EQUINE DISEASE QUARTERLY

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COMMENTARY

IN THIS ISSUE

University of Kentucky
College of Agriculture, Food and Environment
Department of Veterinary Science

LLOYD'S

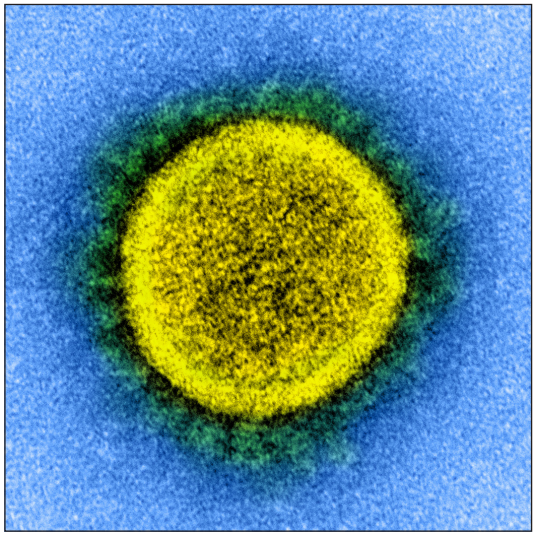
Lloyd's—An international insurance market for bloodstock and other specialist insurance.

Since discovery of the novel coronavirus (SARS-CoV-2), causal agent of the highly contagious and frequently life-threatening disease of humans designated COVID-19 in December 2019, the virus has spread very rapidly around the globe. The exponential increase of cases in affected countries and the alarming case-fatality rate has resulted in a pandemic of unprecedented proportions, in terms of its health and economic impact on human populations worldwide.

Of the seven coronaviruses known to infect humans, three are of major public health significance: severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS), and coronavirus 2019 (COVID-19). Other members of the coronavirus family can cause respiratory or intestinal disease in a range of domestic species, including horses, swine, cattle, cats, dogs and chickens. SARS-CoV-2 is genetically and otherwise uniquely distinct from these other coronaviruses, none of which are known to be human pathogens.

There are many aspects of the biology of SARS-CoV-2, including its host range, epidemiology, pathogenesis, and nature of the immune response to the virus, that remain to be fully elucidated.

The pandemic of COVID-19 has had significant implications for the U.S. horse industry. A point of continuing concern for many in the industry is whether SARS-CoV-2 is capable of infecting and perhaps causing disease in horses. At the present time, there is no evidence confirming the susceptibility of horses to infection. This is supported by the outcome of a recent study undertaken to determine conservation of the angiotensin-converting enzyme 2 (ACE2) across 410 vertebrates including 252 mammalian species, and the likelihood of it functioning as a SARS-CoV-2 cell receptor. The horse was ranked low risk in predicted susceptibility to infection based on the binding characteristics of its ACE2 compared to the human homologue. In the current absence of any information to the contrary, it is not possible to speculate on the potential risk of horse-to-horse transmission of the virus and whether horses might play a role in transmitting the virus back to humans.



NIAID-RML

The novel coronovirus that causes COVID-19.

Aside from the primary consideration of its potential to affect the health of the horse, COVID-19 has had a major impact on the economy of the horse industry in Kentucky and the USA. Virtually all sectors of the industry have been negatively influenced by the current pandemic. Racing, equestrian events, and horse shows have been cancelled or postponed to a later date. Horse sales and other ancillary businesses have been similarly affected. This has inevitably resulted in layoffs or furloughing of workers who would otherwise

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INTERNATIONAL

First Quarter 2020

The International Collating Centre, Newmarket, United Kingdom, and other sources reported the following equine disease outbreaks.

The Republic of South Africa (RSA) confirmed the occurrence of African horse sickness at expected levels within endemic areas of eight of the nine provinces. The highest number of cases were recorded in Gauteng Province; none were confirmed in Western Cape Province.

African horse sickness was also reported for the first time in Thailand. Three outbreaks were confirmed, involving 78 cases with 57 fatalities.

An outbreak of Venezuelan equine encephalomyelitis was confirmed by Belize. Four of five unvaccinated horses died from the disease.

