

# Porcine epidemic diarrhoea

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## Contact information

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

### AUSVETPLAN — Animal Health Australia

Executive Manager, Emergency Preparedness and Response  
PO Box 5116  
Braddon ACT 2612  
Tel: 02 6232 5522  
email: [aha@animalhealthaustralia.com.au](mailto:aha@animalhealthaustralia.com.au)

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# 1

# Introduction

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## 1.1 This manual

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### 1.1.1 Purpose

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

### 1.1.2 Scope

This response strategy covers PED caused by porcine epidemic diarrhoea virus.

This response strategy provides information about:

- the disease (Section 2)
- the implications for Australia, including potential pathways of introduction; social, environmental, human health and economic effects; and the critical factors for a response to the disease (Section 3)
- the agreed policy and guidelines for agencies and organisations involved in a response to an outbreak (Section 4)
- declared areas and premises classifications (Section 5).

The key features of PED are described in the **Porcine epidemic diarrhoea fact sheet** (Appendix 1).

### 1.1.3 Development

The strategies in this document for the diagnosis and management of an outbreak of PED are based on risk assessment. They are informed by the recommendations in the World Organisation for Animal Health (WOAH, formally OIE) *Terrestrial animal health code* (Section 4) and the WOAH *Manual of diagnostic tests and vaccines for terrestrial animals* (Part 3). The strategies and policy guidelines are for emergency situations and are not applicable to policies for imported animals or animal products.

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

In this manual, text placed in square brackets [xxx] indicates that that aspect of the manual remains unresolved 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 Other documentation

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

- other AUSVETPLAN documents, including the operational, enterprise and management manuals; and any relevant guidance and resource documents. The complete series of manuals is available on the Animal Health Australia website<sup>1</sup>
- relevant nationally agreed standard operating procedures (NASOPs).<sup>2</sup> These procedures complement AUSVETPLAN and describe in detail specific actions undertaken during a response to an incident. NASOPs have been developed for use by jurisdictions during responses to emergency animal disease (EAD) incidents and emergencies
- relevant jurisdictional or industry policies, response plans, standard operating procedures and work instructions
- relevant Commonwealth and jurisdictional legislation and legal agreements (such as the Emergency Animal Disease Response Agreement – EADRA<sup>3</sup>), where applicable.

## 1.3 Training resources

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### **EAD preparedness and response arrangements in Australia**

The EAD Foundation Online course<sup>4</sup> provides livestock producers, veterinarians, veterinary students, government personnel and emergency workers with foundation knowledge for further training in EAD preparedness and response in Australia.

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1 [www.animalhealthaustralia.com.au/ausvetplan](http://www.animalhealthaustralia.com.au/ausvetplan)

2 [www.animalhealthaustralia.com.au/nationally-agreed-standard-operating-procedures](http://www.animalhealthaustralia.com.au/nationally-agreed-standard-operating-procedures)

3 [www.animalhealthaustralia.com.au/eadra](http://www.animalhealthaustralia.com.au/eadra)

4 [www.animalhealthaustralia.com.au/online-training-courses](http://www.animalhealthaustralia.com.au/online-training-courses)

# 2

## Nature of the disease

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Porcine epidemic diarrhoea (PED) is a viral disease of pigs. It is characterised by acute, rapidly spreading diarrhoea, and is most severe in neonatal pigs, in which morbidity and mortality can reach 100%.

The WOAHP does not include PED on its list of notifiable diseases.<sup>5</sup>

### 2.1 Aetiology

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PED is caused by PED virus, an enveloped, single-stranded RNA virus within the genus *Alphacoronavirus*, family *Coronaviridae*.

Different strains of PED virus vary in their virulence. The presence of insertions or deletions in the hypervariable part of the virus's S glycoprotein is associated with generally lower virulence (S-INDEL strains), whereas strains without such insertions or deletions (NON-INDEL strains) are considered highly virulent (Boniotto et al 2016, Chen et al 2016, Leidenberger et al 2017, Pizzurro et al 2017). However, field virulence and mortality rates may still vary with S-INDEL strains, and mortality rates of more than 70% have been seen in suckling piglets affected by an S-INDEL strain (EFSA 2014, Hanke et al 2015, Stadler et al 2015, Leidenberger et al 2017).

Neonatal pigs are reported to have higher susceptibility to NON-INDEL strains than older pigs (Jung et al 2020). This may be partly attributed to the immaturity of gastrointestinal immune defences in neonatal piglets (Annamalai et al 2015).

### 2.2 Susceptible species

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PED affects pigs; it is not known to affect any other species.

#### 2.2.1 Zoonotic potential

PED does not infect people.

### 2.3 World distribution

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For the latest information on the distribution of PED, refer to the WOAHP World Animal Health Information System.<sup>6</sup>

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<sup>5</sup> WOAHP-listed diseases are diseases with the potential for international spread, significant mortality or morbidity within the susceptible species, and/or zoonotic spread to humans. WOAHP member countries that have been free from a notifiable disease are obliged to notify the WOAHP within 24 hours of confirming the presence of the disease.

<sup>6</sup> [wahis.woah.org/#/home](http://wahis.woah.org/#/home)

### 2.3.1 Distribution outside Australia

PED virus was first reported in Europe in the 1970s and is now endemic in many European and Asian countries.

In 2010, a more virulent strain of PED virus than previously seen emerged, with a severe outbreak of PED in China causing high mortality among suckling piglets. Outbreaks of these highly virulent (NON-INDEL) PED virus strains have subsequently occurred in Asia, the Americas (including the United States, Canada, and parts of central and South America) and Ukraine (Stevenson et al 2013, EFSA 2014).

In 2014, less virulent (S-INDEL) PED virus strains emerged in the United States (Wang et al 2014). S-INDEL strains have also been circulating in parts of Europe since 2014 (Hanke et al 2015, Boniotti et al 2016, Pizzurro et al 2017).

### 2.3.2 Occurrence in Australia

PED has not been reported in Australia.

## 2.4 Epidemiology

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### 2.4.1 Incubation period

The incubation period of PED is typically between 1 and 4 days (OIE 2014).

### 2.4.2 Persistence of agent and modes of transmission

#### General properties

PED virus is considered to be more persistent than the related transmissible gastroenteritis virus. It is viable for variable periods outside a host, depending on temperature and humidity. For example, PED virus:

- is viable for at least 28 days in slurry at 4 °C, 7 days in faeces-contaminated dry feed at up to 25 °C, up to 14 days in wet feed at 25 °C and at least 28 days in wet feed mixture at 25 °C (OIE 2014)
- was still infective in effluent ponds at least 6 months after an outbreak (Khafipour & Min Tun 2015)
- is stable at pH 6.5–7.5 at 37 °C and at pH 5–9 at 4 °C (Pensaert 1999, as cited in Popischil et al 2002).

PED virus loses infectivity above 60 °C. It is susceptible to a number of disinfectants, including formalin (1%), anhydrous sodium carbonate (4%), lipid solvents, iodophores in phosphoric acid (1%) and sodium hydroxide (2%) (OIE 2014).

#### Environment (including windborne spread)

PED virus persists for prolonged periods, especially at low temperatures.

The role of windborne transmission remains unclear. Recent epidemiological modelling on outbreaks in the United States and Japan identified a high risk of local horizontal transmission of PED virus to pigs located 5 km or less from infected properties. Aerosol transmission was proposed as a likely explanation for the pattern of spread observed in the densely populated areas (Alvarez et al 2016, Sasaki et al 2017).

In experiments, piglets inoculated with air samples taken from rooms housing infected pigs developed clinical signs of PED, with the diagnosis confirmed through laboratory investigation (Alonso et al 2014). In the same study, viral RNA was detected up to 16 km from infected premises, although infectivity could not be demonstrated.

## **Live animals**

PED virus is highly contagious, and the movement of infected live pigs is a key mechanism of spread.

Faecal–oral transmission is the main mode of transmission between pigs. Pigs are less susceptible to aerosol transmission (Hesse et al 2014). PED virus is shed in large amounts in faeces, and a low infectious dose is required to infect naive piglets. Faecal shedding of PED virus begins 24–48 hours following infection and generally lasts about 1 week, although shedding for 1–2 months has been reported (EFSA 2014).

Infection does not persist, and recovered pigs may be susceptible to reinfection (see Section 2.6).

In one study, approximately 10% of wild boars tested were infected with PED virus in South Korea (Lee et al 2016), suggesting that wild and feral pig populations may serve as a reservoir of infection.

## **Animal products**

Transmission by animal products and byproducts is not an important means of spread. However, products may be contaminated with infectious material during processing.

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

Transmission of PED virus has not been associated with pigmeat or meat products (including meatmeal), but contamination of these products with infectious material during processing could pose a risk if the contaminated material is subsequently fed as swill.

There are no specific studies on measures to inactivate PED virus in pig products, including rendering. Therefore, a risk assessment should be undertaken on a case-by-case basis to determine the safety of products.

## **Animal byproducts**

### **Hides, skin, wool and other fibres**

Transmission of PED virus has not been associated with hides or skin. However, faecal contamination of these items could pose a risk of transmission.

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

Viral RNA has been detected in semen from healthy boars in China (Sun et al 2014). Recent research has shown PED virus shedding in semen from infected boars; however, the ability of PED virus to be venereally transmitted remains uncertain (Gallien et al 2018, 2019). Cross-contamination of semen is a possibility.

There is no information on the presence of PED virus in porcine embryos or on the potential role of embryos in viral transmission (EFSA 2014).

## **Waste products and effluent**

As PED virus is primarily shed in the faeces of infected pigs, waste products and effluent from infected premises pose a significant risk for transmission of disease.



