



Immunisation in Veterinary Care: The Hendra Experience



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Vaccination in animal health

Aims of vaccination:

Prevent infection

Prevent disease

Reduce severity of clinical signs

An aid in the control of...



To prevent zoonotic disease...

Family Paramyxoviridae

Hendra Virus

September 1994:



Family Paramyxoviridae

Hendra Virus

September 1994:
Acute respiratory disease
20 horses affected
14 died (7 <12 hrs)

A Morbillivirus That Caused Fatal Disease in Horses and Humans

Keith Murray,* Paul Selleck, Peter Hooper, Alex Hyatt, Allan Gould, Laurie Gleeson, Harvey Westbury, Lester Hiley, Linda Selvey, Barry Rodwell, Peter Ketterer

A morbillivirus has been isolated and added to an increasing list of emerging viral diseases. This virus caused an outbreak of fatal respiratory disease in horses and humans. Genetic analyses show it to be only distantly related to the classic morbilliviruses rinderpest, measles, and canine distemper. When seen by electron microscopy, viruses had 10- and 18-nanometer surface projections that gave them a "double-fringed" appearance. The virus induced syncytia that developed in the endothelium of blood vessels, particularly the lungs.

The emergence of new viruses may result in previously unrecognized or new diseases (1-3). Although emerging viruses may contain novel mutations or represent gradual evolu-

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tion (3), more often they emerge because of changes in behavior or the environment whereby they are introduced to a new host (3-5). Viruses that are pathogenic in novel human and nonhuman hosts include Marburg and Ebola viruses; hantaviruses; human immunodeficiency viruses; Lassa virus; dolphin, porpoise, and phocine morbilliviruses; feline immunodeficiency virus; and bovine spongiform encephalopathy agent (3).

Dolphin, porpoise, and phocine morbilliviruses, rinderpest virus, and measles virus belong to the genus *Morbillivirus* within the family *Paramyxoviridae*. Although nonhuman morbilliviruses have been associated

Hendra Virus

Congested, firm, fluid filled lungs,
with dilated lymphatics

Thick, foamy, haemorrhagic exudate
in airways



Figure 27: Equine morbillivirus pneumonia — acute pneumonia in an experimentally infected horse (AAHL)

Family Paramyxoviridae

Genus Henipavirus

Hendra Virus

September 1994:
Acute respiratory
disease
20 horses affected
14 died (7 <12 hrs)



Nipah Virus

1998-9:
Encephalitis in people
265 cases
105 fatalities

Subsequent outbreaks
in Bangladesh

Reservoir in flying foxes (fruit bats)

An Emerging Zoonosis

To date:

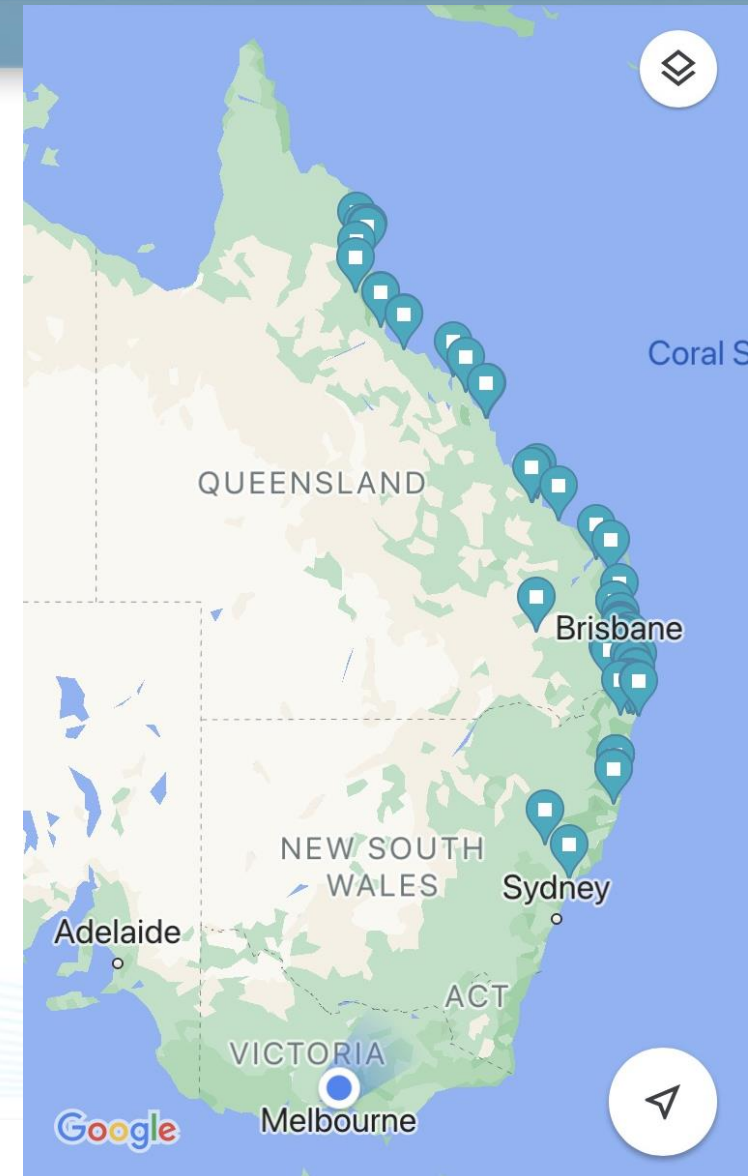
64 reported outbreaks in Eastern
Australia

106 horses affected

All died or euthanased

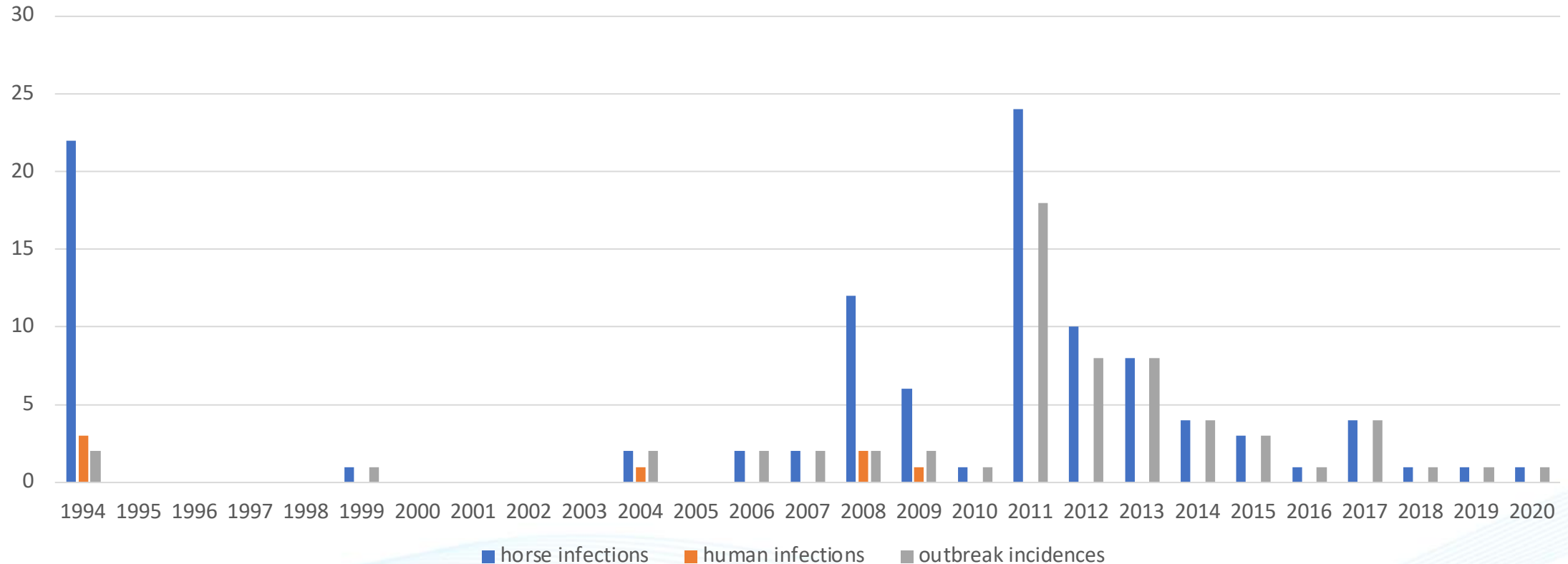
7 human cases (4 died)

Antibodies in dogs



An Emerging Zoonosis

Hendra virus outbreaks and infections



<https://www.health.nsw.gov.au/Infectious/controlguideline/Pages/hendra-case-summary.aspx>

<https://www.business.qld.gov.au/industries/service-industries-professionals/service-industries/veterinary-surgeons/guidelines-hendra/incident-summary>

1994 - 2008

Sporadic cases

Sudden death

Respiratory signs



2008 Redlands outbreak changed everything

Redlands 2008



- Five cases of Hendra at vet clinic in Brisbane in June.
- Two human cases: one fatality
- Four horses severely ill and euthanased
- One recovered horse (high Ab titre)
- All confirmed cases PCR positive on blood and/or nasal swabs and/or tissue samples from Post Mortem
- **NO RESPIRATORY CLINICAL SIGNS**
SIGNIFICANT NEUROLOGICAL SIGNS

- Two human fatalities (Vets)
- Significant increase in horse cases
- Considerable interest in Hendra virus
 - Laboratory experiments
 - Ecological field work
 - Epidemiological studies
- Call from vets and industry for a vaccine to be developed



Experimental infection studies:
3 horses (BSL4)
Intra-nasal and Intravenous challenge
Euthanased at onset of clinical signs

