

Hendra virus vaccine and its use by veterinary surgeons in Queensland

Agriculture and Environment Committee

Submission from the Australian Veterinary Association Ltd



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About us

The Australian Veterinary Association is the national organisation representing veterinarians in Australia. Our 8500 members come from all fields within the veterinary profession. Clinical practitioners work with companion animals, horses, farm animals, such as cattle and sheep, and wildlife. Government veterinarians work with our animal health, public health and quarantine systems while other members work in industry for pharmaceutical and other commercial enterprises. We have members who work in research and teaching in a range of scientific disciplines. Veterinary students are also members of the Association.

Equine Veterinarians Australia is a special interest group of the Australian Veterinary Association. It represents over 1000 veterinarians who treat horses as part of their practice.

Executive summary

Hendra virus has posed a number of challenges for Queensland horse owners, equine veterinarians, government agencies, equine industries and the general public since it was identified in 1994. Animal health and welfare, workplace health and safety, and public safety are shared responsibilities where all these stakeholders have a role to fulfil. These shared responsibilities in relation to Hendra virus are even more important under the general biosecurity obligation being introduced in the new Queensland *Biosecurity Act 2014*. The problematic aspects of the disease can only be addressed through constructive cooperation and communication among all stakeholders.

In recent years, veterinarians have had to consider increasingly complex risks in their decisions relating to Hendra virus. This is due to five main factors:

1. The unpredictable nature of the disease
2. The death of two veterinarians from the disease in 2008 and 2009
3. Debilitating illness in a veterinary nurse caused by Hendra virus
4. The inability of veterinary practices to obtain business interruption insurance against quarantine of veterinary hospitals after a confirmed Hendra virus infection on the premises
5. The legal charges brought against three private veterinary practitioners by Workplace Health and Safety Queensland.

Some veterinarians have stopped treating horses, some have moved interstate, while others have responded with a range of policy approaches to minimise the risk to themselves, their staff and their businesses. These risk mitigation responses are likely to continue and potentially become more entrenched unless current circumstances change.

There is limited scope for change in many aspects of the disease. Hendra virus will continue to circulate in and spill over from flying fox populations. The flying foxes cannot be permanently removed due to their important ecological role. Horses will continue to come in contact with flying fox excretions, despite advice to horse owners to minimise contact, and the risk of horses contracting Hendra virus will remain.

The full personal protective equipment mandated by government guidelines for investigating potential Hendra virus infections does provide a high level of protection for people, but also increases other work health and safety risks for veterinarians, horse owners and handlers. These risks include a greater likelihood of physical injury from the horse and other hazards, as well as heat stress in the Queensland climate. These risks can be difficult to mitigate in the field. The use of personal protective equipment offers no protection for horses against infection from flying foxes.

Mobile testing for Hendra virus antibodies ('stall-side testing') is currently not available. Even if it were to become a reality, it would have some significant limitations and could not be relied upon in a field situation. Like personal protective equipment, mobile testing does not prevent the infection of horses.

Individual horse antibody titre testing is currently available in one laboratory and may be helpful in managing horses that have experienced vaccine side effects. However, in other comparable situations where animal

vaccination provides a public health benefit (such as rabies vaccination of animals in the USA), antibody titre levels are not considered sufficiently reliable to assume full protection against the disease. As a result, rabies vaccination of animals in the USA is mandatory in most states regardless of titre levels to ensure that public health is protected.

The Queensland Department of Agriculture and Fisheries has stated that **“Vaccination is the single most effective way of reducing the risk of Hendra virus in horses.”**¹ Workplace Health and Safety Queensland asserts that **“The vaccine is the single most effective way of reducing the risk of Hendra virus infection in horses and provides a work health and safety and public health benefit”**² while the Hendra Virus Interagency Working Group, which includes Queensland Health, adds that **“Widespread uptake of the horse vaccine has the potential to significantly reduce the number and risk of human exposures.”**³

Vaccination has proven the most useful tool for veterinarians adapting to the challenges posed by Hendra virus in equine practice. It takes a central role in the risk assessments undertaken by veterinarians. Based on the existing scientific literature, it prevents horses from becoming infected with Hendra virus and from shedding virus that may infect other horses and people. No vaccine for humans or animals can ever be guaranteed to be effective under all circumstances. The Hendra virus vaccine is much more reliable than many equine vaccines, some of which have not been tested by a challenge with the infectious agent, and many of which do not prevent shedding of the virus. As the effectiveness of the vaccine has been clearly demonstrated in scientific studies and because veterinarians have confidence in these studies, sick vaccinated horses will likely have faster access to veterinary care if exclusion tests are not required. Vaccinated horses also represent less of a risk to the community, and lower costs to Queensland taxpayers who fund all responses to outbreaks by the Department of Agriculture and Fisheries, Queensland Health and Workplace Health and Safety Queensland.

The vaccine is fully registered by the Australian Pesticides and Veterinary Medicines Authority for horses older than 4 months of age and for breeding females, and has undergone rigorous testing by the Australian Animal Health Laboratory. Veterinarians administering the vaccine have not observed any reason to question its safety and effectiveness. Australian Veterinary Association members have reported a similar frequency and severity of adverse reactions to the vaccine as published by the Australian Pesticides and Veterinary Medicines Authority in June 2015 – a low percentage of reported reactions, with the majority of these being minor effects expected from an effective vaccine prompting an immune response.

Some horse owners have expressed concerns about health problems in their horses that they attribute to the Hendra virus vaccine, while many others assert that they have not observed reactions in horses that have received multiple doses of the vaccine. Serious health problems in horses are very worrying for owners and veterinarians alike. All suspected adverse reactions should continue to be reported to and investigated by the Australian Pesticides and Veterinary Medicines Authority so that vaccine safety can be monitored over time.

Recommendations

1. The Committee endorses the position of the Department of Agriculture and Fisheries, Workplace Health and Safety Queensland and Queensland Health that the vaccine is the single most effective way of reducing the risk of Hendra virus infection in horses and provides a work health and safety as well as a public health benefit.
2. All of these three Queensland government agencies actively communicate with horse industry stakeholders to promote the Committee's endorsement.
3. The Queensland government supports the registration processes of the Australian Pesticides and Veterinary Medicines Authority in relation to the safety and effectiveness of the Hendra virus vaccine, and the continued investigation of any reported adverse reactions.
4. The Committee acknowledges that the vaccine plays a significant role for equine industries and event organisers in managing their risks relating to Hendra virus.
5. The Queensland government endorses event organisers who choose to manage their risks relating to Hendra virus by requiring participants to vaccinate their horses as a condition of entry.
6. The Committee supports the vaccine being only administered by veterinarians to maintain the integrity of the vaccine database, to ensure adherence to effective vaccine administration protocols and to protect animal and human health in line with international standards for preventive medical care.
7. The Committee acknowledges that the vaccine plays a significant role for veterinary practitioners in managing their risks relating to Hendra virus and practitioners must make their own decisions about how to best manage their individual risk.
8. Stakeholders continue to work together to achieve greater clarity in relation to work health and safety guidelines that can be practically and safely applied in the field, including developing a single set of government guidelines that communicate clearly and simply to both veterinarians and the community.
9. The Queensland government provides additional funding and support to assist the veterinary profession in accurately and consistently applying the relevant work health and safety guidelines.
10. The Queensland government provides additional funding and support for community education on the importance of the relevant work health and safety guidelines.
11. The Queensland government increases funding for Hendra virus exclusion testing to provide services on weekends and public holidays, and faster result reporting to improve animal welfare outcomes.