France, the Netherlands, and the USA recorded outbreaks of equine influenza. The number of outbreaks included four in France (one to 20 cases per outbreak), two in the Netherlands (three to five cases per outbreak), and nine in the USA, where the disease is endemic. The number of cases per outbreak varied from three to 30, with many unvaccinated against the disease.

Strangles is considered endemic in most countries with reports from Belgium (two outbreaks), France (20 outbreaks), the Netherlands (24 outbreaks), Switzerland (four outbreaks), and the USA (16 outbreaks in 11 states).

Equine herpesvirus 1 (EHV-1) related diseases were recorded by Belgium, France, Canada, the Netherlands, Switzerland, the UK, and the USA. Respiratory disease outbreaks were confirmed in Belgium (two), France (three), the Netherlands (one), and the USA (six). Abortion due to EHV-1 was reported by Belgium (four outbreaks, one involving six cases), Canada (one outbreak), the Netherlands (five outbreaks), the UK (four outbreaks), and the USA (eight outbreaks of abortion/neonatal disease, one involving four cases). EHV-1 neurologic disease was confirmed by Canada (one case), the Netherlands (two outbreaks, one involving two cases and the second, seven cases), Switzerland (single case), the UK (three outbreaks, one involving nine cases), and the USA (seven outbreaks, with two each in California and Virginia).

Numerous countries recorded outbreaks of equine herpesvirus 4 respiratory disease. These included Argentina (one outbreak in five to seven month old foals), Belgium (one outbreak), France (18 outbreaks, mostly single cases), the Netherlands (two outbreaks), Spain (one case), Switzerland (two outbreaks, one involving co-infection with EHV-1), and the UK (five outbreaks, two linked to new arrivals).

France reported finding the carrier state in three stallions infected with equine arteritis virus.

Equine infectious anemia was confirmed in Canada (a case of subclinical infection) and the USA (three outbreaks, with single cases in California and Texas and three cases in Iowa).

The RSA was the only country to report the presence of equine piroplasmosis. Isolated cases were diagnosed throughout the country.

Two outbreaks of leptospiral abortion were recorded by Belgium, both involving single cases of the disease.

The USA reported a significant number of cases of nocardioform placentitis/abortion. Of 256 cases confirmed, 147 represented cases of placentitis and 109 where the placentitis was accompanied by submission of a fetus or neonate. *Amycolatopsis* was implicated in 98 cases and *Crossiella equi* in 65 cases.

A fatal case of Tyzzer's disease (*Clostridium piliforme*) infection was confirmed in a foal in Kentucky, USA.

The USA reported a non-fatal case of equine coronavirus infection in a gelding in Arizona.

Rotavirus infection in foals was diagnosed by France (two outbreaks), Spain (one case), and the USA (one case).

The USA reported 10 cases of *Lawsonia* enteropathy due to *Lawsonia intracellularis* infection in the first quarter of 2020. It also confirmed detection of *Clostridium perfringens* in 24 foals originating in Kentucky and Indiana, and *Clostridium difficile* in 16 foals in Kentucky; these included two toxin Type A strains and two toxin Type B strains.

The RSA recorded cases of equine encephalosis in seven of the country's nine provinces, with over 100 cases diagnosed in Gauteng Province.

Equine Disease Quarterly

Editors
Peter Timoney
Alan Loynachan
Rebecca Ruby

Staff
Diane Furry
Tawana Brown
Dennis Duross

Correspondence should be addressed to the editors, Department of Veterinary Science, Maxwell H. Gluck Equine Research Center, University of Kentucky, Lexington, Kentucky USA, 40546-0099
Telephone (859) 257-4757
Fax (859) 257-8542

Internet address:
http://gluck.ca.uky.edu/equine-disease-quarterly

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Equine Acute Respiratory Distress Syndrome

Acute respiratory distress syndrome (ARDS) causes rapidly progressive and severe respiratory failure and is associated with high mortality in affected patients. First described in critically ill humans more than 50 years ago, ARDS is now recognized as a rare cause of respiratory failure in several veterinary species including horses, where it is referred to as veterinary ARDS (VetARDS).