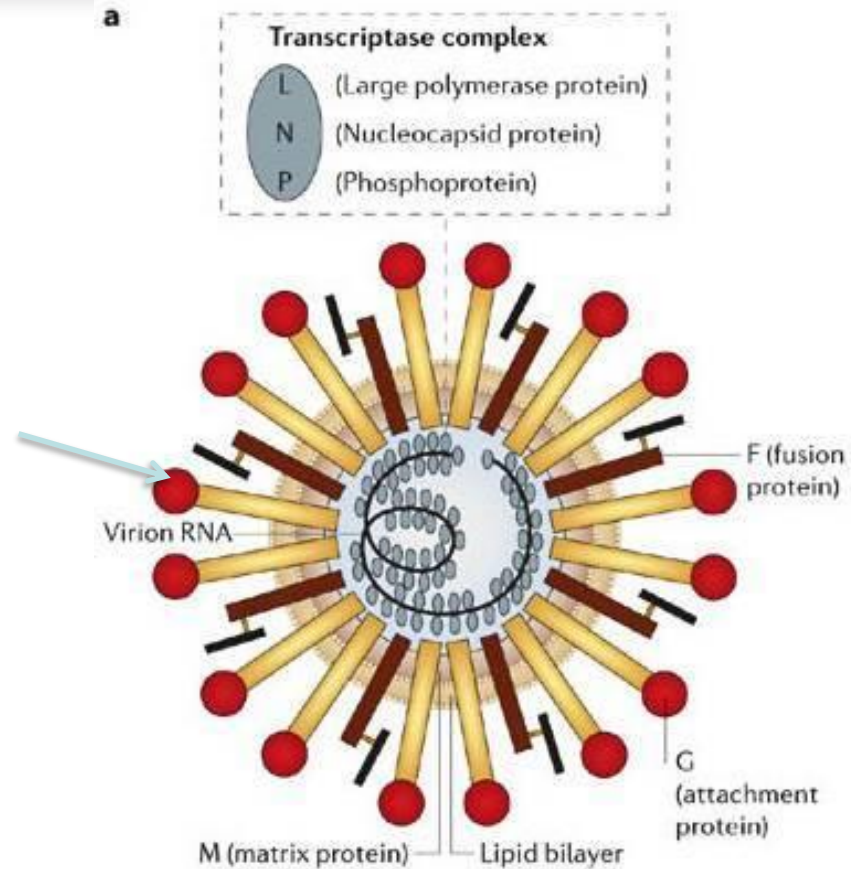


| Horse 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|-----|---|------|--------|--------|--------|------|
| Blood Heparin Ribo-pure RNA extraction P-gene | U | U | U | U | 39.4 | 33 | 31.2 |
| Blood Heparin Ribo-pure RNA extraction N-gene | U | U | U | U | 37.9 | 31.3 | 29.8 |
| Urine P-gene | N/A | U | U | 41.9/U | U | 41.6/U | 36.2 |
| Urine N-gene | N/A | U | U | U | 40.3/U | 38.7 | 34.2 |
| Rectal swab P-gene | U | U | U | U | U | U | U |
| Rectal swab N-gene | U | U | U | U | U | U | 42 |
| Nasal swab P-gene | U | U | 37.5 | 34.7 | 35.9 | 29.5 | 32.8 |
| Nasal swab N-gene | U | U | 35.9 | 33.1 | 34.3 | 28.2 | 31.7 |
| Oral swab P-gene | U | U | U | U | U | 41.2 | 38.5 |
| Oral swab N-gene | U | U | U | U | U | 38.2 | 34.7 |
| Faeces P-gene | N/A | U | U | U | U | 40.7 | 36.1 |
| Faeces N-gene | N/A | U | U | U | 40.6/U | 39.8 | 33.2 |

| Horse 2 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|-----|---|------|------|------|--------|--------|------|------|------|
| Blood Heparin Ribo-pure RNA extraction P-gene | U | U | U | U | U | U | 37.3 | 32.2 | 31.4 | 29.9 |
| Blood Heparin Ribo-pure RNA extraction N-gene | U | U | U | U | U | 40.6/U | 34.8 | 30.6 | 30.3 | 28.6 |
| Urine P-gene | N/A | U | U | U | N/A | U | U | 36.2 | 36.3 | 33.5 |
| Urine N-gene | N/A | U | U | U | N/A | U | 38.7/U | 33.9 | 34 | 30.1 |
| Rectal swab P-gene | U | U | U | U | U | U | U | U | 38.2 | 40.5 |
| Rectal swab N-gene | U | U | U | U | U | U | U | 43.6 | 36.4 | 36.5 |
| Nasal swab P-gene | U | U | 36.3 | 32.4 | 38.9 | 34.3 | 31.1 | 28.1 | 29.2 | 35.2 |
| Nasal swab N-gene | U | U | 34 | 31.7 | 35.8 | 31.8 | 30 | 27.5 | 27.8 | 33.1 |
| Oral swab P-gene | U | U | U | U | U | U | U | 36.6 | 35.8 | 34.5 |
| Oral swab N-gene | U | U | U | U | U | U | 40.0/U | 33.6 | 33.4 | 32.1 |
| Faeces P-gene | N/A | U | U | U | U | U | 40.7/U | 37 | 35 | 35.2 |
| Faeces N-gene | N/A | U | U | U | U | U | 40.5 | 34.9 | 34.2 | 33 |

| Horse 3 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|-----|--------|------|-----|------|------|--------|------|------|
| Blood Heparin Ribo-pure RNA extraction P-gene | U | U | U | U | U | 39.1 | 36.3 | 32.8 | 31.6 |
| Blood Heparin Ribo-pure RNA extraction N-gene | U | U | U | U | U | 36.5 | 33.6 | 31.7 | 29.9 |
| Urine P-gene | N/A | U | U | U | U | U | 40.7 | 39 | 34.3 |
| Urine N-gene | N/A | U | U | U | U | U | 39.4 | 38.1 | 32.8 |
| Rectal swab P-gene | U | U | U | U | U | U | U | U | U |
| Rectal swab N-gene | U | U | U | U | U | U | U | 42.9 | 42.8 |
| Nasal swab P-gene | U | U | 42 | N/A | 41.4 | 43 | U | 37.9 | 32.9 |
| Nasal swab N-gene | U | U | 38.8 | N/A | U | 41.2 | 40.0/U | 34.6 | 31.5 |
| Oral swab P-gene | U | U | U | U | U | 41.8 | 40.3/U | 39.5 | 38.5 |
| Oral swab N-gene | U | U | U | U | U | U | 38.9 | 35.6 | 34.4 |
| Faeces P-gene | N/A | 41.1/U | U | U | 42.2 | U | 39.2 | 39 | 34.5 |
| Faeces N-gene | N/A | U | U | U | U | U | 35.5 | 32 | 32.8 |

Hendra virus vaccine



G protein:

Receptor binding protein

Binds to host cell receptors (β -ephrin)

Initiates infection



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Efficacy Assessment of HeV Vaccine

Vaccine studies:

3 horses (BSL4)
2 Vaccinated

No HeV nucleic acid
detected ante-
mortem **or** post-
mortem



| Daily samples | HeV N-gene TaqMan results | | | | | | | | | |
|------------------|---------------------------|---|---|------|------|------|------|------|------|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Sample day | | | | | | | | | | |
| 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 #V3 | Control | | | | | | | | | |
| Oral swab | | | | | | | | 39.9 | 35.3 | |
| Rectal swab | | | | | | | | | 36.9 | |
| Nasal swab | | | | 38.9 | 35.2 | 34.6 | 35.2 | | 34.1 | |
| Urine | | | | | | | | | 36.2 | |
| Faeces | | | | | | | | | | |
| EDTA blood | | | | | | | | 35.1 | 34.1 | |
| Colour code: | Negative | | | | | | | | | |
| | Positive | | | | | | | | | |

| Tissue Type | HeV N-gene TaqMan results | | |
|---------------------|---------------------------|------------|-------------------|
| | Horse #V1 | Horse # V2 | Horse #V3 control |
| Adrenal | | | 31.2 |
| Bladder | | | |
| Brain | | | |
| CSF | | | |
| Guttural Pouch | | | 39.9 |
| Heart Horse | | | 30.8 |
| Kidney Horse | | | 32 |
| Large Intestine | | | 30.6 |
| Liver | | | 36.8 |
| Lung | | | 23.2 |
| Lymph-Bronchial | | | 32.3 |
| Lymph-Head | | | 30.7 |
| Lymph-Inguinal | | | 37 |
| Lymph- Mandibular | | | 34.5 |
| Lymph-Renal | | | 31.1 |
| Meninges | | | 34.2 |
| Nasal turbinate | | | 37.5 |
| Nerve | | | 35.9 |
| Olfactory Lobe | | | 35.9 |
| Ovaries | | | 32.4 |
| Pharynx | | | 35.5 |
| Small Intestine | | | 33.9 |
| Spinal Cord | | | |
| Spleen | | | 30.1 |
| Trigeminal ganglion | | | 36.3 |
| Uterus | | | 36.9 |
| Colour code: | | Negative | |
| | | Positive | (Ct<40) |

Efficacy Assessment of HeV Vaccine

Vaccine studies:

3 horses & 1 Guinea pig (BSL4)