Cleanliness is important as transmission of PED is mainly by the faecal-oral route

## Biological products

The use of spray dried porcine plasma (SDPP) in pig feed was mooted as the means of introduction of PED into Canada. PED virus genetic material was identified in both feed pellets and the commercial batch of SDPP, and subsequently shown to be infectious in bioassays (Pasick et al 2014). However, it is not known whether there had been inefficient treatment of the SDPP (such that any PED virus present had not been inactivated) or whether there had been subsequent contamination of the SDPP and pig feed with PED virus. Other studies have shown that manufacturing techniques for SDPP result in inactivation of PED virus (Gerber et al 2014, Pujols & Segalés 2014). Trudeau et al (2016) proposed that heating pig feed at more than 130 °C for up to 30 minutes or irradiating it at over 50 kGy (kilograys) would adequately reduce the risk of PED virus transmission in pig feed containing SDPP. The potential for PED virus transmission in feed is discussed further under 'Crops, grains, hay, silage and mixed feeds', below.

## People

To prevent the spread of PED virus through movement of people, waiting a minimum of 12 hours between pig exposures, and showering on and off premises with complete clothing changes have been found to be effective.

## Crops, grains, hay, silage and mixed feeds

Feed pellets contaminated with PED virus were believed to be the source of an outbreak in the United States (Bowman et al 2015). Heat treatment of feed has been proposed to manage the risk of PED virus spread in feed. In a recent study, PED virus concentration was reduced by 99.9% when pig feed was heated at 120 °C for 25 minutes (Trudeau et al 2016), and a 3.9 log reduction was observed when feed ingredients were heated to 90 °C for 30 minutes (Trudeau et al 2017). However, if feed is contaminated after processing, it can act as a vehicle for PED virus infection in pigs (Dee et al 2014).

Field and laboratory experiments have shown that PED virus may remain viable in some feed substrates (eg soybean meal) throughout intercontinental shipments in models and under real-world conditions [Dee et al 2016, 2018, 2021].

### **Vehicles, including empty livestock transport vehicles**

Contaminated vehicles used for the movement of pigs have been identified as an important risk factor for spreading the disease [Lowe et al 2014, Sasaki et al 2016].

In the United States, protocols of heating pig trailers to 71 °C for more than 10 minutes or holding them at 20 °C for 7 days were found to be effective [Thomas 2015].

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

Faecal contamination of fomites (including equipment, feed, vehicles, clothing and people) is an important means of PED virus transmission.

### **Other relevant considerations**

It is thought plausible that PED virus could be viable for several weeks within the weave of flexible intermediate bulk containers that are used for carrying bulk materials, including livestock feeds [USDA 2015].

## **2.4.3 Factors influencing transmission**

PED virus is more stable at lower temperatures, which facilitate its persistence and therefore transmission.

In Japan, a higher risk of local PED virus spread was associated with greater farm size, smaller distance (less than 5 km) to PED-infected farms and shorter (less than 20 minutes) disinfectant contact times [Sasaki et al 2016].

In the United States, increased risk of infection due to aerosol transmission was associated with reduced distances from infected premises. For example, premises within 2 km of a farm that had been infected within the past 7 days are at higher risk of infection than premises further away. Infection spread via contaminated fomites is also important – premises within 21 km of a farm infected within the past 3 weeks are at higher risk of infection due to the movement of fomites [Alvarez et al 2016].

# **2.5 Diagnostic criteria**

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## **2.5.1 Clinical signs**

### **Animals**

The severity of PED is variable; it depends on the viral strain, and the age and immunological status of the affected pig. The primary, and often only, clinical sign is acute watery diarrhoea, although vomiting may also occur. Consequent dehydration and metabolic acidosis may be observed. Neonates are often more severely affected than other age groups, and most older pigs recover.

Clinical signs are typically less severe in outbreaks of S-INDEL strains of PED virus than in outbreaks of NON-INDEL strains [Wang et al 2014, Hanke et al 2015].

## 2.5.2 Pathology

### Microscopic lesions

Histopathological lesions, which are not pathognomonic, usually include small intestinal villus blunting and changes to the ultrastructure of the colon (atrophic enteritis). S-INDEL PED virus strains have been associated with milder pathological changes in piglets than NON-INDEL strains (Chen et al 2016).

Acute back muscle necrosis may also occur (Pospichil et al 2002).

## 2.5.3 Differential diagnosis

PED is clinically similar to transmissible gastroenteritis (exotic), infection with porcine deltacoronavirus (exotic) and other causes of gastroenteritis. Laboratory testing is required for differentiation.

## 2.5.4 Laboratory tests

### Samples required

Appropriate laboratory samples include faeces or oral fluids from live, acutely affected pigs within 24 hours of clinical onset. Alternatively, intestinal contents, intestine and colon may be sampled via necropsy of affected pigs as soon after death as possible. Specimens obtained later in the course of the disease can be less reliable for detection of the virus.

### Transport of specimens

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

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

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

## 2.5.5 Laboratory diagnosis

Laboratory confirmation of PED in Australia would be based on real-time reverse transcriptase PCR (RT-PCR) with sequencing, and virus isolation in selected cases. Samples should be taken early in the course of the disease because shedding of viral material can decrease dramatically as the intestinal lining becomes atrophic. Antigen-detection ELISA tests have also been used in other countries to differentiate PED virus from transmissible gastroenteritis virus.

Antibody-detection ELISA tests, generally targeting antibodies to the spike protein of the virus (Chang et al 2019), can be used to confirm exposure to PED virus; antibodies may persist for more than 1 year in the serum of infected pigs (Myint et al 2019). Serology is unlikely to play a major role in the diagnosis of an outbreak unless the disease has passed the initial acute phase and become established in herds.

## CSIRO-ACDP tests

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

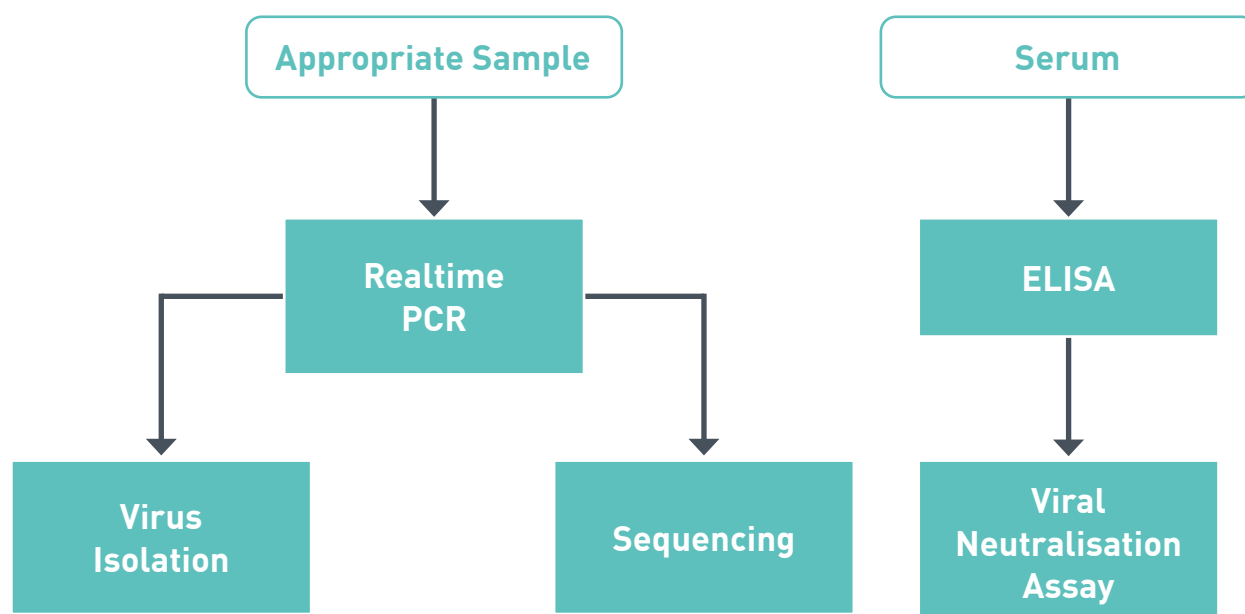


Figure 2.1 The current approach to diagnostic testing at CSIRO-ACDP for PED

Table 2.1 Laboratory tests currently available at CSIRO-ACDP for diagnosis of PED

Test	Specimen required	Test detects	Time taken to obtain result
<b>Agent detection</b>			
Real-time PCR	Swabs, faeces, gut tissues or cultured virus	Viral RNA	4–5 hours
<b>Agent characterisation</b>			
Sequencing	Swabs, faeces, gut tissues or cultured virus	Viral genome	2 days
Virus isolation	Swabs, faeces, gut tissues or cultured virus	Virus	5–10 days
<b>Serology</b>			
ELISA	Serum	Antibody	1 day
Virus neutralisation	Serum	Antibody	4–5 days

Source: Information provided by CSIRO-ACDP, 2020 (refer to CSIRO-ACDP for most up-to-date information)

## 2.6 Resistance and immunity

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Maternal antibodies in the colostrum of PED-immune sows may confer some protection to neonates.

Post-infection immunity in pigs is temporary, leaving them susceptible to reinfection when immunity wanes (OIE 2014).

## 2.7 Vaccination

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Killed, modified live and genetically modified (using alphavirus replicon technology) vaccines are available overseas and have been used to aid the control of PED outbreaks with mixed success (Gerdtz & Zakhartchouk 2016). Genetically modified vaccines may facilitate differentiation of infected from vaccinated animals.

Vaccination of sows before farrowing may result in transfer of maternally derived antibodies to piglets and provide protection to suckling piglets (typically the age group most vulnerable to PED). Because immunity is short lived in both sows and piglets, revaccination of sows before each farrowing may be necessary to protect piglets (Leidenberger et al 2017). Vaccination of previously infected sows has been shown to improve immunity (Niederwerder & Hesse 2018).

## 2.8 Treatment of infected animals

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There is no specific treatment for PED, although supportive therapy may be beneficial (eg electrolytes and ensuring constant access to clean water).

## 2.9 Control overseas

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Attempts to control PED overseas have met with varying success; stringent and persistent measures are required for an effective response.

