When should I vaccinate my horses?

The Equine Infectious Diseases Advisory Board have developed an easy to follow vaccination protocol.
We recommend you use these guidelines when planning an annual vaccination schedule for your horses.

What is the horse's age?

Younger than 12 months

All horses younger than 12 months require a vaccination priming regimen for Hendra Virus, Tetanus, Strangles and Equine Herpes Virus

Tetanus
From three months of age
- two doses, four weeks apart

Strangles
From three months of age
- three doses, two weeks apart

Equine Herpes Virus
From three months of age
- two doses, four weeks apart

Hendra Virus
From four months of age
- two doses, three to six weeks apart, followed by a booster every six months

Older than 12 months

What classification is the horse?

Low interaction horse

Vaccination Maintenance
Regimen required for the following disease states

Tetanus
One dose annually

Strangles
Consult your vet

Hendra Virus
Two doses, three to six weeks apart, followed by a booster every six months

Competitive/pleasure horse

Vaccination Maintenance
Regimen required for the following disease states

Tetanus
One dose annually

Strangles
One dose every six months

Equine Herpes Virus
One dose every six months

Hendra Virus
Two doses, three to six weeks apart, followed by a booster every six months

Breeding horse

Female Breeding Horses Only
Vaccination Maintenance Regimen required for the following disease states

Tetanus
One dose annually

Strangles
One dose every six months

Equine Herpes Virus
One dose at five, seven and nine months of gestation

Rotavirus
One dose one month prior to foaling for mares primed during a previous pregnancy*

Hendra Virus
Two doses, three to six weeks apart, followed by a booster every six months**

Hendra Virus

The Equine Infectious Diseases Advisory Board supports the Australian Veterinary Association's position to strongly recommend that all horses in Australia are vaccinated against Hendra virus to help protect humans from its potentially fatal outcome.

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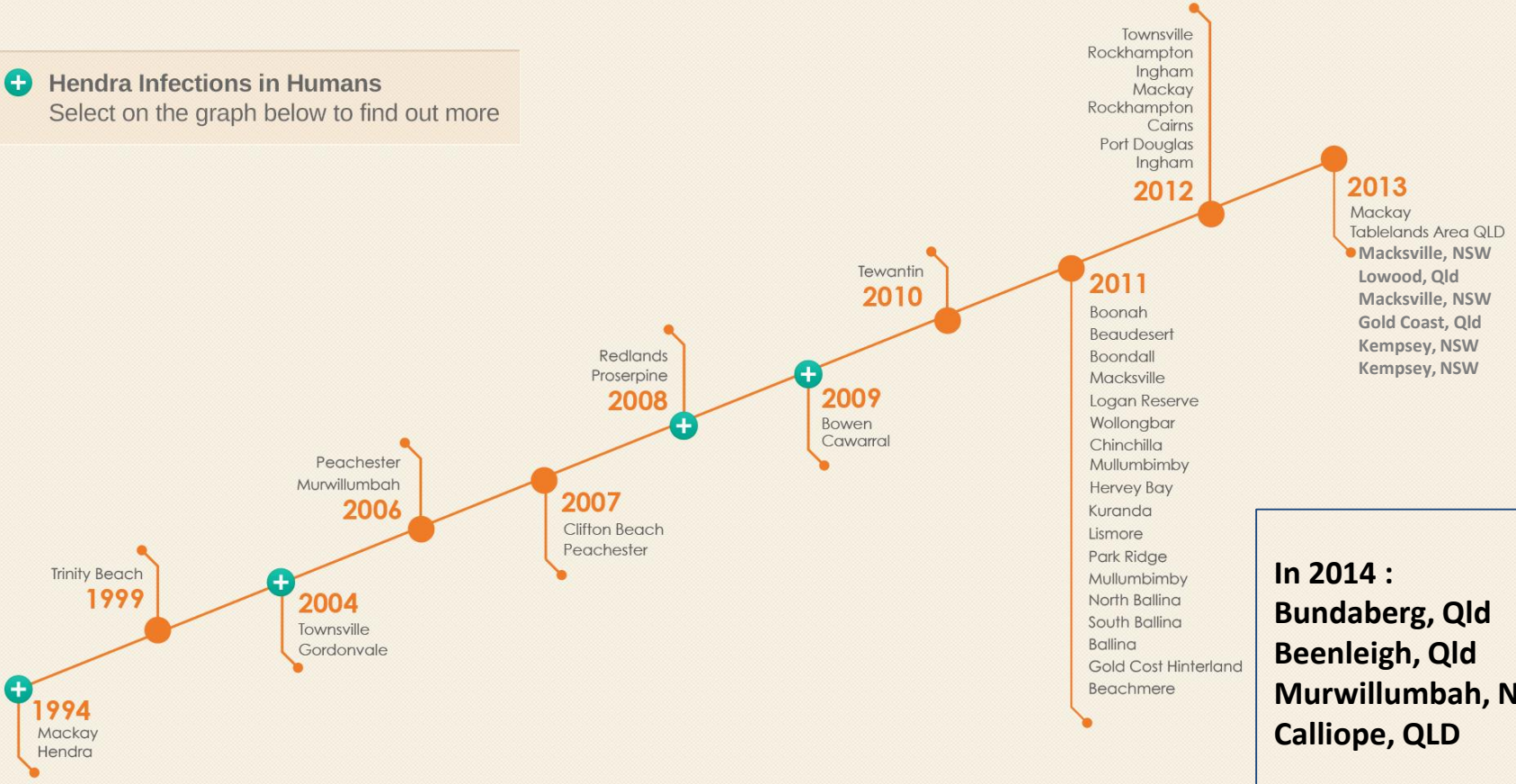
NOTE: In the event that you are unsure of your horse's vaccination status, consult your vet about undertaking a Vaccination Priming Regimen * Priming protocol is one dose at eight, nine and ten months of pregnancy
** Equivac HeV has not been tested in pregnant or breeding horses . Regulatory status: Equivac HeV is not a registered chemical product and an application for registration has been made.