Background

Hendra virus is a lethal virus which can be transmitted between animals and humans, and between animals. It was first identified in 1994. In disease outbreaks so far recorded it has not been shown to be highly contagious. Outbreaks have occurred sporadically in Queensland and northern New South Wales. The virus spills over from its natural host, flying foxes, into horses. Close contact with an infected horse's body fluids can transmit the virus to people.

Although this is a sporadic disease, for veterinarians the risk is very real on a daily basis. There have been 48 laboratory-confirmed cases in horses from 41 outbreaks between 2011 and 2015. All the initial cases in each of these 41 outbreaks were diagnosed by private veterinary practitioners. Some practices have diagnosed four cases in horses, and some individual veterinarians have diagnosed three cases. A veterinarian practising in an area where there has been a Hendra virus case faces a daily concern that a horse may be infectious.

Horse owners are also at risk from the Hendra virus. While veterinarians come into contact with many sick horses, owners are also susceptible to infection through contact with the body fluids of their own sick horse. In 2014, six people who were not veterinarians had sufficient exposure to the virus to warrant access to an experimental treatment (monoclonal antibodies) in the hope of preventing the disease.⁴

The consequences of infection are very serious for both horses and people. In horses, there is a 79% mortality rate with a national policy to euthanase survivors to protect public health. This policy is currently subject to review. The mortality rate for humans is 57%¹ with potential for serious long term health effects in patients who recover

from acute infection.

There are four main factors that increase the risk of a horse or person becoming infected.

- Geographical location – Hendra virus infections have so far been recorded in the eastern coastal regions of Queensland and New South Wales, as far west as Chinchilla and as far south as Kempsey
- Presence of flying foxes in a horse's environment
- Contact between the excretions of flying foxes and horses
- Contact with body fluids of an infected horse.

There are many unknowns about the exact routes of transmission and why some people become infected after contact with body fluids from an infected horse while others do not. Given the extremely serious consequences of infection, a very high level of precaution against the disease is considered necessary.²

As stated in ***Hendra virus infection prevention advice***³, an additional complication is that:

“infected horses are considered to present the most significant level of risk of infection to humans up to 72 hours before the onset of clinical signs and up to and including post-mortem examination ... and safe disposal of the carcass. Because experimental studies have detected viral RNA from two infected horses up to five days before the onset of clinical signs^{5,6} consideration should also be given to assessing the theoretical risk of human infection from high risk procedures undertaken in the five day period preceding onset of clinical signs in the horse.”⁷

In other words, a horse does not have to appear sick to still have the potential to infect a person. In fact, one of the seven confirmed human cases of Hendra virus infection occurred as a result of contact with an infected horse shedding virus before clinical signs in the horse became apparent.⁸

Clinical signs of Hendra virus infection are varied, vague and similar to many common equine ailments that veterinarians encounter on a daily basis. The Queensland government's ***Guidelines for veterinarians handling potential Hendra virus infection in horses*** states that Hendra virus infection should be considered if a horse may have had contact with flying foxes and any one or combination of the following signs are present:

- Acute illness
- Increased temperature
- Increased heart rate
- Discomfort or shifting weight between legs
- Depression or rapid deterioration in health.¹

Horses with confirmed Hendra virus infection have also presented with respiratory, colic, or neurologic signs, weakness, inappetence or behaviour change.

Essentially this indicates that almost any unvaccinated sick horse with potential exposure to flying fox excretions, virus-contaminated objects or other horses may have a Hendra virus infection. As it is a sporadic disease, the likelihood is not high, but the consequences are so severe that this possibility must be taken very seriously. Given that horses can be infectious before becoming obviously ill, there is also a possibility that a seemingly healthy horse can transmit the virus to a person. In both instances, a low likelihood combined with a very severe potential consequence or impact does not equate to a low risk. The standard risk management matrix explains how the concepts of likelihood and impact of an event work together to support decision-making around risk.

Likelihood/ Impact	Nearly No	Minor	Moderate	Major	Disaster
Will Happen	Medium	High	High	Extreme	Extreme
Most likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	Extreme
Unlikely	Low	Medium	Medium	Medium	High
Rare	Low	Low	Medium	Medium	High

For example, in a region where there have been several confirmed cases, a veterinarian could assess the likelihood of a sick horse of having Hendra as possible. As a positive case is potentially fatal because the horse is unvaccinated, this would be assessed as a disastrous impact. Using the risk management matrix, the risk in that situation is extreme. By taking precautions to help prevent infection such as avoiding invasive treatments and wearing personal protective equipment, the potential likelihood may reduce to unlikely, and the risk reduces to high. If the sick horse were vaccinated, the likelihood of infection of the person would revert to a lower category of extremely rare (although not shown in this matrix) although the potential impact does not shift from disastrous. The risk would then reduce below the 'high' level.

There has never been a confirmed case of Hendra virus in a vaccinated horse and the scientific evidence confirms the vaccine's effectiveness.¹⁰ This means that in a vaccinated horse, the risk is lower because based on current knowledge, the likelihood is rare.

How equine veterinarians respond to these risks in their daily working life is guided by three sets of government guidelines.^{1,2,3} These guidelines are consistent in the high level of precautions required of veterinarians who treat horses. The guidelines allow a degree of flexibility for veterinarians to undertake their own professional risk assessments in individual cases based on factors such as geographic location, vaccination status of the horse, proximity to flying foxes, and management features such as stabling. These guidelines repeatedly point out that vaccination is the single most effective way of reducing the risk of Hendra virus, with the use of personal protective equipment and biosecurity protocols providing a lower level of risk mitigation.

These guidelines were originally provided as recommendations for action, but they are now used to mandate the responses of veterinarians when faced with a suspect Hendra virus case. For example, legal charges are being laid against veterinarians who are alleged to have not complied with particular aspects of the guidelines. The primary veterinary insurer will cover veterinarians for professional indemnity and liability in the event of a confirmed Hendra virus case if they can demonstrate full compliance with the government guidelines in handling the case. As a result of the changed environment, and due to difficulties applying these guidelines in practical field situations, these guidelines should be combined into a single set of clear guidelines for veterinarians and the general public.

The vaccine

Terms of reference

1. the development, trials and approval processes
2. the incidence and impact of adverse reactions by horses following vaccination and the reporting of adverse reactions and economic impacts of the HeV EquiVac ® vaccine

The Hendra virus vaccine for horses has been available since November 2012 under a minor use permit issued by the Australian Pesticides and Veterinary Medicines Authority.^a

It was fully registered in August 2015.

Trials conducted at the Australian Animal Health Laboratory showed strong scientific evidence that this vaccine is very safe and effective.⁹

Approximately six months after being vaccinated, when horses were infected (challenged) with Hendra virus, all were protected from clinical signs of disease. In addition, virus was not found in any samples from any of the horses collected before or after euthanasia and there was no evidence of virus spreading beyond the site of administration (i.e. the upper respiratory tract).

The virus challenge dose was much larger than what would be expected under field conditions of flying foxes shedding virus. This challenge dose was highly lethal to control animals who had not been previously vaccinated.

In summary, all vaccinated animals were protected from disease against a virulent challenge with Hendra virus for up to six months, and transmission or shedding of virus was prevented.¹⁰

After more than three years administering more than 430,000 doses of the vaccine to over 120,000 horses, Australian veterinarians remain convinced of the safety and effectiveness of the vaccine. There has never been a confirmed case in a vaccinated horse.

