

# Submission to the Agriculture and Environment Committee

Hendra virus (HeV) EquiVacc® vaccine and its use by  
veterinary surgeons in Queensland

Department of Agriculture and Fisheries

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## Executive Summary

Hendra virus (HeV) is a serious zoonotic disease (meaning that it can be transmitted from animals to humans) which can and has resulted in a number of animal and human fatalities. Given the seriousness of the disease, stringent biosecurity and health and safety measures are necessary.

Vaccination is considered the single most effective means of preventing infection with Hendra virus in horses. With vaccination and other risk mitigation methodologies, including strict infection control procedures such as the use of appropriate personal protective equipment (PPE) and personal hygiene, Hendra virus infection should be considered preventable.

## Background

### Hendra virus

Hendra virus is a paramyxovirus of the genus *Henipavirus*. The only other members of this genus are Cedar and Nipah virus. Nipah virus was responsible for the death of 105 humans and the culling of one million pigs in an outbreak in Malaysia in 1999.

Hendra virus was first identified after an outbreak of acute equine respiratory disease that resulted in the deaths of 20 horses and 1 human in the Brisbane suburb of Hendra in 1994. After an extensive series of serological and viral isolation studies the Australian flying-foxes (Chiroptera: *Pteropodidae*) were identified as the primary wildlife reservoir.

Research has shown that the virus is probably ancient and genetically stable in flying-fox populations (meaning mutations are rare). Infected flying-foxes do not show any clinical signs of disease.

There have been 55 Hendra virus incidents with 97 Hendra virus infected horses in total and a mortality rate of 77 out of the 97 cases (79%). There have also been seven known cases of human infection, resulting in death in four cases.

## Clinical signs of Hendra virus

Hendra virus infection can cause a broad range of clinical signs in horses. Hendra virus should be considered in any sick horse when the cause of illness is unknown and particularly where signs progress quickly with rapid deterioration.

The following clinical signs have all been associated with Hendra virus cases in horses, but not necessarily all signs will be found in any one infected horse:

- rapid onset of illness
- fever
- increased heart rate
- discomfort or weight shifting between legs
- depression
- rapid deterioration with either respiratory and/or nervous signs.

Respiratory signs include:

- difficulty breathing
- rapid breathing
- nasal discharge at death - can be initially clear, progressing to stable white froth or stable blood-stained froth.

Nervous signs include:

- wobbly gait
- apparent loss of vision in one or both eyes
- aimless walking in a dazed state
- head tilting and circling
- muscle twitching
- urinary incontinence
- inability to rise.

Other observations that may be seen in horses with Hendra virus infection include:

- facial oedema and/or swollen lips
- muscle trembling
- altered gait or high stepping
- colic-like signs (rolling and thrashing)
- straining with difficulty passing manure
- stranguria (difficult urination).

## **Epidemiology of Hendra virus in flying-foxes**

Hendra virus is predominantly detected in the black flying-fox (*Pteropus alecto*) and the closely related spectacled flying-fox (*P. conspicillatus*). There is minimal detection in the grey headed flying-fox (*P. poliocephalus*) and the little red flying-fox (*P. scapulatus*).

Hendra virus excretion in flying-foxes can occur at any time of the year. However, the excretion normally occurs periodically rather than continuously and in geographically different flying-fox populations with a marked peak in detection prevalence in winter in southern Queensland and central and northern NSW.

## **How Hendra virus is spread to horses**

Transmission can and has occurred from infected flying-foxes to horses and then from infected horses to humans and other animals. The precise mechanism of transmission to horses has yet to be confirmed; however recent studies show that flying-fox urine is the most likely route of excretion for Hendra virus. This knowledge will help inform appropriate risk mitigation strategies.