3 horses vaccinated

No HeV nucleic acid detected ante-mortem **or** post-mortem



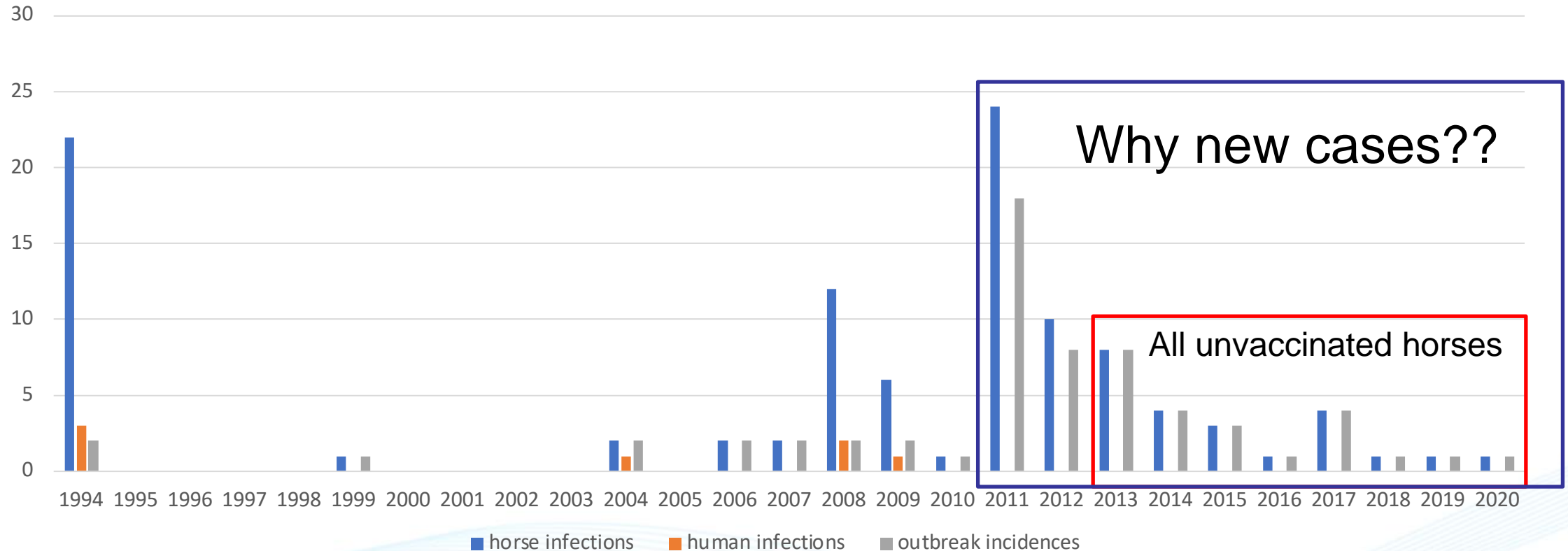
| | HeV N-gene TaqMan results | | | | Sample day | | | | |
|-------------------|---------------------------|-----|-----|-----|------------|------|-----|-----|-----|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Horse #V4 | | | | | | | | | |
| Oral swab | | | | | | | | | |
| Rectal swab | | | | | | | | | |
| 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 |
| Guinea pig | | | | | | | | | |
| Brain | | | | | | 35.6 | | | |
| Lung | | | | | | 33 | | | |
| Spleen | | | | | | 27.1 | | | |

| | | |
|--------------|----------|---------|
| Colour code: | Negative | |
| | Positive | (Ct<40) |

| Tissue Type | HeV N-gene TaqMan results | | | |
|---------------------|---------------------------|------------|-----------|---------------|
| | Horse #V4 | Horse # V5 | Horse #V6 | Guinea pig #3 |
| Adrenal | | | | |
| Bladder | | | | |
| Brain | | | | 35.6 |
| CSF | | | | |
| Guttural Pouch | | | | |
| Heart Horse | | | | |
| Kidney Horse | | | | |
| Large Intestine | | | | |
| Liver | | | | |
| Lung | | | | 33 |
| Lymph-Bronchial | | | | |
| Lymph-Head | | | | |
| Lymph-Inguinal | | | | |
| Lymph- Mandibular | | | | |
| Lymph-Renal | N/A | | | |
| Meninges | | | | |
| Nasal turbinate | | | | |
| Nerve | | | | |
| Olfactory Lobe | | | | |
| Ovaries | | | | |
| Pharynx | | | | |
| Small Intestine | | | | |
| Spinal Cord | | | | |
| Spleen | | | | 27.1 |
| Trigeminal ganglion | | N/A | | |
| Uterus | | | | |
| Colour code: | Negative | | | |
| | Positive | | | (Ct<40) |

Vaccine launched November 2012

Hendra virus outbreaks and infections



<https://www.health.nsw.gov.au/Infectious/controlguideline/Pages/hendra-case-summary.aspx>

<https://www.business.qld.gov.au/industries/service-industries-professionals/service-industries/veterinary-surgeons/guidelines-hendra/incident-summary>

Australia 2011

Unusually wet Summer

Flooding in South Eastern
Queensland

Cyclone Yasi in North
Queensland

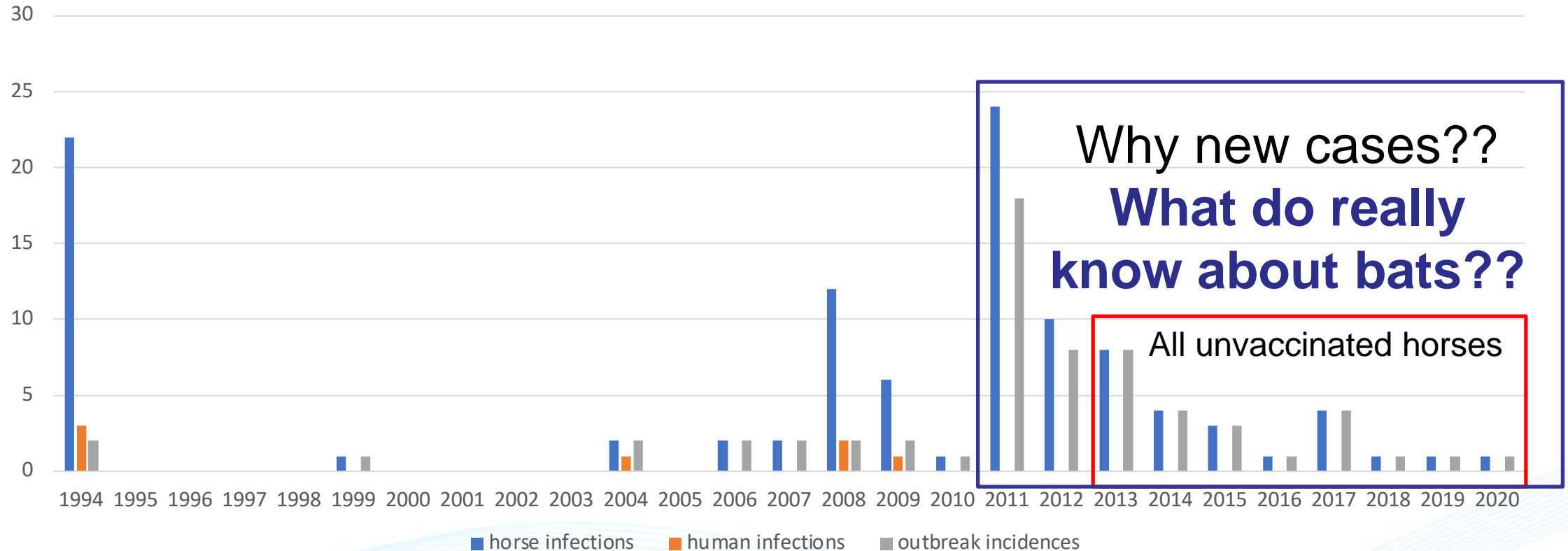
Flooding in Southern NSW

Flooding in Northern Victoria



Vaccine launched November 2012

Hendra virus outbreaks and infections



<https://www.health.nsw.gov.au/Infectious/controlguideline/Pages/hendra-case-summary.aspx>

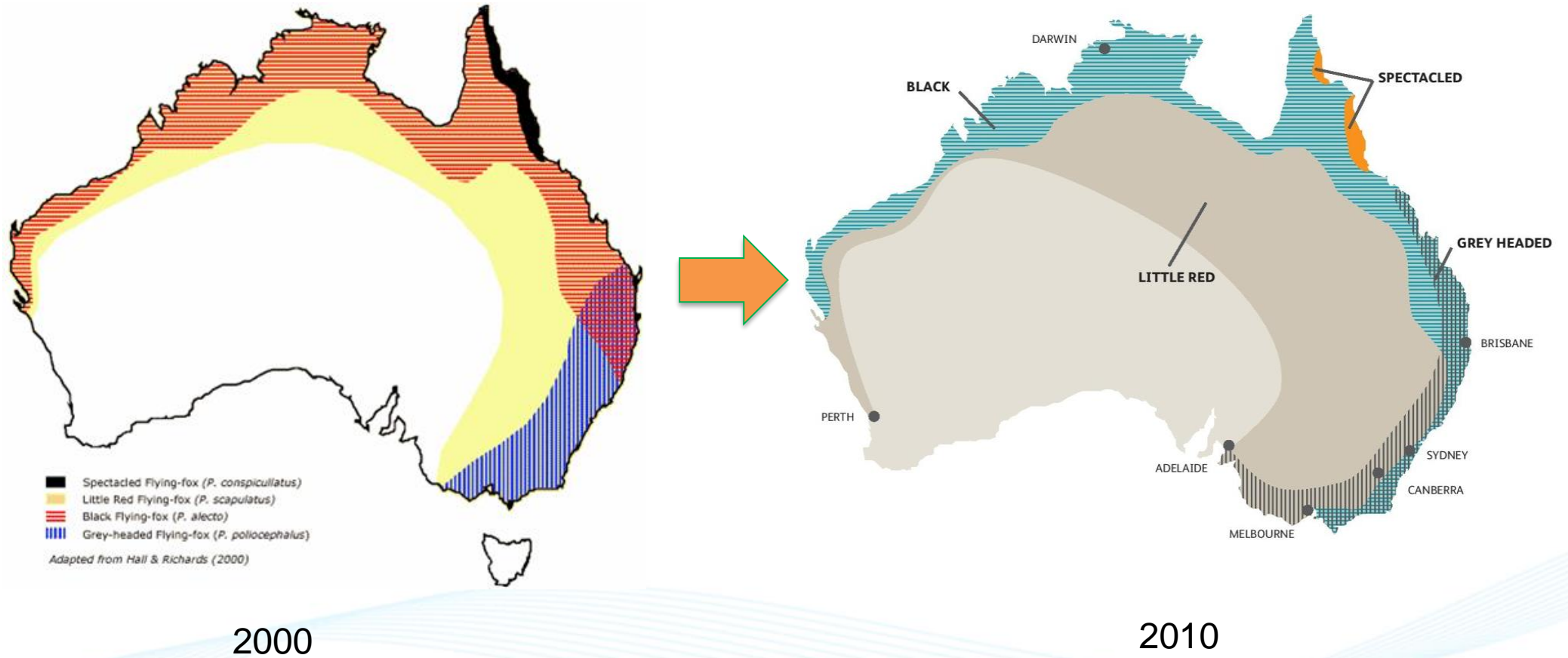
<https://www.business.qld.gov.au/industries/service-industries-professionals/service-industries/veterinary-surgeons/guidelines-hendra/incident-summary>

