*JWD* 2017 53(2):411-413

[**Natural Infection of the South American Tapir (*Tapirus terrestris*) by *Theileria equi***](https://doi.org/10.7589/2016-06-149)

Da Silveira AW, De Oliveira GG, Menezes Santos L, et al.

**ABSTRACT:** *Theileria* *equi* is a tick-borne piroplasm considered endemic in equines in Brazil. The cohabitation of domestic and wild animals in areas of extensive cattle breeding favors the close contact between different species and the sharing of vectors and, consequently, pathogens. We report the natural infection of a young South American tapir (*Tapirus terrestris*) by *T. equi* in Mato Grosso do Sul, Brazil. Although it was not possible to associate the clinical and hematologic status of the animal with the infection by the protozoan parasite, our report represents an alert on the sharing of pathogens between domestic and wild animals

**Key Points:**

* Natural infection by piroplasms is reported in both captive and free-living tapirs
* An ~3mo F South American tapir was rescued on a beef cattle farm
  + The tapir had a compound fracture and myiasis of the left pelvic leg
  + The tapirl was hyperthermic (38.9 C), apathetic, and anorexic
  + CBC found normochromic microcytic anemia, leukocytosis, neutrophilia without a left shift, and lymphocytosis
  + Suggestive erythrocytic inclusions resembling piroplasms was observed
  + The tapir was euthanized due to the severity of the fracture
* *Theileria* *equi* was identified via PCR and Sanger sequencing
  + The clinical characterization of *T. equi* infection in tapirs has not been described
  + Transmission of *T. equi* occurs via infected ticks, especially *Amblyomma spp*.
  + Ticks were observed parasitizing this case animal, indicating the possible source of the infection

**TLDR:** *Theileria* *equi*naturally infect South American tapirs; unknown if it is pathogenic

**Related Articles:** *None on the current ACZM reading list*

*JZWM* 2018 49(4):1047-1050

[***Echinococcus equinus* hydatid cyst in the liver of a Przewalski's horse (*Equus przewalskii*) in a Canadian zoo**](https://doi.org/10.1638/2018-0072.1)

Milnes E, Delnatte P, Dutton CJ, et al.

**ABSTRACT:** A 23-yr-old captive-born Przewalski's horse mare (*Equus przewalskii*) was euthanized at a Canadian zoo because of severe colic resulting from rupture of a jejunal pseudodiverticulum. An incidental finding of an encysted larval cestode within a hepatic granuloma was diagnosed on histopathology. Gel-based polymerase chain reaction (PCR) on liver tissue was positive for *Echinococcus granulosus* sensu lato, and deoxyribonucleic acid sequencing of the PCR product was 100% homologous with *Echinococcus equinus*. This appears to be the first molecular confirmation of *E. equinus* in North America, and the first report of cystic echinococcosis in a Przewalski's horse.

**Key Points:**

* Hepatic cystic echinococcosis was an incidental finding at postmortem
* *Echinococcus* spp. are obligate two-host tapeworms of mammals
  + Adults typically occur in the small intestine of the carnivore definitive host
  + Proglottids containing taeniid-type eggs are passed in the carnivore's feces
  + Eggs are accidentally ingested by herbivorous or omnivorous intermediate hosts
  + Larvae migrate through the intestinal wall and develop in the liver over months to years into fluid-filled cysts (metacestodes), which contain protoscolices
  + Carnivore definitive hosts consume intermediate hosts and protoscolices
* Cystic echinococcosis (i.e., disease due to metacestodes) in equids is generally the result of infection with *E. equinus*; it is considered a rare incidental finding on necropsy
* Hydatid cysts of *E. equinus* mainly develop in the liver and lungs of infected horses, and occasionally result in severe clinical illness
* The most likely route of infection was via contamination of the grazing areas or feed by feces of a carnivore definitive host
  + Wild foxes and coyotes are known to be able to access the exhibit
  + However, the maintenance of a transmission cycle between wild carnivores and equids seems unlikely in the semiurban Greater Toronto area
  + *E. equinus* transmission in endemic countries occurs between horses and dogs fed horse viscera
  + The historic importation of infected horses could represent a plausible origin
  + Perhaps more likely, an infected domestic dog could have traveled from an *E. equinus*-endemic country and contaminated the environment

**TLDR:** An *E. equinus* hydatid cyst in the liver of a Przewalski's horse was found incidentally in Canada

**Related Articles:** *None on the current ACZM reading list*

Flanders, J. A. (2018). Survey for equine herpesviruses in polar bears (*Ursus maritimus*) and exotic equids housed in us aza institutions. *Journal of Zoo and Wildlife Medicine*, *49*(3), 599-608.

