



# Equine neurological diseases of significance

A guide for  
veterinarians



If you suspect an emergency animal disease,  
you **MUST** report it immediately to the **Emergency  
Animal Disease Hotline** on **1800 675 888**  
or an Authorised Officer on 1300 795 299.

EMERGENCY ANIMAL  
DISEASE HOTLINE  
**1800 675 888**





Early detection and reporting of notifiable disease is vital to minimise the impacts of an outbreak. Veterinarians in New South Wales are at the forefront of disease surveillance.

Veterinarians attending horses showing neurological signs face significant and unique challenges relating to diagnostics, safety, risk assessment, and management of owner expectations. In NSW, notifiable and emergency animal diseases, such as Hendra virus, must be included in your differential diagnoses of these cases. Notifiable diseases require consideration of reporting requirements, management and zoonotic risk.

This guide has been developed to support you in conducting a disease investigation when presented with a horse showing neurological signs. It provides information about differential diagnoses of significance, including notifiable diseases in NSW, personal protective equipment, sampling and testing, packaging and reporting of notifiable diseases as prescribed under the *Biosecurity Act 2015*.

## SEE. REPORT. PROTECT.

### **Dr Jo Coombe**

Chief Veterinary Officer  
NSW Department of Primary Industries



## Differential diagnoses

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# Neurological disease – differential diagnoses

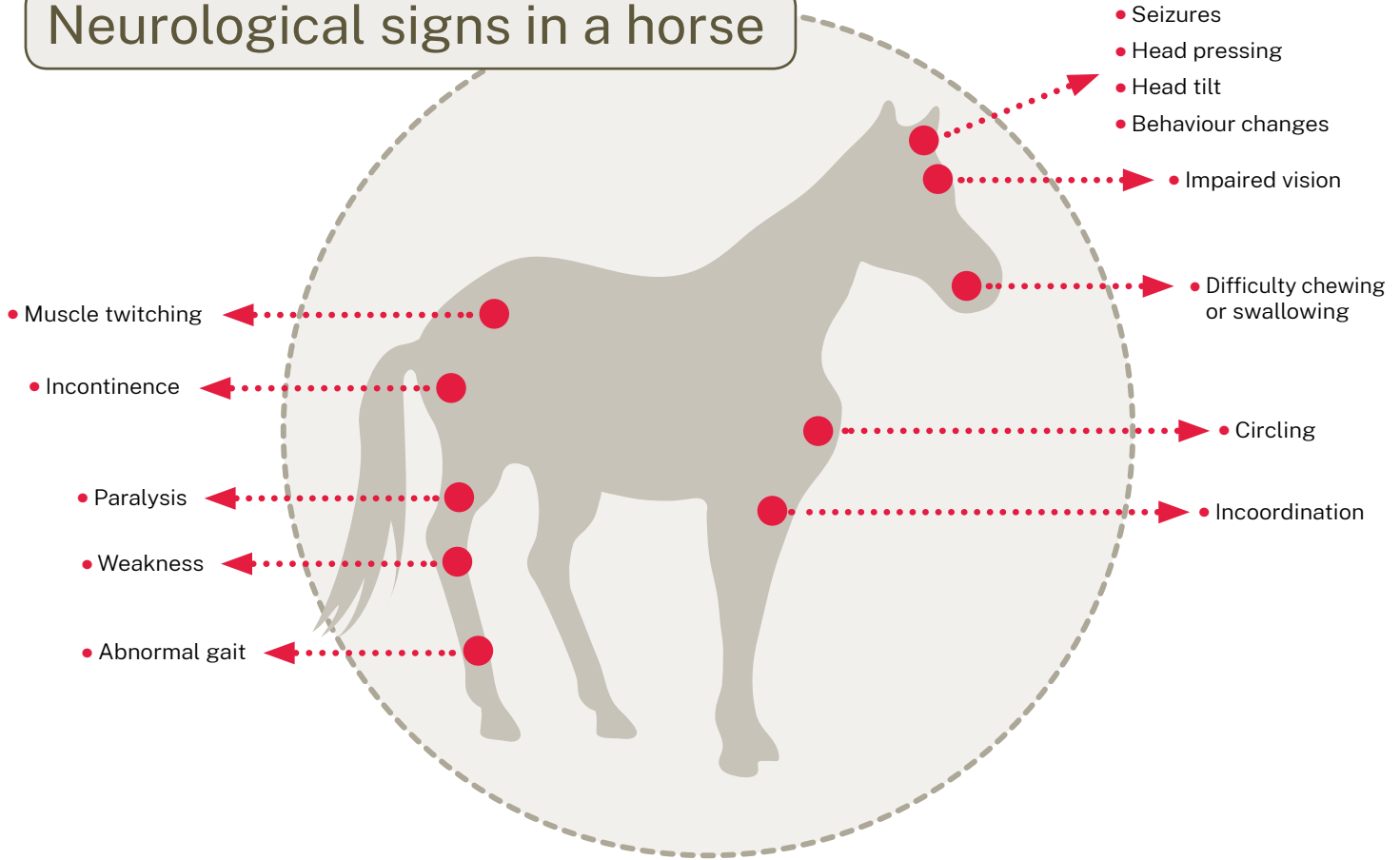
Differential diagnoses for horses showing neurological signs, and their classification under the *NSW Biosecurity Act 2015* are listed below:

<b>SCHEDULE 2</b> NOTIFY IMMEDIATELY (Prohibited Matter)	<b>SCHEDULE 1</b> NOTIFY WITHIN ONE DAY	<b>OTHER</b> NOT NOTIFIABLE IN NSW
* <b>Hendra virus</b>	* <b>West Nile virus infection</b> – clinical	<b>Murray Valley encephalitis</b>
* <b>Japanese encephalitis</b>		<b>Listeriosis</b> ( <i>Listeria monocytogenes</i> )
* Equine herpes virus 1 (neurological strain)		Tetanus ( <i>C. tetani</i> )
* <b>Australian bat lyssavirus</b> (clinical disease in animals other than bats)		Botulism ( <i>C. botulinum</i> )
* <b>Equine encephalomyelitis</b> (Eastern, Western and Venezuelan)		Trauma
* Surra ( <i>Trypanosoma evansi</i> )		Wobbler syndrome (Cervical static stenosis or cervical vertebral instability)
* <b>Rabies</b>		Plant toxicosis (such as stringhalt)
		Lead toxicosis
		Snake envenomation
		Paralysis tick
		Equine protozoal myeloencephalitis
		Genetic conditions

