AUSTRALIAN BREEDING HORSES – COMMON DISEASES AND THEIR PREVENTION

Suggested Vaccination Protocols for Horse Stud Farms, Spelling Farms and other production facilities.

Zoetis considers the contents of this document to be best practice based on the science available to it as at June 2019 and includes advice from expert guidelines panels. It is a guide only and you should consult your veterinarian for context-specific advice.

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VACCINATION PROTOCOL FOR STUDS

Vaccination, being the cornerstone of disease management for humans and horses, is of particular importance at breeding facilities. The aim of vaccination is to prevent or minimise disease, and therefore to minimise production losses. Neonatal losses can be a significant issue for any breeding establishment, with infectious disease playing a major role in neonatal mortality. Prevention therefore, may be the best choice for decreasing these losses.[1]

Foals are born with very few antibodies. They rely almost entirely upon the maternal antibodies that are passed from the mare via the colostrum for defence against infection. Maternal antibodies don't last forever, and must be replaced by the foal's own antibodies, either generated from natural infection (not an ideal option), or vaccination. For this reason, it is imperative that any disease prevention program include a comprehensive vaccination program.[2]

The primary aim of any vaccination program is to protect the most susceptible members of the population (in this case foals) - so particular attention must be paid to vaccinations for pregnant mares, and also vaccination of any horse in contact with foals, including nanny mares. Keeping pregnant mares up to date with vaccines helps ensure optimal colostral transfer of maternal antibodies. Foals can receive their own vaccines from as early as 3 months of age.[3,4]

DISEASES

TETANUS

Tetanus is an often-fatal disease caused by a neurotoxin produced by the bacterial organism *Clostridium tetani*, which is found in soil and manure. Horses are particularly susceptible to this disease, and the bacteria can form dormant spores which survive in the environment for many years. These spores enter the horse's body via puncture wounds. The spores then re-activate and multiply if there is a lack of oxygen, which is favourable to bacterial growth. The toxin produced results in the characteristic spastic muscle paralysis that is fatal in up to 80% of cases.[5]

All horses are at risk of tetanus, since the dangerous bacterial spores live in the same environment as the horses.[5]

Foals without maternal antibodies and post-partum mares not recently vaccinated may be at particular risk.[6]

It is recommended that all horses be vaccinated for tetanus annually using either Equivac® 2in1 (covering Tetanus and Strangles) or Equivac® T.[4]

THE FOLLOWING ARE BROAD RECOMMENDATIONS FOR TETANUS VACCINCATIONS:[3,4]

- **Pregnant Mares**
  - Vaccinate with a booster a month prior to foaling (assuming a previous primary course of 2 doses 4 weeks apart has been given)
- **All other adult horses on breeding farms**
  - Annual boosters (assuming a previous primary course of 2 doses 4 weeks apart has been given)
- **Foals**
  - Primary course of 2 injections 4 weeks apart beginning from 3 months of age, followed by annual boosters

STRANGLES

Strangles is a highly contagious respiratory disease of horses caused by the bacteria *Streptococcus equi*. The disease can be easily spread by direct horse to horse contact, shared watering sites, sharing of grooming tools or feed buckets, and even via the hands or clothes of people handling the horses. A frustrating feature of *S.equi* is its ability to hide away in the guttural pouches of horses after they have recovered and create a persistent carrier state. These carriers look healthy, but intermittently shed the bacteria, infecting susceptible horses and triggering new outbreaks. Around one in 10 horses that recover from strangles become carriers, therefore identification and treatment of carriers is important to eliminate ongoing outbreaks of disease.[7,8]

Outbreaks of strangles on stud farms may be costly – foals that have had strangles can have delayed growth rates, ill-thrift, and lasting effects on the respiratory system, and perhaps generate less revenue in the sales ring. The veterinary costs and nursing time required to manage a strangles outbreak on stud can be considerable and also lead to reduced profit.[9]

