SPs and TPs.

In a disease outbreak, not all classifications may be needed. Premises classifications are mutually exclusive — that is, a given premises can have only one classification at any given time. After an epidemiological investigation, clinical assessment, risk assessment or completion of control measures, a premises may be reclassified.

5.2.1 Infected premises (IP)

An IP is a defined area (which may be all or part of a property) on which animals meeting the case definition are or were present, or the causative agent of the EAD is present, or there is a reasonable suspicion that either is present, and that the relevant CVO or their delegate has declared to be an IP.

A premises with susceptible animals that have met the case definition will be declared an IP. For most diseases, the RA(s) will include **all** IPs.

For most diseases, the classification of a premises as an IP would be followed by the declaration of the areas around it as an RA and a CA.¹⁶ In the case of vector-borne diseases, a transmission area (TA) may also be identified, if required.

Depending on the situation, control measures in accordance with the agreed Emergency Animal Disease Response Plan (EADRP)¹⁷ or the relevant AUSVETPLAN disease strategy or response policy brief may be applied immediately, or may await the outcomes of further investigation of the IP.

When the required control measures for an IP have been completed, the premises would be classified as a resolved premises (RP). After further risk assessment, it may be reclassified as:

- a zero susceptible species premises (ZP), if destocked
- an at-risk premises (ARP) with a vaccination qualifier (ARP-VN), if not destocked, and vaccinated
- an ARP with an assessed-negative qualifier (ARP-AN), if neither destocked nor vaccinated.

If a premises has been classified as an IP on the basis of clinical signs as per the case definition,¹⁸ and subsequently both the EAD and the causative agent are confirmed as absent (ie a ‘false’ declaration), the premises would be reclassified as an RP. Thereafter, depending on the specific disease and its epidemiology, it would be reclassified as a ZP or an ARP (the qualifiers AN and/or VN may also be used, depending on the actions taken on the premises).

¹⁶ Less contagious diseases (eg Hendra virus, anthrax, Australian bat lyssavirus) do not use declared areas as part of their control measures. See the applicable AUSVETPLAN disease strategies or response policy briefs for details.

¹⁷ An EADRP will usually be prepared for consideration at the first CCEAD meeting, at the start of a disease response.

¹⁸ During the early phase of an EAD response, a comprehensive ‘initial case definition’ is used — eg individual and herd clinical signs, epidemiological investigation and risk assessment, and laboratory evaluation. Later in the response, the ‘response case definition’ may be used, which may be only clinical signs and on-site clinical assessment.

5.2.2 Suspect premises (SP)

SP is a temporary classification of a premises that contains a susceptible animal(s) not known to have been exposed to the disease agent but showing clinical signs similar to the case definition, and that therefore requires investigation(s).

For most diseases, the RA should contain as many SPs as practical. Every effort should be made to investigate and reclassify SPs as soon as possible. SPs are considered a very high priority for veterinary investigations. The investigation and risk assessment may produce the following outcomes:

- If the case definition is confirmed, the premises would be classified as an IP.
- If the case definition is not confirmed but suspicion remains, the premises would continue to be classified as an SP, until further investigation determines its reclassification.
- If the case definition is ruled out, the premises would be given the qualifier AN. If it is located in the RA, it would then be reclassified as an ARP with the qualifier AN (ARP-AN). If it is located in the CA, it would be classified as a premises of relevance (POR) with the qualifier AN (POR-AN)

5.2.3 Trace premises (TP)

TP is a temporary classification of a premises that contains a susceptible animal(s) that tracing indicates may have been exposed to the disease agent, or contains contaminated animal products, wastes or things, and that requires investigation(s).

For most diseases, the RA should include as many TPs as practical. Every effort should be made to investigate and reclassify a TP as soon as possible. Exposure may occur from animal movements, contaminated material, vehicles, equipment and fomites, as well as via aerosol, especially if the premises is contiguous with an IP. The investigation and an epidemiological assessment may produce the following outcomes:

- If the case definition is met, the premises would be classified as an IP.
- If it appears highly likely that the disease is present and that the TP is highly likely to contain an infected animal(s) or contaminated animal products, wastes or things, even though there are no visible clinical signs, the premises would be classified as a DCP or a DCPF.
- If the investigation shows no evidence of the EAD, the premises would be assessed as negative. If it is located in the RA and there are susceptible animals remaining, it would then be reclassified as an ARP with the qualifier AN (ARP-AN). If it is located in the CA, it would be classified as a POR with the qualifier AN (POR-AN).
- If the tracing investigation reveals no susceptible animals or risk products, wastes or things on the destination premises, a TP may be reclassified as a ZP.

5.2.4 Dangerous contact premises (DCP)

A DCP is a premises, apart from an abattoir, knackery or milk processing plant or other such facility, that, after investigation and based on a risk assessment, is considered to contain a susceptible animal(s) not showing clinical signs, but considered highly likely to contain an infected

animal(s) and/or contaminated animal products, wastes or things that present an unacceptable risk to the response if the risk is not addressed, and that therefore requires action to address the risk.

During the initial phase of a response, the RA should contain all the DCPs. As the incident develops, epidemiological investigation and tracing from IPs, SPs and TPs within the RA could identify DCPs that are sufficiently distant that they are outside the existing RAs and within the CA. This could trigger an extension of the RA to include them. However, it may prove impractical to extend an RA if the DCP is sufficiently distant from the existing RA. The trigger to declare a separate RA would be the identification of an IP. A DCP on its own does not trigger an RA. In these cases, it is possible that a DCP would be situated within a CA.

Whether an RA is drawn around a DCP depends on whether the transmission risk can be contained on the premises using premises-specific measures, or whether there is a need for RA measures to be applied as well, involving surrounding properties in heightened surveillance and tighter movement controls. The characteristics of the disease and its behaviour will be the major determinant. The risk assessment would consider these, as well as the stage of the response, the animal(s) present and the local situation.

Although susceptible animals on such premises are not showing clinical signs, they are considered to have been significantly exposed to the disease agent — this might be via an infected animal(s); a vector; contaminated animal products, wastes or things; or another transmission mechanism. If susceptible animals on a premises were exhibiting clinical signs that were similar to the case definition, the premises must be classified as an SP.

Since a DCP presents an unacceptable risk to the response if the risk is not addressed, such premises are subjected to appropriate control measures, including ongoing epidemiological monitoring, risk assessment and investigation, as required. Monitoring, risk assessment or investigation of a DCP may produce the following outcomes:

- If the presence of an infected animal or contaminated animal products, wastes or things is confirmed, the premises would be classified as an IP.
- If their presence is not confirmed but the likelihood is considered to remain high, the premises would continue to be classified as a DCP until completion of control measures enables it to be reclassified as an RP. A subsequent risk assessment would allow it to be reclassified as an ARP with an AN qualifier. If animals had been vaccinated as part of the control measures, the premises may also have the qualifier VN.
- If it is considered unlikely that an infected animal or contaminated animal products, wastes or things are present, the premises would be assessed as negative (DCP-AN). If it is located in the RA, it would then be reclassified as an ARP with the qualifier AN. If it is located in the CA, it would be classified as a POR with the qualifier AN.

