

Common Questions Regarding Aflatoxin in Corn Grain and Silage



By: Donna Amaral-Phillips, Ph.D., Paul Vincelli, Ph.D., Chad Lee Ph.D.

Question #1: I have heard that aflatoxin could be a concern in this year's corn crop. What is aflatoxin and why is it a concern for dairy producers?

Answer #1: Aflatoxin is a mycotoxin produced primarily by the fungus or mold, *Aspergillus flavus*. Aflatoxin is a family of compounds that are considered very toxic and carcinogenic. The FDA limits the amount of aflatoxin that can be found in lactating dairy cow feed to 20 parts per billion (ppb) and to 0.5 ppb in milk as aflatoxin M1. Generally, 1 to 3% of the aflatoxin found in the diet of lactating dairy cows will come through in the milk. The amount of aflatoxin allowed in feeds for lactating dairy cows and young dairy or beef cattle (action level of 20 ppb) is lower than non-lactating, breeding beef cattle (action level of 100 ppb).

Question #2: I have seen mold growing on ears of corn in the field. Should I be concerned?

Answer #2: Many different molds can grow on ears of corn. Some of these molds can produce mycotoxins, others do not. Aflatoxin is only one of hundreds of mycotoxins produced by molds.

Aspergillus ear rot is a fungal disease resulting in an olive-green, powdery mold generally growing on the tip of the ear, but it may be located all the way to the base. This fungal disease is caused mainly by *Aspergillus flavus* and it can produce aflatoxin. The presence of the *A. flavus* does not necessarily mean that the kernels will contain aflatoxin. *A. flavus* tends to attach kernels when temperatures are 80 to 100°F, in high humidity and with high nighttime temperatures during grain fill and pollination. These conditions can be seen sometimes in July and August. This does not mean that Kentucky grown corn does or does not contain aflatoxin, just that it is possible that it could contain aflatoxin.

Aspergillus flavus grows under the husks by growing on the yellow-brown silks. Researchers who study *Aspergillus* ear rot report that kernel development is needed for the growth of *Aspergillus* mold. Thus, in corn plants which did not pollinate (those harvested as corn silage without ears), the risk for aflatoxin appears to be low. Fields should be scouted for this disease prior to harvest as grain or silage to assess the possibility of potential aflatoxin problems. For more information on detecting this mold, please refer to University of Kentucky Grain Crops Update article entitled, "[Scouting Corn for Aspergillus Ear Rot](http://graincrops.blogspot.com/2012/09/scouting-corn-for-aspergillus-ear-rot.html)". (<http://graincrops.blogspot.com/2012/09/scouting-corn-for-aspergillus-ear-rot.html>)

Cooperative
Extension Service

Agriculture and Natural Resources
Family and Consumer Sciences
4-H Youth Development
Community and Economic Development

MARTIN-GATTON COLLEGE OF AGRICULTURE, FOOD AND ENVIRONMENT

Educational programs of Kentucky Cooperative Extension serve all people regardless of economic or social status and will not discriminate on the basis of race, color, ethnic origin, national origin, creed, religion, political belief, sex, sexual orientation, gender identity, gender expression, pregnancy, marital status, genetic information, age, veteran status, physical or mental disability or reprisal or retaliation for prior civil rights activity. Reasonable accommodation of disability may be available with prior notice. Program information may be made available in languages other than English. University of Kentucky, Kentucky State University, U.S. Department of Agriculture, and Kentucky Counties, Cooperating. Lexington, KY 40506



Disabilities
accommodated
with prior notification.

Question #3: Is milk tested for aflatoxin? Will I be shut off if my milk tests positive?

Answer #3: Yes, milk is routinely spot checked to make sure the amount of aflatoxin M1 is below 0.5 ppb. Milk testing above this level will not be sold for human consumption. The farm with the violation will not be able to sell milk until the milk tests under 0.5 ppb. In a research trial, aflatoxin appeared in the milk within hours of consumption and returned to baseline within 2-3 days after removal. At a farm level when aflatoxin is detected in the milk supply, the difficulty often is locating the feed source of aflatoxin in the diet, removing it, and waiting to be retested. Other factors, such as amount of aflatoxin in the diet, may impact clearance rates in milk.

Question #4: I have heard that a load of corn can be rejected by an elevator for possible aflatoxin, but if the farmer gets in line again with the same load, it may test negative. How can that be?

Answer #4: Great variation exists in sampling even when proper sampling procedures are followed. Contaminated kernels are not uniformly distributed throughout the load. One sample may contain kernels of corn grain from a hotspot in the load, whereas the next sample does not. In addition, the amount of aflatoxin is measured at very low amounts at the level of parts per billion (this would be equivalent to one second in 32 years). Both of these factors lead to great variation in testing for aflatoxin.

For example, the table below shows the results for 10 different samples for 3 different lots of peanuts. Each sample within each lot consisted of 10 probefuls of peanuts with at least 10 lbs of peanuts collected, the entire sample was then ground, 2 lbs sample collected from the 10 lb original sample, reground and tested. If the sample collected at the collection facility was above 20 ppb, the load would have been rejected. One can quickly see how different samples could give different action results of whether the loads was accepted or rejected.

Table: Aflatoxin test results (parts-per-billion, ppb) in ten samples collected from each of three lots of peanuts. (Similar results could be expected if corn grain had been sampled.)			
Sample	Lot A	Lot B	Lot C
1	0 ppb	0	0
2	0	0	3
3	0	0	5
4	0	0	9
5	2	0	32
6	4	3	49
7	8	8	87
8	14	26	91
9	28	52	127
10	43	70	168
Average	9.9	15.9	58.1
Source: University of Kentucky publication ID-59, "Aflatoxins in Corn"			

Question #5: Can I have my feeds tested for aflatoxin?

Answer #5: Aflatoxin can be found in not only corn grain but also cottonseed and peanuts. Various commercial and diagnostic laboratories are able to run laboratory tests on feed to measure the amount of aflatoxin and other mycotoxins, such as DON (also known as vomitoxin), T-2, zearalenone, or fumonisin. Proper sampling of the grain or forage in question is critical. However, also realize that molds tend to grow in pockets or on certain plants in the field and the sampling procedure may or may not detect the amount of aflatoxin at various locations, kernels, or pockets in stored feeds.

Question #6: Should I have my corn silage tested for aflatoxin?

Answer #6: Corn silage with corn grain potentially could be a source of aflatoxin and might be a factor in contributing greater than 20 ppb in the total diets for dairy cows. Corn silage harvested from plants without ears carry a low risk. Scouting fields ahead of harvest, if possible, is recommended. For fields already harvested, testing for aflatoxin in well-eared silage may be necessary. However, realize you are testing for very low quantities of aflatoxin, aflatoxin produced in the field is not be uniform across the field, and when sampling you may or may not sample the location where the aflatoxin is present. Unfortunately, there are no good solutions here.

Question #7: Will distiller's grains or corn gluten feed also contain aflatoxin if they were produced from corn with aflatoxin?

Answer #7: Yes, these feeds will actually be 3-fold or higher in aflatoxins and other mycotoxins than the corn grain they originated from. Removal of the starch tends to concentrate nutrients and mycotoxins.

Question #8: If I think I might have a problem, can I just add a mycotoxin binder to my cow's feed and not worry about the problem?

Answer #8: FDA considers the use of a product in this manner as a feed additive and as such they must have data submitted by the company regarding this purpose, review these data, and then approve this product for this intended use. To our knowledge, FDA has not approved any feed additives for use as binders of mycotoxins.