**Abstract: Infection by equine herpesvirus (EHV) strains (EHV-1, EHV-9) in ursid species, including polar bears (*Ursus maritimus*), has been associated with neurological disease and death.** A serosurvey of captive exotic equid and polar bear populations in US Association of Zoos and Aquaria institutions was performed to determine the prevalence of EHV strains using quantitative polymerase chain reaction (qPCR) and enzyme-linked immunosorbent assay (ELISA) tests. **Equid species surveyed included zebra (*Equus* spp.), Przewalski's wild horse (*Equus ferus przewalskii*), Persian onager (*Equus hemionus*), and Somali wild ass (*Equus africanus somaliensis*).** A questionnaire regarding husbandry and medical variables was distributed to institutions housing polar bears. **No polar bears tested positive for EHVs on qPCR of blood or nasal swabs. No exotic equids tested positive for EHVs on qPCR of blood, but two exotic equids (*n* = 2/22; 9%) tested positive for EHVs on qPCR of nasal swabs. On ELISA, polar bears infrequently were positive for EHV-1 (*n* = 5/38; 13%). Exotic equids were positive for EHV-4 on ELISA more frequently (*n* = 30/43; 70%) than for EHV-1 (*n* = 8/43; 19%).** Nine institutions submitted samples from both exotic equids and polar bears, two of which had both exotic equids and polar bears positive for EHVs by ELISA. Each of these institutions reported that the polar bear and exotic equid exhibits were within 80 m of each other and that risk factors for fomite transmission between exhibits based on husbandry practices were present. One institution that did not house exotic equids had a polar bear test positive for EHV-1 on ELISA, with no history of exposure to exotic equids. Further testing of captive polar bears and exotic equids is recommended, as is modification of husbandry practices to limit exposure of polar bears to exotic equids.

Introduction:

* + EHV 4 – Respiratory infection.
  + EHV 1 – Respiratory infection, neurologic disease, abortion.
    - Clinical dz reported in nonequid species – tapir, guinea pigs, camels, giraffe, gazelle, black bears.
      * A strain of EHV1 has been sequenced from brain of a polar bear in a zoological institution that died following acute onset neuro dz.
        + These bears had no direct contact with zebras, but was determined to be a zebra-borne strain of EHV1.
  + EHV 9 – Closely related to EHV 1.
    - Infection detected via PCR of brain from PB in zoo that died after rapid onset progressive neuro dz.
      * EHV9 also detected in two zebras within 61m of the bear.
      * Clinical dz has also been reported in giraffe and experimental infection in other spp.

Materials/Methods:

* Aimed to document prevalence of EHV strains in exotic equid and PB populations in US AZA institutions via qPCR and ELISA testing. Also performed survey of husbandry parameters and species proximity to ID risk factors.

Results/Discussion:

* **All polar bear nasal swabs were negative on PCR for EHV1 and EHV9.**
* **Two plains zebra nasal swabs from an institution without PB tested positive for EHV1 and EHV9 on qPCR.**
* All polar bear EDTA blood samples were negative on qPCR for EHV1 and EHV9.
* All exotic equid EDTA blood samples were negative on qPCR for EHV1 and EHV9.
* **EHV1 and EHV4 ELISA in PB – 5 samples positive for EHV1 Ab on ELISA.**
  + **One from control institution without equids, four others had equids.**
  + **Three institutions with positives vaccinate their equids for EHV.**
* EHV1 and EHV4 ELISA in equids – 14 samples negative for EHV1, 4, 23 samples negative for EHV1 and positive for EHV4 on ELISA, 9 samples positive for EHV1, 4.
  + Of equid serum samples submitted from institutions that vaccinate exotic equids against EHV, 4 negative for EHV1, 4; 5 negative for EHV 1, 4; 1 positive for both.
* Overall, US exotic equids had a lower prevalence of EHV1 on ELISA.
  + 5 EHV1 positive US PB were detected with ELISA, none in Europe.
* Four/five positive PB housed at institutions that also housed exotic equids, 5fh at a control institution.
* ELISA in this study did not distinguish between EHV1, EHV9.
* Samples from domestic equids were not requested for this study.
* Various husbandry and management practices that could allow fomite transfer from equids to PB – Overlap of keepers between enclosures, lack of footbaths, proximity of enclosures.
* Ultimately, the transmission method of EHVs between equid and nonequid species is unknown.

Conclusions:

* Some PB have been exposed to EHV1 at institutions that do and do not house exotic equids.
* **Recommended practices – separate keeper staff for PB and equids, not using enrichment of equine origin or feeding horse meat to PB, maintaining disinfection foot baths at entrances to exhibits, having dedicated tools and utensils for use only in PB areas.**
* **Testing of PB with clinical signs consistent with neuro dz for EHVs is recommended, with the use of banked serum samples to establish a timeline of potential exposure.**

Wenker, Christian, et al. "Equine sarcoids in captive wild equids: diagnostic and clinical management of 16 cases—a possible predisposition of the european cohort of somali wild ass (equus africanus somaliensis)?." *Journal of Zoo and Wildlife Medicine* 52.1 (2021): 28-37.

**Abstract**: Equine sarcoids (ES) were diagnosed in 12 Somali wild asses (SWA) (Equus africanus somaliensis) from 10 different institutions of the SWA European Endangered Species Programme from 1976 to 2019. Samples of surgically excised masses, biopsies, or necropsy samples were submitted for histologic and virologic analysis. In addition, tissue samples from one onager (Equus hemionus onager), one kulan (Equus hemionus kulan), and two Hartmann’s mountain zebras (HMZ) (Equus zebra hartmannae) were examined. Histology conﬁrmed the diagnosis of ES exhibiting the typical microscopic features. **Polymerase chain reaction detected bovine papillomavirus type 1 (BPV1) DNA in eight SWA samples and bovine papillomavirus type 2 (BPV2) DNA in one SWA sample. The onager, kulan, and one HMZ sample tested positive for BPV1. The other HMZ tested positive for BPV1 and BPV2. This is the ﬁrst report of ES in an onager**. **Surgical excision was the treatment elected by most veterinarians. A follow-up survey of the cases over several years after clinical diagnosis and therapy revealed variable individual outcome with ES recurrence in four cases.** Three SWA and the kulan were euthanized due to the severity of the lesions. Nine affected SWA were males with seven having a sarcoid located at the prepuce. Because a genetic disposition is a risk factor for the development of ES in horses, this may also be true for endangered wild equids with few founder animals in their studbook history. Innovative approaches regarding therapy and prevention of ES in wild equids are therefore highly encouraged.

Introduction/Background:

* Somali wild ass – critically endangered – 600 individuals in fragmented habitat
* All animals in managed care descended from 17 wild-caught individuals
* Equine Sarcoids
  + Fibroblastic skin tumor with an epidermal component – most common skin neoplasm in equids
  + Various forms – occult, verrucous, nodular, fibroblastic, mixed, malevolent
  + Surgical excision, cryotherapy, hyperthermia, radiotherapy, immunotherapy all used with varying degrees of success
  + Bovine papillomavirus type 1,2,3 detected – shared between both bovids and equids
    - BPV infection alone is not sufficient to produce disease – different leukocyte antigen haplotypes and skin wounds appear to play a role in developing disease

Cases:

* 2 ES on their head, others on thorax, abdomen, teats, and prepuce
* Most ES were nodular and fibroblastic with different degrees of ulceration causing substantial irritation and pain
* Radical excision was the most common treatment – 5/9 had complete resolution, 2/9 had repeated surgery
* All SWA tissue samples tested positive for BPV on PCR
* Two Hartman mountain zebras and one onanger cases were also included which also showed BPV positive tissue – soft tissue sarcomas were a rule-out in some of these due to different histology
* SWA & HMZ both have high incidences – both also have founder effected
* NA SWA are less commonly affected
* Prevention – insect repellent, immunotherapeutics being developed in horses, a vaccine could provide some protection similar to human papillomaviruses but is not yet available
* Radical excision had the most successful outcome

Conclusions: Equine sarcoids common in SWA & HPZ and should be treated with excision

Description of gastric ulcers and of their suspected, associated risk factors in deceased wild equids at the réserve africaine de sigean, france (2010–2016).

Lamglait, B., Vandenbunder-Beltrame, M., Trunet, E., & Lemberger, K.

*Journal of Zoo and Wildlife Medicine*, 2017;48(3):668-674.

Gastric ulcers are common in domestic horses and foals, affecting at least 90% of unmedicated racehorses in active training. Despite these high prevalences in domestic horses, literature about this condition in wild equids is almost nonexistent. The presence of gastric ulcers was evaluated at **necropsy in six species of wild equids that died at the Re´serve Africane de Sigean, a safari park in the south of France from 2010 to 2016**. Among the 55 individuals that died during that period, a description of the gastric mucosa was available in 82% (45/55) of cases. Considering the cases for which a description of the gastric mucosa was available, the prevalence of gastric ulcers was 64% (29/45). The highest prevalences were noted in Grant’s zebra (Equus quagga boehmi) and Hartmann’s mountain zebra (Equus zebra hartmannae) at 83% and 100%, respectively. In contrast to what is reported in domestic foals, gastric ulcerations were only diagnosed in one foal (out of 11 foals necropsied). The higher prevalence was noted in young individuals (3–36 mo old) at 93% (14/15); the lesions observed consisted mainly of single to multiple, superficial lesions, of which, only the mucosa was missing; these superficial lesions are often considered not clinically significant. The prevalence was lower for adults (74%; 14/19), but lesions were deeper or with a hyperemic or inflammatory appearance. All the lesions observed were located in the gastric, nonglandular, stratified squamous mucosa, along the margo plicatus. No statistical correlation could be found between the development of gastric ulcers and an ongoing, chronic pathologic process or a digestive tract pathology. The detection of gastric ulcers was, therefore, significantly greater in wild equids isolated in smaller enclosures. Nevertheless, additional larger-scale research is needed to point out predisposing factors in equids under human care.

Background

* + Gastric ulcers common in domestic horses and foals, especially in performance disciplines, recent changes in housing or social interactions, and illness.
  + Factors implicated in causing ulcers in horses – fasting, gastric acid clearance (motility and emptying), aggressiveness of gastric acid, pepsin, and volatile fatty acids produced from fermentation of soluble carbohydrates. Anything modifying one or more of those components can lead to EGUS.
    - Intermittent feeding with high-grain diets, physical and environmental stress i.e. transport stress and stall conferment, lack of exposure to other conspecifics, chronic administration of NSAIDs. Neonatal domestic foals significant risk for perforating peptic ulcers, gastric mucosa is not full thickness at birth.

Key Points:

* + Grant’s and Hartmann’s zebras demonstrated significantly greater proportions of gastric ulcers compared to overall population.
  + Low in foals, differs from domestic horses.
  + 3-36 mos old significantly more affected. Adults had more severe lesions. Not correlated with severity of CS in this study. Also no correlation between ulcers and other chronic GI conditions.
  + All gastric ulcers along the margo plicatus, particularly in the saccus caecus and squamous mucosa (non-glandular) along the lesser and greater curvatures.
  + Detection of ulcers significantly greater in wild equids isolated in enclosures < 75 m^2.

Takeaways: Gastric ulcerations and erosions are significant conditions in captive wild equids. Low prevalence in foals, higher in ‘young’ 3-36mos old, more severe in adults, along the margo plicatus in all cases. Associated with individuals isolated in small enclosures.

