Disaster Recovery

Crops and Livestock

Mycotoxins pose possible problems this fall

The extremely wet conditions this year increase the risk of developing certain ear and kernel rots of corn. Because the crop is late and there may be a threat of frost damage, some grain may be harvested with higher moisture content than desirable. Also, uneven corn growth within fields may result in difficulties in drying the grain evenly. Because of these factors, be aware of the potential for developing ear and kernel rots, and the possibilities of mycotoxins in moldy corn.

Ear and Kernel Rots of Corn

There are a number of fungi that can invade and cause damage to grains and seeds. In general terms we can divide the damage caused by these fungi into two groups—ear rots and storage molds. Some fungi cause both types of damage. Mycotoxin contamination can result from either ear rots or storage molds.

Ear rot fungi invade the kernels before harvest. These fungi can affect the appearance, and reduce the weight and quality of kernels. Infections are often more severe on ears damaged by corn borers and other insects. Usually damage caused by field fungi occurs before harvest, and can be detected in the field. However, if grain is not stored properly, these fungi can spread and cause additional damage.

Storage molds are caused by those fungi that invade grain or seeds during storage. They may cause little or no damage before harvest. They are brought in from the field with the grain or by insects that feed in storage. The inoculum may be present as spores on the surface of kernels or as symptomless infections of harvested kernels. Under improper storage conditions, this small amount of inoculum can increase rapidly, leading to significant problems. The development of storage fungi is influenced by the moisture content of the stored grain, the temperature, the length of time the grain is stored and the amount of insect or mite activity in storage.

Mycotoxins

Although most fungi do not produce harmful chemicals, a few produce chemicals called mycotoxins, which in small amounts can be harmful to animal or human health. Presence of molds or their spores does not necessarily mean that mycotoxins always will be produced. Circumstances that favor mold growth may allow production of mycotoxins in some situations, but frequently mold growth occurs with little or no mycotoxin production. Once formed, mycotoxins are stable and may remain in feeds long after the fungus has died. Adding mold inhibitors or drying grain to low moisture levels will prevent further mold growth but will not destroy any toxin already formed. In general, swine and poultry are more susceptible than ruminants to mycotoxin induced health problems at an equivalent dosage.

The most important mycotoxins in corn are aflatoxin, fumonisins, vomitoxin and zearalenone. *Aspergillus* species that produce aflatoxin are favored by hot, dry conditions, so we don't expect a problem with this toxin in 1993. Fumonisins are produced by *Fusarium moniliforme*, a very common ear rot fungus. While *Fusarium moniliforme* can

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grow under a wide variety of conditions, fumonisin production seems to occur more often in drier years. The most likely mycotoxin problems this year will be vomitoxin and zearalenone, both produced by the fungus *Gibberella zeae*. This fungus is more common in wet years.

Symptoms of mycotoxin problems in livestock depend on the mycotoxin and the type and age of the animals involved. Generally, symptoms may include loss of appetite, lethargy, incoordination, difficult breathing, and reduced weight gain. See Table 1 for a description of symptoms. The first sign of vomitoxin problems may be refusal of feed or vomiting. Zearalenone causes reproductive abnormalities in swine. Fumonisins are believed to be carcinogenic, and cause fatal conditions in swine and horses. If you see symptoms, contact your veterinarian and save some of the suspected grain for a mycotoxin analysis. If you notice molds in your grain, it should also be tested for mycotoxins.

Feeding contaminated grain

Disposition of grain known to be contaminated with mycotoxins is a problem. Proper use or disposal depends on which mycotoxin is present and the level of contamination. Blending contaminated lots with clean corn is not permissible if the corn is to enter interstate commerce. With careful sampling and laboratory analysis, most contaminated lots can be used locally for cattle feed. If you consider blending, it is very important to know the level of contamination, so you can calculate how much to mix. If mycotoxin levels are very high, blending may not be feasible. Grains known to be contaminated with aflatoxin should never be fed to lactating dairy cows, because some of the toxin is secreted in milk. If you have a mycotoxin analysis performed, your veterinarian or the laboratory providing the analysis should advise you on safe levels for feeding.

Reducing mycotoxin problems

There are a number of practices that will reduce the development of molds and mycotoxins in stored grain. If corn appears visibly moldy in the field, harvest it promptly, but not until the moisture content is down to 23 to 25 percent or less. Mold growth is more severe on damaged kernels, so grain should be cleaned before storage. Grain should be dried as soon as possible after harvest. Holding wet grain even for short time periods can result in an increase in mycotoxins. Field-molded corn above 18 percent moisture should not be low-temperature dried. Low-temperature drying this corn will provide an opportunity for continued mold development. Even if molds are not evident, low-temperature drying of high moisture corn increases the risk of molds and mycotoxins. High-temperature drying can be used until the grain reaches 18 percent moisture, followed by low-temperature drying to 13 percent moisture. Shelled corn should be dried to 15 percent moisture as rapidly as possible but no longer than 24 to 48 hours after harvest. For safe, long-term storage, moisture content should be 13 to 14 percent. Clean bins thoroughly before the new crop is stored. After drying, the grain should be cooled to 35 to 40 F and kept dry.

Several organic acids (propionic, isobutyric, acetic, and mixtures of these with ammonium isobutyrate) are registered for use on high moisture grain in storage and sold under various trade names. These products prevent mold growth, but they will not destroy toxins already present. Grain treated with an organic acid can be used only for livestock and poultry feed. There are no fungicides registered for use on stored grain.

Silage also can have mycotoxin problems. The ensiling process will retard mold growth and mycotoxin production, but will not destroy toxins present. The same considerations for livestock effects apply to grain or silage.

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Expected detrimental feed concentrations of various mycotoxins

	Concentration	Duration	Effect
Aflatoxin			
Swine			
All	50 parts/billion		None
Piglets	100+ ppb		Decreased productivity, liver lesions
Feeder pigs	300 ppb		Decreased productivity, liver lesions, residues
Grow/finish	750 ppb		Decreased productivity, liver lesions
Sows	500 ppb		Decreased productivity, liver lesions, residues
Cattle			
Dairy	50 ppb		Violative residue
Calves	200 ppb		Decreased productivity
Feedlot	300 ppb		Violative residue
Feedlot, Dairy	500 ppb		Decreased productivity, violative residue
Vomitoxin (deoxynivalenol, DON)			
Swine			
Feeder pigs	1-3 parts/million	1-5 days	Reduced feed intake 10%
	5-10 ppm	1-5 days	Reduced feed intake 50%
	10-40 ppm	1-5 days	Complete feed refusal Vomiting may occur
Sows	3.5 ppm	Gestation, 1-52 days	Lower fetal weights, but no reproductive failure
Cattle			
Feeder cattle	10 ppm	Indefinite	Tolerated, no feed refusal
Dairy cows	6 ppm	6 weeks	Reduced hay and concentrate consumption
Zearalenone			
Swine			
Prepubertal gilts	1-5 ppm	3-7 days	Hyperestrinism, prolapse
Pubertal open gilts	3-10 ppm	Mid cycle	Anestrus and pseudopregnancy
Bred sows	5-30 ppm	Gestation, first 1/3	Early embryonic death and small litters
Juvenile boars	10-50 ppm		Reduced libido, smaller testicles
Mature boars	200 ppm		No effect
Cattle			
Virgin heifers	12 ppm	Open heifers	Reduced conception
Dairy cows	50 ppm	Open cows	Reduced conception

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