ORGANIC POULTRY PRODUCTION AND MYCOTOXINS

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Why should organic broiler producers be more concerned about grain quality and mycotoxins than conventional growers?

There are several reasons:

- Supply versus demand: According to a 2011 USDA survey, organic corn represents only .26 percent of the total production in the United States. With a limited supply, buyers end up accepting grains with higher levels of broken kernels and impurities.
- Grains with broken kernels and impurities usually contain higher levels of molds and mycotoxins.
- Molds and mycotoxins have a direct and indirect effect on poultry health performance.
- Organic producers are limited on mycotoxin risk management and gut health prevention tools.
- Mycotoxins can negatively impact economic return on poultry production.

Grain quality

Are organic grains more or less contaminated with mycotoxins?

There is research showing both outcomes, and until now there was limited information on this topic to offer a conclusive answer. Looking at papers published in the past, there is evidence that organically produced grains have lower incidences of *Fusarium,* mainly due to the lower nitrogen concentration in the tissues of grains as stated by Van Bruggen (2003). However, in a paper published by the Danish Veterinary and Food Administration, organic rye and wheat had a higher Ochratoxin contamination than conventionally grown cereals.

Most of the mycotoxin-producing species of molds are considered to be soil-born fungi, which can survive and remain in fields for long periods of time. With modern agricultural practices such as no-till methods, the incidences of fungal contamination appear to be increasing. The presence of corn stems and infected ears remaining on the soil surface from one year to another may serve as a source of inoculums, contributing to the increased incidences of contaminated grains (Mora and Moreno, 1984).

Under no-tillage, soil contamination with fungal spores has been shown to be 92.9 percent higher compared to soil under conventional tillage (Baliukoniene et al., 2011). Plant density can also have a direct impact on mold levels. Trento et al. (2002) suggests that as the density of plants increase, so do the incidences of fungal contamination in both monocultures and crop rotation.

The use of fungicides is not allowed when growing organic corn, and according to Duarte et al. (2008), fungicides can reduce the incidence of *Fusarium* molds in corn grain, thus running the risk of higher incidences of mold contamination in organic corn production.