Diseases in **bold** are known zoonotic diseases

Diseases with \* are nationally notifiable diseases

# Neurological signs in a horse





Hendra  
virus

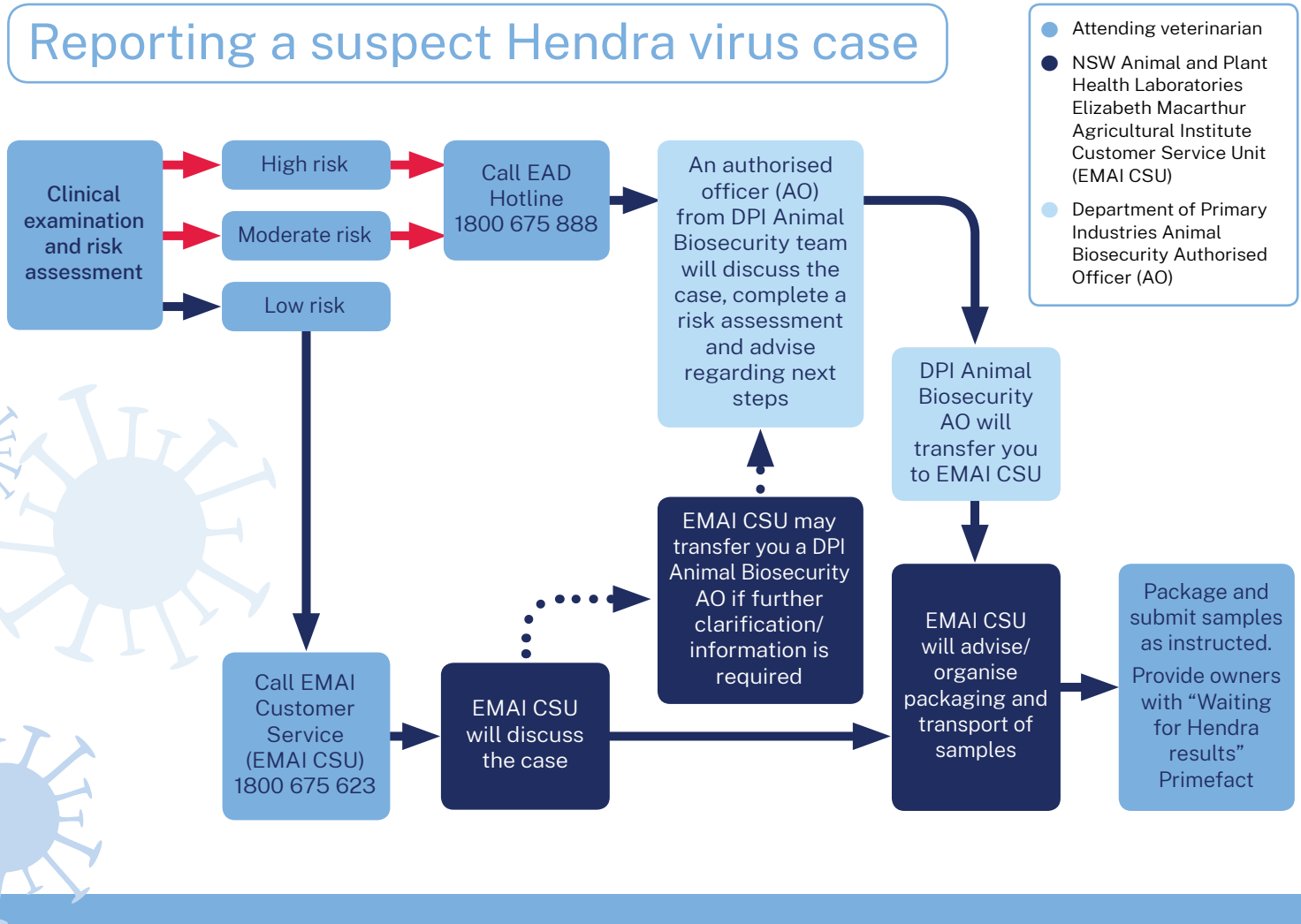
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# Reporting a suspect Hendra virus case



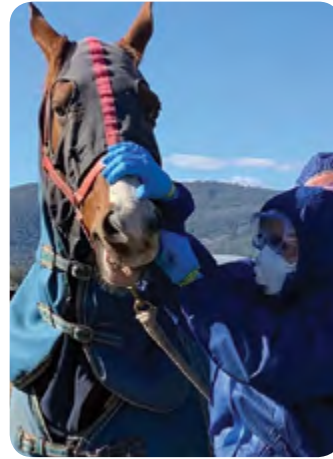
## About Hendra virus

Hendra virus is carried by flying foxes (fruit bats) that inhabit Australia, Papua New Guinea, and surrounding islands. Flying foxes appear to be unaffected by the virus.

Hendra virus is a zoonotic agent and can cause serious illness and death in humans and horses. Horses, dogs, and humans can be naturally infected with Hendra virus. Infected dogs have remained clinically normal. Clinical disease due to Hendra virus infection has only been recognised in Australia.

All known Hendra virus cases have predominantly occurred in Queensland or northern NSW and east of the Great Dividing Range. Cases have, however, occurred as far south as Newcastle.

Shedding of Hendra virus by flying foxes shows a strong winter seasonality in NSW with spillover events occurring between May and October. Incidents are sporadic but sometimes occur in clusters associated with periods of feed shortages and cold stress for flying foxes (see 'Flying fox ecology').



Hendra virus is very fragile. It is easily killed by soap or detergents, heat, and by desiccation. It may survive in the environment several hours to several days depending on environmental conditions. Survival is longer in cool, moist conditions where pH is close to neutral.

*Top left – Vets sampling for Hendra virus (NSW DPI),  
Top right – Grey headed flying fox (Shona Lorigan, DPIE)*



### **HENDRA VIRUS IS A NOTIFIABLE DISEASE.**

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



# Clinical signs in horses

Hendra virus can cause a wide range of clinical signs in horses, these are not specific and may vary.

Veterinarians should consider Hendra virus in any unvaccinated, sick horse where the cause of illness is unknown and particularly where there is rapid onset and deterioration associated with neurological and/or respiratory signs, or sudden death.

## The following signs have been associated with Hendra virus cases:

- Neurological signs
  - » Ataxia (incoordination), head pressing, muscle twitching, altered consciousness, aimless walking, circling, apparent blindness, urinary incontinence
- Respiratory signs
  - » Dyspnoea (laboured breathing)
  - » Tachypnoea (increased respiratory rate)
  - » White or blood-tinged frothy discharge from the mouth and nostrils particularly in terminal stages
- Recumbency (unable to stand)
- Pyrexia (fever  $>38.5^{\circ}\text{C}$ )
- Discomfort/weight shifting between legs that may mimic colic
- Depression
- Colic (rolling and sweating with absent gut sounds)
- Abnormal mucous membranes

***Not all these signs will be found in any one infected horse***

## African horse sickness

African horse sickness virus (AHSV) is a highly pathogenic arbovirus spread by biting midges of the *Culicoides* genus. It frequently causes severe, usually fatal, circulatory and respiratory disease in horses.

AHSV is an emergency animal disease that is not present in Australia.

While it does not usually present with neurological clinical signs, AHSV should always be considered as a differential to sudden deaths and respiratory signs in horses.



Above: Frothy, blood-tinged fluid from the nostril. (Dr Camilla Weyer, MSD)

# Hendra risk factors

Risk factors to consider when assessing a suspect Hendra virus case:



## Time of year

>95% cases of Hendra virus in horses in Australia have occurred between May and October



## Geographic location of horse



## Hendra virus vaccination history

All cases of Hendra virus in horses have occurred in horses that were not vaccinated



## Presence of flowering or fruiting trees



## Presence of flying foxes

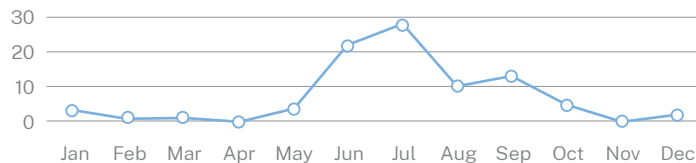
- Known roosts in the locality increases spill-over risk
- Roosting, feeding or breeding activity



## Feed and water

- Stabled overnight or grazing 24/7
- Location of food and water relative flying foxes and/or fruiting/flowering trees

Hendra virus cases in horses in Australia by month 1994-2023



## Spatial distribution of flying fox roosts in Australia

Flying fox roosts vary every year, both in the population and in the prevalence of Hendra Virus infection.

Scan the QR code to find the interactive flying fox web viewer



- Black flying fox
- Spectacled flying fox
- Grey-headed flying fox
- Little-Red flying fox

Source: Top - Hendra virus cases in horses in Australia by month, Left: Spatial distribution of flying fox roosts in Australia

# Sampling and laboratory testing

Hendra virus has the potential to be a serious zoonotic disease. Rigorous biosecurity and safety measures are required. Careful, safe work practices and the proper use of personal protective equipment (PPE) are required to manage potential exposure to you and your clients.



Source: DPI

## Appropriate PPE includes:

- Splash-proof overalls
- Long sleeves to prevent contamination of skin where there may be cuts and abrasions
- Cotton or disposable overalls with impervious or splash-proof apron
- Impervious boots
- Double gloves
- Face shield or safety glasses
- P2 particulate respirator mask to prevent inhalation of aerosols

**Note:** People who have beards require specialised respiratory protection with full face shields and filtered air supplied by electric fans powered by portable power units.

Scan the QR code for information on PPE and decontamination procedures



## Sampling and laboratory testing *cont.*

If you suspect Hendra virus, contact the Emergency Animal Disease Hotline on 1800 675 888 or NSW Animal and Plant Health Laboratories at Elizabeth Macarthur Agriculture Institute (EMAI) to notify the submission of samples for testing. A risk assessment will be performed by NSW DPI staff to evaluate the urgency of testing.