In the 2017 outbreak in Canada, approximately 80 herds became infected over the course of 6 months; however, within a year of the outbreak's onset, only three premises remained positive (Manitoba Pork 2018). The key elements in the response to PED in Canada included active surveillance (including on sites with high pig traffic, such as saleyards and abattoirs), controls on the movement of live pigs, stringent biosecurity (eg biosecure management of carcasses and waste materials), practicing 'feedback',<sup>7</sup> and heightened biosecurity on uninfected premises and at high-risk points along the associated industry supply chain (eg cleaning and disinfection of pig transport vehicles, feed and manure trucks, loading yards, processing facilities).

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<sup>7</sup> 'Feedback practice' is a pathogen inoculation practice where naïve pigs are provided access to select porcine pathogen-contaminated material from infected animals.

# 3

## Implications for Australia

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### 3.1 Potential pathways of introduction

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Importation of infected live pigs, or contaminated pig products, biological products or fomites (eg contaminated feed and feed containers), could result in the introduction of porcine epidemic diarrhoea (PED) virus to Australia. Introduction through contaminated fomites may be more likely in the cooler months, when PED virus may persist for longer periods. PED virus appears to have a very low infectious dose; the disease may therefore establish if infected live pigs or contaminated fomites are taken onto premises with pigs in Australia.

Australia's strict import biosecurity controls, and industry-based biosecurity and quality assurance programs help mitigate the risks of introduction and establishment of PED virus in Australia.

### 3.2 Social, economic and environmental effects

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Introduction of virulent PED virus to the Australian pig herd is expected to result in high morbidity and mortality, particularly in young piglets. Additional costs due to depopulation, export market losses, biosecurity protocols and vaccines would be expected to exceed the direct losses (AHC 2014).

Disease control measures, potential loss of livelihood and stigma associated with disease outbreaks on individual premises may also affect the social wellbeing of individual producers, and the pig production, and associated, industries throughout Australia.

Weng et al (2016) conducted an economic evaluation of intervention strategies for PED in a farrow-to-finish farm. The intervention strategies studied included gilt introduction, feedback exposure of gilts when inoculated through the feeding of infected porcine tissue and faeces, biosecurity measures and vaccination. The study concluded that losses from PED could be significantly reduced using any of these interventions. For example, the most profitable strategy involved front-loading of gilts fed with infected material to improve herd immunity, intensive biosecurity protocols and no vaccination – this combination reduced losses by approximately 10 times the cost of implementation. The process of front-loading involves introducing gilts immediately before the herd is closed. The seronegative gilts purchased before herd closure are fully exposed to PED virus, which ensures a high probability of complete herd immunity.



Regular inspection of pigs is important for early detection of signs of disease

### 3.3 Critical factors for an Australian response

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The critical factors for the response to PED in Australia include the following:

- Reporting of cases may be delayed if the presentation is mild and PED is not initially suspected.
- If a mild strain of PED virus becomes established, it may subsequently mutate to a more virulent form.
- PED virus is persistent and readily spread by fomites, including feed.
- Contact of vermin and feral pigs with PED virus-contaminated material may facilitate spread of disease.
- Australia has a limited number of pig abattoirs, which are geographically dispersed.
- Animal welfare concerns may arise if response measures include movement restrictions on pig premises.
- Public uncertainty over food safety due to the disease may negatively affect domestic consumption of pork and other pig products.

# 4

# Policy and rationale

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## 4.1 Introduction

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### 4.1.1 Summary of policy

For virulent presentations of porcine epidemic diarrhoea (PED), the agreed policy between Australian governments and the Australian pig industry is to eradicate PED through the use of stamping out, modified stamping out, or controlled rapid exposure (CRE) on infected premises (IPs). Eradication measures will be supported by a range of strategies, including:

- *enhanced farm biosecurity*
- *epidemiological assessment*
- *quarantine and movement controls* over pigs, pig products (including offal and semen) and fomites (including transport vehicles) 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
- *decontamination* of premises
- *treatment or destruction and disposal* of dead pigs and pig products (including manure and reproductive material) likely to be contaminated, to reduce the source of infection
- *welfare management* to handle overcrowding and the impacts of disease on IPs
- *industry support* to increase understanding of the issues, facilitate cooperation, and address animal welfare issues and on-farm biosecurity
- *a public awareness campaign.*

Further response activities (including whether to continue with eradication if the disease is present on other premises, and the strategies to achieve this) will depend on whether the disease is considered eradicable and the cost–benefit ratio of achieving eradication. Decisions will be informed by the outcomes of the initial tracing, surveillance and epidemiological assessment, and will take into consideration:

- confidence that the known extent of disease represents the true extent
- presence of infection in free-range and/or feral pig populations
- capacity for destruction and disposal of pigs
- feasibility of decontamination of affected piggeries and of potentially contaminated fomites
- market impacts.

For nonvirulent presentations of PED, the agreed policy is to prevent further spread using quarantine, movement controls and enhanced biosecurity, while undertaking initial tracing, surveillance and epidemiological investigations. Further response activities (including whether to pursue eradication) will depend on whether the disease is considered eradicable and the cost–benefit ratio of achieving eradication. These activities will require agreement between the Australian governments and the pig industry on a funding mechanism.

#### 4.1.2 Case definition

For the purpose of this manual, a case of PED is defined as laboratory-confirmed infection with PED virus in one or more pigs.

##### Notes:

- Positive serology in the absence of detection of PED virus, with no clinical or epidemiological evidence supporting infection, does not constitute a definition of a case.
- AUSVETPLAN case definitions guide when a response to an emergency animal disease (EAD) incident should be undertaken. AUSVETPLAN case definitions do not determine when international reporting of an EAD incident is required, nor do they define criteria for when cost sharing can be considered.
- At the time of an outbreak, revised or subsequent case definitions may be developed with the agreement of the Consultative Committee on Emergency Animal Diseases (CCEAD).
- For the purpose of this manual, the case definition does not include disease in pigs caused by deltacoronaviruses and would not be satisfied should avirulent strains of PED alphacoronaviruses be detected in a pig herd.

The definition of virulent PED<sup>8</sup> in an outbreak is where:

- one or more animals have tested positive for PED virus by PCR or virus isolation, and
- there is high morbidity (>50%) in one or more age groups of pigs with clinical signs consistent with PED, and
- atrophic enteritis is demonstrated by histopathology.

#### 4.1.3 Cost-sharing arrangement

In Australia, PED is included as a Category 4 emergency animal disease in the Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Responses (EAD Response Agreement – EADRA).<sup>9</sup> When cost sharing of the eligible response costs of an incident is agreed, Category 4 diseases are those for which costs will be shared 20% by government and 80% by industry.

#### 4.1.4 Criteria for proof of freedom

The WOAHP provides general guidance for demonstrating proof of freedom from EADs in Chapter 1.6 of its *Terrestrial animal health code*.<sup>10</sup>

After an outbreak of PED, a statistically valid serological survey would have to be undertaken to demonstrate proof of freedom. The survey would concentrate on the restricted areas (RAs) in which the disease had been present and the high-risk herds, based on the results of tracing and pig movements.

<sup>8</sup> As supported by the PED Emergency Animal Disease Response Agreement categorisation panel.

<sup>9</sup> Information about the EAD Response Agreement can be found at [www.animalhealthaustralia.com.au/eadra](http://www.animalhealthaustralia.com.au/eadra)

<sup>10</sup> [www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access](http://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access)

Surveillance of pigs in the control areas (CAs) and outside area (OA) will also be necessary to demonstrate proof of freedom.

Sampling strategies (both within and between herds) would need to take into account WOA guidelines, the epidemiology of the outbreak, the structure of the herd and the pig industry, and the sensitivity and specificity of the diagnostic tests used.

Under a stamping-out or modified stamping-out approach, all infected and exposed pigs will be either culled or slaughtered. Serological surveillance of restocked pigs will be used to demonstrate proof of freedom at the herd level. Restocked pigs must remain seronegative.

When a CRE approach is used, previously infected pigs may be seropositive for prolonged periods after infection has been eliminated. Sentinel pigs must be placed and monitored for seroconversion to PED virus. Guidance on testing to resolve premises undergoing CRE is provided in Appendix 2.

Serological surveillance would be complemented with clinical surveillance on lower-risk premises such as at-risk premises (ARPs) and premises of relevance (PORs) (eg by monitoring of the neonatal and preweaning mortalities from diarrhoea).

#### 4.1.5 Governance

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

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

## 4.2 Public health implications

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PED has no public health implications.

## 4.3 Control and eradication policy

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Eradication of PED may be achieved through the use of stamping out, modified stamping out or CRE. The use of these approaches (on the index and subsequent premises) is outlined below:

- Stamping out involves quarantine, destruction of all infected and exposed susceptible pigs on IPs and possibly on dangerous contact premises (DCPs), sanitary disposal of destroyed animals and potentially contaminated pig products, and decontamination of premises.
- Modified stamping out involves quarantine and the immediate slaughter of all saleable exposed pigs at approved abattoirs, if circumstances allow safe (biosecure) transport and slaughter, and processing capacity is available.
- CRE involves quarantine and exposure to infection of naive pigs within infected herds, thus allowing immunity to develop and possibly for infection to be eliminated from individual herds once shedding has ceased.

Stamping out should be used sparingly; its use should be limited to circumstances in which the disease is restricted to one or only a few herds, the herds are relatively isolated, the disease is contained and unlikely to spread, and stamping out is highly likely to quickly eradicate the disease.

Modified stamping out is preferred over stamping out where the safe (biosecure) transport and slaughter of pigs are practicable, and processing capacity is available. However, without highly

biosecure transport of infected pigs and decontamination of transport vehicles, this method may contribute to further spread of the virus.

CRE to infected material may be adopted to eradicate infection from herds with a high prevalence of disease. Strict biosecurity should be maintained on the site for a prolonged period. More detail on CRE is provided in Appendix 2.