Early detection of the illness in an individual allows for quarantine and isolation procedures to be enacted quickly. The incubation period ranges from 3 – 14 days, and horses will generally develop a fever a couple of days prior to more obvious clinical signs such as lymph node enlargement.[7]

It is important that farms have a clear strategy around strangles, including separation of sick horses and elimination of any shared feed, grooming or watering tools, vehicles and staff. Staff should be instructed in good biosecurity and hygeine, and in the case of staff that will handle both healthy and sick animals a clear instruction should be given that healthy horses must all be tended to before entering the sick horse area in order to limit the spread of the infection.[7]

In the event of an outbreak horses should be segregated into three groups using the traffic light system and held as far apart as possible. Groups should be: Red; sick, Green; no known contact with sick animals and Amber; known contact with sick animals but no clinical signs of illness yet detected. These groups should be well separated, but with the ability to move horses from group to group if their status changes.[7]

Red group horses should be treated by a vet, and not vaccinated for at least 12 months post-recovery.

Green group horses should commence vaccination immediately.

Amber group horses should be observed for 7-10 days and vaccination commenced if a temperature does not develop in this time, or alternatively treated as sick and moved to the red group if a temperature develops. Any horse undergoing a vaccination program that is moved to the red group should have further vaccinations suspended for at least 12 months post-recovery.[10]

To help prevent strangles outbreaks, it is suggested that all horses be vaccinated using either Equivac® S or Equivac® 2in1. It is not claimed that strangles vaccination will completely eliminate the risk of infection, but rather that it will reduce the incidence and severity of cases. The objective of vaccination is to maintain a high level of antibodies to strangles in the blood of all horses on the farm, with a view to preventing an outbreak, or minimising the impact of an outbreak. Good infection control of the disease can be achieved this way, but good infection control procedures and good farm biosecurity are critical elements in strangles prevention and management.[11]

THE FOLLOWING ARE GENERAL RECOMMENDATIONS FOR STRANGLES VACCINATIONS :[4,10]

- **Pregnant Mares**
  - Vaccinate with Equivac S or Equivac 2in1 a month prior to foaling in addition to regular 6 monthly boosters with Equivac S or Equivac 2in1.
- **All other adult horses on breeding farms**
  - Regular 6 monthly boosters with Equivac S or Equivac 2in1, assuming a previous primary course of 3 doses at least 2 weeks apart has been previously given.
- **Foals**
  - Primary course of 3 doses of either Equivac S or Equivac 2in1 at least 2 weeks apart beginning from 3 months of age, followed by regular 6 monthly boosters.
- **Training facilities, racehorses in training, spelling farms and show/performance facilities are considered high risk for transmission of strangles and should receive regular 6 monthly boosters with either Equivac S or Equivac 2in1 (assuming a previous primary course of 3 doses at least 2 weeks apart has been given).**

EQUINE HERPES VIRUS

Equine Herpes Virus 1 (EHV-1) causes respiratory disease, abortion and neurological disease in horses and is a significant problem in horse industries around the world. EHV-4 causes predominantly respiratory disease and is even more common than EHV-1. Once infected with EHV, a horse becomes a lifelong carrier of the virus which may then reactivate and be shed during periods of stress. A feature of EHV-related abortion is the so-called 'abortion storm', where an EHV-related abortion in a single mare may be followed a couple of weeks later by abortions in multiple other mares on the farm if strict biosecurity practices are not followed.[12]

Since 1997, EHV-1 disease in Australia has been managed by a combination of vaccination programs and management practices in an attempt to reduce the risk of EHV-1 abortion storms.[12]

Factors identified as being associated with EHV-1 abortion include:[12]

- Stress factors, such as the following
  - Transporting mares late in gestation
  - Mixing groups of pregnant mares late in gestation
  - Co-mingling pregnant mares with barren mares and young horses (weanlings/yearlings etc)
- Failing to follow strict biosecurity and hygiene protocols following an initial EHV-1 abortion case
- Mares purchased pregnant and unvaccinated

