

Vesicular stomatitis

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Contact information

If:

- you have any requests or inquiries concerning reproduction and rights; or
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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

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DISEASE WATCH HOTLINE: 1800 675 888

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

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Beef cattle in field.



1

Introduction

1.1 This manual

1.1.1 Purpose

As part of AUSVETPLAN (the Australian Veterinary Emergency Plan), this response strategy contains the nationally agreed approach to the response to an incident – or suspected incident – of vesicular stomatitis (VS) in Australia. It has been developed 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 provides information about:

- the disease ([Section 2](#))
- the implications for Australia (potential pathways of introduction, expected effects and critical factors for a response) ([Section 3](#))
- the default policy and guidelines for agencies and organisations involved in a response to an outbreak ([Section 4](#))
- declared areas and premises ([Section 5](#))
- quarantine and movement controls ([Section 6](#))
- surveillance during the response and to support proof of freedom ([Section 7](#)).

The key features of VS are described in the **Vesicular stomatitis fact sheet** [under development].

1.1.3 Development

The strategies in this document for the diagnosis and management of an outbreak of VS are based on risk assessment. 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 contentious or is under development; such text is not part of the official manual. The issues will be worked on by experts and relevant text included at a future date.

1.2 Other documentation

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

- other AUSVETPLAN documents, including the operational, enterprise and management manuals, and any relevant guidance and resource documents; the complete series of manuals is available on the Animal Health Australia website¹
- relevant nationally agreed standard operating procedures (NASOPs).² 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 and industry policies, response plans, standard operating procedures and work instructions
- relevant Commonwealth, and state and territory legislation and legal agreements (such as the Emergency Animal Disease Response Agreement,³ where applicable).

1.3 Training resources

EAD preparedness and response arrangements in Australia

The EAD Foundation online course⁴ provides livestock producers, veterinarians, veterinary students, government personnel and emergency workers with foundation knowledge for further training in EAD preparedness and response in Australia.

1 www.animalhealthaustralia.com.au/our-publications/ausvetplan-manuals-and-documents

2 www.animalhealthaustralia.com.au/what-we-do/emergency-animal-disease/nationally-agreed-standard-operating-procedures

3 www.animalhealthaustralia.com.au/what-we-do/emergency-animal-disease/ead-response-agreement

4 www.animalhealthaustralia.com.au/emergency-animal-disease-training-program

2

Nature of the disease

Vesicular stomatitis (VS) is a viral disease that primarily affects cattle, equids and pigs, and, less commonly, sheep, goats and camelids. The disease is spread by insects, and by direct contact with infected animals and contaminated fomites. VS is characterised by the formation of vesicles (in the mouth, and on the feet and teats) that are clinically indistinguishable from those caused by foot-and-mouth disease (FMD).

VS is also zoonotic and typically causes a mild influenza-like illness in people.

OIE listing

VS is not a World Organisation for Animal Health (OIE)-listed disease.⁵

2.1 Aetiology

VS is caused by several antigenically distinct viruses of the *Vesiculovirus* genus of the family *Rhabdoviridae*. There are two serotypes: New Jersey (VSV-NJ) and Indiana (VSV-IN). VSV-IN has three recognised subtypes: VSV-IN1 (the most prevalent strain found in the United States), VSV-IN2 (Cocal virus) and VSV-IN3 (Alagoas virus). Within serotypes, isolates differ in their physical, chemical and biological properties (Hansen et al 1985). Pathogenicity is not related to virus type.

2.2 Susceptible species

Clinical disease occurs most commonly in cattle, equids and pigs, but has also been reported in sheep, goats and camelids (AVMA 2006, USDA 2012).

Serological evidence of exposure to VS virus (VSV) has been detected in a wide range of other species, including deer, pronghorn, bats, raccoons, opossums, anteaters, sloths, bobcats, bears, wild canids, domestic dogs, primates, rabbits, various rodents, turkeys and ducks (Hanson 1952; Andrade et al 1981, cited in Reis et al 2009; AVMA 2006; Reis et al 2009; Medlin et al 2016; Spickler 2016).

Other rodent species, ferrets, deer and chickens have been infected experimentally (Olitsky et al 1934, cited in Hanson 1952; Hanson 1952; Kowalczyk 1952, cited in Hanson 1952; Spickler 2016).

The susceptibility of Australian native animals to VSV and their likely role in the epidemiology of the disease are unknown. However, given the serological evidence of exposure to VSV in many diverse wild animal species in the Americas, it is possible that some species of Australian fauna will be susceptible to infection.

⁵ At its 82nd General Session in 2014, the World Assembly of Delegates of the OIE agreed to delete VS from the OIE list of diseases.

Zoonotic potential

VS is a zoonosis, typically causing a mild influenza-like illness in people.

2.3 World distribution

VS is endemic in the Americas, from northern South America to southern Mexico, with clinical disease outbreaks recorded annually. Outbreaks also occur in other areas of North and South America; they have been recorded as far north as southern Canada and as far south as northern Argentina.

The different serotypes and subtypes usually occur in defined geographical regions, with VSV-IN2 and VSV-IN3 only reported from some areas of South America (Reis et al 2009). VSV-NJ is reported as being responsible for more than 80% of cases in the endemic area, and VSV-IN1 for the remainder (Hanson et al 1968).

A disease resembling VS was described as affecting horses and mules in the Transvaal, South Africa, between 1884 and 1943 (Theiler 1901, cited in Hanson 1952) but the causative agent was not identified, and evidence of the involvement of VSV is lacking. VS was apparently introduced by army horses from North America to France in 1915 and 1917 but failed to establish an endemic cycle (Hanson 1952).

Occurrence in Australia

There have been no occurrences of VS in Australia.

2.4 Epidemiology

2.4.1 Incubation period

The incubation period in natural infection is generally 2–8 days (USDA 2012).

OIE incubation period

VS is no longer listed in the OIE *Terrestrial animal health code*. The 2013 Terrestrial Code described the longest incubation period for VS as 21 days.

2.4.2 Persistence of agent and modes of transmission

General properties

VSV is a relatively unstable enveloped virus and is inactivated by:

- heating in serum to 55 °C for 4 minutes or 60 °C for 1 minute (Zimmer et al 2013)
- exposure to sunlight and ultraviolet radiation (OIE 2013a, Spickler 2016)
- detergents (Zimmer et al 2013)
- formaldehyde and 1% formalin, ether and other organic solvents, chlorine dioxide, 1% sodium hypochlorite, 70% ethanol, 2% glutaraldehyde, 2% sodium carbonate, 4% sodium hydroxide and 2% iodophors (OIE 2013a)
- pH <4 or >10 (OIE 2013a).

Environment (including windborne spread)

In the United States, outbreaks of VS have been more common in animals held on pasture than in



Cattle drinking from water trough.

housing (USDA 2012). VSV reportedly survives 3–4 days in saliva-contaminated hay (Spickler 2016). Although the virus is not thought to survive long outside the host, some outbreaks appeared to spread in a windward direction (Sellers & Maarouf 1990, cited in Nunamaker et al 2003), although this may have been associated with the movement of vectors rather than windborne spread of virus.

VSV has also been recovered from water in contaminated troughs (Hansen et al 1985).

Live animals

Live domestic animals

VSV enters livestock hosts through direct contact between contaminated secretions and mucosa and skin, or via insect bites. Infection is thought to spread to and between livestock (Howerth et al 2006):

- mechanically by flies feeding on infected secretions
- via biting insects
- by direct contact between infected domestic or wild animals and susceptible livestock
- mechanically on contaminated equipment such as teat cups and harness bits, or on human hands
- via drinking water or feed contaminated with infected saliva and vesicular fluid.

Virus is shed primarily in vesicular fluids and saliva, but has also been detected in nasal discharge and from conjunctival swabs. In experimental studies, shedding was detected as early as 1–2 days post-inoculation, with most shedding occurring within the first 6 days; shedding had ceased by day 10 post-inoculation. Shedding was also detected in asymptotically infected animals (Howerth et al 2006).

Although viral shedding appears to be short lived, virus could be isolated from lymphoid tissue on days 12–15 postmortem (Howerth et al 2006) and from tongue epithelium 21 days after the onset of clinical signs (Thurmond et al 1987).

Domestic livestock are not thought to develop sufficient viraemia to enable onward transmission of VSV to biting insects. The virus has not been isolated from the blood or plasma of livestock (Stallknecht et al 1999, Howerth et al 2006).

In utero infection has not been reported, and VSV does not appear to cross the placenta or cause fetal seroconversion (Spickler 2016).

Experimental infections have been demonstrated via aerosols, and by parenteral injection via the intranasal, intradermal and intravenous routes (Cornish et al 2001, Howerth et al 2006, Spickler 2016). Aerosols are thought to play little or no part in disease transmission within or between herds.

Live wild (including feral) animals

In general, the presence of one or more susceptible animal species capable of maintaining sustained levels of viraemia is an essential part of the life cycle of arthropod-borne viruses. Vectors feeding on viraemic animals become infected and transmit infection to other susceptible animals.

In endemic areas, wild rodents are suspected to act as reservoirs for VSV. Rodents (such as deer mice) may develop viraemia following experimental infection (Cornish et al 2001, Mesquita et al 2017), and black flies can become infected by feeding on viraemic rodents (Mesquita et al 2017). However, naturally infected animal hosts capable of sustaining viraemia and serving as reservoirs for insect transmission have not been identified (McCluskey & Mumford 2000, Cornish et al 2001).

In one study, wild pigs had a high prevalence of VSV, and it was mooted that they may act as reservoirs of infection for grazing livestock (cattle, sheep and goats) (Miller et al 2017).

Carcasses

The persistence of VSV in organic material is thought to be related to temperature: survival is lower at higher temperatures and more prolonged at lower temperatures (Spickler 2016). The potential exposure of insect vectors to infectious carcasses (eg vesicular fluid, saliva) may pose a risk for mechanical transmission of the virus.

Animal products

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

VSV has been detected in epithelial tissues and associated draining lymph nodes of experimentally infected animals (Howerth et al 2006, Reis et al 2009), and may be found in some tissues of an infected carcass. However, there are no reports of outbreaks of VS being associated with trade in meat or meat products. When VS was listed by the OIE, the OIE did not recommend any risk management measures for trade in meat and meat products, regardless of the VS status of the exporting country (OIE 2013b).

Milk and dairy products, including use as animal feed

There are reports that VSV could be found in raw milk but does not survive pasteurisation (Hanson

1981). However, recent reviews have concluded that VSV does not appear to be shed in milk (EFSA 2012, Spickler 2016), and there are no reports of outbreaks of VS being associated with trade in milk. When VS was listed by the OIE, the OIE did not recommend any risk management measures for trade in milk or milk products, regardless of the VS status of the exporting country (OIE 2013b).

Animal byproducts

Hides, skin, wool and other fibres

Although VSV can be found in the epithelium and vesicular fluids associated with lesions, infectivity is short lived (Howerth et al 2006), and there are no reports of outbreaks of VS being associated with trade in skins, hides or fibres. When VS was listed by the OIE, the OIE did not recommend any risk management measures for trade in hides, skins and fibres, regardless of the VS status of the exporting country (OIE 2013b).

Semen and embryos from live susceptible animals

There are no references to VSV being excreted in semen (OIE 2014). Haematogenous contamination of semen is unlikely (as livestock are not thought to develop substantial viraemia), and transmission by artificial insemination has never been reported in any species.