Routine observation of the abundance of flying-fox urine, faeces and food debris underneath trees in which they are feeding suggests that horses can have a high likelihood of direct physical contamination with potentially infectious material at these sites. Equine behavioural studies confirm that horses are active primarily during twilight in terms of their feeding activity and in general spend more time resting at night than foraging. This infers that horses could be more likely to be resting than grazing or browsing when flying-foxes are most actively foraging, making direct inoculation of infectious flying-fox urine across the mucosal surfaces of horses another plausible transmission pathway in addition to ingestion of contaminated material.

The Hendra virus itself is quite fragile. Laboratory studies have shown the virus can survive on mango flesh from 2 hours to more than 2 days and higher survival of virus in mango pulp than in urine. The same studies indicate that drying out of the virus in the natural environment would substantially reduce survival time. Environmental factors including weather conditions (rain, wind) and microclimate (temperature, humidity) all play a role of the survivability of the virus in the environment.

Although Hendra virus is present in flying-fox populations across Australia, the likelihood of horses or other animals becoming infected is very low.

Field evidence indicates that Hendra virus can spread directly from horse to horse through:

- direct contact with infectious body fluids; or
- indirect contact via contaminated equipment that could transfer infectious body fluids from one horse to another eg shared veterinary instruments.

Hendra virus is not very contagious and is more likely to occur in a single horse than in a number of horses. In paddock situations, most Hendra virus cases have involved a single infected horse that has died without any companion horses becoming infected.

There have only been 6 occasions where one or more companion horses have become infected after close contact with the first infected horse before or at the time of death.

### **Hendra virus transmission to people**

Contamination with infected horse body fluids has occurred in all cases of human infection. The few cases of Hendra virus infection in people have resulted from very close contact with respiratory secretions (e.g. mucus) and/or blood from an infected horse. There have been multiple cases of people who have reported having some contact with infected horses and who have remained well and testing showed no evidence of Hendra virus infection.

There is no evidence of Hendra virus spreading directly from flying-fox to human or human to human.

### **Hendra virus infection in other animals**

In July 2011, a dog was identified to have been naturally exposed to Hendra virus on a place in Queensland where several horses were infected with the virus. Test results confirmed the presence of antibodies to Hendra virus though the dog did not show any signs of ill health.

This was the first reported case of Hendra virus antibody detection in a dog outside of an experimental setting.

In July 2013, a dog from a place in New South Wales where a horse was confirmed as infected with Hendra virus was confirmed as infected with the virus.

Whilst the exact route of infection in both these cases may never be known, both dogs had multiple opportunities to be in contact with the infected horses, prior to and after death. Both dogs were known to be closely associated with the horses, indicating the most plausible route of exposure was from contact with the body fluids of the infected horses.

### **Experimental studies**

While cats, guinea pigs, ferrets and pigs have been experimentally infected with Hendra virus there is no evidence of natural infection in these species.

In experimentally infected horses, genetic material of Hendra virus can be detected at least three days before onset of clinical signs of disease.

# Roles and responsibilities for Hendra virus incidents

Biosecurity Queensland, a service of the Department of Agriculture and Fisheries, is the lead agency for managing Hendra virus incidents in animals when they occur.

## Animal and disease control

Hendra virus is a notifiable disease under Queensland legislation. Biosecurity Queensland's involvement in a Hendra virus case typically occurs once a positive diagnosis has occurred.

Where a horse or other susceptible animal tests positive for Hendra virus, Biosecurity Queensland works with the owner / person in charge to manage the situation. The affected place will be quarantined and biosecurity measures implemented to stop the potential spread of infection. Nationally agreed protocols for the management of Hendra virus will be implemented until confidence is established that the disease is no longer present on the place. A similar approach would be applied to a Hendra virus incident at an event.

Biosecurity Queensland regularly controls Hendra virus incidents by implementing basic biosecurity measures.

