Significant Disease Investigation Guide

Horses

AGRICULTURE VICTORIA

The role of veterinarians is critical to help protect the health of people, livestock, companion animals and wildlife by reporting and investigating significant disease events.

This booklet aims to help you conduct a Significant Disease Investigation involving horses, and provides information about reporting notifiable diseases, as prescribed under the *Livestock Disease Control Act 1994*.

A companion edition of this guide has been produced for cattle and sheep diseases. You can obtain a copy by contacting cvo.victoria@ecodev.vic.gov.au

The Victorian Significant Disease Investigation Program

EMERGENCY ANIMAL DISEASE WATCH HOTLINE
1800 675 888

The Victorian Significant Disease Investigation (SDI) program aims to boost Victoria's capacity for the early detection of significant diseases in livestock (including horses, pigs and poultry) and wildlife by increasing the participation of veterinarians and subsidising the cost of investigating significant or unusual disease incidents.

Subsidies are available for initial field investigations, including clinical examination and necropsy, laboratory testing and follow-up investigations. Subsidy details can be found on the Agriculture Victoria Significant Disease Investigations website page **agriculture.vic.gov.au/sdi**.

To be considered a significant disease, one or more of the following criteria must be met:

- an unusual or atypical manifestation of disease, including high morbidity, mortality and/or rate of spread, or
- an initial investigation fails to establish a diagnosis, including when veterinary treatment does not produce an expected response, or
- there are findings suggesting a possible effect on trade, public health, biodiversity or the viability of the farm, industry or region, excluding events where there is a genuine suspicion of an emergency animal disease

Where there is a genuine suspicion of an exotic or emergency animal disease, Agriculture Victoria will lead and cover the cost of the disease investigation.

If you wish to take advantage of this program, please contact your local Agriculture Victoria veterinarian prior to submitting samples.

If you suspect an exotic or emergency animal disease, call the EAD Watch Hotline 1800 675 888.

EMERGENCY ANIMAL DISEASE WATCH HOTLINE
1800 675 888

Report suspicion (or confirmation) of notifiable diseases

Under the Victorian *Livestock Disease Control Act 1994*, a person knowing or having reason to suspect that a notifiable disease is present in livestock (or livestock products) that are either:

- owned by that person or in the possession, control or charge of that person;
- on land owned and occupied by that person; or
- dealt with by that person as a veterinary practitioner, an inspector under the Meat Industry Act 1993 or the Export Control Act 1982, operator of a meat processing facility licensed under the Meat Industry Act 1993 where a quality assurance program is in force; or
- dealt with by the owner or person in charge of premises registered as a veterinary diagnostic laboratory, knacker, stock agent or other person dealing with livestock, livestock products or hives by way of a profession, trade or business must report the disease or the suspicion of disease. The term 'livestock' includes horses under the Act.

If a horse has been seen by a veterinarian and a notifiable disease is suspected, it is usually the veterinarian who notifies Agriculture Victoria.

Table 1. Endemic diseases of horses that are notifiable in Victoria

Report immediately	Report within 12 hours	Report within 7 days
Hendra virus	equine herpesvirus - type1 (abortigenic and neurological strains)	equine infectious anaemia
anthrax	cattle tick *(Rhipicephalus microplus)* infestation	equine viral arteritis
		leptospirosis
		salmonellosis
		strangles
		verocytotoxigenic *E. coli*

A full list of notifiable diseases, including exotic diseases, can be found on the Agriculture Victoria website, **agriculture.vic.gov.au**

Notification can be made by contacting your District Veterinary Officer or Animal Health Officer at Agriculture Victoria or by calling the all-hours Emergency Animal Disease Watch Hotline on 1800 675 888. A disease notification form can be downloaded from the Agriculture Victoria website, and details of where to forward the report are provided on the form.