Hendra virus

Equivac HeV

HENDRA FROM 1994–2014

Hendra Infections in Humans
Select on the graph below to find out more



In 2014 :
Bundaberg, Qld
Beenleigh, Qld
Murwillumbah, NSW
Calliope, QLD

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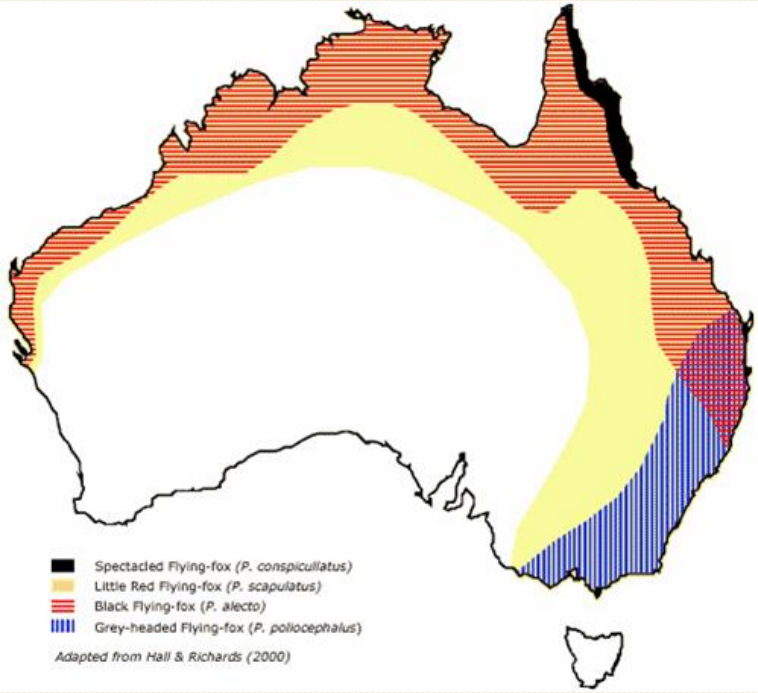
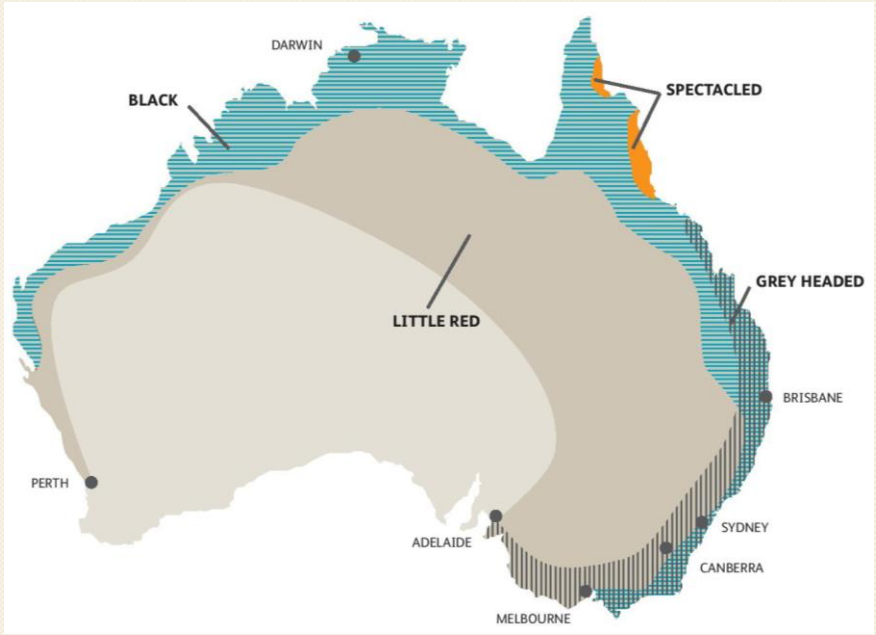
Equivac® HeV
The only way to vaccinate against Hendra

BAT DISTRIBUTION – 2000 TO 2013





ADAPTED FROM RICHARDS, HALL AND PARISH (2012)[6]

- Fruit bats (flying foxes) are the natural hosts of Hendra virus
- Fruit bats range over a large portion of the Australian mainland.
- Infected fruit bats do not exhibit signs of illness from the Hendra virus[3]

SIGNS OF HENDRA VIRUS IN HORSES

(FOLLOWING INCUBATION PERIOD OF 5-16 DAYS)

Common symptoms may include any one or combination of the following

- Acute onset of illness
- Increased body temperature
- Increased heart rate
- Discomfort/weight shifting between legs
- Rapid deterioration with respiratory and neurological signs

