

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 *Aspergillus*. Some of this year's crops are contaminated with aflatoxins as a result of the drought stress.

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. Below this level there is no hazard for the consuming public.

Aflatoxicosis is a disease caused by the consumption of aflatoxins, metabolites produced by some strains of *Aspergillus flavus* and *Aspergillus parasitius*. The four most common aflatoxins are B₁, B₂, G₁ and G₂. 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.

Aflatoxins are metabolized in ruminants by the liver and excreted in the bile. Aflatoxin B₁ is the most potent mycotoxin (toxic substance produced by a mold). Aflatoxin B₁ increases the apparent protein requirement of cattle and is a potent cancer causing agent (carcinogen). When significant amounts of aflatoxin B₁ are consumed, the metabolite M₁ appears in the milk within 12 hours. Research suggest M₁ is not as carcinogenic or mutagenic as B₁, but it does appear to be as toxic as its parent compound.

“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.

Table 1: U.S. Food and Drug Administration action levels for aflatoxin in animal feeds.
<http://www.cfsan.fda.gov/~lrd/fdaact.html> - accessed 8/17/05)

| Commodity | Class of Animal | Action Level (ppb) |
|--|--|--------------------|
| Corn, peanut products, cottonseed meal and other animal feed ingredients | Dairy cattle | 20 |
| Corn, peanut products and other animal feeds and feed ingredients, excluding cottonseed meal | Immature animals | 20 |
| Corn and peanut products | Breeding beef cattle, breeding swine, mature poultry | 100 |
| Corn and peanut products | Finishing swine (100 pounds or greater) | 200 |
| Cottonseed meal | Beef cattle, swine or poultry | 300 |
| Corn and peanut products | Finishing beef cattle | 300 |

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, impaired growth rate, decreased milk production and reduced 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 Veterinary Medical Diagnostic Laboratory, P.O. Drawer 3040, College Station, TX 77841-3040, (979) 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. Check that they have a proven record of properly monitoring their feed products.
2. Don't buy poor quality feed or feed ingredients. A good deal on feed can be the most expensive buy a dairy producer 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 an expensive and hazardous process. Ammoniated corn is only approved for beef cattle in Texas.

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 beef breeding stock is 100 ppb, while the maximum for immature animals is 20 ppb.
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 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.