Once the control measures are completed, the DCP will be reclassified as an RP.

5.2.5 Dangerous contact processing facility (DCPF)

A DCPF is an abattoir, knackery, milk processing plant or other such facility that, based on a risk assessment, appears highly likely to have received infected animals, or contaminated animal products, wastes or things, and that requires action to address the risk.

Particularly for DCPFs, classification provides authorities with a framework for the exercise of legal powers over the premises and to facilitate product tracking, and serves as a communication tool for reporting nationally and internationally on progress in the response.

Since a DCPF presents an unacceptable risk to the response if the risk is not addressed, such premises are subjected to appropriate control measures, including ongoing epidemiological monitoring, risk assessment and investigation, as required. Monitoring, risk assessment and investigation of a DCPF may produce the following outcomes:

- If the presence of an infected animal or contaminated animal products, wastes or things is confirmed, the premises would be classified as an IP.
- If their presence is not confirmed but the likelihood is considered to remain high, the premises would continue to be classified as a DCPF until completion of control measures enables it to be reclassified as an RP. A subsequent risk assessment may allow it to be reclassified as an approved processing facility (APF), if increased biosecurity measures are maintained.
- If it is considered unlikely that an infected animal or contaminated animal products, wastes or things are present, the premises would be assessed as negative (DCPF-AN). It may then be reclassified as an APF, if increased biosecurity measures are maintained.

Once the control measures are completed, the DCPF will be reclassified as an RP.

If, as part of disease control management, a DCPF is used to slaughter suspect or infected animals, it will be reclassified as an IP until it meets the definition for an APF or ZP.

5.2.6 Approved processing facility (APF)

An APF is an abattoir, knackery, milk processing plant or other such facility that maintains increased biosecurity standards. Such a facility could have animals or animal products introduced from lower risk premises under a permit for processing to an approved standard.

Before being classified as an APF, the premises is assessed to confirm that it has not received infected animals, or contaminated animal products, wastes or things, and is operating according to agreed biosecurity standards.

If, during the course of a response, the premises is suspected to have received infected animals, or contaminated animal products, wastes or things, it will be reclassified as a DCPF pending further investigation.

5.2.7 At-risk premises (ARP)

An ARP is a premises in an RA that contains a live susceptible animal(s) but is not considered at the time of classification to be an IP, DCP, DCPF, SP or TP.

The animal(s) on such premises are subject to disease control procedures, such as regular surveillance and movement restrictions, that are appropriate to the RA.

5.2.8 Premises of relevance (POR)

A POR is a premises in a CA that contains a live susceptible animal(s) but is not considered at the time of classification to be an IP, SP, TP, DCP or DCPF.

The animal(s) on such premises are subject to disease control procedures, such as heightened surveillance and movement restrictions, that are appropriate to the CA.

5.2.9 Resolved premises (RP)

An RP is an IP, DCP or DCPF that has completed the required control measures and is subject to the procedures and restrictions appropriate to the area in which it is located.

Later in a response, as control measures on IPs, DCPs and DCPFs are completed, the premises are reclassified to RP, and their risk status is progressively reviewed.

After appropriate investigation and risk assessment, an RP will become an ARP, POR, ZP or APF.

5.2.10 Unknown status premises (UP)

A UP is a premises within a declared area where the current presence of susceptible animals and/or risk products, wastes or things is unknown.

If an investigation and epidemiological risk assessment on a UP confirmed:

- the presence of an infected animal or contaminated animal products, wastes or things, the premises would be classified as an IP
- that it contained no susceptible animals and/or risk products, wastes or things, the UP would be reclassified as a ZP
- the presence of susceptible animals and excluded the presence of an EAD or the causative agent of the EAD, the UP would be reclassified as an ARP if in the RA, or a POR if in the CA
- clinical signs similar to the case definition, the UP would be reclassified as an SP
- an epidemiological link to a risk premises, the UP would become a TP
- a high-risk epidemiological link but without clinical signs of an EAD, the UP would be reclassified as a DCP or DCPF.

5.2.11 Zero susceptible species premises (ZP)

A ZP is a premises that does not contain any susceptible animals or risk products, wastes or things.

5.2.12 Qualifiers

The following qualifying categories may be added to a property status.

5.2.12.1 Assessed negative (AN)

AN is a qualifier that may be applied to ARPs, PORs and premises previously defined as SPs, TPs, DCPs or DCPFs that have undergone an epidemiological and/or laboratory assessment and have been cleared of suspicion at the time of classification, and can progress to another status. The animals on such premises are subject to the procedures and movement restrictions appropriate to the declared area (RA or CA) in which the premises is located.

This classification is a description to document progress in the response and in the proof-of-freedom phase. The AN qualifier is a temporary status and only valid at the time it is applied. The time that the AN qualifier remains active will depend on the circumstances and will be decided by the jurisdiction. One day is considered a reasonable guideline. The AN qualifier should also provide a trigger for future surveillance activity to regularly review, and change or confirm, a premises status.

The AN qualifier can also function as a counting tool to provide quantitative evidence of progress, to inform situation reports in control centres during a response. It provides a monitor for very high-priority premises (SPs and TPs) as they undergo investigations and risk assessment, and are reclassified, as well as a measure of surveillance activity overall for ARPs and PORs.

The AN qualifier can be applied in a number of ways, depending on the objectives and processes within control centres. The history of each premises throughout the response is held in the information system; the application of the AN qualifier is determined by the jurisdiction, the response needs and the specific processes to be followed in a local control centre.

5.2.12.2 Vaccinated (VN)

VN is a qualifier that can be applied in a number of different ways. At its most basic level, it can be used to identify premises that contain susceptible animals that have been vaccinated against CSF. However, depending on the legislation, objectives and processes within a jurisdiction, the VN qualifier may be used in different ways to track a range of criteria and parameters. The details would need to be developed and tailored to meet individual needs of jurisdictions and circumstances.

Some of the issues that could be included for consideration are detailed below.

Definition and monitoring of vaccination

The vaccination status of a population of animals or premises might be important when considering movement controls and the proof of freedom phase.

For the purposes of AUSVETPLAN, the following guidance should be followed.

To be referred to as a vaccinated population, the population must have been vaccinated in accordance with:

- the Australian Pesticides and Veterinary Medicines Authority (APVMA) registered label particulars, or
- APVMA-approved permit instructions relating to an approved EADRP for off-label use or use of an unregistered immunobiological product(s), or
- instructions of the relevant CVO.

Monitoring vaccination programs

A mechanism for recording and monitoring primary and booster vaccinations for all vaccinated animals should be part of the disease control monitoring system, to provide information on the control of the outbreak as well as evidence for proof of freedom. For example, jurisdictions may choose to add numbers to the qualifiers to indicate primary (VN1) or booster (VN2) vaccinations.

Incomplete vaccination programs

Vaccination programs during emergency responses are not always completed by the time a response is terminated. Therefore, there may be populations of animals present in the proof-of-freedom phase that are only partially vaccinated and will need to be accounted for, particularly if serology is used for proof of freedom.