Other clinical observations

Respiratory signs

- Congestion & fluid on the lungs
- Difficulty breathing
- Nasal discharge- initially clear then frothy white/blood stained
- Weakness, loss of coordination, collapse

Neurological signs

- Wobbly gait
- Altered consciousness
- Head tilting
- Muscle twitching
- Urinary incontinence

Other clinical observations may be noted

If you have observed any of these symptoms or you are concerned about your horse, consult your veterinarian immediately

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Equivac® HeV

The only way to vaccinate against Hendra

SIGNS OF HENDRA VIRUS IN HUMANS

Clinical signs and symptoms	
Influenza-like symptoms	**Neurological signs**
Fever	Encephalitis with headache
Cough	Fever
Sore throat	Drowsiness
Other clinical observations may be noted	

- Horse to human transmission can occur if there has been close contact with the bodily secretions and/or blood of an infected horse
- Humans may begin to show signs of illness within 5 - 21 days of contact with an infected horse[1]

If you or your horse handlers experience any of these symptoms following contact with a suspected or confirmed case of Hendra virus, seek medical attention immediately

WHAT IS THE RISK OF A HORSE BEING INFECTED WITH HENDRA VIRUS?

RISK ASSESSMENT MATRIX				
SEVERITY / PROBABILITY	Catastrophic (1)	Critical (2)	Marginal (3)	Negligible (4)
Frequent (A)	High	High	Serious	Medium
Probable (B)	High	High	Serious	Medium
Occasional (C)	High	Serious	Medium	Low
Remote (D)	Serious	Medium	Medium	Low
Improbable (E)	Medium	Medium	Medium	Low
Eliminated (F)	Eliminated			

REDUCING THE RISKS

How can I reduce the risk of spreading Hendra virus?

Consult your vet if you are concerned

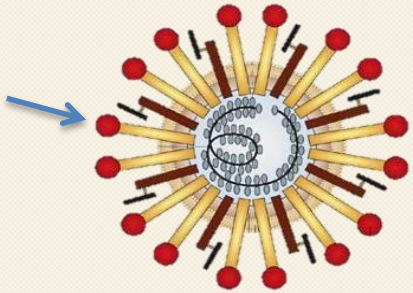
- **Ensure vaccination protocols are followed and all horses are vaccinated against the Hendra virus**
- Protect water and food sources from contamination by flying foxes
- Avoid planting trees that attract flying foxes in or near horse paddocks
- Isolate sick horses from other horses, animals and people
- Ensure strict hygiene and cleaning practices are used on your property
- Personal protective equipment (PPE) including gloves, overalls, boot covers, face shields, safety eyewear and masks should be used when Hendra virus is a potential diagnosis

There are currently no known treatments for Hendra virus in horses or humans.

Ask your vet about Hendra vaccine

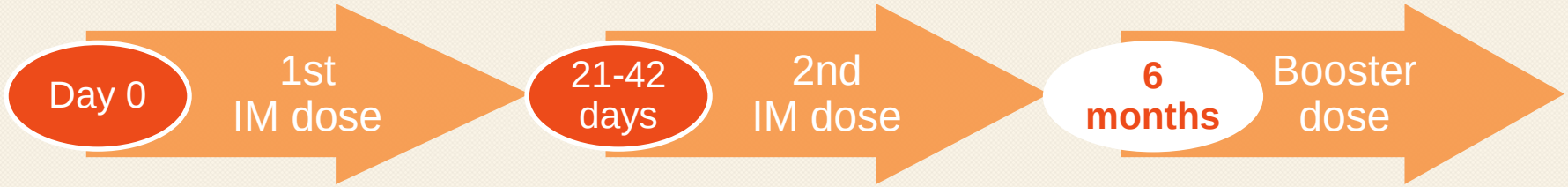
WHAT IS Equivac® HeV?

- Equivac® HeV is called a ‘subunit’ vaccine, which means it only contains a small part of the Hendra Virus – a small protein on the virus surface



VACCINATION WITH Equivac® HeV

- Equivac® HeV vaccine is for use in healthy horses from 4 months of age as an aid in the prevention of clinical disease caused by Hendra Virus
- Equivac® HeV is administered as two x 1 mL doses by intramuscular (IM) injection 21-42 days apart.
- Effective levels of antibodies develop approximately 21 days after the second dose.



What happens in unvaccinated horses?

Horse 1	0	1	2	3	4	5	6			
Blood					37.9	31.3	29.8			
Urine	N/A					38.7	34.2			
Rectal swab		N/A	N/A							
Nasal swab			35.9	33.1	34.3	28.2	31.7			
Oral swab						38.2	34.7			
Faeces	N/A					39.8	33.2			
Horse 2										
Blood							34.8	30.6	30.3	28.6
Urine	N/A				N/A			33.9	34	30.1
Rectal swab										
Nasal swab			34	31.7	35.8	31.8	30	27.5	27.8	33.1
Oral swab								33.6	33.4	32.1
Faeces	N/A							34.9	34.2	33
Horse 3										
Blood						36.5	33.6	31.7	29.9	
Urine	N/A						39.4	38.1	32.8	
Rectal swab										
Nasal swab			38.8	N/A				34.6	31.5	
Oral swab							38.9	35.6	34.4	
Faeces	N/A						35.5	32	32.8	
Horse 4										
Blood							35.1	34.1		
Urine								36.2		
Oral swab							39.9	35.3		
Rectal swab								36.9		
Nasal swab				38.9	35.2	34.6	35.2	34.1		
Faeces										

Slide courtesy of Dr Deborah Middleton, CSIRO

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What happens in vaccinated horses?

