Emergency Animal Diseases

A guide for veterinarians

If you suspect an emergency animal disease, you **MUST** report it to the **Emergency Animal Disease Hotline** on **1800 675 888** or an Authorised Officer.

EMERGENCY ANIMAL DISEASE HOTLINE
1800 675 888

NSW GOVERNMENT

The New South Wales (NSW) Government's commitment to emergency animal disease (EAD) prevention and preparedness activities reflects the significance of animals industries to our state's economic livelihood as well as the serious socio-economic impacts an EAD outbreak would have for NSW and Australia.

Preparation and timely responses are key to avoiding or limiting the impact of an EAD. This does not happen in isolation. Effective biosecurity protection can only happen in partnership with our animal health and livestock industries, community and other stakeholders.

Veterinarians play a pivotal role in helping to protect the NSW livestock industry. Working on the frontline, you not only provide veterinary services to livestock owners but also play an important role in educating them about animal health and good biosecurity practices to prevent disease introduction, establishment and spread.

Well-established plans are in place to deal with an EAD incident but surveillance for early detection and early reporting of the disease are critical in reducing the spread and severity of a disease outbreak.

The impacts of an EAD can be significant, for example, the social and economic impact of a FMD outbreak would be severe and prolonged. A recent study estimates that a large, multi-state FMD incident could cost Australia more than $80 billion in lost revenue over ten years.

While there are many emergency and notifiable animal diseases that could impact our animal industries; this guide provides essential information on the clinical signs, sampling, differential diagnoses, transmission pathways and biosecurity controls of priority EADs to NSW, to support timely detection and reporting.

Together we can keep NSW and Australia EAD-free.

Be EAD aware. Be EAD prepared.

Dr Sarah Britton
Chief Veterinary Officer
NSW Department of Primary Industries

NSW GOVERNMENT

Foot-and-mouth disease

If you suspect **foot-and-mouth disease** in livestock, you **MUST** report it to the **Emergency Animal Disease Hotline** on **1800 675 888** or an Authorised Officer.

EMERGENCY ANIMAL DISEASE HOTLINE
1800 675 888

NSW GOVERNMENT

About foot-and-mouth disease (FMD)

Foot-and-mouth disease is a serious and highly contagious viral disease affecting cloven-hoofed animals including: (cattle, sheep, goats, pigs, camelids (camels, llamas and alpacas), bison, water buffalo *(Bubalus bubalis)*, African buffalo *(Syncerus caffer)*, deer, antelopes, giraffe, wildebeest, eland and warthog.

The disease is clinically characterised by the formation of vesicles and erosions in the mouth and nostrils, on the teats, and on the skin between and above the hoofs. FMD can cause serious welfare issues and production losses and is a major constraint to international trade in livestock and livestock products.

FMD is caused by a member of the *Picornaviridae* family of RNA viruses. There are seven distinct serotypes (A, O, C, SAT-1, SAT-2, SAT-3, and Asia 1), each with a wide spectrum of antigenic diversity. Immunity to one serotype provides little to no cross protection against other serotypes.

The incubation period is highly variable depending on the strain, infectious dose, route of transmission, host species, physiological and immunological variables and husbandry conditions under which animals are kept. Under field conditions, the incubation period is typically two to five days and for the purposes of disease control, the incubation period specified in the World Organisation for Animal Health (WOAH) Terrestrial Animal Health Code is 14 days.

FOOT-AND-MOUTH DISEASE IS A NOTIFIABLE DISEASE.

In Australia, if you suspect foot-and-mouth disease in susceptible livestock, you **MUST** report it immediately to the **Emergency Animal Disease Hotline** on **1800 675 888** or an Authorised Officer on 1300 795 299**.**

Bovine – oral lesions

Bovine – 2 day old oral lesion

Bovine - 2-3 day old foot lesion

Image source: EU FMD

Clinical signs of FMD–general

FMD is highly contagious and easily spread. Large numbers of animals may become affected simultaneously and may display a range of clinical signs depending on the stage of infection and severity of the disease process.

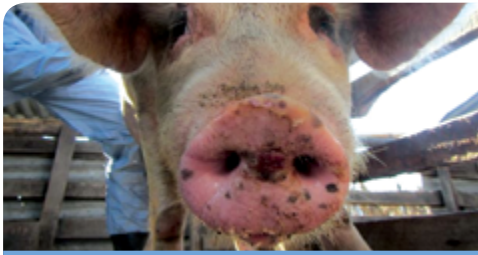
As much history and epidemiological information should be gathered to assess the index of suspicion for FMD or other emergency animal diseases.

FMD should be considered as a differential diagnosis whenever vesicles are seen in cloven-hoofed animals. A provisional diagnosis of FMD should then be made when there is a combination of the following clinical signs:

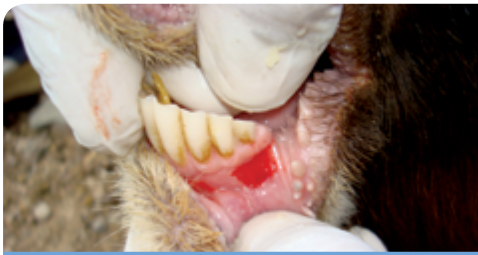
- Acute lameness in a group of animals
- Excess salivation
- Vesicles in the mouth, on the feet and/or on the teats
- Fever
- A considerable drop in milk yield (in dairy species).

Clinical signs are usually milder and more subtle in sheep than in pigs and cattle.

Bovine – large lesion on the tongue



Pig – snout lesions

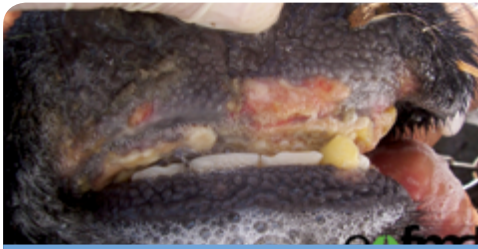


Goat – 2 day old mouth lesion

Image source: EU FMD

Clinical signs in cattle

- Fever (up to 42°C), accompanied by depression, inappetence, and a sudden drop of milk production in dairy animals
- Smacking of the lips, teeth grinding, drooling, lameness, reluctance to stand, and stamping or kicking of the feet
- Vesicle formation on buccal (oral) and nasal mucous membranes, on the mammary glands and/or between the claws and coronary band
- Rupture of vesicles leaving erosions
- Complications may include secondary infection of lesions, hoof deformation, mastitis and permanent impairment of milk production
- Death of young animals from viral myocarditis (inflammation of the heart muscle)



Four day old lesion on dental pad

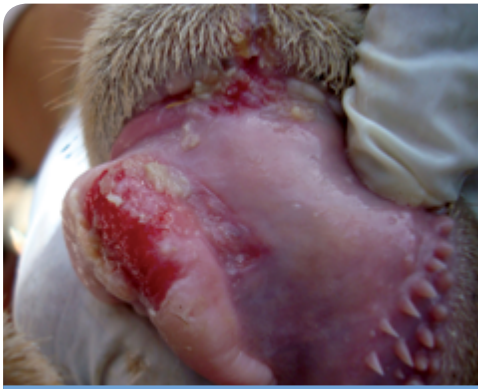
Vesicles on teat

Interdigital lesion

Image source: EU FMD

Clinical signs in sheep and goats

- Lesions in the oral cavity are not prominent, however, vesicles, when present, are most likely to occur on the dental pad and caudal and dorsal portions of the tongue
- Lameness is often mild
- Foot lesions along the coronary band or interdigital spaces may go unrecognised, as may lesions on the dental pad
- Agalactia (milk production failure) in milking sheep and goats
- Death of young animals from viral myocarditis



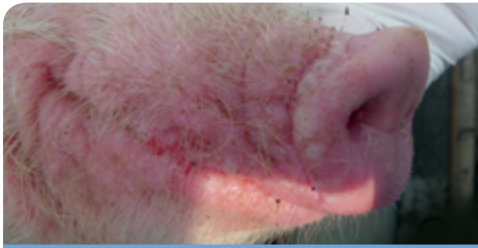
2-3 day old mouth lesion

Freshly ruptured vesicle on the tongue of a goat

Image source: EU FMD

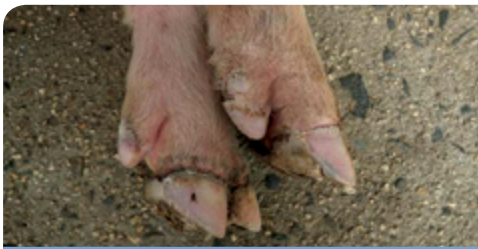
Clinical signs in pigs

- Fever, inappetence and reluctance to move
- Often a severe lameness with vesicle formation around the top of the foot, on the heels and between the claws
- Vesicles may occur on the snout, inside the mouth and on teats of sows
- Abortion is common and may be the presenting clinical problem



Unruptured vesicles on snout

3 day old tongue lesions



Older coronary band lesions

Top and bottom image source: EU FMD; Middle image source: DEFRA

Sampling and laboratory testing

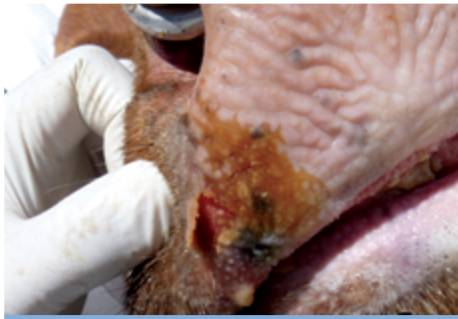
Ensure you report all suspect EADs to the **Emergency Animal Disease Hotline** on **1800 675 888** or an **Authorised Officer** on **1300 795 299**. For advice about sampling and testing for foot-and-mouth disease, contact the NSW Animal and Plant Health Laboratories *(see 'Contacts' tab)*.