Using a point of care test to test for Hendra virus is prohibited in NSW. A point of care test for Hendra virus can only be conducted under an exemption order or prohibited matter permit authorised by the Chief Veterinary Officer.

**WARNING:** Hendra virus is a serious zoonotic risk. Do not undertake invasive procedures or necropsy. Blood collection is possible in most cases with minimal invasive technique. Full PPE must be worn for taking samples.

Test	Sample(s) required	Days of the week test is conducted	Turnaround time <sup>1</sup>
Hendra virus real time PCR	EDTA blood (purple top tube) and swabs(nasal, ocular, vaginal, rectal) in PBGS, Clotted blood (red top tube)	According to need <sup>2</sup>	Same day to 48 hours <sup>3</sup>
Hendra virus antibody ELISA	Serum from clotted blood (red top tube)	Batch tested weekly	Up to 7 days

<sup>1</sup> Turnaround times are provided as a guide only. For specific information about your submission please contact EMAI Customer Service on 1800 675 623.

<sup>2</sup> Prior approval of delivery and testing on Saturday is required. Please contact Customer Service on 1800 675 623 to seek approval.

<sup>3</sup> Turnaround time is dependent on urgency.

(See EMAI in the Contacts tab).



- Pack as IATA 650 category B, biological substances UN 3373 (as for routine diagnostic specimen submissions)
  - » Double bag the samples
  - » Pack the small foam Esky inside a cardboard box. Include an ice-brick to keep samples cool but not frozen
- All submissions must have a **clear warning note, e.g. 'Hendra exclusion' inside the Esky** and on top of the samples. Do not record this on the outside packaging or on the consignment note.



# Transmission of Hendra virus

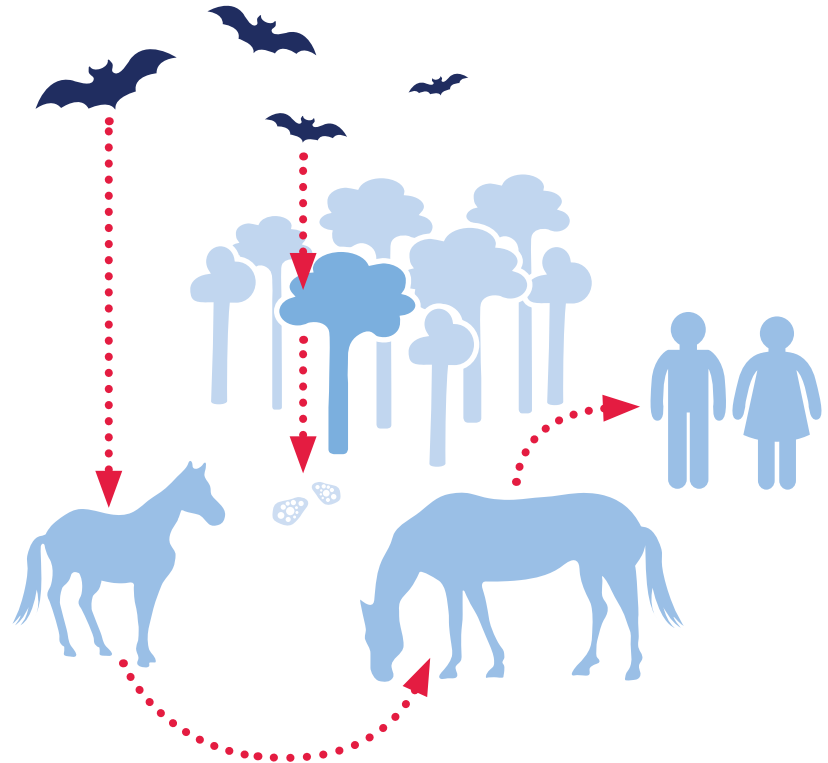
Hendra virus transmission from a flying fox to a horse most likely occurs through contact with material contaminated with infected flying fox urine, saliva, fluids, or any other excretions.

Hendra virus may also spread from horse-to-horse through contact with infectious body fluids. Transmission of Hendra virus from horse to horse is uncommon but has occurred among horses in close contact, including some horses in paddock situations. Horse-to-horse transmission is more likely between stabled horses.

Human cases of Hendra virus have included infection via very close contact with respiratory secretions (e.g. mucus) and/or blood from an infected horse.

There is no evidence of direct transmission of Hendra virus infection from flying foxes to humans.

Transmission by fomites (such as contaminated tack) cannot be excluded, however the virus is thought to survive for only a short time in the environment and is readily inactivated by detergents and disinfectants.



# Flying fox ecology

Flying fox ecology and Hendra virus spillover events are closely linked. Australia has four species of flying fox – the spectacled flying fox, the little red flying fox, the black flying fox and the grey headed flying fox, all with varying ranges across northern and eastern Australia.

Reduced availability of winter flowering plant/tree species has resulted in changes in flying fox range (and behaviour), to seek out alternative food sources. During periods of food shortage flying foxes will search for food in peri-urban and agricultural areas, increasing the likelihood of contact with horses.

All species of flying fox can carry Hendra virus. Excretion in urine has only been confirmed in black, spectacled and grey headed (Hendra virus variant HeV-g2) flying foxes.

Climate patterns and local seasonality can be used to predict likely feed shortages and therefore the increased risk of spillover events. To date, all spillover events in NSW have occurred between May and October.

*Risk factors for development of Hendra virus by horses. The concentration of virus in the environment is affected by the quantity of virus that bats are shedding and the probability of virus survival outside of the bat host, which in turn are affected by the factors in (a). Exposure of horses to virus is affected by the factors in (b). (c) The effectiveness of innate and acquired immunity determines whether horse exposure leads to fulminating infection.*

## (a) Viral load

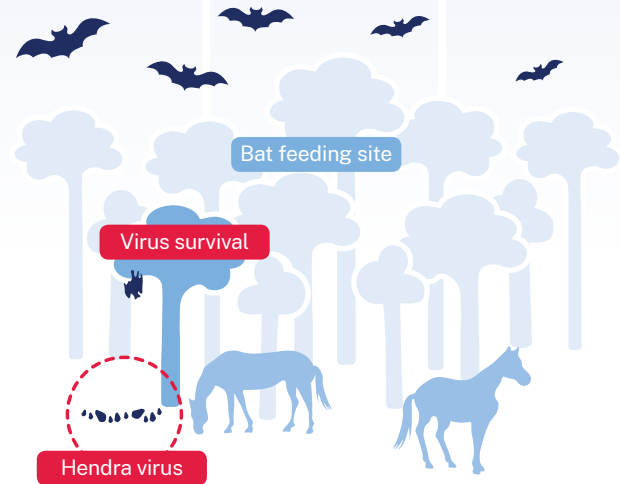
- Local bat density
- Abundance of bat food in trees
- Rate and duration of bat feeding visits
- Infection prevalence or shedding rates
- Viral load excreted

## (b) Horse exposure

- Husbandry
- Pasture quality
- Green forage under trees
- Nutritional status
- Horse behaviour

## (c) Horse susceptibility

- Innate immunity
- Acquired immunity
- Route of exposure



Source: Plowright et al. 2015





## Flaviviruses

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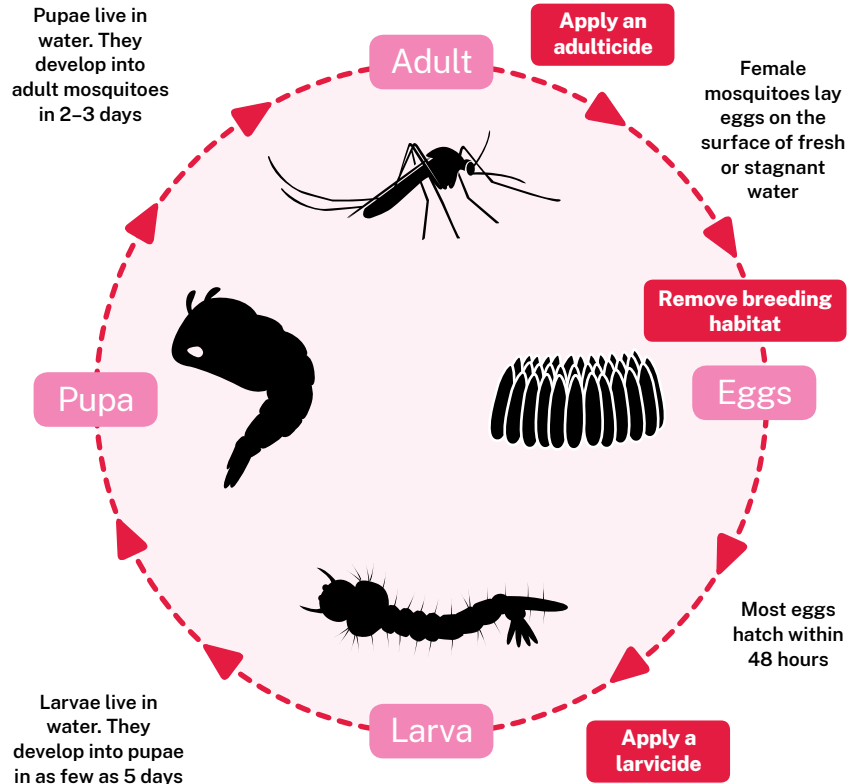
# About flaviviruses

Japanese encephalitis virus (JEV) is an acute mosquito-borne viral disease that can cause encephalitis in horses, humans and piglets, and reproductive losses in pigs.