Significant Disease Investigation

EMERGENCY ANIMAL DISEASE WATCH HOTLINE
1800 675 888

Ensure all required information is collected at the time of examination

Information required on the record of disease event (RODE) and laboratory submission forms includes:

- Owner and property details including the Property Identification Code (PIC).
- Species. Is more than one species affected?
- Number affected:
  - number of deaths
  - number sick
  - number at risk
  - number examined.
- Age, condition score, sex.
- History and predisposing factors:
  - date the outbreak began
  - the time until recovery
  - vaccinations and treatments recently given
  - recent livestock introductions
  - possible sources of introduction and spread
  - grazing/feeding history, pasture/feed type and weed species.
- Clinical history and signs.
- Primary syndrome.
- Gross lesions and necropsy findings.
- Include photographs where relevant:
  - unwell and dead horses
  - gross lesions.

RODE forms can be downloaded from www.agriculture.vic.gov.au/SDI

Just a reminder...always practice good biosecurity

To avoid disease spread between properties:

- Always carry disinfectant and cleaning equipment in your vehicle
- If possible, leave your vehicle outside the property
- Include a bucket, brush, disinfectant and bin bags
- Ensure clothes and boots are clean prior to entering the property
- Wear disposable gloves to collect samples
- Always clean boots and equipment before disinfecting. Soil and organic material can prevent disinfectants from being effective
- Pay particular attention to footwear, hands and fingernails, as well as equipment used on animals
- Collect all waste and disposable equipment in a plastic bin bag.

If you suspect an emergency animal disease, call the Emergency Animal Disease Watch Hotline immediately (i.e. before leaving the property).

Picture courtesy of Newscorp

Always consider potential zoonotic diseases prior to examining a horse

When investigating a disease incident, always consider potential zoonotic diseases and ensure those in contact with the horses take appropriate safety precautions, including:

- Always assume that a zoonotic disease may be present, and ensure good hygiene and safety practices. (Remember that infected horses may shed disease agents (e.g. Hendra virus) prior to showing clinical signs of disease)
- Do not conduct a necropsy if diseases such as Hendra or anthrax are suspected
- Perform an in-field anthrax ICT in cases of sudden death or if there is any suspicion of anthrax
- Wear appropriate personal protective equipment when examining horses
- Take care not to ingest food or water potentially contaminated with faecal material or other secretions
- Avoid splashing or inhaling body fluids
- Avoid insect bites such as ticks or mosquitoes (e.g. wear long sleeves and/or use insect repellents)
- Pay particular attention to your own skin wounds (i.e. cover the wound to prevent infection)
- Consider vaccination against diseases such as Q fever and rabies
- If you are unsure about a safety procedure, do not proceed until you have sought advice. (No query is foolish if it protects your own health)
- Seek medical advice if you are concerned about exposure to a zoonotic agent.

Table 2. Potential zoonotic diseases of horses

Known to occur in Australia	Mode of transmission
Hendra virus	• Contact with infected body fluids or tissues or through droplet transmission • Nasal secretions may pose a risk of transmission prior to horses showing clinical signs
anthrax *(Bacillus anthracis)*	• Contact with anthrax spores; entry via a wound or scratch • Inhalation of spores
chlamydiosis *(Chlamydia psittaci)*	• Contact with foetal membranes from infected mare, via inhalation or direct inoculation of the eyes or nose • Contact with infected foals
colibacillosis *(Escherichia coli)*	• Ingestion of faecal contaminated material, food and water
cryptosporidiosis *(Cryptosporidium spp.)*	• Ingestion of faecal contaminated material, food or water
dermatophilosis *(Dermatophilus congolensis)*	• Direct contact with lesion or contaminated fomite (e.g. horse tack)
leptospirosis *(Leptospira spp.)*	• Direct contact with urine or tissues of infected animals • Inhalation of aerosols of contaminated fluids
MRSA *(Methicillin-resistant Staphlococcus aureus)*	• Direct contact, particularly through skin wounds
Murray Valley encephalitis	• Mosquito bite
Q fever *(Coxiella burnetii)*	• Inhalation of the bacteria: - that is in the air/dust (bacteria can survive in the soil/dust for years and be spread several kilometres by wind) - when handling infected animal fluids or tissues (particularly reproductive tissues/fluids, urine, faeces, blood or milk) - while handling infected animals during routine husbandry procedures • Direct contact with infected animal tissue or fluids on broken skin • Consumption of unpasteurised milk from infected animals