The choice of eradication approach on the index premises (and subsequent premises, where applicable) will be informed by:

- confidence that biosecurity on the premises and contacts beyond will contain infection
- resource availability (eg biosecure transport, abattoir and processing capacity)
- welfare considerations (to manage potential overcrowding and/or disease impacts, especially in piglets).

Eradication on the index premises (and, if agreed, subsequent IPs) will be supported by a range of strategies, as outlined below.

#### 4.3.1 Epidemiological assessment

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

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

- the spatial distribution of infected and free animal populations
- potential vectors involved, including as potential amplifying hosts
- the source of infection
- the prevalence of infection
- pathways of spread and the likely size of the outbreak
- risk factors for the presence of infection and susceptibility to disease (including weather and insect populations).

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

The outcomes of the epidemiological assessment will also be used initially to determine the feasibility of eradication versus long-term control and to guide the selection of other appropriate response measures (including the application of movement controls) and assess the progress of disease control measures.

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

### 4.3.2 Quarantine and movement controls

Also refer to Section 6 for information on the general principles of movement controls, the types of movement permits available and guidelines for using the permits.

#### Quarantine

The declaration of RAs and CAs will assist with the implementation of disease control measures in affected areas. In defining the boundaries of these areas, consideration should be given to the location of other premises within the supply chain of the local pig production and associated industries – for example, of interconnected piglet, weaner, grow-out and breeding premises; and of abattoirs and processing facilities.

Extrapolating from the risk factors identified in the United States:

- the boundaries of the RA should be a minimum of 3 km from the nearest IP and should include as many other high-risk premises (suspect premises (SPs), trace premises (TPs) and DCPs) as possible; the structure of the Australian pig industry and its supply chains means that a much larger RA may be required
- the boundaries of the CA should be a minimum of 20 km from the boundary of the RA(s) within it, but the CA may be much larger and may initially include all of the affected state(s).

Quarantine will be imposed on all high-risk premises (IPs, SPs, TPs and DCPs).

#### Movement controls

Controls on the movement of risk animals and things will apply, as follows:

- Live pigs
  - Depending on the circumstances of the incident, consideration may be given to prohibiting all movements of pigs within the RA until the results of initial tracing and surveillance are known. Otherwise, the following controls will apply.
  - Movement of live pigs off IPs and DCPs is prohibited except under special permit for movement to an approved abattoir as part of an official modified stamping-out program.
  - Movements off other high-risk premises (SPs and TPs) is prohibited. Once their status has been resolved, movement restrictions appropriate to their new classification will be applied.
  - Movement of pigs onto high-risk premises (IPs, DCPs, SPs and TPs) is prohibited except under special permit and as part of an official control program (eg where replacement stock are introduced as part of CRE or where sentinel pigs are being introduced following destocking and the completion of disease control measures on the premises).
  - Movement of pigs from ARPs in the RA is prohibited except under special permit to slaughter or to other ARPs in emergency circumstances (eg to address animal welfare issues) if risk analysis indicates that the risk associated with the movement is acceptable within the response.
  - Movement of pigs from the CA or OA into the RA is prohibited except under special permit for slaughter if there is no suitable abattoir available in the CA or OA and if risk analysis indicates that the risk associated with the movement is acceptable within the response.
  - Movement of pigs from PORs in the CA or from the OA onto PORs in the CA is prohibited except under general permit.
  - Shows and sales involving pigs in declared areas should be cancelled.
  - Pig hunting activities in declared areas should be discouraged.
  - Movement of live pigs within the OA is allowed without restriction.

- Carcasses
  - Movement off premises of carcasses of pigs culled for disease control measures is prohibited except under special permit to an approved processing facility (for hygienic rendering – see Section 4.3.10) or to an approved disposal site (ADS; see also Section 4.3.12).
- Pigmeat
  - The onward movement from approved processing facilities of pigmeat derived from pigs from IPs, DCPs, SPs and TPs is prohibited except under special permit if risk analysis (on a case-by-case basis) indicates that the risk associated with the movement is acceptable within the response. Movement may be considered if the pigmeat has undergone treatment as described in Section 4.3.10.
  - Movement of pigmeat derived from pigs from other premises is not restricted.
- Semen and embryos
  - Movement controls for semen and embryos should be the same as for live pigs until a risk assessment of PED virus in germplasm has been carried out. Other factors, such as the time since collection, and storage and segregation conditions, could be taken into consideration.
- Other pig products and byproducts (including offal)
  - Movement of other pig products and byproducts (including offal) derived from pigs from IPs, DCPs, SPs and TPs is prohibited except under special permit if risk analysis (on a case-by-case basis) indicates that the risk associated with the movement is acceptable within the response.
- Pig transport vehicles and equipment
  - Movement of all pig transport vehicles and equipment originating in the RA is prohibited except under special permit; movement from the CA is prohibited except under general permit (see Section 4.3.6 for appropriate biosecurity requirements).
- People
  - Biosecurity requirements for people moving off high-risk premises are provided in Section 4.3.5.
- Piggery waste and effluent
  - Wastes and effluent should not be moved off high-risk premises (IPs, DCPs, SPs and TPs) or moved from ARPs to outside the RA. These movements may be considered on a case-by-case basis (under special permit) based on risk assessment to ADSs for biosecure disposal.
- Potentially contaminated crops and feed
  - Potentially contaminated crops and feed should not be moved off high-risk premises. These movements may be considered on a case-by-case basis (under special permit) based on risk assessment to ADSs for biosecure disposal.

Appropriate conditions for movement permits in response to PED would be based on those for equivalent movements in the **AUSVETPLAN response strategy *Transmissible gastroenteritis***.

### 4.3.3 Tracing and surveillance

#### Tracing

Tracing teams will need access to personnel who have a good knowledge of different pig enterprises in the jurisdiction, and their typical movement and trading patterns (eg through the Specialist Advice –



Accurate record keeping of all pig movements is vital for tracing

Livestock Industry function). This knowledge will help focus tracing activities to identify the highest-risk pigs and locations.

Trace-back from IPs will be important to identify premises, products or fomites that may have been the source of infection, and help identify other infected or contaminated locations. Priorities for trace-back include all movements onto the IP of live pigs (highest priority); pig products and byproducts; and equipment, vehicles, feed and other potential fomites capable of transferring faecal material (including people).

Forward tracing aids the identification of other locations where infection or contamination may be present. Priorities for trace-forward include all movements off IPs of live pigs (highest priority); pig products and byproducts; and equipment, vehicles, feed and other potential fomites capable of transferring faecal material (including people).

The trace period chosen will be influenced by the incubation period of PED virus, the time of onset of the first clinical signs, the expected persistence of the virus and the time that quarantine is imposed.

If the presentation of PED is mild, or was initially mild, identification of the time of onset of the first clinical signs may be difficult.

The epidemiological investigation on an IP will further guide prioritisation of tracing activities.

Additional guidance on undertaking tracing and surveillance in EAD responses is available in the **AUSVETPLAN guidance document *Tracing and surveillance***.

## Surveillance

The main aims of surveillance in the response to PED will be to:

- delimit the extent of the incident, and identify potentially infected or contaminated locations or things in a timely manner
- provide evidence to inform decisions on the implementation of measures to prevent further spread and eliminate infection
- support resolution of premises and declared areas (see Appendix 3).

Surveillance priorities will include:

- determining whether epidemiologically linked premises are infected or contaminated – using active surveillance supported by laboratory investigation
- identifying premises (not identified through tracing) where infection is suspected – using enhanced passive surveillance, supported by active surveillance and laboratory investigation where SPs are identified.

Additional prioritisation will be based on risk, taking into account the likelihood that subclinical infection may be present, and the risks of ongoing disease transmission and dissemination.

Surveillance in feral pig populations may be required (see Section 4.3.14).

Additional guidance on undertaking tracing and surveillance in EAD responses is available in the **AUSVETPLAN guidance document *Tracing and surveillance***.

### 4.3.4 Zoning and compartmentalisation for international trade

Where it is not possible to establish and maintain disease freedom for the entire country, establishing and maintaining disease-free subpopulations, through zoning and/or compartmentalisation,<sup>11</sup> may be considered.

In the case of a limited disease outbreak, a containment zone<sup>12</sup> may be established around the areas where the outbreak is occurring, with the purpose of maintaining the disease-free status of the rest of the country outside the containment zone.

All zoning applications would need to be prepared by the Australian Government in conjunction with the relevant jurisdiction(s) and agreed to by the CCEAD. Zoning is usually negotiated after a disease outbreak has begun.

Compartmentalisation applications typically need to be negotiated before an outbreak occurs, and will require input from the relevant industries.

Recognition of both zones and compartments must be negotiated between the Australian Government and individual overseas trading partners. Zoning and compartmentalisation would require considerable resources that could otherwise be used to control an outbreak. Careful consideration will need to be given to prioritising these activities, because the resulting competition for resources could delay the quick eradication of the disease and recognition of disease freedom.

<sup>11</sup> With zoning, disease-free subpopulations are defined primarily on a geographical basis. With compartmentalisation, disease-free subpopulations are defined primarily by management practices (such as the biosecurity plan and surveillance practices of enterprises or groups of enterprises).

<sup>12</sup> The WOA defines a 'containment zone' as an infected zone within a previously free country or zone, which includes all suspected or confirmed cases that are epidemiologically linked and where movement control, biosecurity and sanitary measures are applied to prevent the spread of, and to eradicate, the infection or infestation. The Australian Government Department of Agriculture, Fisheries and Forestry commissioned a report on what would be required for the establishment of containment zones in Australia. This report is available at [www.ausvet.com.au/tools-resources](http://www.ausvet.com.au/tools-resources).

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

The WOAHA guidelines for zoning and compartmentalisation are in Chapter 4.4 and Section 4 of the WOAHA *Terrestrial animal health code*.

### 4.3.5 Biosafety and biosecurity for personnel

PED virus is a persistent virus, and the implementation of stringent biosecurity measures in managing the movements of people on and off premises will be important for controlling the disease.