To allow a definitive laboratory diagnosis, obtain a full range of samples.

Do not omit some samples based on your lesion ageing assessment. Ideally collect **duplicate samples** from **each** affected animal or from **10 or more affected animals** in a large herd or flock.

For FMD confirmation and exclusion, **vesicular fluid**, **epithelium**, **blood**, **saliva**, **oral**, **nasal** and **tonsillar swabs** are the diagnostic samples of choice in live animals.

The agent can be detected by qPCR and virus isolation and further characterised by PCR and gene sequencing. Serological tests include ELISA and immunofluorescence antibody test (IFAT).



Epithelial flap

Image source: EU FMD

Collection container	Collect from live animals	Collect from dead animals
EDTA tube (purple top) — full	Blood (5ml)	Blood (recently deceased animals only)
Plain tube (red or grey/red speckled top)	Blood for serology (20ml)	
Separate sterile collection containers (no media) for fresh samples* *(kept chilled at 4°C, not frozen)*	■ Vesicular fluid should be carefully aspirated from newly formed vesicles by syringe and needle ■ Up to six epithelial coverings of intact vesicular lesions (at least 2 cm^2, or minimum 1–2 grams), if available, should be collected ■ Oral, nasal and tonsillar swabs	As for live animals (recently deceased only)
Large collection container with 10% neutral buffered formalin *(kept chilled at 4°C, not frozen)*		Duplicate samples of other tissues

Forward the samples to the NSW Animal and Plant Health Laboratories at Elizabeth Macarthur Agricultural Institute (EMAI; *refer to the 'Bio controls & reporting' tab*). The laboratory will provide relevant samples to the national reference laboratory (the Australian Centre for Disease Preparedness in Geelong, Victoria) if required.

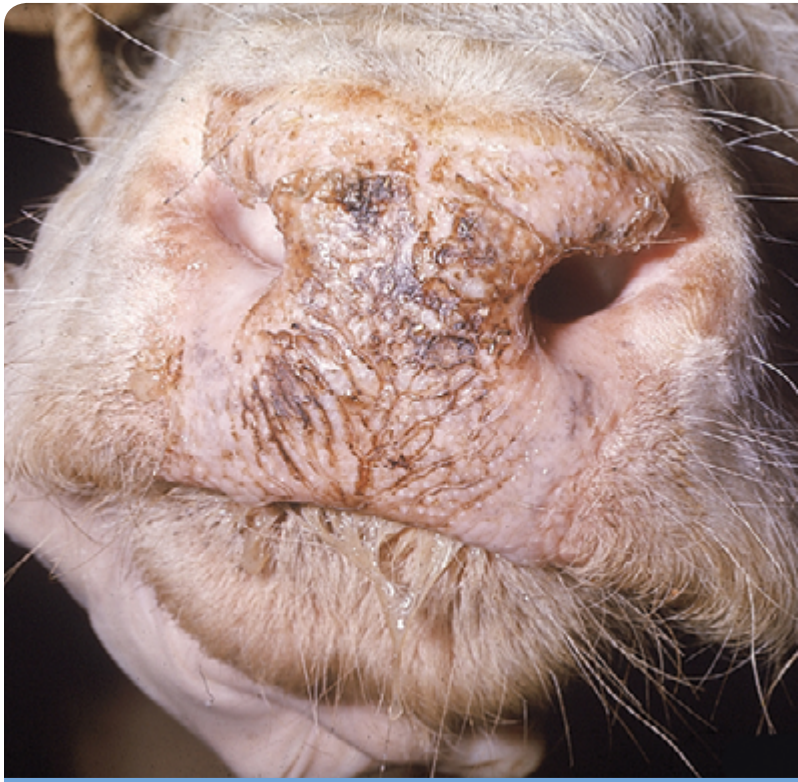
Differential diagnosis

Clinically indistinguishable exotic vesicular diseases include:

- Vesicular stomatitis,
- Swine vesicular disease and
- Vesicular exanthema of swine.

Other differential diagnoses for conditions or diseases endemic to NSW include:

- Bovine virus diarrhoea,
- Infectious bovine rhinotracheitis,
- Malignant catarrhal fever,
- Contagious ecthyma and
- Some plant toxicities resulting in photosensitisation.



Malignant catarrhal fever - multiple shallow erosions are filled with dried nasal exudate

Image source: Plum Island Animal Disease Center (PIADC)

Transmission of FMD

FMD is one of the most contagious animal diseases known.

Infected animals excrete virus in fluid from ruptured vesicles, exhaled air, saliva, milk, semen, faeces and urine. Under field conditions, infected animals may be infectious for up to two days before clinical signs develop.

The primary method of transmission within herds and flocks is by direct contact or via respiratory particles and droplets.

Pigs are comparatively less susceptible to aerosol infection than cattle, but highly susceptible to infection by the oral route. Pigs are potent amplifiers and excretors of the virus (amplifier species) and serve as a significant source of viral aerosols.

Cattle are highly susceptible to aerosol infection and readily display clinical signs (indicator species). Sheep are equally susceptible to infection, but are comparatively less infectious than cattle (maintenance species).

Spread of infection between properties and areas may readily occur due to movement of infected animals or contaminated vehicles, equipment, people and animal products. Windborne spread of infected aerosols can occur for many kilometres under appropriate environmental conditions.

The FMD virus may remain viable in the environment for several weeks, and possibly longer in the presence of organic matter. It is susceptible to a change in pH and both acid and alkaline disinfectants including sodium hydroxide and sodium carbonate. Personal decontaminants of choice include citric acid, chlorhexidine and Virkon® S.

African Swine Fever

If you suspect **African swine fever** in pigs, you **MUST** report it to the **Emergency Animal Disease Hotline** on **1800 675 888** or an Authorised Officer.

EMERGENCY ANIMAL DISEASE HOTLINE
1800 675 888

NSW GOVERNMENT

About African swine fever (ASF)

African swine fever is a severe and infectious haemorrhagic viral disease that affects domestic and feral pigs and has spread rapidly around the world in recent years. African swine fever is not present in Australia.

The disease would have a significant impact on pig health and production in Australia and contribute to wider economic impacts for our primary industries and communities.

There is currently no vaccine or treatment for African swine fever.

The African swine fever virus is a complex, large, enveloped DNA virus. It is currently classified as the only member of the Asfarviridae family, genus *Asfivirus*. The virus is stable at a wide range of pH levels and can remain viable for long periods in blood, faeces and tissues, particularly in chilled and frozen meat.

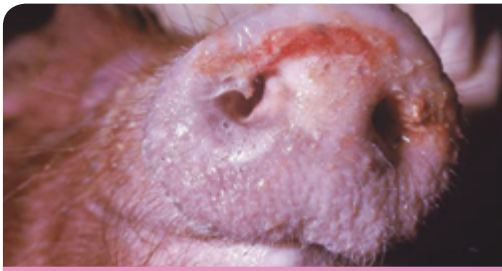
African swine fever can present as peracute, acute, subacute and chronic forms.

The incubation period is usually 5–15 days but may be as long as 20 days.

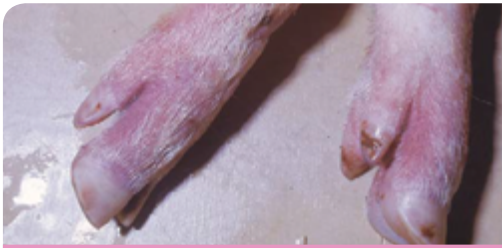
African swine fever is unrelated to classical swine fever; however, the clinical signs may be similar.

AFRICAN SWINE FEVER IS A NOTIFIABLE DISEASE.

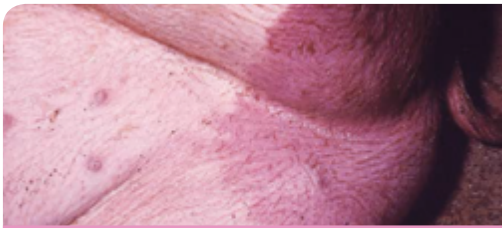
In Australia, if you suspect African swine fever in pigs, you **MUST** report it immediately to the **Emergency Animal Disease Hotline** on **1800 675 888** or an Authorised Officer on 1300 795 299**.**



Bloody, mucoid, foamy nasal discharge



Marked hyperaemia of the distal limbs



Large, sharply demarcated zone of hyperaemia of the perineal skin

Image source: PIADC

Clinical signs

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

Peracute form

Pigs may be found dead with no prior clinical signs.

Acute form

- High fever (40.5–42°C)
- Depression, listlessness
- Anorexia
- Cyanosis and incoordination within 24–48 hours before death
- Haemorrhages in the skin (redness of skin on ears, abdomen, legs)
- Abortion in pregnant sows
- Vomiting, diarrhoea
- Death in 6–13 days (but sometimes up to 20 days)
- Mortality rates up to 100%

Subacute form

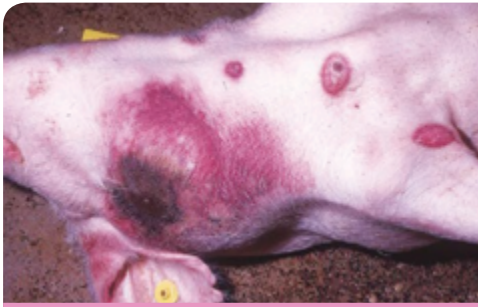
Moderately virulent virus may show less intense clinical signs for longer periods (5-30 days).

