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Tick-related diseases are often incriminated in cases of fevers of unknown origins.

Equine Fevers and Muscle Disease

There were presentations on horses with fevers of unknown origin and on horses with neuromuscular disease that had encysted parasites in the muscle.

By Nancy S. Loving, DVM

Researchers look at *S. fayeri* encysted parasites in a horse's muscle as a potential cause of lameness and fevers of unknown origin.

Tick-Borne Pathogens

Horses often develop fevers without being compromised by respiratory disease. The challenge for the equine practitioner

is to determine the cause of a fever of unknown origin (FUO).

In endemic areas of the USA, tick-related diseases are often incriminated in such non-specific fevers.

A horse's response to doxycycline might provide an indication that the horse is suffering from a tick-borne pathogen, but not all tick diseases (or all cases of FUO) respond to doxycycline.

In addition, a horse might suffer from a co-infection, or the cause of fever might not be related to ticks.

Linda Mittel, DVM, MSPH, of Cornell University's Animal Health Diagnostic Center, discussed research findings on the tick-borne pathogens *Anaplasma* sp., *Ehrlichia* sp., and *Neorickettsia* sp. in febrile horses in two regions of the United States—the Great Lakes and

Eastern states. The highest incidence of tick-borne disease in humans correlates to Wisconsin and north Mid-Atlantic States.

Cases of FUO from 15 equine practices in nine states were recruited for this case-controlled study. The study examined PCR diagnostic results on blood from 52 horses with matched controls from the same farm. Also included were 23 horses with FUO that did not have matched controls.

The horses notably demonstrated anorexia and lethargy as well as signs of depression, icterus, cough, lameness, colic and abnormal feces. Criteria for horses in the study were a rectal temperature greater than 101.5 degrees F, as well as a history of ticks. Surveillance of ticks from the farms included ticks not necessarily found directly on the horses.

The genetic profiles of horses and ticks revealed the following:

- Of 54 cases of *Anaplasma* sp., no controls were infected, and five ticks carried the pathogen.
- Of four cases of *Neorickettsia* sp., no controls were infected, yet 26 ticks carried the organism. Mittel noted that while ticks normally carry *Neorickettsia*, not all are pathogenic.
- Of one case of *Ehrlichia* sp., there were no controls affected and no carrier ticks.

The study also looked at *Borrelia* sp. and found no cases in febrile horses or in controls; however, 13 ticks were carriers. It should be noted that *Borrelia* is not typically found in blood but rather is better identified in synovia.

The conclusion of this case-controlled study in the Great Lakes and Eastern regions of the USA “confirmed that *Anaplasma phagocytophilum* is a common cause of FUO.” It is important to recognize that not every FUO



Black-legged tick



Deer tick



Rocky Mountain wood ticks

is associated with ticks, but tick-borne pathogens should be high on a list of rule-outs for practitioners encountering FUO cases, particularly in endemic regions of the United States.

***Sarcocystis fayeri* and Neuromuscular Disease**

While sarcocysts in equine muscle (diaphragm, heart, esophagus, and tongue) historically have been an incidental finding, all practitioners have been faced with horses having lameness,

stiffness, myalgia and gait deficits of unknown cause. Many of these have been responsive within 15 days to anti-protozoal drugs such as ponazuril.

Monica Aleman, MVZ Cert., PhD, DACVIM, of the University of California, Davis, investigated the prevalence of sarcocysts in skeletal muscle biopsies in horses with neuromuscular disease and presented the findings at the AAEP Convention in San Francisco.

Muscle samples were obtained from 392 horses with neuromuscular disease and from 36 control horses. Of these, 35 horses with neuromuscular disease had encysted parasites in the muscle, for a prevalence of 8.9%. The mean/median age of the affected horses was 7 years old, but there was no breed or gender predilection. Signs of neuromuscular disease included weakness, short stride, muscle atrophy and gait deficits not localized with diagnostic nerve blocks. Other signs include stiffness, fasciculation and muscle pain with palpation. Muscle enzymes, such as CK and AST were elevated in over half of horses (13/20) for which there were complete blood counts and chemistries.

Of the 35 horses with signs of neuromuscular disease that had encysted parasites in the muscle, 51 of 61 muscles (83.6%) tested contained sarcocysts, with 2-21 sarcocysts per muscle. Of 36 healthy horses, only 1.4% had sarcocysts in 72 muscles.

The protozoa seem to prefer to take up residence in Type 2 muscle fibers, which are low oxidative, highly glycolytic myofibers. Myofiber size was significantly larger in muscles with sarcocysts than those without parasites.

S. fayeri in large numbers can affect muscle function, and while there is an association with neuromuscular disease, there is not yet solid confirmation of cause and effect. Aleman recommended acquisition of a muscle biopsy for horses with neuromuscular disease of undetermined origin to look for *S. fayeri* encysted parasites in the muscle. **EM**

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