



FACT SHEET

Department of Animal Science, University of Connecticut

Effective Horse Management - Horse Health Series

Coronavirus in Horses

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When I first heard about the coronavirus outbreak in 2020, I thought to myself, gee, that sounds like a familiar disease. As an associate professor in Animal Science and Equine Extension Specialist, you learn about many things most horse enthusiasts may never come across. I remembered hearing about coronavirus causing diarrhea in foals, and I was right! The year 2010 was when some coronavirus outbreaks occurred throughout the world in adult horses, but luckily, horses have never transmitted the disease to humans. It is also extremely unlikely that the disease would jump into humans from horses. In late summer 2018, several horses were affected by equine coronavirus at a horse show here in the Northeast.

Equine coronavirus or ECoV is classified as a betacoronavirus just like COVID-19 (SARS CoV-2). Coronavirus is basically microscopic strands of RNA encased in an envelope of proteins. It was given the name of a coronavirus because it looks like it is wearing a crown when viewed under a microscope. While bacteria can multiply on their own, a virus like ECoV needs to take over a host cell (such as a cell that lines the horse's gastrointestinal tract), taking over its resources to divide and make more virus particles. A horse must ingest the feces of another horse or something contaminated with the feces of a horse infected with the virus in order to become infected. Once ingested, the virus travels to the small intestine, where it attaches to specific receptors on the intestinal cells using proteins sticking out from its outer layer (envelope). The particles then fuse with

the host's cell, the RNA enters the host cell and integrates itself into the host cell's DNA. This allows it to use the cells resources to replicate, making thousands more of these virus-causing particles.

Coronavirus has been found in both foals with intestinal disease and normal foals. In central Kentucky, it was found in 30% of foals. The sign in foals is diarrhea and the virus has also been found in conjunction with Rotavirus or *Clostridium perfringens*. Draft horses and horses used for pleasure were more likely to be positive for ECoV in a recent study (Pusterla et al. 2019). Also multiple horses on a premises tended to be affected in this study. After testing 5,250 apparently healthy horses from 18 states, Pusterla et al. reports the horses most at-risk for ECoV reside in the Midwestern U.S., are draft horses, participate in ranch work/farming or are used in breeding programs. Outbreaks usually last about 3 weeks. ECoV can occur at any time, but is most common in cooler months.

Diagnosis is through the detection of the virus in feces by electron microscopy, quantitative PCR (this test was developed in 2010 for ECoV, it takes 3 business days to get results), and/or isolation of the virus. In a recent study of 20 horses that tested positive for ECoV through fecal testing, only 4 tested positive on nasal swab as well (Pusterla et al. 2019). The researchers felt that the positive nasal tests may have been due to the horses breathing in feces contaminated with the virus. Additionally, in a 2019 study by Pusterla et al., 7.2% of horses with an acute onset of fever tested positive for ECoV but were diagnosed through fecal testing, nasal testing did not yield the same results so fecal testing should be used to test for ECoV.

A blood sample will show leukopenia (a low white blood cell count) due to neutropenia (a low neutrophil count) and lymphopenia (a low lymphocyte count). As mentioned, recent outbreaks of coronavirus in adult horses resulted in diarrhea and colic.

Pusterla et al. found that approximately 2-6% of horses suspected of infection ultimately test positive for ECoV. However, the number of affected horses has increased over the past eight years most likely due to increased recognition of the disease by veterinarians and owners agreeing to test for it. Horses generally show signs within 48 to 72 hours after exposure to ECoV. Infected horses then will shed the virus in their feces 3 to 4 days after exposure which will continue for another 3 to 25 days on average but has lasted as long as 99 days. Intermittent fecal shedding may occur.

According to a recently published study (Pusterla et al. 2019), the clinical signs of equine coronavirus (with percent affected in parentheses) are:

- 🐾 Anorexia (going off feed) (97%)
- 🐾 Lethargy (88%)
- 🐾 Fever (range, 101.5-106°F median, 103.8°F) (83%)
- 🐾 Soft, watery feces (23%)
- 🐾 Colic (19%)
- 🐾 Encephalopathy (circling, head-pressing, seizures) (3%)

Lack of nasal discharge was significantly associated with horses diagnosed with ECoV meaning that horses did not have nasal discharge (Pusterla et al. 2019). Much like human coronavirus in that there can be asymptomatic carriers, only 130 of the 472 study horses that tested positive for ECoV displayed clinical signs of disease. An estimated 4-83% of affected horses stayed healthy with no signs despite positive tests for ECoV in their feces. The researchers estimate that only about 20% of horses that become infected with ECoV

and test positive will show any of the signs of disease. These horses might be sources of disease spread, just like in people with COVID-19.