- Slight fever
- Reduced appetite and weight loss
- Depression
- Abortion in pregnant sows
- Death in 15–45 days
- Mortality rates in the range 30–70%

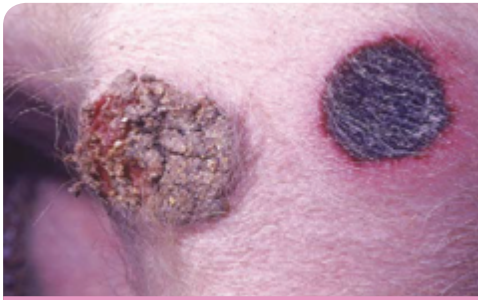
Chronic forms

Moderately virulent or low-virulent virus may show varying and less intense clinical signs for a much longer period (2-15 months).

- Weight loss
- Irregular peaks of temperature
- Respiratory signs
- Necrosis in areas of skin and chronic ulcers
- Arthritis
- Swelling over joints
- Low mortality



Multiple, sharply demarcated foci of cutaneous haemorrhage and/or necrosis; haemorrhagic lesions, some containing dark-red (necrotic) centres



Necrotic exudate sloughing from the left lesion; rim of hyperaemia around the focus of haemorrhage and necrosis (infarct) on the right

Image source: PIADC

Post-mortem findings

Peracute form

There may not be many post-mortem findings, as the pigs may die before any gross pathology is seen.

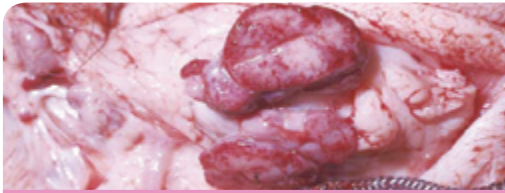
Acute form (not all lesions are seen, depending on the isolate)

- Pronounced haemorrhages in the gastrohepatic and renal lymph nodes
- Petechiae of the renal cortex, medulla and pelvis
- Congestive splenomegaly
- Oedematous areas of cyanosis in hairless parts
- Cutaneous ecchymoses on the legs and abdomen
- Excess of pleural, pericardial and/or peritoneal fluid
- Petechiae in the mucous membranes of the larynx and bladder, and on visceral surfaces of organs
- Oedema in the wall of the gall bladder and mesenteric structures of the colon and adjacent to the gall bladder

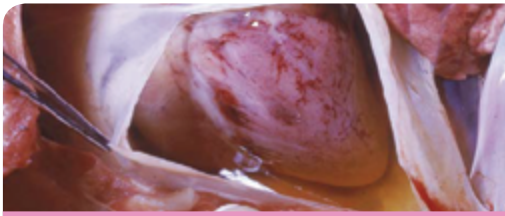
Chronic form

- Possible focal caseous necrosis and mineralisation of the lungs
- Enlarged lymph nodes

Cortical petechiation of the kidney



Moderate peripheral (medullary) haemorrhage of the mandibular lymph node



Abundant, straw-coloured pericardial fluid (hydropericardium), and multifocal epicardial haemorrhage

Image source: PIADC

Sampling and laboratory testing

Ensure you report all suspect EADs to the **Emergency Animal Disease Hotline on 1800 675 888** or an Authorised Officer on 1300 795 299. For advice about sampling and testing for African swine fever, contact the NSW Animal and Plant Health Laboratories *(see 'Contacts' tab)*.

To allow a definitive laboratory diagnosis, obtain a full range of samples.

The agent can be detected by qPCR and virus isolation and further characterised by PCR and gene sequencing. Serological tests include ELISA and immunofluorescence antibody test (IFAT).

If you can, **collect samples from 10 animals** (dead or alive). This may be a combination of post-mortems and blood/swab samples from sick pigs.

Collection container	Collect from live pigs	Collect from dead pigs
EDTA tube (purple top) — full	Blood (7-10ml/animal)	Blood (recently deceased animals only)
Plain tube (red or grey/red speckled top)	Blood for serology (min. 10ml)	
Swabs in viral transport media	Oral cavity, tonsils, nasal cavity	Oral cavity, tonsils, nasal cavity
Separate sterile collection containers (no media) for fresh samples* *(kept chilled at 4°C, not frozen)*		Tonsils, spleen, lymph nodes (gastrohepatic and mesenteric), lung, kidney, ileum (2g of each tissue)
Large collection container with 10% neutral buffered formalin		Tonsils, spleen, liver, lymph nodes, lung, kidney, ileum, heart, brain, lesions seen in any tissue†

* *Take tissue samples from affected pigs that have been killed and from pigs that have recently died. To minimise the risk of contamination, take tissue samples as aseptically as possible and without delay.*

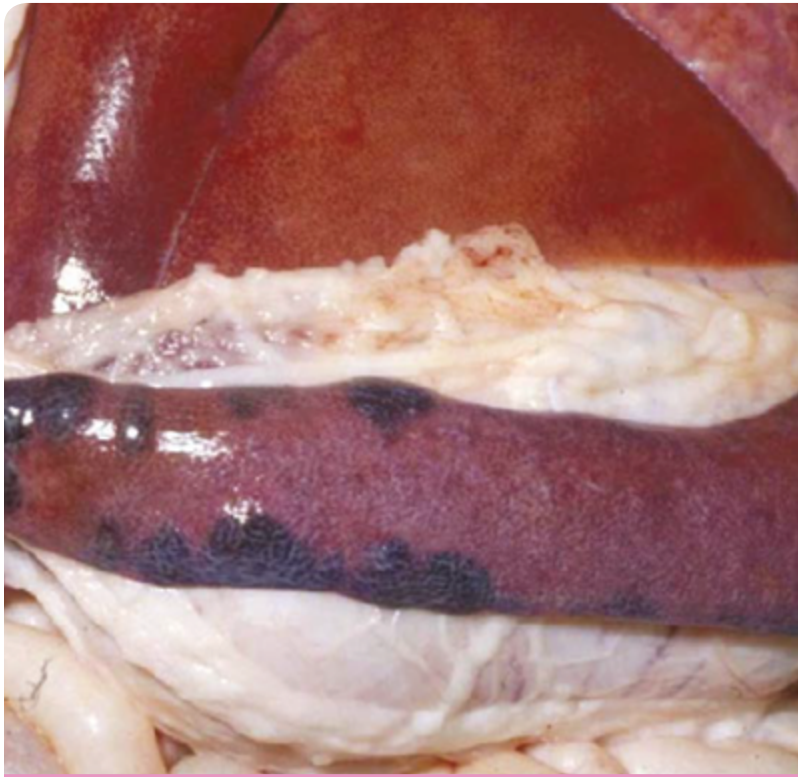
† *The fixed samples listed are a guide. To discuss your state or territory's requirements further, contact the laboratory directly.*

Forward the samples to the NSW Animal and Plant Health Laboratories at Elizabeth Macarthur Agricultural Institute (EMAI; *refer to the 'Bio controls & reporting' tab*). The laboratory will provide relevant samples to the national reference laboratory (the Australian Centre for Disease Preparedness in Geelong, Victoria) if required.

Differential diagnosis

It is not possible to differentiate African swine fever from classical swine fever by clinical or post-mortem examination. It is essential to send samples for laboratory examination.

- Other clinically indistinguishable diseases include:
- Porcine reproductive and respiratory syndrome
- Erysipelas
- Salmonellosis
- Aujeszky's disease
- Pasteurellosis
- Other septicaemic conditions.



Multiple coalescing, swollen, dark-red infarcts along the margins of the spleen

Image source: PIADC and CFSPH

Transmission of African swine fever

The epidemiology of African swine fever is variable and complex, with different epidemiological patterns of infection occurring in Africa, Europe and Asia.

Transmission depends on:

- The environment
- The pig production systems
- The presence/absence of competent vectors
- Human behaviours
- The presence/absence of feral pigs.

The primary method of transmission within herds is by direct contact.

Spread also occurs indirectly though the ingestion of contaminated material (e.g. food waste, garbage, feed).

Spread of infection between properties and areas may readily occur due to movement of infected pigs or contaminated vehicles, equipment, people or animal products.

The virus may remain viable for long periods in blood, faeces, secretions and tissues of infected pigs.