Route of Infection:[12]

Susceptible mares may inhale or ingest EHV-1 virus from the following sources:

- Aerosols, fluids or foetal matter from an aborted foetus or the affected mare
- Young horses with 'colds'
- Clinically healthy carrier horses
- Pasture, feed bins, water troughs, halters, rugs, bedding, floats and staff clothing that have been in contact with affected horses

After an abortion, mares clear the virus from their reproductive tracts within a few days, but can shed virus from their respiratory tract for up to 14 days.[12]

The virus may remain infective in the environment and on horse hair for up to 6 weeks in cool, moist conditions.[12]

Studs should have an EHV policy in place for visiting mares. It is recommended that vaccination status be checked and verified. Treating veterinarians should be able to confirm when vaccination has occurred, as vaccination is available only via veterinarians.

Vaccination:

Horses in Australia may be vaccinated against EHV-1 and EHV-4 with Duvaxyn® EHV1,4 to help protect against respiratory disease and abortion. Due to the endemic nature of the disease in Australia's breeding and racing industries, it is recommended that all competitive and breeding horses be vaccinated against EHV.[4]

The intent of vaccinating pregnant mares is to help protect against abortion storms, and to reduce possible economic impacts.

A program of vaccination should encompass the following groups of stock and the following protocols are recommended when using Duvaxyn EHV 1,4:[4,13,14]

- Pregnant Mares
  - Vaccinate in the 5th, 7th and 9th months of pregnancy (assuming a primary course of 2 doses a month apart has previously been completed)
- All other adult horses on breeding farms
  - Regular 6 monthly booster vaccinations (assuming a primary course of 2 doses a month apart has previously been completed)
- Foals
  - Primary course of 2 doses 4 weeks apart beginning from 3-5 months of age, followed by regular 6 monthly boosters
- Breakers, racehorses in training, spelling farms and show/performance facilities are considered high risk for the respiratory form of the disease
  - Regular 6 monthly boosters (assuming a primary course of 2 doses 4 weeks apart has previously been completed)

During an outbreak, the movement of horses on and off your farm may be restricted. This will include the movement of horses to other farms to be covered by stallions or for foaling and the movement of horses for sales. Talk to your veterinarian about how best to protect your horses.[12]

ROTAVIRUS

Rotavirus is a major cause of foal diarrhoea, estimated to occupy between 20% and 77% of clinical cases and be endemic in horse populations world-wide. With up to 70% of foals having an episode of diarrhoea before weaning, it is a costly and labour-intensive disease to manage. Young foals are highly susceptible to infection with rotavirus and develop a malabsorptive watery diarrhoea which can lead to severe dehydration and rarely, death.[4,15]

Vaccination of pregnant mares has been shown to decrease the incidence and severity of foal diarrhoea cases on farms. Mares should be vaccinated in the 8th , 9th and 10th months of their first gestation and then, as a minimum, in the 10th month of each future pregnancy.[4]

Implementation of a rotavirus vaccination program makes an important contribution to effectively managing diarrhoea in foals. Foals from vaccinated mares may be spared the growth rate check that commonly occurs with rotavirus infection, and additionally there can be a significant reduction in associated costs of disease management.[16,17]

Strict biosecurity, together with good management and handling practices, can reduce the incidence of foal gastrointestinal upsets, and any mare owner considering breeding should implement both a vaccination and management protocol with the assistance of their veterinarian or stud farm.[4]

It is recommended that any mare moving into a high risk situation (high number of horses, highly transient population of horses or staff) should be vaccinated while pregnant to provide protection to their foal.[17]

A PROGRAM OF VACCINATION SHOULD ENCOMPASS THE FOLLOWING GROUPS OF STOCK AND THE FOLLOWING PROTOCOLS ARE RECOMMENDED WHEN USING DUVAXYN® R:[18]

- **Pregnant Mares**
  - Vaccinate in the 8th, 9th and 10th months of their first pregnancy and then as a minimum in the 10th month of each subsequent pregnancy.