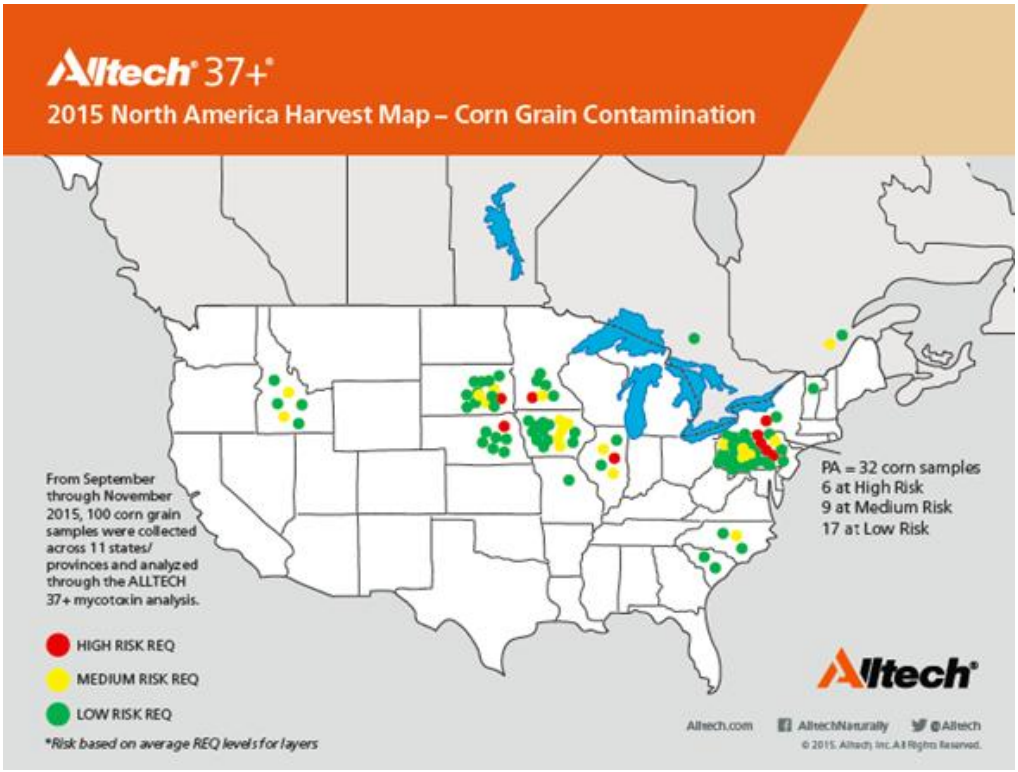
Survey of mycotoxin contamination

The 2015 North America Harvest Analysis conducted via the Alltech 37+® mycotoxin analysis collected and tested more than 100 corn samples from across the United States and Canada from September to

November 2015. Results showed an average of 3.1 mycotoxins per sample that ranged from low to high risk in broilers, with 97 percent of samples testing positive for at least one mycotoxin.

The harvest analysis revealed the greatest prevalence of Fumonisins, Fusaric Acid and Type B Trichothecenes in both the Midwest and East Coast regions. Type B Trichothecenes and Fusaric Acid can interact synergistically with one another, increasing toxicity and elevating the potential to negatively impact poultry health and performance. The mycotoxin group with the greatest contamination levels that could be a risk for broiler performance and health was Type B Trichothecenes, which measured at higher levels in Minnesota, Pennsylvania and South Dakota.

ALLTECH 37+® CORN GRAIN SAMPLE LOCATION MAP



The cost of mycotoxins

Based on the average risk level (low) from the corn samples analyzed in the North America Harvest Analysis, scientific literature shows broiler performance may be negatively impacted over time. Even at these lower levels, broilers may exhibit a reduction of three grams per day in average daily gain and an increase of 4.7 percent in feed conversion rate (FCR). With this loss in performance, and considering current prices, the reduction in net return is an estimated decrease of $0.21 per broiler.

Grain quality and poultry performance

Moldy or damaged corn has a direct impact on the grain's quality and nutritional value. As stated by Rostagno (1993), the nutritional value of low quality grains is affected by changes in its chemical composition, leading to a low bioavailability of some nutrients, with or without the presence of mycotoxins.

In a study conducted by Leal (2012), corn with higher levels of molded grains resulted in lower gross energy, with a drop of 2.55 kcal/kg for every one percent of molded grain. In an additional study, she

stated that for every one percent of molded grain, chickens lost 1.4lbs/bird, feed conversion increased in 0.001 points and Villus height on ileum decreased as moldy grain was added to the diet.

When mycotoxins are present in feed and consumed by the birds, it can lead to deterioration of the liver and kidneys. In addition, some mycotoxins act as neurotoxins, while others interfere with cellular protein synthesis, producing skin sensitivity and extreme immunodeficiency.

Classic clinical signs linked to mycotoxins in poultry production include mouth lesions caused by T-2 toxins, yellow liver from Aflatoxins or gizzard erosions from cyclopiazonic acid. Action is generally only taken if one of those symptoms is clearly diagnosed. Recent studies, however, have indicated that mycotoxins can directly affect gut integrity, opening the door to secondary infections, even when found in low to moderate levels in feed.

A paper by Antonissen et al. (2014) indicates that vomitoxin (DON, or Deoxynivalenol) increases the percentage of birds with subclinical necrotic enteritis and causes barrier disruption and epithelial damage to the intestine. The increased permeability of the epithelium and lower protein absorption may stimulate growth of clostridium perfringens. With lower nutrient absorption, the risk of intestinal challenges may lead to performance losses.

Alvarez et al. (2008) showed that broilers exposed to mycotoxins from naturally contaminated corn and vaccinated against coccidiosis developed a high lesion level unless a mycotoxin control agent was used.

In summary, based on scientific research, broilers consuming contaminated grains with mycotoxins had poorer gut health and weakened immune systems, leading to a lower efficiency in performance.

In order to best control mycotoxin challenges in feed, management strategies and implementation of a thorough program are necessary to prevent exposure to mycotoxins. Checking grain quality through high standard testing facilities, utilizing industry-approved standards to collect samples and submitting them to high standard laboratories is a good start, followed by routine maintenance of the feed mill to eliminate possible contamination in the milling process. Organic certified mycotoxin control agents in the diets should be utilized to help prevent or offset the impacts mycotoxins can have on overall performance.