VSV does not appear to cross the placenta (Spickler 2016), and haematogenous contamination of embryos is unlikely. Embryos that have been collected, prepared with an intact zona pellucida and subjected to trypsin washings, and stored in accordance with the principles of the International Embryo Transfer Society are considered highly unlikely to pose a transmission risk (Sutmoller & Wrathall 1997).

Specimens

Laboratory-acquired infection has been reported in people following contact with infectious specimens, exposure to aerosols or accidental inoculation (Hanson et al 1950, cited in EFSA 2012; Johnson et al 1966, cited in Reif et al 1987; Spickler 2016).

Waste products and effluent

VSV is not considered to be shed in faeces or urine from naturally infected animals (EFSA 2012, Spickler 2016), although it has been reported occasionally in faeces from experimentally infected pigs (Stallknecht et al 1999, Howerth et al 2006).

Biological products (eg vaccines)

The use of live attenuated vaccines poses a potential route of transmission (see Section 2.7).

VSV is not found in blood (Lubroth et al 2006, cited in OIE 2014).

Nonsusceptible animals

Mechanical transmission of VSV by contaminated but uninfected animals is a possible but unlikely route of natural transmission of VSV.

People

Mechanical transmission of VSV by people who come in contact with infected animals is possible.

The primary routes of human infection are the respiratory tract via infective aerosols, the nasopharynx and conjunctiva via contaminated hands or contact with infective fluids, and skin abrasions (Reif et al 1987). Iatrogenic infection (via needlestick injury) has also been reported, and transmission by insect bites cannot be excluded.

There is no documented evidence of person-to-person transmission of VSV or of transmission from people to animals.

Crops, grains, hay, silage and mixed feeds

VSV survives for 3–4 days in infected saliva on buckets, feed racks and hay (Hanson 1952). It has also been recovered from water in contaminated troughs (Hansen et al 1985).

Dee et al (2018) simulated long-distance (trans-Atlantic and trans-Pacific) transport of various feed substrates contaminated with VSV and found that VSV was not detected in any feeds at the end of the 37-day simulation.

Vehicles and equipment, including personal items

Mechanical transmission of VSV by contaminated vehicles and equipment is possible. The virus survives for 3–4 days on contaminated equipment such as nose leads (Hanson 1952).

Arthropod vectors

In endemic areas, the virus is probably maintained by transmission cycles between insects and wild mammals, although this has not been confirmed.

VSV has been isolated from several insect species, including sandflies and midges (*Lutzomyia*, *Phlebotomus*, *Culicoides*), mosquitoes (*Aedes*, *Culex*, *Trichoprosopon digitatum*), mites (*Gigantolaelaps*), gnats (*Hippelates pusio*), horn (buffalo) flies (*Haematobia irritans*), horse flies (*Tabanus*), stable flies (*Stomoxys calcitrans*) and black flies (*Simuliidae*) (Francy et al 1988; Mead et al 2000, 2004; McCluskey 2002; Drolet et al 2005; Spickler 2016).

Currently, the evidence for insect transmission is most compelling for sandflies (*Lutzomyia shannoni*) and black flies. Transovarial transmission occurs in both; and virus uptake, replication and salivary secretion (of infectious virus) by black flies have been demonstrated experimentally (Mead et al 2000, McCluskey 2002). Horizontal transmission by black flies was also demonstrated by Mead et al (2000) when infected and noninfected black flies were allowed to feed on the same animal (deer mouse). Although the animal failed to develop viraemia, noninfected black flies acquired the virus. The authors concluded that the presence of viraemia in the host animal was not a requirement for an insect to become infected with VSV and that co-feeding provides a mechanism of infection for an insect-transmitted virus.

It is thought that *Culicoides* midges may also act as biological vectors, as virus has been isolated from field-collected midges (Walton et al 1987, EFSA 2012). The role of other insect species as competent biological or mechanical vectors has not been clarified.

It has also been hypothesised that VSV might be a natural parasite of plants and/or invertebrates that are inadvertently eaten by grazing animals, with the virus being released during mastication. North American migratory grasshoppers (*Melanoplus sanguinipes*) were infected experimentally, and one-third of cattle that ingested the infected grasshoppers developed typical VS, with virus shed in the saliva. The titre of VSV detected in infected grasshoppers was substantially higher than the inoculative dose, suggesting that grasshoppers may act as amplifying hosts for VSV. Possible pathways by which VSV could infect cattle through the accidental consumption of grasshoppers have been identified, including via consumption of fresh and processed forage, which may contain large numbers of grasshoppers (Nunamaker et al 2003). No information is available on the potential for Australian grasshoppers or other insects to fill this niche.

Other relevant considerations

VS has never become established outside the Americas, suggesting that a specific ecological niche is required for the disease to become endemic.

2.4.3 Factors influencing transmission

The factors influencing transmission in the Americas are not well understood, but may include the following (Hansen et al 1985, McCluskey et al 2003, Nunamaker et al 2003, USDA 2012):

- **Topography** - The virus is endemic in lowland tropical and subtropical forests, and savanna. Outbreaks occur along river valleys, and on plains that have shade trees and natural surface water. The disease has not been reported on treeless, dry plains or at higher altitudes. This distribution may relate to the habitat of insect vectors.
- **Climate** - Outbreaks occur more regularly in tropical and subtropical areas, and infrequently in temperate areas. Outbreaks generally occur during late summer or the end of the wet season, and cease with the onset of frosts or once the dry season is well established. These observations are consistent with insect transmission, although major outbreaks have occurred in the southern United States during winter.
- **Feed quality** - Transmission can be increased by abrasion of the oral mucosa by feed such as coarse roughage; hard pellets; seeds; stubble; rough, bushy pasture; or feed contaminated with awns, burrs, thorns or stalks.
- **Husbandry** - Transmission may be aided by ill-fitting, poorly maintained or roughly applied milking equipment or harness bits, or feeding troughs, which traumatise the teat skin, teat canal or oral mucosa. In cattle and horses, the incidence and severity of disease tend to be higher in animals at pasture than in housed animals. In dairy herds, morbidity increased as the quality of management declined. Identified risk factors include higher stocking densities, poor milking hygiene, poor ground surface conditions, leftover feed and uncleaned feeding troughs.
- **Age** - Older dairy cows and calves have suffered more disease than other cows.
- **Stress** - High-producing dairy cows have exhibited more severe disease than low producers.
- **Internal parasitism** - Experimentally, pigs fed ascarids (roundworms) and VSV simultaneously are more likely to develop disease.

Different patterns of spread have been reported, including progressive spread through a region; simultaneous appearance over a large area; and sudden, unexpected geographical jumps (bypassing significant populations of susceptible animals) (Hanson 1952, Hansen et al 1985).

2.5 Diagnostic criteria

2.5.1 Clinical signs

Animals

Most livestock infections with VSV are subclinical. Disease is more commonly seen in cattle, equids and pigs; disease in sheep and goats is rare.

In livestock, early clinical signs of VS include fever, loss of appetite and excessive salivation. Isolated or coalescing vesicles, erosions and ulcers may appear on the tongue, lips, gums, coronary bands, interdigital skin, udder (especially the teats) and genitals. The vesicles are easily ruptured, and intact vesicles are not often seen unless animals are closely examined in the early stages of disease. As the



Horse mouth with extensive erosion of the lip at the mucocutaneous junction. Photo credit: PIADC and Center for Food Security and Public Health, Iowa State University

disease progresses, difficulty in eating, lip smacking, lameness (especially in pigs), mastitis and drops in production (loss of condition, reduced or ceased lactation) may be observed.

Rarely, central nervous system signs (involuntary jaw and tongue movements, and intention tremors of the head) have been observed in cows, and nose bleeds and dyspnoea in horses.

Ruptured vesicles begin healing within 4 days, with recovery within 2–3 weeks, unless complicated by secondary bacterial infection (Letchworth et al 1999).

Infection rates are variable among outbreaks, and morbidity can be as high as 96% (Reis et al 2009). In endemic populations, the number of seropositive animals can be close to 100%, with only 5–10% of animals showing clinical signs (AVMA 2006, Reis et al 2009). Mortality is uncommon and usually associated with concurrent infections, or euthanasia of horses that develop laminitis (Reis et al 2009, USDA 2012).

Experimentally infected rodents may develop systemic disease and neurological signs, including encephalitis (Cornish et al 2001).

Humans

VS in people typically occurs as an influenza-like disease, with fever, muscle aches, headaches and general malaise. Other reported symptoms in humans include pharyngitis, oral mucosal lesions and enlargement of the cervical lymph nodes (Heymann 2014). Most cases recover uneventfully in 4–7 days. Encephalitis associated with VS has been reported in one human case (Quiroz et al 1988).

Clinical disease in humans has mostly been reported in laboratory workers and veterinarians (Reif et al 1987, Webb et al 1987, Reis et al 2009). Of people who worked with VSV or infected animals, 95% developed antibody to the virus over a 7-year period (Patterson et al 1958). Up to 90% of farmers in some endemically infected areas in Central America have antibody to VSV (Tesh et al 1969).

2.5.2 Pathology

Apart from the vesicles described above, there are no other characteristic gross lesions and no disease-specific microscopic lesions.

The pathogenesis of VS in natural infections is unclear but has been proposed following experimental studies in horses. Howerth et al (2006) mooted that, following oral inoculation, replication of VSV primarily occurs in the tonsils. They also proposed that, following inoculation at other sites, replication of VSV primarily occurs within the epithelium at the site of inoculation, with subsequent spread to the tonsils via low-level viraemia. Once in the tonsils, primary or secondary replication of VSV occurs, and virus is shed in saliva. It is not clear whether lesions at other sites are initiated by the mooted low-level viraemia or from separate inoculation of virus (eg from additional insect bites).

2.5.3 Differential diagnosis

Other diseases and conditions in which signs and lesions similar to VS may be seen include:

- exotic viral diseases
 - FMD
 - swine vesicular disease
 - vesicular exanthema
 - bluetongue
 - rinderpest
 - peste des petits ruminants
 - epizootic haemorrhagic disease
 - senecavirus A (Seneca Valley virus)
- endemic infectious diseases
 - bovine ulcerative mammillitis
 - pseudocowpox
 - bovine papular stomatitis
 - mucosal disease
 - bovine malignant catarrh
 - contagious ecthyma ('scabby mouth')
 - infectious bovine rhinotracheitis/infectious pustular vulvovaginitis
- lameness
 - footrot
 - hoof abscess
 - laminitis
 - bad floors
 - new concrete
 - mud
- dermatitis
 - scalding
 - wetting
 - contact dermatitis
 - photosensitisation

- phytophotodermatitis – contact with certain plants containing furocoumarins (especially Umbelliferae, such as parsnips, celery and parsley) resulting in photosensitisation (Pathak et al 1962, Montgomery et al 1987ab)
- trauma, including oral trauma induced by coarse forage or plant awns
- chemical or thermal burns
- ulceration or erosion of oral mucosa in horses (reviewed by McCluskey & Mumford (2000)) caused by
 - equine viral arteritis virus and equine herpesvirus (rarely)
 - bedding material derived from wood shavings of the Simaroubaceae family
 - blister beetles (*Epicauta* spp.), which contain an irritant toxin called cantharidin
 - adverse reactions to nonsteroidal anti-inflammatory drugs and other medications
 - dermatological conditions – pemphigus foliaceus, equine exfoliative eosinophilic dermatitis and stomatitis
 - Balclutha horse syndrome – an ulcerative stomatitis of unknown cause reported in New Zealand.

Recent or concurrent disease in horses should be investigated to assist differential diagnosis, as other viral vesicular diseases do not affect horses.