Animal Health Australia (AHA) manages the Australian Veterinary Emergency Plan (AUSVETPLAN) manuals and supporting documents that guide governments and industry through a preferred approach to manage any emergency animal disease (EAD) incident. Hendra virus incidents are covered in a specific Response Policy Brief (RPB) which outlines the nationally agreed protocols for the management of Hendra virus infection. The current version – Version 3.5, 2013 is in final stages of review to include new knowledge and science to underpin effective response.

Management of a Hendra virus incident is based on a documented assessment of the risk of Hendra virus transmission to other susceptible species on the place from the infected animal. The assessment categorises the remaining animals into two groups; close contact animals and low interest animals.

Only those animals considered to have had 'close contact' with the infected animal will be isolated to ensure contact with them is tightly controlled. These animals will be subject to a testing regime over a period of approximately 20 days as outlined in the RPB.

Human contact with horses assessed as 'close contact' is limited to essential activities only.

Low risk animals do not require testing and are permitted to move from the place if required. Vaccinated horses (horses with a current vaccination status) are considered low risk and are not be required to be tested.

The quarantine will be maintained until the nationally agreed protocols have been completed. For a testing regime this is currently approximately 25 – 30 days.

Other actions that may be conducted on an infected place include:

- close contact animals on the place are tested and their health status assessed and monitored
- horses are segregated into risk groups with close contact animals isolated
- any horses that have been moved off the place in the previous 16 days (incubation period) will be traced and possibly tested for Hendra virus based on a risk assessment
- neighbouring properties with horses will be assessed for the risk of exposure to the infected animal. Testing and monitoring may be carried out and movement restrictions applied as a result of this assessment.

Biosecurity Queensland will notify the appropriate organisations, including the Department of Agriculture and Water Resources, the Australian Veterinary Association and Equine Veterinarians Australia, peak horse industry bodies and other agencies.

Once laboratory testing confirms at-risk animals on the quarantined place are not infected with Hendra virus, movement restrictions are be lifted.

## **Information and advice**

### **Guidelines**

Biosecurity Queensland developed the *Guidelines for veterinarians handling potential Hendra virus infection in horses* to provide a comprehensive guide for veterinarians. The guidelines were developed by Biosecurity Queensland in conjunction with Queensland Health, Workplace Health and Safety Queensland and the Australian Veterinary Association (AVA) and Equine Veterinary Association. They were developed to be a practical and relevant guide to the real world situation of handling potential Hendra virus infection and provide risk mitigation options to be considered in context of the situation.

The comprehensive guidelines cover investigation planning and preparedness, clinical presentation, workplace health and safety precautions, infection control, biosecurity precautions and sampling, dispatch and laboratory testing and are recognised and referenced as a 'gold standard' publication. The current version is Version 5 September 2013.



### **Engagement activities with private veterinarians**

Biosecurity Queensland undertook a major campaign in 2010 to inform equine veterinary practitioners of the 'Guidelines for veterinarians handling potential Hendra virus infection in horses'. Approximately 130 vet clinics were visited and provided with an information pack which included the Guidelines.

### **Industry engagement**

Biosecurity Queensland chairs the Horse Biosecurity Market Access and Liaison Group which includes representatives of the Queensland horse industry and veterinarians. The group meets four times a year to discuss topics of relevance to horse biosecurity. Hendra virus is a standing agenda item.

Biosecurity Queensland provides information on the latest Hendra virus incidents and risk mitigation strategies on the departmental web site as a focal point of comprehensive information on Hendra virus. Information is also disseminated using social media streams.

Biosecurity Queensland has conducted several survey studies for the horse owners, private equine veterinarians and general public during 2011-2012 on their knowledge, perception and attitude in relation to Hendra virus infection for the improvement of departmental extension work and educational needs on Hendra virus risk mitigation management plan

Biosecurity Queensland has been part of research team on a longitudinal cohort study of horse owners (Horse owners and Hendra virus: A Longitudinal study To Evaluate Risk-HALTER) to identify trends in Hendra virus risk perception, uptake of risk mitigation practices, and attitudes towards Hendra virus control and risk communication. This project offered recommendations for improving communication with horse owners, addressing barriers to the uptake of risk mitigation practices, reviewing communication and approaches to current vaccination implementation, and preserving the important veterinarian-horse owner relationship.

