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To the Editor,

The other evening I was called out to yet another horse with colic whose primary veterinarian had refused to attend because the horse was not currently vaccinated against Hendra virus (HeV). To be considered current in the manufacturer's Hendra vaccination registry, annual boosters are mandated, even though the one study published to date with relevant data on duration of immunity indicated that annual boosters may be unnecessary in many, and perhaps even in most, horses.[1]

The horse had been routinely vaccinated against HeV in the past, but the owner had chosen not to continue with annual boosters. This decision by horse owners, or refusal to vaccinate at all, is a common occurrence in my experience and a phenomenon that is well documented in the veterinary literature.[2-4] Disturbingly, there are more studies published on why horse owners aren't vaccinating against HeV than there are on the safety and efficacy of the HeV vaccine. Concerns about vaccine safety, efficacy, cost, and value persist among horse owners in my practice area.

Rather than continuing to mandate vaccination per the manufacturer's direction and refuse service to clients whose horses are unvaccinated or whose HeV vaccination status is lapsed or unknown, perhaps it's time we begin taking a more measured approach. I propose we accept the documentation of HeV-specific antibodies in the horse's serum as evidence of a HeV-specific immune response (whether naturally acquired or vaccine induced), with the likelihood of a rapid anamnestic response in the event of subsequent exposure.

Two separate studies have shown that horses are capable of generating HeV-specific virus neutralising (VN) antibody titres well above the threshold currently considered protective (≥ 16)[5] within one week, whether in response to natural infection[6] or vaccination.[1] The speed with which horses generated a vigorous VN antibody response in these studies suggests that a similarly rapid and robust response is possible — indeed, is likely — in the event of natural exposure in horses who already have HeV-specific antibodies in their serum.

Of course, the point of booster vaccination is to maintain protective immunity throughout the risk period. However, humoural immunity is only one component of the immune response to pathogens, and the inevitable decline in titre in the absence of repeated challenge tells us nothing about the cell-mediated immune capacity, including immunological 'memory', of that individual. Furthermore, we don't know the serum VN threshold that is protective against HeV in real-world situations, where the incubation period may be as long as two weeks[7] and the amount of virus encountered by the horse is likely to be much lower than that administered during experimental challenge: "the experimental horses were exposed to considerably higher levels of HeV than have been recovered from flying foxes…".[5]

As the authors of the HeV vaccine field study stated, "It is possible that protection from field exposure to virus may also occur in immunised horses with lower (or even undetectable) titres. The reasons for this include the rapid time-frame over which extensive mucosal exposure to infective fluid occurs under experimental conditions and the fact that protection will depend upon the development of an anamnestic response, in addition to pre-existing antibody levels."[1]

As for concerns about human safety, the one vaccine challenge study published to date showed that a titre as low as 16 prevented meaningful shedding in the face of massive viral challenge.[5] Again, we don't know the serum VN threshold that is protective against viral transmission in real-world situations, but it is likely to be lower than that documented in this single experimental study, in which the lowest pre-challenge titre of the ten vaccinated horses was 16 and the horses were challenged with 2 million units of HeV via the oronasal route.

The CSIRO Australian Animal Health Laboratory (AAHL) offers two HeV-specific serum antibody tests: an ELISA and a VN titre.[8] Currently, the cost of the ELISA is comparable to the retail price of the HeV vaccine. Unfortunately, the VN titre is considerably more expensive. Although the ELISA provides only three possible results (positive, negative, inconclusive), a positive ELISA is surely evidence of a HeV-specific immune response and the potential for a rapid anamnestic response in the face of natural challenge that could be expected to protect against severe illness at least, and probably from viral transmission as well.

Instead of denying veterinary care to horses in need, let's start testing horses for HeV-specific antibodies and use our knowledge of clinical immunology and the available veterinary literature to tailor HeV vaccination and other risk-mitigation programs. We may even be able to encourage better uptake of the vaccine with this approach. One thing is certain: it can only help our tattered reputation among horse owners.

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References

1. Tan RHH, Hodge A, Klein R, *et al.* Virus-neutralising antibody responses in horses following vaccination with Equivac® HeV: a field study. Aust Vet J 2018;96:161–166. https://doi.org/10.1111/avj.12694

2. Manyweathers J, Field H, Longnecker N, *et al.* "Why won't they just vaccinate?" Horse owner risk perception and uptake of the Hendra virus vaccine. BMC Vet Res 2017;13(1):103. https://doi.org/10.1186/s12917-017-1006-7

3. Goyen KA, Wright JD, Cunneen A, *et al.* Playing with fire — What is influencing horse owners' decisions to not vaccinate their horses against deadly Hendra virus infection?. PLoS One 2017;12(6):e0180062. http://doi.org/10.1371/journal.pone.0180062

4. Wiethoelter AK, Sawford K, Schembri N, *et al.* "We've learned to live with it" — A qualitative study of Australian horse owners' attitudes, perceptions and practices in response to Hendra virus. Prev Vet Med 2017;140:67-77. https://doi.org/10.1016/j.prevetmed.2017.03.003

5. Middleton D, Pallister J, Klein R, *et al.* Hendra virus vaccine, a One Health approach to protecting horse, human, and environmental health. Emerg Infect Dis 2014;20(3):372–379. https://doi.org/10.3201/eid2003.131159

6. Colling A, Lunt R, Bergfeld J, *et al.* A network approach for provisional assay recognition of a Hendra virus antibody ELISA: test validation with low sample numbers from infected horses. J Vet Diagn Invest 2018;30(3):362–369. https://doi.org/10.1177/1040638718760102

7. Broder CC, Weir DL, Reid PA. Hendra virus and Nipah virus animal vaccines. Vaccine 2016;34(30):3525–3534. https://doi.org/10.1016/j.vaccine.2016.03.075

8. https://aahl.csiro.au/info/companion_and_equine_testing.aspx