There are other closely related flaviviruses in NSW that can infect horses, including West Nile virus (WNV) and Murray Valley encephalitis virus (MVEV) which can present with similar clinical signs in horses. Flavivirus infection is often associated with the presence of large mosquito populations particularly over the warmer months.

Horses are known to be a 'dead-end host' (see "*Transmission of JEV, WNV and MVEV*"). People do not become infected with JEV, WNV or MVEV through contact with horses.

**JEV and Hendra virus can present with similar clinical signs.** It is important to take appropriate precautions when assessing, sampling, and treating affected horses until negative PCR results have been reported for Hendra virus.



*Mosquito life cycle, mosquito control and timing for maximum impact. Adapted from Mosquito Life Cycle, CDC, 2020*

# Clinical signs in horses

JEV infection in horses is frequently subclinical. However, when disease is apparent, neurological signs are common. When they develop neurological disease the mortality rate can range from 5-40%.

Infected animals that survive severe disease can have life-long residual damage to the central nervous system.

Infection with JEV, MVEV or WNV may present with the same clinical signs in a horse.

## Clinical signs of JEV, MVEV or WNV infection in a horse may include:

- Neurological signs:
  - » Can vary in severity
  - » Ataxia (incoordination)
  - » Circling
  - » Head pressing
  - » Dysphagia (difficulty swallowing)
  - » Impaired vision
  - » Rarely the horse becoming hyper excited
- Pyrexia (fever  $>38.5^{\circ}\text{C}$ )
- Depression
- Anorexia



Image: © iStockphoto.com/benedek

# Flavivirus detections in NSW

## JEV and WNV detection events

JEV was first detected in NSW in 2022 and was associated with a strong La Niña event that resulted in flooding across much of western NSW.

The WNV outbreak in 2011 was also associated with a strong La Niña event.

## Understanding test results

Confirmation of disease due to JEV in equids is challenging because confirmation depends on detection of the virus or specific antibodies in the central nervous system (CNS).

Seroconversion detected by testing of samples collected early in the onset of disease and 3-4 weeks later can indicate a probable JEV case. However, it is usually not possible to confirm JE disease by testing of single serum samples, particularly as the time of infection cannot be identified and there is frequently cross reactivity due to infection with other related flaviviruses.

In the 2022 outbreak, evidence of infection was detected in horses from the North Coast, Hunter, Greater Sydney, Central West and Riverina Local Land Services regions. No cases have been definitively confirmed but the combination of clinical signs and test results suggest that JEV was the probable or possible cause for the disease.

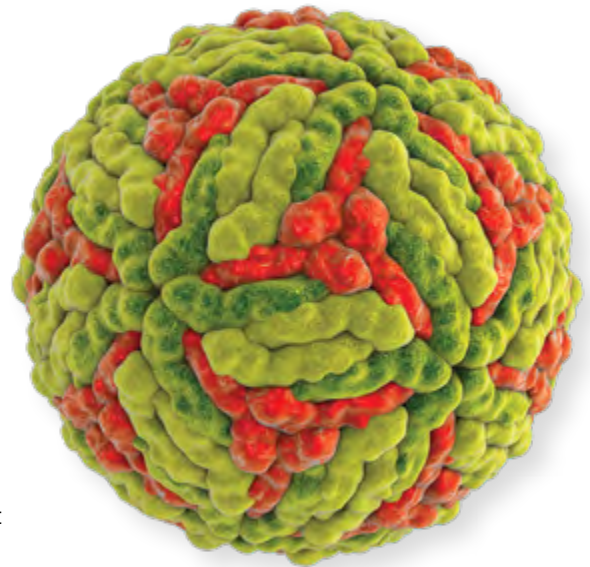


Image: © iStockphoto.com/Dr\_Microbe

## Sampling and laboratory testing

Confirmation of Japanese encephalitis (JE) disease depends on detection of the virus or specific antibodies in the central nervous system. The viraemia is extremely short, low titred and the virus has usually been cleared by the production of antibodies before an animal shows clinical signs.

Serological tests for flaviviruses are frequently affected by cross-reactivity, particularly between JEV and MVEV and to a lesser extent WNV. Positive results obtained in one or more serological tests, suggest that the animal has been infected with one or more flaviviruses at some time in the past. However, it is usually not possible to establish whether this is a recent or historical event.

When all tests give negative results, a second sample collected 3-4 weeks after the onset of disease may assist with the investigation. Assays to detect IgM to JEV and WNV are available. A positive result in these assays indicates recent infection but may not clearly indicate which virus was involved.

Using a point of care test to test for Japanese encephalitis virus is prohibited in NSW. A point of care test for JEV can only be conducted under an exemption order or prohibited matter permit authorised by the Chief Veterinary Officer.



**WARNING:** if symptoms are highly suspicious of Hendra virus, a serious zoonotic risk, do not proceed with CSF collection or post mortem collection of tissue samples. Blood collection still possible in most cases with minimal invasive technique. Full personal protective equipment (PPE) is recommended when obtaining samples.

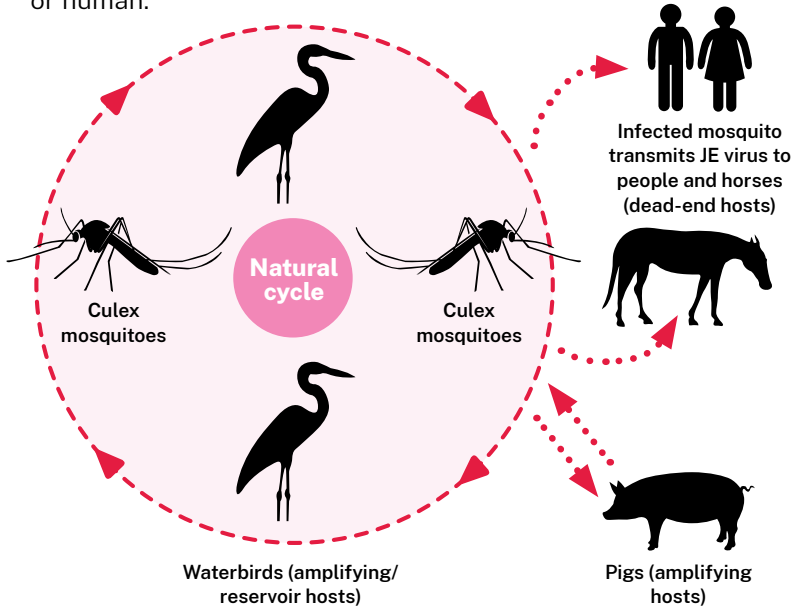
Test	Sample(s) required	Turnaround time
JEV, WNV, MVEV ELISA	Clotted blood (red top tube), collected as soon as possible after the onset of disease. Collect a second sample 3-4 weeks after the first sample. CSF –collected with extreme care, usually from a dead or sedated animal	7-10 days
Hendra virus exclusion	Refer to the Hendra virus section	

**For advice about sampling and testing for Flaviviruses, contact the NSW Animal and Plant Health Laboratories (see EMAI in the Contacts tab) or call the Emergency Animal Disease Hotline on 1800 675 888.**