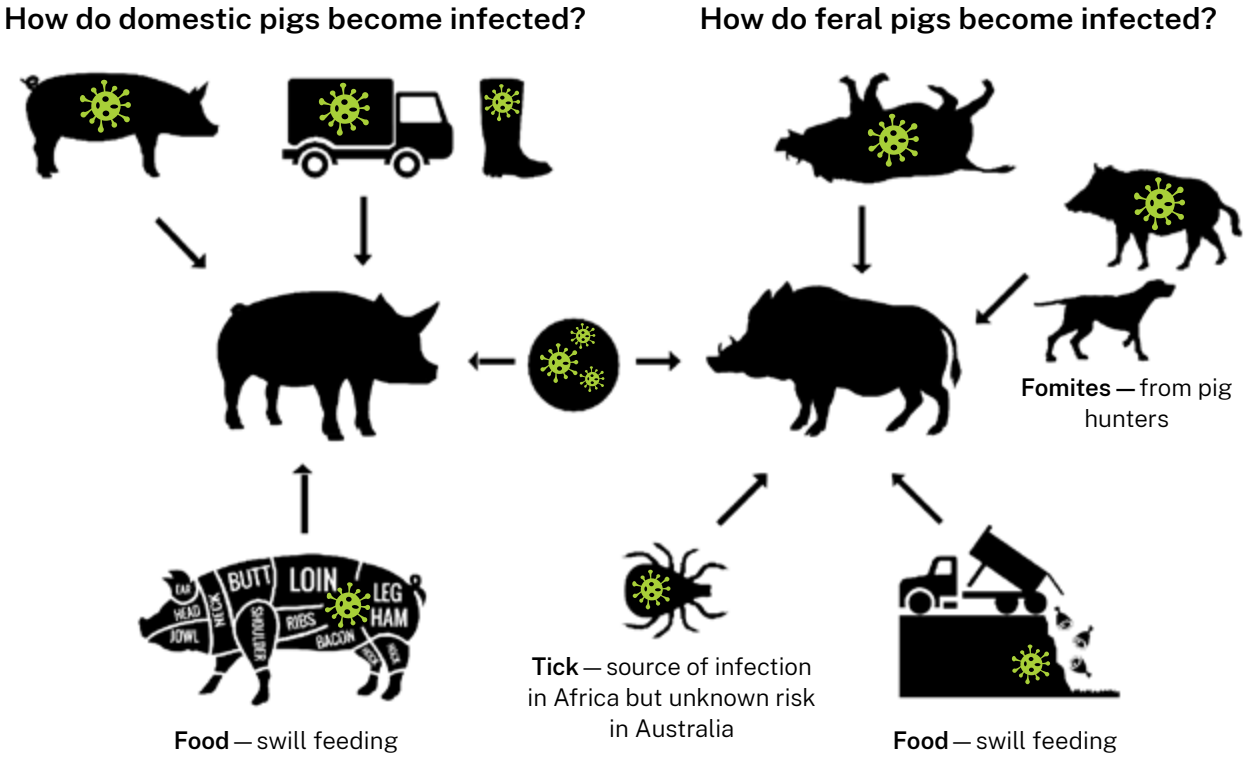
It is highly resistant to low temperatures and can survive at least 30 days in the environment (e.g. pig pens) and up to 300 days in some pork products.

Pigs that have recovered from either acute or chronic infections may become persistently infected, acting as virus carriers.

Ticks of the genus *Ornithodoros* are the only known natural arthropod hosts of the virus and act as reservoirs and biological vectors.

It is not fully understood whether soft ticks (such as kangaroo tick of the genus *Ornithodoros*) may contribute to the transmission of the virus in Australia. Work is continuing in this area.

Transmission of African swine fever *continued*



Lumpy skin disease

If you suspect **lumpy skin disease** in cattle, you **MUST** report it to the **Emergency Animal Disease Hotline** on **1800 675 888** or an Authorised Officer.

EMERGENCY ANIMAL DISEASE HOTLINE
1800 675 888

NSW GOVERNMENT

About lumpy skin disease (LSD)

Lumpy skin disease (LSD) is highly host-specific viral disease affecting cattle of all breeds and water buffalo. It does not affect other types of livestock or humans.

The incubation period is between 4 and 14 days however the World Organisation for Animal Health (WOAH) Terrestrial Animal Health Code describes the incubation period as 28 days.

LSD causes severe systemic disease with clinical signs ranging from inapparent to severe.

The main distinguishing feature of LSD is skin nodules scattered throughout the body, especially on the flanks, back and lower parts of the abdomen.

- Morbidity rates vary – ranging between 1% and 95%.
- Mortality rates up to 75% have been reported but 1-5% is more usual.

Host susceptibility, dose, and route of virus inoculation affect the severity of disease.

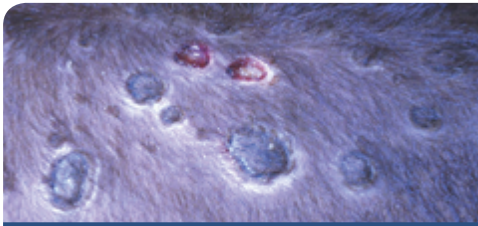
Bos taurus cattle are generally more susceptible than *Bos indicus* cattle.

Young calves often have more severe disease.

The bottom image shows the classical presentation with disseminated cutaneous papules.

LUMPY SKIN DISEASE IS A NOTIFIABLE DISEASE.
In Australia, if you suspect lumpy skin disease in cattle, you **MUST** report it immediately to the **Emergency Animal Disease Hotline** on **1800 675 888** or an Authorised Officer on 1300 795 299**.**

Bovine Muzzle with Papules



Skin nodules with necrotic centres

Disseminated cutaneous Papules

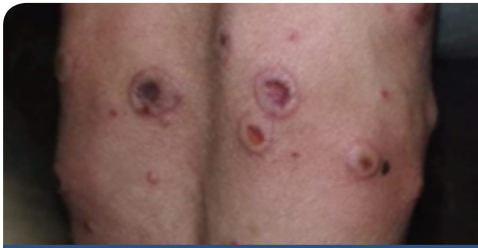
Top image source: Dr Massimo Scacchia; Centre, and bottom image source: Center for Food Security and Public Health (CFSPH) at Iowa State University, PIADC.

Clinical signs

Clinical signs of lumpy skin disease include:

- Fever
- Nasal and ocular discharges (these may occur before other signs)
  - Rhinitis and conjunctivitis can also be seen.
- Firm raised skin nodules up to 50mm in diameter develop around the head, neck, genitals and limbs.
  - Nodules can develop on any part of the body.
  - Skin nodules can vary from 1cm to 7cm and penetrate the full thickness of the skin.
  - Swollen skin nodules may separate from healthy skin and dry to and harden to form what is called a “sit-fast”
  - Lesions may also be found on the nose and the mucous membranes of the oral and nasal cavities
- Swelling of limbs, brisket, and genitals may occur
  - Sterility may occur in bulls
  - Abortion
- Lameness from inflammation and oedema of the legs
- Reluctance to move and eat
- Enlarged superficial lymph nodes
- Reduced milk production

Red Bos Indicus calf with lesions



Nodules on scrotum of an affected bull

Ruptured nodule

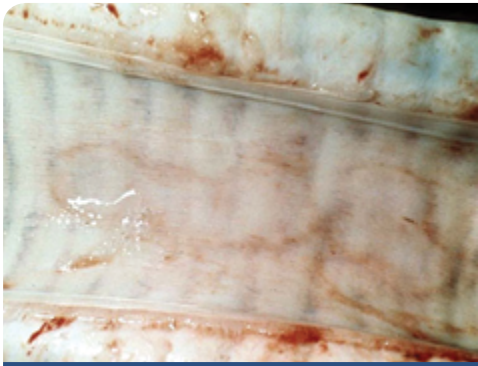
Image source: Dr Aziz Chowdhury

Post-mortem findings

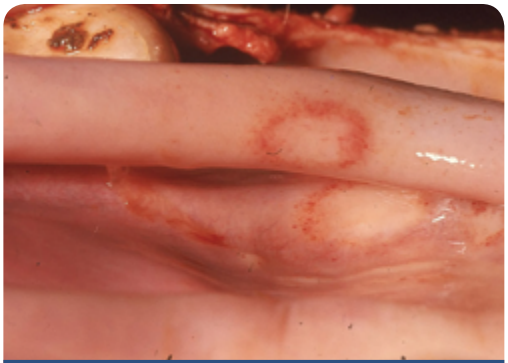
Typical post-mortem findings:

- Extensive greyish-pink skin nodules with caseous necrotic centres
- Similar nodules may be found in the:
  - nasopharynx
  - trachea
  - bronchi
  - lungs
  - rumen
  - abomasum renal cortex
  - testicle and
  - uterus
- Swollen, congested lymph nodes with petechial haemorrhages
- Bronchopneumonia may be present
- Synovitis may be seen with fibrin in the synovial fluid.

Samples: Collect fresh and fixed samples of affected tissues



Trachea, two coalescing mucosal macules have hyperaemic margins



Nasal turbinate, early pox lesions are slightly pale round foci rimmed by petechia

Lung, marked generalised interlobular oedema with a small cluster of red nodules on the left side

Image source PIADC and CFSPH

Sampling and laboratory testing

Ensure you report all suspect EADs to the **Emergency Animal Disease Hotline on 1800 675 888** or an Authorised Officer on 1300 795 299. For advice about sampling and testing for lumpy skin disease, contact the NSW Animal and Plant Health Laboratories *(see 'Contacts' tab)*.

To allow a definitive laboratory diagnosis, obtain a full range of samples including skin lesions, biopsies, scabs, scrapings, vesicular fluid, saliva and nasal swabs and blood. If you can, **collect serum from 10 animals** (live, clinically affected animals) and 10 in contact animals. Duplicate tissue specimens should be collected.

The agent can be detected by:

- PCR – using the Capripoxvirus – TaqMan Assay
- ELISA using the Capripox double antigen ELISA for the detection of antibodies.
- Electron microscopy and histology.