A close-up of a brain

Description automatically generated with low confidenceA close-up of a rock

Description automatically generated with medium confidence

Chart

Description automatically generated

Health assessment of wild lowland tapirs (*Tapirus terrestris*) in the highly threatened Cerrado biome, Brazil.

Fernandes-Santos RC, Medici EP, Testa-José C, Micheletti T.

Journal of wildlife diseases. 2020;56(1):34-46.

**Over 2 yr, we assessed the health of 35 lowland tapirs (Tapirus terrestris) in the Brazilian Cerrado (CE) biome, an area that is highly affected by human activities. This involved physical examinations, hematology and blood biochemistry, urinalysis, fecal parasitologic evaluation, microbial profiling of anatomic cavities and lesions, and serologic surveys for evidence of infectious agents.** Research methods closely resembled those used in previous tapir health assessments in the Atlantic Forest (AF) and Pantanal (PA) biomes, allowing for a comparison among the three populations. Although not reaching statistical significance (P.0.05), tapirs from the CE exhibited poorer body and skin condition as compared to animals from the AF and PA. Furthermore, there were higher prevalences of dental problems and traumatic lesions as compared to those from the AF and PA. Eight of the 12 hematologic parameters evaluated and 17 of the 30 biochemical parameters differed significantly (P,0.05) between the tapirs from CE and those from the AF and PA. We isolated 24 different microbiologic strains from swabs of anatomic cavities and dermal lesions, of which five taxa had not previously been found in the AF or PA. We detected serum antibodies to Leptospira interrogans, bluetongue virus, and porcine parvovirus. Overall, our results suggested that tapirs from the CE exhibited more health abnormalities than tapirs in the AF and PA, possibly due to a greater exposure to environmental disturbances in the area

Background

* Lowland tapir (*Tapirus terrestris*) - Vulnerable IUCN
* Threats: large-scale agriculture and cattle ranching, habitat loss and fragmentation, car strike, poaching, environmental contamination by pesticides and heavy metals, increased exposure to domestic and feral animal diseases

Key Points

* Trapped and darted or just darted, all given atropine, 1 died
* CE population had more dental disease: tooth loss, fractures, periodontitis, gingival retraction
  + Skin lesions and poor BCS also common
* No haemoparasites detected in blood smears
* Higher leukocyte, neutrophil, monocyte counts, reactive lymphocytes common
* AST and GGT higher than AF and PA populations
* UA (dipstick) no difference between populations
* Low levels of ascarid eggs (50%) and strongylid eggs (8%)
* Serology: 60% titers to *Leptospira interrogans* (Pomona and Grippotyphosa)*,* 91% blue-tongue virus, 97% porcine parvovirus

Conclusion

* Tapirs in the Cerrado biome appear less healthy than in the Atlantic Forest and Pantanal biomes so bloodwork results in this paper should not be used as references
  + Possibly related to pesticides and heavy metals used on monoculture plantations

Journal of Zoo and Wildlife Medicine 49(2): 404–411, 2018

PITUITARY PARS INTERMEDIA DYSFUNCTION (EQUINE CUSHING’S DISEASE) IN NONDOMESTIC EQUIDS AT MARWELL WILDLIFE: A CASE SERIES. ONE CHAPMAN’S ZEBRA (EQUUS QUAGGA CHAPMANI) AND FIVE PRZEWALSKI’S HORSES (EQUUS FERUS PRZEWALSKII)

**Abstract:** Pituitary pars intermedia dysfunction (PPID), also known as equine Cushing’s disease, is widely reported in middle-aged to older domestic equids but to date reported in only one nondomestic equid, the onager (Equus hemionus onager). This case series reports clinical, hematological, and pathological findings consistent with PPID in two further equid species: one Chapman’s zebra (Equus quagga chapmani) and five Przewalski’s horses (Equus ferus przewalskii). The case series reports basal adrenocorticotropic hormone (ACTH) testing as a method to diagnose and monitor PPID in zoological equids and the use of pergolide mesylate to reduce basal ACTH concentration and reduce clinical signs associated with PPID. Gross and histopathological examinations of the pituitary gland in four of these cases revealed either pars intermedia adenomas or adenomatous hyperplasia, similar to pathological findings in domestic equids affected by PPID. These findings suggest that clinicians working with nondomestic equids should be aware of this condition and consider screening for it routinely, particularly given that improvements in management and veterinary care for exotic animals are resulting in a more aged captive population. Early diagnosis and treatment of PPID may prevent the development of painful clinical sequelae and therefore improve the welfare of zoo equids.