There is also strong evidence that government departments are confident in the vaccine to prevent infection in the field. From 2013 to 2015 there were seven outbreaks of Hendra virus in New South Wales. The NSW Department of Primary Industries used the Hendra virus vaccine in 19 horses that had been in contact with the seven Hendra-infected horses. These 19 vaccinated horses remained healthy and did not develop the disease. In the July 2015 outbreak on the Atherton Tablelands in Queensland, there were six vaccinated horses on the property where the positive case was identified. These six horses remained healthy and were released early from quarantine according to the national protocol determined by the Animal Health Committee (the committee of Australia's Chief Veterinary Officers).

The current dose regime is two initial priming doses 3-6 weeks apart, with a third dose administered six months after the second priming dose and boosters every six months after that. Research that found immunity lasted at least 12 months after the third dose is currently being reviewed by the Australian Pesticides and Veterinary Medicines Authority. This anticipated change in the booster regime would be welcomed by veterinarians to help reduce the cost to owners associated with vaccination and address concerns about 'over-vaccination'.

Six-monthly booster doses of equine vaccines are not uncommon. For example, vaccinations against equine influenza and West Nile virus are both required twice yearly, and have widespread uptake overseas. In Europe, the USA and UK twice yearly vaccinations against equine influenza are a requirement to participate in any equine competitive events including thoroughbred racing. These vaccinations must be administered and certified by a veterinarian for a horse to be permitted to enter an event.

^a According to the Australian Pesticides and Veterinary Medicines Authority, a minor use permit is "for uses where no relevant registered products or use patterns exist because registering the use pattern would not produce an economic return."

Reactions

A condition of the minor use permit for the vaccine was mandatory reporting and investigation of adverse reactions by the vaccine manufacturer, Zoetis Australia. These investigations were then independently assessed by the Australian Pesticides and Veterinary Medicines Authority to determine the likelihood that the reported reaction was caused by the vaccine. Each report was classified into one of four categories – probable, possible, unknown or unlikely.

From November 2012 to June 2015, 977 reports of adverse reactions to the vaccine in horses were made from the administration of 367,759 vaccine doses. Of these, the majority (674 or 69%) were classified as 'probable', and most reports related to expected routine responses to a vaccine such as swelling or soreness at the injection site.¹⁰ These are the types of minor effects expected from an effective vaccine prompting an immune response in the vaccinated animal and are similar to those experienced by people who have received an immunisation.

The results of investigations into adverse event reports during the period to June 2015 generally reflect the experiences of veterinarians in the field who are vaccinating horses. The Australian Veterinary Association recently asked veterinary practices about the number of vaccine doses administered, and the number and type of reactions reported by owners in vaccinated horses. Veterinary practices reported that approximately 1 in every 140 doses of the vaccine administered caused some form of reaction, with 70% reported as minor injection site reactions – a small incidence of mostly expected immune responses.

There is a level of confidence being displayed by many horse owners in the vaccine. The Australian Veterinary Association invited veterinary clients to sign a petition that they have had their horses vaccinated without experiencing adverse reactions, and that they intend to continue vaccinating their horses in the future. One thousand two hundred and forty (1240) people signed the petition in both hard copy and online formats (Appendix 1). Many horse owners made additional comments after signing the petition along the lines of those included below. All comments are included at the end of Appendix 1.

"I have lost a horse to Hendra and exposed my ex-wife and best friend to high level exposure to Hendra which required the 3 of us to have the monoclonal treatment at the PA hospital as the only form of protection from infection. I have had all 6 of my horses vaccinated 5 times with no reactions with the oldest over 40 years of age. I know of no one in our area that has had a reaction at all. I will never put others at risk ever again by not having my horses vaccinated." Allan Mitchell

"I have vaccinated over 40 horses with WA Police over the last 3 years with no adverse side effects." Glen-Roy Potter

"I have vaccinated 11 horses multiple times and have not seen any reactions. I fully support veterinarians who choose not to treat unvaccinated horses. I believe in the science that brought us such a safe and highly effective vaccine." Kate Purvis

"I have vaccinated my horse since it was first available. He was recently very ill and presented with what could have been Hendra symptoms and would have been a notifiable event if not for his vaccinations. Instead he was able to receive prompt and probably life-saving treatment. Myself and my family and friends did not have to spend an anxious time worrying about possible exposure and going through the considerable inconvenience of a quarantine until results were available." Jo-Anne Border

"I value the lives of my horses, family and friends as I live in a high risk area my horses are on their 6th round of shots with not one single reaction." Michelle Chalmers

Veterinarians are not seeing widespread serious reactions to the vaccine. They are seeing the expected rate of minor reactions, similar to those experienced by people receiving an immunisation. There are many satisfied horse owners choosing to continue to use the vaccine and the experiences of these satisfied clients must be considered alongside those who have concerns. Suspected reactions to any veterinary medicines should be reported to the Australian Pesticides and Veterinary Medicines Authority so that any problems with the vaccine can be identified and addressed. Serious reactions to vaccines are very concerning to horse owners and veterinarians alike, and it

is only through diligent reporting of adverse events that evidence can be gathered.

Equine events

The Australian Veterinary Association believes Hendra virus vaccination should be a condition of entry to events where horses gather together to compete from high risk regions of Queensland and New South Wales. The large numbers of horses in close proximity at events increase the likelihood of disease transmission between horses. The many people interacting with and often camping near horses increases the likelihood of human exposure to the disease. A Hendra virus vaccination requirement minimises the risk of a major biosecurity incident should a horse travel in the pre-clinical stage of the disease and become unwell and present a potentially fatal disease risk to other horses and people in attendance.

In addition, a confirmed case at an event will be costly and difficult for the government to manage with a potentially large-scale quarantine and possibly inadequate facilities.

There have been no confirmed cases of Hendra virus at an equine event to date. However, it is not uncommon for a horse to become sick over the course of an event that spans several days, and veterinarians are often called to examine horses under those circumstances. A level of risk exists of a horse travelling in the contagious pre-clinical stage of a Hendra virus infection and becoming sick while at an event.

In December 2015, the Australian Competition and Consumer Commission (ACCC) issued a statement of reasons in relation to a notification from Equestrian Australia seeking a decision on the organisation's approach to requiring Hendra virus vaccination for event participation under certain conditions. The Commission stated that:

“the ACCC considers that having the Hendra vaccination required as a condition of entry to particular equestrian events (after an event specific biosecurity risk assessment has been undertaken) is likely to result in public benefits by reducing the risk of transmission of the Hendra virus to other horses or to humans.”¹¹

While the ACCC acknowledged the concerns and detriments of only allowing vaccinated horses to participate in events under certain conditions, its decision was that the benefits outweigh these detriments.

The Australian Veterinary Association strongly encourages horse industries and event organisers to establish a Hendra virus vaccination policy appropriate to their risk profile. A number of events across several states have successfully implemented a requirement for Hendra virus vaccination for horses from high-risk areas. They have reported a reasonably smooth transition to the new rules, with no adverse impact on the number of competitors registering for the events. Some examples include:

- Brisbane Royal Agricultural Show
- Sydney Royal Agricultural Show
- Queensland State Eventing Championships
- Fig Tree Pocket Equestrian Club One Day Events
- Tambourine Equestrian Group One Day Events
- Kooralbyn Equestrian Group One Day Events
- Warwick Horse Trials
- Albury CIC (one day equestrian event)
- Melbourne CCI (three day equestrian event)
- Sydney CCI (three day equestrian event)
- Adelaide CCI (three day equestrian event and the only 4 star event in the southern hemisphere)

Some endurance horse events, pony clubs, school equestrian teams, local agricultural shows, riding schools, agistment centres and Riding for the Disabled centres have also made Hendra virus vaccination a requirement of entry.