Vaccination records and identification of vaccinated animals

The key requirement in an EAD response in which vaccine is used will be to identify vaccinated animals (fully or partially) so they can be disposed of or tested in the proof-of-freedom phase. Records of the number of doses administered and their timing can be kept to identify fully vaccinated premises and premises that have not completed the planned vaccination program (partially vaccinated) or are overdue for booster vaccinations.

In cattle, the National Livestock Identification System (NLIS) can record the animals vaccinated. For other species, the NLIS still relies on mob identification. Where appropriate, individual animal identification by means other than NLIS (eg individual animal management tags, microchips [radio-frequency identification], collars) may be necessary.

5.3 Guidelines for reclassifying previously declared areas

Maintaining movement restrictions on areas for long periods has important implications for resource management, animal welfare, business continuity, and socioeconomic impacts on producers and regional communities.

During the course of an EAD response, it may become necessary for a CA or RA to be expanded, as additional geographic areas or new foci of infection are identified. Later in the response, as control is achieved, mechanisms for gradually reducing the size of the CA and RA can be introduced.

An EAD may involve multiple foci of infection, with several jurisdictions potentially involved. Since disease might be controlled at different rates in different areas, there may be the opportunity to progressively lift restrictions on an area basis. This would involve reclassifying previously declared areas (RAs and CAs), with a staged approach to lifting of movement restrictions. This is a key step in the recovery process and will have positive benefits on the community.

The lifting of restrictions in declared areas is managed by jurisdictions according to their local legislation, regulations and processes.

The key principles for reclassifying a previously declared area during a response should include the following, noting that not all will be relevant for some diseases:

- The area should be epidemiologically distinct from other declared areas.
- All TPs and SPs have been investigated and reclassified, and all IPs, DCPs and DCPFs in the area have been reclassified as RPs.
- All tracing and surveillance associated with EAD control has been completed satisfactorily, with no evidence or suspicion of infection in the area.
- A minimum period of 'x' days¹⁹ has elapsed since pre-determined disease control activities and risk assessment were completed on the last IP or DCP in the area.
- An approved surveillance program (including the use of sentinel animals, if appropriate) has confirmed no evidence of infection in the RA (see below).
- For vector-borne diseases, vector monitoring and absence of transmission studies indicate that vectors are not active.

Lifting of restrictions is a process managed by the combat CVO under jurisdictional legislation and consistent with the most current agreed EADRP. When the appropriate conditions are satisfied, a combat jurisdiction can, in consultation with the Consultative Committee on Emergency Animal Diseases (CCEAD), reduce the size of the RA or lift all restrictions. The previous part of the RA would then become part of the CA. Jurisdictions should be able to present documented evidence that the appropriate conditions have been met.

When an RA is lifted and becomes part of the CA, it will have a lower risk status, and the movement restrictions that apply will be consistent with those applying within the CA. Over time, all of the RAs will be reduced and lifted.

If there is more than one combat jurisdiction involved, each will use its own appropriate legal jurisdictional mechanisms to lift the declaration of the RA or CA, coordinating with each other and consulting with the CCEAD to ensure wide communication and coordination.

After a further period of surveillance and monitoring, and provided that the additional surveillance and monitoring find no evidence of infection, a jurisdiction, in consultation with the CCEAD, could lift the CA. This would result in the lifting of all the remaining regulatory controls associated with the response, and a return to business as usual.

¹⁹ The minimum period uses, or is based on, the disease-specific incubation periods defined by the OIE — two incubation periods is a common guideline.

6 Quarantine and movement controls

6.1 General principles

The principles for the recommended quarantine practices and movement controls are as follows:

- Containment and eradication of classical swine fever (CSF) is the highest priority. Therefore, ‘normal business movements’ are not allowed.
- Live animals pose the greatest risk of disease spread; therefore, their movements from all premises within the restricted area (RA) and control area (CA) must be strictly controlled.
- The outside area (OA) should remain as ‘clean’ as possible. Therefore, movement of animals from the RA to the OA is prohibited, and movement of products is generally prohibited. Movement of animals and products from the CA to the OA will also be restricted.
- Trace premises (TP) and suspect premises (SP) are temporary classifications, and every effort should be made to resolve the status of these premises as soon as possible.
- The numbers of susceptible animals within the RA should be minimised. Therefore, movements of animals into the RA will be limited and usually for slaughter only.
- Movement restrictions are more stringent within the RA than within the CA, and will be more stringent in the early stages of the response.
- Movement controls may be varied during a response from those listed here. However, this will involve a variation to the agreed Emergency Animal Disease Response Plan, with endorsement by the Consultative Committee on Emergency Animal Diseases (CCEAD) and the National Management Group (NMG).
- Recommended movement controls apply to any movement off a premises, whether on foot or by vehicle, that involves either public or private land.

6.2 Guidelines for issuing permits

When assessing risk for the purposes of issuing a permit, the elements to consider may include:

- sources of risk
 - species of animal
 - type of product
 - presence of disease agent on both the originating and destination premises
 - current vector activity, if relevant
 - organisation and management issues (ie confidence in animal tracing and surveillance, biosecurity)
 - proposed use of the animals or products
 - proposed transport route
 - vaccination status of the animals (if relevant)
 - treatment of animals and vehicles to prevent concurrent movement of vectors, if relevant
 - security of transport
 - security and monitoring at the destination
 - environment and natural events

- community and human behaviour
- risk of sabotage
- technology
- regulations and standards
- available resources for compliance and enforcement
- areas of impact
 - livestock health (health of affected species, including animal welfare)
 - human health (including occupational health and safety)
 - trade and economic impacts (including commercial and legal impacts)
 - environmental impacts
 - organisational capacity
 - political impacts
 - reputation and image
- proposed risk treatment measures
 - vaccination
 - processing of product
 - disinfection or other treatment of animals, vehicles and fomites
 - vector control, if relevant
 - security
 - communication.

6.3 Types of permits

Permits are either general or special. 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. Either type of permit may include conditions. Once permit conditions have been agreed from an operational perspective, all permit conditions must be met for every permit. Both general and special permits may be in addition to documents required for routine movements between or within jurisdictions (eg health certificates, waybills, consignment notes, National Vendor Declarations).

6.3.1 General permit

General permits (GPs) are used for lower risk movements, and create a record of each movement to which they apply. They are granted without the need for direct interaction between the person moving the animal(s), commodity or thing and a government veterinarian or gazetted inspector of stock. The permit may be completed via a webpage or in an approved place (such as a government office or commercial premises). A printed version of the permit must accompany the movement. The permit may impose preconditions and/or restrictions on movements. GPs may not be available until the relevant chief veterinary officer (CVO) gives approval for general movements, and this may not be available in the early stages of a response.

6.3.2 Special permit

Special permits (SpPs) are issued by the relevant government veterinarian or gazetted inspector of stock. They are used for higher risk movements, and therefore require formal application and

individual risk assessment. SpPs describe the requirements for movement of an animal (or group of animals), commodity or thing, for which a specific assessment has been conducted by the relevant government veterinarian or gazetted inspector of stock. A printed version of the permit must accompany the movement. The permit may impose preconditions and/or restrictions on movements.