Table 2. Potential zoonotic diseases of horses

Known to occur in Australia	Mode of transmission
ringworm (dermatophytes including *Trichophyton* and *Microsporum spp.)*	• Direct contact with the lesion or formites
Ross River virus	• Mosquito bite
salmonellosis *(Salmonella spp.)*	• Ingestion of faecal contaminated material, food and water
West Nile virus (Kunjin strain)	• Mosquito bite
Diseases exotic to Australia	**Mode of transmission**
brucellosis *(Brucella abortus)*	• A potential cause of poll evil or fistulous withers in horses. Possible transmission via ingestion, inhalation or direct contact through skin abrasions or mucous membranes.
equine encephalitis (eastern, western, St Louis and Venezuelan)	• Mosquito bite • Direct transmission through infected blood and cerebrospinal fluid
equine granulocytic anaplasmosis *(Anaplasma phagocytophilum) (formerly Erhlichia equi)*	• Tick bite
Glanders *(Burkholderia mallei)*	• Direct contact with infected animals or their tissues or body fluids. • Indirect contact through contaminated fomites, food, soil and water.
Lyme disease *(Borrelia burgdorferi)*	• Tick bite
rabies	• Infected animal bite (transmission through the saliva) • Direct contact with infected saliva into an open wound or the mucous membranes
screw worm fly	• Direct contact
West Nile virus (other than Kunjin strain)	• Mosquito bite

Always consider potential exotic diseases and know which diseases are notifiable

Table 3. Syndromes and some potential causes in horses (Diseases notifiable in Victoria are shown in bold type)

Syndrome	Exotic diseases	Endemic diseases
Sudden death	• **equine piroplasmosis** *(Babesia caballi, Theileria equi)* • **Potomac fever** *(Neorickettsiae risticii)*	• **Hendra virus** • **anthrax** *(Bacillus anthracis)* • enteritis • exercise induced pulmonary haemorrhage (EIPH) • trauma • severe haemorrhage (internal or external) • torsion or rupture (e.g. uterine, intestinal) • snake envenomation • plant toxicosis • blue-green algae toxicosis • medication (adverse effect) • cardiovascular anomaly (e.g. aneurysm) • **equine herpesvirus – type 1** (neurological strain) • monensin toxicosis • excessive food ingestion/grain overload • botulism *(Clostridium botulinum)* • lightning strike

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Syndrome	Exotic diseases	Endemic diseases
Respiratory signs	• **equine influenza** • **African horse sickness** • **glanders** *(Burkholderia mallei)* • **epizootic lymphangitis** *(Histoplasma capsulatum; H. farciminosum)* Seen in northern Australia • meliodosis *(Burkholderia pseudomallei)*	• **Hendra virus** • **strangles** *(Streptococcus equi)* • pneumonia (infectious, inhalation, aspiration) • dorsal displacement of soft palate (DDSP) • epiglottic entrapment • laryngeal hemiplegia ('roarer') • exercise induced pulmonary haemorrhage (EIPH) • pulmonary oedema • lung worm • chronic obstructive pulmonary disease • ethmoid haematoma • guttural pouch empyema • guttural pouch mycosis • guttural pouch tympany • **equine viral arteritis** • **equine herpesvirus – type 1** • equine herpesvirus – type 4 • hyperthermia/exercise exhaustion • snake envenomation • tick paralysis *(Ixodes holocyclus)* • botulism *(Clostridium botulinum)*

Table 3. Syndromes and some potential causes in horses (Diseases notifiable in Victoria are shown in bold type)

Syndrome	Exotic diseases	Endemic diseases
Neurological	• **rabies** • **Japanese encephalitis** • **equine encephalitis** (eastern, western and Venezuelan) • **surra** *(Trypanosoma evansi)* • **West Nile virus** (clinical infection; Kunjin strain is endemic) • Lyme disease *(Borrelia burgdorferi)*	• **Hendra virus** • **Australian bat lyssavirus** • trauma • cervical static stenosis or cervical vertebral instability (wobbler syndrome) • blue-green algae toxicosis • plant toxicosis (e.g. stringhalt) • snake envenomation • paralysis tick • genetic conditions (e.g. cerebellar abiotrophy) • Ross River virus • tetanus *(Clostridium tetani)* • botulism *(Clostridium botulinum)* • **lead toxicosis** • Murray Valley encephalitis • **West Nile virus** (Kunjin strain; clinical infection) • vestibular disease • **equine herpesvirus – type 1** • **listeriosis** *(Listeria monocytogenes)*