### **Other available information**

The AVA has developed their own document, 'Guidelines for Veterinary Personal – Biosecurity' which describes similar actions to those of the Biosecurity Queensland guidelines. This is available on the AVA website along with other supporting material, including the 'Suit Up' video.

Additional relevant material is available on the Queensland Health and Workplace Health and Safety websites.

## Hendra virus testing

The Biosecurity Sciences Laboratory, Biosecurity Queensland’s veterinary diagnostic laboratory at Coopers Plains, performs Hendra virus testing predominantly on horses but other susceptible species such as dogs can be tested.

There are two categories of testing – disease investigation and health testing. Hendra virus testing as part of a disease investigation is performed on samples from horses that are unwell and show clinical signs of possible infection. These exclusion tests are provided at no cost to the submitter in recognition of the substantial public health benefits involved in the event of a positive Hendra virus diagnosis.

Health testing for Hendra virus of samples from horses that do not show signs of possible Hendra virus infection are performed at the request of a veterinarian prior to other treatments or procedures, including export. There is a charge applied for these tests.

Table 1: Number of equine cases submitted to the Biosecurity Sciences Laboratory for Hendra virus testing from 2011-2016

Year	No. of cases requesting Hendra virus testing	
	All categories <sup>a</sup>	Disease investigation category
2011	719	605
2012	618	488
2013	628	524
2014	616	532
2015	938	845
2016 <sup>b</sup>	241	215

<sup>a</sup> Hendra virus categories – disease investigation, health testing, regulatory

<sup>b</sup> Testing for 2016 as of 11/04/2016

Samples submitted for Hendra virus health tests are usually blood samples. For a disease investigation, nasal, oral and anal swabs as well as blood are recommended.

There are two types of tests performed at the laboratory – the polymerase chain reaction (PCR) and the enzyme-linked immunosorbent assay (ELISA).

PCR tests can be conducted on blood, swabs and tissue samples. They detect the direct presence of genetic material of Hendra virus in a sample and can detect live or dead virus but cannot differentiate between them. The Hendra virus PCR testing is performed daily during business hours. Samples that are received prior to 2:00 pm are tested and reported

to the submitting veterinarian that same day. Samples that received after 2:00 pm are tested and reported the following day. The protocol has been well established as it maximises efficiencies in the laboratory system.

Hendra virus PCR testing may be performed outside of business hours, including weekends, if a horse is showing clinical signs of suspect Hendra virus infection and a risk assessment identifies an urgent need to undertake the test, including significant human exposure or high risk situations such as an incident at large equestrian event. For out of hour's cases, an on-call duty pathologist is available to discuss the case with the attending veterinarian and undertake the risk assessment. If a decision is made that testing needs to be performed, the laboratory will complete the tests as soon as samples can be received. This is done at no additional costs to the submitting veterinarian. Currently, the additional costs of undertaking the tests outside business hours are absorbed by the Government.

ELISA tests are conducted on blood serum samples to detect the presence of antibodies to Hendra virus. The ELISA test is regarded as a screening test and is performed weekly for health testing purposes. It is used during Hendra virus incidents to assess close contact horses.

The current charge for health tests are \$61.74 for a PCR and \$43.47 for an ELISA.

## **The development of the Hendra virus vaccine**

The development of a Hendra virus vaccine for horses had been under investigation for many years by CSIRO in collaboration with international partners. In 2010, CSIRO announced the results of a series of trials that showed that horses could be vaccinated against Hendra virus to prevent infection. The Queensland Government's then Department of Employment, Economic Development and Innovation contributed \$300,000 to research for the development of the vaccine in the financial year 2010-11, through a collaborative agreement with CSIRO and matched by the federal Government. These funds were used to undertake trials on horses to demonstrate whether the experimental Hendra virus vaccines would provide adequate protection.