2.5.4 Laboratory tests

Specimens should be taken from several affected animals in the herd, flock or group. These can be taken from lesions in the mouth or the feet, or at other sites with suitable lesions.

The best samples for all vesicular disease exclusions are:

- vesicular fluid
- epithelium from unruptured vesicles (1–2 cm diameter)
- epithelial tags from freshly ruptured vesicles (1–2 cm diameter)
- nasal, oral and tonsillar swabs
- oropharyngeal fluid, collected with a probang, if this is available
- acute and convalescent serum samples (minimum of 5 mL).

From dead animals, fresh and formalin-fixed samples from several tissues (lymph nodes, thyroid and adrenal glands, kidney, spleen and heart) should also be collected.

Sample collection

Vesicular fluid from unruptured vesicles should be carefully aspirated using a syringe and needle, and placed in a sterile container. Alternatively, fluid from small vesicles can be collected onto a swab and the swab placed in 500 µL of buffer, such as phosphate-buffered saline or virus transport medium.

Epithelium; epithelial tags; oral, nasal and tonsillar swabs; and oropharyngeal fluid can be submitted in phosphate-buffered saline or virus transport medium, if available.

Transport of specimens

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

If the state or territory laboratory deems it necessary, duplicate samples of the specimens should be

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

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

Packing specimens for transport

Blood samples and unpreserved tissue specimens should be chilled and transported with frozen gel packs. For further information, see the **AUSVETPLAN management manual *Laboratory preparedness***.

Laboratory diagnosis

Because VS cannot be reliably distinguished clinically from other vesicular diseases, other vesicular diseases must be ruled out during laboratory tests.

Laboratory tests currently available for VS include PCR, antigen ELISA, virus isolation, and serological assays for the detection of antibodies. Testing strategies are based on samples submitted, and clinical and epidemiological information provided.

Serological tests, including serum neutralisation and ELISA, are useful during trace-back, epidemiological and surveillance studies. However, the degree of cross-reaction with endemic rhabdoviruses in Australia is not well characterised.

The testing algorithm used by CSIRO-ACDP is shown in Figure 2.1. Further details of tests currently available at CSIRO-ACDP are shown in [Table 2.1](#).

CSIRO-ACDP treats any vesicular disease exclusion by testing for all appropriate vesicular diseases. Samples submitted for exclusion of either FMD, VSV or swine vesicular disease will be automatically tested for the other relevant vesicular diseases.

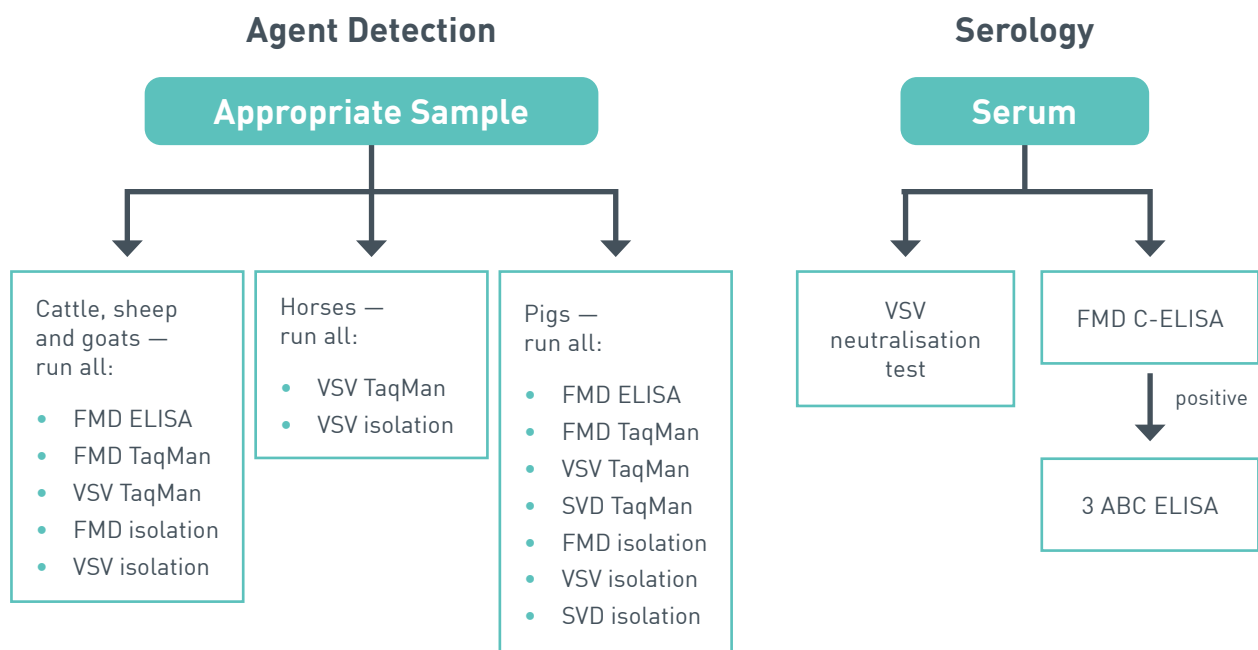


Figure 2.1 The approach to diagnostic testing provided by the then CSIRO-Australian Animal Health Laboratory, 2016

Table 2.1 Laboratory tests currently available at CSIRO ACDP for diagnosis of vesicular stomatitis

Test	Specimen required	Test detects	Time taken to obtain result
Agent detection			
qPCR	Vesicular fluid, swab or epithelium	Viral RNA	4 hours
ELISA	Vesicular fluid, swab or epithelium	Viral antigen	4 hours
Agent characterisation			
Virus isolation	Vesicular fluid, swab or epithelium	Virus	2–4 days
PCR and sequencing	Vesicular fluid, swab, epithelium or isolate	Viral RNA	2–3 days
Serology			
Serum neutralisation	Serum	Antibody	2–3 days

ELISA = enzyme-linked immunosorbent assay; PCR = polymerase chain reaction; qRT-PCR = quantitative real-time PCR
 Source: Information provided by the then CSIRO-Australian Animal Health Laboratory, 2016 (refer to CSIRO-ACDP for the most up-to-date information)

2.6 Resistance and immunity

Immunity appears to be of short duration, probably not longer than 6 months.

Infected animals usually develop serotype-specific antibodies (Spickler 2016). The presence of immunoglobulin M (IgM) antibodies can be demonstrated within 4–5 days using the competitive ELISA test in domestic animals. Both complement fixation (CF) and neutralising antibodies are detectable by 14 days post-infection. IgM antibodies disappear within 2 months and CF antibodies within 6 months, but neutralising antibodies may persist for several years in the absence of apparent reinfection or latent infection. However, the presence of neutralising antibodies is not sufficient to prevent clinical disease in cattle under normal conditions; most animals in endemic areas have neutralising antibody titres before the onset of clinical disease (Vernon et al 1990).

Maternal antibodies are passed to calves via colostrum and persist for 3–4 months.

Maternal antibodies were detectable in foals at 4 months but not by 5 months of age (Webb et al 1987). Horses may become infected with the same serotype within 6 months and develop disease despite high levels of humoral specific antibodies (OIE 2013a). Cross-immunity between serotypes does not appear to occur (Bennett 1986).

Humoral and cell-mediated immunity persisted for at least 6 months after experimental infection of pigs (Redelman et al 1989).

Carrier or latent infections have not been demonstrated in domestic animals.

2.7 Vaccination

Attenuated ('live') vaccines, prepared from chicken embryo-adapted or cell-cultured virus, induce high levels of specific antibodies in the sera of vaccinated cattle when administered intramuscularly, without causing disease or shedding of virus. In pigs, however, lesions are sometimes induced and virus is shed.

Inactivated vaccines have been successfully used in pigs (Hanson 1981). Difficulties in differentiating between antibodies due to attenuated vaccines and antibodies due to natural infection have limited the use of such vaccines.

No vaccines are commercially available in the United States, but autogenous killed virus vaccines have been used during outbreaks (McCluskey & Mumford 2000). Killed vaccines for both the New Jersey and Indiana strains are manufactured in Colombia and Venezuela, and are licensed for use in a number of South American and Central American countries. However, it is not clear whether serum antibodies prevent disease, and, despite widespread use of these vaccines, their effectiveness has not been rigorously tested (Letchworth et al 1999).

2.8 Treatment of infected animals

There is no specific treatment for VS, and therapy is primarily supportive.

2.9 Control overseas

In the United States, measures to aid the control of VS outbreaks include (USDA 2012, OIE 2014, ProMED-mail 2015):

- separating affected from unaffected animals (to limit potential transmission via contact)
- quarantining premises with affected animals
- prohibiting movement of live animals off quarantined premises until at least 21 days after all lesions have healed (unless animals are going to slaughter)
- increasing biosecurity on premises with susceptible livestock
- avoiding hard or abrasive feeds (to limit possible oral abrasions)
- minimising vector exposure (eg stabling rather than leaving animals on pasture, moving animals away from watercourses where vector populations may be higher, using insecticide)
- using personal protective equipment to minimise human infections.

In some Central and South American countries, vaccines may also be used to aid control.

3

Implications for Australia

3.1 Potential pathways of introduction

Potential pathways for the introduction of vesicular stomatitis virus (VSV) into Australia include importation of affected animals, contaminated genetic material or other risk commodities (such as contaminated crops or stockfeed of plant origin). Australia's biosecurity import controls mitigate the risk of introduction through these pathways.

Australia has large numbers of susceptible cattle, pigs and horses. Although it is possible that some (currently unknown) epidemiological factors are missing from the Australian environment, in the absence of complete scientific data on maintenance and spread of VSV, it should be assumed that the disease could become established if it entered Australia. As sheep and goats are relatively resistant to vesicular stomatitis (VS), the disease may be less likely to become established in these species in Australia (Geering 1990).

3.2 Social and economic effects

Should VS occur in Australia, the following social and economic effects may arise:

- Effects on Australia's international trade in livestock and livestock products, if the disease is initially mistaken for foot-and-mouth disease (FMD) and reported as such in the media.
- Production losses in animals (reduced weight gain, weight loss, milk drop, reduced performance in racing animals), costs of supportive treatment and, rarely, stock losses (eg if animals are destroyed).
- Effects of disease control measures, including vector control, restrictions on movements of animals and, if used, judicious destruction.
 - Prolonged restrictions on movement of healthy animals at the local, state or territory, and national levels, and prohibition of horse races, other equestrian events, rodeos and cattle sales could have significant social and economic consequences, similar to those experienced during the Australian outbreak of equine influenza in 2007. That outbreak was reported to have cost \$560 000 per day for disease control measures and \$3.35 million per day in foregone income from equine-associated businesses, including racing, farming and recreational activities (Callinan 2008).
 - If used, the judicious destruction of animals to quickly eliminate infection is likely to generate societal concern, particularly if high-value or recreational horses are involved.
- An increase in influenza-like illnesses among infected people.
- Loss of livelihoods, loss of animals and uncertainty around future earnings from the stigma associated with disease. These factors may affect mental health and reduce community cohesion in areas with a heavy reliance on livestock production or recreational equine activities.

The extent of the social and economic effects of VS in Australia would depend on a number of factors, including how quickly it was differentiated from FMD, the severity and location of the outbreak, the types and distribution of animals affected, the time of year of the outbreak, the speed with which it was contained and eradicated, and the reaction of overseas markets to the importation of Australian livestock, including horses and animal products (such as genetic material).