Collection container	Collect from live cattle	Collect from dead cattle
EDTA tube (purple top) — full	Blood from clinically affected and contact animals (7-10ml/animal)	Blood (recently deceased animals only)
Plain tube (red or grey/red speckled top)	Blood for serology	
Swabs in viral transport media	Oral, nasal, rectal, conjunctival, skin lesions	Oral, nasal, rectal, conjunctival, skin lesions
Separate sterile collection containers (no media) for fresh samples* *(kept chilled at 4°C, not frozen)*	Skin lesions, scabs, scrapings, biopsies, vesicle fluid (2g of each tissue)	Skin lesions and samples from affected organs
Collection containers with 10% neutral buffered formalin	Skin lesions, scabs, biopsies and samples from affected organs	Skin lesions and samples from affected organs

** Note: the best samples for detecting virus are skin nodules, scabs and crusts as these contain high amounts of LSD virus (LSD can be isolated from this material for 35 days and possibly longer).*

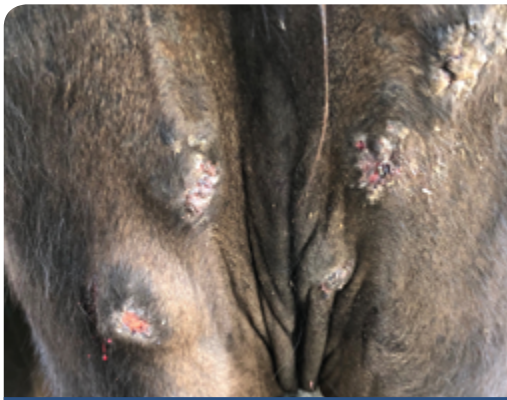
Forward the samples to the NSW Animal and Plant Health Laboratories at Elizabeth Macarthur Agricultural Institute (EMAI; *refer to the 'Bio controls & reporting' tab*). The laboratory will provide relevant samples to the national reference laboratory (the Australian Centre for Disease Preparedness in Geelong, Victoria) if required.

Differential diagnosis

LSD can appear similar to other diseases including:

- Rinderpest
- Screw-worm fly myiasis
- Cutaneous tuberculosis
- Bovine herpes virus 2 (pseudo-lumpy skin disease)
- Bovine papular stomatitis
- Dermatophilosis
- Dermatophytosis
- Demodicosis
- Insect and tick bites
- Ectoparasites
- Photosensitisation
- Skin allergies
- Bovine papilloma
- Pythiosis
- Bovine Ephemeral Fever

Insect bite allergic hypersensitivity



Infection “Pythiosis”

Source: Top image: Dr Ian Poe, bottom image: Dr Jill Kelly

Transmission of lumpy skin disease (LSD)

Lumpy skin disease (LSD) is a vector borne virus.

It is primarily spread by biting insects.

Insects such as mosquitoes, biting flies and possibly ticks mechanically transfer the virus.

It can also be spread through direct contact between animals via secretions and excretions.

Contaminated feed, water, vehicles and iatrogenic means (for example, repeated use of needles on different animals) can all spread the disease.

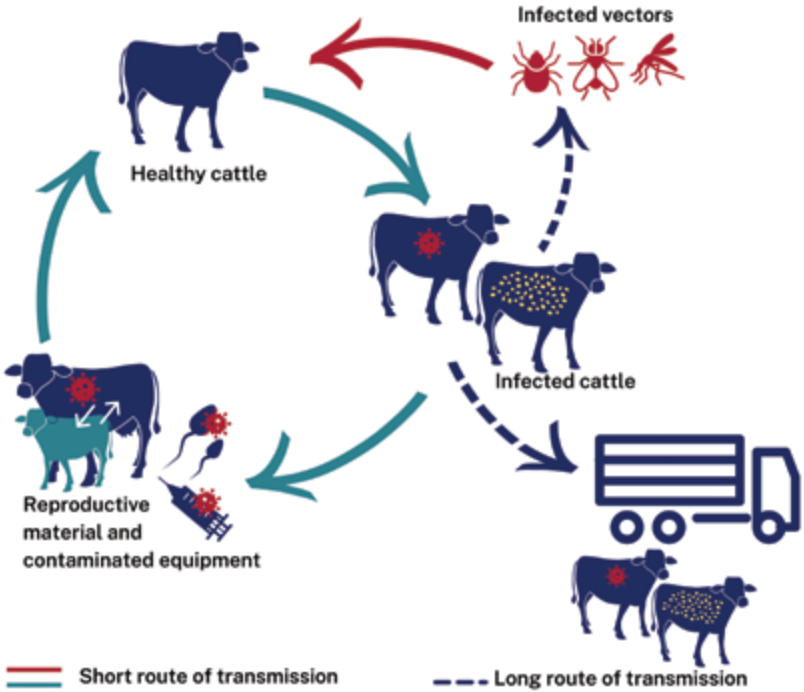
The virus may be shed in semen and may be present in milk of infected animals.

LSD does not cause chronic disease. It does not exhibit latency and recrudescence of disease does not occur.

Outbreaks of LSD are associated with high temperature and high humidity.

It is usually more prevalent during the wet summer months, especially in low-lying areas or near bodies of water, however, outbreaks can also occur during the dry season.

Lumpy Skin Disease: Modes of transmission



Avian Influenza

If you suspect **avian influenza** in poultry, you **MUST** report it to the **Emergency Animal Disease Hotline** on **1800 675 888** or an Authorised Officer.

EMERGENCY ANIMAL DISEASE HOTLINE
1800 675 888

NSW GOVERNMENT

About avian influenza (AI)

Avian influenza is a highly infectious viral disease, primarily of avian species. Humans are susceptible to infection with avian influenza viruses.

Avian influenza viruses are classified into two pathotypes - low pathogenic avian influenza (LPAI) and highly pathogenic avian influenza (HPAI).

Eight outbreaks of HPAI occurred in Australia between 1976 and 2020, most likely due to LPAI infection being passed from wild birds to commercial poultry, followed by mutation to HPAI.

Incubation periods are extremely variable. For the purposes of the World Organisation for Animal Health (WOAH) Terrestrial Animal Health Code, the incubation period at the flock-level for high pathogenicity avian influenza is 14 days.

Wild birds, especially waterfowl, are considered the natural host for the virus and usually carry it without showing any symptoms of the disease. Avian influenza (AI) can be spread by movements of infected birds (domestic or wild), through droppings and secretions of infected birds directly or through movement of contaminated objects, clothing or vehicles. Windborne spread from infected large flocks is also possible over short distances.

AVIAN INFLUENZA IS A NOTIFIABLE DISEASE.

In Australia, if you suspect avian influenza in poultry, you **MUST** report it immediately to the **Emergency Animal Disease Hotline** on **1800 675 888** or an Authorised Officer on 1300 795 299**.**

Oedema of head/combs/wattles

Oedema of combs and wattles

Top image source: Dr Eliz Braddon, bottom image source: Agriculture Victoria AgriBio Laboratory

Clinical signs

Clinical signs vary with the subtype and strain of avian influenza virus, the avian species infected, and the presence of other diseases.

Peracute form - HPAI (chickens and turkeys)

Birds may die suddenly without showing any clinical signs.

Acute form - HPAI

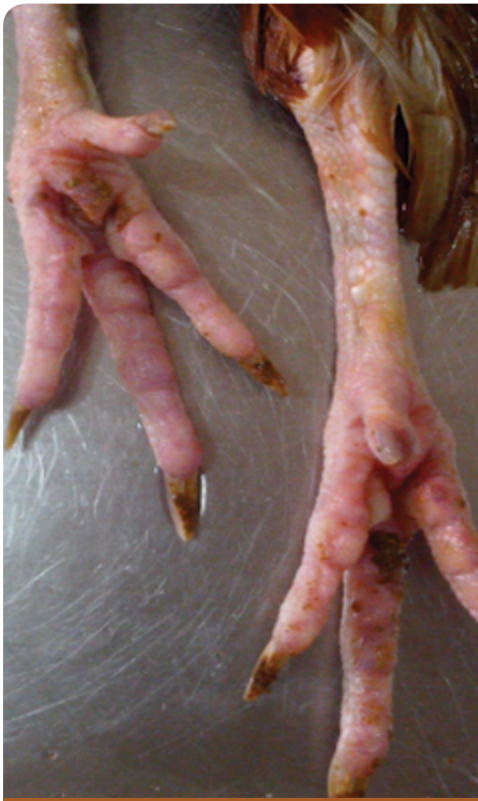
- Severe respiratory signs
- Cyanosis of combs/wattles/shanks
- Oedema of head/combs/wattles
- Nervous signs
- Egg drop syndrome
- Sudden decline in feed and/or water consumption
- Sudden appearance of pale shell eggs or eggs without shells

Subacute and chronic forms - LPAI

Inapparent to mild or severe respiratory disease in chickens and turkeys

- Loss of appetite
- Depression
- Misshapen eggs
- Ruffled feathers
- Mortality ranges from 3% (caged layers) to 15% (meat chickens)
- Subclinical infection in ducks

A chicken shows signs of the Highly Pathogenic Avian Influenza: Swelling of the tissue around the eyes and neck



Layer chicken, shank showing hyperaemia

Top image source: Central Diagnostic Laboratory, National Veterinary Research Institute, and University of Ibadan, Nigeria; Left image source: USDA

Post-mortem findings

Peracute form – HPAI

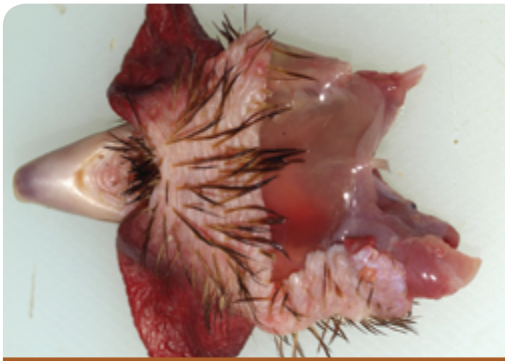
There may be no gross lesions. Chickens die 1-2 days post-infection.