Table 3. Syndromes and some potential causes in horses (Diseases notifiable in Victoria are shown in bold type)

Syndrome	Exotic diseases	Endemic diseases
Gastrointestinal	• **African horse sickness** • **Potomac horse fever** *(Neorickettsia risticii)* • **equine encephalomyelitis** (eastern, western, Venezuelan)	• internal parasitism (Strongyles) • colic (due to intestinal pathology) • colic (other aetiologies) • **salmonellosis** (*Salmonella* spp.) • **verocytotoxigenic *Escherichia coli*** • other bacterial colitis (e.g. *Clostridium* spp.) • **anthrax** (*Bacillus anthracis*) • **equine herpesvirus 1 (EHV1)** • other viral infection (e.g. rotavirus) • protozoal infection (e.g. *Cryptosporidium* spp.) • neoplasia (e.g. intestinal lymphosarcoma) • toxicosis (e.g. plant, blue-green algae, contaminated feed) • excessive food consumption • medications (adverse effects)
Oral lesions	• **vesicular stomatitis** • **Japanese encephalitis**	• trauma (physical or chemical)

Table 3. Syndromes and some potential causes in horses (Diseases notifiable in Victoria are shown in bold type)

Syndrome	Exotic diseases	Endemic diseases
Reproductive	• **contagious equine metritis** (*Taylorella equigenitalis)* • **dourine** (*Trypanosoma equiperdum*) • **Potomac fever** (*Neorickettsiae risticii*) • **surra** (*Trypanosoma evansi*)	• **equine herpesvirus - type 1 (EHV1)** • chlamydiosis (*Chlamydia psittaci*) • equine coital exanthema (EHV3) • equine herpesvirus – type 4 (EHV4) • **equine viral arteritis** • **leptospirosis** (*Leptospira* spp.) • **listeriosis** (*Listeria monocytogenes*) • Q fever (*Coxiella burnetii*)

Table 3. Syndromes and some potential causes in horses (Diseases notifiable in Victoria are shown in bold type)

Syndrome	Exotic diseases	Endemic diseases
Skin lesions	• **epizootic lymphangitis** (*Histoplasma capsulatum; H. farciminosum*) • **screw worm fly** (*Cochliomyia hominivorax, Chrysomya bezziana*) • **vesicular stomatitis** • **surra** (*Trypanosoma evansi*) • **glanders** (*Burkholderia mallei*) Seen in northern Australia • meliodosis (*Burkholderia pseudomallei*)	• dermatophilosis (*Dermatophilus congolensis*) • insect bites (wasp stings, mosquito bites, buffalo flies) • insect bite hypersensitivity (e.g. *Culicoides*) • ringworm (*Trichophyton* and *Microsporum* spp.) • insecticide treatments • lice infestation • urticaria/allergic reactions • bullous pemphigoid • equine collagenolytic granuloma/equine eosinophilic granuloma • mange (Chorioptic, Psoroptic) • **cattle tick** (*Rhipicephalus microplus*) **infestation** • **equine viral arteritis** • cutaneous habronemiasis (*Habronema* spp.) • myiasis (fly strike) • onchocercal dermatitis (*Onchocerca cervicalis*) • photosensitization • tick infestation (other than *Rhipicephalus microplus*) • papilloma virus • equine coital exanthema • equine viral popular dermatitis • equine sarcoidosis • granulomatous enteritis

Table 3. Syndromes and some potential causes in horses (Diseases notifiable in Victoria are shown in bold type)