Racing thoroughbred and standardbred horses are not currently required to be vaccinated in Queensland. Should an unvaccinated racehorse with a suspected Hendra virus infection be stabled at a racecourse or present to race

while contagious but before becoming sick, there would be substantial financial, public health and public perception impact to the industry. Given that Queensland government agencies have stated that vaccination is the most effective way to control the disease, the ramifications are far-reaching for Racing Queensland should an incident occur at a racetrack.

This type of business interruption does occur in the racing industry. Recently a race meeting in country Victoria was postponed and relocated due to a case of strangles, an infectious equine bacterial disease, in a horse stabled on the racecourse.¹²

Required vaccinations are not uncommon in equine competitive industries internationally. The International Equestrian Federation and the British Racing Authority both require current equine influenza vaccination administered by a veterinarian in order for a horse to compete. The United States Equestrian Federation has recently instituted a policy that horses must have had an equine influenza and equine herpes virus vaccine administered by a veterinarian within the last six months to be able to compete in registered events.

There have been instances of event participants in Queensland objecting to requirements for horse vaccination against Hendra virus, partly because the Queensland government has not directed event organisers to do so in order to protect the animals and people at their event from disease. The Australian Veterinary Association would like to see the Queensland government resolve this misunderstanding by issuing a statement endorsing event organisers who choose to manage their risks relating to Hendra virus by requiring participants to vaccinate their horses as a condition of entry.

Record keeping

A key aspect of preserving the public health benefit of the Hendra virus vaccine is the integrity of the electronic database that records microchip numbers and the vaccination history of each vaccinated horse. Without a reliable record of current vaccination, there can be no certainty that any particular horse is vaccinated and a risk assessment would need to assume that a horse is not vaccinated.

Currently the vaccine is only available to veterinarians, who are responsible for ensuring the vaccine's effectiveness by maintaining the appropriate cold chain and only administering the vaccine to healthy horses. They are also required to ensure each vaccination is recorded in the central database. It is essential that these conditions are maintained to ensure that the vaccine is effective, and information about a horse's vaccination status can be relied upon when making decisions about a serious public health threat like Hendra virus.

Internationally, there are strong precedents for vaccinations only being administered by veterinarians where compliance is a requirement for participation in equine competitive events and for certification of vaccination prior to export. For example, in the USA, UK and Europe, six-monthly vaccinations against equine influenza are a requirement for competition entry and these can only be administered and certified by a veterinarian. Given that a key purpose of Hendra virus vaccination is the health and safety of people, there is a strong argument in this instance for maintaining the current requirement for veterinarian-only administration.

Recommendations

1. The Committee endorses the position of the Department of Agriculture and Fisheries, Workplace Health and Safety Queensland, and Queensland Health that the vaccine is the single most effective way of reducing the risk of Hendra virus infection in horses and provides a work health and safety and public health benefit.
2. All of these three Queensland government agencies actively communicate with horse industry stakeholders to promote the Committee's endorsement.
3. The Queensland government supports the registration processes of the Australian Pesticides and Veterinary Medicines Authority in relation to the safety and effectiveness of the Hendra virus vaccine, and the continued investigation of any reported adverse reactions.
4. The Committee acknowledges that the vaccine plays a significant role for equine industries and event organisers in managing their risks relating to Hendra virus.

5. The Queensland government endorses event organisers who choose to manage their risks relating to Hendra virus by requiring participants to vaccinate their horses as a condition of entry.
6. The Committee supports the vaccine being only administered by veterinarians to maintain the integrity of the vaccine database, to ensure adherence to effective vaccine administration protocols, and to protect animal and human health in line with international standards for preventive medical care.

Infection prevention

Terms of reference

3. who bears the risks of HeV infection and who incurs the costs and receives the benefits from each risk mitigation option
4. whether the guidelines/procedures required for veterinarians attending horses that are not vaccinated against HeV are proportionate to the consequences

The risks of a Hendra virus infection are borne by several stakeholders and all benefit from mitigating their respective risks:

- Horse owners – risk of horse death and the emotional or financial consequences, risk to themselves of contracting a zoonotic disease
- Veterinarians and veterinary staff – risk of contracting a zoonotic disease, legal liability in relation to providing a safe workplace, potential financial loss through restricting service provision or quarantine of premises
- Horses – risks to health, welfare and life
- Equine business owners – risk of contracting a zoonotic disease, legal liability in relation to providing a safe workplace, potential financial loss through quarantine of premises
- Equine event organisers – risk of breaching duty of care responsibilities in relation to the safety of animals and people, often a risk of legal liability in relation to providing a safe workplace, financial loss through business interruption and other costs of quarantine.

Several factors make effective management of these risks challenging:

- Because Hendra virus is a sporadic disease and not highly contagious, there is a level of complacency around the risks among those in contact with horses. Complacency will become more of a concern if the number of outbreaks continues to decline because of the protection provided by vaccination.
- Clinical signs of Hendra virus infection are very varied and similar to many common equine ailments. It can only be diagnosed through a laboratory test, and the disease cannot be ruled out on the basis of a physical examination.
- Infected horses can be contagious before they start showing clinical signs of disease. This means that there is a risk that a healthy horse may be infected and able to infect people.
- Some aspects relating to disease transmission to horses and then to people remain unknown. It is not known conclusively why the disease has only appeared in parts of Queensland and New South Wales so far, although recent research indicates that virus spill over is common to the range of the black and the spectacled flying fox species.¹³ It should be noted that the range of the black flying fox is continuing to move southwards.¹⁴ Disease transmission from flying foxes to horses is likely to occur via infected flying fox excretions, but why some horses become infected while others do not is still open to speculation. Some people in contact with an infected horse's body fluids contract the disease, and others do not.
- The consequences of underestimating the risk in any given circumstances may prove fatal to those in close contact with an infected horse.

Although this is a sporadic disease, for veterinarians the risk is very real. There have been 41 confirmed outbreaks in horses from 2011 to 2015 and all the initial cases in these outbreaks were diagnosed by private veterinary practitioners. Some practices have diagnosed four cases in horses, and some individual veterinarians have diagnosed three cases. A veterinarian practising in an area where there has been a Hendra virus case faces a

daily concern that a horse may be infectious.

Horse owners are also at risk from the Hendra virus. While veterinarians come into contact with many sick horses, owners are also susceptible to infection through contact with the body fluids of their own sick horse.

Horse owners are responsible for the costs of looking after the health and welfare of their animals, paying for food, shoes, veterinary treatment or preventive healthcare such as Hendra virus vaccination.

Elimination of risks

Horse owners and veterinarians can eliminate the risk of infection by relocating to an area where Hendra virus is not known to have occurred in horses, or ceasing all contact with horses. Some veterinarians have chosen this option, moving interstate to regions where Hendra virus has not appeared in horses to date. Equine veterinary practices are finding it difficult to recruit new veterinarians to work in areas where there is a known Hendra virus risk. Some veterinarians have decided to cease treating horses altogether to eliminate their risks.

Both costs and benefits of each of these risk elimination measures are largely borne by the respective decision-makers. In the case of veterinarians no longer providing equine veterinary services for whatever reason, horse owners might also bear some of the cost of that decision through having fewer options available for medical treatment of their horses. There may be an animal welfare impact if horses remain untreated for treatable conditions due to a lack of access to equine veterinary services. Veterinarians will bear the cost of reduced income if they choose to treat fewer or no horses.

Risk mitigation

Options to reduce the risk of Hendra virus infection in horses include:

- Vaccination
- Limiting horse contact with flying fox excretions – covering feed and water troughs, stabling horses at night, relocating horses when flying foxes are active.