The Hendra virus vaccine for horses became commercially available in August 2012 under a minor use permit after the culmination of seven years scientific research from multiple agencies worldwide.

Apart from funding contributions, the Queensland Department of Agriculture and Fisheries played no part in the development of the vaccine or the trials associated with its proof of efficacy and safety. This work was done by Australian Animal Health Laboratories in conjunction with private industry partners.

The Australian Pesticide and Veterinary Medicines Authority (APVMA) is the Federal Government body responsible for the assessment and registration of veterinary medicines including vaccines. The Department of Agriculture and Fisheries accepts the safety and efficacy of the Hendra virus vaccine as determined by the APVMA.

Biosecurity Queensland does not collect or keep statistics on the number of horses vaccinated or the number of adverse reactions reported. These are maintained by other organisations, including the vaccine manufacturer and the APVMA.

During an incident managed by Biosecurity Queensland, access to the database of vaccinated animals maintained by the vaccine manufacturer is used to confirm the vaccination status of horses.

## **Hendra virus risk assessment**

Within a standard risk management matrix, the consequences of Hendra virus infection are classified as being potentially catastrophic for both horses and humans. As a result, a conservative 'precautionary principle' approach is taken whenever uncertainty exists - that is, procedures should be put in place to limit possible harm in all cases where Hendra virus is considered as a differential diagnosis.

### **Managing the risks of Hendra virus infection**

Much is now known about Hendra virus and how it is transmitted.

Knowledge has progressed significantly in the past few years and current understanding of the virus suggests there are a number of basic biosecurity measures horse owners can take to reduce the risk of horses becoming infected with Hendra virus and prevent spread to other animals or humans.

#### **Vaccination**

The single most effective means of preventing Hendra virus infection in horses is vaccination. Clinical trials of the vaccination have shown complete protection when vaccinated horses were exposed to a lethal dose of Hendra virus and demonstrated that:

- all vaccinated horses were protected from disease
- infection with Hendra virus did not establish
- Hendra virus was not shed or transmitted from vaccinated horses (to other horses or humans).

Vaccination is not a replacement for biosecurity practices such as limiting interaction with bats, good personal hygiene, minimisation of contact with the horse's bodily fluids and the

exercising of extreme caution when handling sick horses. Although the vaccine is an important breakthrough in the options for preventing Hendra virus infection, no vaccine is 100% effective. It is important that people in contact with horses continue to practice good biosecurity and infection control at all times, even with vaccinated horses.

All horse owners are encouraged to discuss a vaccination program with their veterinarian.

With vaccination and other risk mitigation methodologies, Hendra virus infection should be considered preventable.

Research has shown that vaccination uptake is showing signs of slowing down and moving away from the recommended vaccination regime. A key finding was that horse owners need to be reassured about the safety and efficacy of the vaccine to improve uptake.

### **Limiting horse and flying-fox interaction**

Flying-foxes are attracted to a broad range of flowering and fruiting trees and vegetation as food sources. Flying-foxes have been known to travel up to 40km from their colony at night to feed. Many horse owners are unaware of flying-fox activity on their properties. Recent studies show that flying-fox foraging is repetitious, with individual flying-foxes returning night after night to the same location. There is a preference for feeding in individual trees that can be easily accessed by the flying-foxes and non-native plant species. This situation is found in many typical horse paddocks, resulting in increased flying-fox activity around rural and peri-urban areas and heightened equine exposure risk.

There is a range of measures that can be applied to limit the interaction between horses and flying-foxes, including:

- removing horse feed and water containers from under trees. If possible, feed and water containers should be placed under a shelter
- inspecting and identifying flowering/fruiting trees/shrubs on the place. Remove horses from paddocks with trees/shrubs that attract flying-foxes
- return horses to paddocks with flowering/fruiting trees/shrubs only after the trees/shrubs have stopped flowering/fruiting
- consider fencing (temporary or permanent) to restrict access to affected areas if horses cannot be removed from the paddock
- temporarily removing horses during times of peak flying-fox activity (usually at dusk and during the night eg night time stabling).