Acute form – LPAI

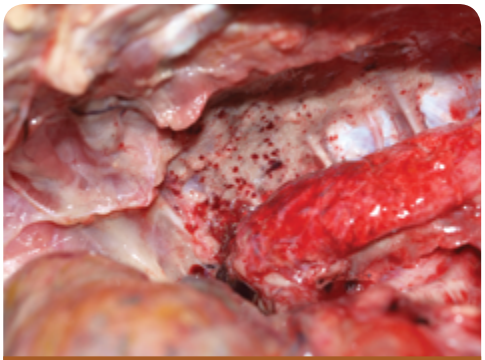
- Catarrhal, serofibrinous, mucopurulent or caseous inflammation in the sinuses
- Tracheal mucosa may be oedematous, with an exudate varying from serous to caseous
- Air sacs may be thickened and have a fibrinous to caseous exudate
- Catarrhal to fibrinous peritonitis
- Egg yolk peritonitis
- Catarrhal to fibrinous enteritis may be seen in the caecum and/or intestine (particularly in turkeys)

Acute form - HPAI

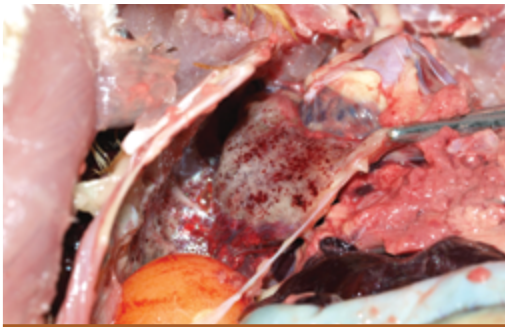
- Haemorrhagic, necrotic, congestive and transudative changes
- Oviducts and intestines often have severe haemorrhagic changes



Lower beak and submandibular soft tissue. Submandibular oedema. Congestion of wattles



Thoracic cage showing haemorrhages in adipose tissue of parietal pleura



Thoracic cage, showing Thorax. Haemorrhages in adipose tissue of visceral pleura (lung)

Source: Agriculture Victoria AgriBio Laboratory

Sampling and laboratory testing

Ensure you report all suspect EADs to the **Emergency Animal Disease Hotline on 1800 675 888** or an Authorised Officer on 1300 795 299. For advice about sampling and testing for avian influenza, contact the NSW Animal and Plant Health Laboratories *(see 'Contacts' tab)*.

The initial approach to avian influenza diagnosis is screening by real-time PCR , therefore, swabs in PBGS are important for rapid diagnosis.

If you can, **collect samples from at least 7** affected or recovered birds and provide at least **5 whole birds** for post-mortem examination.

Collection container	Collect from live birds	Collect from dead birds
Plain tube (red or grey/red speckled top)	Clotted blood/serum (2ml/bird)	
Swabs in PBGS, or placed in 2 ml sterile saline if PBGS is not available	Cloacal, oropharyngeal, tracheal	Cloacal, oropharyngeal, tracheal (recently dead or euthanased birds)
Separate sterile collection containers (no media) for fresh samples* *(kept chilled at 4°C, not frozen)*	Faeces	Proventriculus, pancreas, brain, intestine, caecal tonsil; trachea, lung; fresh faeces
Large collection container with 10% neutral buffered formalin		Tissues

* *To minimise the risk of contamination, take tissue samples as aseptically as possible and without delay.*

Dead birds should be double bagged and clearly identified as suspect avian influenza; and then packed securely.

Swabs should also be collected from dead birds on the farm before sending the carcasses and swabs to the laboratory for examination.

Forward the samples to the NSW Animal and Plant Health Laboratories at Elizabeth Macarthur Agricultural Institute (EMAI; *refer to the 'Bio controls & reporting' tab*). The laboratory will provide relevant samples to the national reference laboratory (the Australian Centre for Disease Preparedness in Geelong, Victoria) if required.

Differential diagnosis

Highly pathogenic avian influenza should be suspected whenever there is high or escalating mortality and sudden death (with no apparent known cause) with severe depression, loss of appetite, nervous signs, watery diarrhoea, severe respiratory signs, and/or a drastic drop in egg production.

Avian influenza in chickens is frequently indistinguishable on clinical and post-mortem examination from:

- Newcastle disease
- Infectious laryngotracheitis
- Erysipelas
- Fowl cholera
- Acute pasteurellosis
- Escherichia coli cellulitis of the head
- Mycoplasmosis
- Infectious coryza
- Aspergillosis
- Botulism

Newcastle disease include open mouth breathing with moderate swelling of the comb and wattles

Image source: USDA

Transmission of avian influenza

The most likely way avian influenza viruses initiate outbreaks is likely via wild birds contaminating water or food supplies for poultry, or directly contaminating range areas with faeces on free-range farms.

Subsequently, infection spreads through the movements of infected live birds, or faecally contaminated eggs, feed, equipment, materials, clothing, and footwear.

Infected backyard poultry and live bird markets can be a source of infection for commercial poultry.

In past outbreaks, dissemination of avian influenza virus between flocks has been primarily attributed to poor biosecurity, involving:

- Movement of infected birds (including vaccinated birds)
- Live bird markets (movement of birds, contaminated crates and vehicles)
- Human-associated movements, such as transporting food, personnel, equipment and vehicles out of premises that are contaminated with infected faeces or respiratory secretions
- Centralised egg handling facilities and equipment, particularly shared use of egg trays and fillers
- Depopulation activities that infect nearby properties
- Use of dead bird pick-up or waste collection centres by people from different premises

African horse sickness

If you suspect **African horse sickness** in an equid, you **MUST** report it to the **Emergency Animal Disease Hotline** on **1800 675 888** or an Authorised Officer.

EMERGENCY ANIMAL DISEASE HOTLINE
1800 675 888

NSW GOVERNMENT

About African horse sickness (AHS)

African horse sickness (AHS) is a highly pathogenic arbovirus spread by biting midges of the *Culicoides* genus. It has the potential to cause severe, often fatal, circulatory, and respiratory disease in horses. African horse sickness is not present in Australia.

AHS virus is a double stranded RNA virus belonging to the family *Reoviridae*, genus *Orbivirus*. There are nine serotypes and it is morphologically similar to Bluetongue virus.

Horses are most severely affected, however all equine species are susceptible, including donkeys, mules, and zebra. Disease with mortality has been observed in dogs following ingestion of infected horse meat.

Seroconversion has also been observed in camels, however there is no evidence to suggest camels contribute to the persistence and spread of the virus.

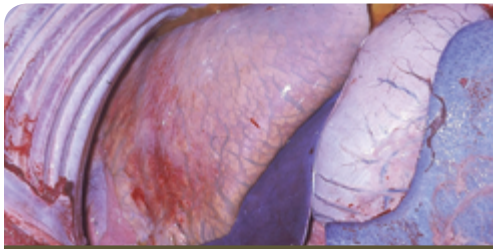
AHS virus can survive a few hours in carcasses but is readily inactivated once the carcass pH falls below 6.0 as part of the normal decomposition process.

While the incubation period is usually 3-14 days, the World Organisation for Animal Health (WOAH) Terrestrial Animal Health Code, reports an infective period of 40 days.

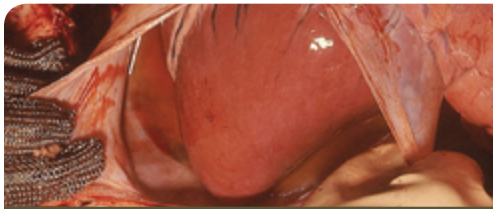
AFRICAN HORSE SICKNESS IS A NOTIFIABLE DISEASE.

In Australia, if you suspect African horse sickness in horses, you **MUST** report it immediately to the **Emergency Animal Disease Hotline** on **1800 675 888** or an Authorised Officer on 1300 795 299.

Abundant froth draining from the nostrils



Severe interlobular oedema of the lung



Pericardial sac contains excessive, slightly turbid straw-coloured fluid (hydropericardium)

Image source: PIADC

Clinical signs

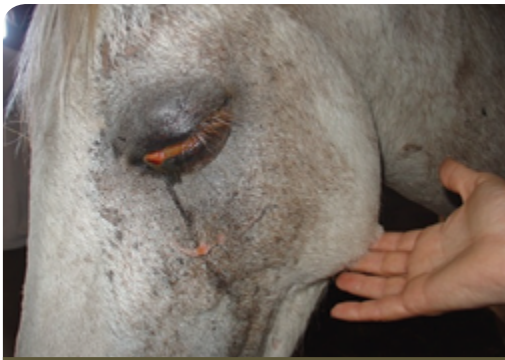
Naïve horses almost always develop severe disease, displaying a range of cardiovascular and/or respiratory signs. In contrast, most infected zebras and some donkeys remain asymptomatic.

There are four recognised clinical presentations of AHS:

1. Horse sickness fever: occurs in horses previously exposed to the infecting serotype, or in naturally resistant equids such as the African donkey or zebra. Clinical signs include mild fever, malaise, and mild supraorbital fossa oedema. Mortalities are uncommon.
2. The cardiac form: horses present with a fever of 39-41°C and subcutaneous oedema affecting the supraorbital fossa, neck, chest, and shoulders. The mortality rate is 50%.
3. The pulmonary form: horses are markedly depressed, have a fever >40°C and are severely dyspnoeic. The mortality rate is 95% with death occurring within 7 days of displaying clinical signs.
4. The mixed form: the most common presentation. It is a combination of cardiac and pulmonary clinical signs including fever, oedema, depression, and moderate dyspnoea with a mortality rate of 70-80%.

- Viraemia lasts 4-8 days (maximum of 21) in horses, 4 weeks in donkeys and 6 weeks in zebra. This prolonged period of viraemia in donkeys and zebra contributes to their success as maintenance hosts.
- In rare cases of recovery, horses develop antibodies against the infecting serotype providing a degree of immunity to reinfection with that serotype.