# Transmission of JEV, WNV and MVEV

## JEV

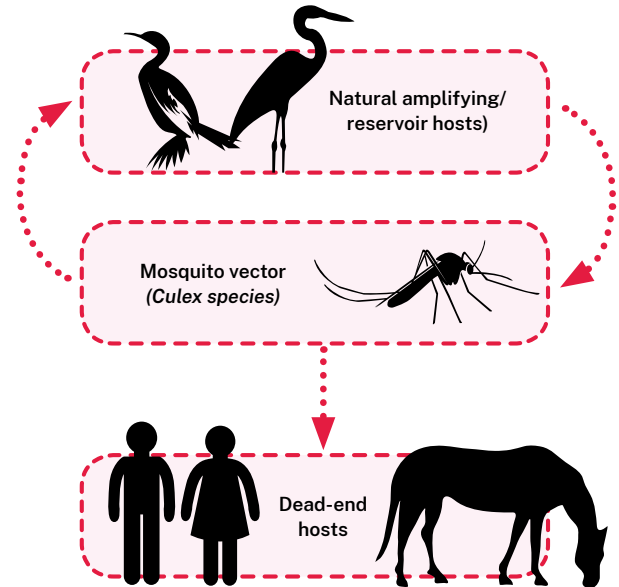
The reservoir hosts for JEV in Australia are water birds, mainly wading birds. Pigs can also act as an amplifying host, which means that they are able to infect local mosquito populations. Horses and humans are 'dead-end hosts' and cannot transmit the virus back to mosquitoes. There is no further spread of JEV from an infected horse or human.



## WNV and MVEV

WNV and MVEV have similar transmission cycles. Wading birds are key natural reservoirs of WNV in Australia.

Horses, people and a variety of other animals may become infected through a bite from an infected mosquito. There is no further spread of the virus from an infected mammal.





# Protecting against mosquitoes

Protecting against mosquitoes is the most important way of preventing flavivirus infection. Australia has several mosquito species that are capable of transmitting JEV, MVEV and WNV to animals and humans. Culex species, the most common vector, tend to be most active at dawn and dusk.



JE is a vector-transmitted zoonosis and, although most human infections are asymptomatic, a small proportion of people can develop severe neurological disease that is often fatal. For advice on human health, mosquito bite prevention and JE vaccination eligibility, visit <https://www.health.nsw.gov.au/infectious/jev/> or contact the NSW Health Public Health Unit on 1300 066 055.

Horse owners should have mosquito management plan to protect horses and those who work with them against JEV, MVEV, WNV and other important zoonotic arboviruses such as Ross River virus.

Image: © iStockphoto.com/Harlequin129

## Protecting horses from mosquitoes

- Stable horses between dusk and dawn
- Rug/hood horses in lightweight permethrin treated material (if climatically appropriate)
- Remove mosquito breeding sites - dripping or leaking taps/water troughs, discarding old tyres (a common breeding ground)
- Turn off lights inside stables at night or use fluorescent lights that do not attract mosquitoes
- Ensure all screens/mesh at building openings are intact and repair holes
- Use fans in stables
- Use topical treatment of horses using registered vector repellents such as DEET
- Clean floats/trucks using a high-pressure wash to remove organic material that may act as a breeding ground



**For an example mosquito management plan, scan the QR code**



Equine  
herpes  
virus 1

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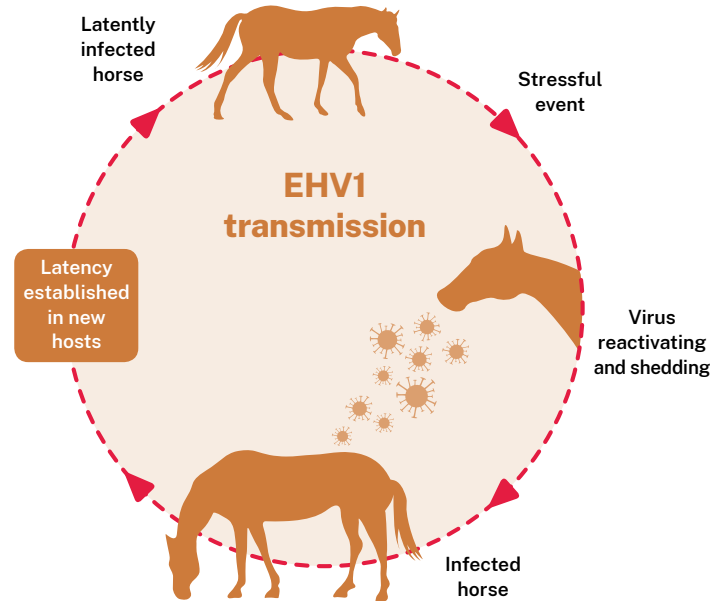
# About equine herpes virus 1 (EHV1)

Equine herpes virus 1 (EHV1) typically infects a wide range of tissues, which can cause severe systemic illness. There are two different variants of EHV1: abortigenic and neuropathogenic.

Infection of horses with EHV1 commonly occurs via the respiratory route, often with little or no sign of disease unless the mare is pregnant. Once infected with EHV1 the horse is usually latently infected for life. The virus lies dormant in lymph nodes or tissue of the nervous system and if the horse is stressed the virus can be activated again.

EHV1 abortion is a Schedule 1 notifiable disease and is endemic in some areas of Australia. Many countries that accept exported horses require government certification that the horse comes from a property where there has not been a case of EHV1 abortion. There are no other mandatory actions required for these cases.

Strains of EHV1 causing neurological disease (equine herpesvirus myeloencephalopathy) is considered to be exotic to Australia. It is listed as Schedule 2 prohibited matter, and therefore must be reported immediately to an Authorised Officer if suspected.



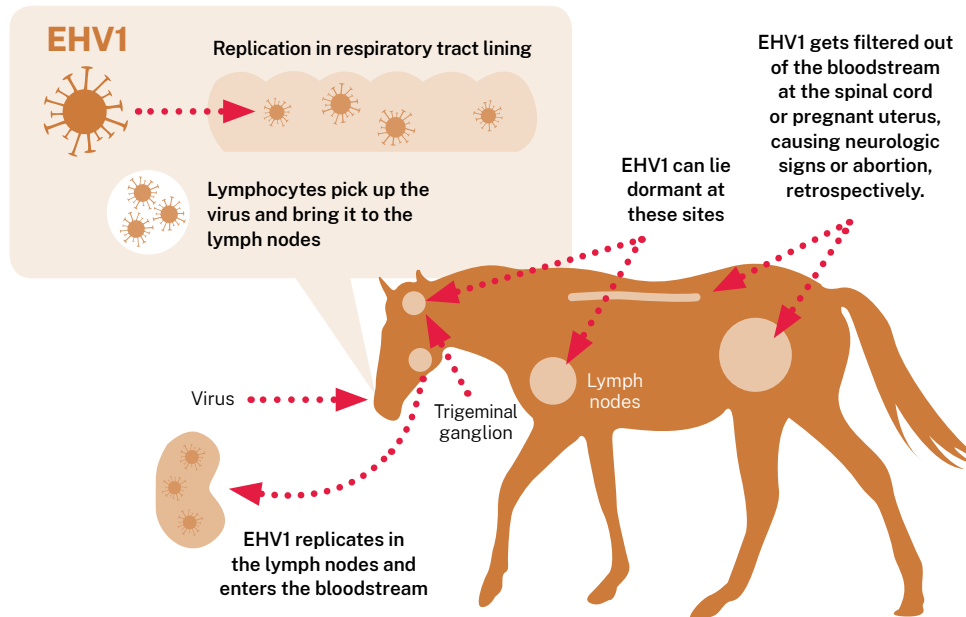
## EHV1 IS A NOTIFIABLE DISEASE.

In Australia, if you suspect neurological disease in horses due to EHV1, you **MUST** report it immediately to the Emergency Animal Disease Hotline on **1800 675 888** or an Authorised Officer on 1300 795 299.