If VS became endemic in Australia, eradication in the long term would be unlikely, and recurrent outbreaks may lead to periodic disruptions to international trade (Biosecurity Australia 2010).

3.3 Critical factors for response

The critical factors for the response to VS should it occur in Australia include the following:

- VS is clinically indistinguishable from FMD – except that VS may affect horses and FMD does not.
- Domestic animals are not believed to be the primary hosts of VSV. Both insect vectors and wildlife species are implicated as reservoir hosts in countries where VS is present.
- Carrier or latent infections have not been demonstrated in domestic animals.
- Oral shedding can occur in horses without detectable oral lesions.
- The potential role of Australian wildlife in the epidemiology of VSV is unknown.
- The mechanisms of spread of VSV are poorly understood but are believed to include both biological and mechanical spread by insect vectors, direct contact with contaminated saliva and vesicular fluids, and contact with contaminated fomites (eg equipment, clothing, footwear).
- Outbreaks have been traced to the movements of infected live animals (including horses).
- Some insect species from which VSV has been isolated are present in Australia.
- Viraemia in domestic animals is considered insufficient to result in infection of biting insects.
- No effective commercial vaccine is available.
- VSV is relatively unstable in the environment and is susceptible to a range of common disinfectants.
- Transmission of VSV has not been associated with animal products and byproducts.
- VS is zoonotic and causes a mild influenza-like illness in people.
- Horses are often of high economic or sentimental value; destruction of horses would be likely to raise significant public concerns and opposition to disease control measures.
- Both the recreational and commercial horse sectors typically involve frequent movement of horses (eg by riding, for racing, for stud purposes).
- Pig production systems are prone to rapid overcrowding if output is disrupted (eg by restrictions on animal movements for disease control purposes), with negative effects on animal welfare.

4

Policy and rationale

4.1 Introduction

Vesicular stomatitis (VS) is important in the international trade of animals because it causes clinical signs resembling foot-and-mouth disease (FMD) in cattle and pigs, and less often in sheep and goats. Unlike other vesicular diseases, it also occurs in horses. VS can significantly affect production in dairy cattle and performance in horses, and has the potential for rapid spread. VS is also a zoonosis.

4.1.1 Summary of policy

Until FMD has been excluded, the FMD response strategy will be implemented.

On confirmation of VS and exclusion of FMD, this response strategy will be used.

The default policy is to contain and eradicate VS.

The strategies that may be employed to facilitate eradication include:

- *rapid laboratory confirmation of disease* to move the response from an FMD response
- *immediate assessment of the epidemiological situation*, to determine whether insect vectors or wild animals are implicated in the spread of infection and whether ecologically suitable niches may be present that favour formation of an ongoing reservoir
- *tracing and surveillance* to determine the source and extent of infection, and to provide proof of freedom from the disease
- *quarantine and movement controls* on animals, animal products and potentially contaminated things in declared areas to prevent spread of infection
- *enhanced biosecurity* to limit the potential for spread of infection
- where appropriate, *judicious destruction* of clinically affected animals and in-contact reservoir hosts
- *vector control* to protect valuable individual animals in declared areas and to reduce further transmission
- *decontamination* of facilities, equipment and other contaminated items to prevent spread of the virus from infected animals and premises
- a *public awareness campaign* to facilitate cooperation from the community
- *industry support* to improve understanding of the issues and facilitate cooperation.

Vaccination will not be used because there are no suitable commercially available vaccines.

Successful implementation of the policy will depend on industry cooperation and compliance with all control and eradication measures.



Pig skin with large vesicle (bullae) on dorsal snout. Photo credit: Center for Food Security and Public Health, Iowa State University, College of Veterinary Medicine

If eradication cannot be achieved, the policy will be modified to contain the disease and to minimise the effects on trade.

4.1.2 Case definition

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

Notes:

- 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.
- Positive serology in the absence of genome or antigen does not constitute a case but would warrant further investigation to determine whether infection is present.
- At the time of an outbreak, revised or subsequent case definitions may be developed with the agreement of the Consultative Committee on Emergency Animal Diseases (CCEAD).

4.1.3 Cost-sharing arrangement

In Australia, VS is included as a category 2 EAD in the Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Responses (EAD Response Agreement).⁶ When cost sharing of the eligible response costs of an incident is agreed, category 2 diseases are those for which costs will be shared 80% by government and 20% by industry.

4.1.4 Criteria for proof of freedom

VS is no longer listed by the World Organisation for Animal Health (OIE), and there are no current specific international standards for demonstrating proof of freedom from the disease.

Following an outbreak of VS, Australia's self-declaration of its return to VS-free status would be informed by the OIE Terrestrial Code chapter on general surveillance (Chapter 1.4).

Surveillance and proof of freedom are discussed in more detail in [Section 7](#).

4.1.5 Governance

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

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)***.

Disease-specific governance issues

As VS is zoonotic, close collaboration between animal health and public health agencies will be required. The chief veterinary officer in the affected state or territory has responsibility for managing animal health risks and instituting animal health control action within that jurisdiction. The chief health officer of the affected state or territory has responsibility for managing public health risks and instituting public health control action within that jurisdiction. Government environment agencies may also be involved if wildlife and/or feral animals are involved in the disease incident.

4.2 Public health implications

Work health and safety (WHS) legislation in Australia requires businesses and workers to, as far as reasonably practicable, ensure the health and safety of themselves and others. Jurisdictional WHS authorities should be consulted on individual jurisdictional legislative requirements.

Vesicular stomatitis virus (VSV) can infect humans and cause clinical disease (see [Section 2.5.1](#)).

Measures to manage the risks of VS include:

- minimising contact between humans and potentially infected animals
- providing information, training, instruction or supervision to protect people from VSV risks, including on handling animals, decontaminating reusable equipment, and using personal protective equipment (PPE)
- providing suitable PPE and ensuring that PPE is worn by those at risk (see [Section 4.3.5](#))
- referring potentially exposed personnel to a human health professional.

⁶ Information about the EAD Response Agreement can be found at www.animalhealthaustralia.com.au/what-we-do/emergency-animal-disease/ead-response-agreement.

There are no human vaccines against VS. The disease is not considered a food safety issue.

Further instructions about the public health management of VS, including management of cases of VS, should be obtained from state or territory public health authorities.

4.3 Control and eradication policy

Until FMD has been excluded, the **FMD response strategy** will be implemented.

On confirmation of VS and exclusion of FMD, this response strategy will be used.

The possibility of confusion with FMD when there is infection in ruminants, in the absence of clinical signs in equids, means that the presence of VS in Australia is of major concern. Coupled with the potential effects of VS on production and performance in affected livestock species, this makes the immediate eradication of VS desirable.

The most likely scenario for the occurrence of VS in Australia is that it will occur in an animal(s) recently imported from North or South America. Where the disease is confined to a small number of animals or a limited area, and insect vectors and/or wild animal reservoirs are not likely to be involved in its transmission, eradication may be facilitated by preventing further spread of infection and allowing infection to 'die out' on affected premises. Further spread of infection may be prevented by the implementation of quarantine on affected premises, stringent biosecurity and hygiene to prevent spread by fomites and mechanical vectors, and insect control (to limit exposure of potential biological and mechanical vectors to infectious animals). These measures should continue until the affected animals are no longer infectious and should be supplemented by supportive treatment of affected animals, as appropriate.

In some circumstances, stamping out through the use of judicious destruction may be used to eradicate the disease (see [Section 4.3.11](#)).

Where infection is present in insect vectors and/or wild animal reservoirs, control will be more challenging. Eradication may not be feasible, and a longer-term control program may need to be considered (see [Section 4.4](#)).

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 to guide the selection of other appropriate response measures (including the application of movement controls) and assess the progress of disease control measures.

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

4.3.2 Quarantine and movement controls

Guidance on declared areas and premises classifications can be found in the **AUSVETPLAN guidance document *Declared areas and allocation of premises definitions in an EAD response***.

Quarantine

In the response to VS, quarantine will be immediately imposed on all premises and areas on which infection with VSV is either known or suspected.

[Section 5](#) provides details on the use of declared premises and areas, and on reclassifying premises and areas.

Movement controls

Controls may be placed on the movement of infected or potentially infected animals, and contaminated or potentially contaminated things.

[Section 6](#) provides details on movement controls to prevent further spread of VSV.

4.3.3 Tracing and surveillance

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

Tracing

Rapid trace-back and trace-forward of high-risk animals and items from infected premises (IPs) will help identify the source of the disease, and the location of potentially infected animals and contaminated items. This will help define the potential extent of disease spread.

Tracing should consider movements onto and off IPs in the period from 21 days before the time clinical signs were first observed until quarantine was imposed on the premises. Movements occurring from 8 days before the onset of clinical signs until quarantine was imposed should be considered higher risk.

Tracing will include:

- susceptible species (equids, ruminants, pigs and camelids) (highest priority)
- animal products, feed and bedding
- vehicles and equipment (eg transport vehicles, horse floats, feed trucks, horse gear, racetrack stalls)

- people (eg service providers such as veterinarians, artificial insemination technicians, farriers, dental technicians and branders)
- semen and embryos.

Tracing should include consideration of vector dispersal and contact with wild or feral animals. Follow-up investigation of premises identified by tracing should be prioritised by the likelihood of transmission and the potential consequences for disease control activities.

Information management systems should be used to support tracing activities, as well as examination of farm records, and interviews with farm workers and managers. Databases for the National Livestock Identification Systems (NLIS) and documents such as National Vendor Declarations (NVDs) or Animal Health Statements should be used to assist with tracing.

Surveillance

Surveillance during a VS outbreak will initially focus on:

- detecting new outbreaks
- identifying the vectors (and amplifying hosts) and wild animal species involved, and their distribution
- defining the extent of infection
- demonstrating that infection is not present in the control area (CA) and outside area (OA).

This will be achieved by investigation of suspect premises (SPs), trace premises (TPs) and dangerous contact premises (DCPs), and surveillance of premises that hold susceptible species in declared areas. Prioritisation of surveillance should be risk based, and take into account the apparent rate of transmission, and profiles of susceptible species and implicated insect vectors. Surveillance will also occur in the OA to follow up on traces, investigate suspect case reports and demonstrate that infection is not present.

The surveillance program will include clinical, serological, virological and molecular approaches to the surveillance of susceptible (domestic and wild) animal populations. Molecular and virological surveillance of relevant vector populations will also be important.

Surveillance in wild animal and vector populations is discussed in [Sections 4.3.14](#) and [4.3.15](#), respectively.

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

4.3.4 Zoning and compartmentalisation for international trade

Where it is not possible to establish and maintain disease freedom for the entire country, establishing and maintaining disease-free subpopulations, through zoning and/or compartmentalisation,⁷ may be considered.

In the case of a limited disease outbreak, a containment zone⁸ 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.

7 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).

8 The OIE 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 and Water Resources 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.

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

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

General guidelines for zoning and compartmentalisation are in Chapter 4.4 of the OIE Terrestrial Code.

4.3.5 Biosafety and biosecurity for personnel

To minimise the risk of exposure, all people who work with potentially infected animals or potentially contaminated fomites, or handle VSV, should wear appropriate PPE. This may include personnel involved in field surveillance; involved in destruction, disposal and decontamination activities; and in laboratories. The PPE should be chosen based on the assessed level of risk, the task and the animal species. Appropriate PPE may include:

- gloves
- long pants and long-sleeved shirt
- water-resistant dressings to cover cuts and abrasions
- safety eyewear or face shield to protect the face and mucous membranes from aerosols and contact with vesicular fluid, saliva, and oral and nasal discharges (including a respirator or similar where there is a risk of aerosols)
- enclosed footwear.

