

# INFO SHEET

## Veterinary Services

United States  
Department of  
Agriculture

Animal and  
Plant Health  
Inspection  
Service

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## Fumonisin B<sub>1</sub> Mycotoxin in Horse Grain/Concentrate on U.S. Horse Operations

A USDA study showed that grain/concentrates fed on 5.3 percent of horse operations had fumonisin levels above that considered safe for horses.

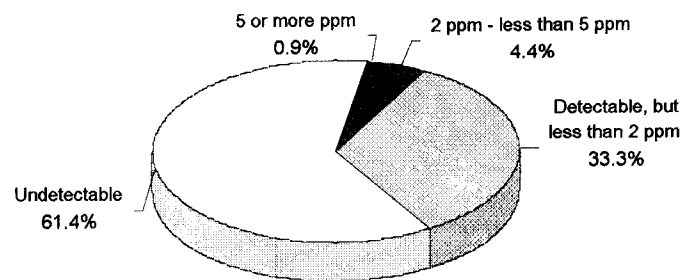
Fumonisin is a product of fungi commonly found in corn. Weather and insect damage can contribute to fumonisin production and improper storage is often a cause of increasing fumonisin levels that are toxic to animals.

Of all the domestic species, horses are the most sensitive to the effects of fumonisins. Equine leukoencephalomalacia (ELEM) is caused by consumption of feed contaminated by fumonisins. While ELEM can cause liver damage, signs (loss of appetite, weakness, incoordination, moving repeatedly in circles, head pressing, depression, and blindness) primarily reflect brain damage. Once signs are seen, the affected horse's chance for survival is low. ELEM is associated with a high mortality rate and can occur in outbreak proportions.

The USDA's National Animal Health Monitoring System (NAHMS) collected data on equine health and management practices from a representative sample of equine operations in 28 states<sup>1</sup> as part of the Equine '98 study. These operations represented about three-fourths of the equine population and three-fourths of operations with equids in the U.S. Overall 2,904 operations with one or more equids participated in the first interview from March 16 through April 10, 1998. More detailed information on the study and the sampling methodology is available upon request.

Figure 1

### Percent of Operations by Level of Fumonisin B<sub>1</sub> in Grain/Concentrate



Percent Operations

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ppm = parts per million

The biological sampling phase of the Equine '98 study was limited to 1,178 operations with three or more horses on January 1, 1998. On 910 of these operations, one grain/concentrate sample was collected from the last possible place that feed was stored before it was presented to horses. The National Veterinary Services Laboratories' (NVSL) Toxicology Laboratory in Ames, Iowa, measured the levels of fumonisin B<sub>1</sub>, B<sub>2</sub>, and B<sub>3</sub> in those samples. Only fumonisin B<sub>1</sub> is reported here. Fumonisin B<sub>2</sub> and B<sub>3</sub> occur with fumonisin B<sub>1</sub> but always at lower levels.

Grain/concentrate samples for the majority of operations (94.7 percent) had less than 2 ppm of fumonisin B<sub>1</sub>, a level considered safe for horses (Figure 1). Just over 4 percent had levels of 2 ppm but less than 5 ppm. While safe for horses, those that receive grain with these levels of fumonisin B<sub>1</sub> should also receive grain that has lower levels. Just under 1 percent of operations had grain/concentrate that tested 5 ppm or higher, a level at which the grain should not be fed to horses at all. Equine '98 owners/operators with these

<sup>1</sup>Alabama, California, Colorado, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Louisiana, Maryland, Michigan, Minnesota, Missouri, Montana, New Jersey, New Mexico, New York, Ohio, Oklahoma, Oregon, Pennsylvania, Tennessee, Texas, Virginia, Washington, Wisconsin, and Wyoming.

levels were advised to discontinue feeding the grain/concentrate at once.

From 0.1 percent of operations in the Western region to 10.5 percent in the Central region had fumonisin B<sub>1</sub> levels of 2 ppm or higher in grain/concentrate (Figure 2).