## Clinical signs – neuropathogenic EHV1

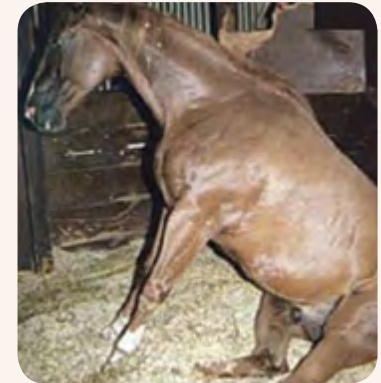
Infection with neurological strains of EHV1 results in damage to the spinal cord. Clinical cases vary and clinical signs can range from mild ataxia (incoordination) to paralysis in all four limbs and death.

The average time from infection to onset of clinical signs is 4 to 7 days (up to 14 days) and depends on the individual horse, viral virulence, and environmental factors including stress.



### Clinical signs of neurological disease due to EHV1 may include

- Neurological signs:
  - » Mild ataxia (incoordination) and paresis (weakness) in hindlimbs more often than forelimbs
  - » Severe hindlimb paralysis
  - » Recumbency (unable to stand)
  - » Loss of bladder and tail function and loss of skin sensation in the perineal and inguinal areas
  - » Paralysis in all four limbs
- Pyrexia (fever  $>38.5^{\circ}\text{C}$ )



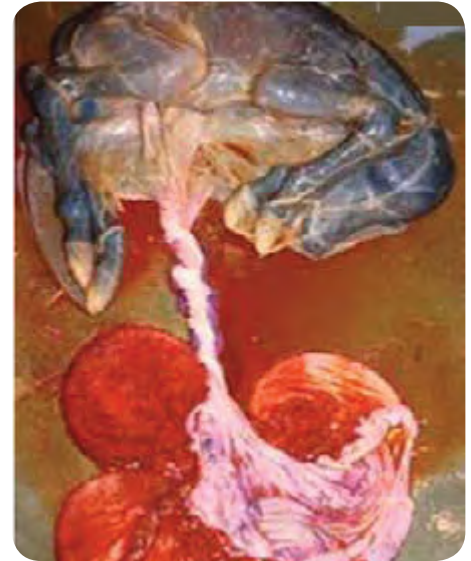
Hindlimb paralysis. (Beshir Ata et al 2020)

## Clinical signs – abortigenic EHV1

The average time from infection to onset of clinical signs is 4 to 7 days (up to 14 days) and depends on the individual horse, viral virulence, and environmental factors including stress.

### Clinical signs of EHV1 abortigenic may include

- Pyrexia (fever  $>38.5^{\circ}\text{C}$ )
- Abortion, usually in late pregnancy (8-10 months) but can occur as early as the 4 months
- Signs of respiratory infection (not always present)
- Expelled foetus covered in placenta
- Foals born alive but weak, depressed and die in a few days with signs of respiratory disease (when infected in late pregnancy)



Above left: Nasal discharge indicating respiratory disease (Dr Kate Martin)

Above right: Late pregnancy abortion. (Beshir Ata et al 2020)

# Sampling and laboratory testing

For advice about sampling and testing for EHV1, contact the NSW Animal and Plant Health Laboratories (*see Contacts tab*) or call the Emergency Animal Disease Hotline on 1800 675 888.

Using a point of care test to test for neurological disease due to EHV1 is prohibited in NSW. A point of care test for neurological disease due to EHV1 can only be conducted under an exemption order or prohibited matter permit authorised by the Chief Veterinary Officer.



**WARNING:** if symptoms are highly suspicious of Hendra virus, a serious zoonotic risk, do not proceed with post-mortem collection of tissue samples. Blood collection still possible in most cases with minimal invasive technique. Full Personal Protective Equipment (PPE) is recommended when obtaining samples.

Test	Sample(s) required	Days of the week test is conducted	Turnaround time <sup>2</sup>
Equine herpes virus – Type 1 PCR	Fresh tissue <sup>1</sup>	According to demand	2-3D
Equine herpes virus – Type 1 VNT	Clotted blood (red top tube)	Batch tested on Thursday	1-2W
Histopathology examination	Fixed tissue or aborted foetus	Monday – Friday	Up to 5D

<sup>1</sup> To minimise the risk of contamination, take tissue samples as aseptically as possible and without delay.

<sup>2</sup> Turnaround times are provided as a guide only. For specific information about your submission please contact Customer Service.

**Send the samples to the NSW Animal and Plant Health Laboratories at Elizabeth Macarthur Agricultural Institute (*see EMAI in the Contacts tab*).**





Other  
equine  
neurological  
diseases

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# Other equine neurological diseases

## Australian bat lyssa virus (ABLV)

In 2013, 2 horses were confirmed as being infected with ABLV on a property in Southeast Queensland. These were the first and only known cases of ABLV in an animal other than a bat in Australia. Both horses presented with pyrexia and neurological signs and progressing ataxia (incoordination).

ABLV infections have been detected in all four of the mainland species of flying-fox in Australia and one species of insectivorous microbat, the yellow-bellied sheath-tail bat. ABLV is present in less than 1% of free-living healthy bats, but up to one third of sick or injured bats with central nervous system signs are infected with ABLV. ABLV is shed in the saliva. Like rabies virus, it is presumed that ABLV is usually transmitted by bites or contamination of a fresh wound, scratch, or mucous membranes with infected saliva.

### **ABLV IS A NOTIFIABLE DISEASE.**

Clinical disease in animals other than bats is classed as an emergency animal disease (EAD).



*Grey-headed flying-foxes (René Riegal)*



## **ABLV IS A NOTIFIABLE DISEASE.**

If you suspect an emergency animal disease you **MUST** report it immediately to the Emergency Animal Disease Hotline on **1800 675 888** or an Authorised Officer on 1300 795 299.

# Other equine neurological diseases *cont.*

## Equine encephalomyelitis (Eastern, Western, Venezuelan)

Eastern, Western and Venezuelan encephalomyelitis (EEE, WEE and VEE) are caused by vector-transmitted zoonotic arboviruses that are endemic in North, Central and South America. They are not present in Australia.

Clinical signs of EEE, WEE and VEE can be identical.

## **EQUINE ENCEPHALOMYELITIS (EASTERN, WESTERN, VENEZUELAN) ARE EMERGENCY ANIMAL DISEASES.**



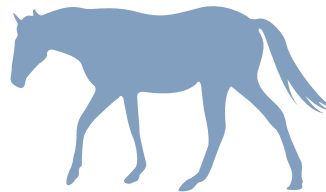
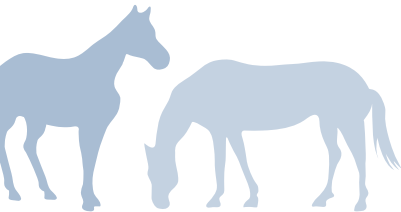
If you suspect an emergency animal disease you **MUST** report it immediately to the Emergency Animal Disease Hotline on **1800 675 888** or an Authorised Officer on 1300 795 299.

### Clinical signs include:

- Neurological signs:
  - » Occur in severe cases
  - » Hyperexcitability, blindness, ataxia (incoordination), severe mental depression, recumbency (unable to rise), convulsions
- Pyrexia (fever)
- Anorexia
- Severe depression



Equine encephalomyelitis is also known as “sleeping sickness”. Image: ©iStockphoto.com/anjajuli



## Other equine neurological diseases *cont.*

### Lead toxicosis

Lead toxicosis may present as either acute or chronic and is usually the result of exposure to contaminants in the grazing environment including lead-based paint on old fences and discarded lead acid batteries. Young animals are most at risk due to natural curiosity. Clinical signs include anorexia, colic, apparent blindness, head pressing, bruxism, hyperaesthesia (hypersensitivity to stimuli) and ataxia (incoordination).

### Tetanus

Tetanus occurs in unvaccinated horses with or without a history of injury. *Clostridium tetani* produces a potent neurotoxin causing spasmodic, tonic contractions of muscles. Clinical signs include spasms of the third eyelid, erect ears, dilated nostrils, stiffened extended tail and stiff gate. Approximately 80% of cases are fatal.

### Botulism

Botulism is a rapidly fatal disease caused by eating feed contaminated with the *Clostridium botulinum* toxin. Outbreaks have been known to occur in association with contaminated hay. The toxin causes flaccid paralysis of muscles resulting in clinical signs such as disturbed vision, difficulty chewing/swallowing and overall weakness progressing to generalised paresis. The toxin can be difficult to isolate from either feed or affected animal. Diagnosis is often by elimination of other causes of flaccid paralysis.