Options to reduce the risk of Hendra virus infection in people involve reducing the likelihood of high level contact with the body fluids of an infected horse through:

- Vaccination of horses
- Wearing personal protective equipment
- Good personal hygiene.

'Stall-side testing' or mobile testing for Hendra virus has been proposed as a risk mitigation option. Unfortunately no such test currently exists. Should one become available it would need to guarantee no false negatives to be able to be relied upon in the field and similar tests for other pathogens have not been able to achieve this. The consequences of a false negative in relation to a Hendra virus infection could be catastrophic. Due to the low numbers of Hendra virus infections, it would also be very difficult to reliably measure the false negative rate and quantify the risk. Approval from Therapeutic Goods Administration would be required for such a test and competence of the operator would need to be confirmed by the National Association of Testing Authorities. In addition, a test would also not protect horses from infection, which is fatal in around 79% of cases with recovered horses euthanased for public safety under current national policy. Testing also does not mitigate the risk of human exposure prior to confirming the case. Although advances in Hendra virus testing would be welcome, they are not likely to replace vaccination as the most effective risk mitigation strategy.

Removing flying foxes is not a preferred risk mitigation option because of their important ecological role. Some communities have attempted to move flying fox colonies for various reasons, but these efforts are often unsuccessful.¹⁰

Costs and benefits

Vaccination

The costs of vaccinating a horse against Hendra virus are not prohibitive when considered in the context of the

overall cost of owning a horse. We have calculated the approximate cost of keeping a racehorse in racing and training at \$45,000 per annum. For a sport horse, the annual cost is approximately \$14,000 and for a pony club horse, the annual cost is around \$7800. Annual agistment costs of \$5200 could be added for sport or pony club horses if the horse is not kept at the owner's property.

Each vaccine dose costs a horse owner between \$80 and \$120. Using the mid-point in this range, at the current six-monthly dose regime, the annual cost of Hendra vaccination is approximately \$200 per horse. This equates to a small percentage of what is likely to be spent each year on owning a horse in Queensland (not including agistment costs), and the costs will be halved once the annual booster regime is approved.

Hendra vaccination costs as a percentage of total expenses

Racehorse	0.4%
Sport horse	1.4%
Pony club horse	2.6%

A recent survey of 514 horse owners by Equestrian Queensland asked respondents how much they spend each year on equestrian sports and all associated horse-related expenses. Eight per cent reported spending less than \$4000 each year, 38% reported spending between \$4000 and \$10,000, while 30% spent between \$10,000 and \$20,000. Twenty three per cent of respondents reported spending more than \$20,000 each year on their horses and participating in equestrian sports.

Veterinarians have provided incentives to help encourage vaccination against Hendra virus. Often they supply the vaccine itself close to cost, at a lower margin than any other veterinary medication they supply. Other pricing incentives used by veterinarians to encourage vaccination include discounted rates for multiple horses vaccinated on a property. Because of these incentives, veterinary businesses are not earning substantial additional income from Hendra virus vaccinations. They bear all costs of supplying and administering the vaccine that are not passed on to the horse owner.

The primary benefits of vaccination are for the horse, which is protected from a disease with a very high mortality rate, and also for humans in contact with that horse. The horse and owner will also have access to faster emergency care, and hospital admission in the event of the horse needing intensive medical or surgical treatment. (See the section below on practice policies for more information and explanation).

Veterinarians and their staff make risk management decisions based on the known safety and effectiveness of the vaccine. This means that in some cases, standard precautions can be used and treatment provided to vaccinated horses without requiring an exclusion test. Horse owners and handlers also enjoy significantly higher levels of protection from the disease in the event that the vaccinated horse becomes sick.

Personal protective equipment

The financial costs of any personal protective equipment used during a veterinary consultation are charged to the horse owner. Personal protection appropriate to each case's risk of Hendra virus infection must be worn by the veterinarian and any horse owner or handler assisting with the consultation. Currently, the veterinarian is responsible for ensuring the appropriate use of personal protective equipment by the horse owner or handler present during the consultation. The Queensland government sponsored rebate scheme for personal protective equipment used to investigate suspect cases ceases in 2016.

For unvaccinated sick horses where Hendra virus cannot be excluded as a diagnosis, full personal protective equipment is required to be worn by veterinarians and attendants until Hendra virus has been excluded. This includes impermeable boots and overalls, double nitrile gloves, goggles or face shield and a P2-rated respirator. The cost to a horse owner for exclusion testing amounts to around \$350 once additional time, sampling, sample packing and transport are added to the cost of personal protective equipment.

There are risks from wearing this level of personal protective equipment around unpredictable animals for both veterinarians and owners. Horses are very large, strong animals and some are inclined to bite, kick and strike the people around them. Protective eyewear can limit vision, and the risks of physical injury, needle stick injuries, or

heat stress are increased with full personal protective equipment. Under field conditions these risks are difficult to mitigate.

With vaccinated sick horses, the infection risk is significantly lower and so the veterinarian's risk assessment may conclude that lower levels of personal protective equipment are warranted. Consequently, the financial cost to the owner is also lower.

The Australian Veterinary Association has produced a training video that shows how to use this full personal protective equipment. It can be viewed at www.ava.com.au/suit-up.

Titre testing

Titre testing for Hendra virus antibodies in a horse's blood is conducted by the Australian Animal Health Laboratory in Geelong. The cost is borne by the horse owner - \$318 for the test plus the cost of transporting the sample to the laboratory in Victoria and a veterinarian collecting and packaging the samples.

While titre testing may be helpful in managing horses that have experienced severe or repeated adverse reactions to the vaccine, there are some limitations to its usefulness.

- Based on the laboratory trials of the vaccine, there is evidence to indicate that a titre level of 32 may be protective against the disease, but there is insufficient laboratory evidence to absolutely rely on this figure under field conditions.
- Titre testing only provides a snapshot in time of a horse's antibody levels. A horse's immunity will decline over time at an individual rate so there is no way to know how long a particular titre level will continue to provide immunity in an individual horse.
- In countries where rabies is endemic^b and vaccination of pets is mandatory, it is not permitted to rely on titre levels to preclude the need for booster vaccination.¹⁵ This is primarily because of the public health importance of rabies immunity in animals, which is also a key consideration in Hendra virus vaccination in horses.
- Revaccination may still be required when titre levels are below the protective threshold, although as noted above, there is no way of knowing when this might occur in any individual horse.

Reducing exposure to flying foxes

Other mitigation options include management changes such as stabling horses at night, removing food and water sources from flying fox contamination and moving horses away from flying fox populations. These reduce the risk of the horse contracting a Hendra virus infection to some degree, but may not be enough on their own to alter management protocols in relation to treating a sick horse.

Research released in March 2016 has highlighted a limited application of these types of preventive strategies by horse owners. The research project (Horse owners and Hendra virus: a longitudinal study to evaluate risk, or HHALTER) studied a cohort of horse owners over three years, 2012 to 2014, in relation to their Hendra virus risk mitigation practices and attitudes. It concluded that "The uptake of recommended property management approaches was quite low in the study sample (20% in the final survey) and did not change over time. Recommendations to reduce horse access to areas around trees were felt to be difficult to achieve and unlikely to be effective at reducing risk." A large majority of horse owners (85%) reported that their horses always had access to uncovered water, and around half reported that their horses always had access to uncovered food. These figures changed little over time.¹⁶

Another survey of horse owners conducted early in 2012 found that only 13% of respondents routinely stabled their horses at night, 13% had horse feed bins under cover and 15% had horse water points under cover.¹⁷

While these risk mitigation strategies have been recommended for many years, available evidence suggests that

^b A disease is endemic where it remains in a steady state in a population over time, without the need for external input. For example, measles is endemic in humans in Australia.

implementation is not widespread.