Pulmonary form: frothy, blood-tinged fluid from the nostril



Mixed form: conjunctivae and periorbital swelling

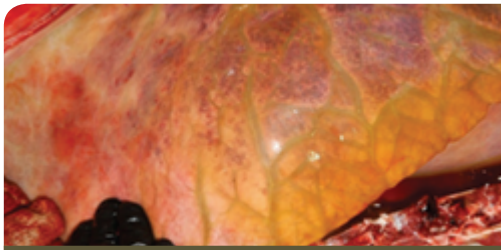
Image source: Dr Camilla Weyer, MSD

Post-mortem findings

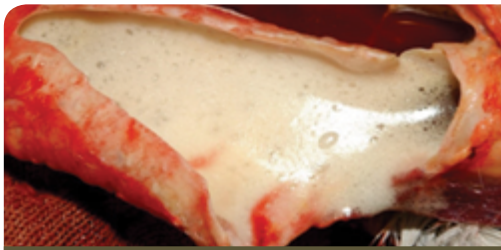
The post-mortem lesions vary depending on the disease form. In the pulmonary form, lesions include interlobular oedema of the lungs, hydrothorax, hydropericardium, frothy discharge within the trachea, oedema of the lymph nodes, and petechial haemorrhage on serosal surfaces. Occasionally congestion in the renal cortex and oedematous infiltration around the aorta and trachea may be seen.

Common lesions in the cardiac form include hydropericardium; petechial to ecchymotic haemorrhages of the epi-and endocardium; yellow gelatinous infiltrate of the fascia of the head, neck, and shoulders; and occasionally petechial haemorrhages of the gastrointestinal serosa.

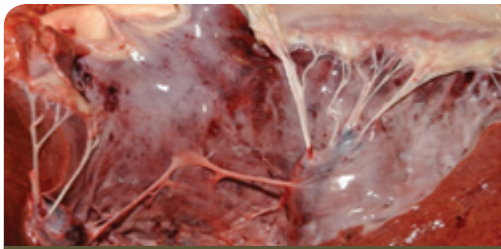
Post-mortem findings for the mixed form are a combination of the pulmonary and cardiac lesions.



Interlobular oedema of the lungs



Intra-tracheal froth



Petechial haemorrhages in horse heart

Image source: PIADC

Sampling and laboratory testing

Ensure you report all suspect EADs to the **Emergency Animal Disease Hotline on 1800 675 888** or an Authorised Officer on 1300 795 299. For advice about sampling and testing for African horse sickness, contact the NSW Animal and Plant Health Laboratories *(see 'Contacts' tab)*.

To allow a definitive laboratory diagnosis, obtain a full range of samples.

The agent can be detected by qPCR and virus isolation and further characterised by PCR and gene sequencing. Serological tests include ELISA and immunofluorescence antibody test (IFAT).

If you can, **collect samples from 10 animals (dead or alive)**. This may be a combination of post-mortems and blood/swab samples from sick horses.

WARNING: symptoms are also highly suspicious of Hendra, a serious zoonotic risk. Unless 100% sure Hendra can be excluded, do not proceed with post-mortem collection of tissue samples. Blood collection still possible in most cases with minimal invasive technique. Recommend full PPE is worn for taking samples.

Collection container	Collect from live horses	Collect from dead horses
EDTA tube (purple top) — full	Blood (7-10ml/animal)	
Plain tube (red or grey/red speckled top)	Blood for serology	
Separate sterile collection containers (no media) for fresh samples* *(kept chilled at 4°C, not frozen)*		Spleen, lymph nodes, lung

** To minimise the risk of contamination, take tissue samples as aseptically as possible and without delay.*
† The fixed samples listed are a guide. To discuss your state or territory's requirements further, contact the laboratory directly

Forward the samples to the NSW Animal and Plant Health Laboratories at Elizabeth Macarthur Agricultural Institute (EMAI; *refer to the 'Bio controls & reporting' tab*). The laboratory will provide relevant samples to the national reference laboratory (the Australian Centre for Disease Preparedness in Geelong, Victoria) if required.

Differential diagnosis

African horse sickness should be on the differential list for horses presenting with fever along with severe respiratory and cardiovascular symptoms, as well as sudden death.

Laboratory testing is required for definitive diagnosis.

AHS can appear similar to other diseases including:

- Hendra virus,
- Piroplasmosis, and
- Equine viral arteritis.

NOTE: Hendra virus (HeV) has serious zoonotic potential. Extreme caution must be taken when handling horses with clinical signs consistent with HeV, including, African horse sickness. Full PPE is recommended when handling and sampling horses with consistent signs.

Equine viral arteritis, lacrimation (tearing from one or both eyes)

Image source: PJ Timoney, University of Kentucky. USA

Transmission of African horse sickness

African horse sickness virus is transmitted by biting midges of the *Culicoides* genus. The *Culicoides* midge ingests blood containing the virus from an infected horse. The virus then migrates to the salivary gland of the midge before being transmitted when the midge next feeds on another horse.

C. imicola is the only confirmed vector in Africa however *C. bolitinos* is strongly suspected to act as a competent vector. Although *C. imicola* and *C. bolitinos* are exotic to Australia there are several other *Culicoides* species endemic to Australia which could potentially serve as AHSV vectors. Of concern is *C. brevitarsis* which is a vector of Bluetongue virus and Akabane virus.

Although AHS virus has been demonstrated in equine semen and embryos, the significance of this is unclear. There are no records of transmission of disease by reproductive material.

Culicoides midge


Biosecurity
controls &
reporting

Sample packaging and transport

Send samples to the **NSW Animal and Plant Health Laboratories** *(see 'Contacts' tab for more information)*.

NSW DPI will pay for the cost of the courier and the laboratory testing for Emergency Animal Disease exclusions.

Submitting laboratory samples

Before submitting samples, contact the:

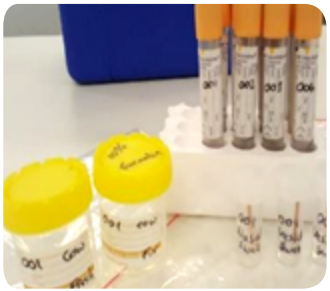
1. EAD Hotline on 1800 675 888 or an Authorised Officer on 1300 795 299
2. Laboratory staff at the NSW DPI Animal and Plant Health Laboratory (at EMAI) to advise samples are being submitted for EAD testing on 1800 675 623 or by email to laboratory.services@dpi.nsw.gov.au.

EAD Hotline and laboratory staff can assist with arranging a courier.

Further information on packaging of specimens is available in the NSW DPI Laboratory Services customer services page at http://www.dpi.nsw.gov.au/about-us/services/laboratory-services/veterinary/veterinary-test-list/collecting-and-submitting-samples-for-veterinary-testing

Packaging samples

- Ensure all samples are clearly labelled and cleaned prior to packing
- Samples for EAD exclusion may be packed as IATA 650 (Biological Substance Category B) UN 3373 as for routine diagnostic specimen submissions
  - small foam esky inside a cardboard box
  - include an ice-brick to keep samples cool but not frozen
  - double bag the samples and disinfect the sample bags
- All submissions for Zoonotic animal disease testing must have a clear warning note, e.g. 'Hendra exclusion' inside the esky and on top of the samples



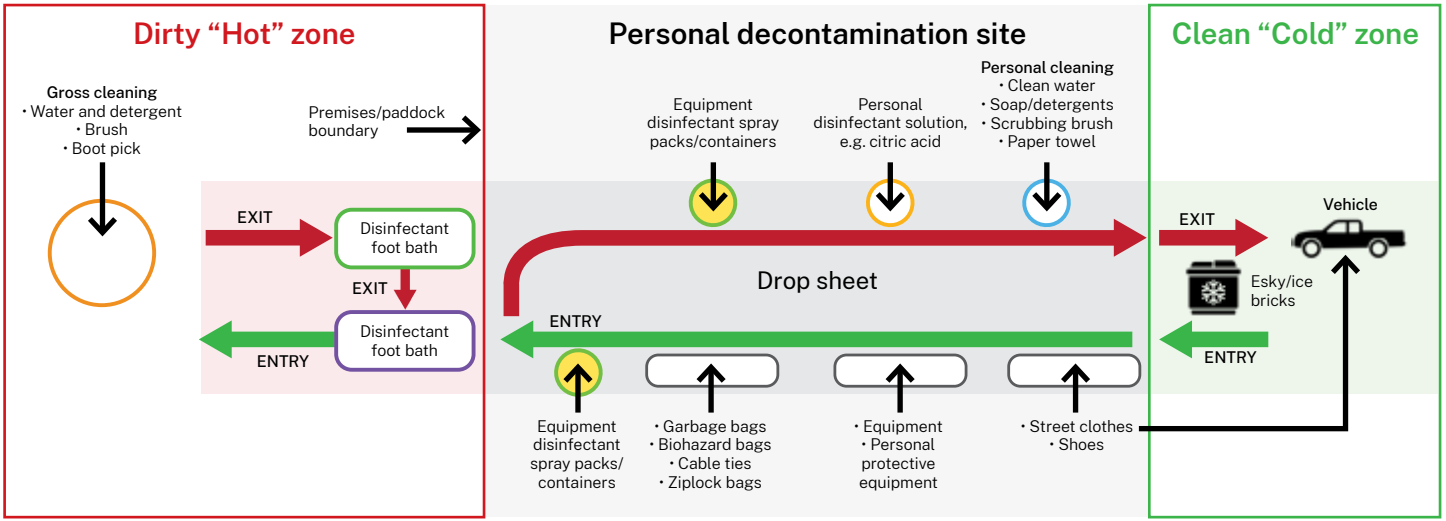
Personal biosecurity controls

If an EAD is suspected, always follow the appropriate personal biosecurity protocols when entering and exiting the premises. Before entering the premises, assess the biosecurity risk — in particular the risk of iatrogenic disease spread — and determine the most appropriate course of action. Consider the:

- Tasks at hand (e.g. clinical examination and sampling)
- Tools required (e.g. animal restraint, sedative and sampling equipment)
- Personal items required (e.g. mobile phone)
- Personal decontamination procedures necessary for biosecure entry and exit.

