

## Potomac Horse Fever

Potomac horse fever (PHF) is a rickettsial disease that can affect horses of any age. Rickettsial organisms are a type of bacteria. PHF originally surfaced in the 1980s, when an outbreak of diarrhea in the Potomac River area of Maryland occurred. Since that time the disease has frequently been recognized throughout the country. In 2010 we are recognizing a particularly severe outbreak.

The causative agent, *Neorickettsia risticii*, has a complicated life cycle that has been linked to fresh water snails and aquatic insects. Snails carry microscopic parasites called flukes within their gastrointestinal systems. There are several developmental stages of the flukes; the first larval forms of the fluke are called cercariae. *Neorickettsia risticii* is carried by these juvenile parasites. During hot weather, cercariae infected with *Neorickettsia risticii* are released into the water from snails and are consumed by aquatic fly larvae such as mayflies, caddis flies, dragonflies and 14 other aquatic insects (generally seen in New York from May through early September). These aquatic insects are thus infected with the organism that causes PHF. The cercariae mature into metacercariae after being consumed by the aquatic insects. These metacercariae are RESISTANT to the acid pH of the horse's stomach and therefore will not be destroyed by it. Horses grazing or eating feedstuffs can inadvertently consume these infected aquatic insects. Horses kept near fresh-water streams or ponds are therefore more likely to be at risk for getting the disease, because of the close proximity of the aquatic insects. It is currently thought that horses cannot get the disease from drinking water containing infected cercariae or eating the snails because the cercariae are easily digested in the stomach and are NOT RESISTANT to the acid pH of the stomach.

Unfortunately, a horse does not have to be near water to contract PHF. Six horses were diagnosed with PHF after attending a horse show in Minnesota in 2005 where they were stabled and did not have access to a stream, pond, or turnout. Competitors reported vast numbers of dead mayflies that blew into the facility and into horse trailers at the show grounds, which contaminated the stalls, hay supplies, and water of many horses. Aquatic insects carrying the bacteria can travel and easily congregate around stall lights or exterior lights that have been left on. These insects eventually die and fall into the horse's water bucket, feed bucket and/or hay where they can be consumed.

*Neorickettsia risticii* damages the intestine by invading the horse's white blood cells and migrating into the bowel, where it enters the colonocytes and enterocytes lining the mucosa of the bowel. Marked edema of the intestinal wall results, with a cascade of inflammation and toxin uptake from the damaged bowel.

The most common signs of PHF include depression, anorexia ("off feed"), and fever. A smaller number of horses develop diarrhea, or have signs of colic. Laminitis (inflammation of the lamina of the feet) occurs in 10-20% of cases, and is often severe. Most deaths attributed to Potomac Horse Fever occur due to euthanasia necessitated by severe laminitis.

Diagnosis of PHF consists of a careful history, a thorough physical examination, CBC/Chemistry profile and specific testing for *Neorickettsia risticii*. PCR blood testing (polymerase chain reaction: DNA testing looking for the bacteria in the white blood cells) can be performed but is often frustrating, as the organism leaves the blood stream so early in the course of the disease. A positive PCR confirms infection with PHF, but a negative test does not rule it out. Serology (immunofluorescent antibody) tests look for antibodies to the rickettsial organism. Unfortunately, testing the horse's serum for an antibody response

can be unrewarding as some sick horses will have low titers. However, a titer of  $\geq 800$  will confirm PHF. Most of the horses that we have recently diagnosed with PHF have a history of fever and lack of interest in feed, low white blood cell counts, low calcium, low total protein and dehydration. Few have had diarrhea. About 20% have developed severe laminitis. Most of our current cases are PCR negative and serology positive.

If the signs are recognized early enough, most horses are successfully treated. Treatment with intravenous oxytetracycline, fluids and anti-inflammatories is needed for 3-7 days, depending on response to therapy. If caught early, most horses will respond to treatment in 24-48 hours and have a dramatic recovery. It is common for appetite to take several days to return fully, and dehydration can continue for several days, especially if diarrhea is present or the weather is hot and humid. Early aggressive treatment is the best choice to prevent the development of laminitis. Horses that are quite toxic, dehydrated or have very high fevers have the most risk for this devastating sequela.

We have seen a notably increased case load during this hot dry summer. One theory is that the hot weather and drought-like conditions have dried up regions where low-level water was previously present. This leaves areas of greener grass where horses can now have access for grazing. In these areas, there may be a large number of dead mayflies and caddis flies. The second theory is that some of the aquatic insects are traveling from the areas that have dried up in search of an aquatic environment. During their travels, the horse inadvertently ingests the insects when they die out in the pasture.

There is no guarantee that vaccination for PHF will prevent the disease; however, there is evidence that the severity may be reduced. Vaccination failures may represent variability in an individual's responsiveness to the vaccine antigens or lack of immunogenicity of the vaccines used. Until new vaccines become available, more strategic vaccination to target peak antibody production with highest likelihood of exposure to *N. risticii* may be the most useful tool for reducing disease mortality in endemic areas. Cornell University School of Veterinary Medicine is currently recommending vaccination every 90 days from April to October due to the severity of this outbreak.

To reduce the risk of your horses being infected with PHF:

- Keep stable and exterior lights off in the barn at night.
- Do not place your paddock water buckets or tubs near a light source. Insects will congregate around the light and then may inadvertently fall into the water.
- Restrict your horses grazing near low-lying wet areas, as well as creeks and ponds during May through September.

Most importantly, monitor your horse carefully and frequently for changes in demeanor, appetite and presence of fever. Please call us if you have any concerns.

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