### **Management of human and horse interactions**

Contamination with infected horse body fluids has occurred in all cases of human infection.

Research indicates that virus can be shed in the nasal passages of Hendra virus infected horses up to 72 hours prior to clinical signs being exhibited. Excretion of virus from an infected horse increases exponentially as clinical symptoms of the disease progress with a peak of excretion immediately prior to death.

Exposure to body fluids of horses poses the greatest risk to humans for transmission of the virus. Any procedure or interaction between humans and horses that increases the risk of exposure to horse body fluids increases the likelihood of transmission. Proportionate risk treatments need to be identified and applied:

- minimise close contact with the mouth and nose of a horse
- procedures that require exposure to body fluids should only be done with appropriate levels of protective equipment
- if accidentally exposed to body fluids, immediately implement basic hygiene eg wash hands, remove soiled clothing
- isolate sick horses from other horses, people and animals until you have a veterinarian's opinion
- if there is more than one horse on a place, handle unaffected horses first. Handle sick horses only after taking appropriate precautions
- clean and disinfect all gear exposed to any body fluids from sick horses before using it on another horse. This includes halters, lead ropes and twitches
- when cleaning contaminated equipment from a sick horse, wear gloves, cover any cuts or grazes and wash hands thoroughly afterwards
- do not travel with, work on or take sick horses to other places or equestrian events
- do not allow visiting horse practitioners (e.g. farriers) to work on sick horses
- seek veterinary advice before bringing a sick horse on to a place.

### **Personal Protection Equipment (PPE) rebate program**

Given the importance of PPE as a mechanism for limiting exposure to Hendra virus, the then Queensland Government allocated \$1 million over four years to deliver on a 2012 election commitment to help frontline veterinarians through the Hendra virus PPE Rebate Scheme. To promote the use of PPE and minimise the risk of exposure to Hendra virus, the Rebate Scheme offsets the purchase price of PPE for eligible equine veterinarians and is administered by QRAA.

PPE covered by the scheme includes:

- biohazard bag
- disposable boot covers
- disposable overalls

- disposable respirator
- duct tape
- full face shield
- nitrile gloves
- safety eyewear
- sharps disposal container.

As at 30 March 2016, over \$145,000 has been paid to eligible veterinarians across the State of which approximately \$11,500 has been distributed as part of the Start-up rebate, and \$134,000.00 for the Replenishment rebate.

As at 30 June 2015, there have been 2092 submissions to the Biosecurity Queensland (BQ) laboratories, with each of those eligible to receive the \$250 Replenishment rebate. If all eligible applications had been submitted, over \$523,000 could have been allocated by QRAA to date. These figures indicate that currently the Replenishment rebate is not being fully taken up, despite a number of initiatives to encourage uptake by eligible veterinarians.

Figures provided by QRAA have indicated that program funds have been accessed by only 39 individual applicants.

## **Risk and cost of a Hendra virus incident**

All livestock producers and owners (including horse owners) are expected to take an active role in managing the biosecurity risks under their control. Individuals and organisations whose activities pose or potentially pose a biosecurity risk have an obligation to manage them.

Any costs associated with routine animal management and disease control mechanisms are borne by the owner.

The Department of Agriculture and Fisheries undertakes response actions only after a positive notification of a Hendra virus case.

### **Increased risk at horse events**

The gathering of animals at shows or events increases biosecurity risks for a multitude of possible disease scenarios. Animals travel from all over the state, and regularly from interstate, accumulate and intermingle for several days in smaller areas, and then disperse back to multiple places across the country.

The presence of a Hendra virus infected horse at an event would cause considerable cost to individuals and government to implement control measures.