Treating unvaccinated horses

Sick unvaccinated horses represent a real risk to the health and safety of veterinarians, horse owners and other people in contact with the horse. Because the disease is sporadic, some assume this risk is low. However the potential consequences of infection are disastrous (death) while the likelihood is unlikely or possible (depending on other factors such as geographical location). This translates to a high or extreme risk for people in contact with a sick unvaccinated horse.

It is of the utmost importance that veterinarians and veterinary staff have a safe working environment, and that horse owners are also protected from the consequences of this risk. Workplace Health and Safety, the Department of Health and the Department of Agriculture and Fisheries have established guidelines that place high expectations on veterinarians managing this risk to prevent people from becoming infected.^{1,2,3} After conducting a risk assessment appropriate to the individual case, the veterinarian is required to follow these guidelines.

The Queensland Government's *Hendra virus infection prevention advice*³ outlines the appropriate actions a veterinarian should take according to which of four categories best describes the patient.

In **Level 4**, the horse is healthy, and there are no apparent clinical signs of Hendra virus infection. Veterinarians should adopt standard precautions such as hand hygiene, sharps safety, aseptic non-touch technique, clinical waste management and standard decontamination procedures. Where there is a likelihood of contact with body fluids, additional protection such as gloves, overalls and potentially goggles or a face shield are appropriate. For procedures on a healthy horse where there is a risk of infectious aerosols being created (such as dentistry or endoscopy of the upper respiratory tract) a P2-rated respirator should also be worn.

In **Level 3**, Hendra virus cannot be ruled out when examining a sick horse, and in **Level 2**, the veterinarian has a high level of suspicion of a Hendra virus infection. In both instances, an exclusion test is required by law as Hendra virus is a notifiable disease^c, which requires a veterinarian to notify the government as soon as possible if they suspect, diagnose or confirm that disease. The exclusion test is a very direct way of making that notification via the government veterinary laboratory. The test is also required to confirm or exclude Hendra virus.

Until Hendra virus is excluded, the guidelines require a high level of personal protective equipment for all people in contact with the horse (including any owner or handler assisting the veterinarian), quarantine of the horse from other horses, people and other animals, and minimally-invasive treatment administered by the veterinarian. Personal protective equipment required in this situation includes standard precautions plus rubber boots, impermeable overalls, double nitrile gloves, face goggles and a P2-rated respirator.

A horse in **Level 1** has been confirmed as having Hendra virus and the same high level of precautions is required as for Level 2 and Level 3 cases. Confirmed cases are managed by Department of Agriculture and Fisheries veterinarians, and the Queensland government funds the costs. The role of the private veterinary practitioner generally ends once a case is confirmed, although on occasions the private practitioner is engaged by the Department of Agriculture and Fisheries to participate in the disease response.

Dead horses can still be infectious and these high levels of precautions must be taken even after death until Hendra virus can be excluded.

All these requirements are not optional, but are mandatory to satisfy legal obligations under the *Work Health and Safety Act 2011 (Qld)*.

The financial cost of these high level of precautions is borne primarily by the horse owner. In Level 3 and Level 2 cases, the cost of full personal protective equipment and the taking and transport of samples for exclusion testing is approximately \$350. There is an additional cost to the Queensland government, which provides exclusion testing free of charge to the horse owner.

^c Hendra virus is a notifiable disease under the *Stock Act 1915* and the *Exotic Diseases in Animals Act 1981*

While these high levels of precautions are effective and appropriate to reduce the risk of infection, they do involve other costs. For example, the full personal protective equipment required by Level 2, 3 and 4 cases increase the risk of other work safety problems, particularly physical injuries from sick and unpredictable horses, needle-stick incidents and unpredictable environmental conditions such as heat, rain, and unfamiliar terrain. These risks apply to everyone wearing this high level of protective clothing, not just veterinarians. It is known that equine veterinary practice under normal circumstances carries a high level of risk of injury.¹⁸ These high levels of precautions may increase the risk of physical injury.

Costs of these treatment protocols extend to sick horses that may not have access to invasive treatments until Hendra virus has been excluded. This equates to treatment delay, and increased pain, suffering and potentially death for the affected horse. In addition, the major equine mortality insurance policies will not cover an unvaccinated horse that dies as a result of Hendra virus, or because of treatment delay caused by the horse not being vaccinated against Hendra virus. These factors can have a significant emotional impact on the horse owner, and emotional costs must be considered alongside financial costs. The Australian Veterinary Association would like to see faster and more available exclusion testing to reduce these costs to horses and their owners. This will come at a financial cost to government which currently funds exclusion testing.

There are significant costs to equine businesses by being the subject of an extended period of quarantine when Hendra virus is confirmed and normal business is not possible. Some Queensland businesses have not survived, while others have been very severely compromised after a Hendra virus quarantine period.

Veterinary practice policies

Terms of reference

5. impacts on the equine industry and the economy arising from veterinarians applying a policy not to treat unvaccinated horses; and
6. the impact of Workplace Health and Safety actions on the decision by veterinarians not to attend unvaccinated horses and results of previous Workplace Health and Safety HeV investigations where there have been human infections.

Veterinary practices are privately-owned businesses where owners and managers make their own decisions about services and pricing in a competitive free market. The work of veterinarians is primarily regulated by the Queensland *Veterinary Surgeons Act 1936* along with legislation relating to workplace health and safety, the use of drugs and poisons and biosecurity (among others).

As noted above, it is a legal requirement to notify the government on suspicion of a notifiable disease. Complying with government guidelines after this point restricts treatment options until Hendra is ruled out by an exclusion test. These aspects of current treatment protocols are mandated by government guidelines and are not optional.

Veterinary practices have made a range of decisions about treating horses in light of these government expectations and other factors.

In the case of equine veterinary hospitals and reproduction centres, it is not possible to insure against the business interruption caused by a confirmed Hendra virus case on the premises and the resulting quarantine period. Currently, quarantine would effectively close a veterinary business for 20-30 days and pose a major risk to its ongoing viability.

As a result, business owners have made policy decisions to minimise the risk of a horse coming on to the premises that may ultimately prove to have a Hendra virus infection. Some equine veterinary hospitals in Queensland now require proof of health before accepting healthy unvaccinated horses on the premises. This health testing confirmation costs a horse owner approximately \$330 and the cost of the test itself is not covered by the government (unlike testing for suspected Hendra virus cases). All equine veterinary hospitals in Queensland restrict admission of unvaccinated horses with certain symptoms that have been linked to Hendra virus infection.

The Australian Veterinary Association has analysed 56 written policies relating to the Hendra virus from Australian

veterinary practices that treat horses. Half of these policies (28) were from practices based in Queensland, which represents approximately 30% of practices treating horses in Queensland.

Of the total of 56 written policies analysed:

- 55 (98%) referred to the safety of 'others' – that is, people not employed by the practice
- 50 practices (89%) will treat unvaccinated horses in an emergency, but will not provide invasive treatments until Hendra virus is ruled out by an exclusion test
- 48 practices (86%) activate the policy when the receptionist takes the call
- 46 practices (82%) specify that a veterinarian must carry out a risk assessment before handling a horse
- The policies in 44 practices (79%) specify checking the vaccination status of the horse in clinic records or the central vaccination database
- 5 practices (9%) allow a booster period of 12 months to consider horses vaccinated, showing an increasing acceptance by veterinarians of the validity of this duration of immunity ahead of formal approval by the Australian Pesticides and Veterinary Medicines Authority.

Policies of the 28 practices based in Queensland reflect the heightened risk of Hendra in many parts of the state.

