

## **The Role Of Horses In Hendra Virus Transmission Dynamics.**

Belinda Linnegar<sup>1</sup>

Hamish McCallum<sup>1</sup>, Andrew Hoegh<sup>2</sup> and Alison Peel<sup>3</sup>

<sup>1</sup> Griffith University

<sup>2</sup> Montana State University

<sup>3</sup> University of Sydney

**Introduction:** Anthropogenic changes are driving increased exposure between wildlife, humans and our domesticated animals. To improve our understanding of domestic animals in emerging zoonoses, we investigated the dynamics of domestic horses in Hendra virus.

**Method:** We collated and generated diverse datasets to quantify the spatiotemporal distribution of domestic horses, equine syndromic surveillance for Hendra virus spillover, and equine susceptibility to Hendra virus in northeast New South Wales and southeast Queensland, Australia, from 2011-2023. We tested spatial autocorrelation using Moran I. Horse densities and vaccination rates were analysed through Random Forest algorithms. We tested covariates for spillover, vaccination and detection with zero-inflated binomial modelling.

**Results:** Domestic horse populations broadly correlated with the distribution of Hendra virus spillovers. However, while the highest horse densities occurred in Queensland's highly urbanised suburbs, the greatest densities in NSW were in suburbs with >70% agriculture land cover and no flying fox roosts. Hendra virus surveillance testing decreased over time, which was not driven by increased vaccination rates. Rather, equine vaccination rates have declined since 2015, particularly since 2021.

**Conclusions:** Declining vaccination rates and decreasing surveillance efforts, alongside an increasing population of susceptible horses, suggest that spillovers are likely going undetected. There is a need for ongoing veterinary and government engagement to mitigate the risk of infection to horses and humans.