Hand hygiene should be undertaken after removing PPE.

4.3.6 Biosecurity for equipment

Vehicles and equipment contaminated with vesicular fluid, saliva, or oral and nasal discharges from infected (and potentially infected) animals should be properly cleaned and disinfected to prevent transmission of VSV on fomites (see [Section 4.3.13](#)).

4.3.7 Animal welfare

Guidance on managing animal welfare can be found in the **AUSVETPLAN operational manual *Livestock welfare and management***.

In the response to VS, animal welfare issues may particularly arise if movements of intensively housed animals are restricted and if there are restrictions on the movement of dairy animals to milking. VS may also result in welfare issues where secondary infections (eg mastitis and laminitis) develop in affected animals.



Dairy cattle in milking shed for milking.

4.3.8 Vaccination

Vaccination will not be used because a suitable VS vaccine is not commercially available.

4.3.9 Treatment of infected animals

There is no specific treatment for animals affected by VS. Infected animals should be isolated, protected from insects and provided with supportive care.

4.3.10 Treatment of animal products and byproducts

Treatment of embryos from susceptible animals is outlined in [Section 6.2.3](#).

Treatment of other animal products and byproducts is not required.

4.3.11 Destruction of animals

Destruction plans should be developed for each premises on which animals may be destroyed. Guidance on destruction methods can be found in the **AUSVETPLAN operational manual *Destruction of animals***.

In certain circumstances, stamping out through judicious destruction of infected animals and potential reservoir host animals may be considered if it supports eradication. For example, stamping out may be considered on the index premises if a case of an exotic vesicular disease is detected in cloven-hoofed animals, horses are not involved, FMD has not been excluded and the risk of transmission (while awaiting the results of laboratory investigation) is unacceptable. However, a stamping-out policy for VS is unlikely to be effective unless the disease is detected in an individual animal or a small group of animals.

Critical factors to take into account when considering stamping out include the following:

- Unless the index case is in a quarantine station, it is unlikely that it will be the primary case.
- Infected livestock do not develop a viraemia capable of infecting biting insects.
- A large number of animals may have subclinical infection.
- Horses are likely to be affected, and their destruction is likely to be opposed by members of the public.
- Public opinion is unlikely to support stamping out once FMD has been excluded.
- The majority of VS cases will recover within 21 days.
- Industry and public support is essential for an effective response.
- Management of the media (including social media) represents a major challenge.
- Stamping out is unlikely to be effective if insect vectors are involved in transmission or if infection is established in a wild animal reservoir.
- VS has never become established outside the Americas.

Where stamping out through judicious destruction is used, adequate hygienic practices must be adopted, and carcasses must be protected from insects.

Rarely, infected animals may need to be destroyed for welfare reasons.

Restocking and use of sentinel animals

The requirement for restocking will be limited if stamping-out measures have not been applied. However, restocking may be necessary in severely affected dairy herds where animals have been destroyed because of mastitis or poor production, or if destocking has been used because the disease occurred in a defined area such as a quarantine station or stable complex. A risk assessment should precede the introduction of new animals into a previously infected herd. Where an evidence-based timeframe cannot be determined, a period of at least 42 days from the time of healing of the last lesion should be adopted.

Sentinel animals could be introduced after decontamination procedures are complete. However, VSV does not survive well in the environment (see [Section 2.4.2](#)), and the use of sentinel animals will be limited in most circumstances.

4.3.12 Disposal of animals, and animal products and byproducts

Disposal plans should be developed for each quarantined premises. Guidance on disposal options and methods can be found in the **AUSVETPLAN operational manual *Disposal***.

The method chosen for disposal of animals, animal products and byproducts, waste products, effluent and contaminated fomites from high-risk premises (IPs, DCPs, dangerous contact processing facilities – DCPFs, SPs and TPs) will be influenced by the type 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.

Where possible, this material will be disposed of by burial in a way that prevents access by feral animals and therefore spread of the disease. If there may be a delay between destruction and disposal, vector control should be implemented, taking into consideration local vector species and population dynamics.

Decontamination of all equipment and machinery involved in on-site disposal will be required.

If biosecure disposal of carcasses by burial on-site is not possible, they may be transported for rendering before disposal or to an approved disposal site, provided that adequate hygienic practices are adopted, carcasses are protected against insects, and vehicles and areas used for disposal are properly cleaned and disinfected.

Additional guidance on the movement of high-risk material is provided in [Section 6.2](#).

4.3.13 Decontamination

Decontamination plans should be developed for each premises to be decontaminated. General guidance on decontamination can be found in the **AUSVETPLAN operational manual *Decontamination***.

Potentially contaminated fomites (including people, clothing, footwear, vehicles, premises, animal housing and animal equipment) should be decontaminated to eliminate VSV and contain its spread. Maintaining good hygiene is also important to prevent infection of people.

Decontamination of housing and equipment that can cause damage to the skin or mucous membranes of animals is particularly important, because VSV can enter susceptible animals through cuts and abrasions. This includes housing such as pens, crates and rough flooring; and equipment such as teat cups, nose leads and twitches, harnesses, feed and water troughs, and yards. Teat cups should be disinfected between cows, and infected cows should be milked last. Feeders must be disinfected after use by infected cows.

VSV is sensitive to soaps and detergents, as well as a wide range of disinfectants (see [Section 2.4.2](#)).

4.3.14 Wild animal management

Guidance on wild animal management can be found in the **AUSVETPLAN *Wild animal response strategy***.

The actual or potential role of wild animals (including native wildlife, feral animals such as horses and other equids, and other exotic fauna) in the epidemiology of VS, and the likelihood of contact between wild animals and infected domestic animals (including indirectly via vectors) should be assessed early in an outbreak.

The susceptibility of Australian native animals to VSV and their likely role in the epidemiology of the disease are unknown. However, given the serological evidence of exposure to VSV in many diverse wild animal species in the Americas, it is possible that some species of Australian fauna will be susceptible to infection. These populations are more likely to act as potential reservoirs of infection for vectors than as a direct source of infection for domestic livestock.

If VS is confirmed in wild animals, the source of infection and method of spread should, if possible, be determined. Control measures for wild animals may not be warranted or may be inappropriate (eg if they contribute to the dispersal of potentially infected wild animals and so facilitate disease spread). If wild animals are only being infected from domestic livestock, it is possible that the infection may die out naturally in low-density populations once this source of infection is eliminated. However, if wild animals are a primary source of infection or infection is being maintained in wild populations, programs to monitor and control these populations should be instigated.

Experts in wild animal management should be consulted in the development of planning, monitoring, surveillance and control programs. Where necessary, control of wild animals will be incorporated into a modified stamping-out approach. Control activities may include improving fencing; or containing, reducing or eliminating wild animal populations (without dispersing them) in the restricted area (RA) and CA.

4.3.15 Vector management

Early epidemiological investigation of potential vector species will be important to inform vector management. With input from an entomologist, a vector monitoring program should be implemented to identify the vectors of concern. A targeted approach to vector control should be used to break the transmission cycle.

Any approach to vector control should recognise that viraemia in VSV-infected ruminants and horses is insufficient to infect biting insects.

A wide range of insect vector species have been associated with the biological or mechanical transmission of VS overseas. Some of these are known to occur in Australia (see [Section 2.4.2](#)), and other local species may also act as vectors. A range of approaches to vector control may be required. The approach used should take into consideration the insect species involved; the distribution and abundance of these species; the weather, season and topography; and the availability of suitable labour and materials.

Measures may target a local reduction in insect populations and/or the exposure of susceptible animals to insects. Where small numbers of animals are involved, measures may include using systemic or pour-on ivermectin, using insecticide-treated ear tags, applying insecticide externally, and treating vector breeding areas by ground spraying.

Infected vectors can be mechanically transferred in vehicles, containers, crates and so on. After each load, vehicles and equipment used for transporting live animals should be cleaned and treated with an appropriate insecticide that is effective against the vector species.

For details of appropriate insecticide treatments, refer to the **AUSVETPLAN operational manual *Decontamination***.

Additional sources of expertise and equipment for vector control include state and territory health departments, local government authorities, and the Australian Plague Locust Commission.

4.3.16 Public awareness and media

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

VS is a difficult disease to understand. Because it results in signs similar to FMD in cattle and pigs, it has the potential to raise major concerns among the public and livestock producers. Horse owners, and equestrian and racing organisations will question why movement restrictions have been imposed on horses.

Once VS has been confirmed, a considered public information and stakeholder engagement campaign will help to address any public health concerns, and foster engagement and support for response activities.

The key topics to cover in public information messages include the following:

- VS is not the same as FMD.
- VS must be eradicated because it confuses FMD diagnosis and has international trade consequences.
- Eradication is believed to be feasible because the disease has never established in any country outside the Americas.
- Cattle, equids and pigs are most commonly affected by VS. Sheep, goats, deer and camelids may also be affected.
- Susceptible species should be inspected regularly for clinical signs.
- Suspicious lesions and unusual signs (eg mouth ulcers, a sudden drop in milk production, slobbering, lameness) should be reported promptly.
- Most animals recover quickly, and death is unusual.
- Initially, movement restrictions and prohibitions on congregations of animals, including horses, are necessary to prevent further disease spread before limits of the outbreak have been defined.
- Only in exceptional circumstances will animals be destroyed.
- VS can cause disease in people handling infected animals, but there is little risk if infected animals, equipment and products are handled using hygienic standards.
- There is no documented public risk in contacting or consuming animal products or byproducts.

National coordination of public information and engagement messaging in the event of a VS incident in Australia may occur through:

- activation of the National Biosecurity Communication and Engagement Network⁹ to coordinate animal health information, and liaise with public health and environmental agencies
- activation of the National Health Emergency Media Response Network to coordinate public health information, and liaise with animal health and environmental agencies.

The Australian Government Department of Health will produce and manage public and media messages (including appropriate public health warnings) about the human health aspects of the incident.

4.3.17 Other strategies

Good management, stringent hygiene and the modification of some husbandry practices (to reduce trauma) will help to reduce infection rates and assist some animals to resist infection. If possible, infected animals should be assembled close to handling facilities and isolated from unaffected animals on the premises.

Other strategies for the control and eradication of VSV may be required, depending on the circumstances of the outbreak. These would be proposed by the affected state(s) or territory(ies) in their Emergency Animal Disease Response Plan(s), and considered by the CCEAD and National Management Group (NMG) (if convened).

4.3.18 Stand-down

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

Stand-down of the response will occur once VS has been controlled or eradicated, when control or

⁹ Previously known as the Primary Industries National Communication Network (NCN). More information is available at www.outbreak.gov.au/about/biosecurity-incident-national-communication-network.



Horse housed in barn.

eradication is no longer considered feasible or practicable, or when the NMG formally declares the outbreak over.

4.4 Other control and eradication options

If eradication is not feasible or practicable, VS could become established in Australia. In such a situation, a long-term control program may need to be developed through consultation between governments and the affected industries. Zoning and/or compartmentalisation may be considered as part of this consultation; however, they may be difficult to implement effectively if the epidemiology of VS in Australia, particularly the host and vector species involved in transmission, is not well understood.

4.5 Funding and compensation

Details of the cost-sharing arrangements can be found in the EAD Response Agreement.¹⁰ 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***.

¹⁰ www.animalhealthaustralia.com.au/what-we-do/emergency-animal-disease/ead-response-agreement

5

Declared areas and premises

5.1 Declared areas

Detailed guidelines for declared areas are provided in the **AUSVETPLAN guidance document *Declared areas and premises classifications***.