Syndrome	Exotic diseases	Endemic diseases
Ill thrift	• **equine granulocytic anaplasmosis** (*Anaplasma phagocytophilum*) • **equine piroplasmosis** (*Babesia caballi; Theileria equi*) • **glanders** (*Burkholderia mallei*) • **surra** (*Trypanosoma evansi*) Seen in northern Australia • meliodosis (*Burkholderia pseudomallei*)	• internal parasites (Strongyles) • external parasites (e.g. lice, ticks) • gastric duodenal ulcers • laminitis • Cushing's disease • poor dentition • chronic liver disease • chronic obstructive pulmonary disease (COPD) • chronic pain/arthritis • chronic renal disease • equine sarcoidosis • **equine infectious anaemia** • maldigestion/malabsorption • malnutrition or trace mineral deficiency • medication (adverse effects of long-term therapy) • neoplasia (e.g. melanoma, lymphoma) • toxicosis (e.g. chronic plant, blue-green algae) • windsucking

Picture courtesy of the Weekly Times

Routinely collect the full range of recommended samples

Routine samples should include:

Collect for every live horse submission		
Fresh	**Fixed**	**Sample**
✔		Blood – plain collection tube
✔		Blood – EDTA collection tube
✔		Faeces (~200g)
✔		Urine

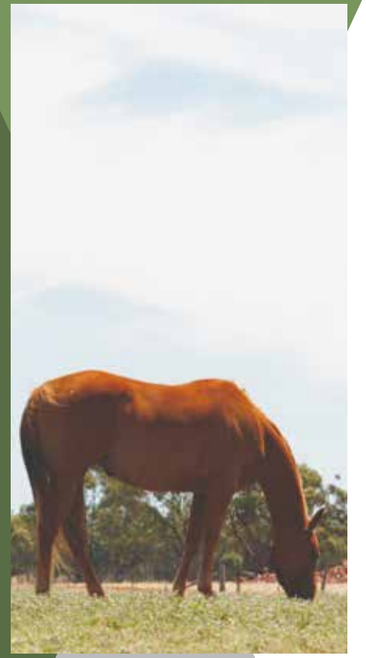
Collect for every horse necropsy submission
(Always assess the risk of Hendra virus, anthrax or other zoonotic infection before proceeding with a necropsy)

Fresh	Fixed	Sample
✔	✔	Any lesion (include margin) or abnormal system
✔		Aqueous humour – plain collection tube
✔		Blood – plain collection tube
✔		Blood – EDTA collection tube
✔		Faeces (~200g)
✔	✔	Lung
	✔	Heart
✔	✔	Spleen
✔	✔	Liver
✔	✔	Kidney
✔		Urine – dipstick, if abnormal then sterile sample
✔		Loop of ileum or ileum contents – 40mls chilled
	✔	Gut – duodenum, jejunum, caecum, colon, lymph node (should be opened to expose lumen to allow good fixation)
	✔	Stomach
✔	✔	Brain

If system pathology is suspected, also include relevant samples such as...

Fresh	Fixed	Sample
✔		Virus medium (or saline swab) – oral ulceration
✔		Nasal swab
	✔	Oesophagus
	✔	Trachea
✔	✔	Nerve
✔	✔	Muscle
	✔	Bone marrow (hematopoietic) – rib or sternum
	✔	Bone marrow (starvation) – femur
✔	✔	Joint – whole
	✔	Eye – whole (preferably in Bouin's fixative, formalin OK)
✔		Stomach contents – 250 ml chilled (sudden/unexplained death - botulism, urea, plant poisoning, toxins)
✔	✔	Uterus/foetus
✔	✔	Placenta (post-abortion)
✔	✔	Spinal cord – multiple sections (neuropathy, ataxia)

What should be collected in the field?



To complete the Record of Disease Event form (RODE) and laboratory submission form you will need to gather these details.

- Species. Is more than one species affected?
- Number of deaths , number sick, number at risk, number examined.
- Age, condition score, sex.
- History and predisposing factors.
  - When did the outbreak begin?
  - What is the recovery time?
  - What vaccinations and treatments have the animals had?
  - Recent livestock introductions?

  Consider possible sources of introduction/spread. Grazing / feeding history, pasture/feed type and weed species (if suspect plant toxicity).
- Clinical history and signs.
- Primary syndrome.
- Lesions and necropsy findings.
- Owner and property details including the Property Identification Code.
- RODE forms are available at www.agriculture.vic.gov.au/sdi

Photographs

- Sick and dead animals.
- Lesions / pathology.