6.3.2.1 Emergency permit

An emergency permit is a special permit that specifies strict legal requirements for an otherwise high-risk movement of an animal, to enable emergency veterinary treatment to be delivered, to enable animals to be moved for animal welfare reasons, or to enable any other emergency movement under exceptional circumstances. These permits are issued on a case-by-case basis under the authorisation of the relevant CVO.

6.4 Recommended quarantine practices and movement controls

Restricted and control areas will be declared and their operations policed in line with good disease control procedures and internationally agreed guidelines. The boundaries of the restricted area (RA) should be approximately 3 km from an IP. The control area (CA) should have its boundary at least 10 km from relevant IPs, to ensure a satisfactory buffer zone between the infected and free areas. As many as possible of the SPs will be included in the RA, with the IPs and DCPs.

IPs, DCPs and SPs will be declared as soon as they are detected. Quarantine and movement controls in the RA will be imposed on IPs, DCPs and SPs, and movements in and out of the area will be restricted.

Movement of live pigs, products and fomites from IPs, DCPs and SPs will generally be prohibited, with some movements allowed under permit. Pigs from free properties, PORs and ARPs in the RA may be permitted to move to slaughter for human consumption under supervision.

Movement controls in the CA will not be as restrictive, but movements will generally be subject to permit. It would be preferable to have a processing plant in the CA to process pigs from within the CA, as well as those permitted to move for slaughter from the RA.

If the CA contains an appropriate premises for slaughtering pigs, and depending on the form of CSF present, permission may be granted for pigs to be removed for supervised slaughter for human consumption from quarantined farms where no sign of infection has developed for an agreed period of time after the event that placed that property in quarantine. Permission will be based on risk assessment but represents a minimal risk of infected pigs being removed; the risk is further reduced by the cooking processes involved in the human food chain.

Early in a response to CSF, the affected jurisdiction(s) will reinforce the message that swill feeding is illegal. Therefore, movements of meat products within the RA and CA would generally be allowed, under permit (see Section 6.4.3).

An **area matrix** showing movement controls has been developed for each risky commodity (see the following sections), and **premises matrices** would be developed as necessary.

If at all possible, an RA should include an approved abattoir.

6.4.1 Live susceptible animals

Because of the risk of transmitting CSF, **movement of live pigs from high-risk premises** is prohibited. Movement of live pigs into an RA is restricted, to minimise the number of susceptible animals within the RA.

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

To→ From ↓		RA		CA		OA
		IP/DCP/ SP/TP	ARP/DCPF	SP/TP	POR	
RA	IP/DCP/ SP/TP	Prohibited		Prohibited		Prohibited
	ARP	Prohibited		Prohibited		
CA	SP/TP	Prohibited		Prohibited		Prohibited
	POR	Prohibited	Prohibited, except under SpP2	Prohibited	Prohibited, except under GP1	
OA	OA	Prohibited	Prohibited, except under SpP2	Prohibited	Prohibited, except under GP1	Allowed

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

Notes for Table 6.1

SpP1 conditions — emergency permit for exceptional circumstances only (ie primarily for welfare reasons):

- For slaughter, or to an ARP for other purposes if a risk analysis indicates that the risk associated with movement is acceptable within the response.
- Travel by approved route only, and no stopping en route.
- Appropriate biosecurity standard at receiving premises.
- Appropriate decontamination of equipment and vehicles.
- Absence of clinical signs before and on day of travel.

- Single consignment per load.
- Physical identification of individual animals (eg ear tag, brand), with accompanying movement documentation (eg National Vendor Declaration, waybill, PigPass).

SpP2 conditions

- For slaughter only, if the RA contains the only available abattoir.
- Travel by approved route only, and no stopping en route.
- Appropriate biosecurity standard at receiving premises.
- Appropriate decontamination of equipment and vehicles.
- Absence of clinical signs before and on day of travel.
- Single consignment per load.
- Physical identification of individual animals (eg ear tag, brand), with accompanying movement documentation (eg National Vendor Declaration, waybill, PigPass).

GP1 conditions:

- For slaughter, movement within an approved compartment or movement to other PORs.
- Absence of clinical signs before and on day of travel.
- Appropriate decontamination of vehicles and equipment.
- Travel by approved route only, and no stopping en route.
- Physical identification of individual animals (eg ear tag, brand), with accompanying movement documentation (eg National Vendor Declaration, waybill, PigPass).

6.4.2 Semen and embryos from live susceptible animals

Pig semen

Since CSF can be transmitted by semen, movement of semen from high-risk premises and out of the RA will be prohibited. To enable business continuity, semen sourced from properties in the CA and OA can be moved into the RA and the CA under permit.

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

Table 6.2 Recommended movement controls for pig semen

To→ From↓		RA		CA		OA
		IP/DCP/ SP/TP	ARP/DCPF	SP/TP	POR	
RA	IP/DCP/ SP/TP	Prohibited		Prohibited		Prohibited
	ARP					
CA	SP/TP	Prohibited		Prohibited		Prohibited
	POR	Prohibited, except under SpP3		Prohibited, except under SpP3		
OA	OA	Prohibited, except under GP2		Prohibited, except under GP2		Allowed

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

Notes for Table 6.2 SpP3 conditions:

- Owner declaration and evidence that the boars have been tested twice in the previous 14 days, at least 5 days apart, with negative results, with the second test occurring less than 72 hours before collection of semen.
- Evidence of an operational biosecurity manual, including maintenance of biosecurity procedures, accurate record keeping, and semen containers being adequately clean and biosecure.
- Absence of clinical signs before and on the day of collection and since that time.

GP2 conditions:

- Owner declaration that the boars have been tested twice in the previous 14 days, at least 5 days apart, with negative results, with the second test occurring less than 72 hours before collection of semen.
- Absence of clinical signs before and on the day of collection and since that time.
- Accurate record keeping of all semen movements off the property.
- Evidence of an operational biosecurity manual, including maintenance of biosecurity procedures.

In vivo-derived pig embryos

The risk of transmitting CSF by embryos is very low, especially if embryos are collected and handled appropriately.

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

Table 6.3 Recommended movements controls for in vivo-derived pig embryos

To→ From ↓	RA	CA	OA
RA	Prohibited, except under GP3	Prohibited, except under GP3	Prohibited, except under GP3
CA	Prohibited, except under GP3	Prohibited, except under GP3	Prohibited, except under GP3
OA	Prohibited, except under GP3	Prohibited, except under GP3	Allowed

CA = control area; GP = general permit; OA = outside area; RA = restricted area

Notes for Table 6.3

GP3 conditions:

- Embryos collected and handled in accordance with the procedures detailed in the International Embryo Transfer Society (IETS) manual (4th edition, 2010).
- Absence of clinical signs before and on the day of collection and since that time.
- Accurate record keeping of all embryo movements off the property.
- Evidence of an operational biosecurity manual, including maintenance of biosecurity procedures.