Figure 5.1 illustrates the recommended minimum distances between the boundaries of an infected premises (IP), the transmission area (TA), the restricted area (RA) and the control area (CA) during the initial response.

Infected premises	Transmission area	Restricted area	Control area	Outside area
	Minimum 50km	Minimum 100km	Minimum 250km	

Figure 5.1 Recommended minimum distances between the boundaries of an infected premises, the transmission area, the restricted area and the control area

5.1.1 Restricted area (RA)

For vesicular stomatitis (VS), an RA will be declared to encompass any transmission areas (TAs) identified (see [Section 5.2](#)). The boundaries of the RA should be determined by risk assessment, which should consider:

- the factors used to determine the boundaries of the TA (see [Section 5.2](#))
- the location of key elements in industry supply chains (eg abattoirs, artificial breeding centres)
- the impacts on the industry of disease control measures compared with the expected benefits of disease control
- the resources available to implement control more rapidly than continued spread of infection by vector dispersal.

The boundaries of the RA typically would be 100 km from the boundaries of the TA.

5.1.2 Control area (CA)

The boundaries of the CA will be based on risk assessment, taking into consideration the factors used to inform the size of the RA. As a general principle, to facilitate control of the disease, it will be preferable to start with a larger CA and subsequently reduce its size when appropriate.

The boundaries of the CA typically would be 250 km from the boundary of the RA(s) within it. However, based on risk assessment, the CA may need to be much larger – initially, possibly as large as the state or territory in which the incident occurs.

5.2 Other areas

Transmission area (TA)

A TA should include all likely infected vectors in the area surrounding known areas of transmission. The TA will include all IPs and, where possible, all suspect premises (SPs), trace premises (TPs), dangerous contact premises (DCPs) and dangerous contact processing facilities (DCPFs).

The boundaries of the TA should be determined by a risk assessment of:

- the known distribution of infection (informed by detection of disease, seroconversion of susceptible animals, trapping and testing of vectors, and any other confirmation of active transmission of vesicular stomatitis virus – VSV)
- the length of time infection is thought to have been present in the area, and therefore where subclinical infection may be present (noting the incubation period of up to 21 days)
- the likely local vector species, and their distribution and expected dispersal (eg as informed by prevailing weather conditions and geographical features)
- the location and distribution of populations of susceptible animals (including feral animals) in the area, and patterns of livestock movements
- the accuracy of available information.

The boundaries of the TA typically would be 50 km from the nearest IP, SP, TP, DCP or DCPF.

5.3 Declared premises

Detailed guidelines for declaring premises status are provided in the **AUSVETPLAN guidance document *Declared areas and premises classifications***.

5.3.1 Premises status classifications

For VS, the premises classifications to be used are:

- infected premises (IP)
- suspect premises (SP)
- trace premises (TP)
- dangerous contact premises (DCP)
- dangerous contact processing facility (DCPF)
- approved processing facility (APF)
- approved disposal site (ADS)
- at-risk premises (ARP)
- premises of relevance (POR)
- resolved premises (RP)
- unknown status premises (UP)
- zero susceptible species premises (ZP).

5.3.2 Qualifiers

The qualifying category 'assessed negative' (AN) may be added to a property status.

5.3.3 Other disease-specific classifications

Not applicable.

5.4 Resolving premises and reclassifying previously declared areas

Resolving premises

For the purposes of this manual, unless otherwise stated, the recommended minimum quarantine period is 21 days after resolution of the last clinical case on a premises. This period may need to be varied based on risk assessment.

Reclassifying previously declared areas

Detailed guidelines for reclassifying previously declared areas are provided in the **AUSVETPLAN guidance document *Declared areas and premises classifications***.

For VS, the key principles for reclassifying a previously declared area to one of a lower risk status include the following:

- The area should be epidemiologically distinct from other declared areas.
- All TPs and SPs have been investigated and reclassified. Predetermined disease control activities and risk assessment have been completed on all IPs, DCPs, DCPFs and vaccinated ARPs in the area, and these premises have been reclassified as RPs.
- All tracing and surveillance associated with control of the disease have been completed satisfactorily, with no evidence or suspicion of infection in the area.
- A minimum period of 42 days has elapsed since all IPs, DCPs and DCPFs in the area were reclassified as RPs. This period may need to be varied based on risk assessment.
- An approved surveillance program has confirmed no evidence of infection in the area.
- Vector monitoring and absence-of-transmission studies indicate that vectors are not actively involved in the transmission of infection.

6

Movement controls

6.1 Principles

General principles for movement controls for managing emergency animal diseases are provided in the **AUSVETPLAN guidance document *Movement controls***.

Key considerations for movement controls for managing vesicular stomatitis (VS) are as follows:

- Transmission of vesicular stomatitis virus (VSV) is thought to occur by direct contact between clinically affected animals, mechanically by insects feeding on infected secretions from lesions on susceptible hosts, via bites from biological vectors, via consumption of infected insects, or by contact with contaminated fomites.
- Infected animals may shed virus without showing clinical signs.
- Viraemia in susceptible domestic animals is insufficient to infect biting insects.
- VSV is relatively unstable in the environment, and is susceptible to many common detergents and disinfectants.
- There are no reports of VS outbreaks in association with trade in meat or meat products; milk or dairy products; or hides, skin, wool or other fibres.
- VSV is not known to be shed in the faeces or urine from naturally infected animals.

6.2 Recommended movement controls

General permits (GPs) and special permits (SpPs) may not be available until the relevant chief veterinary officer gives approval for movements, and this approval may not be given in the early stages of a response.

SpPs are used for higher-risk movements. They require formal application and individual risk assessment by the relevant government veterinarian or gazetted inspector of stock. An SpP may only be issued if the assessed risk can be managed by the application of acceptable mitigation measures.

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. Emergency permits are issued on a case-by-case basis under the authorisation of the relevant chief veterinary officer.

Guidance on reclassifying premises (which may affect the movement controls applied) is provided in [Section 5.4](#).

6.2.1 Live susceptible animals

These controls apply to the movement of susceptible animals (cattle, equids, pigs, sheep, goats and camelids).

Live susceptible animals not being sent to slaughter

Movements off infected premises (IPs), dangerous contact premises (DCPs), suspect premises (SPs) and trace premises (TPs) of live susceptible animals not being sent to slaughter are prohibited.

Table 6.1 shows the requirements for movement of live susceptible animals off other premises.

Table 6.1 Recommended movement controls for live susceptible animals not being sent to slaughter (other than from IPs, DCPs, SPs and TPs)

To →	RA	CA	OA
From ↓			
RA	Prohibited, except under SpP1	Prohibited	Prohibited
CA	Prohibited	Prohibited, except under GPa	Prohibited, except under GPa
OA	Prohibited	Allowed	Allowed

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

Notes for Table 6.1

SpP1 conditions

- No evidence of clinical disease in susceptible animals on the premises on the day of movement or in the previous 21 days.
- Physical identification of animals (eg National Livestock Identification System – NLIS – or other ear tag, brand), with appropriate accompanying movement documentation (eg National Vendor Declaration – NVD, waybill, PigPass).
- Livestock transport vehicles and associated equipment are cleaned before loading and treated with insecticide to prevent adult competent vectors travelling with animals.
- Animals are treated to control vectors.
- Agreed transport route and destination, with no spelling en route.
- The permit accompanies the livestock during movement, and the person responsible for the livestock retains a copy of the permit, consistent with the legal requirements of the jurisdiction.
- Animals are not permitted to move again for 21 days (ie they must remain resident at the destination for a minimum of 21 days).
- Any animals that develop any clinical signs during the 21 days following movement are immediately reported to a government veterinary officer.

GPa conditions

- No evidence of clinical disease in animals being moved.
- Animals were born on the property or resident on the property for the consecutive 21 days immediately before movement.
- Physical identification of animals (eg NLIS or other ear tag, brand), with appropriate accompanying movement documentation (eg NVD, waybill, PigPass).
- The permit accompanies the livestock during movement, and the person responsible for the livestock retains a copy of the permit, consistent with the legal requirements of the jurisdiction.
- Any animals that develop any clinical signs during the 21 days following movement are immediately reported to a government veterinary officer.
- Animals are not permitted to move again for 21 days (ie they must remain resident at the destination for a minimum of 21 days).

Live susceptible animals being sent to slaughter

Table 6.2 describes the recommended movement controls, within and between declared areas, for live susceptible animals being sent for slaughter other than from IPs, DCPs, SPs and TPs. (Movement of live susceptible animals off quarantined premises is not permitted during the quarantine period.)

Table 6.2 Recommended movement controls for live susceptible animals being sent to slaughter (other than from IPs, DCPs, SPs and TPs)

To →	RA	CA	OA
From ↓			
RA	Prohibited, except under SpP2	Prohibited, except under SpP2	Prohibited
CA	Prohibited, except under SpP3	Prohibited, except under GPb	Prohibited, except under GPb
OA	Prohibited, except under SpP3	Allowed	Allowed

CA = control area; GP = general permit; OA = outside area; RA = restricted area; SpP = special permit
 Note: Under exception circumstances, an emergency permit may be issued on a case-by-case basis.

Notes for Table 6.2

SpP2 conditions

- For animals originating in the restricted area (RA), movements to slaughter in the control area (CA) only if there is no suitable abattoir within the RA.
- No evidence of clinical disease in animals being moved.
- Livestock transport vehicles and associated equipment are cleaned before loading and treated with insecticide to prevent adult competent vectors travelling with animals.
- Animals are treated to control vectors, and withholding period or export slaughter interval is completed before slaughter.
- Movement directly to abattoir (an approved processing facility – APF) with no stopping en route.
- Appropriate biosecurity at the APF.

- Onward movement of animals is not permitted.
- Animals are slaughtered within 24 hours.
- Any animals that develop any clinical signs following movement are immediately reported to a government veterinary officer.
- Physical identification of animals (eg NLIS or other ear tag, brand), with appropriate accompanying movement documentation (eg NVD, waybill, PigPass).
- The permit accompanies the livestock during movement, and the person responsible for the livestock retains a copy of the permit, consistent with the legal requirements of the jurisdiction.

SpP3 conditions

- As for GPb, with the following additions:
 - Only if the RA contains the only appropriate abattoir.
 - Movement is directly to abattoir.
 - Animals are slaughtered within 48 hours.
 - Livestock transport vehicles are decontaminated following movement and treated with insecticide to prevent adult competent vectors travelling with the vehicle.

GPb conditions

- No evidence of clinical disease in animals being moved.
- Animals were born on the property or resident on the property for the consecutive 21 days immediately before movement.
- Physical identification of animals (eg NLIS or other ear tag, brand), with appropriate accompanying movement documentation (eg NVD, waybill, PigPass).
- The permit accompanies the livestock during movement, and the person responsible for the livestock retains a copy of the permit, consistent with the legal requirements of the jurisdiction.
- Any animals that develop any clinical signs before slaughter are immediately reported to a government veterinary officer.
- Onward movement of animals is not permitted.

6.2.2 Carcasses

The movement of carcasses from quarantined premises (IPs, DCPs, SPs and TPs) is prohibited except under SpP, subject to risk assessment on a case-by-case basis. Where permitted, such movements may be to an approved facility for rendering (and subsequent movement only to an approved disposal site – ADS) or directly to an ADS for biosecure disposal by burial.

Where such movements are permitted, the carcasses should be protected from insects during transport, and before processing and disposal. All vehicles and equipment involved in the transport should be decontaminated and disinfected following the movement. Appropriate biosecurity should be maintained at the APF and ADS.

