

Mycotoxins and Dairy Cows
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Because of weather conditions during the past growing season, mold and mycotoxin contamination of some crops, particularly corn, is common. Molds are organisms and mycotoxins are chemicals produced by certain species of molds that are toxic to animals. Visibly moldy grain may or may not have mycotoxins and mycotoxins can be found on feeds that are not visibly moldy. Moldy corn that is not contaminated with mycotoxins is not as nutritious as clean corn. Molds consume nutrients, usually the most digestible one, thereby reducing the nutrient content of the corn. Moldy corn typically has higher concentrations of fiber and lower concentrations of starch and fat than clean corn. If allowed, cattle will select against consuming visibly moldy hay and fiber digestibility can be reduced when cattle are fed visibly moldy silage. Experiments directly evaluating the effects of feeding moldy grain to dairy cows are lacking. The consensus among nutritionists is that moldy feed most likely will reduce feed intake, which will then result in reduced milk production. Most of the research on moldy feeds have used hay or silage, and these typically comprise the majority of the diet. Corn and other grains usually make up less than one-third of the diet. Also because of all the mixing and blending that occurs during combining, storage, and feed manufacturing, mold is likely much less concentrated in grain than in hay or silage. This means that the increased amount of mold on corn grain this year may not be a general problem for cattle. However, if you observe visibly moldy corn (for example a moldy pocket in a bag) it should be discarded and not be fed to cows because of the potential decrease in intake and milk yield.

Hundreds (perhaps thousands) of different mycotoxins exist and unfortunately we know very little about most of them. The mycotoxins that are most commonly identified in feedstuffs this year are deoxynivalenol (DON; vomitoxin), T-2, zearalenone, and fumonisin, with DON being by far the most common.

1. Mycotoxin contamination of grain is not uncommon; cows (and people) have probably been consuming these compounds for centuries. Various surveys conducted in different years and in different countries typically find that 25 to 50% of feed commodities have detectable concentrations of DON (typically samples with detectable concentrations have concentrations less than 1 ppm). Therefore, you should not be overly concerned if grains have low, but measurable concentrations of DON (less than or equal to 1 ppm).
2. Distribution of molds and mycotoxins is not uniform. Tremendous variability in concentrations can occur within a single batch or bin of feed. This means that results from a single sample may not be meaningful. Multiple individual samples are needed to determine whether mycotoxin contamination is a concern. A single negative sample does not mean that the grain is mycotoxin free and a single sample with high concentrations of mycotoxins does not mean that the bin of feed should not be fed.

3. Distillers grain can be a substantial source of mycotoxins. Fermentation removes starch from the corn, resulting in an approximate 3X concentration of the remaining nutrients and contaminants. Corn that contained 1 ppm DON will produce distillers grain with about 3 ppm DON (on a dry basis). Some extremely high concentrations of DON have been reported in distillers grain this year. You should purchase only distillers grains that have been adequately sampled and analyzed for mycotoxins and contain an acceptable concentration (probably less than about 5 ppm DON on a dry basis). Because of the potential of mycotoxin contamination and other reasons (e.g., variable fat concentrations), the amount of distillers grains in dairy cows diets should be limited to 10 to 15% of diet dry matter.
4. The concentration of DON in the total diet that causes problems for dairy cows is not well defined but total diets with less than 3.5 ppm DON (dry basis) are probably okay when fed to lactating cows. Some studies that fed the specific compound (not actual contaminated grain) found no adverse effects at rates greater than 10 ppm, but most people think it is not a single mycotoxin that causes problems but the combination of different mycotoxins and molds that occur in naturally contaminated grain that cause the problem. A recent experiment was conducted with dairy cows fed diets with no detectable DON or a similar diet (3.5 ppm DON in the total diet) that included contaminated corn (7.5 ppm DON) and wheat (2.4 ppm DON) and they found no difference in feed intake (54.1 lbs/day for control and 52.8 lbs/day for the contaminated diet) and no difference in milk yields (73.5 and 78.3 lbs/day for control and contaminated treatments, respectively). The function of certain immune cells, however, was depressed in cows fed the contaminated grains. Another study that fed DON contaminated wheat found no effects on intake when the total diet contained approximately 5 ppm DON. However some field reports suggest that total dietary concentrations greater than about 2.5 ppm DON are associated with production losses. Fresh cows (first few weeks of lactation) may be more sensitive to mycotoxins than other cows because they are recovering from the stresses associated with calving, have relatively low intakes but high milk production, and can be immunosuppressed. Diets with up to 3.5 ppm DON (dry basis) may be acceptable for later lactation cows but may not be acceptable for fresh cows.
5. If you are faced with feeding mycotoxin contaminated feeds, the most effective solution is to limit the inclusion rate of contaminated feeds to dilute the concentration in the total diet. Certain feed additives are often included in diets to 'bind toxins'. Data supporting these claims are generally quite limited. Many compounds will bind aflatoxin (a type of mycotoxin that should not be common this year) and reduce its concentrations in milk. The chemistry of aflatoxin is very different from many other mycotoxins, and compounds that bind aflatoxin often do not react with other mycotoxins. Limited data derived from cows suggest that some yeast-based products (e.g., glucomannans) may have some beneficial effects when fed with DON-contaminated diets. Field reports suggest that some clay-based compounds may also have some beneficial effects with

DON-contaminated feeds. These compounds will increase ration costs and some of them can reduce the availability of certain minerals (especially copper and zinc) and vitamins. The safest and most effective method of reducing the impact of feeding mycotoxin contaminated feed is simply to dilute out the contaminated feed.