ARDS and VetARDS develop as a complication when a primary disease or injury triggers overwhelming and uncontrolled inflammation in the lung. This inflammatory response causes the hallmark features of ARDS: severe pulmonary damage and edema, respiratory dysfunction, and profound hypoxemia (low oxygen in the blood). Pneumonia and conditions associated with severe systemic inflammation, such as sepsis, represent the most common risk factors for ARDS and VetARDS. Other potential risk factors include smoke inhalation, severe trauma, aspiration of stomach contents, and near drowning.

In horses, VetARDS is a rare, but distinct, clinical condition in foals younger than nine months of age. Previously, this condition was referred to as acute interstitial or bronchointerstitial pneumonia. Bacterial pneumonia is the most common predisposing cause of VetARDS in these foals. There does not appear to be a single bacterial pathogen associated with VetARDS in foals but *Rhodococcus equi*, *Klebsiella* sp. and *Streptococcus* sp. have all been identified with VetARDS. Sepsis represents the most likely risk factor in neonatal foals and conditions consistent with VetARDS have been reported in adult horses after smoke inhalation or near drowning.

A definitive diagnosis of VetARDS can be challenging, and distinguishing VetARDS from severe bacterial pneumonia may not be possible. The specific criteria established for the diagnosis of ARDS in veterinary species include recent onset of clinical signs (< 72 hours), exposure to a known risk factor, radiographic changes consistent with widespread pulmonary damage and edema, evidence of severe hypoxemia on blood analysis, and if possible, inflammatory changes identified on respiratory fluid analysis. These diagnostic criteria apply to all veterinary species with minor modifications existing only for neonatal foals less than one week of age. Specific postmortem diagnostic criteria also exist for animals that succumb to VetARDS.

Foals with VetARDS present with a sudden onset of severe and rapidly progressive respiratory distress that may follow a recent history of pneumonia. Other nonspecific findings on physical examination can include fever, abnormal lung sounds, increased heart rate, and depression. Radiographic or ultrasound examination of the lungs is recommended. Blood laboratory analysis is useful to detect and monitor hypoxemia. Other laboratory findings vary but are typically consistent with inflammation or other disease process. Additional diagnostics should focus on identifying any underlying primary disease.

Regardless of age, the goals of treatment for horses with VetARDS include addressing any underlying primary disease, controlling inflammation, improving oxygenation, and providing supportive care. These cases require prompt and intense management. In humans with ARDS, lung-protective mechanical ventilation is the only therapy that has resulted in reduced mortality. Unfortunately, this is not feasible for the vast majority of horses with this condition. Intranasal oxygen supplementation, administration of anti-inflammatory medications (e.g. corticosteroids) and antibiotics, and appropriate nutritional and intravenous fluid support represent the mainstay of therapy for most horses with VetARDS.

The prognosis for recovery from VetARDS is guarded. Survival rates of 60% have been reported in older foals but are often lower in neonatal foals. With appropriate treatment, survivors typically stabilize or improve within a few days. While the impact of this condition on future athletic performance is unknown at this time, limited reports suggest that recovered foals can go on to have successful athletic careers.

CONTACT:
Kara Lascola, DVM, MS, DACVIM
Kml0068@auburn.edu
(334) 844-4490
College of Veterinary Medicine,
Department of Clinical Sciences
Auburn University
Auburn, Alabama

Muzzle lesion in VS affected equid.

Mitigation Strategies to Prevent Vesicular Stomatitis Virus Transmission to Equids

DR. PIPER NORTON

Vesicular stomatitis (VS) is a viral disease of horses and other livestock caused by vesicular stomatitis virus (VSV), which is endemic in southern Mexico and only occasionally moves northward into the United States. The clinical disease is characterized by vesicular (blister-like) lesions on the muzzle, lips, tongue, ears, udder, sheath, or coronary bands. While the lesions usually heal on their own, some horses require supportive care. A 2019 outbreak of VSV was the largest in recent history with 1,144 premises affected in eight states (Colorado, Kansas, Nebraska, New Mexico, Oklahoma, Texas, Utah, and Wyoming). VS returned this year on April 13, 2020, with equine premises in Arizona, New Mexico, and Texas affected. Expansion of the disease to other states is expected this summer. Taking steps now to prevent VSV transmission on equine premises is imperative to limit the spread.