Movements of personnel onto or off high-risk premises (IPs, DCPs, SPs and TPs) should be limited, where possible. Where movements are unavoidable, all people (eg farm personnel, truck drivers) should shower (including hair washing) before entering and after leaving premises, with complete clothing changes. If showering facilities are not available on-site, showering may occur elsewhere but should occur as soon as practicable after leaving the premises. Farm-specific boots and overalls should be used. Decontamination of farm-specific footwear after each use and hot laundering ( $\geq 60$  °C) of used overalls is required. These requirements should also be met by workers and drivers entering and leaving processing facilities handling pigs from IPs, DCPs, SPs and TPs (ie approved processing facilities (APFs) and dangerous contact processing facilities (DCPFs)).

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

As an enhanced biosecurity measure, personnel leaving high-risk premises should wait an appropriate time before entering another premises with pigs (eg 12 hours is recommended best practice in the Australian pig industry), taking into account the context of the outbreak.

Enhanced biosecurity is also encouraged on all other premises with pigs. The *National farm biosecurity manual for pork production*<sup>13</sup> and the APIQV® *Standards manual*<sup>14</sup> provide guidelines and industry standards for pig producers on both routine and high-risk biosecurity procedures. The **AUSVETPLAN enterprise manual Pig industry** provides additional detail on the biosecurity and other response measures that may be used on pig premises in an EAD response.

### 4.3.6 Biosecurity for equipment

Movements of vehicles and equipment onto or off high-risk premises (IPs, DCPs, SPs and TPs) should be limited, where possible. Use of loading facilities and feed bins near perimeter fencing (with shuttles to main feed storage etc), where possible, is recommended to limit vehicular movements onto these premises.

Equipment should not be shared between pig sheds – and ideally not between production units within a shed. Non-reusable equipment should be disposed of in a biosecure manner (eg incineration, commercial hazardous biological waste program). Reusable equipment, including vehicles, should

<sup>13</sup> [www.farmbiosecurity.com.au/toolkit/plans-manuals](http://www.farmbiosecurity.com.au/toolkit/plans-manuals)

<sup>14</sup> [www.apiq.com.au/standards-asf-african-swine-fever/standards-manual](http://www.apiq.com.au/standards-asf-african-swine-fever/standards-manual)

be decontaminated (see the **AUSVETPLAN operational manual *Decontamination***) on exit from the premises (or at an approved 'receiving' premises) and allowed to completely dry before reuse.

#### 4.3.7 Animal welfare

The imposition of movement controls on live pigs on premises with intensive livestock production (such as piggeries) may result in animal welfare issues due to overcrowding within 2 weeks, depending on the production system in use (Garner et al 2012). Careful management will be required to avoid or mitigate the welfare issues – for example, ensuring access to temporary housing on-site, ensuring rapid destocking (where a stamping-out policy is being implemented), or ensuring that biosecure transport to an approved abattoir is readily available (where either a modified stamping-out or a CRE policy is being implemented). Where the latter option is not available, culling of overcrowded pigs on farm may need to be considered.

Because the morbidity and mortality of PED are variable, and may be high in piglets, close monitoring and careful management of animal welfare on affected premises will be required, especially where CRE forms part of the response strategy.

Additional guidance on managing livestock welfare can be found in the **AUSVETPLAN operational manual *Livestock welfare and management***.

#### 4.3.8 Vaccination

No vaccines against PED are registered for use in Australia.

The use of CRE is discussed in Appendix 2.

#### 4.3.9 Treatment of infected animals

There is no PED virus-specific treatment for infected animals.

#### 4.3.10 Treatment of animal products and byproducts

The movement of pig products and byproducts (including offal) derived from pigs from IPs, DCPs, SPs and TPs is prohibited except under special permit if risk analysis (on a case-by-case basis) indicates that the risk associated with the movement is acceptable within the response.

Hygienic rendering of pig products and byproducts at APFs may also be considered on a case-by-case basis, subject to risk analysis.

Raising awareness of prohibited pig feed (swill) regulations, and additional compliance monitoring, will be important to prevent virus transmission through the feeding of pigmeat and products to pigs (see Section 4.3.15).

#### 4.3.11 Destruction of animals

##### Stamping out

Where a stamping-out approach is used, all infected and exposed pigs on IPs will be destroyed on-site. Destruction of pigs on DCPs may be considered, depending on the circumstances and based on risk assessment.

Under a modified stamping-out approach, any seropositive and/or exposed pigs without clinical signs may be slaughtered at approved abattoirs (if circumstances allow safe transport and slaughter, and

processing capacity is available). At approved abattoirs, pigs from IPs should be slaughtered within 4 hours of arrival (or as soon as practicable) and all other pigs within 18 hours of arrival, to minimise virus shedding on-site and contamination of the lairage area. Particular care should be taken to prevent contamination of the meat with intestinal contents. The head and neck (including lymph node) should be removed and disposed of by rendering. Exposed pigs that are showing clinical signs should be destroyed on-site, or held in quarantine until clinical signs resolve and then sent to slaughter. Decisions on the management of clinically affected pigs should be based on risk assessment.

### **Destruction methods**

With a CRE approach, any pigs that need to be culled will be destroyed on-site.

Where destruction of pigs on-site is not possible, alternative arrangements may be considered, based on an assessment of the risk of disease spread through the movement of the infected and exposed pigs.

Additional guidance on destruction methods can be found in the **AUSVETPLAN operational manual *Destruction of animals***.

### **4.3.12 Disposal of animals, and animal products and byproducts**

Large volumes of risk material may require disposal, presenting a biosecurity challenge. The following guidelines are provided for the disposal of high-risk material:

- Carcasses of infected and exposed pigs should be disposed of on-site by deep burial (to ensure that they are inaccessible to scavengers).
- Effluent management on-site will be important because PED virus may be viable in effluent for several months (see Section 2.4.2).
- Composting on farm may be considered where space allows, and where pest and wild animal management is adequate to prevent mechanical transmission.
- Waste from the processing of infected and exposed pigs should be rendered before disposal at an ADS.

The disposal method chosen will be influenced by the type and volume of material to be disposed of, the resources available, the local environment, the prevailing weather, legislative requirements (including environmental protection legislation) and the risk of spreading the disease. Decontamination of all equipment and machinery involved in on-site disposal will be required.

Where disposal on-site is not feasible, the use of an ADS may be considered, subject to risk assessment, including the risk of disease transmission during transport of the risk material being disposed of.

Additional guidance on disposal methods for EAD responses is available in the **AUSVETPLAN operational manual *Disposal***.

### **4.3.13 Decontamination**

Decontamination of premises (including APFs) and fomites (eg vehicles, people, clothing, equipment) is a critical part of the response to PED (see also Section 4.3.6).

IPs will be decontaminated following depopulation. Special measures may be implemented if eradication is being undertaken while animals are still on the premises (eg staged decontamination with a modified stamping-out approach, or with CRE – see Appendix 2).

Additional guidance on decontamination methods for EAD responses is available in the **AUSVETPLAN operational manual *Decontamination***.

#### 4.3.14 Wild animal management

As PED virus can be spread mechanically by pest and feral animals (eg rodents, flies, birds, dogs, cats, foxes), measures to prevent contamination of these animals with PED virus – and so prevent transmission to feral pig populations – should be implemented. This may include undertaking rodent and fly control, maintaining perimeter fencing and bird-proofing premises.

Surveillance of feral pig populations near IPs will be required. If feral pigs are infected, measures to manage the disease in these populations may need to be considered. Depending on the scale of the outbreak and the dynamics of the local feral pig population, culling of feral pigs may be an option. Where this is impractical or unlikely to eliminate infection from the feral pig population, compartmentalisation of the commercial pig industry may need to be pursued instead (see Section 4.4).

#### 4.3.15 Public awareness and media

Public awareness and industry engagement will support a cohesive response. The communications strategy should include mechanisms for raising awareness in owners of petting zoos and school farms, as well as urban and peri-urban pig owners and smaller commercial piggeries, which may not be engaged with the industry peak body.

Messaging should include:

- assurance that PED does not pose a public health risk, to maintain buyer confidence in pork meat and products
- signs of PED and details of how to report suspect cases
- farm biosecurity measures to prevent entry of PED virus to pig production premises
- explanation of the control measures, compensation legislation and processes, and swill feeding regulations, to encourage compliance and discourage illegal activities
- information on progress in eradication of the disease.

Additional guidance on managing public information can be found in the Biosecurity incident public information manual.

#### 4.3.16 Other strategies

Other control strategies may need to be considered, depending on the context of the incident.

Guidance on the use of CRE is provided in Appendix 2.

#### 4.3.17 Stand-down

Stand-down of the response will occur once PED has been eradicated; when eradication of PED is no longer considered feasible, cost-effective or beneficial; or when the National Management Group formally declares that the outbreak is over.

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

## 4.4 Other control and eradication options

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If it is not feasible to eradicate PED using the strategies outlined above, a long-term control program may need to be developed through consultation between Australian governments and the pig industry. This may include compartmentalisation of the commercial pig industry, supported by accredited industry quality assurance and/or government accreditation programs, should PED virus become established in the feral pig population.

## 4.5 Funding and compensation

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Details of the cost-sharing arrangements can be found in the Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Responses.<sup>15</sup> Details of the approach to the valuation of, and compensation for, livestock and property in disease responses can be found in the **AUSVETPLAN operational manual *Valuation and compensation***.

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<sup>15</sup> [www.animalhealthaustralia.com.au/eadra](http://www.animalhealthaustralia.com.au/eadra)

# 5

## Declared areas and premises

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When an emergency animal disease (EAD) is first suspected, the premises involved would undergo a clinical and/or epidemiological investigation. If the case definition, as defined in the relevant AUSVETPLAN response strategy, is met (ie the index case<sup>16</sup>), the relevant chief veterinary officer (CVO) or their delegate will determine the premises classification and may declare the premises an infected premises (IP).

After the identification of the first IP, a restricted area (RA) and a control area (CA) may be declared.<sup>17</sup> A transmission area (TA) may also be defined, if appropriate. All premises within these areas will be classified.