Samples

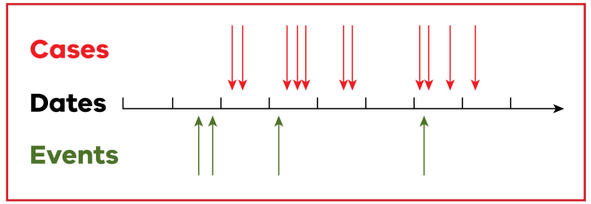
- From affected and healthy animals.
- Perform a necropsy.
- Check the sample collection guide.
- Describe lesions and take measurements.
- Be aware of zoonoses – collect samples carefully and wear appropriate PPE.

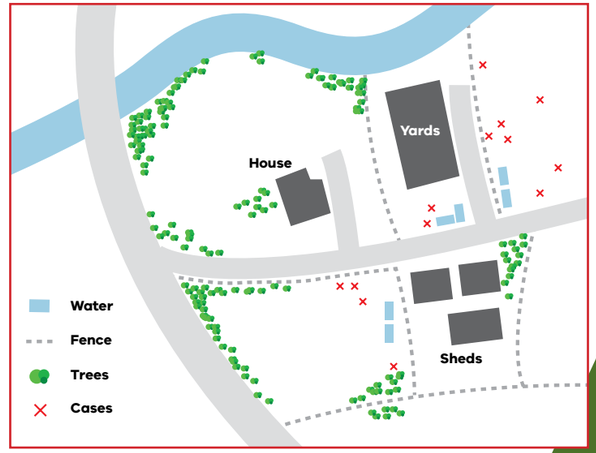
Timeline

- Sequence dates of disease cases and note clusters.
  - Find the first case – what happened before it?
  - Note other events that happened on the property within the timeline.
  - What's different when cases don't occur?

Details of the location

- Take GPS coordinates if possible.
- Address and PIC.
- Physical factors.
  - Infrastructure
  - Geography
  - Soil
  - Vegetation
  - Water sources
- Photos of layout and significant features.
- Spatial mud map of where cases occurred.
  - Identify clusters of cases.
  - Overlay geography and infrastructure.





Correct sampling and handling of blood samples is essential to assist in obtaining an accurate diagnosis

- Always ensure the correct tube is used for the required tests.
- Fill blood tubes, if possible.
- Do not allow tubes to become too hot (store blood samples at 4^{O}C).
- To avoid haemolysis:
  - remove the needle before transferring blood from a syringe to a collection tube
  - ensure samples that are required to clot remain upright
  - always mix anticoagulant tubes gently
  - don't allow blood samples tubes to cool too quickly
  - never freeze blood samples.

Tube type	Description		Tests
Serum separation and clot activator Allows the clot to form so serum can be analysed	Gold and red tops		Serology Antibody and antigen tests Clinical Biochemistry
EDTA Contains anticoagulant	Purple tops		Haematology Haemoparasite Virus isolation Polymerase chain reaction (PCR)
Lithium heparin Contains anticoagulant	Green tops		Clinical biochemistry

Correct collection and handling of tissue samples is important to assist in obtaining an accurate diagnosis

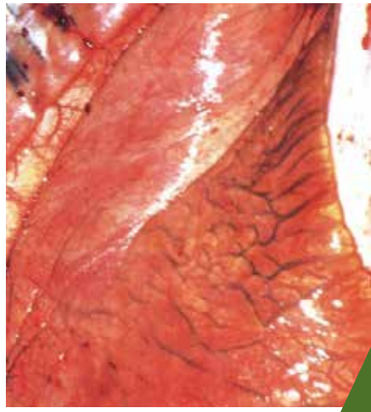
- Ensure samples are representative of lesions.
- Sample the interface with normal tissue.
- Sample areas of different color or consistency.
- Consider multiple sections for large lesions.
- Collect fresh and fixed tissue samples.