SALMONELLA

Salmonella infections are a potential diagnosis for diarrhoea in horses and many other species. Clinical signs can range from virtually none (subclinical carrier), to acute severe diarrhoea with fever, colic, sepsis, laminitis and even death. Joint or bone infections are also common.[19]

It is important to note that salmonella infection is zoonotic – in other words it can be transferred to humans and is therefore an occupational health and safety issue.[19]

Horses of all ages can be infected by the bacteria, however, salmonella infections are most severe in newborn foals, with the bacterium causing septicaemia, haemorrhagic diarrhoea, septic arthritis, meningitis and pneumonia. Maternal antibodies may play a role in protecting young foals. Husbandry and environmental stressors play a large role in determining the susceptibility of animals and the severity of the disease.[19]

Risk factors for salmonella infection include antibacterial administration, feed changes, concurrent illness, overcrowding, overgrazing, poor pasture management (fecal build-up), hospitalization, gastrointestinal disturbances, colic, other illnesses, transportation, and environmental stressors such hot weather.[19]

Transmission occurs via faecal-oral spread, often via ingestion of contaminated pasture, roughage, feed or water, contaminated equipment or people, and can be complicated by intermittent shedding by subclinical carrier horses or recovered horses, which can shed for up to 30 days.[19]

Salmonella bacteria are hardy and can survive in adverse environmental conditions and temperatures ranging from 7-45 degrees Celcius. Viable bacteria have been found in contaminated soil for 300 days, water for up to 9 months and dried faeces for up to 30 months.[19]

Salmonella vaccination with Equivac EST is approved for mares and foals as an aid in the control of diseases caused by *Salmonella typhimurium.* Foals should receive sufficient maternal antibodies to last until four months of age, when they may receive their own vaccines.[20]

A PROGRAM OF VACCINATION SHOULD ENCOMPASS THE FOLLOWING GROUPS OF STOCK AND THE FOLLOWING PROTOCOLS ARE RECOMMENDED WHEN USING EQUIVAC® EST: [20]

- **Vaccinated Pregnant Mares**
  - Booster vaccination 6 weeks before foaling
- **Pregnant mares and other adult stock (except stallions*) not previously vaccinated**
  - Primary course of 2 doses 4 weeks apart, followed by annual boosters. If pregnant, a booster administered no later than 6 weeks before foaling
- **Empty mares with no vaccination history**
  - Primary course of 2 doses 4 weeks apart anytime followed by annual boosters
- **Foals**
  - Primary course of 2 injections 4 weeks apart beginning from 4 months of age, followed by a 6 month booster, then annual booster vaccination
- **Equivac EST must be given by deep intramuscular injection, preferably in the RUMP**
  - Equivac EST is contraindicated for stallions and horses in training.

HENDRA VIRUS

The Hendra virus causes a potentially deadly viral disease that can spread from horses to horses and horses to humans. It has only ever been reported in Australia. Bats with antibodies to the virus have been found in all mainland states of Australia, however infected horses have only been detected in NSW and QLD to date.[21,22,23]

Fruit bats are the natural hosts of the Hendra virus and the virus is most likely transmitted from fruit bat to horse via the ingestion of bat urine. Hendra virus can then be spread from horse to horse, horse to human or horse to dog via contact with respiratory secretions or other bodily fluids from an infected horse. The black flying fox is considered the most likely bat species to shed the virus and has been detected from the mid-coast of Western Australia, across the north, and down the east coast as far south as Melbourne.[21,22,23,24]

Hendra virus is fatal in over 80% of horses and 57% of humans.

