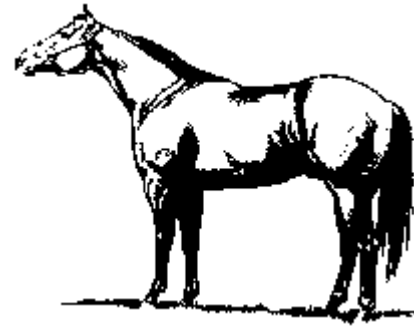


Animal Science Horse Information Series

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BOTULISM MAY BECOME A PROBLEM IN HORSES THIS WINTER

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A veterinary clinic in East Tennessee has reported 18 cases of suspected botulism poisoning/toxicity in horses in the past six weeks. The veterinarians theorized that feeding round bales of hay stored outside and exposed to rain may be the primary cause of the disease.

Botulism is a form of poisoning caused by the toxin produced by the bacteria *Clostridium botulinum*. The bacteria are commonly found in the soil and produce toxin under conditions found in decaying plant or animal matter. The toxin is among the most potent poisons known. Horses are highly sensitive to *C. botulinum* which means that less toxin is required to cause clinical signs and death in horses than other species.

In horses there are three ways by which botulism may occur: 1) consumption of

toxin in feeds primarily forages; 2) production of toxin in the intestine (usually involving foals) and 3) production of toxin from wound contamination with *C. botulinum*.

Forage poisoning follows consumption of toxin in feeds and occurs more commonly in forage than in grains. Water may also be a source of *C. botulinum* toxin. Type B botulism toxin is the more common type. It is usually produced under conditions found in decaying vegetable (forage) matter. Botulism toxin may also be produced in decaying animal carcasses. Botulism can occur when dead animals accidentally get baled in hay and the toxin leaches out.

Toxicoinfectious botulism is observed in foals between 2 to 8 weeks of age and is known as the shaker foal syndrome. This occurs when the foal ingests *C. botulinum* and the toxin is produced in the foal's immature gastrointestinal tract and absorbed into the blood stream.

Wound botulism occurs when *C. botulinum* contaminates a wound and produces toxin anaerobically (reduced oxygen). It has been seen after castration and been associated with injection abscesses, trauma and surgery in adult horses and in foals with umbilical hernias treated with clamps.

Botulism affects the nervous system. Clinical signs in horses are weakness; decrease muscle tone of the tail, eyelid and tongue; trembling; dilated pupils; failure of the pupil to respond to bright light; lying down; difficulty swallowing and abnormal stance with all four legs close together. Eventually, the horse will be unable to stand and respiratory failure occurs.

Clinical signs, history and environmental observation are used to make a tentative

diagnosis. Unfortunately, several other equine diseases produce similar clinical signs such as: equine herpesvirus 1 (EHV1) myeloencephalitis, equine motor neuron disease, equine protozoal myeloencephalitis (EPM), eastern equine encephalomyelitis (EEE), western equine encephalomyelitis (WEE) and plant toxicity.

The University of Tennessee College of Veterinary Medicine has documented botulism in a horse farm case. Initially, two yearlings become acutely ill. The clinical signs observed were muscle tremors and subsequent difficulty swallowing. In the next 12 hours, the yearlings became progressively weaker, recumbent and could not rise without assistance. When encouraged to stand, they had prominent muscle contractions. Rectal temperature, pulse and respirations were normal. The yearlings were moderately dehydrated and could not hold grain in their mouths. There was decreased eyelid tone, weak tongue strength, decreased light reflexes of the pupils and general weakness.

Botulism was suspected and one yearling was treated with *C. botulinum* Type B antitoxin along with supportive care; however, both yearlings died within 12 hours of this initial examination.

The next day, 8 of the remaining 13 yearlings developed similar clinical signs and died within 48 hours. All together ten of 15 yearlings died.

On the third day, two stallions from this same farm were presented for physical exams. One was normal and the other was lethargic and had a decreased ability to retract its tongue. The stallion took approximate 8 minutes to consume 8 ounces of grain due to difficulty in swallowing. Normally, a horse would consume this amount of grain in 2 minutes.