At the beginning of an EAD incident, the initial premises classifications would be IP, at-risk premises (ARP), premises of relevance (POR), unknown status premises (UP) and zero susceptible species premises (ZP).

Any premises within the RA or CA will have only one classification at any one time. After an epidemiological investigation, clinical assessment, risk assessment or completion of control measures, a premises may be reclassified.

Once the first IP has been identified, intelligence gathering through veterinary epidemiological investigations would quickly lead to the identification of suspect premises (SPs) and trace premises (TPs). These would be high priorities for follow-up investigation by the relevant state or territory authorities. In a worst-case scenario, an SP could become an IP; therefore, SPs need to be investigated as a matter of very high priority. Similarly, investigation and risk assessment of a TP might identify it as an IP, dangerous contact premises (DCP) or dangerous contact processing facility (DCPF). An SP or TP might also be assessed as negative and qualified as SP-AN or TP-AN, and eventually reclassified as an ARP, POR or ZP.

All premises classifications are subject to change as a result of a modification in the case definition(s) or investigation(s) as the incident response proceeds.

Classifications should be applied with information needs of managers in mind. They should assist managers to monitor and report progress. Premises classifications to be used should be agreed early in a response, so that control centre personnel can apply the correct and consistent classifications and definitions from the outset of the investigation and response.

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<sup>16</sup> The first case to come to the attention of investigators

<sup>17</sup> This is invariably the case with highly contagious diseases (eg foot-and-mouth disease, equine/avian/swine influenza, classical swine fever) but may not apply to less contagious diseases (eg Hendra virus, anthrax, Australian bat lyssavirus).

# 6

# Movement controls

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Also refer to Section 4.3.2 for information on the specific movement controls for live animals, products and so on.

## 6.1 Principles

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

- Containment and eradication of porcine epidemic diarrhoea (PED) 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.
- All movement control matrixes and narratives are for guidance.
- Application for a movement permit does not automatically mean that one will be granted.
- In emergency or exceptional circumstances, any proposed movement may be considered by the jurisdictional chief veterinary officer (CVO) on a risk-assessed case-by-case basis.
- Interstate movements will need to meet the import requirements of the receiving jurisdiction.

## 6.2 Guidelines for issuing permits

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In an emergency animal disease (EAD) event, quarantine and movement controls must strike a balance

between quick and effective disease control and business continuity. Therefore, it is not appropriate to simply prohibit all movement of animals and products. On the other hand, diligence needs to be applied to minimise the risk of further spread of the disease.

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

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

Permits may not be available until the relevant CVO provides approval for movements, and this may not be available in the early stages of a response. When assessing risk for the purposes of issuing a permit, the elements to consider may include:

- sources of risk (as applicable)
  - risk material such as live or dead susceptible animals, semen, embryos, meat, meat products, waste products, offal, paunch screenings, manure, render material, fertiliser, biological specimens, casings, used wrappers and cartons, effluent, fomites (vehicles, people, nonsusceptible animals, crops, grains, hay silage and mixed feeds)
  - presence of the disease agent on both the originating and destination premises, and uncertainty
  - location of source and destination premises
  - fate at destination premises (eg for slaughter vs for growing out)
  - 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
  - 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 (as applicable)
  - livestock health (health of affected species, including animal welfare)
  - human health (including work 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
- destruction of animals
- processing of product
- disinfection or other treatment of animals, vehicles and fomites
- vector control, if relevant
- security
- communication.

## 6.3 Types of permits

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Permits are either general or special. Emergency permits are a form of special permit. Permits 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 – NVDs).

### 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 CVO gives approval for general movements, and this may not be available in the early stages of a response.

### 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.

### Emergency permit

An emergency permit is an SpP 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.

### Other movement requests

Movements not reflected within any of the movement control matrixes or narratives may be considered by the relevant jurisdictional CVO on a risk-assessed case-by-case basis.

# A1

## Appendix 1

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### PORCINE EPIDEMIC DIARRHOEA FACT SHEET

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#### Disease and cause

Porcine epidemic diarrhoea (PED) is a highly contagious viral disease of pigs caused by porcine epidemic diarrhoea virus, an enveloped, single-stranded RNA virus within the family *Coronaviridae*. Depending on strain virulence, infection can result in high morbidity and mortality, with mortality rates of more than 70% seen in suckling piglets.



It is important to ensure feed is free from contaminants to prevent spread

## **Occurrence in Australia**

There have been no outbreaks of PED in Australia.

## **Species affected**

PED does not infect humans.

PED only infects domestic and feral pigs.

## **Key signs**

For the purposes of this manual, the WOAHP incubation period of 1–4 days is used.

PED has one primary clinical sign: acute, watery diarrhoea. Occasionally, vomiting may occur, and consequent dehydration and metabolic acidosis may be observed. Neonates are often more severely affected than other age groups, and the majority of older pigs recover. Clinical signs are typically less severe in outbreaks of S-INDEL strains of PED virus than in outbreaks of NON-INDEL strains.

PED is clinically similar to transmissible gastroenteritis, infection with porcine deltacoronavirus and other causes of gastroenteritis. Laboratory testing is required to differentiate between these.

## **Spread**

PED virus is shed in the faeces of infected pigs, and in semen from infected boars. The main mode of disease transmission between pigs is faecal–oral transmission, via ingestion of products contaminated with faeces from infected pigs.

Transmission by animal products and byproducts is not an important means of spread, unless these products are contaminated with faeces from infected pigs. Waste products and effluent from infected premises are a significant risk for transmission of disease.

## **Persistence of the agent**

PED virus is stable and persists for prolonged periods outside the host, especially at low temperatures. It can remain viable for at least 28 days in wet feed mixture at 25 °C, has been found in effluent ponds 6 months after an outbreak, and is stable at pH 5–9 when at 4 °C.

# A2

## Appendix 2

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### USE OF CONTROLLED RAPID EXPOSURE TO MANAGE PED ON FARROWING PREMISES

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The following guidance is based on that provided in the response strategy for transmissible gastroenteritis, with modifications informed by the control measures used in overseas outbreaks of porcine epidemic diarrhoea (PED) (AASV 2013, Geiger & Connor 2013, Swine Health Professionals 2017, Manitoba Pork 2018, Niederwerder & Hesse 2018).

The exact protocol to be adopted would depend on the facilities, their management and the circumstances of the incident. Stringent biosecurity and highly competent management are absolute prerequisites for the success of controlled rapid exposure for eradicating PED from a pig premises. The virulence of the virus and animal welfare must be taken into consideration, as this control measure involves infection of naive pigs within infected herds. If there are clinical signs from PED virus infection, there are ethical and animal welfare issues related to keeping sick animals for a prolonged period. The emotional impact on staff and the availability of adequate support systems for staff should also be considered. The suitability of individual premises and management systems to successfully implement controlled rapid exposure should be critically evaluated before it is attempted on a premises.

#### Steps

##### Day 1

Diagnosis of PED; movements of marketable pigs off premises for direct slaughter only and subject to risk assessment.

Ensure that strict biosecurity protocols are in place, including:

- increased cleaning and hygiene for all facilities, vehicles, equipment and personnel
- one-way flow of personnel through production areas, sheds and premises (clean to dirty)
- dedicated entry area where decontamination and disinfection procedures can be implemented
- controlled movement of vehicles on to site (eg shuttle feed from perimeter fencing to pig shed/storage)
- use of dedicated clothing (disposable coveralls), footwear (dedicated boots or disposable boot covers) and equipment for individual sheds – or, ideally, individual production areas within sheds
- use of dedicated staff for individual sheds – and, ideally, individual production areas within sheds.

##### Days 1–21 (until the cessation of clinical signs)

Close the herd – introduce breeding stock replacements necessary for a minimum of 4–6 months. This should include pigs of differing weight ranges. No further introductions of pigs to the herd are allowed until

sentinel pigs are brought in and have completed the stipulated exposure and surveillance measures.

Allocate staff to different production areas within the shed and farm, using strict biosecurity between production areas (eg dedicated overalls, gloves and footwear for each area/pen, hand hygiene, dedicated equipment).

Feedback of herd over 5–7 days: exposure of the entire herd (including replacements) to feedback material. Feedback material is taken from diseased piglets that have recently died or been euthanased because of PED. Pigs are permitted access to the feedback material as a PED inoculation practice. Feedback practice must meet Australian and jurisdictional biosecurity and welfare legislation and codes of practice. For PED virus control through feedback, 'donor' piglets should ideally have been showing clinical signs for approximately 6 hours before death/euthanasia or collection of contaminated material. Allowing access to feedback material should begin with sows in late gestation and continue backwards to the sows and boars in the breeding area. Continue feedback until clinical signs are observed in all pigs. Pigs that do not develop clinical signs within 12–36 hours of feedback may need retreatment. Supportive care should be provided to breeding stock that become ill as a result of feedback (eg electrolytes and ensuring constant access to clean water).

Note: A ~50–100% mortality rate is expected in newborn piglets over the 3-week period following feedback to sows; careful monitoring and management of animal welfare are required. Early weaning of suckling piglets (eg from 12 days of age) or euthanasia of all suckling piglets should be implemented.



Piglets must be carefully monitored and managed if PED has been discovered on the premises

### Following cessation of clinical signs

After clinical signs have subsided, begin a strict 'all-in-all-out' system for farrowing and weaner rooms (with cleaning and disinfection between each batch):

- Pressure-wash and clean sheds daily to reduce faecal contamination and viral load.
- Undertake frequent cleaning and flushing of water and feed lines.
- Clean, disinfect and dry farrowing pens and equipment between litters.
- Wash down sows before they enter farrowing pens to remove faecal contamination.
- Clean and disinfect laneways used to move pigs (after each movement).
- Ban the use of foster nursing or sharing of piglets between litters – consider euthanasia of piglets if there are more piglets in a litter than functional teats on a sow.
- Implement frequent removal of dead stock, with strict handling and disposal practices.
- Implement biosecure management of faecal and other waste material.