Hendra virus ecology



- Hendra antibody detected in all four mainland Australian *Pteropid* bat species
- Seroprevalence varies (2 – 50%)
Suggests non-lethal infection in bats
No evidence of clinical disease in either naturally or experimentally infected bats
- Detected in foetal/neonatal lung
Detected in uterine fluid & renal tissue
- No definitive data on bat-to-bat spread
- No data on bat-to-horse spread
- No evidence of bat-to-human spread

Bat distribution





RESEARCH ARTICLE

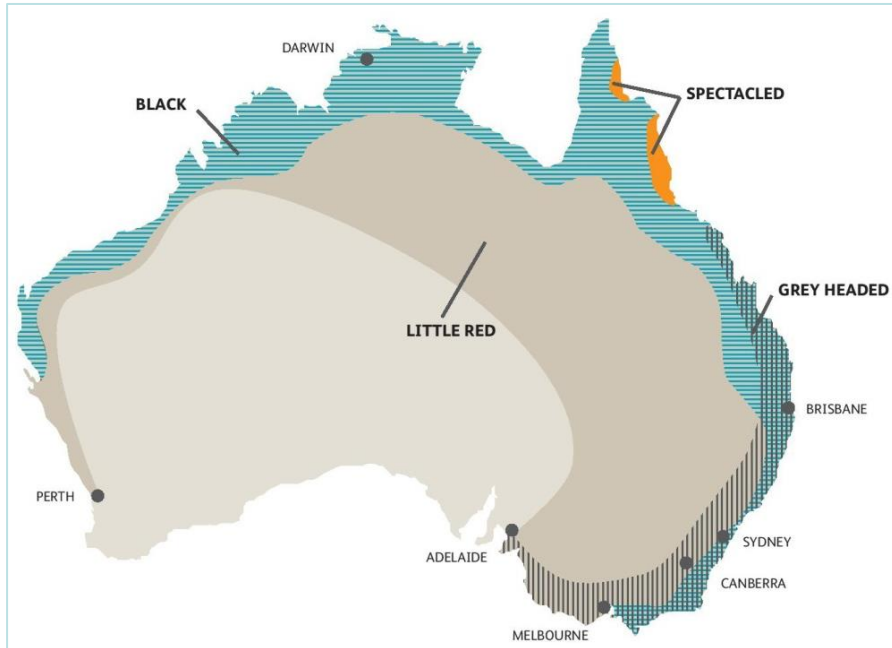
Natural Hendra Virus Infection in Flying-Foxes - Tissue Tropism and Risk Factors

Lauren K. Goldspink^{1*}, Daniel W. Edson¹, Miranda E. Vidgen¹, John Bingham², Hume E. Field^{1,3}, Craig S. Smith¹

1 Queensland Centre for Emerging Infectious Diseases, Biosecurity Queensland, Department of Agriculture and Fisheries, Coopers Plains, Queensland, Australia, **2** Australian Animal Health Laboratory, Commonwealth Scientific and Industrial Research Organisation, East Geelong, Victoria, Australia, **3** EcoHealth Alliance, New York, New York, United States of America

PLOS ONE | DOI:10.1371/journal.pone.0128835 June 10, 2015

Hendra virus ecology



- HeV detected in multiple tissues including kidney, spleen, lung, liver, placenta and blood components
- Lack of detection in foetal tissues of HeV positive pregnant females
- Supports placental and foetal tissues not being an important source of equine infection, and reinforces bat urine as a key transmission pathway

Table 1. Test results from RT-qPCR (n = 310) were subjected to a generalised linear model [19] under the Binomial distribution and logit link, using GenStat [20].

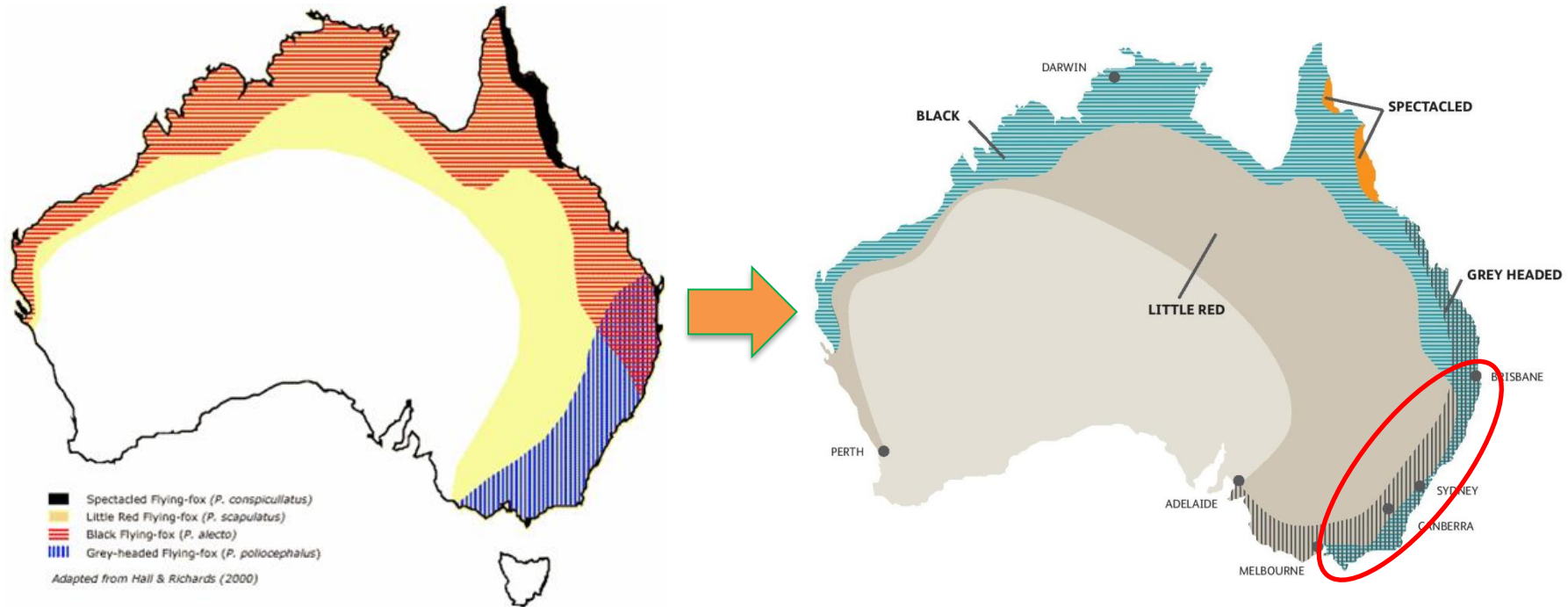
| Variable | Category | Detected(Total) | Adjusted mean prevalence (\pm S.E.) | P χ^2 |
|---------------------|---|-----------------|--|------------|
| Reproductive status | | | | 0.122 |
| | Male | 6 (119) | 4.7 (2.9–6.5) | |
| | Immature female | 0 (36) | 0.0 (0.0–0.1) | |
| | Mature female not pregnant | 8 (72) | 9.4 (6.3–12.5) | |
| | Mature female pregnant | 4 (41) | 10.8 (6.1–15.5) | |
| | Unknown | 2 (40) | 6.2 (2.2–10.3) | |
| Season | | | | 0.689 |
| | Spring | 7 (146) | 7.1 (4.5–9.7) | |
| | Summer | 6 (74) | 4.7 (2.7–6.6) | |
| | Autumn | 2 (41) | 12.2 (5.2–19.1) | |
| | Winter | 5 (49) | 7.1 (4.1–10.1) | |
| Species | | | | 0.003 |
| | <i>Chalinobus</i> spp. ^a | 0 (2) | 0.0 (0.0–0.2) | |
| | <i>Miniopterus australis</i> ^a | 0 (1) | 0.0 (0.0–0.3) | |
| | <i>Nyctophilus</i> spp. ^a | 0 (1) | 0.0 (0.0–0.3) | |
| | <i>Pteropus alecto</i> ^b | 9 (105) | 8.6 (5.8–11.3) | |
| | <i>Pteropus conspicillatus</i> ^b | 10 (44) | 22.7 (16.4–29.0) | |
| | <i>Pteropus poliocephalus</i> ^a | 1 (91) | 1.1 (0.0–2.2) | |
| | <i>Pteropus scapulatus</i> ^b | 0 (50) | 0.0 (0.0–0.1) | |
| | <i>Saccolaimus flaviventris</i> ^a | 0 (1) | 0.0 (0.0–0.3) | |
| | <i>Scotorepens</i> spp. ^a | 0 (3) | 0.0 (0.0–0.2) | |
| | <i>Synconycteris</i> spp. ^a | 0 (3) | 0.0 (0.0–0.2) | |
| | Unknown <i>Pteropus</i> spp. ^b | 0 (5) | 0.0 (0.0–0.1) | |
| | Unknown <i>Vespertilioniformes</i> ^a | 0 (4) | 0.0 (0.0–0.2) | |
| Latitude | | | | 0.232 |
| | North | 13 (82) | 9.3 (5.9–12.7) | |
| | South | 7 (228) | 4.2 (2.4–6.0) | |
| Year | | | | 0.233 |
| | 96 | 7 (105) | 4.7 (3.0–6.4) | |
| | 97 | 13 (205) | 8.0 (6.0–9.9) | |

Adjusted mean proportions, and their standard errors are reported.

^aVespertilioniformes.

^bPteropodiformes.