6.4.3 Meat and meat products

The risks from pigmeat and offal are addressed primarily through movement controls on live pigs going to slaughter and the fact that swill feeding to pigs is illegal in all jurisdictions. Because CSF is not a zoonosis, disease concerns are limited to CSF in pigs arising from the diversion of pigmeat or offal for pig feed.

Table 6.4 describes the recommended movement controls for fresh/frozen pigmeat and offal, from an approved abattoir, within and between declared areas.

Table 6.4 Recommended movement controls for fresh/frozen pigmeat and offal

To→ From↓	RA	CA	OA
RA	Prohibited, except under SpP4	Prohibited, except under SpP4	Prohibited, except under SpP4
CA	Prohibited, except under GP4	Prohibited, except under GP4	Prohibited, except under GP4
OA	Allowed	Allowed	Allowed

CA = control area; GP = general permit; OA = outside area; RA = restricted area; SpP = special permit

Notes for Table 6.4

SpP4 conditions:

- Biosecure transport to an approved biosecure disposal facility or rendering facility, or biosecure disposal on-site; approved route only.
- The material is not brought into direct or indirect contact with susceptible animals.
- Every precaution is taken to ensure that effluent, other fluids or aerosols do not leak out of the transport vehicle.
- Transport vehicle and containers are decontaminated under supervision between loads.

GP4 conditions:

- The material is not brought into direct or indirect contact with susceptible animals.
- Every precaution is taken to ensure that effluent, other fluids or aerosols do not leak out of the transport vehicle.
- Transport vehicle and containers are decontaminated between loads.

6.4.4 Waste products and effluent

Pig effluent can transmit CSF virus; therefore, movement of piggery wastes from high-risk premises and out of the RA is generally prohibited. The exception is from IPs under permit, after depopulation, to properties without susceptible species (ZP).

Table 6.5 shows the recommended movement controls for pig waste products and effluent within and between declared areas.

Table 6.5 Recommended movement controls for waste products and effluent

To→ From ↓		RA		CA	OA
		IP/DCP/ TP/SP/ARP	ZP (within RA)	ZP	
RA	IP	Prohibited	Prohibited, except under SpP5	Prohibited	Prohibited
	DCP/SP/ TP		Prohibited		
	ARP		Prohibited, except under SpP5	Prohibited, except under SpP5	
CA	SP/TP	Prohibited		Prohibited	Prohibited
	POR			Prohibited, except under GP5	Prohibited, except under GP5
OA	OA	Prohibited	Allowed	Allowed	Allowed

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; ZP = zero susceptible species premises

Notes for Table 6.5

SpP5 conditions:

- After a minimum of 30 days following depopulation.
- Only to a ZP (such as a broadacre farm) for use as fertiliser, or to a composting facility.
- The material is not brought into direct or indirect contact with susceptible animals.
- Every precaution is taken to ensure that effluent, other fluids or aerosols do not leak out of the transport vehicle.
- Transport vehicle and containers are decontaminated under supervision between loads.
- Use of an approved transport route.

GP5 conditions:

- Only to a ZP (such as a broadacre farm) for use as fertiliser, or to a composting facility.
- The material is not brought into direct or indirect contact with susceptible animals.
- Every precaution is taken to ensure that effluent, other fluids or aerosols do not leak out of the transport vehicle.
- Transport vehicle and containers are decontaminated between loads.

6.4.5 Empty livestock transport vehicles and associated equipment

CSF virus does not survive for long periods in the environment. However, vehicles that have been used to transport pigs and equipment used with pigs must be thoroughly cleaned after use.

Table 6.6 shows the recommended movement controls for empty pig transport vehicles and associated equipment within and between declared areas.

Table 6.6 Recommended movement controls for empty pig transport vehicles and equipment

To→ From ↓	RA	CA	OA
RA	Prohibited, except under SpP6	Prohibited, except under SpP6	Prohibited, except under SpP6
CA	Prohibited, except under GP6	Prohibited, except under GP6	Prohibited, except under GP6
OA	Allowed	Allowed	Allowed

CA = control area; GP = general permit; OA = outside area; RA = restricted area; SpP = special permit

Notes for Table 6.6

SpP6 conditions:

- Vehicles that have carried pigs and equipment that has been used with pigs are appropriately decontaminated as soon as possible after use, at an appropriate site (eg truck wash-down facility at an abattoir), and are dry before reuse.

GP6 conditions:

- Vehicles that have carried pigs and equipment that has been used with pigs are appropriately decontaminated as soon as possible after use, at an appropriate site (eg truck wash-down facility at an abattoir), and are dry before reuse.

6.4.6 People and nonsusceptible animals

The movement of **people** is restricted to essential visitors who use protective clothing, including boots, on the premises, including between sections containing pigs of different health status, and decontaminate their hands before leaving the premises.

6.4.7 Crops, grains, hay, silage and mixed feeds

The movement of **crops and grains** is allowed, subject to appropriate decontamination.

6.4.8 Sales, shows and other events

The movement of pigs to **sales and shows** might be prohibited during a response. Hunting of feral pigs for nonresponse purposes in the RA and CA should be actively discouraged during a response to CSF.

7 Procedures for surveillance and proof of freedom

7.1 Surveillance

In determining an effective but efficient program to prove freedom after an outbreak, the following elements should be considered in conjunction with the OIE *Terrestrial Animal Health Code* recommendations on surveillance for CSF:

- The populations of pigs in the area. Pigs within the restricted, control and free areas should, if possible, be defined into discrete populations for the purposes of surveillance. For example, feral pigs located within a state forest would be one population, and ‘fringe’ piggeries may be another. Intensive piggery operations would usually be treated as discrete units.
- The number of properties detected as infected during the outbreak, and the degree of spread this indicates.
- The estimated time the virus could have been present in Australia.
- For surveillance planning, the agreed incubation period. Special attention must also be given to examining swill feeding activities.
- The accuracy, cost and availability of laboratory tests to examine a large number of animals.
- Whether vaccine has been used.
- The resources available to undertake surveillance testing. Close cooperation between the epidemiologist and resources manager is essential. However, limited resources should not compromise achieving a scientifically acceptable result. For example, savings may be accomplished by:
 - collecting material from abattoirs, even though material can only be selected from specific age groups
 - organising the program over a slightly longer period.

All these factors will influence the statistically acceptable sample size of testing required for Australia to claim freedom from disease. Clearly, the pattern and timing of testing will depend on the specific circumstances, but should aim at expanding the free area.

7.2 Proof of freedom

The OIE Terrestrial Code states that a country may be considered free from classical swine fever (CSF) when risk assessment and surveillance have been conducted (in accordance with Chapter 15.2 of the Code²⁰), and no outbreak has been observed for at least 12 months. This period may be reduced to 6 months where a stamping-out policy without vaccination is practised. If vaccination is practised, vaccinated pigs must be slaughtered unless there are validated means of distinguishing between vaccinated and infected pigs.

²⁰ www.oie.int/index.php?id=169&L=0&htmfile=chapitre_1.15.2.htm

Appendix 1

CLASSICAL SWINE FEVER IN FERAL PIGS

Although classical swine fever (CSF) is not sustained by **most** wild pig populations, outbreaks can be long lived in wild populations (Artois et al 2002) and can become endemic in some populations (Laddomada et al 1994, Rossi et al 2005, Vicente et al 2005).