Continue to monitor for clinical signs of diarrhoea; use laboratory investigation to differentiate aetiology.

Thirty days after clinical signs of PED have stopped, commence serial testing for presence of virus (eg using faecal swabs for RT-PCR testing). Testing may need to be repeated (eg fortnightly) until all pigs return negative results.

### Place sentinels

Once all pigs are negative for PED virus on RT-PCR testing, naive sentinel pigs may be introduced in weaner, grower, breeding and gestation buildings from a herd known to be free from PED. Sentinels should test negative for PED on serology just before or on entry to the premises.

Observe the sentinels for clinical signs of PED daily over a 60-day sentinel period. If diarrhoea occurs, euthanase and necropsy acutely affected pigs, and submit tissues for laboratory investigation.

After 30 days, and then again at the end of the 60-day observation period, the sentinels should undergo serological testing for antibodies to PED virus. If this testing is negative (on both occasions) and no clinical signs of PED have been observed, it may be assumed that the virus has been eliminated.

Subject to risk assessment, recovered piglets, weaners and finishers may be grown out and sold for slaughter (but these pigs must still be assumed to be infected and sent to approved processing facilities only).

# A3

## Appendix 3

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### RESOLUTION OF PREMISES

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Where stamping out or modified stamping out has been applied, quarantine of infected premises (IPs) may be lifted 30 days after completion of destruction, disposal and decontamination procedures.

When a controlled rapid exposure (CRE) approach is used, quarantine of IPs may be lifted once serological surveillance of sentinel pigs is completed and all results have been negative (guidance on the use of CRE to manage a PED incident is provided in Appendix 2).

Quarantine of suspect premises (SPs) and trace premises (TPs) may be lifted if they are recategorized as at-risk premises (ARPs) or premises of relevance (PORs). Quarantine of dangerous contact premises (DCPs) may be lifted once they become resolved premises (RP).

Detailed guidelines for classifying (and reclassifying) declared areas and premises are provided in the **AUSVETPLAN guidance document *Declared areas and allocation of premises classifications in an emergency animal disease response***.

# Glossary

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## Disease-specific terms

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<b>Feedback material</b>	Select porcine pathogen-contaminated material used in feedback practice.
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<b>Feedback practice</b>	A pathogen inoculation practice where naïve pigs are provided access to select porcine pathogen-contaminated material from infected animals. Feedback practice must meet Australian and jurisdictional biosecurity and welfare legislation and codes of practice (ie porcine material must be sourced from pigs that have spent their entire life on the same farm as where it is applied and must have the written approval as a therapeutic treatment by a registered veterinarian (Animal Health Committee, 2019). Feed and water must also be free from contaminants.
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## Standard AUSVETPLAN terms

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### Animal

<b>- captive wildlife</b>	Assessed negative (AN) is a qualifier that may be applied to ARPs, PORs, SPs, TPs, DCPs or DCPFs. The qualifier may be applied following surveillance, epidemiological investigation, and/or laboratory assessment/diagnostic testing and indicates that the premises is assessed as negative at the time of classification.
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<b>- domestic animal</b>	An animal that has been tamed and lives under human supervision and control to serve a purpose – especially a member of those species that have, through selective breeding, become notably different from their wild ancestors.
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<b>- feral animal</b>	A previously domesticated animal that now does not live under human supervision or control.
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<b>- wildlife/wild animal</b>	A previously domesticated animal that now does not live under human supervision or control.
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<b>Animal byproducts</b>	Products of animal origin that are not for consumption but are destined for industrial use (eg hides and skins, fur, wool, hair, feathers, hoofs, bones, fertiliser).
<b>Animal Health Committee</b>	<p>A committee whose members are the chief veterinary officers of the Commonwealth, states and territories, along with representatives from the CSIRO Australian Centre for Disease Preparedness (CSIRO-ACDP) and the Australian Government Department of Agriculture, Fisheries and Forestry. There are also observers from Animal Health Australia, Wildlife Health Australia, and the New Zealand Ministry for Primary Industries. The committee provides advice to the National Biosecurity Committee on animal health matters, focusing on technical issues and regulatory policy.</p> <p><i>See also</i> National Biosecurity Committee</p>
<b>Animal products</b>	Meat, meat products and other products of animal origin (eg eggs, milk) for human consumption or for use in animal feedstuff.
<b>Approved disposal site</b>	A premises that has zero susceptible livestock and has been approved as a disposal site for animal carcasses, or potentially contaminated animal products, wastes or things.
<b>Approved processing facility</b>	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.
<b>At-risk premises</b>	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.
<b>Australian Chief Veterinary Officer</b>	<p>The nominated senior veterinarian in the Australian Government Department of Agriculture, Fisheries and Forestry who manages international animal health commitments and the Australian Government's response to an animal disease outbreak.</p> <p><i>See also</i> Chief veterinary officer</p>
<b>AUSVETPLAN</b>	Australian Veterinary Emergency Plan. Nationally agreed resources that guide decision making in the response to emergency animal diseases (EADs). It outlines Australia's preferred approach to responding to EADs of national significance, and supports efficient, effective and coherent responses to these diseases.

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<b>Carcase</b>	The body of an animal slaughtered for food.
<b>Carcass</b>	The body of an animal that died in the field.
<b>Case fatality rate</b>	The proportion of infected animals that die of the disease among all animals diagnosed with the disease at the time.
<b>Chief veterinary officer (CVO)</b>	<p>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.</p> <p><i>See also</i> Australian Chief Veterinary Officer</p>
<b>Compartmentalisation</b>	The process of defining, implementing and maintaining one or more disease-free establishments under a common biosecurity management system in accordance with WOAHP guidelines, based on applied biosecurity measures and surveillance, to facilitate disease control and/or trade.
<b>Compensation</b>	<p>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.</p> <p><i>See also</i> Cost-sharing arrangements, Emergency Animal Disease Response Agreement</p>
<b>Consultative Committee on Emergency Animal Diseases (CCEAD)</b>	The key technical coordinating body for animal health emergencies. Members are state and territory chief veterinary officers, representatives of CSIRO-ACDP and the relevant industries, and the Australian Chief Veterinary Officer as chair.
<b>Control area (CA)</b>	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).
<b>Cost-sharing arrangements</b>	<p>Arrangements agreed between governments (national and state/territory) and livestock industries for sharing the costs of emergency animal disease responses.</p> <p><i>See also</i> Compensation, Emergency Animal Disease Response Agreement</p>
<b>Dangerous contact animal</b>	A susceptible animal that has been designated as being exposed to other infected animals or potentially infectious products following tracing and epidemiological investigation.

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<b>Dangerous contact premises (DCP)</b>	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.
<b>Dangerous contact processing facility (DCPF)</b>	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.
<b>Declared area</b>	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.
<b>Decontamination</b>	Includes all stages of cleaning and disinfection.
<b>Depopulation</b>	The removal of a host population from a particular area to control or prevent the spread of disease.
<b>Destroy (animals)</b>	To kill animals humanely.
<b>Disease agent</b>	A general term for a transmissible organism or other factor that causes an infectious disease.
<b>Disease Watch Hotline</b>	24-hour freecall service for reporting suspected incidences of exotic diseases – 1800 675 888.
<b>Disinfectant</b>	A chemical used to destroy disease agents outside a living animal.
<b>Disinfection</b>	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.
<b>Disinsectisation</b>	The destruction of insect pests, usually with a chemical agent.
<b>Disposal</b>	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.

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<b>Emergency animal disease</b>	<p>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.</p> <p><i>See also</i> Endemic animal disease, Exotic animal disease</p>
<b>Emergency Animal Disease Response Agreement</b>	<p>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.</p> <p><i>See also</i> Compensation, Cost-sharing arrangements</p>
<b>Endemic animal disease</b>	<p>A disease affecting animals (which may include humans) that is known to occur in Australia.</p> <p><i>See also</i> Emergency animal disease, Exotic animal disease</p>
<b>Enterprise</b>	<i>See</i> Risk enterprise
<b>Enzyme-linked immunosorbent assay (ELISA)</b>	<p>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.</p>
<b>Epidemiological investigation</b>	<p>An investigation to identify and qualify the risk factors associated with the disease.</p> <p><i>See also</i> Veterinary investigation</p>
<b>Epidemiology</b>	<p>The study of disease in populations and of factors that determine its occurrence.</p>
<b>Exotic animal disease</b>	<p>A disease affecting animals (which may include humans) that does not normally occur in Australia.</p> <p><i>See also</i> Emergency animal disease, Endemic animal disease</p>
<b>Exotic fauna/feral animals</b>	<i>See</i> Wild animals
<b>Fomites</b>	<p>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.</p>

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<b>General permit</b>	<p>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.</p> <p><i>See also</i> Special permit</p>
<b>In-contact animals</b>	<p>Animals that have had close contact with infected animals, such as noninfected animals in the same group as infected animals.</p>
<b>Incubation period</b>	<p>The period that elapses between the introduction of a pathogen into an animal and the first clinical signs of the disease.</p>
<b>Index case</b>	
<b>– for the outbreak</b>	<p>The first case of the disease to be diagnosed in a disease outbreak.</p> <p><i>See also</i> Index property</p>
<b>– for a herd, flock or other defined group</b>	<p>The first diagnosed case of an outbreak in a herd, flock or other defined group.</p>
<b>Infected premises (IP)</b>	<p>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.</p>
<b>Local control centre</b>	<p>An emergency operations centre responsible for the command and control of field operations in a defined area.</p>
<b>Monitoring</b>	<p>Routine collection of data for assessing the health status of a population or the level of contamination of a site for remediation purposes.</p> <p><i>See also</i> Surveillance</p>
<b>Movement control</b>	<p>Restrictions placed on the movement of animals, people and other things to prevent the spread of disease.</p>

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<b>National Biosecurity Committee</b>	A committee that was formally established under the Intergovernmental Agreement on Biosecurity (IGAB). The IGAB was signed on 13 January 2012, and signatories include all states and territories except Tasmania. The committee provides advice to the Agriculture Senior Officials Committee and the Agriculture Ministers' Forum on national biosecurity issues, and on the IGAB.
<b>National Management Group (NMG)</b>	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, Fisheries and Forestry 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.
<b>Native wildlife</b>	See Wild animals
<b>Operational procedures</b>	Detailed instructions for carrying out specific disease control activities, such as disposal, destruction, decontamination and valuation.
<b>Outside area (OA)</b>	The area of Australia outside the declared (control and restricted) areas.
<b>Owner</b>	Person responsible for a premises (includes an agent of the owner, such as a manager or other controlling officer).
<b>Polymerase chain reaction (PCR)</b>	A method of amplifying and analysing DNA sequences that can be used to detect the presence of viral DNA.
<b>Premises</b>	A tract of land including its buildings, or a separate farm or facility that is maintained by a single set of services and personnel.
<b>Premises of relevance (POR)</b>	A premises in a control area that contains a live susceptible animal(s) but is not considered at the time of classification to be an infected premises, suspect premises, trace premises, dangerous contact premises or dangerous contact processing facility.
<b>Prevalence</b>	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.
<b>Primary case</b>	The individual that introduces disease into a herd, flock or other group under study. Not necessarily the first case diagnosed case in that herd, flock or other group under study.