Bat distribution



Species is a significant risk factor for the detection of HeV in naturally infected bats, specifically *P. alecto* (Black) and *P. conspicillatus* (Spectacled)

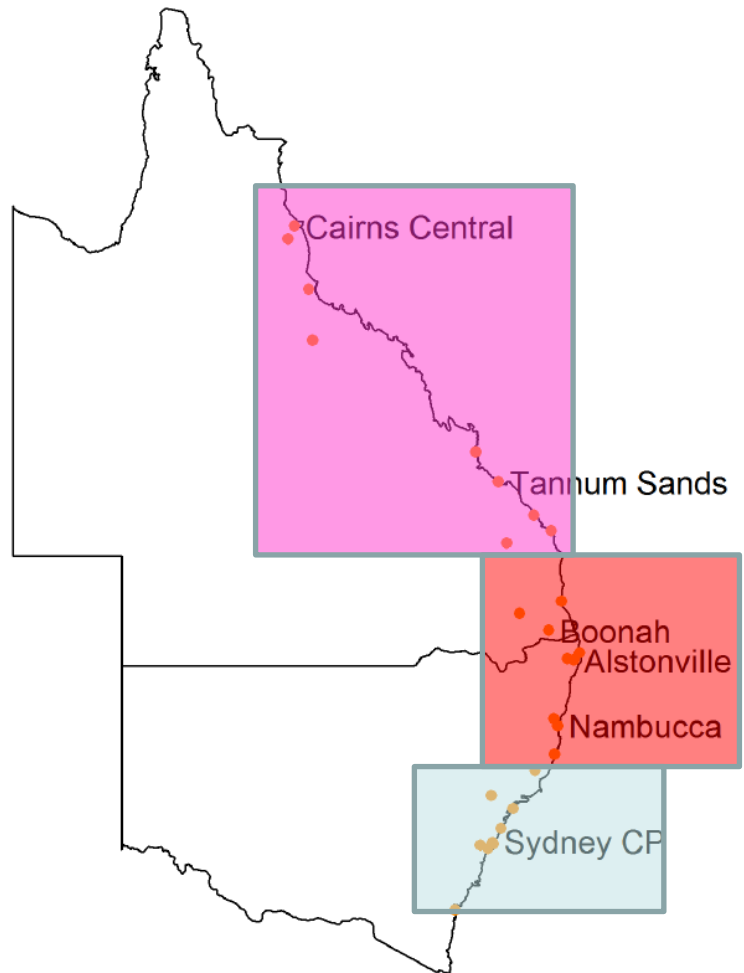
These two species are likely the primary reservoir host of HeV

RESEARCH ARTICLE

Spatiotemporal Aspects of Hendra Virus Infection in Pteropid Bats (Flying-Foxes) in Eastern Australia

Hume Field^{1,5*}, David Jordan^{2*}, Daniel Edson^{1,6}, Stephen Morris², Debra Melville¹, Kerry Parry-Jones³, Alice Broos¹, Anja Divljan^{3,7}, Lee McMichael^{1,8}, Rodney Davis⁴, Nina Kung^{1,9}, Peter Kirkland⁴, Craig Smith¹

Hendra virus ecology



- Monthly pooled urine samples beneath 27 roosts over 3 years
- High excretion: Southern Qld / Northern NSW
- Moderate excretion: central and Northern Qld
- Low / zero excretion: Southern NSW

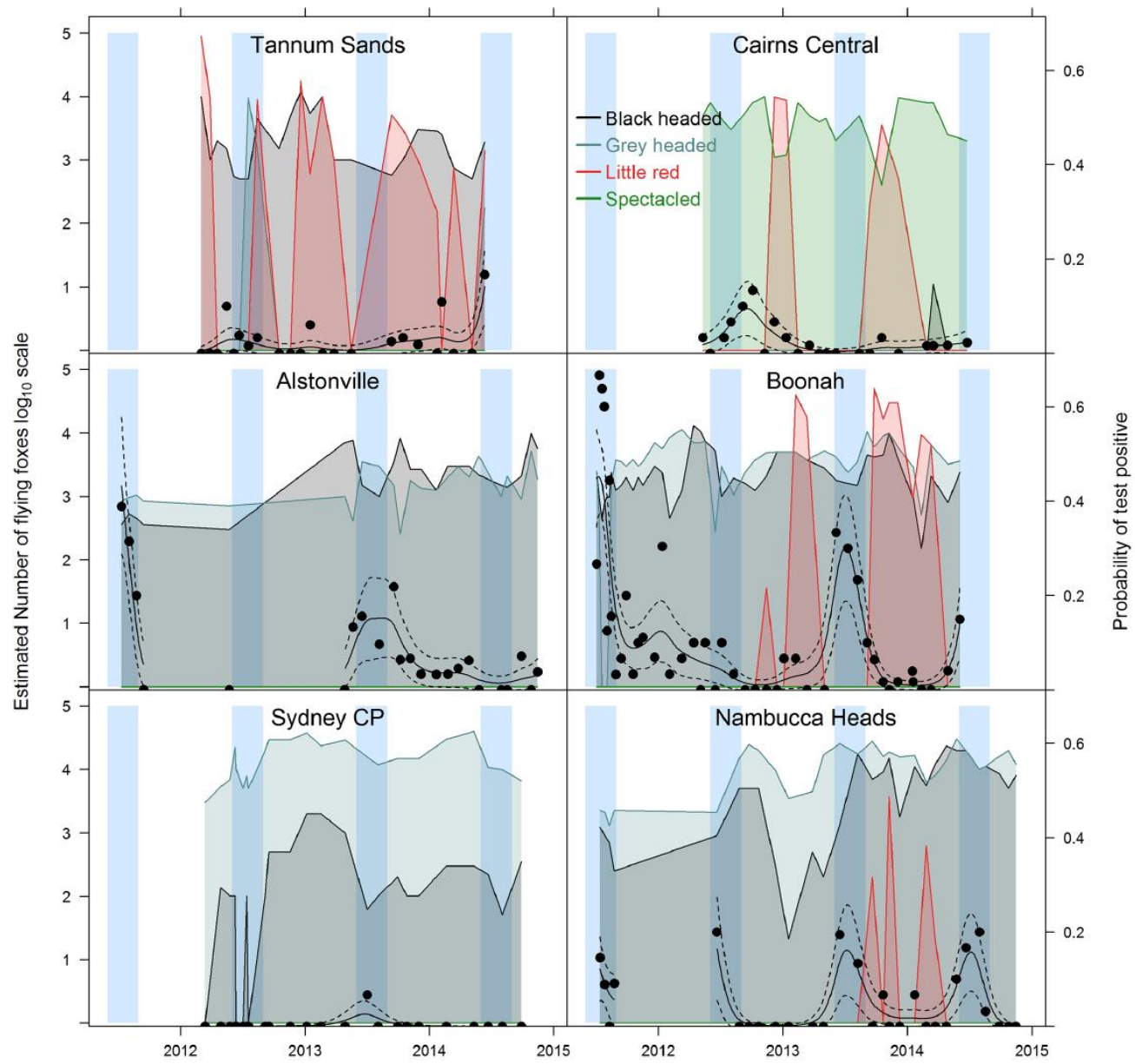


Fig 4. Observed (points) and estimated (smooth curves) probability of Hendra virus being detected in flying-fox pooled urine samples collected at selected roosts over the duration of study. Dashed lines indicate the predicted probability plus or minus two standard errors. Vertical shaded regions show winter periods. Shaded polygons show estimated (observed) species count (key lower right) over time on the log₁₀ scale, where 1 log₁₀ represents 10 individuals and 5 log₁₀ represents 100,000 individuals. (Sydney CP = Sydney Centennial Park).

- High HeV +ve = Black flying fox
- Low/zero HeV +ve = Grey headed
- Little red were not significant source (huge population increase ≠ HeV +ve)
- Winter seasonality
- Year-to-year variation

Hendra virus ecology

Dr Ed Annand

- Horses as sentinels
- Pan-paramyxovirus qRT-PCR screen
- **Identified a new variant of HeV**



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THE PREPRINT SERVER FOR BIOLOGY

bioRxiv posts many COVID19-related papers. A reminder: they have not been formally peer-reviewed and should not guide health-related behavior or be reported in the press as conclusive.

New Results

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Novel Hendra virus variant detected by sentinel surveillance of Australian horses

 Edward J. Annand, Bethany A. Horsburgh, Kai Xu,  Peter A. Reid, Ben Poole, Maximillian C. de Kantzow, Nicole Brown, Alison Tweedie, Michelle Michie,  John D. Grewar,  Anne E. Jackson,  Nagendrakumar B. Singanallur, Karren M. Plain,  Mary Tachedjian, Brenda van der Heide, David T. Williams,  Cristy Secombe,  Eric D. Laing, Spencer Sterling, Lianying Yan, Louise Jackson, Cheryl Jones,  Raina K. Plowright,  Alison J. Peel, Ibrahim Diallo,  Andrew C. Breed,  Christopher C. Broder,  Philip N. Britton,  Navneet K. Dhand,  Ina Smith,  John-Sebastian Eden

