

Mycotoxin in Swine Diets

Some molds produce mycotoxins. The molds can invade feed and produce toxic compounds that contaminate the feed. Molds can infect grain in the field, during harvesting, handling, and storage.

More than 200 mycotoxins have been identified, but only a few are believed to affect swine performance. Risk to the pig from mycotoxin-contaminated feed depends on the age and health of the pig and level of toxin in the feed. The most severe effect is death, but low levels of mycotoxin can hurt pig performance and general well being. When pigs eat feed containing a harmful mycotoxin, the toxin can affect the pig's central nervous system, liver, kidney, immune system, or reproductive process.

Aflatoxin, zearalenone, and tricothecene (vomitoxin and T-2 toxin) are the most often reported mycotoxin in swine feed. Each toxin is produced by a different mold. The conditions that promote growth of molds vary, although high moisture and warm temperatures are responsible for most mold growth on feedstuffs.

Aflatoxin

We know more about aflatoxin and its effect on pig performance than other mycotoxins. Aflatoxin is produced by *Aspergillus flavus*, which can germinate at moisture levels of 15 to 17%, but infection and growth require higher moisture. Aflatoxin production appears to be higher at grain moisture levels of 22 to 26% and temperatures of 80 to 90°F. Conditions for aflatoxin production are ideal when temperatures remain high both day and night, but temperatures above 95°F will dramatically slow growth.

The effect of feeding aflatoxin-contaminated grain on pig performance depends on the age and health of the pig, the concentration or level of toxin in the feed, and for how long the pig eats the contaminated feed. Young pigs are the most sensitive to aflatoxin effects. Symptoms occur with concentrations in the parts per



billion (ppb) range. Small amounts can reduce pig performance and overall health. Aflatoxin at low levels (20 to 200 ppb), suppress the immune system and make pigs more susceptible to bacterial, viral, or parasitic diseases. Long term consumption of contaminated feed may cause cancer, liver damage, jaundice, and internal bleeding. Profits are reduced because of loss in feed efficiency, slower growth, and increased medical costs. High concentrations of aflatoxin (1,000 to 5,000 ppb) result in acute effects, including death.

The following guidelines for feeding levels of aflatoxin are considered safe under normal conditions. Animals under stress or disease situations may react to lower levels.

1. Do not feed corn containing greater than 20 ppb to young pigs.
2. The total diet of breeding swine should contain less than 100 ppb.
3. The total diet of finishing swine, more than 100 pounds, should contain less than 200 ppb.

Aflatoxin M1 has been found in the milk of sows fed diets containing aflatoxin. Pigs nursing sows consuming feed with 500 to 750 ppb of aflatoxin had higher death rates and slower growth. Pigs were permanently stunted, and performance was reduced throughout the grow/finishing period, even though they were not exposed to aflatoxin after weaning.

Preventing Mycotoxin

Mycotoxin usually appears in feed because one feed ingredient has been contaminated. Contamination of grain may occur in the field. Drought stressed corn is less resistant to fungi and should be considered to be of high risk. To avoid mold problems, minimize stress with variety selection, planting density, irrigation, weed and insect control, and adequate fertilization.

The two major environmental factors associated with fungal growth are temperature and humidity. Anytime humidity is above 62%, temperature is above 80°F, and grain moisture levels are above 14% to 15%, there is a greater chance that fungi will grow. One exception is zearalenone, which is produced under cool temperatures (less than 70°F) and moist conditions.

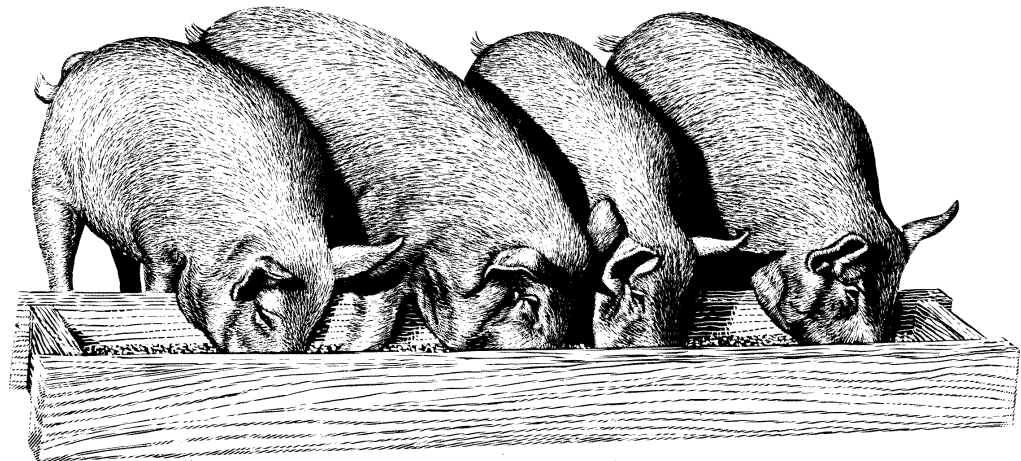
Damaged feedstuffs are readily available food sources for mold growth. Anytime the grain kernel is cracked and the endosperm is exposed, the probability of mold growth increases. During harvest, adjust equipment to lessen kernel damage and remove foreign matter. The time between harvest and drying is critical because temperature and moisture conditions are often ideal for mold growth and toxin production. Thus you should not delay grain drying more than six hours after harvest.

Storage conditions are also important. The critical point for controlling fungal growth in storage is grain moisture levels. Grain that is dry when placed in

storage and kept dry (less than 14% moisture) is unlikely to support growth of fungi that produce mycotoxins. Keep grain storage bins clean and in good repair. After drying the grain, cool it to air temperature before loading the storage bin, since hot grain can cause condensation, which sets the stage for mold growth and toxin production. Clean feed and grain storage bins frequently to prevent bridging feedstuffs and forming hot spots.

Consider treating the grain after drying but before storing with an insecticide to reduce insect damage. Fungal inhibitors, such as propionic acid, may help prevent fungal growth on stored grains. However, fungal inhibitors have no effect on mycotoxin already present in the corn at the time of application. They only prevent future growth of fungi.

Ground feed is an ideal source of food for fungal growth. During periods of high humidity and heat, do not store ground feedstuffs and/or swine diets more than 10-14 days. Corn screening is an excellent medium for fungal growth and has been associated with Fumonisin toxicity. If feed ingredients or completely mixed diets appear to have mold growth, then it is best to sample the ingredients or mixed diets before feeding to livestock. You can send samples to the State Chemical Laboratory at Mississippi State University or other commercial laboratories. For assistance with taking samples and sample analysis, contact your county Extension office.



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