Day	0	1	2	3	4	5	6	7	8	9
Horse #V1										
Oral swab										
Rectal swab										
Nasal swab										
Urine										
Faeces										
EDTA blood									N/A	
Horse #V2										
Oral swab										
Rectal swab										
Nasal swab										
Urine										
Faeces										
EDTA blood								N/A		
Horse #V4										
Oral swab										
Rectal swab										
Nasal swab										
Urine										
Faeces										
EDTA blood										
Horse #V5										
Oral swab										
Rectal swab										
Nasal swab										
Urine										
Faeces										
EDTA blood										
Horse #V6										
Oral swab										
Rectal swab										
Nasal swab										
Urine										
Faeces										
EDTA blood		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

Slide courtesy of Dr Deborah Middleton, CSIRO

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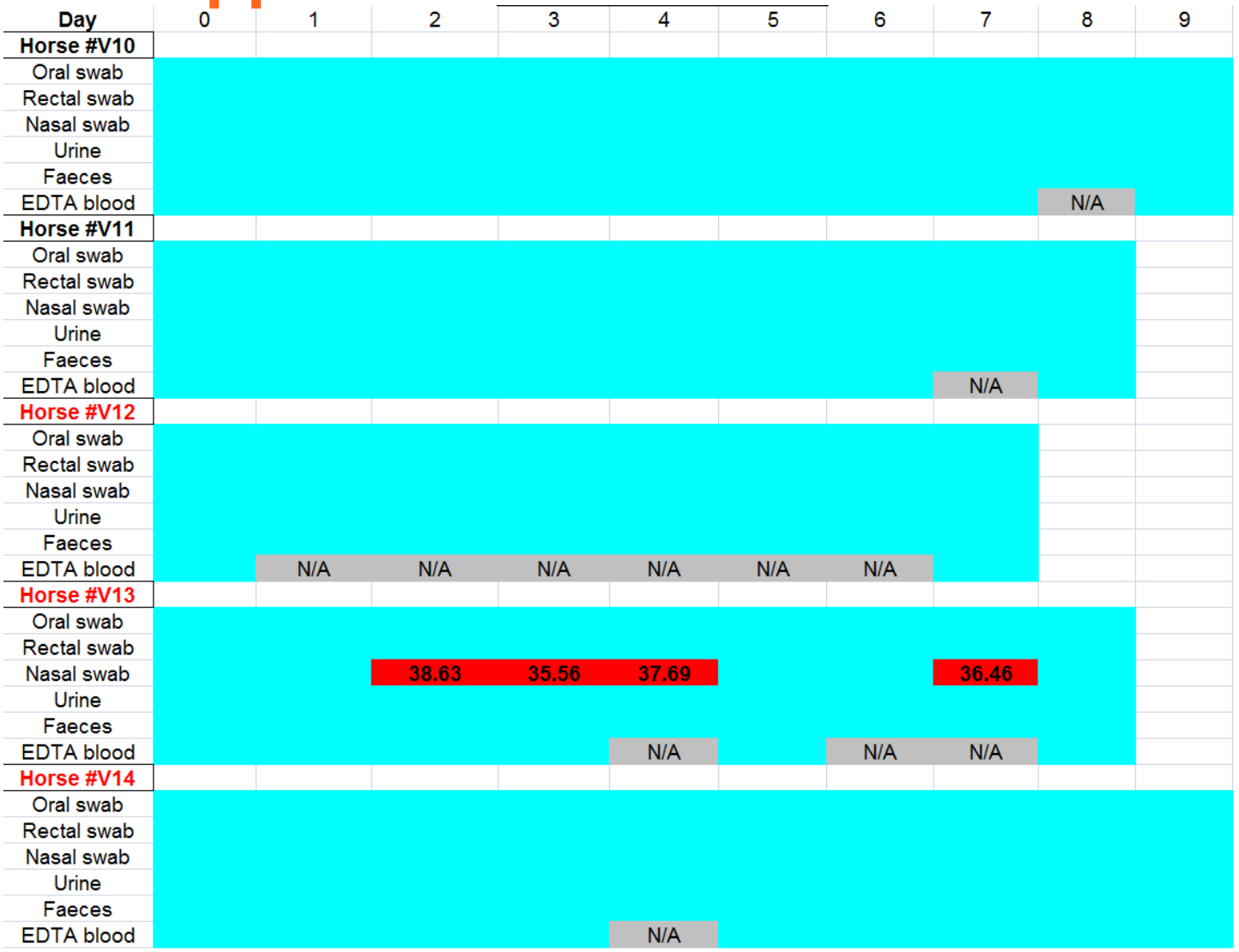
What happens in vaccinated horses?



Slide courtesy of Dr Deborah Middleton, CSIRO

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Is Equivac® HeV SAFE?