doi: <https://doi.org/10.1101/2021.07.16.452724>

OCTOBER 8 2021 - 9:26AM

Hendra variant case confirmed in horse at West Wallsend near Newcastle

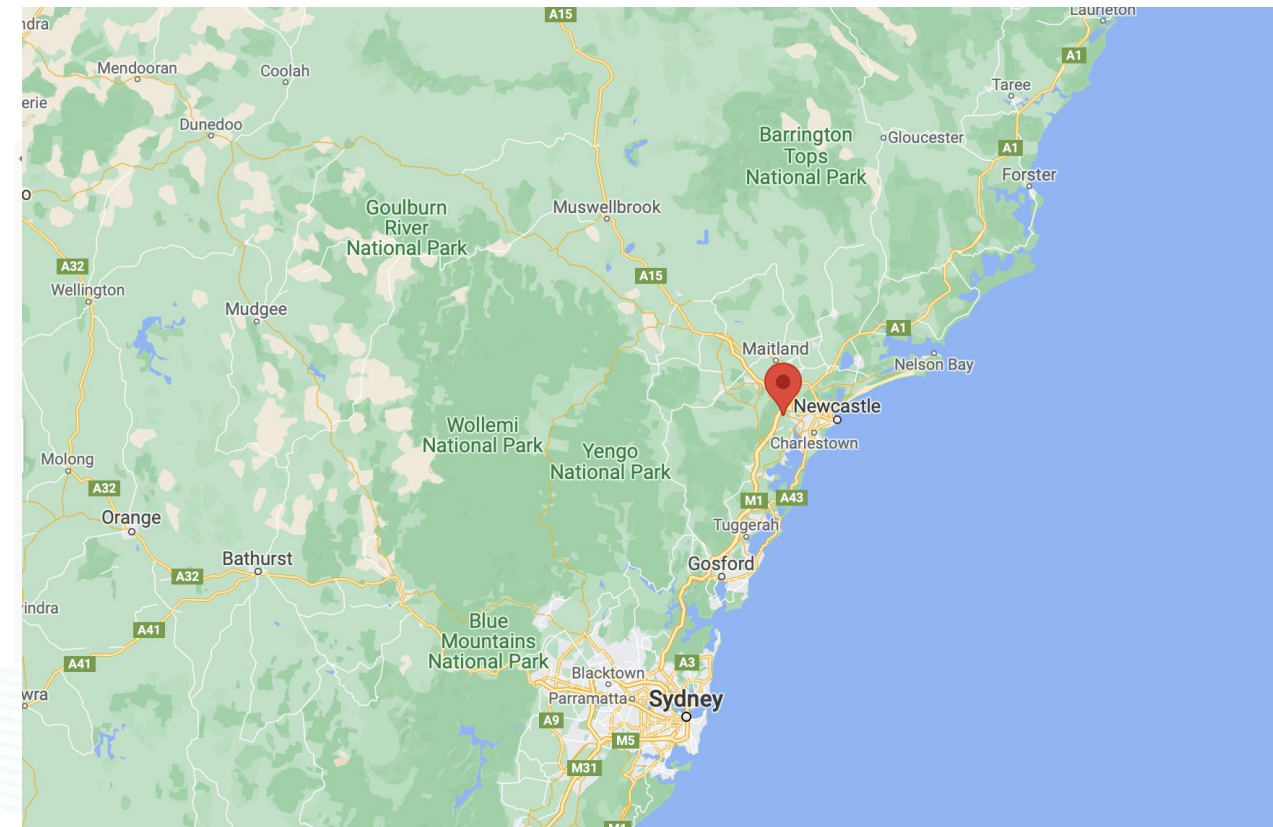
Local News



A variant Hendra virus strain has been confirmed in a 7-year-old unvaccinated Clydesdale from West Wallsend, near Newcastle.

The location of the infected horse is further south than the virus is usually found. Hendra has previously been confined to Queensland and Northern NSW.

The detection of the virus was confirmed through testing at NSW Department of Primary Industries' (DPI) Elizabeth Macarthur Agricultural Institute laboratory and at the Australian Centre for Disease Preparedness.



<https://www.singletonargus.com.au/story/7461262/hendra-case-reported-in-horse-from-newcastle/>

Hendra virus ecology

Wang et al. *Virology Journal* (2021) 18:197
<https://doi.org/10.1186/s12985-021-01652-7>


Virology Journal

RESEARCH

Open Access

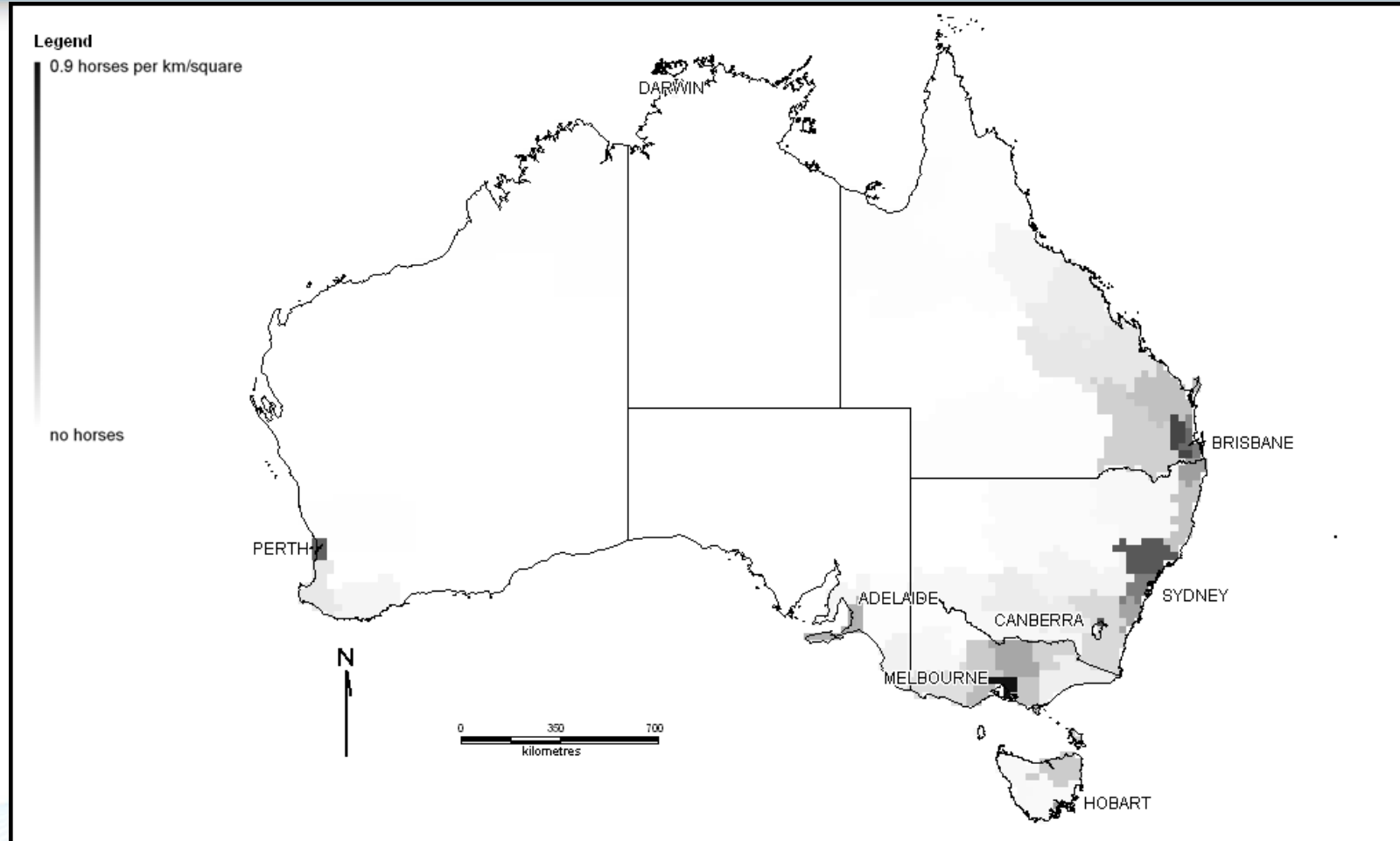
A new Hendra virus genotype found in Australian flying foxes



Jianning Wang^{1*} , Danielle E. Anderson², Kim Halpin¹, Xiao Hong¹, Honglei Chen¹, Som Walker¹, Stacey Valdeter¹, Brenda van der Heide¹, Matthew J. Neave¹, John Bingham¹, Dwane O'Brien¹, Debbie Eagles¹, Lin-Fa Wang^{2,3} and David T. Williams¹

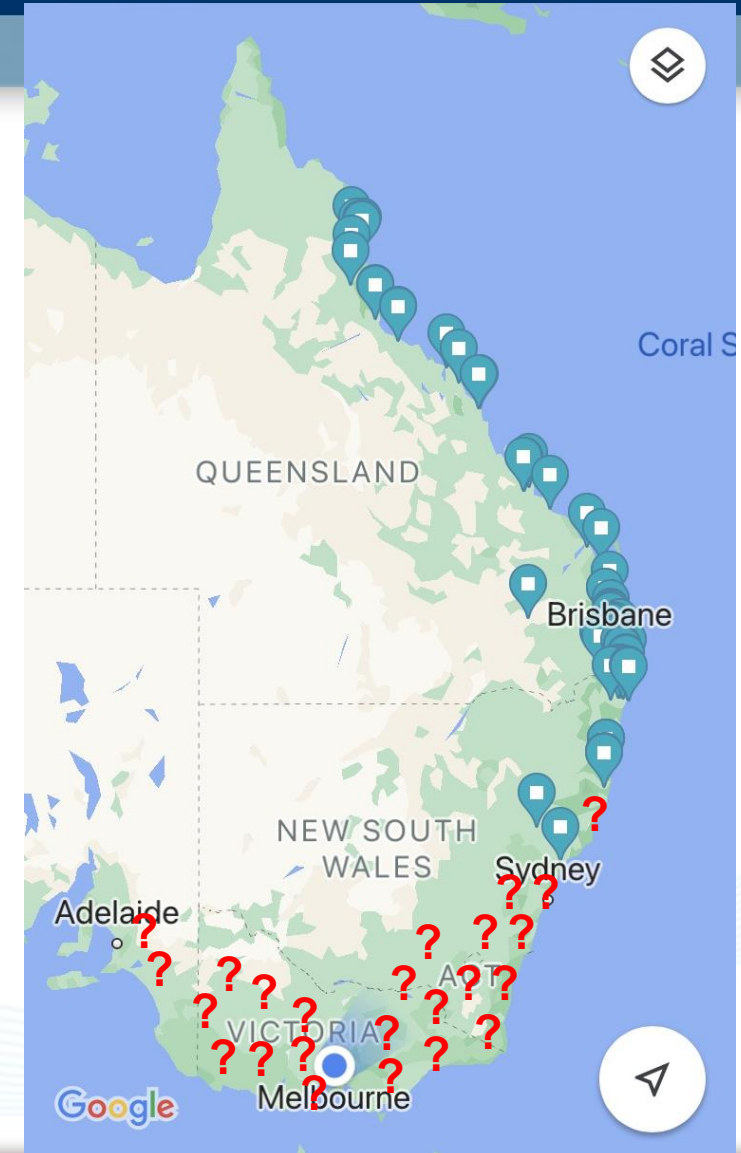
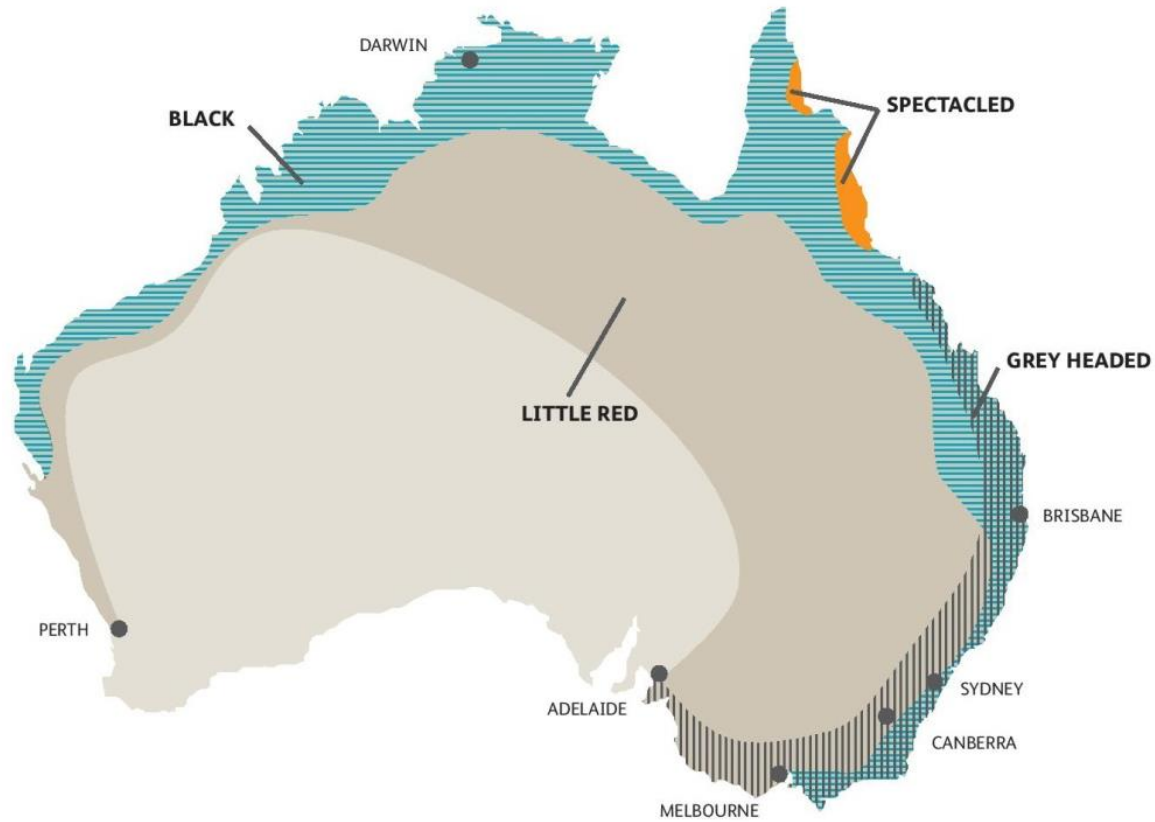
- 11 flying foxes positive for HeV variant
- 10/11 were grey-headed flying foxes (*Pteropus poliocephalus*)
- Collected from **Victoria and South Australia** and one positive Little red flying fox (*Pteropus scapulatus*) was collected from **Western Australia**

