

# Texas Dairy Matters

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## AFLATOXINS AND DAIRY CATTLE

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Whenever crops are under stress, the potential for aflatoxins increases. Aflatoxins are poisonous by-products of the growth of some species of the mold fungus *Aspergillus*. Some crops may be contaminated with aflatoxins, particularly whenever drought stress occurs.

When lactating animals are fed aflatoxin contaminated feed, they excrete aflatoxin metabolites into the milk. The aflatoxins are capable of causing aflatoxicosis in consumers of milk. This is why government regulations specify that milk must be free of aflatoxin. However, action is not taken until the aflatoxin level exceeds 0.5 ppb in market milk, the level below which there is no hazard for the consuming public.

"Action levels" for livestock represent the level of contamination at which the feed may be injurious to their health or result in contamination of milk, meat or eggs. Action levels by class of livestock are in table 1.



*Aspergillus flavus* growth on corn.

Aflatoxicosis is a disease caused by the consumption of aflatoxins, the mold metabolites produced by some strains of *Aspergillus flavus* and *Aspergillus parasiticus*. The four most common aflatoxins are B<sub>1</sub>, B<sub>2</sub>, G<sub>1</sub> and G<sub>2</sub>. Contaminated grains and grain by-products are the most common sources of aflatoxins in Texas. Corn silage may also be a source of aflatoxins, because the ensiling process does not destroy the toxins already present in silage.

**Table 1:** The FDA Center for Veterinary Medicine "Action" levels for aflatoxin in feed grain in interstate commerce.

Action Level (parts per billion)	Class of Animal
20	Dairy Immature Animals Immature Poultry
100	Breeding Cattle Breeding Swine Mature Poultry
200	Finishing Swine (100 lbs. or greater)
300	Finishing Cattle

Aflatoxins are metabolized in ruminants by the liver and excreted in the bile. Aflatoxin B<sub>1</sub> is the most potent mycotoxin (toxic substance produced by a mold). Aflatoxin B<sub>1</sub> increases the apparent protein requirement of cattle and is a potent cancer causing agent (carcinogen). When significant amounts of aflatoxin B<sub>1</sub> are consumed, the metabolite M<sub>1</sub> appears in the milk within 12 hours. Research suggests M<sub>1</sub> is not as carcinogenic or mutagenic as is B<sub>1</sub>, but it does appear to be as toxic as its parent compound.

### Symptoms

Dairy and beef cattle are more susceptible to aflatoxicosis than sheep. Young animals of all species are more susceptible to the effects of aflatoxins than mature animals. Pregnant and growing animals are less susceptible than young animals but more susceptible than mature animals.

Feed refusal, reduced growth rate, decreased milk production and decreased feed efficiency are the predominant signs of chronic aflatoxin poisoning. In addition, listlessness, weight loss, rough hair coat and mild diarrhea may occur. Anemia along with bruises and subcutaneous hemorrhage are symptoms of aflatoxicosis. The disease may also impair reproductive efficiency, including abnormal estrous cycles (too short or too long) and abortions. Other symptoms include impaired immune response, increased susceptibility to other diseases and rectal prolapse. In dairy cattle, aflatoxin metabolites appear in the milk before any of the above signs develop.

## **Pathology**

Clinical laboratory findings vary with the species, level of aflatoxin in the ration, and duration of feeding the contaminated feed. Necropsy shows the liver is usually pale tan, yellow or orange. Hepatic fibrosis and edema of the gallbladder may also be observed.

## **Diagnosis**

Aflatoxicosis in milking cows is readily evident from milk samples. However, diagnosis in non-lactating cattle is more difficult because of the variation in clinical signs, gross pathology, and presence of other diseases due to suppression of the immune system. More than one mold or toxin can further complicate diagnosis as well. By the time overt symptoms are noticed, the prognosis is poor.

Feed can be analyzed for aflatoxin and other mycotoxins at the Texas A&M Veterinary Medical Diagnostic Laboratory, P.O. Drawer 3040, College Station, TX 77841-3040, (409) 845-3414, or a commercial laboratory of your choice.

## **Prevention**

Aflatoxicosis can only be prevented by feeding rations free of aflatoxin. Preventing aflatoxin contamination requires an on-going and thorough sampling and testing program.

1. Purchase feed from reputable persons and companies experienced in aflatoxin prevention and who have a proven record of properly monitoring their feed products. A reliable feed company will carry insurance to cover misfortunes with aflatoxins or other problems.
2. Don't buy poor quality feed or feed ingredients. A good deal on feed prices can be the most expensive buy a dairy farmer ever makes if it proves to contain aflatoxin.
3. Store feed at proper moisture levels.
4. Develop a systematic inspection and clean-up program to keep bins, delivery trucks and other equipment free of adhering or caked feed ingredients.
5. Minimize dust accumulation in milling and mixing areas. Keep all feed equipment free of caked feed.
6. Check feed storage bins for leaks.
7. Implement effective rodent and insect control programs in grain storage areas.
8. Grains contaminated with aflatoxins have been successfully treated with ammonia but it is expensive and dangerous to do.

## **Treatment**

Aflatoxicosis is typically a herd rather than an individual animal problem. If aflatoxin is suspected, analyze the ration immediately. Eliminate the source at once, if aflatoxins are present. Increase levels of protein and vitamins A, D, E, and K in the ration as the toxin binds vitamins and affects protein synthesis. Practice good management to alleviate stress, reducing the risk of secondary infections. Provide immediate attention and treatment for secondary infections.

## **When Prevention Fails**

Because preventing aflatoxin contamination is not always 100 percent effective, here are a few facts to remember when dealing with contaminated feeds.

1. The recommended aflatoxin feeding level is 0 parts per billion (ppb).
2. The level of aflatoxin an animal can tolerate depends on age and sex of the animal, its health status, and overall management on the farm.
3. To avoid contamination of milk, do not exceed 20 ppb aflatoxin in the total ration of lactating cows.
4. Do not feed calves milk from cows fed in excess of 20 ppb aflatoxin.
5. Do not feed beef cattle more than 300 ppb aflatoxin in the total ration. The maximum for young stock is 100 ppb in their total rations.
6. Aflatoxin levels can increase if grain is stored improperly.

## **Conclusion**

Aflatoxins are highly toxic to livestock and people. Even fed at non-lethal levels, aflatoxins can seriously impair animal health and productivity. For lactating cows, do not exceed 20 ppb aflatoxin in the ration to avoid exceeding the Food and Drug Administration level of 0.5 ppb in milk.