If you suspect an emergency animal disease you **MUST** report it immediately to the Emergency Animal Disease Hotline on **1800 675 888** or an Authorised Officer on 1300 795 299.

## Sampling and laboratory

For advice about sampling and testing for the above diseases, contact the NSW Animal and Plant Health Laboratories on (see *Contacts tab*) or call the Emergency Animal Disease Hotline on 1800 675 888.

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



**WARNING:** if symptoms are highly suspicious of Hendra virus, a serious zoonotic risk, do not proceed with post-mortem collection of tissue samples. Blood collection still possible in most cases with minimal invasive technique. Full Personal Protective Equipment (PPE) is recommended when obtaining samples.

Send the samples to the NSW Animal and Plant Health Laboratories at Elizabeth Macarthur Agricultural Institute (see *EMAI in the Contacts tab*).







Reporting  
a notifiable  
disease

If you suspect an emergency animal disease,  
you **MUST** report it immediately to the **Emergency  
Animal Disease Hotline** on **1800 675 888**  
or an Authorised Officer on 1300 795 299.

EMERGENCY ANIMAL  
DISEASE HOTLINE  
**1800 675 888**



# Reporting and immediate measures

If you suspect an emergency animal disease (EAD), you **MUST** report it to the Emergency Animal Disease Hotline on 1800 675 888 or an Authorised Officer on 1300 795 299.

Collect as much relevant history, clinical and epidemiological information as possible. This information will help inform likelihood and risk assessments and guide next steps (see *“What to collect in the field”*).

## You or the property manager may be asked to apply enhanced biosecurity measures such as:

- Immediately isolate affected horses and keep free-range (wild) animals away from the premises boundary.
- Depending on the size of the premises, 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.

Laboratory testing is required to confirm or exclude the presence of an EAD.

NSW Department of Primary Industries Animal Biosecurity and/or Local Land Services District Veterinarians will provide information and support in managing the premises during this period.

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

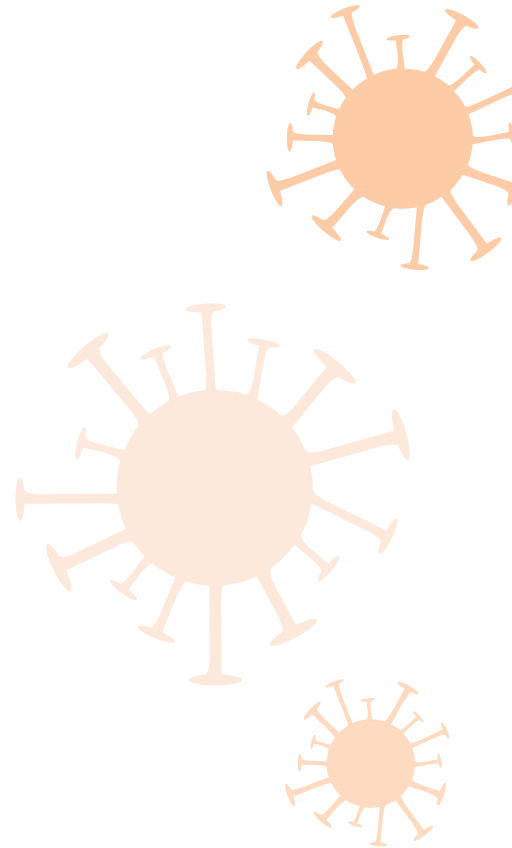
- Prevent movement from the premises of material that has been in contact with suspect animals, including bedding, feed, equipment, clothing, footwear, and vehicles.
- Prevent people from having unnecessary contact with suspect animals. If possible, place a ‘No entry’ sign on farm gates and other access 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 will be contactable by phone.
- DPI may institute control measures including an Individual Biosecurity Direction with specific conditions.



# Zoonotic risk

**Consider zoonotic disease FIRST when attending horses showing neurological signs. If unsure, ALWAYS ensure everyone in contact with the horse/s takes appropriate protective measures, including:**

- Minimise the number of people in contact with the horse to only those necessary for safety.
- Everyone at risk, including those assisting, should be properly protected with appropriate personal protective equipment.
- Assess zoonotic risk prior to any invasive procedures.
- Consider vaccination of personnel against diseases such as Q fever, rabies and Japanese encephalitis.
- Adopt personal hygiene and decontamination practices.
- Cover personal wounds to prevent infection.
- Ensure safe sharps handling and disposal practices.
- Attain a full vaccination history, including scanning for a microchip and checking the Hendra vaccine registry.
- Educate owners on zoonotic risk and limit further human contact to essential activities in suspect cases.
- Protect personnel against insect bites by ticks or mosquitoes with long sleeves/insect repellent.
- Contact local NSW Health Public Health Unit 1300 066 055 for advice about exposure to a zoonotic agent.
- If you suspect an emergency animal disease, you MUST immediately report it to the Emergency Animal Disease Hotline on 1800 675 888 or an Authorised Officer.



# Personal biosecurity controls

Scan the QR code for Australian Veterinarian Association's "suit up" and "PPE for equine veterinarians" videos

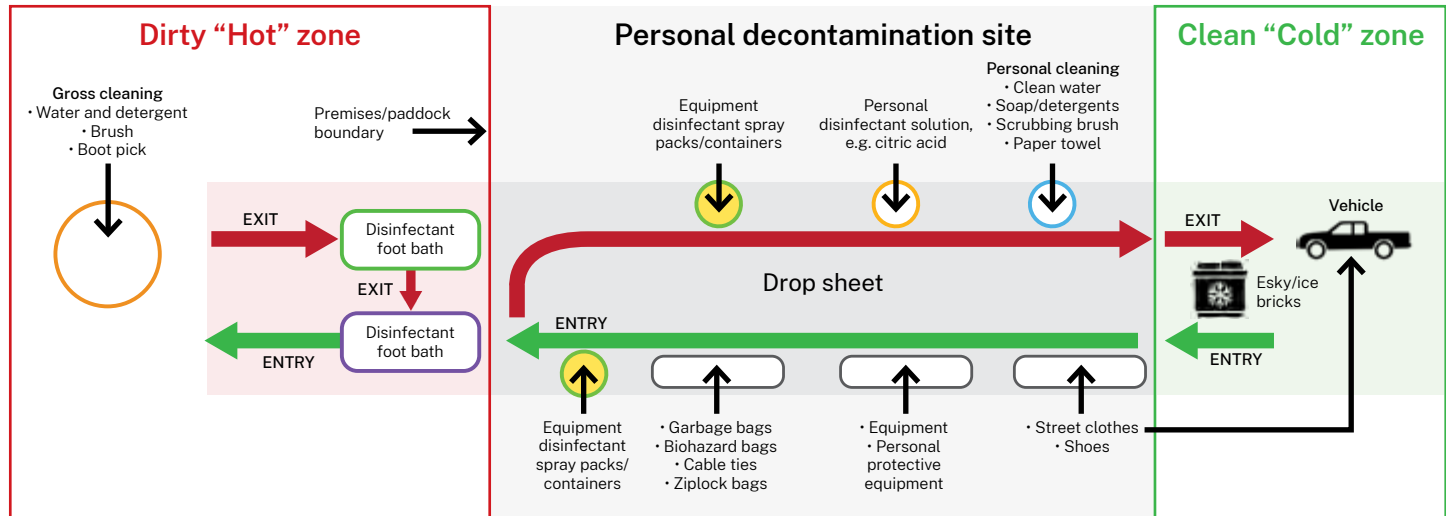


Before entering a premises, assess the biosecurity risk, in particular the risk of iatrogenic disease spread, before determining the most appropriate course of action.