High-prevalence, persistent or endemic CSF in feral pigs

Factors that may contribute to high-prevalence, persistent or endemic CSF in feral pigs are:

- high-density populations (Vicente et al 2005)
- seasonal breeding, leading to regular increases in susceptibility of the population as new, naive animals are born; these animals can be infected by persistently infected young born the previous breeding season (Kern et al 1999)
- poor management (eg inappropriate management units — see Zanardi et al [2003])
- regular contact between domestic and wild pigs (Artois et al 2002)
- contiguous populations (Cowled and Garner 2008).

Control options

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 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 further culling is required.

It is important that culling reduce 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 Germany where CSF has become endemic, oral vaccination with a conventional live virus vaccine based on an attenuated CSF virus strain has been regularly practised (Kaden et al 2000). This vaccine was delivered in baits by aeroplane or hand delivered on the ground. The baits were not consumed well by younger pigs, perhaps because older animals excluded them from baits (Artois et al 2002). However, during trials in Australia, young animals readily consumed baits with biomarkers in field situations because appropriate baiting strategies were used (Cowled et al 2008b).

It has been difficult to audit the effectiveness of vaccination programs in Germany because it is not possible to distinguish between naturally induced and vaccine-induced immunity (Artois et al 2002).

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 expense and the extensive resources required to demonstrate proof of freedom after vaccination has occurred in an area (and associated trade implications). Despite this, it is likely that proof of freedom could be demonstrated after vaccination with a sensitive pestivirus real-time PCR test at CSIRO-AAHL and adequate surveillance, which may include the use of sentinel herds of feral pigs from disease-free areas.

Glossary

Disease-specific terms

Term	Definition
Cyanosis (adj. cyanotic)	Blueness of the skin and/or mucous membranes due to insufficient oxygenation of the blood.
Hyperaemia	An increase in the amount of blood in a tissue or organ due to dilation of the supplying arteries.
Leucopenia	A decrease in the number of white cells in the blood.
Rendering	Processing by heat to inactivate infective agents. Rendered material may be used in various products according to particular disease circumstances.
Swill	<p>[Also known as ‘prohibited pig feed’, material of mammalian origin, or any substance that has come in contact with this material; it does not include:</p> <ul style="list-style-type: none"> • milk, milk products or milk byproducts, either of Australian provenance or legally imported for stockfeed use into Australia • material containing flesh, bones, blood, offal or mammal carcasses that is treated by an approved process • a carcass or part of a domestic pig, born and raised on the property on which the pig or pigs that are administered the part are held, that is administered for therapeutic purposes in accordance with the written instructions of a veterinary practitioner • material used under an individual and defined-period permit issued by a jurisdiction for the purposes of research or baiting.]
Swill feeding	<p>[Also known as ‘feeding prohibited pig feed’, includes:</p> <ul style="list-style-type: none"> • feeding, or allowing or directing another person to feed, prohibited pig feed to a pig • allowing a pig to have access to prohibited pig feed • the collection and storage or possession of prohibited pig feed on a premises where one or more pigs are kept • supplying to another person prohibited pig feed that the supplier knows is for feeding to any pig.]

Standard AUSVETPLAN terms

Term	Definition
Animal byproducts	Products of animal origin that are not for consumption but are destined for industrial use (eg hides and skins, fur, wool, hair, feathers, hooves, bones, fertiliser).
Animal Health Committee	A committee whose members are the Australian and state and territory CVOs, the Director of the CSIRO Australian Animal Health Laboratory, and the Director of Environmental Biosecurity in the Australian Government Department of the Environment. The committee provides advice to the Australian Agriculture Ministers' Forum on animal health matters, focusing on technical issues and regulatory policy (formerly called the Veterinary Committee). <i>See also</i> Australian Agriculture Ministers' Forum
Animal products	Meat, meat products and other products of animal origin (eg eggs, milk) for human consumption or for use in animal feedstuff.
Approved processing facility	An abattoir, knackery, milk processing plant or other such facility that maintains increased biosecurity standards. Such a facility could have animals or animal products introduced from lower risk premises under a permit for processing to an approved standard.
At-risk premises (ARP)	A premises in a restricted area that contains a live susceptible animal(s) but is not considered at the time of classification to be an infected premises, dangerous contact premises, dangerous contact processing facility, suspect premises or trace premises.
Australian Agriculture Ministers' Forum (AGMIN)	The forum of Australian national, state and territory and New Zealand ministers of agriculture that sets Australian and New Zealand agricultural policy (formerly the Standing Council on Primary Industries). <i>See also</i> Animal Health Committee

Term	Definition
Australian Chief Veterinary Officer	The nominated senior veterinarian in the Australian Government Department of Agriculture who manages international animal health commitments and the Australian Government's response to an animal disease outbreak. <i>See also</i> Chief veterinary officer
AUSVETPLAN	<i>Australian Veterinary Emergency Plan.</i> A series of technical 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.
Chief veterinary officer (CVO)	The senior veterinarian of the animal health authority in each jurisdiction (national, state or territory) who has responsibility for animal disease control in that jurisdiction. <i>See also</i> Australian Chief Veterinary Officer
Compartmentalisation	The process of defining, implementing and maintaining one or more disease-free establishments under a common biosecurity management system in accordance with OIE guidelines, based on applied biosecurity measures and surveillance, in order to facilitate disease control and/or trade.
Compensation	The sum of money paid by government to an owner for livestock or property that are destroyed for the purpose of eradication or prevention of the spread of an emergency animal disease, and livestock that have died of the emergency animal disease. <i>See also</i> Cost-sharing arrangements, Emergency Animal Disease Response Agreement
Consultative Committee on Emergency Animal Diseases (CCEAD)	The key technical coordinating body for animal health emergencies. Members are state and territory CVOs, representatives of CSIRO-AAHL and the relevant industries, and the Australian CVO as chair.

Term	Definition
Control area (CA)	A legally declared area where the disease controls, including surveillance and movement controls, applied are of lesser intensity than those in a restricted area (the limits of a control area and the conditions applying to it can be varied during an incident according to need).
Cost-sharing arrangements	Arrangements agreed between governments (national and states/territories) and livestock industries for sharing the costs of emergency animal disease responses. <i>See also</i> Compensation, Emergency Animal Disease Response Agreement
Dangerous contact animal	A susceptible animal that has been designated as being exposed to other infected animals or potentially infectious products following tracing and epidemiological investigation.
Dangerous contact premises (DCP)	A premises, apart from an abattoir, knackery or milk processing plant (or other such facility), that, after investigation and based on a risk assessment, is considered to contain a susceptible animal(s) not showing clinical signs, but considered highly likely to contain an infected animal(s) and/or contaminated animal products, wastes or things that present an unacceptable risk to the response if the risk is not addressed, and that therefore requires action to address the risk.
Dangerous contact processing facility (DCPF)	An abattoir, knackery, milk processing plant or other such facility that, based on a risk assessment, appears highly likely to have received infected animals, or contaminated animal products, wastes or things, and that requires action to address the risk.
Declared area	A defined tract of land that is subjected to disease control restrictions under emergency animal disease legislation. There are two types of declared areas: restricted area and control area.
Decontamination	Includes all stages of cleaning and disinfection.