Key Points:

* PPID affects up to 30% of older horses
* Clinical signs include hypertrichosis, laminitis, polyuria, polydipsia, muscle wasting
* Diagnosed with high adrenocorticotropic hormone (ACTH) – normal range < 29 pg/mL
  + Other testing options – thyrotropin stimulating hormone or dexamethasone stimulation tests
* Anesthetized with 2.5 mg/kg ketamine + medetomidine 0.1 mg/kg OR 0.05-0.1 mg/kg detomidine + 0.03-0.06 butorphanol
* Treated with pergolide 1 mg daily (3 mcg/kg PO q24h)
* Other clinicopathologic findings – elevated GGT

Take Home: PPID may be playing a role in older non-domestic equids and testing should be done for any showing signs

References:

1. Schott H, Andrews F, Durham A, Frank N, Hart K, Kritchevsky J, McFarlane D, Tadros L. Recommendations for the diagnosis and treatment of pituitary pars intermedia dysfunction (PPID) [Internet]. c2017 [cited 5 December 2017]. Available from https://sites. tufts.edu/equineendogroup/files/2017/11/2017-EEG- Recommendations-PPID.pdf

Rabies Virus Exposure in Wild Lowland Tapirs (Tapirus terrestris) from Three Brazilian Biomes

Journal of Wildlife Diseases, 57(2), 2021, pp. 443–446

ABSTRACT: We evaluated the presence of antibodies for rabies virus in 177 serum samples from 125 wild lowland tapirs (Tapirus terrestris) from three different Brazilian biomes. The rapid fluorescent focus inhibition test was performed. No antibody titers suggesting the circulation of the rabies virus in tapir habitat were detected.

Key points

* goal was to evaluate the presence of neutralizing antibodies specific for rabies virus in tapir serum samples from the Brazilian Atlantic Forest, Pantanal, and Cerrado biomes collected between 2006 and 2018.
* hypothesis was driven by the proximity of tapirs to domestic livestock in our study sites, along with bat feeding behavior and the ability of rabies virus to spill over
* 177 serum samples from 125 wild lowland tapirs
* Rapid fluorescent focus inhibition test was performed
* Our results showed titers of neutralizing anti-
* rabies antibodies ranging between 0.01 and0.07 IU/mL (>0.5 considered consistent with exposure) – all negative

Journal of Zoo and Wildlife Medicine 2021 52(2) : 774-778

**EQUID ALPHAHERPESVIRUS 9 OUTBREAK ASSOCIATED WITH MORTALITY IN A GROUP OF GREVY’S ZEBRA (*EQUUS GREVYI*) HOUSED IN A MIXED-SPECIES EXHIBIT**

Antoine Leclerc, DVM, Dipl ECZM (ZHM), Baptiste Mulot, DVM, Nicolas Goddard, DVM, Amelie Nicolau, DVM, Gabrielle Sutton, MSc, Romain Paillot, PhD, HDR, Karin Lemberger, DVM, Dipl ACVP, Stephane Pronost, MSc, PhD, HDR, and Loıc Legrand, MSc, PhD