- 6 practices (21%) will not treat unvaccinated horses under any circumstances
- 15 practices (54%) will not provide routine treatment to unvaccinated horses, but will attend in an emergency to conduct an exclusion test before invasive treatments are undertaken
- One equine hospital will not allow unvaccinated horses on the premises under any circumstances
- All the other practices with an equine hospital in Queensland will only allow unvaccinated sick horses on the premises after an exclusion test.

The decisions of veterinary practices to manage the risks around Hendra virus in these ways have on occasion caused concern among horse owners. However by extrapolating these findings, only one in five practices in Queensland will not treat unvaccinated horses under any circumstances. More than half will provide emergency treatment for unvaccinated horses after the government-mandated exclusion test.

Practices with more restrictive policies are likely to be in areas where there is a higher risk of Hendra virus, so these may disproportionately impact the availability of equine veterinary services in those areas. With the risks greater in these areas, the need for vaccination to protect horses also increases, and this should be an important consideration for horse owners experiencing restricted availability of veterinary services.

Decisions must be made by veterinarians based on the risks and circumstances of each veterinary business, and cannot be imposed as a blanket approach given the variations in risk of different locations and business models. These decisions are comparable to those made by veterinary practices to no longer service bad debtors, to provide or not provide after-hours emergency service, or to treat particular species but not others according to their market opportunities, preference or expertise.

Impacts

Changing or restricting the availability of equine veterinary services has undoubtedly affected the equine and veterinary industries in Queensland.

Managing the risk of Hendra virus in Queensland increases the cost of horse ownership and veterinary services as outlined in earlier sections. The Australian Veterinary Association does not have access to any modelling that quantifies the economic impact on horse owners generally or equine industries specifically.

Veterinary practices are not reporting any significant downturn in revenue associated with complying with the guidelines, despite increased costs from the necessary additional training, administration and client communication activities required to respond to Hendra virus. The more significant impacts relate to the effect of constant risks to the health of veterinary staff. These have resulted in veterinarians ceasing to treat horses, relocating to other states where Hendra is a lower risk, and choosing not to work at practices in areas where Hendra virus is known to be present.

For equine practitioners in the field, the inevitability of eventually diagnosing a Hendra virus infection may result in high levels of stress. The potential for prosecution by Workplace Health and Safety Queensland should they make a wrong decision, significantly adds to these already high levels of stress. Veterinarians who have diagnosed a Hendra virus infection are subject to the same exposure risk assessments and possible testing as other people who have been in contact with an infected horse. Testing can mean several weeks of uncertainty while waiting for clearance from a potentially fatal infection, resulting in significant stress for the veterinarians and their families. Some individual veterinarians have personally diagnosed three cases.

Communication issues and occasional conflict with clients and members of the general public over these necessary responses to Hendra virus are also costly to veterinary businesses. They can add to the high levels of stress experienced by equine veterinarians in Queensland.

The application of government guidelines relating to responding to a suspected Hendra virus case (essentially almost any sick horse) has proven difficult in practice. While the need for protection against the virus is clear, the necessary flexibility in the guidelines has not always made them easy to apply accurately in practice. The prosecutions of three respected equine veterinarians for allegedly not fulfilling their obligations under these guidelines demonstrate this difficulty.

The three sets of guidelines were originally provided as recommendations for action, to allow a certain degree of flexibility for veterinarians to undertake their own risk assessments in individual cases based on the relevant risk factors. However, these assessments might be interpreted differently by Workplace Health and Safety Queensland or the courts. The guidelines are now being used to mandate the responses of veterinarians when faced with a suspect Hendra virus case. For example, legal charges have been laid against veterinarians who are alleged to have not complied with particular aspects of the guidelines. The primary veterinary insurer will only cover veterinarians for professional indemnity and liability in the event of a confirmed Hendra virus case if they can demonstrate full compliance with the government guidelines in handling the case.

Each set of guidelines was designed to perform a slightly different function. The *Guidelines for veterinarians handling potential Hendra virus infection in horses*¹ has 48 pages of information and recommendations for veterinarians on how to manage the risks around Hendra virus. *Hendra virus infection prevention advice*³ has 38 pages of information and advice on preventing and managing infection in horses and people. *Hendra virus – information for veterinarians*² sets out three pages of guidelines about managing work health and safety risks relating to Hendra virus. As a result of the changed environment, and due to difficulties applying these guidelines in practical field situations, these guidelines should be combined into a single set of clear guidelines for veterinarians and the general public.

The veterinary profession has made enormous changes in response to the risk of Hendra virus. However, the task is not complete. The Australian Veterinary Association would like to see increased support and training for the veterinary profession to facilitate their practical decision-making about managing Hendra virus risks in the field. This might include more detailed practical training on common scenarios, with training approved and overseen by Workplace Health and Safety Queensland to ensure compliance with regulatory expectations.

Another important impact of the risk management strategies for Hendra virus is animal welfare. Veterinarians understand and appreciate the need for avoiding invasive treatment of unvaccinated horses, but this does lead to suffering for the horse and owner. The speed and availability of exclusion testing is a key aspect to minimising this suffering. The Australian Veterinary Association would like to see increased government funding to exclusion testing to allow tests on weekends and public holidays, and faster turnaround times to minimise the suffering of sick horses.

Recommendations

7. The Committee acknowledges that the vaccine plays a significant role for veterinary practitioners in managing their risks relating to Hendra virus, and practitioners must make their own decisions about how to best manage their individual risk.
8. Stakeholders continue to work together to achieve greater clarity in relation to work health and safety

- guidelines that can be practically and safely applied in the field, including developing a single set of government guidelines that communicate clearly and simply to both veterinarians and the community.
9. The Queensland government provides additional funding and support to assist the veterinary profession in accurately and consistently applying the relevant work health and safety guidelines.
 10. The Queensland government provides additional funding and support for community education on the importance of the relevant work health and safety guidelines.
 11. The Queensland government increases funding for Hendra virus exclusion testing in order to provide services on weekends and public holidays, and faster result reporting to improve animal welfare outcomes.

Commentary

This section raises some of the broader issues that may be affecting attitudes towards Hendra virus vaccination and how progress might be made in the future.

Perceptions of Hendra virus risk

The recently-released HHALTER study report¹³ encapsulated a number of key concepts at work in the current situation. An important one relates to declining perceptions of risk from Hendra virus among horse owners over the study period. During the same period, government agencies and veterinarians were responding to heightened perceptions of risk as a result of the deaths and serious illness of veterinary staff in 2008 and 2009, and an unusually high number of equine cases in 2011 (23 cases between June and October).

The HHALTER study found that perceived risk of Hendra virus among the horse owner cohort decreased significantly over the period of the study. At the outset, 75% reported they would be very or extremely concerned about their horses if there was a Hendra virus case in their area, while at the close of the study, only 39% of owners responded in that way. Horse owners indicated that they felt a greater sense of control over Hendra virus risk over time, that their knowledge had increased and that Hendra was less of a priority as a horse health issue.

The study did not draw any conclusions, but the availability of a vaccine and its use in high risk areas may well be a contributing factor to lower numbers of confirmed cases and an ensuing decline in perceptions of risk among horse owners.

Vaccine uptake over the full study period was generally linked to higher perceived likelihood of Hendra virus, greater concerns about the risks, greater sense of control over the risk, and higher levels of trust in elements of the official system. Having fewer horses and greater feelings of financial security were also linked to increased vaccine uptake.

Lower vaccine uptake was linked to horse owners with lower perceptions of risk, less trust in the official system, larger numbers of horses and feeling less financially secure.