6.2.3 Semen and embryos from live susceptible animals

No controls are required on the movement of semen from susceptible animals (cattle, equids, pigs, sheep, goats and camelids).

No controls are required on the movement of embryos from susceptible animals (cattle, equids, pigs,

sheep, goats and camelids), provided that the embryos have been collected, prepared with an intact zona pellucida and subjected to trypsin washings, according to principles of the International Embryo Transfer Society (IETS).

Movement of other embryos (those not collected, processed and stored according to IETS principles) from susceptible animals (cattle, equids, pigs, sheep, goats and camelids) from quarantined premises will be considered on a case-by-case basis, informed by risk assessment:

- Embryos collected in the period starting 21 days before the onset of clinical signs on the premises until the end of the quarantine period, and not collected, processed and stored according to IETS principles, should be destroyed and disposed of in a biosecure manner.
- Embryos collected more than 21 days before the onset of clinical signs on the premises may be held on-site and moved without restriction once the premises has been released from quarantine, provided that there is confidence that the embryos were not contaminated with VSV during processing and storage.

Movement of other embryos (those not collected, processed and stored according to IETS principles) from susceptible animals (cattle, equids, pigs, sheep, goats and camelids) from other premises in declared areas may occur without restriction if the donor animal was present on the premises for at least 21 days before collection and there were no clinical signs of VS on the premises throughout that period.

6.2.4 Meat and meat products

Meat and meat products are not subject to movement restrictions.

6.2.5 Milk and dairy products

Milk and dairy products are not subject to movement restrictions.

6.2.6 Eggs and egg products

Not applicable.

6.2.7 Hides, skin, wool and other fibres

Hides, skins, wool and other fibres are not subject to movement restrictions.

6.2.8 Other animal byproducts

Movements of other animal byproducts will be considered on a case-by-case basis, informed by risk assessment. The risk assessment should consider the likelihood that the byproduct may be infectious, the potential for exposure of susceptible animals or people, and the consequences of any such exposure. Factors that may inform the risk assessment include the origin of the byproduct, any processing undertaken or planned, and the proposed end use of the byproduct.

6.2.9 Waste products and effluent

Waste products and effluent from susceptible animals do not pose a transmission risk. However, vehicles transporting these materials from premises in the RA should be covered and use insecticide to avoid the concurrent transport of potentially infected or contaminated insect vectors.

For details of appropriate insecticide treatments, refer to the **AUSVETPLAN operational manual Decontamination**.

6.2.10 Vehicles, including empty livestock transport vehicles and associated equipment

Conditions for the movement of vehicles and equipment used to move susceptible animals from premises in the RA are provided in [Section 6.2.1](#).

For movements of other vehicles from premises in the RA, care should be taken to avoid the concurrent transport of potentially infected or contaminated insect vectors.

For details of appropriate insecticide treatments, refer to the **AUSVETPLAN operational manual Decontamination**.

6.2.11 Nonsusceptible animals

Nonsusceptible animals are animals other than cattle, equids, pigs, sheep, goats and camelids. Management of potentially infected wild animals is discussed in [Section 4.3.14](#).

Nonsusceptible animals on quarantined premises should have any potentially VSV-contaminated material removed (eg by thorough cleaning) before movement, to prevent the mechanical spread of VSV.

Care must be taken to avoid the concurrent transport of infected vectors (see [Section 6.2.10](#) regarding movements of vehicles from premises in the RA).

6.2.12 People

Any potentially VSV-contaminated material should be removed from people leaving quarantined premises to prevent the mechanical spread of VSV. Contamination may be removed through use of hand hygiene, showering if necessary, and cleaning of footwear and contaminated clothing.

Care must be taken to avoid the transport of infected vectors with any movement of people off premises in the RA (see also [Section 6.2.10](#)).

6.2.13 Specimens

Specimens should be collected according to [Section 2.5.4](#), and packed and transported according to guidelines of the International Air Transport Association.

6.2.14 Crops, grains, hay, silage and mixed feeds

The movement of crops, grains, hay, silage and mixed feeds from quarantined premises should be subject to risk assessment, on a case-by-case basis. The risk assessment should consider the potential for contamination with VSV, the presence of potentially infected vectors, and the proposed use of the materials, including any further processing that may occur. Epidemiological advice should inform the risk assessment.

Potentially contaminated crops, grains, hay, silage and mixed feeds should not be fed to, or used as bedding or litter for, susceptible animals.

6.2.15 Equipment, including personal items

Equipment that has been in contact with infected, or potentially infected, animals on quarantined

premises (IPs, DCPs, SPs and TPs) should be cleaned before leaving the premises or disposed of in a biosecure manner (eg through normal biohazard waste management). Cleaning (or disposing of) contaminated equipment minimises the likelihood of fomite transmission and the inadvertent exposure of people through needlestick or similar injury.

6.2.16 Sales, shows and other events

All sales, shows and other events where susceptible animals may congregate in the RA are prohibited. The conduct of these events in the CA will be under permit and subject to risk assessment on a case-by-case basis.

6.2.17 Stock routes and rights of way

The use by susceptible animals of stock routes, public riding trails and rights of way in the RA is prohibited. The use by susceptible animals of stock routes, public riding trails and rights of way in the CA will be under permit and subject to risk assessment on a case-by-case basis.

6.2.18 Animal movements for emergency (including welfare) reasons

Movements of susceptible animals that are otherwise prohibited may be considered on a case-by-case basis (informed by risk assessment) for emergency (including welfare) reasons. Examples are movements for emergency veterinary treatment, movements to different premises under the same ownership to manage feed availability, or movements to slaughter for welfare reasons. If allowed, such movements will be under SpP or emergency permit.

6.2.19 Other movements

Movements of other risk materials will need to be considered on a case-by-case basis, informed by risk assessment.

7

Surveillance and proof of freedom

The key objectives and priorities for surveillance in response to an outbreak of vesicular stomatitis (VS) are outlined in [Section 4.3.3](#).

7.1 Surveillance

7.1.1 Specific considerations

Specific considerations for surveillance for VS include the following:

- Surveillance of potential insect vector species (and amplifying hosts) will be required.
- In risk areas, insects collected under sentinel programs for other diseases should also be tested for vesicular stomatitis virus (VSV). Existing arbovirus and vector surveillance systems – including the National Arbovirus Monitoring Program – may be used to carry out surveillance for VS.
- Public health vector monitoring programs may also be of value.
- A range of vector collection techniques should be used, depending on the suspected vector species.
- Surveillance of wild animal populations may be required to inform understanding of the distribution of infection.
- The degree of cross-reaction between VSV and endemic rhabdoviruses is not well characterised and may affect the suitability of serological surveillance. However, serological surveillance may still help identify subclinical populations that have been exposed to VSV and assist with delimiting the distribution of the virus.
- Public health surveillance for VS will be undertaken jointly by national, and state and territory public health authorities. Relevant data will be published in the fortnightly publication *Communicable Diseases Intelligence*.¹¹

7.1.2 Premises surveillance

Domestic animals

Surveillance on suspect premises (SPs)

Any suspect cases of clinical disease in domestic animals must be investigated to establish the distribution of infection. Identification and isolation of virus should be attempted from suitable cases. Serology can also be conducted on sick animals and cohorts, with resampling 2 weeks later to assess antibody conversion to VSV.

¹¹ www.health.gov.au/cdi

Surveillance on premises with epidemiological links to the outbreak (dangerous contact premises – DCPs, and trace premises – TPs)

Animals should be examined for clinical signs of infection. This should be supplemented by serological surveillance to identify evidence of exposure to VSV.

7.2 Proof of freedom

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

The 2013 World Organisation for Animal Health (OIE) Terrestrial Code (when VS was a listed disease) stated that a country is considered to be free from VS when no clinical, epidemiological or other evidence of VS has been found during the previous 2 years. In the absence of other international standards or guidelines for VS, surveillance in this time period may underpin a self-declaration from Australia of a return to freedom from VS. General provisions relating to animal health surveillance can be found in Chapter 1.4 of the OIE Terrestrial Code.¹² Acceptance of a return to freedom following an outbreak will have to be negotiated with individual trading partners.

To provide evidence to support a declaration of freedom, a comprehensive surveillance program will be required. This will build on the surveillance, tracing and diagnostic testing done during the control phase. It will include both clinical and laboratory diagnostic surveillance in domestic animals (including feral populations). This will need to be complemented by surveillance in other wild animal populations and in vectors.

Specific recommendations for this surveillance will be developed using the technical expertise of competent and experienced epidemiologists, and will be based on the characteristics of the outbreak. The advice of entomologists, and those familiar with the ecology of vector and wild animal populations should be sought. The design of this program will also consider the general recommendations in the OIE Terrestrial Code, and the general and specific considerations for VS surveillance outlined in [Section 7.1](#).

¹² www.oie.int/international-standard-setting/terrestrial-code/access-online

Glossary

Disease-specific terms

Primary case	The first case of the disease or infection.
Rendering	See <i>also</i> index case in 'Standard AUSVEPTLAN terms'. Note that the index case will not necessarily be the primary case.
Vesicular disease	Processing by heat to inactivate infective agents. Rendered material may be used in various products according to particular disease circumstances.

Standard AUSVETPLAN terms

Animal byproducts	Products of animal origin that are not for consumption but are destined for industrial use (eg hides and skins, fur, wool, hair, feathers, hoofs, bones, fertiliser).
Animal Health Committee	<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 (ACDP) and the Department of Agriculture, Water and the Environment. 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>See <i>also</i> National Biosecurity Committee</p>

Cont'd

Animal products	Meat, meat products and other products of animal origin (eg eggs, milk) for human consumption or for use in animal feedstuff.
Approved disposal site	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.
Approved processing facility	An abattoir, knackery, milk processing plant or other such facility that maintains increased biosecurity standards. Such a facility could have animals or animal products introduced from lower-risk premises under a permit for processing to an approved standard.
At-risk premises	A premises in a restricted area that contains a live susceptible animal(s) but is not considered at the time of classification to be an infected premises, dangerous contact premises, dangerous contact processing facility, suspect premises or trace premises.
Australian Chief Veterinary Officer	The nominated senior veterinarian in the Australian Government Department of Agriculture, Water and the Environment who manages international animal health commitments and the Australian Government's response to an animal disease outbreak. <i>See also</i> Chief veterinary officer
AUSVETPLAN	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.
Carcase	The body of an animal slaughtered for food.
Carcass	The body of an animal that died in the field.
Chief veterinary officer (CVO)	The senior veterinarian of the animal health authority in each jurisdiction (national, state or territory) who has responsibility for animal disease control in that jurisdiction. <i>See also</i> Australian Chief Veterinary Officer

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Compartmentalisation	The process of defining, implementing and maintaining one or more disease-free establishments under a common biosecurity management system in accordance with OIE guidelines, based on applied biosecurity measures and surveillance, to facilitate disease control and/or trade.
Compensation	The sum of money paid by government to an owner for livestock or property that are destroyed for the purpose of eradication or prevention of the spread of an emergency animal disease, and livestock that have died of the emergency animal disease. <i>See also</i> Cost-sharing arrangements, Emergency Animal Disease Response Agreement
Consultative Committee on Emergency Animal Diseases (CCEAD)	The key technical coordinating body for animal health emergencies. Members are state and territory chief veterinary officers, representatives of CSIRO-ACDP and the relevant industries, and the Australian Chief Veterinary Officer as chair.
Control area (CA)	A legally declared area where the disease controls, including surveillance and movement controls, applied are of lesser intensity than those in a restricted area (the limits of a control area and the conditions applying to it can be varied during an incident according to need).
Cost-sharing arrangements	Arrangements agreed between governments (national and state/territory) and livestock industries for sharing the costs of emergency animal disease responses. <i>See also</i> Compensation, Emergency Animal Disease Response Agreement
Dangerous contact animal	A susceptible animal that has been designated as being exposed to other infected animals or potentially infectious products following tracing and epidemiological investigation.
Dangerous contact premises (DCP)	A premises, apart from an abattoir, knackery or milk processing plant (or other such facility) that, after investigation and based on a risk assessment, is considered to contain a susceptible animal(s) not showing clinical signs, but considered highly likely to contain an infected animal(s) and/or contaminated animal products, wastes or things that present an unacceptable risk to the response if the risk is not addressed, and that therefore requires action to address the risk.