Large round hay bales that were being fed to the yearlings, and had been stored in the open, was removed and replaced with hay harvested at the same time but stored indoors.

A visual examination of one round hay bale that had been fed the yearlings revealed moist, decomposing plant material and mold. Two other round bales of hay that had been stored outdoors directly on the ground also had evidence of mold and moist decomposition in their interior and were warm to the touch. A moldy odor was present in addition to rotting vegetation in the interior of both bales. The hay stored outside had been subject to heavy rain for several weeks prior to the outbreak of botulism.

Samples of hay, serum, stomach and intestinal contents from the yearling necropsied were tested for *C. botulinum* and preformed toxin. *C. botulinum* was isolated from two round hay bales fed the yearlings just before the outbreak. Stomach and colon samples were negative for *C. botulinum* and preformed toxin.

It is difficult to detect botulism toxin in animals. For this reason, there may be more actual cases of botulism that are not recognized. Some cases may not be diagnosed because of the inherent problems of diagnosis, and the fact that several other more common equine diseases have similar clinical symptoms. If clinical signs are compatible to botulism and the hay being fed has been exposed to rain and contains areas of moist decomposing material, one should suspect botulism. The use of round bales stored outdoors in many areas of the state and the extreme fall and winter rains provide ideal conditions for botulism.

Horse owners should be cautious about feeding hay that has been rained on during the harvesting and/or storage phases. Round baled hay is particularly a risk factor when

stored outdoors on the ground. Covered round bales stored outside, even if off the ground, can be a risk if the covering has been torn and the hay exposed to heavy rain.

If round hay bales are to be fed to horses they should be stored indoors off the ground on wood pallets or old tires. Ideally, round hay bales should be fed under cover to prevent exposure to rain. If fed outdoors, round bales should be consumed within a few days.

If *C. botulinum* is present in one area of the hay bale, heavy rain can leach the bacteria to other parts of the bale increasing the risk. Any round bales with rotten or decaying hay should not be fed to horses. Since the decayed material is most likely to be internal in such hay bales, it may be impossible to visually determine this condition unless the bales are opened. If the exterior of the bale is rotten with dark discoloration and moldy or the bales feel warm, it should not be fed.

If one is feeding suspect hay, notes clinical signs compatible to botulism or has a concern about their current hay situation, they should immediately contact their veterinarian. An antitoxin is available to treat horses affected with botulism but it must be administered early in order to be effective. There is also a vaccine to prevent botulism in horses. It is effective against the *C. botulinum* toxoid Type B, the most common form of the disease in horses. The vaccination protocol in adult horses is 3 doses given at least 4 weeks apart with an annual booster. In pregnant mares, the 3 initial doses should be given 30-days apart with the last dose 4-6 weeks before foaling with an annual booster given 4-6 weeks before foaling. Foals from vaccinated mares are also given the initial 3 dose series starting at 2-3 months of age. In emergency situations, 3 vaccinations given at 10-12 day intervals

may provide protective antibodies after 3 weeks.

Horse owners that are feeding round hay bales of unknown origin or management and any hay that have been rained on has an increase risk of botulism or colic. Management is the key to prevention of botulism. Botulism is uncommon in horses that are properly fed and managed. Field observation of 18 suspect botulism cases of equine in East Tennessee raises the concern that additional cases may occur.

It should be noted that botulism has also been confirmed in Tennessee in dairy cattle fed grass haylage stored in plastic wrapped round bales. Apparently, the fermentation process was inadequate to lower the pH to a level to inhibit growth and toxin production of *C. botulinum*. Cattle are not as sensitive to *C. botulinum* as are horses; however, they do die from botulism. The dairy cattle that survived botulism had reduced milk production and had to be culled from the herd.

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Peer Reviewed by: Dr. Bart Rohrbach and Dr. Frank Andrews, Department of Large Animal Clinical Sciences, College of Veterinary Medicine.

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Your veterinarian can obtain the type B botulism vaccine¹ from: Neogen Corporation, 628 Winchester Rd., Lexington, KY 40505. 800-525-2022. Fax: 859-255-5532. (Trade name: Bot Tox-B).

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¹) This is the only Type B botulism vaccine available for horses in the United States.