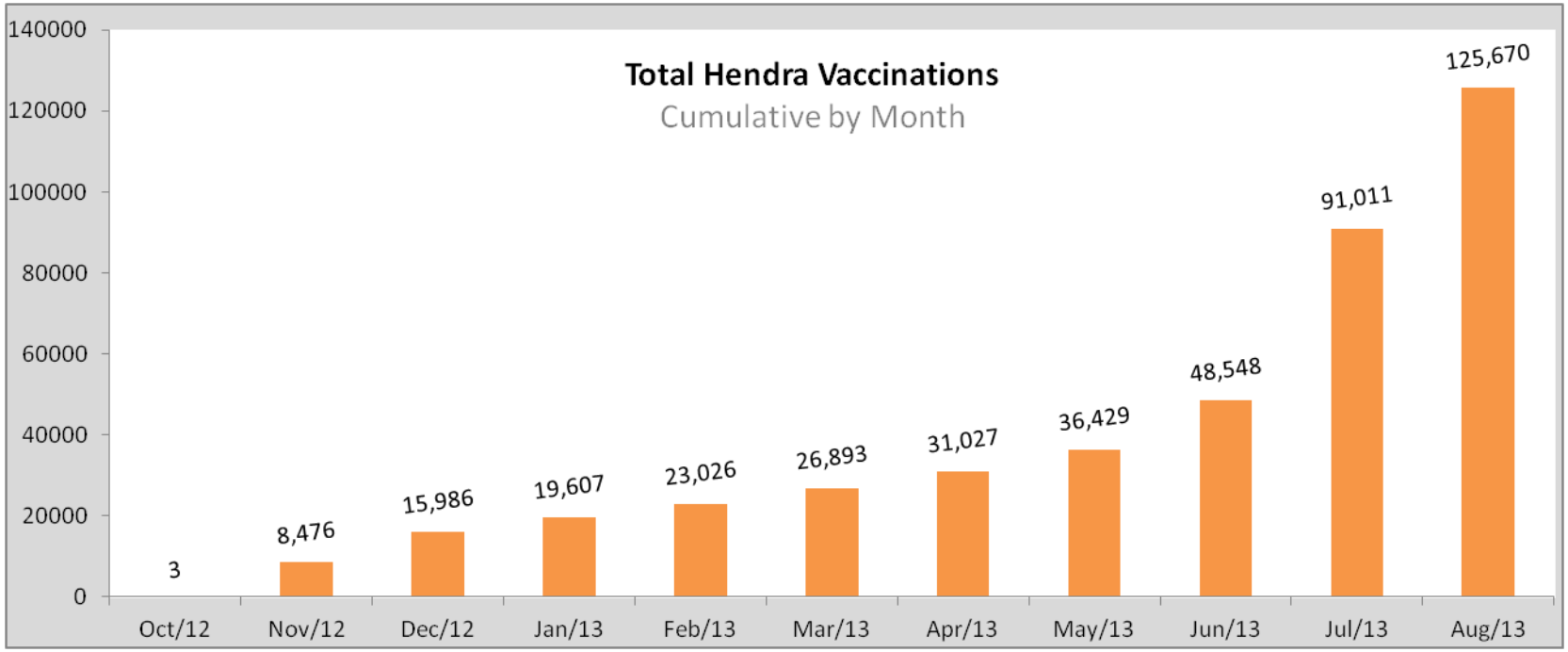
Since vaccine release the incidence of side-effects reported has been very consistent

0.28% adverse event rate to date

This equates to approximately one dose in every 360 with most being mild, responsive to treatment and indicative of the horse's immune system responding to vaccination

To date...

- Released Nov 1, 2012
  - 2200+ vets accredited across Australia
  - 320,000+ doses have been administered
  - 100,000+ horses vaccinated



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- 2. Queensland Horse Council Inc. Fact Sheet: Hendra Virus. January 2012.
- 3. Australian Wildlife Health Network. Hendra Virus (HeV) and Australian Wildlife Draft Fact Sheet. 11/10/2011. www.wildlifehealth.org.au/ Accessed 24/05/2012.
- 4. Hess IMR, Massey PD, Walker B, Middleton DJ, Wright TM. Hendra Virus: What do we know? NSW Public Health Bulletin, 2011;22(5-6):118-22. www.publish.csiro.au/ Accessed 12/10/12.
- 5. APVMA Permit number PER13510, issued 10th August 2012.
- 6. Richards G, Hall L, Parish S. A Natural History of Australian Bats, Working the Night Shift. Published by CSIRO publishing 2012

Equivac HeV is not a registered chemical product and an application for registration has been submitted.

Strangles

Streptococcus equi subsp equi

Equivac S
Equivac 2 in 1

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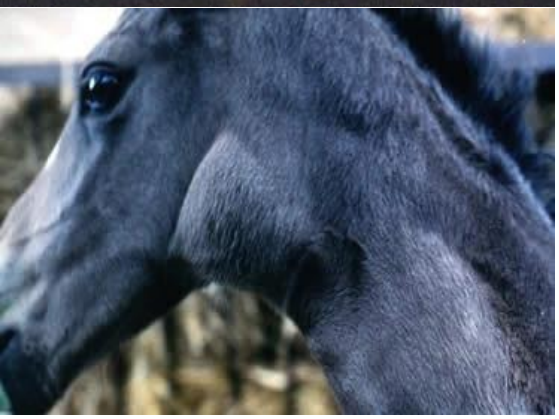
What is ‘Strangles’?