Risk assessments at an event use the same criteria as those for the occurrence of infection on a single place. The additional complexity associated with events is determining exactly which animals had close contact with the infected animal and when. The increased human-animal interactivity at an event means a higher possibility of human exposure to Hendra virus infection. Depending on the size of the event and numbers of animals attending, the risk assessment could take several days.

Vaccinated animals at an event are considered 'low risk animals' and would be allowed to return home and be managed by the owner on place with little or no risk.

Biosecurity Queensland has worked extensively with industry organizations to develop and implement biosecurity plans for events. Some event organisers have included mandatory Hendra virus vaccination for participating horses as part of these plans.

These decisions are entirely at the discretion of the organizing committees taking into consideration the risk factors they have identified.

On 18 December 2015, the Australian Competition and Consumer Commission (ACCC) released its finding in relation to the supply of equestrian event services on condition that horses are vaccinated against the Hendra virus (Notification no. N98410). The ACCC found that having the Hendra vaccination required as a condition of entry to a particular equestrian event is likely to result in public benefits by reducing the risk of transmission of Hendra virus to other horses or to humans. In reaching its conclusion, the ACCC relied on the fact that the appropriate Government veterinary medicine regulatory approval body had recently complete a detailed assessment of the Hendra virus vaccine and found it to be generally safe to use and effective against the Hendra virus.

Support material is available to assist event organisers develop biosecurity plans, including comprehensive advice on the departmental web site and others such as the Animal Health Australia Horse Venue Biosecurity Workbook.

### **Human costs**

Hendra virus infection in humans is a notifiable condition which has resulted in death in 57% (4/7) of known cases. People that have been infected with Hendra virus but survived have suffered significant illness, requiring an extensive period of hospitalisation and intensive care.

### **Animal costs**

The cost of seeking veterinary attention for a horse that contracts Hendra virus, along with testing, quarantine and burial of an animal can be considerable. There may be additional costs involved in the replacement of animals that do not survive Hendra virus infection.



The cost of vaccination is a factor for horse owners to consider as part of their biosecurity risk mitigation for their horses, themselves and their place.

### **Potential industry costs**

The impact of a Hendra virus incident at a horse event where a significant number of horses and people come together would be significant, both to industry and the Government.

There would be severe disruption to movement of animals and people and considerable costs associated with the housing and feeding of animals during the period the incident is being controlled.

The higher the number of vaccinated animals at the event, the lower the potential impact is likely to be as vaccinated horses are able to be released to leave the site after risk assessment.

### **Cost of Government responses**

The government response to the large scale Hendra virus incidents in 2011 cost approximately \$1.4M. The large scale Hendra virus incident in May 2012 cost the government approximately \$222,000.00.

Biosecurity Queensland has demonstrated that the safe and efficient management of Hendra virus incidents can be achieved using basic biosecurity measures.

Hendra virus incidents are now routinely managed as 'business as usual' by Biosecurity Queensland staff and not as large scale emergency responses as previously undertaken. The cost of recent incidents has been in the order of \$10k each.

## **Department of Agriculture and Fisheries recommendations**

Hendra virus infections will continue to occur in Queensland as a result of the normal and natural interactions between flying-fox populations and horses.

The consequence of Hendra virus infection is classified as being potentially catastrophic for both humans and horses that become infected with the virus.

The Department advocates that all persons, including horse owners, veterinarians and event organisers, undertake proper biosecurity risk assessments for their particular circumstances and apply a precautionary approach managing their biosecurity risks, particularly where Hendra virus may be a differential diagnosis given that:

- Hendra virus may transmit prior to symptoms being obvious in an infected animal
- clinical signs may mirror those that present in a number of other conditions.

The department accepts the safety and efficacy of the Hendra virus vaccine as determined by the APVMA through their testing and registration process and supports and affirms the Departments stated position that vaccination is the single most effective (but not sole) risk mitigation measure against a significant disease with catastrophic consequences.

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