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Dangerous contact processing facility (DCPF)	An abattoir, knackery, milk processing plant or other such facility that, based on a risk assessment, appears highly likely to have received infected animals, or contaminated animal products, wastes or things, and that requires action to address the risk.
Declared area	A defined tract of land that is subjected to disease control restrictions under emergency animal disease legislation. There are two types of declared areas: restricted area and control area.
Decontamination	Includes all stages of cleaning and disinfection.
Depopulation	The removal of a host population from a particular area to control or prevent the spread of disease.
Destroy (animals)	To kill animals humanely.
Disease agent	A general term for a transmissible organism or other factor that causes an infectious disease.
Disease Watch Hotline	24-hour freecall service for reporting suspected incidences of exotic diseases – 1800 675 888.
Disinfectant	A chemical used to destroy disease agents outside a living animal.
Disinfection	The application, after thorough cleansing, of procedures intended to destroy the infectious or parasitic agents of animal diseases, including zoonoses; applies to premises, vehicles and different objects that may have been directly or indirectly contaminated.
Disinsectisation	The destruction of insect pests, usually with a chemical agent.
Disposal	Sanitary removal of animal carcasses, animal products, materials and wastes by burial, burning or some other process so as to prevent the spread of disease.
Emergency animal disease	A disease that is (a) exotic to Australia or (b) a variant of an endemic disease or (c) a serious infectious disease of unknown or uncertain cause or (d) a severe outbreak of a known endemic disease, and that is considered to be of national significance with serious social or trade implications. <i>See also</i> Endemic animal disease, Exotic animal disease

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Emergency Animal Disease Response Agreement	<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>See <i>also</i> Compensation, Cost-sharing arrangements</p>
Endemic animal disease	<p>A disease affecting animals (which may include humans) that is known to occur in Australia.</p> <p>See <i>also</i> Emergency animal disease, Exotic animal disease</p>
Enterprise	<p>See Risk enterprise</p>
Enzyme-linked immunosorbent assay (ELISA)	<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>
Epidemiological investigation	<p>An investigation to identify and qualify the risk factors associated with the disease.</p> <p>See <i>also</i> Veterinary investigation</p>
Epidemiology	<p>The study of disease in populations and of factors that determine its occurrence.</p>
Exotic animal disease	<p>A disease affecting animals (which may include humans) that does not normally occur in Australia.</p> <p>See <i>also</i> Emergency animal disease, Endemic animal disease</p>
Exotic fauna/feral animals	<p>See Wild animals</p>
Fomites	<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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General permit	<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>
In-contact animals	<p>Animals that have had close contact with infected animals, such as noninfected animals in the same group as infected animals.</p>
Incubation period	<p>The period that elapses between the introduction of a pathogen into an animal and the first clinical signs of the disease.</p>
Index case	<p>The first case of the disease to be diagnosed in a disease outbreak.</p> <p><i>See also</i> Index property</p>
Index property	<p>The property on which the index case is found.</p> <p><i>See also</i> Index case</p>
Infected premises (IP)	<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>
Local control centre	<p>An emergency operations centre responsible for the command and control of field operations in a defined area.</p>
Monitoring	<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>
Movement control	<p>Restrictions placed on the movement of animals, people and other things to prevent the spread of disease.</p>

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National Biosecurity Committee	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.
National Management Group (NMG)	A group established to approve (or not approve) the invoking of cost sharing under the Emergency Animal Disease Response Agreement. NMG members are the Secretary of the Australian Government Department of Agriculture, Water and the Environment as chair; the chief executive officers of the state and territory government parties; and the president (or analogous officer) of each of the relevant industry parties.
Native wildlife	See Wild animals
OIE Terrestrial Code	OIE <i>Terrestrial Animal Health Code</i> . Describes standards for safe international trade in animals and animal products. Revised annually and published on the internet at: www.oie.int/international-standard-setting/terrestrial-code/access-online .
OIE Terrestrial Manual	OIE <i>Manual of diagnostic tests and vaccines for terrestrial animals</i> . Describes standards for laboratory diagnostic tests, and the production and control of biological products (principally vaccines). The current edition is published on the internet at: www.oie.int/en/standard-setting/terrestrial-manual/access-online .
Operational procedures	Detailed instructions for carrying out specific disease control activities, such as disposal, destruction, decontamination and valuation.
Outside area (OA)	The area of Australia outside the declared (control and restricted) areas.
Owner	Person responsible for a premises (includes an agent of the owner, such as a manager or other controlling officer).
Polymerase chain reaction (PCR)	A method of amplifying and analysing DNA sequences that can be used to detect the presence of viral DNA.
Premises	A tract of land including its buildings, or a separate farm or facility that is maintained by a single set of services and personnel.

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Premises of relevance (POR)	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.
Prevalence	The proportion (or percentage) of animals in a particular population affected by a particular disease (or infection or positive antibody titre) at a given point in time.
Proof of freedom	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.
Quarantine	Legally enforceable requirement that prevents or minimises spread of pests and disease agents by controlling the movement of animals, persons or things.
Resolved premises (RP)	An infected premises, dangerous contact premises or dangerous contact processing facility that has completed the required control measures, and is subject to the procedures and restrictions appropriate to the area in which it is located.
Restricted area (RA)	A relatively small legally declared area around infected premises and dangerous contact premises that is subject to disease controls, including intense surveillance and movement controls.
Risk enterprise	A defined livestock or related enterprise that is potentially a major source of infection for many other premises. Includes intensive piggeries, feedlots, abattoirs, knackeries, saleyards, calf scales, milk factories, tanneries, skin sheds, game meat establishments, cold stores, artificial insemination centres, veterinary laboratories and hospitals, road and rail freight depots, showgrounds, field days, weighbridges and garbage depots.
Sensitivity	The proportion of truly positive units that are correctly identified as positive by a test. <i>See also</i> Specificity
Sentinel animal	Animal of known health status that is monitored to detect the presence of a specific disease agent.
Seroconversion	The appearance in the blood serum of antibodies (as determined by a serology test) following vaccination or natural exposure to a disease agent.

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Serosurveillance	Surveillance of an animal population by testing serum samples for the presence of antibodies to disease agents.
Serotype	A subgroup of microorganisms identified by the antigens carried (as determined by a serology test).
Serum neutralisation test	A serological test to detect and measure the presence of antibody in a sample. Antibody in serum is serially diluted to detect the highest dilution that neutralises a standard amount of antigen. The neutralising antibody titre is given as the reciprocal of this dilution.
Slaughter	The humane killing of an animal for meat for human consumption.
Special permit	A legal document that describes the requirements for movement of an animal (or group of animals), commodity or thing, for which the person moving the animal(s), commodity or thing must obtain prior written permission from the relevant government veterinarian or inspector. A printed version of the permit must accompany the movement. The permit may impose preconditions and/or restrictions on movements. <i>See also</i> General permit
Specificity	The proportion of truly negative units that are correctly identified as negative by a test. <i>See also</i> Sensitivity
Stamping out	The strategy of eliminating infection from premises through the destruction of animals in accordance with the particular AUSVETPLAN manual, and in a manner that permits appropriate disposal of carcasses and decontamination of the site.
State coordination centre	The emergency operations centre that directs the disease control operations to be undertaken in a state or territory.
Surveillance	A systematic program of investigation designed to establish the presence, extent or absence of a disease, or of infection or contamination with the causative organism. It includes the examination of animals for clinical signs, antibodies or the causative organism.
Susceptible animals	Animals that can be infected with a particular disease.

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Suspect animal

An animal that may have been exposed to an emergency disease such that its quarantine and intensive surveillance, but not pre-emptive slaughter, is warranted.

or

An animal not known to have been exposed to a disease agent but showing clinical signs requiring differential diagnosis.

Suspect premises (SP)

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

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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 by-products either of Australian provenance or legally imported for stockfeed use into Australia.
- ii. Material containing flesh, bones, blood, offal or mammal carcasses which is treated by an approved process.¹
- 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.

¹ 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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- Swill feeding** Also known as ‘feeding prohibited pig feed’, it includes:
- feeding, or allowing or directing another person to feed, prohibited pig feed to a pig
 - allowing a pig to have access to prohibited pig feed
 - the collection and storage or possession of prohibited pig feed on a premises where one or more pigs are kept
 - supplying to another person prohibited pig feed that the supplier knows is for feeding to any pig.

This definition was endorsed by the Agriculture Ministers’ Council through AGMIN OOS 04/2014.

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

Tracing The process of locating animals, people or other items that may be implicated in the spread of disease, so that appropriate action can be taken.

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

Vaccination Inoculation of individuals with a vaccine to provide active immunity.

Vaccine A substance used to stimulate immunity against one or several disease-causing agents to provide protection or to reduce the effects of the disease. A vaccine is prepared from the causative agent of a disease, its products or a synthetic substitute, which is treated to act as an antigen without inducing the disease.

– adjuvanted A vaccine in which one or several disease-causing agents are combined with an adjuvant (a substance that increases the immune response).

– attenuated A vaccine prepared from infective or ‘live’ microbes that are less pathogenic but retain their ability to induce protective immunity.

– gene deleted An attenuated or inactivated vaccine in which genes for non-essential surface glycoproteins have been removed by genetic engineering. This provides a useful immunological marker for the vaccine virus compared with the wild virus.

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

Abbreviations

Disease-specific terms

FMD	foot-and-mouth disease
NLIS	National Livestock Identification System
NVD	National Vendor Declaration
PPE	personal protective equipment
VS	vesicular stomatitis
VSV	vesicular stomatitis virus

Standard AUSVETPLAN abbreviations

ACDP	Australian Centre for Disease Preparedness
AN	assessed negative
ARP	at-risk premises
AUSVETPLAN	Australian Veterinary Emergency Plan
CA	control area
CCEAD	Consultative Committee on Emergency Animal Diseases
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CVO	chief veterinary officer
DCP	dangerous contact premises
DCPF	dangerous contact processing facility

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EAD	emergency animal disease
EADRA	Emergency Animal Disease Response Agreement
EADRP	Emergency Animal Disease Response Plan
EDTA	ethylenediaminetetraacetic acid (anticoagulant for whole blood)
ELISA	enzyme-linked immunosorbent assay
GP	general permit
IETS	International Embryo Transfer Society
IP	infected premises
LCC	local control centre
NMG	National Management Group
OA	outside area
OIE	World Organisation for Animal Health
PCR	polymerase chain reaction
POR	premises of relevance
RA	restricted area
RP	resolved premises
SCC	state coordination centre
SP	suspect premises
SpP	special permit
TP	trace premises
UP	unknown status premises
ZP	zero susceptible stock premises

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