

## Mycotoxins in Equine Feed

Prevent mycotoxin's harmful effects from impacting your horse's health and performance.

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Mycotoxins are harmful compounds produced by molds that live in the soil but can grow on grains, forages and silages. They can develop in the field pre-harvest and continue to form post harvest if the feeds are stored in less-than-perfect conditions. In addition, environmental conditions influence mold's lifecycle. For example, high moisture content often predisposes feedstuffs to mold growth and mycotoxin production. Likewise, temperature is also an important influence - plants stressed by drought and high temperatures are commonly invaded by mold spores, and mycotoxins can result. Furthermore, recent global climate changes have created climatic extremes, increasing the frequency of mycotoxin contamination of cereal grains, forages and silages.

### Effects of Mycotoxins

Mycotoxins can harm horse performance by altering both metabolism and behavior. Metabolically, some mycotoxins damage liver, kidney and reproductive tissues, and they can impair a horse's immunity, making the animal more susceptible to infection and disease challenges. Behaviorally, feed intake is the characteristic most often harmed. Feeds contaminated with mycotoxins can reduce a horse's feed intake, and without proper nutrition, performance drops.

### Types of Mycotoxins

Although there are many varieties of mycotoxins, aflatoxin and the various Fusarium mycotoxins have the greatest influence on horse health.

### Aflatoxin

Aflatoxin is produced by a tropical or semi-tropical mold that thrives in high temperatures both in high humidity and in drought conditions. Aflatoxin is one of the most potently carcinogenic compounds known, which could be a factor in the health of older equines. It targets the liver causing weakened function and even death; chronic exposure to even low doses of aflatoxin can result in liver cancer. It also compromises the immune system increasing the chances of infection and disease outbreak. Lastly, reduced feed intake is yet another side effect of aflatoxin's presence.

Aflatoxin content of animal feeds is regulated, but forages can also be sources of it. This is much more difficult to monitor, which complicates

detecting aflatoxin traces. Since it thrives in the heat, a drought can aggravate aflatoxin outbreaks. For example, severe drought conditions in southern Europe in 2003 resulted in significant aflatoxin contamination of forages and silages. Similar drought conditions existed across the mid-western United States in the 2005 crop year, presenting western Iowa and eastern Illinois with high aflatoxin contamination of corn crops - the first outbreak in many years. Horse owners must be alert to the possibility of aflatoxin contamination of equine feeds and monitor aflatoxin residues when they detect poor performance.

### Fusarium Mycotoxins

Photo by Leonid Nyshko

Historically equine leukoencephalomalacia, also known as "moldy corn disease," was attributed to mold-infested corn; however, ELEM can be caused by any feed infected with *Fusarium* molds.

*Fusarium* molds thrive in temperate climates and are common in the United States. They can produce a wide variety of mycotoxins with various effects on horses. One large group of compounds is the trichothecenes. Although more than 100 trichothecenes have been chemically identified, the most common is DON, also known as deoxynivalenol or vomitoxin. DON and the other trichothecenes affect horses in three ways. First, these compounds influence behavior by reducing feed intake and weakening performance. Secondly, they can cause bleeding and ulcers in the digestive tract resulting in decreased nutrient absorption. Thirdly, they suppress the immune system and increase susceptibility to disease. Recent work by Raymond et al. (2003) showed that feeding a concentrate containing a blend of grains naturally contaminated with DON and other *Fusarium* mycotoxins resulted in reduced feed intake and changes in blood chemistry indicative of liver damage. When fed to mature, sedentary mares for 14 days in a different study, there was no significant effect on body weight until the mares were exercised. Then weight loss was visible (Raymond et al., 2005).

A second important *Fusarium* mycotoxin is zearalenone. This compound's estrogen-like properties upset normal hormone balance and can cause infertility and abortions in horses and other mammals.

The fumonisins are another family of *Fusarium* mycotoxins. These compounds affect the nervous system causing a host of neurological signs such as muscle incoordination and ataxia. This can result in equine leukoencephalomalacia (ELEM), a disease specific to horses and characterized by a massive wasting of brain tissues. In addition to this acute effect, the fumonisins, like aflatoxin and the trichothecenes, suppress the immune system.

## Finding a Solution

To completely avoid mycotoxin-induced side-effects, you must avoid feeding mycotoxin-contaminated feedstuffs. Unfortunately, mycotoxin-friendly climatic conditions are beyond our control; therefore, even if feed grains can be monitored by strict quality control, toxins escape notice in forages. Still, there are methods to combat the toxins. One useful strategy is to feed mycotoxin adsorbents. These non-nutritive feed additives are not digested or fermented in the horse's digestive tract. While passing through the digestive system, they can attract and bind small molecules such as mycotoxins, preventing the toxins from being absorbed into the blood stream. Therefore, they cannot be carried to target tissues such as the brain, reproductive tract and liver, which protects these tissues from mycotoxin invasion. The mycotoxins are passed safely in the manure, leaving internal organs free from harm. These adsorbents can be either inorganic or organic polymers. Inorganic types are based on silica, generally referred to as clays; organic molecules are carbon-based and are the equivalent of plant fibers. In the publication of Raymond et al. (2003), researchers showed that such an adsorbent extracted from the cell wall of yeast was very effective in minimizing the effects of DON and other *Fusarium* mycotoxins on feed intake and blood chemistry. These results prove promising to preventing mycotoxin damage through feed additives.

Although we know mycotoxins to be destructive, there isn't enough research in horses to know the level where they become harmful or toxic. Molds can exist virtually everywhere, so their presence in feed is unavoidable - even if it is only a trace. As a precaution, mycotoxin adsorbents are an effective way to protect your horse from possible damaged performance and health. They represent the most practical way to manage mycotoxin challenges in the short term until longer term solutions can be developed.

## Is Your Feed Safe?

Seminole Feed has a two fold system to help protect your horse from the potential dangers of mycotoxins. Firstly, Seminole Feed employs strict quality control measures to ensure only the safest quality grains are used when manufacturing the feeds. In addition to visual, odor and moisture inspections, incoming grains are tested using a screening test to detect traces of the mycotoxins. If the grain does not meet our high standards of quality assurance, the grain is not purchased.

Secondly, a mycotoxin binder is added to our super premium feeds to assist in protecting horses from mycotoxins that can be present in forages. Mycotoxin binders are extracted from the inner walls of yeast cells and binds mold-produced toxins before they can be absorbed into the horse's

bloodstream and cause harm. A mycotoxin binder is found in the following Seminole Feeds: Ultra Performance, Ultra Dynamix, Perfect 10, Perfect 12, Victory, Senior Formula, Mare & Foal, Challenge, Equalizer and all Spillers/Seminole Feeds.