The percentage of operations with fumonisin levels of at least 2 ppm during the winter (6.9 percent) was somewhat higher than in summer (4.4 percent), although this difference was not statistically significant. Results were similar across sizes of operations.

Nearly 25 percent of operations that primarily fed home grown grain had fumonisin levels of 2 ppm or greater. Four percent and 3.5 percent of operations that primarily fed grain/concentrate bought in bags and obtained it through bulk retail had levels of 2 ppm or higher. Some commercial feed producers test corn for fumonisin levels and reject or adjust use of corn with high levels when making horse feed. Home grown feed might not be tested.

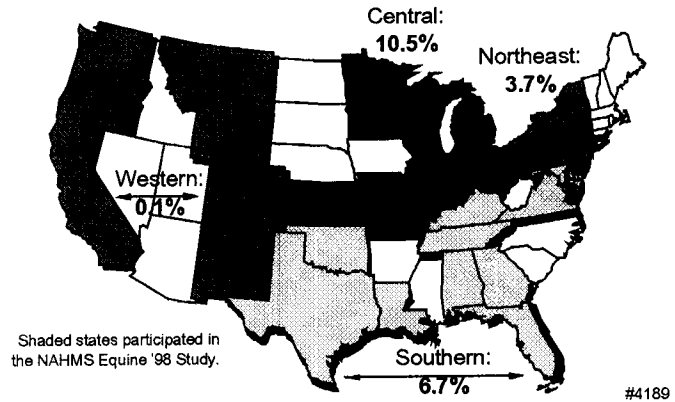
The incidence of feed with dangerous levels of fumonisin is dependent on the amount and quality of corn contained in the feed. Nearly 7 percent of grain/concentrate samples which contained corn had levels of 2 ppm or higher of fumonisin, while only 0.2 percent of those reported not to contain corn had levels of 2 ppm or higher.

Higher percentages of operations feeding grain/pellet mix (7.8 percent) and sweet feed (6.4 percent) had fumonisin B<sub>1</sub> levels of 2 ppm or higher than operations feeding unpelleted grain (2.5 percent) and complete feed (0.4 percent, Figure 3).

Good management practices, such as providing high quality feed concentrates, are critical in preventing ELEM. Feeding high quality corn and corn-based concentrates are cost effective when grain prices are low. As grain prices rise or the supply of corn diminishes, use of poor quality corn may increase the risk of exposure to fumonisins. Feed containing fungi may not appear moldy, even when closely examined, and even if the fungi themselves are no longer present, the feed may still contain dangerous levels of toxins. There are no cost-effective measures available to decontaminate feed sources.

Figure 2

**Percent of Operations with Fumonisin B<sub>1</sub> Levels Greater than 2 ppm\* in Grain/Concentrate by Region**

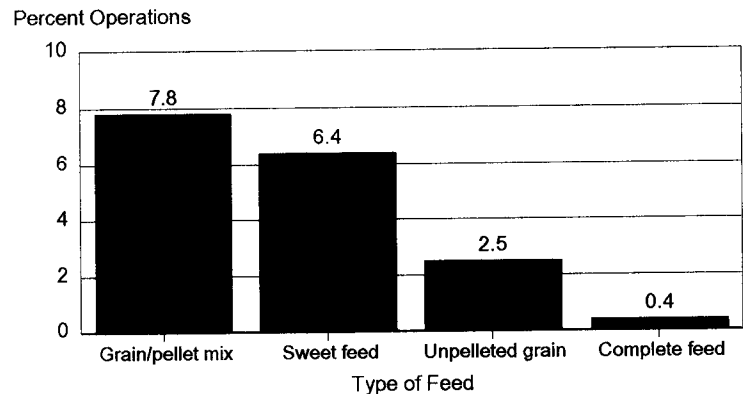


\* ppm = parts per million

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Figure 3

**Percent of Operations with Fumonisin B<sub>1</sub> Levels Greater than 2 ppm\* in Grain/Concentrate by Type of Feed**



\* ppm = parts per million

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Currently, the only treatment for ELEM is to prevent the affected horse from eating more of the contaminated feed as soon as possible to lessen the chance of further exposure.

For more information, contact:

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