Horse distribution



Density of domestic horses in Australia (Australian Bureau of Statistics 2006).

Hendra virus ecology



Common clinical signs of HeV



Any ONE or COMBINATION of the following:

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

Other possible clinical signs

- Congested mucous membranes
- Pulmonary oedema
- Respiratory distress
- Ataxia
- Weakness
- Neurological signs



Any sick horse!

PPE reduces risk



Personal protective equipment

When Hendra is suspected

- Wear full PPE
- Supply full PPE to handler
- Coach handler in the use of PPE
- Includes
 - Impervious overalls
 - Rubber boots or covers
 - Double gloves taped to sleeves
 - Goggles/Face shield
 - P2 mask properly fitted



Other possible clinical signs

- Congested mucous membranes
- Pulmonary oedema
- Respiratory distress
- Ataxia
- Weakness
- Neurological signs

Any sick horse!

Centre for Equine Infectious Disease



PPE is good... up to a point



Welfare implications



- Unvaccinated horses requiring intensive care and treatment in a hospital may need a negative HeV test (LAMP test)
- Potential fatal consequences
- Insurance problems

Response to vaccination

Foals of mares vaccinated for Hendra virus have a suboptimal response to HeV vaccination

Kimberley J. Carey^a, Ina Smith^b, Jennifer Barr^c, Sarah Caruso^c, Gough G. Au^c, Carol A. Hartley^a, Kirsten E. Bailey^a, Wendy Perriam^d, Christopher C. Broder^c, James R. Gilkerson^{a,*}

K.J. Carey et al.

Veterinary Microbiology 295 (2024) 110167

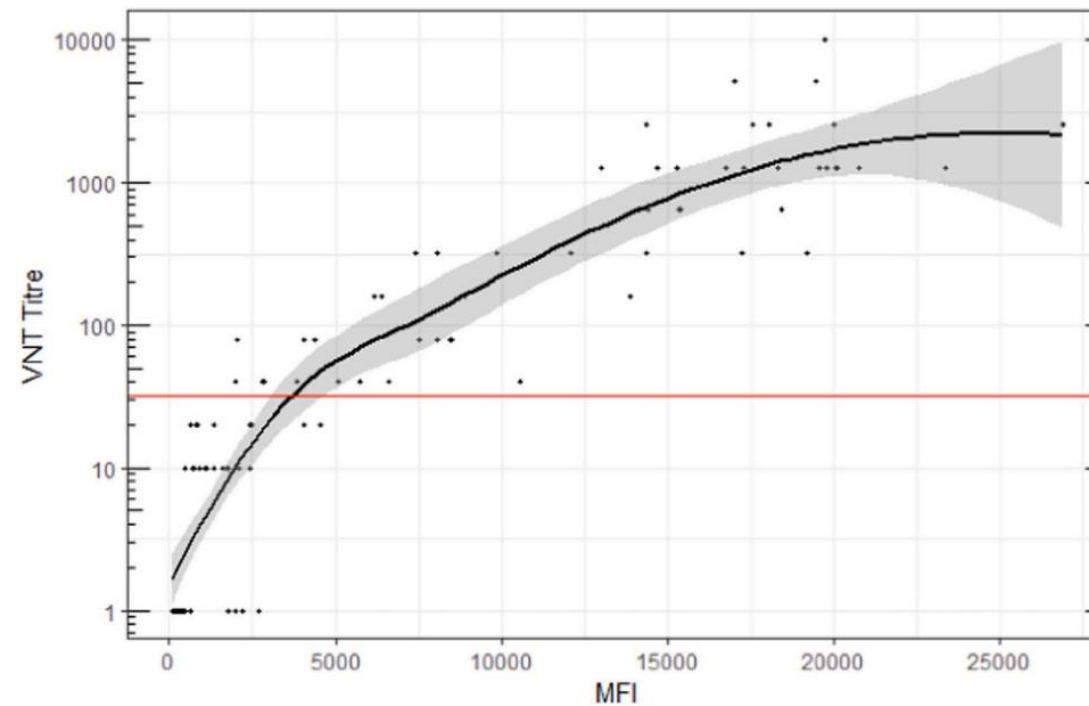


Fig. 1. Scatterplot of VNT titre results and MFI results. Red line shows neutralising VNT titre of 32. Neutralising VNT titre corresponds approximately to an MFI of 4000. Spearman's rank correlation coefficient = 0.94, indicating very strong correlation.

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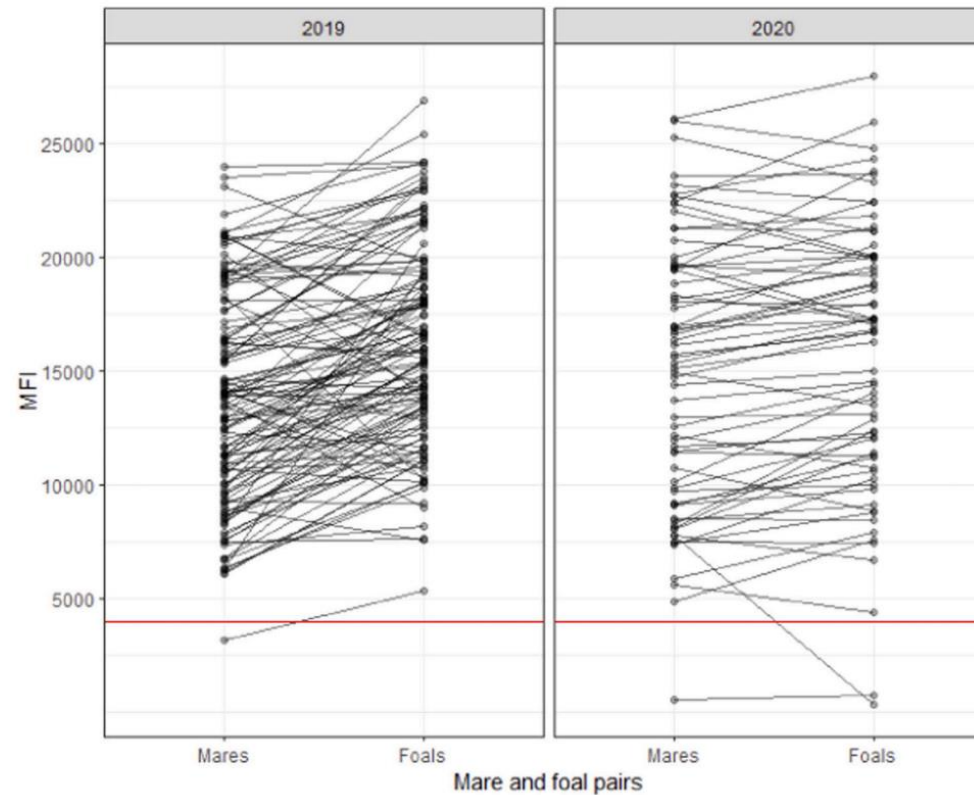


Fig. 5. Transfer of maternal HeV G-specific antibodies from vaccinated mares to their foals during the 2019 foaling season (n = 129 mare-foal pairs) and the 2020 foaling season (n = 68 mare-foal pairs). Red lines show MFI threshold of 4000, which corresponds to minimum neutralising VNT titre of 32.