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<b>Proof of freedom</b>	Reaching a point following an outbreak and post-outbreak surveillance when freedom from the disease can be claimed with a reasonable level of statistical confidence.
<b>Qualifiers</b>	
<b>– assessed negative</b>	Assessed negative (AN) is a qualifier that may be applied to ARPs, PORs, SPs, TP, DCPs or DCPFs. The qualifier may be applied following surveillance, epidemiological investigation, and/or laboratory assessment/diagnostic testing and indicates that the premises is assessed as negative at the time of classification.
<b>– sentinels on site</b>	Sentinels on site (SN) is a qualifier that may be applied to IPs and DCPs to indicate that sentinel animals are present on the premises as part of response activities (ie before it can be assessed as an RP).
<b>– vaccinated</b>	The vaccinated (VN) qualifier 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 the EAD in question. However, depending on the legislation, objectives and processes within a jurisdiction, the VN qualifier may be used to track a range of criteria and parameters.
<b>Quarantine</b>	Legally enforceable requirement that prevents or minimises spread of pests and disease agents by controlling the movement of animals, persons or things.
<b>Resolved premises (RP)</b>	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.
<b>Restricted area (RA)</b>	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.
<b>Risk enterprise</b>	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 and garbage depots.

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<b>Sensitivity</b>	The proportion of truly positive units that are correctly identified as positive by a test.  <i>See also</i> Specificity
<b>Sentinel animal</b>	Animal of known health status that is monitored to detect the presence of a specific disease agent.
<b>Seroconversion</b>	The appearance in the blood serum of antibodies (as determined by a serology test) following vaccination or natural exposure to a disease agent.
<b>Serosurveillance</b>	Surveillance of an animal population by testing serum samples for the presence of antibodies to disease agents.
<b>Serotype</b>	A subgroup of microorganisms identified by the antigens carried (as determined by a serology test).
<b>Serum neutralisation test</b>	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.
<b>Slaughter</b>	The humane killing of an animal for meat for human consumption.
<b>Special permit</b>	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
<b>Specificity</b>	The proportion of truly negative units that are correctly identified as negative by a test.  <i>See also</i> Sensitivity
<b>Stamping out</b>	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.
<b>State coordination centre</b>	The emergency operations centre that directs the disease control operations to be undertaken in a state or territory.

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<b>Surveillance</b>	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.
<b>Susceptible animals</b>	Animals that can be infected with a particular disease.
<b>Suspect animal</b>	<p>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.</p> <p>or</p> <p>An animal not known to have been exposed to a disease agent but showing clinical signs requiring differential diagnosis.</p>
<b>Suspect premises (SP)</b>	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).

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**Swill** Also known as ‘prohibited pig feed’, means material of mammalian origin, or any substance that has come in contact with this material, but does not include:

- i. milk, milk products or milk byproducts either of Australian provenance or legally imported for stockfeed use into Australia
- ii. material containing flesh, bones, blood, offal or mammal carcasses that is treated by an approved process<sup>1</sup>
- iii. 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.
- iv. material used under an individual and defined-period permit issued by a jurisdiction for the purposes of research or baiting.

<sup>1</sup> In terms of (ii), approved processes are:

1. rendering in accordance with the Australian Standard for the Hygienic Rendering of Animal Products
2. under jurisdictional permit, cooking processes subject to compliance verification that ensure that a core temperature of at least 100 °C for a minimum of 30 minutes, or equivalent, has been reached
3. treatment of cooking oil, which has been used for cooking in Australia, in accordance with the National Standard for Recycling of Used Cooking Fats and Oils Intended for Animal Feeds
4. under jurisdictional permit, any other nationally agreed process approved by AHC for which an acceptable risk assessment has been undertaken and that is subject to compliance verification.

The national definition is a minimum standard. Some jurisdictions have additional conditions for swill feeding that pig producers in those jurisdictions must comply with, over and above the requirements of the national definition.

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<b>Swill feeding</b>	<p>Also known as 'feeding prohibited pig feed', it includes:</p> <ul style="list-style-type: none"> <li>• feeding, or allowing or directing another person to feed, prohibited pig feed to a pig</li> <li>• allowing a pig to have access to prohibited pig feed</li> <li>• the collection and storage or possession of prohibited pig feed on a premises where one or more pigs are kept</li> <li>• supplying to another person prohibited pig feed that the supplier knows is for feeding to any pig.</li> </ul> <p>This definition was endorsed by the Agriculture Ministers' Council through AGMIN OOS 04/2014.</p>
<b>Trace premises (TP)</b>	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).
<b>Tracing</b>	The process of locating animals, people or other items that may be implicated in the spread of disease, so that appropriate action can be taken.
<b>Unknown status premises (UP)</b>	A premises within a declared area where the current presence of susceptible animals and/or risk products, wastes or things is unknown.
<b>Vaccination</b>	Inoculation of individuals with a vaccine to provide active immunity.
<b>Vaccine</b>	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.
<b>– adjuvanted</b>	A vaccine in which one or several disease-causing agents are combined with an adjuvant (a substance that increases the immune response).
<b>– attenuated</b>	A vaccine prepared from infective or 'live' microbes that are less pathogenic but retain their ability to induce protective immunity.
<b>– gene deleted</b>	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.
<b>– inactivated</b>	A vaccine prepared from a virus that has been inactivated ('killed') by chemical or physical treatment.

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<b>– recombinant</b>	A vaccine produced from virus that has been genetically engineered to contain only selected genes, including those causing the immunogenic effect.
<b>Vector</b>	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 lifecycle of the agent.
<b>Veterinary investigation</b>	An investigation of the diagnosis, pathology and epidemiology of the disease.  <i>See also</i> Epidemiological investigation
<b>Viraemia</b>	The presence of viruses in the blood.
<b>Wild animals</b>	
<b>– native wildlife</b>	Animals that are indigenous to Australia and may be susceptible to emergency animal diseases (eg bats, dingoes, marsupials).
<b>– feral animals</b>	Animals of domestic species that are not confined or under control (eg cats, horses, pigs).
<b>– exotic fauna</b>	Nondomestic animal species that are not indigenous to Australia (eg foxes).
<b>WOAH Terrestrial Code</b>	WOAH <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: <a href="http://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access">www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access</a> .
<b>WOAH Terrestrial Manual</b>	WOAH <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: <a href="http://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-manual-online-access">www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-manual-online-access</a> .
<b>Wool</b>	Sheep wool.
<b>Zero susceptible species premises (ZP)</b>	A premises that does not contain any susceptible animals or risk products, wastes or things.
<b>Zoning</b>	The process of defining, implementing and maintaining a disease-free or infected area in accordance with WOAH guidelines, based on geopolitical and/or physical boundaries and surveillance, to facilitate disease control and/or trade.
<b>Zoonosis</b>	A disease of animals that can be transmitted to humans.

# Abbreviations

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## Disease-specific abbreviations

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<b>CRE</b>	controlled rapid exposure
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<b>PED</b>	porcine epidemic diarrhoea
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## Standard AUSVETPLAN abbreviations

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<b>ACDP</b>	Australian Centre for Disease Preparedness
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<b>AN</b>	assessed negative
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<b>ARP</b>	at-risk premises
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<b>AUSVETPLAN</b>	Australian Veterinary Emergency Plan
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<b>CA</b>	control area
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<b>CCEAD</b>	Consultative Committee on Emergency Animal Diseases
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<b>CSIRO</b>	Commonwealth Scientific and Industrial Research Organisation
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<b>CVO</b>	chief veterinary officer
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<b>DCP</b>	dangerous contact premises
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<b>DCPF</b>	dangerous contact processing facility
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<b>EAD</b>	emergency animal disease
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<b>EADRA</b>	Emergency Animal Disease Response Agreement
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<b>EADRP</b>	Emergency Animal Disease Response Plan
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<b>EDTA</b>	ethylenediaminetetraacetic acid (anticoagulant for whole blood)
<b>ELISA</b>	enzyme-linked immunosorbent assay
<b>GP</b>	general permit
<b>IETS</b>	International Embryo Technology Society
<b>IP</b>	infected premises
<b>LCC</b>	local control centre
<b>NMG</b>	National Management Group
<b>OA</b>	outside area
<b>PCR</b>	polymerase chain reaction
<b>POR</b>	premises of relevance
<b>RA</b>	restricted area
<b>RP</b>	resolved premises
<b>SCC</b>	state coordination centre
<b>SP</b>	suspect premises
<b>SpP</b>	special permit
<b>TP</b>	trace premises
<b>UP</b>	unknown status premises
<b>WOAH</b>	World Organisation for Animal Health (founded as OIE)
<b>ZP</b>	zero susceptible species premises

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