Term	Definition
Depopulation	The removal of a host population from a particular area to control or prevent the spread of disease.
Destroy (animals)	To kill animals humanely.
Disease agent	A general term for a transmissible organism or other factor that causes an infectious disease.
Disease Watch Hotline	24-hour freecall service for reporting suspected incidences of exotic diseases — 1800 675 888 .
Disinfectant	A chemical used to destroy disease agents outside a living animal.
Disinfection	The application, after thorough cleansing, of procedures intended to destroy the infectious or parasitic agents of animal diseases, including zoonoses; applies to premises, vehicles and different objects that may have been directly or indirectly contaminated.
Disinsectation	The destruction of insect pests, usually with a chemical agent.
Disposal	Sanitary removal of animal carcasses, animal products, materials and wastes by burial, burning or some other process so as to prevent the spread of disease.
Emergency animal disease	A disease that is (a) exotic to Australia or (b) a variant of an endemic disease or (c) a serious infectious disease of unknown or uncertain cause or (d) a severe outbreak of a known endemic disease, and that is considered to be of national significance with serious social or trade implications. <i>See also</i> Endemic animal disease, Exotic animal disease

Term	Definition
Emergency Animal Disease Response Agreement	Agreement between the Australian and state/territory governments and livestock industries on the management of emergency animal disease responses. Provisions include participatory decision making, risk management, cost sharing, the use of appropriately trained personnel and existing standards such as AUSVETPLAN. <i>See also</i> Compensation, Cost-sharing arrangements
Endemic animal disease	A disease affecting animals (which may include humans) that is known to occur in Australia. <i>See also</i> Emergency animal disease, Exotic animal disease
Enterprise	<i>See</i> Risk enterprise
Enzyme-linked immunosorbent assay (ELISA)	A serological test designed to detect and measure the presence of antibody or antigen in a sample. The test uses an enzyme reaction with a substrate to produce a colour change when antigen-antibody binding occurs.
Epidemiological investigation	An investigation to identify and qualify the risk factors associated with the disease. <i>See also</i> Veterinary investigation
Epidemiology	The study of disease in populations and of factors that determine its occurrence.
Exotic animal disease	A disease affecting animals (which may include humans) that does not normally occur in Australia. <i>See also</i> Emergency animal disease, Endemic animal disease
Exotic fauna/feral animals	<i>See</i> Wild animals
Fomites	Inanimate objects (eg boots, clothing, equipment, instruments, vehicles, crates, packaging) that can carry an infectious disease agent and may spread the disease through mechanical transmission.

Term	Definition
General permit	A legal document that describes the requirements for movement of an animal (or group of animals), commodity or thing, for which permission may be granted without the need for direct interaction between the person moving the animal(s), commodity or thing and a government veterinarian or inspector. The permit may be completed via a webpage or in an approved place (such as a government office or commercial premises). A printed version of the permit must accompany the movement. The permit may impose preconditions and/or restrictions on movements. <i>See also</i> Special permit
In-contact animals	Animals that have had close contact with infected animals, such as noninfected animals in the same group as infected animals.
Incubation period	The period that elapses between the introduction of the pathogen into the animal and the first clinical signs of the disease.
Index case	The first case of the disease to be diagnosed in a disease outbreak. <i>See also</i> Index property
Index property	The property on which the index case is found. <i>See also</i> Index case
Infected premises (IP)	A defined area (which may be all or part of a property) on which animals meeting the case definition are or were present, or the causative agent of the emergency animal disease is present, or there is a reasonable suspicion that either is present, and that the relevant chief veterinary officer or their delegate has declared to be an infected premises.
Local control centre (LCC)	An emergency operations centre responsible for the command and control of field operations in a defined area.

Term	Definition
Monitoring	Routine collection of data for assessing the health status of a population or the level of contamination of a site for remediation purposes. <i>See also</i> Surveillance
Movement control	Restrictions placed on the movement of animals, people and other things to prevent the spread of disease.
National management group (NMG)	A group established to approve (or not approve) the invoking of cost sharing under the Emergency Animal Disease Response Agreement. NMG members are the Secretary of the Australian Government Department of Agriculture as chair, the chief executive officers of the state and territory government parties, and the president (or analogous officer) of each of the relevant industry parties.
Native wildlife	<i>See</i> Wild animals
OIE Terrestrial Code	OIE <i>Terrestrial Animal Health Code</i> . Describes standards for safe international trade in animals and animal products. Revised annually and published on the internet at: www.oie.int/international-standard-setting/terrestrial-code/access-online
OIE Terrestrial Manual	OIE <i>Manual of Diagnostic Tests and Vaccines for Terrestrial Animals</i> . Describes standards for laboratory diagnostic tests and the production and control of biological products (principally vaccines). The current edition is published on the internet at: www.oie.int/international-standard-setting/terrestrial-manual/access-online
Operational procedures	Detailed instructions for carrying out specific disease control activities, such as disposal, destruction, decontamination and valuation.
Outside area (OA)	The area of Australia outside the declared (control and restricted) areas.
Owner	Person responsible for a premises (includes an agent of the owner, such as a manager or other controlling officer).

Term	Definition
Polymerase chain reaction (PCR)	A method of amplifying and analysing DNA sequences that can be used to detect the presence of viral DNA.
Premises	A tract of land including its buildings, or a separate farm or facility that is maintained by a single set of services and personnel.
Premises of relevance (POR)	A premises in a control area that contains a live susceptible animal(s) but is considered at the time of classification not to be an infected premises, suspect premises, trace premises, dangerous contact premises or dangerous contact processing facility.
Prevalence	The proportion (or percentage) of animals in a particular population affected by a particular disease (or infection or positive antibody titre) at a given point in time.
Primary case	The first actual case of the disease.
Quarantine	Legal restrictions imposed on a place or a tract of land by the serving of a notice limiting access or egress of specified animals, persons or things.
Resolved premises (RP)	An infected premises, dangerous contact premises or dangerous contact processing facility that has completed the required control measures and is subject to the procedures and restrictions appropriate to the area in which it is located.
Restricted area (RA)	A relatively small legally declared area around infected premises and dangerous contact premises that is subject to disease controls, including intense surveillance and movement controls.

Term	Definition
Risk enterprise	A defined livestock or related enterprise that is potentially a major source of infection for many other premises. Includes intensive piggeries, feedlots, abattoirs, knackeries, saleyards, calf scales, milk factories, tanneries, skin sheds, game meat establishments, cold stores, artificial insemination centres, veterinary laboratories and hospitals, road and rail freight depots, showgrounds, field days, weighbridges, garbage depots.
Sensitivity	The proportion of truly positive units that are correctly identified as positive by a test. <i>See also</i> Specificity
Sentinel animal	Animal of known health status that is monitored to detect the presence of a specific disease agent.
Seroconversion	The appearance in the blood serum of antibodies (as determined by a serology test) following vaccination or natural exposure to a disease agent.
Serosurveillance	Surveillance of an animal population by testing serum samples for the presence of antibodies to disease agents.
Serotype	A subgroup of microorganisms identified by the antigens carried (as determined by a serology test).
Serum neutralisation test	A serological test to detect and measure the presence of antibody in a sample. Antibody in serum is serially diluted to detect the highest dilution that neutralises a standard amount of antigen. The neutralising antibody titre is given as the reciprocal of this dilution.
Slaughter	The humane killing of an animal for meat for human consumption.