VSV is spread two ways; natural transmission by insect vectors or direct contact with infected animals. Mitigation strategies targeting insect vectors and implementation of biosecurity to prevent contact with infected animals and contaminated fomites (shared water troughs, feed buckets, tack, or equipment) are thought to be the best methods of disease prevention. Known competent insect vectors include black flies (*Simulium* spp.), sand flies (*Lutzomyia* spp,), and biting midges (*Culicoides* spp.), but other insects may also transmit the disease.

These insect vectors emerge in specific habitats, which helps target implementation of mitigation strategies. Sand flies prefer dry areas, such as tree holes, rock crevices, and animal burrows. Biting midges prefer wet areas, such as wet leaves and mud around ponds or troughs. Black flies prefer flowing water, such as irrigation ditches, rivers, or streams. Adult flies move outward from these areas. Some can only fly short distances (sand flies), but others fly longer distances (black flies) or travel on wind currents (black flies, midges). Seasonality of the vectors coincides with warmer months, spring through fall, but midges can be more cold-hearty and occasionally transmit VSV in winter. Preferred feeding/biting times vary, with sand flies being night feeders, biting midges feeding around sunrise and sunset, and black flies feeding during the day.

Vector mitigation strategies should be considered at the neighborhood, premises, barn, and animal level. At the neighborhood level, keep animals away from insect emerging sites such as moving water and standing water during the insect seasons. Alternatively, time the rotation of animals through pastures to avoid grazing near a stream returning to base flow after reaching peak runoff, a time of black fly emergence. If possible, move animals to higher-elevation pastures during the vector season. At the premises level, removing manure regularly, maintaining sloped and well-drained footing around water sources, and keeping surrounding vegetation mowed will also reduce insect vectors.

At the barn level, move animals indoors during vector feeding times or provide access to a run-in shed for pastured horses. Installing mesh netting or repellent-treated fabrics on barn openings can further prevent vector entry. Minimizing the use of bright lights at night and adding fans blowing down onto horses can also be preventive. At the animal level, topical insecticides and repellents reduce exposure to biting insects, but repeated application is necessary and must be combined with insect mitigation at the other levels to be effective. Using fly sheets, masks, leg wraps, and ear covers with or without repellent fabric are also animal-level mitigations, but these must cover the areas where VSV lesions occur. Therefore, chemical repellents may need to be used in conjunction with fly sheets and masks to protect the muzzle and lips.

Mitigation strategies and biosecurity measures at multiple levels are needed to provide adequate protection from VSV. For more information access "Management Strategies for Reducing the Risk of Equines Contracting Vesicular Stomatitis Virus in the Western United States" at the following link: https://doi.org/10.1016/j.jevs.2020.103026

CONTACT:
Angela Pelzel-McCluskey, DVM, MS, Equine Epidemiologist
Angela.M.Pelzel-McCluskey@aphis.usda.gov
(970) 494-7391
USDA-APHIS-Veterinary Services
Fort Collins, Colorado

Therapeutic Shoeing

Applying shoes to the feet of horses has been a common practice for over 1,000 years, while the first horseshoes may have been used as much as 2,500 years ago. Generally, the feet of domesticated horses are trimmed to balance and reduce excessive hoof length, and, in many cases, horseshoes are applied as an aid for traction, protection, and to reduce wear of the hoof wall. Therapeutic horseshoeing, therapeutic farriery, corrective shoeing, and podiatry are some of the terms that have been used to describe the care of a horse's hoof to address abnormal conditions beyond this common practice. Since many farriers use various shoes, pads, and application methods, therapeutic shoeing is practiced by most farriers at various levels. It could also be argued that basic horse shoeing is therapeutic in nature.