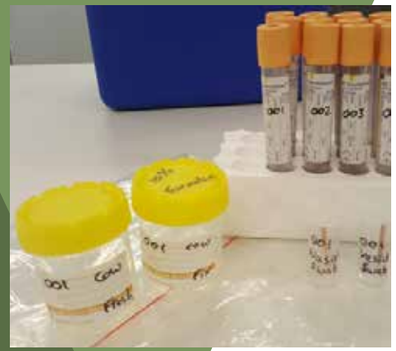
- Place fresh tissues in individual sterile containers and cool in an esky or refrigerator.

- Use 10 times the volume of 10% buffered formalin as tissue.

- Allow at least 24 hours for tissues to fix.

- Fixed tissues can be drained before transportation. Retain a few mL of formalin and seal the container well to ensure the tissue remains moist.





Handling samples in the field

- Ensure samples are taken prior to giving treatments (where possible).
- Ensure enough samples are collected to represent all horses on the property.
- Collect fresh and fixed samples first, then gut samples.

- Label samples as soon as you take them.
- Ensure labelling is clear and indelible. Record PIC, animal identification, date and vet on label.

- Clean any surface contamination from tubes and containers.
- Place tubes/vials into zip-lock bags to keep them clean and contained together.

- Keep fresh samples cool while in the field with ice bricks.
- Don't leave samples standing in the sun while working.
- Use an esky and ice bricks to store samples during transit.

Packaging samples for transport.

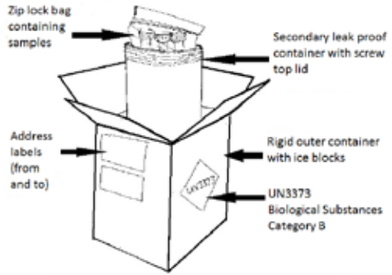
- Refrigerate samples as soon as you return from the property.
- Do NOT freeze samples.
- List all samples taken on the submission form.
- Samples must be sent to the state laboratory, AgriBio, as soon as practical.

- Place all sample containers in zip-lock bags for transport.
- Place bags of samples in a rigid container (esky/cool box).
- Use absorbent material to line container in case of leaks.

- Pack all samples with ice blocks in the transport container.
- Do not pack with wet ice.

- Place laboratory submission form in a separate zip lock bag within the transport container.
- Seal the container with tape.
- If sending via courier, place the consignment note on top of the container.
- If samples are travelling by air, packing must comply with the dangerous goods regulations for
  – UN3373, Biological substances, Category B.

Recommended packaging for transport of biological samples by air



Submitting samples and reports

Veterinary Diagnostic Services
AgriBio Specimen reception
Main Loading Dock
5 Ring Rd
Latrobe University
Bundoora 3083

Phone: (03) 9032 7515
Fax: (03) 9032 7604
Email: vet.diagnostics@ecodev.vic.gov.au

Further information

It is essential that emergency horse diseases are detected quickly to enable rapid response and control of the incident, as well as potentially protect human health. It is also important that we continue to investigate significant or unusual horse disease incidents to maintain a current understanding of conditions affecting the Victorian horse population and to address emerging horse health issues. When it comes to emergency horse diseases, no question is foolish. Don't be the veterinarian who misdiagnoses the next emergency horse disease to occur in Victoria!

For further information contact your local Agriculture Victoria veterinarian or refer to the Agriculture Victoria website **www.agriculture.vic.gov.au**

ATTWOOD	9217 4200	**ELLINBANK**	5624 2222	**SEYMOUR**	5735 4300
BAIRNSDALE	5152 0600	**GEELONG**	5226 4667	**SWAN HILL**	5033 1290
BALLARAT	5336 6856	**HAMILTON**	5573 0900	**TATURA**	5833 5222
BENALLA	5761 1611	**HORSHAM**	4344 3111	**WANGARATTA**	5722 7101
BENDIGO	5430 4444	**LEONGATHA**	5662 9900	**WARRNAMBOOL**	5561 9946
COLAC	5233 5504	**MAFFRA**	5147 0800	**WODONGA**	(02) 6043 7900
ECHUCA	5482 1922	**RUTHERGLEN**	(02) 6030 4500		

And remember, if you suspect an emergency horse disease, please call the Emergency Animal Disease Watch Hotline immediately!

AGRICULTURE VICTORIA

Information correct 2019. Please check your state department website for your current SDI contact.