Abstract: A herd of seven captive-born Grevy’s zebras (*Equus g*revyi) experienced an **outbreak of nasal discharge and sneezing**. **Clinical signs, including lethargy and anorexia, were severe and acute in three animals, including a 16-mo-old male that died within 48 h**. Treatment of two severely affected zebras included valacyclovir (40 mg/kg PO), meloxicam (0.6 mg/kg IM/PO), and cefquinome (2.5 mg/kg IMq48h). An adult female improved rapidly, and clinical signs resolved within 48 h of treatment. Administration of valacyclovir pellets was very complicated in a 2-mo-old female, and death occurred within 48 h. Histologic examination of the two individuals that died revealed severe **fibrinonecrotic interstitial pneumonia with prominent hyaline membranes and type II pneumocyte hyperplasia**. Additionally, the **16-mo-old male presented systemic endothelial activation with vascular thrombosis and necrosis and mild nonsuppurative meningoencephalitis. Herpesviral DNA was detected in the lungs of both individuals by nested polymerase chain reaction**. The nucleic acid sequence of the amplicons showed 100% similarity with previously published equid alphaherpesvirus 9 sequences. Three additional animals developed mild nasal discharge only and recovered spontaneously. The zebras shared housing facilities with other species, including white rhinoceros (*Ceratotherium simum*), reticulated giraffe (*Giraffa camelopardalis reticulata*), and several antelope species. None of these animals showed clinical signs. Additionally, nasal swabs and whole blood samples were collected from cohoused white rhinoceroses (n=3) and springboks (*Antidorcas marsupialis*, n=3) as well as nasal swabs from cohoused reticulated giraffes (n = 4). Nucleic acid sequence from equid herpesviruses was not detected in any of these samples. The source of the infection in the zebras remains unclear.

**Key Points:**

* Equine herpesvirus 4 (EHV-4) associated with respiratory infection
* Equine herpesvirus 1 (EHV-1) associated with respiratory infection, neurological disease and abortion.
* EHV-9, is closely related to EHV-1 and has been shown to exhibit similar pathogenicity
  + EHV 1+9 seropositivity reported in zebras often with little or no signs of disease (greater seropositivity in free-ranging zebras). One report of EHV9 encephalitis in a Grevy’s zebra.
  + Grevy’s zebras are considered an EHV9 reservoir
* Aim: Describe a case series of EHV9 infection and mortality in Grevy’s zebra
* Seven Grevy’s zebra in mixed species habitat
  + 3/7 presented acutely with lethargy, decreased appetite, nasal discharge and sneezing
    - One animal became laterally recumbent and died 2 days later
    - Other 2 cases were milder but progressed to increased nasal discharge and thick exudate
* Treated with valacyclovir, cefquinome and meloxicam in the two remaining animals
  + One animal recovered within 48 hours. Other animal (2 mo) had difficulty accepting the valacyclovir pellets and died within 4 days of the onset of clinical signs
* Three other zebras in herd developed nasal discharge
* Necropsy: pulmonary edema and congestion, fibrinonecrotic pneumonia, fibrinonecrotic rhinitis, epicardial hemorrhage and musculoskeletal necrosis. Case 1 also had vascular thrombosis and meningoencephalitis
  + EHV9 isolated from lung tissue
* Nasal swabs from cohoused rhinos, springbok, giraffe were all negative.  Remaining four zebras negative on nasal swabs 6 months after outbreak.

**Take home:**

Two cases of fatal EHV9 infection in Grevy’s zebras from a mixed species habitat. Both respiratory and neurologic lesions were noted following EHV9 infection. The source of the outbreak was undetermined.

**A COMPARISON OF A SINGLE-DART VERSUS STAGED TWO-DART ANESTHESIA INDUCTION PROTOCOL IN PRZEWALSKI’S HORSES (EQUUS FERUS PRZEWALSKII)**