There are various certifications and endorsements that farriers can acquire from a handful of farrier organizations, indicating specialty or ability. These involve additional training, apprenticeships, case studies, and testing. Additionally, there are veterinarians who are trained farriers with experience and specialty achieved beyond the scope of what is provided in vet school. Depending on client base, geography, experience, and preference, veterinarians and farriers often specialize in certain disciplines or breeds.

As much as 80% of equine forelimb lameness is due to problems involving the feet. Some of the usual conditions where therapeutic horseshoeing is utilized include laminitis and founder, navicular disease, hoof cracks and defects, coffin bone injuries or disease, infections such as canker, white line disease and abscesses. Soft tissue injuries involving tendons and ligaments as well as diseases involving bone and joints can also be addressed with modulation of the foot even though these injuries may be located further up the leg. For example, shoeing applications to reduce strain on a suspensory ligament can greatly improve healing and comfort for suspensory desmitis. Conformational abnormalities may be accommodated with proper attention. Each breed and discipline also has a set of nuances and problems specific to the group. The farrier is part of a team which also includes the horse, owner, trainer, grooms, and veterinarian. This team approach is never more evident than when a horse has an injury or disease. Occasionally, multiple farriers or veterinarians will work together on a case via referral or consultation. It is important to note that an accurate diagnosis is essential for successful treatment.

Shoeing has evolved from the use of standard steel "keg" horseshoes. Manufacturing technology has brought a multitude of therapeutic shoes to market. A farrier can also modify pre-made or build shoes from scratch to custom fit each foot and need. In addition to steel and aluminum; plastics, fabrics, composites, epoxy and acrylic adhesives, and even wood is often utilized. Pads and impression support materials have evolved, offering different application methods, hardness, and even incorporated medications tailored to the needs at hand. Although craftsmanship and skill in building a foot appliance is important, the knowledge of how therapy will affect the horse (positive or negative) in every aspect is imperative. An example is how a wide-webbed shoe with a pad and rolled toe and branches might benefit a horse with navicular pain but will reduce traction and seal a sole from air causing other concerns that may result in different problems.

Therapeutic goals may include protection of internal or external injuries and wounds, stabilization of the hoof capsule, orthotic support, modification of static and dynamic biomechanics of the foot-ground interface, and protection or support of structures above the hoof. To properly address the needs of the condition and the horse, one must have an intimate understanding of the anatomic, physiologic and biomechanical relationships of the foot and leg. There should be an understanding of the disease process at hand. One application for a certain problem may be detrimental for another. This is the main reason that a farrier and veterinarian are most efficient when they have a good working relationship.

CONTACT:
Josh Zacharias, DVM, MS, DACVS, DACVSMR
zachariasdvm@gmail.com
Countryside Large Animal Veterinary Service
Greeley, Colorado

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Department of Veterinary Science
Maxwell H. Gluck Equine Research Center
University of Kentucky
Lexington, Kentucky 40546-0099

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COMMENTARY: *continued from the front page*

be employed at racetracks, equine sporting events, sales, etc. The economic fallout from this pandemic also has affected people who buy horses or wager at racetracks.

Horse breeding has been allowed to take place subject to stringent precautionary measures to prevent further spread of SARS-CoV-2. This is predicated on maintaining an enhanced level of biosecurity in all aspects of breeding shed activity and in following approved standard practices including social distancing by personnel. While much attention has been focused on centers of horse racing and breeding across the country, the financial repercussions of COVID-19 have also been acutely felt by owners of smaller horse farms/ businesses, etc., whose livelihoods are dependent on the sustainability of the equine industry.

It is way too soon to predict what the overall impact of the pandemic will have on the nation's equine industry in all its aspects from racing, equestrian events, horse shows, breeding, sales, and a variety of ancillary businesses. What is certain, however, is that the horse industry will survive and, given time, thrive again and regain its former prominence and importance to the nation's economy.

CONTACT:
Peter J. Timoney, MVB, MS, PhD, FRCVS
ptimoney@uky.edu
(859) 218-1094
Maxwell H. Gluck Equine Research Center
University of Kentucky
Lexington, Kentucky

Muzzle lesion in VS affected equid.

DR. PIPER NORTON