Term	Definition
Special permit	A legal document that describes the requirements for movement of an animal (or group of animals), commodity or thing, for which the person moving the animal(s), commodity or thing must obtain prior written permission from the relevant government veterinarian or inspector. A printed version of the permit must accompany the movement. The permit may impose preconditions and/or restrictions on movements. <i>See also</i> General permit
Specificity	The proportion of truly negative units that are correctly identified as negative by a test. <i>See also</i> Sensitivity
Stamping out	The strategy of eliminating infection from premises through the destruction of animals in accordance with the particular AUSVETPLAN manual, and in a manner that permits appropriate disposal of carcasses and decontamination of the site.
State coordination centre (SCC)	The emergency operations centre that directs the disease control operations to be undertaken in that state or territory.
Surveillance	A systematic program of investigation designed to establish the presence, extent or absence of a disease, or of infection or contamination with the causative organism. It includes the examination of animals for clinical signs, antibodies or the causative organism.
Susceptible animals	Animals that can be infected with a particular disease.
Suspect animal	An animal that may have been exposed to an emergency disease such that its quarantine and intensive surveillance, but not pre-emptive slaughter, is warranted. <i>or</i> An animal not known to have been exposed to a disease agent but showing clinical signs requiring differential diagnosis.

Term	Definition
Suspect premises (SP)	Temporary classification of a premises that contains a susceptible animal(s) not known to have been exposed to the disease agent but showing clinical signs similar to the case definition, and that therefore requires investigation(s).
Swill	<p>Also known as 'prohibited pig feed', material of mammalian origin, or any substance that has come in contact with this material; it does not include:</p> <ul style="list-style-type: none"> • milk, milk products or milk byproducts, either of Australian provenance or legally imported for stockfeed use into Australia • material containing flesh, bones, blood, offal or mammal carcasses that is treated by an approved process • a carcass or part of a domestic pig, born and raised on the property on which the pig or pigs that are administered the part are held, that is administered for therapeutic purposes in accordance with the written instructions of a veterinary practitioner • material used under an individual and defined-period permit issued by a jurisdiction for the purposes of research or baiting.
Swill feeding	<p>Also known as 'feeding prohibited pig feed', includes:</p> <ul style="list-style-type: none"> • feeding, or allowing or directing another person to feed, prohibited pig feed to a pig • allowing a pig to have access to prohibited pig feed • the collection and storage or possession of prohibited pig feed on a premises where one or more pigs are kept • supplying to another person prohibited pig feed that the supplier knows is for feeding to any pig.

Term	Definition
Trace premises (TP)	Temporary classification of a premises that contains susceptible animal(s) that tracing indicates may have been exposed to the disease agent, or contains contaminated animal products, wastes or things, and that requires investigation(s).
Tracing	The process of locating animals, persons or other items that may be implicated in the spread of disease, so that appropriate action can be taken.
Unknown status premises (UP)	A premises within a declared area where the current presence of susceptible animals and/or risk products, wastes or things is unknown.
Vaccination	Inoculation of individuals with a vaccine to provide active immunity.
Vaccine	A substance used to stimulate immunity against one or several disease-causing agents to provide protection or to reduce the effects of the disease. A vaccine is prepared from the causative agent of a disease, its products, or a synthetic substitute, which is treated to act as an antigen without inducing the disease.
– adjuvanted	A vaccine in which one or several disease-causing agents are combined with an adjuvant (a substance that increases the immune response).
– attenuated	A vaccine prepared from infective or ‘live’ microbes that are less pathogenic but retain their ability to induce protective immunity.
– gene deleted	An attenuated or inactivated vaccine in which genes for non-essential surface glycoproteins have been removed by genetic engineering. This provides a useful immunological marker for the vaccine virus compared with the wild virus.
– inactivated	A vaccine prepared from a virus that has been inactivated (‘killed’) by chemical or physical treatment.

Term	Definition
– recombinant	A vaccine produced from virus that has been genetically engineered to contain only selected genes, including those causing the immunogenic effect.
Vector	A living organism (frequently an arthropod) that transmits an infectious agent from one host to another. A <i>biological</i> vector is one in which the infectious agent must develop or multiply before becoming infective to a recipient host. A <i>mechanical</i> vector is one that transmits an infectious agent from one host to another but is not essential to the life cycle of the agent.
Veterinary investigation	An investigation of the diagnosis, pathology and epidemiology of the disease. <i>See also</i> Epidemiological investigation
Viraemia	The presence of viruses in the blood.
Wild animals	
– native wildlife	Animals that are indigenous to Australia and may be susceptible to emergency animal diseases (eg bats, dingoes, marsupials).
– feral animals	Animals of domestic species that are not confined or under control (eg cats, horses, pigs).
– exotic fauna	Nondomestic animal species that are not indigenous to Australia (eg foxes).
Zero susceptible species premises (ZP)	A premises that does not contain any susceptible animals or risk products, wastes or things.
Zoning	The process of defining, implementing and maintaining a disease-free or infected area in accordance with OIE guidelines, based on geopolitical and/or physical boundaries and surveillance, in order to facilitate disease control and/or trade.
Zoonosis	A disease of animals that can be transmitted to humans.

Abbreviations

Disease-specific abbreviations

Abbreviation	Full title
CSF	classical swine fever

Standard AUSVETPLAN abbreviations

Abbreviation	Full title
AAHL	Australian Animal Health Laboratory
AN	assessed negative
APF	approved processing facility
ARP	at-risk premises
AUSVETPLAN	Australian Veterinary Emergency Plan
CA	control area
CCEAD	Consultative Committee on Emergency Animal Diseases
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CVO	chief veterinary officer
DCP	dangerous contact premises
DCPF	dangerous contact processing facility
EAD	emergency animal disease
EADRA	Emergency Animal Disease Response Agreement
EADRP	Emergency Animal Disease Response Plan
EDTA	ethylenediaminetetraacetic acid (anticoagulant for whole blood)
ELISA	enzyme-linked immunosorbent assay
GP	general permit
IETS	International Embryo Transfer Society
IP	infected premises

Abbreviation	Full title
LCC	local control centre
NASOP	nationally agreed standard operating procedure
NMG	National Management Group
OA	outside area
OIE	World Organisation for Animal Health
PCR	polymerase chain reaction
POR	premises of relevance
RA	restricted area
RP	resolved premises
SCC	state coordination centre
SP	suspect premises
SpP	special permit
TP	trace premises
UP	unknown status premises
ZP	zero susceptible species premises

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Training resources

See the **Summary Document** for a full list of training resources.