## 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 below.



# What to collect in the field



## Owner and Location details

- Name and contact number
- Address
- Property Identification Code (PIC)



## Microchip number

- Note if scanned and not found a microchip



## Clinical signs

- Onset of clinical signs
- Whether it has improved/deteriorated/stayed the same
- Type of neurological signs (e.g. ataxia)
- If neurological signs are primary or secondary



## Epidemiological Information

- Vaccination and treatment history
- Recent movement of animals on/off the property
- Previous disease on this or neighbouring properties
- Presence of bats/wild birds/mosquitoes



## Samples

- Live horses: collect samples
- Dead horses: collect samples, note lesions and necropsy findings
- Do not conduct a necropsy if Hendra virus, ABLV, or rabies is suspected
- Assess zoonotic risk prior to any invasive procedures



## Clinical examination

- Detailed clinical examination
- Note if unable to fully examine (such as take temperature, or examine mucous membranes)



## Patient Information

- Species affected
- Age
- Condition score
- Sex
- Number dead, number sick, number at risk, number examined



## Photographs Videos

# 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](mailto:laboratory.services@dpi.nsw.gov.au).

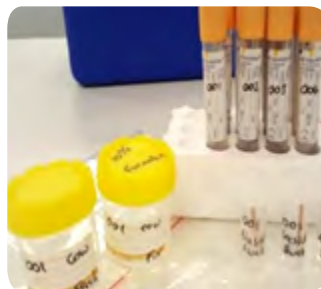
EAD Hotline and laboratory staff can assist with arranging a courier.



Scan the QR code for further information on packaging of specimens is available in the NSW DPI Laboratory Services page 'Collecting and submitting samples for veterinary testing'.

## Packaging samples

- Ensure all samples are clearly labelled and cleaned prior to packing
- Samples for EAD exclusion as you would for a routine specimen submission - IATA 650 (Biological Substance Category B) UN 3373:
  - » 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



# Notifiable disease: legislation

Scan the QR code to access the NSW DPI Primefact on “Notifiable pests and diseases of animals in NSW”



## Notifiable Diseases

- Are a list of diseases where there is a duty, or legal obligation, to notify authorities if you know or suspect that an animal is infected.
- Are listed in the *Biosecurity Act 2015* as prohibited matter and in the *Biosecurity Regulations 2017* as notifiable matter.

## Emergency Animal Diseases (EADs)

- Are a nationally agreed list of animal diseases of national significance due to the impacts they may have on animal health, human health, the environment or the economy and/or may have serious social or trade implications.
- Include exotic diseases, diseases that emerge within Australia and diseases that occur sporadically in Australia but may cause a serious outbreak.
- Are captured as prohibited matter in NSW legislation.

## The Biosecurity Act 2015

- The primary legislation providing a flexible and responsive statutory framework to help achieve the biosecurity objectives for NSW
- Lists Schedule 2 notifiable diseases- prohibited matter.

## The Biosecurity Regulations 2017

- The secondary legislation providing more detail about what may be enforced under the *Biosecurity Act 2015*
- Lists Schedule 1 notifiable diseases- notifiable matter.

## Schedule 2: Prohibited matter

- Includes exotic EADs, such as African Horse Sickness, and other EADs such as Hendra virus.
- Requires a person who owns or is caring for animals, or a person working in their professional capacity such as a veterinarian to **immediately** notify an authorised officer if they suspect, or are aware, that the animals are infested or infected with prohibited matter.

## Schedule 1: Notifiable matter

- Includes endemic diseases, such as West Nile virus.
- Requires a person who owns or is caring for animals, or a person working in their professional capacity such as a veterinarian, to notify an authorised officer **within one working day** if they suspect, or are aware, that the animals are infested or infected with a notifiable pest or disease of animals which is not prohibited matter.

# 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](mailto:laboratory.services@dpi.nsw.gov.au)

Website: [dpi.nsw.gov.au/about-us/services/laboratory-services/veterinary](http://dpi.nsw.gov.au/about-us/services/laboratory-services/veterinary)

### Delivery address:

NSW Animal and Plant Health Laboratories  
Elizabeth Macarthur Agricultural Institute (EMA)  
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: [bslcl0@daf.qld.gov.au](mailto:bslcl0@daf.qld.gov.au)

Website: [qld.gov.au](http://qld.gov.au)

### 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](mailto:vet.diagnostics@agriculture.vic.gov.au)

Website: [agriculture.vic.gov.au](http://agriculture.vic.gov.au)

(search for 'Veterinary Diagnostic Services')

### Delivery address:

5 Ring Road  
La Trobe University Campus  
BUNDOORA VIC 3083

# Contacts





# Animal and human health contacts



## Department of Primary Industries

If you suspect an emergency animal disease, immediately call the 24-hour EAD hotline on **1800 675 888**.

If you have a general query or concern about animal diseases, please email: **[animal.biosecurity@dpi.nsw.gov.au](mailto:animal.biosecurity@dpi.nsw.gov.au)**

Web: [dpi.nsw.gov.au/biosecurity/animal](http://dpi.nsw.gov.au/biosecurity/animal)

## Local Land Services

Your District Veterinarian is a valuable resource for local and independent advice on biosecurity and animal health issues.

Ph: **1300 795 299** (business hours)

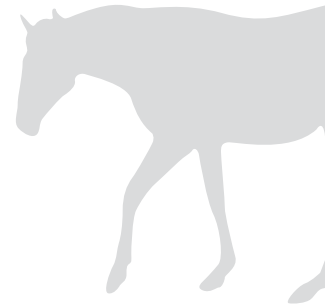
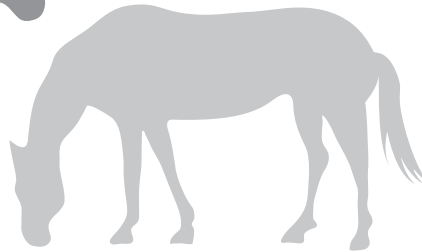
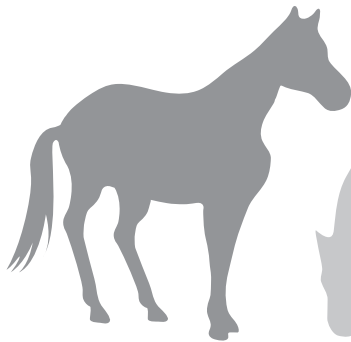
Web: [lls.nsw.gov.au](http://lls.nsw.gov.au)

[lls.nsw.gov.au/biosecurity/emergency-animal-disease/district-vet-contact-details](http://lls.nsw.gov.au/biosecurity/emergency-animal-disease/district-vet-contact-details)

## NSW Health

Call **1300 066 055** to contact your local Public Health Unit.

Web: [health.nsw.gov.au/Infectious/Pages/phus.aspx](http://health.nsw.gov.au/Infectious/Pages/phus.aspx)



# Significant Disease Investigation Program

NSW is fortunate to be free of most of the serious diseases that affect animals in other parts of the world. To maintain essential surveillance for animal diseases, the NSW DPI pay for the cost of laboratory testing for notifiable diseases.

The NSW Significant Disease Investigation (SDI) Program aims to further boost NSW's ability to detect emergency animal diseases in livestock and wildlife early and support market access and trade by building the capacity of and engagement with private veterinary practitioners.

Subsidies are available from NSW for laboratory testing of significant disease events in livestock and wildlife.

## Livestock includes:

- Ruminants (cattle, sheep, goats, alpacas)
- Horses
- Pigs
- Poultry



## Significant disease events

Significant disease events are broadly defined as those clinically consistent with national notifiable animal diseases or diseases showing an increasing incidence and/or an expanding geographic or host range.

### A significant disease is one which meets one or more of these criteria:

Significant morbidity and mortality events in livestock or wildlife

Events clinically consistent with national Notifiable diseases of significance to livestock or wildlife or suspected to be a new or emerging disease (such as increasing incidence/ expanding geographic or host range).

Events may include cases where an EAD has been excluded and further investigation is important to achieve a diagnosis



If you suspect an emergency animal disease, immediately contact the Emergency Animal Disease Hotline on **1800 675 888**.

# 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/mylearning/dashboard/index>).

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
- Work health and safety induction in a biosecurity emergency response

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

## The National Biosecurity Training Hub

Provides a centralised platform for biosecurity training to support biosecurity preparedness, response and recovery.

**National Biosecurity Training Hub** ([biotraininghub.com.au](http://biotraininghub.com.au))

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## NSW DPI EMtrain courses



Provides 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.

[www.dpi.nsw.gov.au/emergencies/emergency/management/training](http://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

See DPI website for more information >



## More information

[www.dpi.nsw.gov.au/biosecurity/animal](http://www.dpi.nsw.gov.au/biosecurity/animal)

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

