



AFLATOXIN

Aflatoxin--A group of toxins (aflatoxins) consisting primarily of aflatoxins B1, B2, G1, G2 and M1. They are named for their respective innate fluorescent properties.

Producing organisms--the major fungus is *Aspergillus flavus*, however, another fungus, *Aspergillus parasiticus*, also produces these toxins. The latter species is especially important in peanuts. Not all strains of these fungi are capable of aflatoxin production.

Conditions favoring disease and toxin formation in the field--When grain such as corn is growing and there is warm ambient temperature (day >90 F; night >75 F), especially noted during drought conditions, the grain becomes more susceptible to aflatoxin formation. These stressful conditions are more prevalent in the southern United States but can occur in the Midwest (Corn Belt). The organism survives in the spores, which, are carried by wind or insects to the growing crop. Any condition that interferes with the integrity of the seed coat allows the organism to gain entry into individual kernels. Insects such as sap beetles carry the organism into the developing ears especially those damaged by corn earworms and European corn borers. Corn, cottonseed, peanuts and tree nuts are the main crops affected.

Visible presence of the fungus on grain--Yellow-green spore masses may be visible at sites of kernel damage or may follow an insect feeding path. If heavily damaged kernels are cracked open by hand and examined under a black light (long wave, 365 nm) they may fluoresce bright greenish-yellow (BGYF). This fluorescence is due to a kojic acid derivative formed by the organism that produces aflatoxin and therefore provides only a "presumptive" indication of the presence of aflatoxin. Individual kernels of corn may contain as high as 400,000 ppb of aflatoxin, therefore, sampling is very important in analysis for levels of contamination in bulk grain lots.

Storage occurrence of aflatoxins--Grains stored under high moisture/humidity (>14%) at warm temperatures (>20 C) or/and inadequately dried can potentially become contaminated. Grains must be kept dry, free of damage and free of insects; the latter can cause mold "hot spots." Initial growth of fungi in grains can form sufficient moisture from metabolism to allow for further growth and mycotoxin formation.

Toxicity impact--Aflatoxins can cause liver disease in animals; aflatoxin B1 is the most potent. Susceptibility varies with breed, species, age, dose, length of exposure and nutritional status. Aflatoxins may cause decreased production (milk, eggs, weight gains, etc.), are immunosuppressive, carcinogenic and mutagenic. Aflatoxins can be present in milk, meat, or eggs if consumed levels are sufficient. Aflatoxin B1 is a human carcinogen, but may be only part of the total answer to human liver cancer. Ammoniation and some adsorbents will reduce or eliminate the effects of aflatoxins in animals.

FDA Action Levels--

- 300 ppb---for feeder cattle
- 200 ppb---for finishing swine
- 100 ppb---for breeding beef cattle, swine and mature poultry
- 20 ppb---for humans, and for immature animals (including poultry), and all dairy animals
- 0.5 ppb---for milk