JZWM 2021 52(2): 453–459

**Abstract**: Przewalski’s horses (Equus ferus przewalskii) are an endangered equid species. Anesthesia administered by remote delivery is often needed to provide medical care. Behavioral and physiologic parameters were prospectively compared in 14 horses (8 females and 6 males, 3–18 yr) after a single-dart or staged two-dart anesthesia induction protocol with intramuscular medetomidine (0.06 mg/kg), butorphanol (0.05 mg/kg), thiafentanil (0.02 mg/kg), and ketamine (1 mg/kg). Seven horses were randomly assigned to receive all drugs in a single dart, and the other seven to receive medetomidine and butorphanol 10 min prior to thiafentanil and ketamine in a second dart. Induction and recovery quality were scored on a scale from 1 to 5 (worst to best), and video recordings were assessed for frequency of specific behaviors. Need for supplemental propofol was recorded. Median induction score was significantly better (P = 0.01) after two darts (4/5) compared to a single dart (3/5). Degree of muscle fasciculation (undesirable) during induction was significantly lower (P = 0.006) with the two-dart protocol. During the transition to recumbency, 71% versus 14% of horses transitioned headfirst (undesirable) after a single dart versus two darts, respectively (P = 0.07). Supplemental propofol administration was necessary in 43% of horses after two darts and in 100% of horses after a single dart (P = 0.10) to facilitate intubation and reach a working depth of anesthesia. Physiologic and recovery parameters were not significantly different between groups. Improved induction quality was observed clinically using a staged two-dart versus a single-dart protocol and should be considered when anesthetizing captive Przewalski’s horses using this drug combination.

**Summary:**

Intro:

* Wild equid anesthesia – challenging
  + non-opioid-based anesthesia techniques have been studied in Przewalski’s horses
  + most common - alpha-2 agonist medetomidine (sedation, muscle relaxation) with dissociative anesthetic ketamine
    - not all horses successfully immobilized with this combo
  + ultrapotent opioid-based techniques reported to induce anesthesia more reliably
    - etorphine considered opioid of choice for anesthesia in non-domestic equids
    - carfentanil - recently unavailable in US
      * rough inductions, increased muscle contraction, significant hypertension in equids
    - thiafentanil – newer, info in Przewalski’s horses limited
      * respiratory depression
        + butorphanol (antagonist of mu opioid receptor) helps mitigate
* Objective: study assessed use of thiafentanil as part of a multidrug protocol including medetomidine, butorphanol, and ketamine for anesthesia induction and influence on anesthesia quality following admin of these medications using a single-dart versus a staged two-dart induction protocol

M+M:

* effectiveness and anesthesia quality following single-dart vs staged two-dart anesthesia protocol compared in 14 captive adult Przewalski’s horses
* Drug combo for all horses: butorphanol (0.05 mg/kg), medetomidine (0.06 mg/kg), thiafentanil (0.02 mg/kg), and ketamine (1 mg/kg) IM
* single-dart protocol - all drugs in single dart
* staged two-dart protocol - medetomidine + butorphanol in 1st dart, thiafentanil + ketamine 10 min later in 2nd dart
* supplemental propofol as needed for intubation, etc
* reversal with naltrexone and atipamezole

Results/discussion:

* recumbency achieved in all horses
* induction time longer for two dart protocol
  + median time to recumbency of 6 min for single-dart protocol and 15 min for two-dart protocol
* behavioral response to second dart significantly reduced because of sedative effects of first dart
* **significant improvement in induction quality with staged two-dart vs single-dart protocol:**
  + **decreased muscle fasciculation, rigidity, incoordination, and reduction in frequency of undesirable (head-first) transitions to recumbency**
* when all drugs combined in single dart, first effects are largely those of thiafentanil, as opposed to those of medetomidine combined with butorphanol
* need for supplemental propofol to reach a working depth of anesthesia once recumbent not significantly different between groups
  + all horses in single dart group needed propofol supplementation
* physiologic parameters not different between groups
* no significant anesthetic or postanesthetic complications noted in either group
* no difference in recovery scores – all had good to excellent recoveries
* two-dart protocol resulted in longer duration between first dart and reversal
* median duration from first dart to standing was same in both protocols
* time from reversal to standing was shorter with two-dart protocol

**Conclusion**: study supports use of thiafentanil in combo with butorphanol, medetomidine, and ketamine for anesthesia in Przewalski’s horses and administration of medetomidine and butorphanol prior to thiafentanil administration consistently provided improved sedation and muscle relaxation and minimized negative characteristics associated with potent opioid inductions and need for supplemental propofol; use of staged two-dart protocol provided improvements to anesthesia induction quality and may improve safety of anesthesia in Przewalski’s horses

Graphical user interface, application

Description automatically generated

Graphical user interface, application, Word

Description automatically generated