In-depth interviews with horse owners in known Hendra virus risk areas revealed often polarised views about vaccination. Veterinarians were noted as important pathways for Hendra virus communication, although some issues were voiced around trust and the motivation of veterinarians.

Apparently communication from government agencies and veterinarians about their heightened perceptions of risk was not being heard, believed or acted upon by horse owners during the study period. It is not surprising that these progressively diverging perceptions of risk have led to conflict, a loss of trust and communication breakdown.

The study underlined the important role of veterinarians in communicating about Hendra virus, although the veterinary profession has long acknowledged that effective communication is not always an easy task. Closer collaboration between government agencies and the veterinary profession on client communication and researching effective approaches may improve communication with horse owners around the facts and risks of Hendra virus.

Perceptions of vaccine reactions

While veterinarians are reporting expected rates of very low levels of adverse reactions to vaccination, there is a high level of concern about adverse reactions among horse owners. It is likely that there are a number of factors contributing to these different perceptions of vaccine reactions.

The HHALTER study highlighted that the classification of adverse reactions by horse owners differs from that used by veterinarians. In the November 2014 survey, 24% of vaccinators reported observing an adverse reaction in their horse. Of the vaccinators who reported an adverse reaction, 30-44% reported 'moderate' levels of swelling around the injection site, general depression or muscle stiffness. Fifteen per cent of this group however felt that these reactions were 'severe'.

There is no mention of the number of doses used or the number of horses involved so these results should be treated with caution. However, veterinarians would generally expect to see some of these types of minor reactions in some horses, and would not consider them a serious health threat or reason not to revaccinate. This is because the aim of vaccination is to induce a protective immune response, through stimulation of the immune system. This cannot be achieved without the activation of physiological processes such as an inflammatory response at the site of immunisation. In this context, appearance of signs such as local swelling or mild fever in the hours or days following the vaccine administration is not necessarily abnormal from an immunological point of view. These signs should only be temporary.¹⁹

Another possible cause for variations in perceptions of adverse reactions might be a lower level of experience with equine vaccines in Australia. Vaccination of horses with other vaccines is historically low in Australia, which is not the case overseas where equine influenza vaccination is mandatory. This may mean there is a lower level of awareness among horse owners about expected versus serious vaccine reactions. Given the high level of vaccination in people, we have a high general awareness about appropriate immune reactions in humans, but perhaps a lower familiarity with vaccines in horses may contribute to variations between veterinarians and horse owners about expected and unexpected reactions.

Added to this, uptake is low in Australia for the only other equine vaccine that has a six-monthly booster regime (the equine herpes virus vaccine). There is also no other vaccine that must be administered by equine veterinarians, although this was the case for equine influenza vaccinations during the 2007-2008 outbreak. These factors may contribute to heightened suspicion and concern among horse owners about adverse reactions.

It is interesting to note that only 58% of HHALTER horse owners who observed adverse reactions to the vaccine reported all instances (mostly to their local veterinarian), so it is likely that there is a degree of under-reporting taking place. It would not be surprising if there was a level of under-reporting by veterinarians as well as horse owners.

Finally, a significant factor influencing different perceptions of risks is the discussion of the vaccine and suspected adverse reactions on mainstream and social media. These reports are not always based on an understanding of all the facts and have created an atmosphere of suspicion that is not justified by the evidence available to us. It would certainly be unfortunate if these reports result in lower levels of vaccination and a higher risk of Hendra virus for horses and people in at-risk areas.

All these factors may be contributing to a climate of suspicion about the vaccine, and encouraging increasingly divergent perceptions about the seriousness and frequency of adverse reactions.

Cost and compulsion

Twenty seven per cent of the HHALTER respondents reported that they had delayed having a 6-month booster or had ceased vaccinating some or all of their horses. These decisions were driven by costs, believing that the vaccine protocol would move to annual boosters, or that their horses' risk of Hendra virus infection was low. Cost may have also been a factor in decisions not to vaccinate by people who owned larger numbers of horses and felt less financially secure.

As veterinarians and equine sporting organisations responded to increased perceptions of risk with more stringent risk mitigation strategies during the study period, horse owners began to feel increasing pressure to vaccinate. Feelings of coercion are well recognised as a factor that will increase outrage in groups of people.²⁰

Policies requiring vaccination as a condition of entry for equine events and restrictions on providing veterinary services to unvaccinated horses have elicited a backlash from horse owners unwilling to vaccinate. For the people and organisations establishing these policies, they are a justifiable and sensible response to legal obligations to ensure the safety of animals and people. For horse owners feeling coerced by these policies, they are an infringement of their right to choose what they think is best for their animals, and they have responded vociferously and vocally.

Concerns of veterinarians

The recent survey of Australian Veterinary Association members mentioned in 'The vaccine' section above provided an opportunity for equine veterinarians to comment on concerns they currently have around the vaccine. None of these comments related to the number or severity of vaccine reactions.

However, there were some important points raised that illuminate the experience of veterinarians as they attempt to manage Hendra virus risks.

Veterinarians were concerned about:

- Being viewed as responsible for situations that they have little control over in the event of a suspect or confirmed Hendra virus case, especially the safety of people on the property after the veterinarian has left
- The need to share their responsibilities for animal welfare and public safety with horse owners who have a responsibility to prevent infection of their horses
- The difficulty of meeting work health and safety requirements in daily practice, especially the risks of serious injury or accident due to working in full personal protective equipment
- Having to wait for an exclusion test before invasive treatment can commence creating welfare issues for horses
- Problems for veterinarians in rural and remote areas getting exclusion samples to Brisbane due to high sample transport costs and extended result turnaround times
- Failure of government to endorse Hendra virus vaccination
- The departure of veterinarians from equine practice, and an impending shortage of equine veterinarians
- The importance of thoroughbred and standardbred racing requiring Hendra vaccination to avoid the potentially devastating effects of a suspect or confirmed case at or directly after an event.

Vaccines and human health

Human health has grappled with similar issues surrounding vaccination for many years, and these issues comprise part of the social environment in which Hendra vaccine concerns are playing out.

An important distinction between the Hendra virus vaccine and human vaccines is that the concept of 'herd immunity' is not relevant to Hendra virus. In people, a high proportion of immunised individuals can help protect those who aren't immunised from disease. In the case of Hendra virus, the pathogen circulates in the flying foxes, not in the horses that are being vaccinated. So only a vaccinated horse is protected from disease, and an unvaccinated horse has the same risk of infection regardless of the vaccination status of any other horse.

The benefits of immunisation to human and public health are well demonstrated. However, there remains a small minority of people who refuse to vaccinate their children against potentially deadly diseases. The scientific literature refers to this view as 'vaccine hesitancy' and attributes it to "the compulsory nature of vaccines, their coincidental temporal relationships to adverse health outcomes, unfamiliarity with vaccine-preventable diseases, and lack of trust in corporations and public health agencies".²¹

In Australia, the current focal point for those unwilling to vaccinate their children is the federal government's recent decision to disallow childcare rebates and payments for unvaccinated children. Recent Queensland legislation which was supported by both political parties permits childcare providers to exclude unvaccinated children was

designed to increase compulsion on those parents, but it has recently been revealed that very few centres have adopted this practice.²²

Human health research into barriers to vaccination may well be applicable in some respects to the current issues around the Hendra vaccine. It is likely that the conclusions of the HHALTER study signpost the right starting point through “a more nuanced and balanced dialogue” between stakeholders and horse owners. The recommendations go on to address specific areas of concern about poor uptake of the vaccine and recommended property management practices, mismatched risk perceptions and rebuilding trust between veterinarians and horse owners.

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