- Contagious bacterial infection
- *Streptococcus equi* subspecies *equi*
- Respiratory tract disease....mostly
- Affects all horses especially young (1-5y)
- Outbreaks common
- Morbidity 90%+
- Mortality up to 10%
- 20% complication rate
  - Purpura haemorrhagica, ‘Bastard’ strangles
    heart, CNS, roarers, myopathy, agalactia
- Notifiable in most states

Infection sources



- Nasal shedding may start 2-3 days after onset of fever and in most cases stops 2-6 weeks after initial infection, but can occur for up to 8 months
- Carriers occur at a low rate (up to 10% of recovered horses)
  - Major source of infection for other horses
  - Infection (chondroids) source in guttural pouch
  - complicated control plan needed
- 25% of horses fail to mount a prolonged immune response
- These can become reinfected within 6-12 months

Treatment and Prevention

- Antibiotic treatment
  - Controversial
  - Inhibits protective immunity
  - Ineffective once LN enlargement begins
- Vaccination (vs M-protein in bacterial cell wall)
  - Prevention better than cure
  - Reduces number and severity of cases
- Quarantine incoming horses for 4w
  - Monitor temps twice daily
  - PCR and Guttural pouch testing
- Biosecurity/hygeine/environmental management

Equivac 2 in 1 vaccine

- **Killed vaccine (also protects against tetanus) given IM in neck**

- **First time: 3 doses not less than 2 weeks apart from 3 months of age**
- **Boosters: 1 dose every 6 or 12 months**

- **Indications**
  - For use **as an aid in the control of strangles** when used in conjunction with appropriate management practices
  - Not a complete preventative but extremely helpful in reducing frequency and severity of infections
- **Keep in fridge (don't freeze it) and check expiry dates**

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Equivac S vaccine

- **Killed vaccine given IM in neck when tetanus booster not wanted**

- **First time: 3 doses not less than 2 weeks apart from 3 months of age**
- **Boosters: 1 dose every 6 or 12 months**

- **Indications**
  - For use **as an aid in the control of strangles** when used in conjunction with appropriate management practices
  - Not a complete preventative but extremely helpful in reducing frequency and severity of infections
- **Keep in fridge (don't freeze it) and check expiry dates**

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References

- Reed, Bayly and Sellon (2010) *Equine Internal Medicine 3rd edition*
- Sweeney et al (2005) Review of streptococcus equi in horses: Guidelines for treatment, control and prevention of strangles in horses. *AAEP Proceedings Vol 51*
- Product labels Equivac S and Equivac 2 in 1
- Equine Infectious Diseases Advisory Board Guidelines 2012

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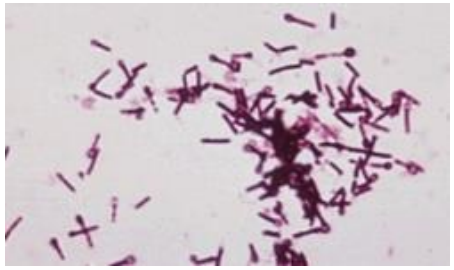
Tetanus

Clostridium tetani

Equivac T
Equivac 2 in 1
Equivac TAT

Tetanus



Relative susceptibility of animals to tetanus toxin*

Horse	**1**	**Most susceptible**
Human	**3**	
Dog	**600**	
Cat	**72,000**	
Chicken	**360,000**	**Least susceptible**

**The horse is assigned an arbitrary value of 1. Comparison relates to the amount of toxin required to produce clinical illness.*

equivac T TETANUS VACCINE

equivac 2in1 STRANGLES & TETANUS VACCINE

equivac TAT TETANUS ANTI-TOXIN

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Tetanus - pathogenesis

- Caused by a spore forming anaerobic bacteria called *Clostridium tetani*
- Normal inhabitant of horse's gut & soil
- Spores highly resistant in the environment
- Enter the horse through a penetrating wound
- Produces a neurotoxin
- Enters nerves at NMJ and travels up nerves to site of action in spinal cord and other CNS sites
- Causes severe muscle spasm
- Incubation period 10-14 days

- Death occurs 5-10 days after onset of CS
- Poor prognosis without early diagnosis and aggressive treatment
- Mortality 60-80%

Tetanus – clinical signs

Spastic muscles ➡ rigid limbs

Erect ears, exposed ‘third eyelids’

Difficulty with
- walking
- eating/drinking
- breathing!!!

➡ DEATH

Tetanus – diagnosis

Clinical signs

History

Equivac T vaccine

- Killed vaccine for use when a strangles booster is not required given IM in neck

- First time: 2 doses 4 weeks apart from 3 months of age
- Boosters: 1 dose every 12 months or 5 years

- Keep in fridge (don't freeze it) and check expiry dates

- Indications
  - For the immunisation of horses against tetanus

Equivac 2 in 1 vaccine

- Killed vaccine that also protects against strangles given IM in neck

- First time: 2 doses 4 weeks apart from 3 months of age
- Boosters: 1 dose every 12 months or 5 years for tetanus only
  (every 6 or 12 months for strangles)

- Keep in fridge (don't freeze it) and check expiry dates

- Indications
  - For the immunisation of horses against tetanus

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Equivac TAT
(tetanus anti-toxin)

- 1500iu/ml of antibodies vs Tetanus toxin
- Single dose or 10ml vials
- Short term protection only (for up to 3w in horses)
- Usually used after wounds or surgery
- Horses, cattle, sheep, goats, pigs and dogs
- s/c injection side of neck
- May be given at same time as Equivac T with no interference
- One syringe enough for prevention (1500iu)
- 10000-20000iu slow i/v for treatment of tetanus
- Not a vaccine