There is no treatment for horses infected with Hendra virus – however there is a post exposure therapy of monoclonal antibodies available for humans– this has been administered to 12 horse owners and 1 veterinarian since becoming available in 2009.[23]

Hendra virus represents a significant work, health and safety issue for any workplace, and as such all horse facilities should have a policy in place around the Hendra virus. Some states (eg QLD and NSW) also have Biosecurity Acts which place significant potential liability on stock owners relating to adequate control of some endemic and exotic diseases.[23]

The major diagnostic challenge with the disease, is that the clinical signs are indistinguishable from other more common equine illnesses, especially in the early stages of infection. A recent review of Hendra virus infections revealed that the most frequently reported clinical signs are lethargy or depression, fever, ataxia (incoordination) and loss of appetite. The only way to accurately diagnose infection is to perform an exclusion test, which may take a few hours or up to 5 days, depending on geographical proximity to the testing laboratory.[21,25]

The human and economic risk of Hendra virus infection has meant that many equine vet hospitals in NSW and QLD have strict policies where they will not admit a sick unvaccinated horse until a negative exclusion test is provided. Sadly, this means that horses may die or clinically deteriorate while waiting for the result.[25]

It is therefore recommended that owners of any horse within a Hendra endemic area, or any horse travelling to a Hendra endemic area (NSW and QLD) have a plan in relation to the virus. Such plans should consider the following:

- Which veterinarian they will utilise for an unwell horse?
- Any policy this vet may have in relation to the virus
- Will the horse potentially need to be referred to a different hospital?, and therefore the policies of the referral hospital.
- Will the horse survive any delay in treatment while waiting for exclusion result?
- What are the implications on insurance if the horse dies or clinically deteriorates while waiting for treatment?
- What are the implications if human exposure also occurs?

The above questions should be considered prior to travelling any horse for breeding, sale, race, training, spelling or competition, as different geographic locations and different businesses will have different policies.

It should be noted that Hendra virus infection is a notifiable disease – and if a horse tests positive to the virus the state government authorities will take control of the case. This could be DPI, LLS or other Departments. The property may be quarantined, with restricted movement of horses on or off the facility.[26]

A vaccine against Hendra virus is available. The vaccine helps protect both horses and humans, and often facilitates immediate and comprehensive treatment of sick horses by veterinary professionals, both in the field and in hospital.[23,25]

A register of Hendra vaccinations is kept, in order that vets, owners and other interested parties can easily assess the vaccination status of the horse. Horses receiving Equivac HeV require a microchip in order for doses to be recorded on the registry.[23]

A PROGRAM OF VACCINATION SHOULD ENCOMPASS THE FOLLOWING GROUPS OF STOCK AND THE FOLLOWING PROTOCOLS ARE RECOMENDED WHEN USING EQUIVAC EQUIVAC® HeV:

- **Primary course – from 4 months of age**
  - 2 doses between 3 and 6 weeks apart, followed by a booster dose in 6 months and further boosters every 12 months.
- **Foals born to vaccinated mares should commence vaccination at 6 months of age**
- **All doses must be entered by the vaccinating veterinarian into the hendra registry and are visible to horse owners at www.health4horses.com.au**
- **Pregnant mares should not be vaccinated in the first 45 days of pregnancy, or in the last 2 weeks prior to foaling**
- **Boosters must be given within 5 weeks of the due date to maintain protected status in Zoetis Hendra Vaccine Registry**

To maintain protected status in the Zoetis Hendra Vaccine Registry, horses that have undergone a 2 dose primary course but have not received a booster within 5 weeks of the due date and are less than 6 months overdue will be re-protected with a single dose, followed by annual boosters.[28]

Horses that have undergone a 2 dose primary course but have not received a booster within 5 weeks of the due date and are more than 6 months overdue will need to undergo another primary course of 2 doses administered between 3 and 6 weeks apart, followed by annual boosters.[28]

STUD MANAGEMENT – SUGGESTED VACCINATION CALENDAR[25]