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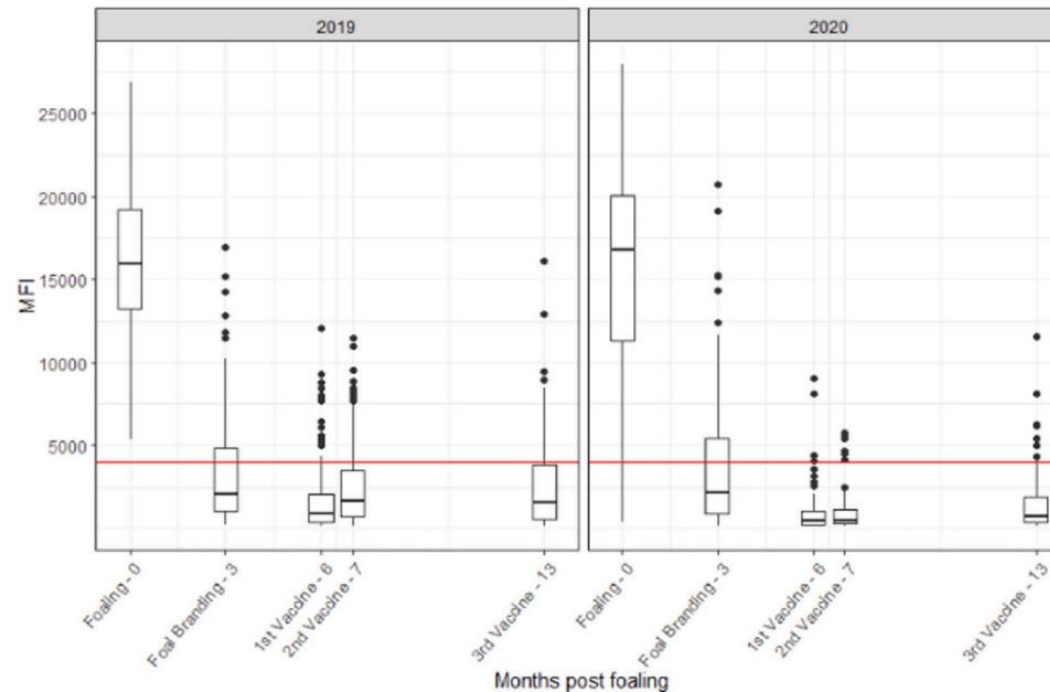
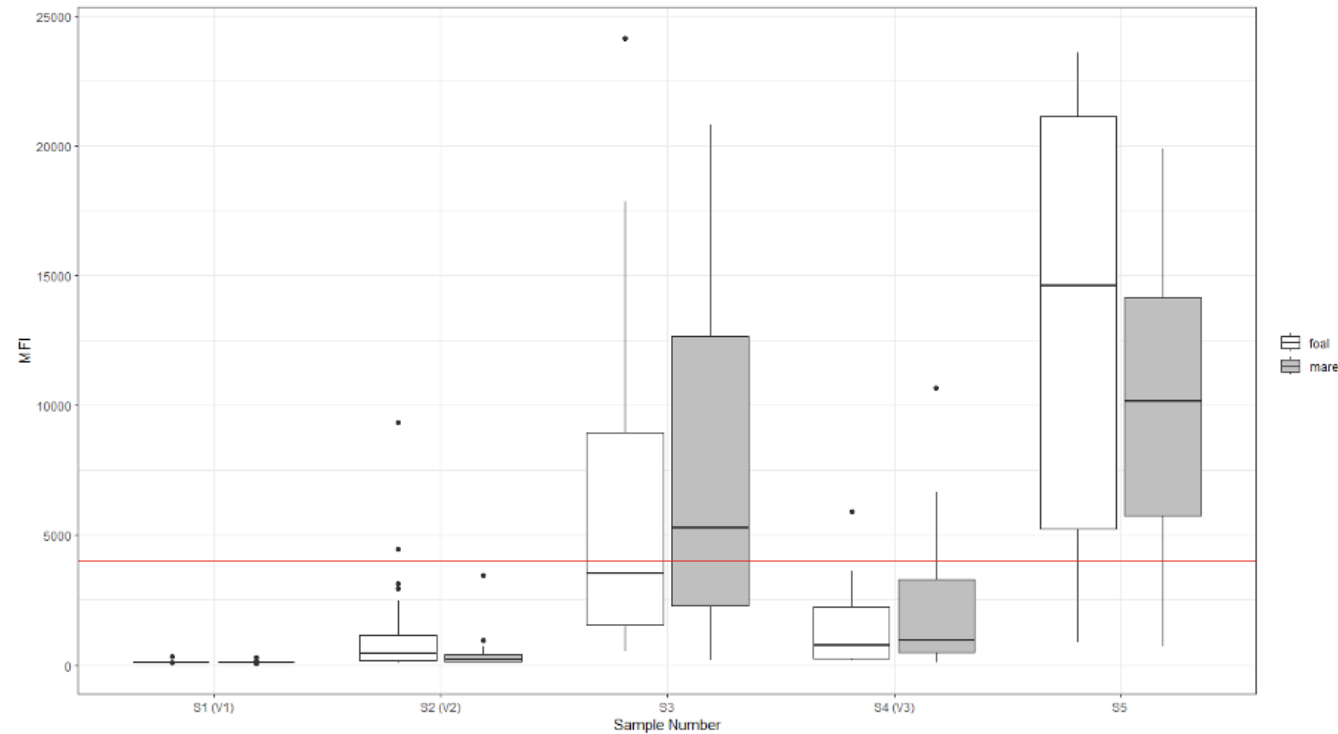


Fig. 6. HeV G-specific antibodies in foals of vaccinated mares in 2019 (n = 129), and 2020 (n = 68) from post colostrum intake to time of third vaccination. Red lines show MFI threshold of 4000, which corresponds to minimum neutralising VNT titre of 32. Foals were approximately 3 months old at foal branding, 6 months old at the first vaccine, 7 months old at the second vaccine, and 13 months old at the third vaccine. At each sampling point the boxes represents the interquartile range and median value, the lines extending from the boxes represent the lower and upper quartiles, and outliers are shown as individual points.

Response to vaccination



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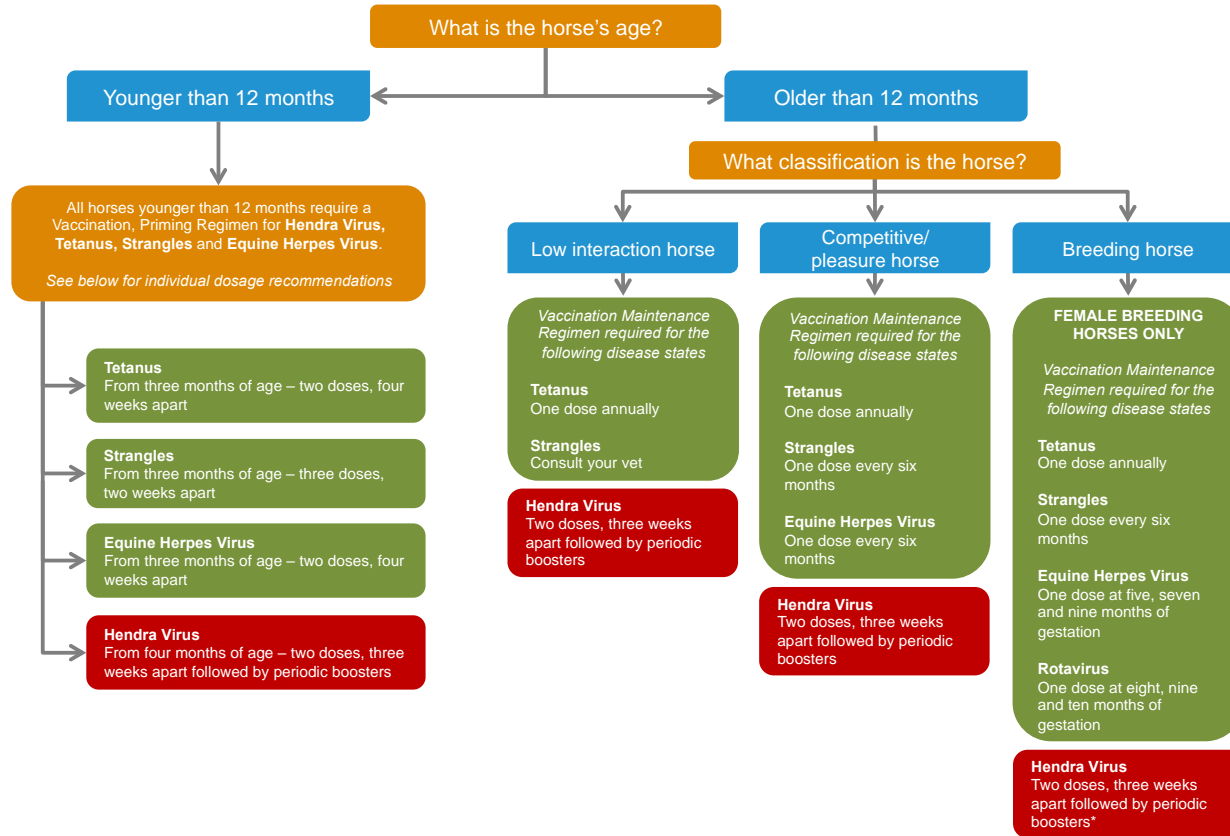
134

Figure 1: Mare and foals antibody levels over preliminary vaccination as detected by Microsphere-Luminex immunoassay. Red line indicates minimum protective threshold of 4000MFI. ¶

Talk to the vet...



Equine Infectious Diseases Advisory Board Vaccination protocol



- HeV is a part of a bigger picture
- Endemic disease
- Manage the risk
- Vaccines are part of a risk reduction plan

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.

NOTE: In the event that you are unsure of your horse's vaccination status, consult your vet about undertaking a Vaccination Priming Regimen
* The Hendra virus horse vaccine has not been tested in pregnant or breeding horses

Questions??