Establish and use a personal decontamination site at the periphery of the premises. This is essential to minimise the likelihood of unintended spread of the virus. A 'gold standard' site is detailed in the images on the right.

For more information on personal decontamination, see https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0007/249370/guide-personal-decontamination.pdf



Reporting and immediate measures

Any suspected an Emergency Animal Disease must be reported immediately to the **Emergency Animal Disease Hotline** on **1800 675 888** or an Authorised Officer on 1300 795 299.

Foot-and-mouth disease, **lumpy skin disease**, **African swine fever**, **avian influenza** and **African horse sickness** are notifiable diseases in Australia.

Collect as much relevant history, clinical information and epidemiological information as possible. This information will help inform likelihood and risk assessments and guide next steps.

Follow the personal biosecurity controls to 'come clean and go clean'. Take all appropriate steps to ensure vehicles, equipment, clothing and footwear are clean and free from pests and diseases.

The following enhanced biosecurity measures may be required to be applied:

- Immediately isolate affected animals and keep free-range (wild) animals away from the premises boundary.
- Depending on the size of the premises and nature of farming, inspect the premises or paddock boundary to ensure there are no breaches or points where suspect animals could escape, wander off or contact feral animals.
- Prevent all animals being moved to or from the premises.

NSW Department of Primary Industries Animal Biosecurity and/or Local Land Services District Veterinarians will provide further information and support in relation to managing the premises while laboratory testing is in progress to confirm or exclude the presence of an EAD.

If an EAD is confirmed, a range of biosecurity measures will be applied to contain and eradicate the disease on the premises.

- Prevent movement from the premises of material that has been in contact with suspect animals, including bedding, feed, equipment, clothing, footwear and vehicles.
- Prevent people from having unnecessary contact with suspect animals. If possible, place a 'No entry' sign on farm gates and other access points.
- Advise people who have been in contact with the suspect animals to avoid contact with other animals and to shower and change their clothing. Clothing and any equipment used must be decontaminated, taking special care to ensure footwear has no organic material on the soles.
- Ensure that someone will remain on the premises and remain contactable by phone.
- Warn people that they risk breaching their general biosecurity duty if they do not take adequate biosecurity precautions.

Australian control policy

An EAD would have a significant impact on animal health and production in Australia and contribute to wider economic impacts including those caused by a loss of access to overseas markets for our livestock products. It is vital that any suspicion of an EAD is immediately reported.

- The response policy would be determined by a number of factors including:
  - nature of the disease
  - aetiology
  - host range
  - incubation period
  - transmission pathways
  - availability of vaccination or treatment
- How early the outbreak is detected
- The extent of the outbreak at detection
- If wild animal populations are involved.

In most cases, the default policy is to control and eradicate the disease in the shortest possible time using a combination of strategies outlined in the disease specific Australian Veterinary Emergency Plan (AUSVETPLAN), which is available at https://animalhealthaustralia.com.au/ausvetplan/.

The agreed Australian response policy and strategies for its implementation include:

- The use of declared areas and premises classifications
- Recommended quarantine and movement controls over live animals, animal products and fomites in declared areas to minimise disease spread
- Vaccination or treatment
- Destruction and sanitary disposal of all affected animals on infected premises
- Decontamination of fomites to eliminate the virus
- Wild animal and vector control
- Public awareness and media campaign.
- Tracing and surveillance to identify the source and extent of infection
- Some or all of these strategies would be used dependent on the EAD detected.

Australian control policy *continued*

Keep prohibited food products out of Australia

The Australian Government Department of Agriculture is responsible for biosecurity at our international border. Passengers, mail and cargo are screened for potential pest and disease risks.

Existing biosecurity import controls for goods that pose a risk of introducing foot and mouth disease and African swine fever are very stringent, in accordance with Australia's appropriate level of protection.

All high-risk meat products are prohibited from entering Australia. These include all personal consignments of smallgoods, jerky and biltong, which can arrive with international passengers and via international mail.

A range of products and import pathways are closely monitored to identify and manage risks. Goods that do not meet Australia's import requirements are seized, and then exported or destroyed.

Illegal importation of virus-contaminated food is considered to be the most likely means by which the FMD and ASF viruses will be introduced to Australia.

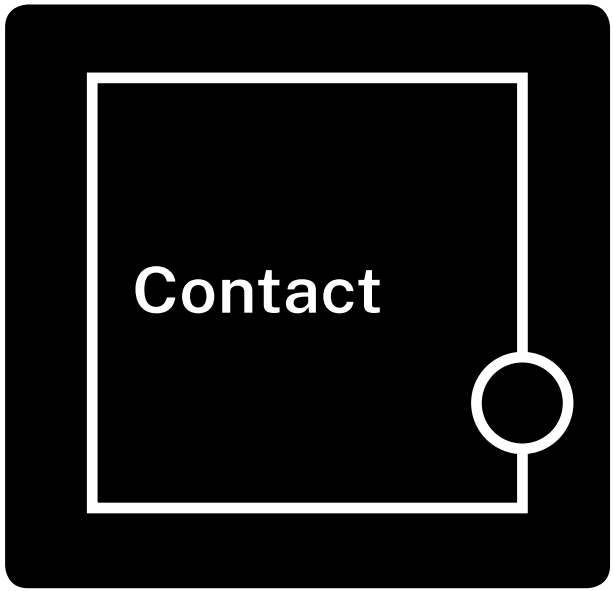
Do not feed prohibited pig feed (swill)

Prohibited pig feed (or swill) is food or food waste containing meat, meat products, some milk or milk products or anything that has been in contact with these items. Pigs must not be fed swill because the FMD and ASF viruses may remain viable in food after some forms of chilling, freezing or inadequate cooking.

Swill feeding is illegal in all states and territories of Australia.

Pig owners should implement strong on-farm biosecurity practices, including limiting contact between domestic and feral pigs. Visit https://www.dpi.nsw.gov.au/animals-and-livestock/pigs/pig-nutrition/swill-feeding for more information.

State and territory laboratory contact details



New South Wales / Australian Capital Territory

NSW Animal and Plant Health Laboratories

Phone: 1800 675 623

Email: laboratory.services@dpi.nsw.gov.au

Website: https://www.dpi.nsw.gov.au/about-us/services/laboratory-services/veterinary

Delivery address:
Elizabeth Macarthur Agricultural Institute (EMAI)
Woodbridge Road
MENANGLE NSW 2568

For veterinarians practising in or near border towns in New South Wales:

Queensland

Biosecurity Sciences Laboratory

Phone: (07) 3708 8762

Email: bslclo@daf.qld.gov.au

Website: https://www.business.qld.gov.au
(search for 'Biosecurity Sciences Laboratory')

Delivery address:
Block 12, Health and Food Sciences Precinct
39 Kessels Road
COOPERS PLAINS QLD 4108

Victoria

AgriBio — Veterinary Diagnostic Services

Phone: (03) 9032 7515

Email: vet.diagnostics@agriculture.vic.gov.au

Website: agriculture.vic.gov.au
(search for 'Veterinary Diagnostic Services')

Delivery address:
5 Ring Road
La Trobe University Campus
BUNDOORA VIC 3083

Veterinary EAD training

Animal Health Australia EAD training courses

Animal Health Australia (AHA) hosts a variety of online courses related to emergency animal disease (EAD) preparedness, arrangements and biosecurity on its eLearning platform: https://aha.canopihr.com.au/. While some of these courses have been developed by AHA, some have also been developed by AHA's member organisations. Training courses include:

- EAD foundation course
- FMD awareness – Protecting your livelihood and community
- FMD training for veterinarians and paraprofessionals
- African swine fever (ASF) prevention and early detection
- Work health and safety induction in a biosecurity emergency response

For more information:
https://animalhealthaustralia.com.au/online-training-courses/

EU FMD training courses

The EuFMD provides training courses that aim to build capacity in emergency preparedness for incursions of FMD into free countries. In addition, training aims to equip veterinary services in countries not currently FMD free with the skills needed for progressive control of the disease.

For more information:
https://www.fao.org/eufmd/training/en/

NSW DPI EMtrain courses

Providing training and exercises for NSW Department of Primary Industries (DPI), Local Land Services (LLS) and our partners, including veterinarians when responding to biosecurity emergencies and where agriculture or animals are affected by natural disasters and other emergencies.

https://www.dpi.nsw.gov.au/emergencies/emergency/management/training.

If you would like to take part in emergency responses, you should also complete these modules:

- Foundation courses:
  - Working in Agricultural emergencies
  - Information and communication management
  - Induction into DPI response
- Personal decontamination and protective equipment
- Veterinarians, hobby farmers and backyard livestock

Resilience NSW – Emergency management courses

Resilience NSW courses focus on Emergency Management, Operation Centre Concepts, Disaster Recovery, Emergency Risk Management and provide accredited and non-accredited, available in online, classroom, and blended learning formats.

For more information:
https://www.emtraining.nsw.gov.au/

More information

www.dpi.nsw.gov.au/biosecurity/animal

If you suspect an emergency animal disease in any animal, you **MUST** report it to the **Emergency Animal Disease Hotline** on **1800 675 888** or an Authorised Officer.