

Fumonisin in Animal Feeds and Animal Feed Ingredients

Fumonisin is a product of fungi and found primarily in corn or corn by-products. One such mold is fusarium, which produces the mycotoxin fumonisin. 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. Fumonisin ingestion in all species leads to number of clinical signs most related to neural dysfunction noted in abnormal behavior, liver damage, loss of control in movement, loss of appetite weakness, depression, blindness, and brain damage.

Studies have demonstrated that horses are the most sensitive to the effects of fumonisin concentrations, and "safe" levels are difficult to recommend. Consumption of fumonisin contaminated feed by horses can cause what veterinarians call Equine leukoencephalomalacia (ELEM), which is associated with a high mortality rate in horses.

The Food and Drug Administration (FDA) released final guidance levels for corn, corn by-products and the total ration in various animal species in November 2001 (Table 1).

Table 1. Summary of Recommended Levels for Total Fumonisin in Corn, Corn By-products, and the Total Ration in Various Animal Species.*

Animal or Class	Recommended Maximum Level Total Fumonisin in Corn and Corn By-Products (ppm ¹)	Feed Factor ²	Recommended Maximum of Level of Total Fumonisin in the Total Ration (ppm ¹)
Horse ³	5	.2	1
Rabbit	5	.2	1
Catfish	20	.5	10
Swine	20	.5	10
Ruminants ⁴	60	.5	30
Mink ⁵	60	.5	30
Poultry ⁶	100	.5	50
Ruminant, Poultry & Mink Breeding Stock ⁷	30	.5	15
All Others ⁸	10	.5	5

¹Total fumonisin = FB₁ + FB₂ + FB₃.

²Fraction of corn or corn by-product mixed into the total ration.

³Includes asses, zebras and onagers.

⁴Cattle, sheep, goats and other ruminants that are > 3 months old and fed for slaughter.

⁵Fed for pelt production.

⁶Turkeys, chickens, ducklings and other poultry fed for slaughter.

⁷Includes laying hens, roosters, lactating dairy cows and bulls.

⁸Includes dogs and cats.

*Table reproduced from FDA "Background Paper in Support of Fumonisin Levels in Animal Feed: Executive Summary of this Scientific Support Document." November 2001. Accessed at: <http://www.fda.gov/Food/FoodborneIllnessContaminants/NaturalToxins/ucm212900.htm>

Please also see: "Guidance for Industry: Fumonisin Levels in Human Foods and Animal Feeds; Final Guidance." November 2001. Accessed at:

<http://www.fda.gov/food/guidanceregulation/guidancedocumentsregulatoryinformation/ucm109231.htm>

Managing fumonisin in animal feeds:

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 using corn as the primary energy source. 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. Currently, there are no approved measures by federal regulatory agencies to decontaminate feed sources; therefore, no feed additive or "miracle" feed ingredient (i.e., mycotoxin binder) can be represented or labeled to bind mycotoxins.

The prevalence of fumonisin infected corn increases if corn products are harvested too wet, or stored too long or improperly. Those using corn as a feedstuff should consider the following measures to assist in protection from fumonisin toxicity problems. The following list provides some useful information that can be used to assist feed manufacturers and producers in reducing problems with fumonisin.

1. Do not add corn products, especially corn screenings, to rations on farm. Most problems have been attributed to feeding corn screenings in horse rations.
2. Inquire from your feed dealer or mill if a testing program is in place for horse feeds containing corn. Feed mills should have a testing program in place. While this doesn't absolutely guarantee that all feeds will be safe, you can have more confidence in suppliers with testing programs.
3. Consider mixes, which use other feedstuffs, or use grain mixes with small amounts of corn. Although "safe" levels are recommended they are not well defined. Reducing the amount of corn in the diet will lessen the potential of fumonisin contamination.
4. Do not store feed products for more than two weeks.
5. Store grain mixes in proper storage facilities that protect the grains from moisture. Routine cleaning of storage facilities will decrease incidence of mold growth or contamination of stored cereal grains. Proper timing of aeration and cooling can reduce temperature and moisture, the two elements that are associated with mold growth in farm stored grain.

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