In the majority of cases, horses return to normal with supportive care such as flunixin meglumine or phenylbutazone and fluids in several days to one week. Occasionally, the disease can progress rapidly and lead to death or euthanasia, but this is usually due to disease complications rather than the primary infection. One potentially serious complication is hyperammonemia in which there is excess ammonia production in the bowel due to a change in the intestinal microbiome (bacteria of the intestine). High levels of ammonia then get absorbed into the body and circulate through the bloodstream throughout the body including the brain. While there are no specific treatments for ECoV, with a diagnosis it is still possible to exclude other causes that might have specific treatments, understand disease trends, and guide infection control practices.

Adopting biosecurity practices can help prevent ECoV infection as well as other types of infection. Isolate any new horses from the other horses on your farm for at least 21 days. Isolate any sick or ECoV positive horses and either handle them last or have staff or family members dedicated just to caring for the sick or ECoV positive horses. Wash your hands after handling sick horses and change clothes as well. Use foot baths and disinfectants to minimize spread of the disease. Coronavirus can be inactivated by virtually the same disinfectants that work on human coronavirus: sodium hypochlorite (bleach), povidone iodine, chlorhexidine gluconate, phenols, quaternary ammonium compounds and peroxygen compounds. First remove any organic materials (feces, bedding, etc.) from surfaces as they will decrease the effectiveness of many disinfectants. Be sure all horses are up to date on their vaccinations. Avoid sharing equipment, buckets, etc. between horses, especially at shows and with horses from other premises.

For those hosting shows, it is recommended that all horses (not just those from out of state) have a health certificate or Certificate of Veterinary Inspection prior to entry and horses should be screened upon entering. An example of this type of screening is that at UConn we require a 3-day temperature log prior to an event. Show ground managers should clean and disinfect the entire facility between horse shows. Manure should be removed from the stalls and grounds as soon as possible. Show ground managers should have a biosecurity plan in place prior to any event with dedicated biosecurity officers present (they can be specially trained show personnel).

Unfortunately, just as for COVID-19 right now, there is no vaccine available to horses. A research group from Japan recently tested a Betacoronavirus vaccine for use in cows on six young Thoroughbred horses but blood antibody titers were not particularly elevated though it did induce antibody production (Nemoto et al. 2017). They will need to do further testing to see if horses produced enough antibodies to prevent infection and they will also need to ensure that it is safe for use in horses.

Hopefully scientists will soon create a vaccine for both equine and human coronavirus. More effective treatments also need to be developed. Please don't be afraid of your horse! In the very rare case that he or she does acquire coronavirus, transmission to you is extremely unlikely. Nevertheless it is recommended to follow CDC guidelines regarding pets: if you get sick with COVID-19, have someone else take care of your horse. If you are sick, avoid contact with your horse including petting, snuggling, being kissed or licked, and sharing food or bedding (!). If you must care for your horse when

you are sick, wear a cloth face covering and wash your hands before and after you interact with it. Be well and have fun with your horses!

Sources:

Centers for Disease Control and Prevention. 2020. Coronavirus Disease 2019 (COVID-19) If You Have Pets. <https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/pets.html>

Nemoto M, Kanno T, Bannai H, Tsujimura K, Taksahi Y, Kokado H. 2017. Antibody response to equine coronavirus in horses inoculated with a bovine coronavirus vaccine. *Journal of Veterinary Medical Science* 79 (1) <https://doi.org/10.1292/jvms.17-0414>

Nemoto M, Oue Yashuhiro, Higuchi T, Kinoshita Y, Bannai H, Koji T, Takashi Y, Takashi K. 2015. Low prevalence of equine coronavirus in foals in the largest thoroughbred horse breeding region of Japan 2012-2014. *Acta Veterinaria Scandinavica* 57:53, 2015.

Oke, Stacey. 2020. What is equine coronavirus? *The Horse* <https://thehorse.com/165259/what-is-equine-coronavirus/>

Pusterla, N., Mapes, S., Wademan, C., White, A., Ball, R., Sapp, K., Burns, P., Ormond, C., Butterworth, K., Bartol, J. and Magdesian, K.G. 2013. Emerging outbreaks associated with equine coronavirus in adult horses. *Vet. Microbiol.* 162, 228-231.

Pusterla N, James K, Mapes S, Bain F. 2019. Frequency of molecular detection of equine coronavirus in faeces and nasal secretions in 277 horses with acute onset of fever. *Vet Rec.* 184(12) doi: 10.1136/vr.104919 Last accessed 5/11/20.

N.M. Slovis, J. Elam, M. Estrada, C.M. Leutenegger. 2014. Infectious agents associated with diarrhoea in neonatal foals in central Kentucky: a comprehensive molecular study. *Equine Veterinary Journal*, 46: 311-316.

Stewart, Allison J. Coronavirus in Horses. *Merck Veterinary Manual*. <https://www.merckvetmanual.com/digestive-system/intestinal-diseases-in-horses-and-foals/coronavirus-in-horses?query=equine%20coronavirus> Last accessed 5/11/20.

Tufts Equine Center. Equine Coronavirus (ECoV) risk assessment during horse shows. <https://equine.vet.tufts.edu/equine-coronavirus-ecov-risk-2019/> Last accessed 5/11/20.

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