References

- Reed, Bayly and Sellon (2010) *Equine Internal Medicine 3rd edition*
- Merck Veterinary Manual 2012
- Tetanus in CSL Veterinary Handbook 1968
- Product labels Equivac T, Equivac 2 in 1 and Equivac TAT
- Equine Infectious Diseases Advisory Board Guidelines 2012

Equine herpes virus

EHV1,4

Duvaxyn EHV1,4

Herpes viruses in Horses

- 9 different herpes viruses in equids
  - 1-5 horses
  - 6-8 donkeys
  - 9 zebras and Thomson's gazelles
- Herpes viruses have become endemic in most horse populations including Australia
  - Exact prevalence unknown but it is estimated that 80-90% have been exposed to EHV1 or EHV4 by 2 years old[1]
  - Seroprevalence of EHV1 in Australian broodmares ~ 30%[1]
  - Recent QLD study of yearlings with respiratory infections detected 4 of 12 cases infected with EHV4[2]
  - Periodic abortion storms reported in Australia[3]
  - ORF30 sequence-associated neurogenic form detected in Australia[4]

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Features of epidemiology that makes EHV control difficult

- Spread by contact or aerosol
- Rapid and successful proliferation, shedding of virus post-infection
- Latent infection - reactivation after stress
- Short duration of immunity (3-5mths)
- High endemic infection rate
- Constant potential for re-infection

- 80-90% of foals can be infected in the first 2 years with EHV
- Foals that carry maternally derived antibodies (MDA) can have limited protection for 2 - 4 months

EHV clinical signs - overview

Respiratory - mostly EHV4 and mostly in young horses
- fever, poor appetite, runny eyes and noses, lung congestion, coughing, sore and swollen glands around throat, swollen legs

Abortion – almost always EHV1 and in mares of any age
- Not always a recent infection, last trimester, foals may be born alive but be fatally ill, others abort within 10-20 days of infection, future reproductive capacity unaffected

Neurological – EHV 1 only and usually a rare strain of virus
- fever, hind limb incoordination, poor bladder control, lying down, paralysis, death

Respiratory disease (most common)

- EHV 4 mostly
- EHV1 causes milder disease
- Spread by coughing horses, indirect contact and abortion tissue (EHV1)
- Young horses especially
  - Many infected by 6-9 months of age
  - Rare over 4 years old
- Maternal antibody in colostrum important
  - Can protect against clinical signs but foal still gets infected and sheds virus

Respiratory Disease - Clinical signs

- Incubation 2-5 days
- Clinical signs indicates virus in URT
- Shed for 2 weeks
- Depression
- Anorexia
- Fever
- Runny nose – watery to muco-purulent
- Lung congestion and coughing
- Enlarged, sore lymph nodes under jaw and along throat

Respiratory disease - treatment

- Supportive therapy
- Rest
- Antibiotic support

- Early detection important for training horses - Continual stress may lead to long term problem

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Abortion (uncommon)

- EHV1 mostly
- Virus gets into blood (viraemia) and causes vasculitis in placental vessels which interferes with blood flow to foetus.
- Can also spread to uterus and infect unborn foal
- Abortion usually
  - 10-20 days after infection, last trimester.
  - Some foals born alive but severely infected and die soon after
- Foal a source of infection for others
- Repeat exposure not protective vs abortion or neurologic forms of disease

Abortion Storm Origin

1. New mare – shedding virus
   - Prevent by quarantine for 14 days

2. Resident latent mare that gets stressed
   - First sign is one aborted/sick foal
   - 10-20 days later, others abort
   - Prevent contact and spread to other mares
   - Disinfect, split mares into small groups with separate handlers for 2-3 wks.

Neurological disease (rare in Australia)

- EHV 1 only and often D_{752} strain
- Viraemia causes vasculitis in spinal cord blood supply interfering with blood flow to spinal cord
- Clinical signs within 8-10 days of infection
- Mature horses mostly
- Hind limb ataxia, recumbency, paralysis, death.

Neurological disease - treatment

- Supportive care, anti-inflammatories
- Antivirals?
- Often have to be euthanased
- Mild cases - recovery can take weeks to months
- Severe cases – poor prognosis

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EHV diagnosis

- Clinical signs
- History of same/associated horses

- Virus isolation and detection from nasal swabs (early) or blood (gold standard)

- PCR from blood or nasal swab
  - Blood +ve indicates viraemia
  - Nasal +ve indicates shedding

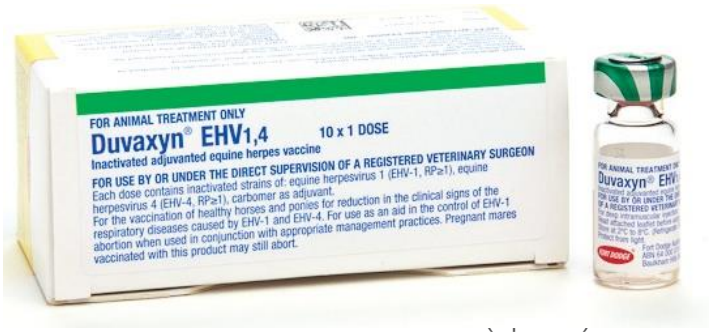
- Foetal organ submission (discuss with lab)

- Serology (rising titre)