Month	Pregnant Mares	Foals	Sales horses	Other adults (dry mares/nanny horses / spellers / stallions)
January			Tetanus dose 2, Strangles dose 3, EHV dose 2, Salmonella dose 2	EHV 6 month booster for later draft sale yearlings, Strangles 6 month booster
February	EHV, Strangles		EHV dose 3	
March	Hendra		Hendra dose 1	Hendra
April	EHV		Hendra dose 2	
May	Rotavirus			
June	EHV, Rotavirus, Salmonella			
July	Tetanus, Strangles, Rotavirus			Tetanus (annual booster), Strangles (6 month booster), EHV (6 month booster), Salmonella* (annual booster)
August	Foaling	EHV 6 month booster		
September				
October				
November		EHV dose 1, Tetanus dose 1, Strangles dose 1, Salmonella dose 1	Hendra 6 month booster	
December		Strangles dose 2	EHV early booster before the sales for early draft	

1. Gross Lesions of the Equine Neonate and Perinatal Period Grant B. Rezabek MPH, DVM OSU/OVMA Summer Seminar Stillwater, Oklahoma June 12, 2015. **2.** Jeffcott L.B. The Transfer of Passive Immunity to the Foal; *Journal Reproductive Fertility, Supplement 23,* 1975: 727-733. **3.** https://aaep.org/guidelines/vaccination-guidelines. **4.** Pfizer Animal Health Equine Infectious Diseases Advisory Board Vaccination Guidelines 2012. **5.** NSW DPI primefact 495 Horse Health Vaccination against tetanus and strangles June 2007. **6.** American Association Equine Practitioners Vaccination Guidelines for tetanus 2012. **7.** https://thehorse.com/125253/strangles-management-and-prevention/ **8.** Boyle et al. ACVIM Consensus Statement Streptococcus equi Infections in Horses: Guidelines for Treatment, Control, and Prevention of Strangles; *Journal of Veterinary Internal Medicine, 2018.* **9.** https://www.sruc.ac.uk/info/120473/premium_assured_strangles_scheme/1363/strangles_disease. **10.** American Association Equine Practitioners Vaccination Guidelines for strangles 2012. **11.** Equivac S and Equivac 2in1 product labels. **12.** https://hunter.lls.nsw.gov.au/resource-hub/media-releases/equine-herpes-virus-alert-for-hunter-horse-owners. **13.** American Association Equine Practitioners Vaccination Guidelines for Equine herpesvirus rhinopneumonitis 2012 **14.** Duvaxyn EHV1,4 product label. **15.** Bailey K.E. et al. Equine rotaviruses—Current understanding and continuing challenges; *Veterinary Microbiology*, 2013; 167:135-144. **16.** Dwyer R. Proceedings of the *Annual Convention of the AAEP*, 2001;47:472-475. **17.** American Association Equine Practitioners Infectious Disease Guidelines: Rotavirus 2019. **18.** Duvaxyn R product label. **19.** American Association Equine Practitioners Infectious Disease Guidelines: Salmonellosis Revised 2017. **20.** Equivac EST product label. **21.** Zoetis Technical Brief: Hendra Virus: The Diversity of Clinical Signs June 2018. **22.** Middleton et al. Experimental Hendra virus infection of dogs: virus replication, shedding and potential for transmission, Australian Veterinary Journal, 95;1-2:10-18. **23.** https://www.vetvoice.com.au/ec/diseases/hendra-virus/ **24.** Richards, Hall and Parish. A Natural History of Australian Bats: Working the Night-Shift. CSIRO Publishing 2012. **25.** R L'Estrange pers comm. **26.** https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/livestock/animal-welfare/pests-diseases-disorders/hendra-virus. **27.** Equivac HeV product label. **28.** ZOEEQU1430 Hendra vaccine protocol for overdue boosters. **29.** Zoetis data on file. **30**. Waller A. *Streptococcus equi:* breaking it's strangles-hold. *Veterinary Record* 2018 182: 316-318