- Notifiable disease (abortion and neuro) (NSW neuro only)

Duvaxyn EHV1, 4 vaccine

- **Inactivated aqueous carbomer adjuvanted EHV-1 and EHV-4**
- **To be administered by or under the direct supervision of a veterinarian**
- **Indications**
  - For primary and booster vaccination of healthy, susceptible, immuno-competent horses and ponies to provide practical, active immunisation to **reduce the severity of the clinical signs of respiratory disease** caused by EHV-1 and EHV-4
  - For use **as an aid in the control of EHV-1 abortion** when used in conjunction with appropriate management practices



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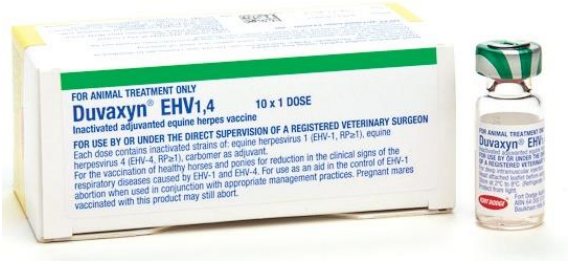
Duvaxyn EHV1, 4 vaccine



- Administration and storage
  - Administer 1.5ml vial by deep IM injection
  - Shake well before use
  - Recommended for use in healthy horses and ponies from 5 months of age (extra dose at 3 months of age in high risk situations)
    - 2 doses 1 month apart
    - Non-breeding horses booster every 6 months
    - Pregnant mares boosters at 5,7 and 9 months gestation
  - Do not use disinfectants or chemicals to sterilise the skin
  - Use contents within one hour of opening
  - Do not freeze, protect from light

Duvaxyn EHV1, 4 vaccine

- Will provide short term immunity
- Will reduce clinical signs
- Will reduce viral shedding
- Will lower environmental viral levels if total herd immunity is practiced

- Will not prevent infection
- Will not eliminate carrier status

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EHV risk minimisation- the keys to success

- Whole herd vaccination
- No entry of unvaccinated animals
- Quarantine of new/returning horses - 2 to 3 weeks
  - Monitor for clinical signs, especially fever
- Quarantine infected horses - 4 weeks
  - Repeat nasal swab until negative
- Isolation of suspect horses
- Minimisation of stress
- Good farm management and biosecurity
- Disease management protocols in place

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- Paillot R, Case R, Ross J, Newton R and Nugent J. (2008) Equine Herpes Virus - 1:Virus, Immunity and Vaccines. *The Open Veterinary Science Journal* 2: 68-91
- Diallo IS, Hewitson GR, de Jong A, Kelly MA, Wright DJ, Corney BG, Rodwell BJ (2008) Equine herpesvirus infections in yearlings in South-East Queensland. *Arch Virol* 153: 1643-1649
- Carrigan M, Cosgrove P, Kirkland P, Sabine M. (1991) *Equine Veterinary Journal* 23 (2) 108-110
- Cuxson J, Hartley CA, Devlin JM and Gilkerson JR. (2011) *Proceedings of the 33rd Bain Fallon Memorial Lectures* p17
- Equine Infectious diseases Advisory Board Guidelines 2012
- Product label Duvaxyn $EHV_{1,4}$

When should I vaccinate my horses?

The Equine Infectious Diseases Advisory Board have developed an easy to follow vaccination protocol.
We recommend you use these guidelines when planning an annual vaccination schedule for your horses.

What is the horse's age?

Younger than 12 months

All horses younger than 12 months require a vaccination priming regimen for Hendra Virus, Tetanus, Strangles and Equine Herpes Virus

Tetanus
From three months of age
- two doses, four weeks apart

Strangles
From three months of age
- three doses, two weeks apart

Equine Herpes Virus
From three months of age
- two doses, four weeks apart

Hendra Virus
From four months of age
- two doses, three to six weeks apart, followed by a booster every six months

Older than 12 months

What classification is the horse?

Low interaction horse

Vaccination Maintenance
Regimen required for the following disease states

Tetanus
One dose annually

Strangles
Consult your vet

Hendra Virus
Two doses, three to six weeks apart, followed by a booster every six months

Competitive/pleasure horse

Vaccination Maintenance
Regimen required for the following disease states

Tetanus
One dose annually

Strangles
One dose every six months

Equine Herpes Virus
One dose every six months

Hendra Virus
Two doses, three to six weeks apart, followed by a booster every six months

Breeding horse

Female Breeding Horses Only
Vaccination Maintenance Regimen required for the following disease states

Tetanus
One dose annually

Strangles
One dose every six months

Equine Herpes Virus
One dose at five, seven and nine months of gestation

Rotavirus
One dose one month prior to foaling for mares primed during a previous pregnancy*

Hendra Virus
Two doses, three to six weeks apart, followed by a booster every six months**

Hendra Virus

The Equine Infectious Diseases Advisory Board supports the Australian Veterinary Association's position to strongly recommend that all horses in Australia are vaccinated against Hendra virus to help protect humans from its potentially fatal outcome.

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NOTE: In the event that you are unsure of your horse's vaccination status, consult your vet about undertaking a Vaccination Priming Regimen * Priming protocol is one dose at eight, nine and ten months of pregnancy
** Equivac HeV has not been tested in pregnant or breeding horses . Regulatory status: Equivac HeV is not a registered chemical product and an application for registration has been made.