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MYCOTOXIN
MANAGEMENT

MULTIPLE MYCOTOXINS DETECTED IN NEW YORK CORN PROVE A THREAT FOR COWS AND RUMINANTS

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Corn silage in New York contained multiple mycotoxins upon harvest in 2017, Alltech test results confirmed, which means increased risk for cows and ruminants in the area.

Molds are a frequent agricultural contaminant, and it is well documented that some of these molds can produce toxic compounds known as mycotoxins.

One hundred percent of samples submitted to the Alltech 37+® mycotoxin analytical services laboratory from October to December 2017 contained mycotoxins, with an average of four mycotoxins per sample.

“Cows may also show immune suppression, altered reproductive performance and decreased milk production or quality.”

Consumption of these groups of mycotoxins (which include type B trichothecenes, Penicillium and aflatoxin B1) can have major effects on cows, causing reduced feed intake, altered rumen functions, gut damage and variable manure quality.

Cows may also show immune suppression, altered reproductive performance and decreased milk production or quality. Furthermore, aflatoxin B1 could be a concern for milk quality, as it may transfer into the milk as the metabolite aflatoxin M1.

Figure 1. Range of REQ risk levels in 2017 corn silage

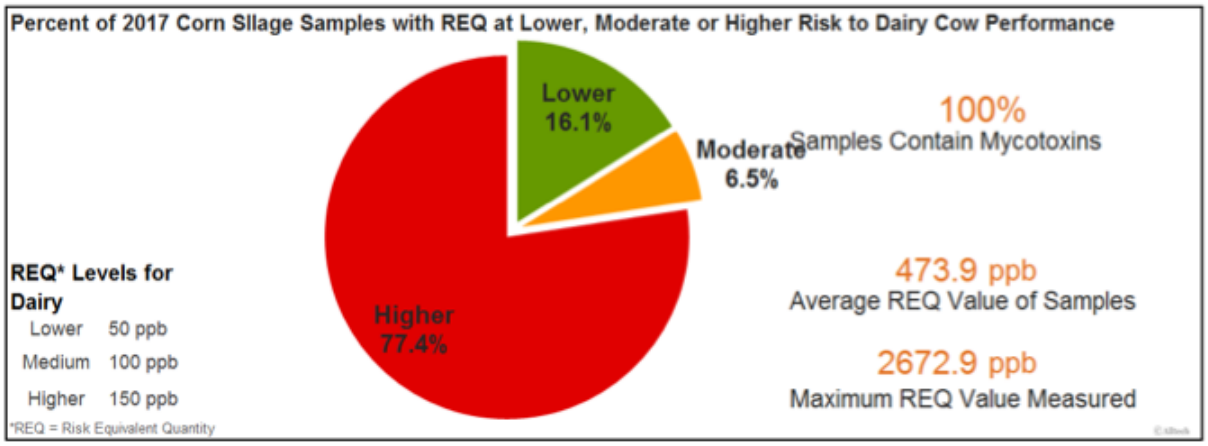
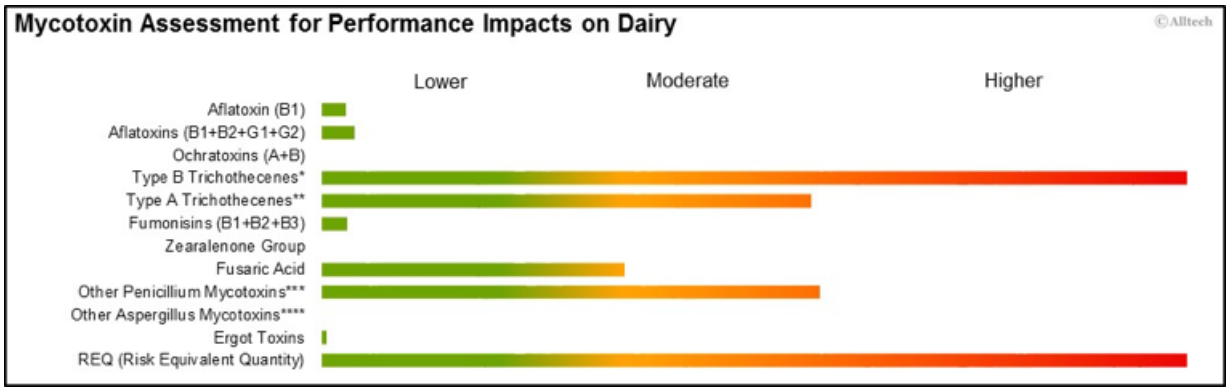


Figure 2. Average mycotoxin risk levels across all corn silage samples



Primary mycotoxin groups of concern for 2017 corn silage include:

- Type B trichothecenes, found in 94 percent of samples at an average concentration of 3,167 parts per billion (ppb). This is a higher risk level for dairy cows.

- Type A trichothecenes, detected in 26 percent of samples at an average concentration of 113 ppb. This is a moderate risk level for dairy cows.
- Fusaric acid, detected in 94 percent of samples at an average concentration of 1,052 ppb. Although frequent in occurrence, the average risk level is lower for dairy cows.

- Other Penicillium mycotoxins, detected in 32 percent of samples at an average concentration of 115 ppb. This is a moderate risk level for dairy cows.

The full report from our Alltech 37+® mycotoxin analysis results and what it means for your cows and ruminants

Penicillium mycotoxins: An unusual threat

The occurrence of Penicillium mycotoxins in about a third of corn silage samples in 2017 follows concerning patterns from previous years. During the same period in 2016, Penicillium mycotoxins were detected in 46 percent of samples at an average of 85 parts per billion (ppb), showing a significant threat each year from this group of mycotoxins.

Penicillium mycotoxins are produced by many species of Penicillium molds and include mycotoxins such as cyclopiazonic acid, penicillic acid and patulin. These mycotoxins can have strong impacts on cow health and performance.

Rumen and microbial functions can be impaired following consumption of Penicillium mycotoxins, which lead to changes in volatile fatty acid (VFA) production and acidosis-type symptoms. Changes in rumen health and gut functions can also lead to loose manure and diarrhea as well as a drop in production. Additionally, the immune system is a major target of the Penicillium mycotoxins, leading to immune suppression and increased susceptibility to other diseases.

The ability to thrive under harsh conditions allows for Penicillium mold growth to take place during feedstuff storage, which gives them their typical name of “storage mycotoxins.”

The Penicillium molds that produce this group of mycotoxins grow well under a variety of environmental conditions, including low pH, low water activity and low oxygen content (Mansfield et al., 2008).

The ability to thrive under these harsh conditions allows for Penicillium mold growth and mycotoxin production to take place during feedstuff storage, which gives these molds their typical name of “storage mycotoxins.” During this time, improper ensilaging or poor-quality storage facilities can promote the occurrence of these molds and mycotoxins, which can increase rapidly in number and concentration.

The occurrence of Penicillium mycotoxins is not limited to storage, either, as it has also been documented during both field growth and harvesting of the plant. In fact, the mold itself is a soil-borne organism that begins to colonize crops following plant damage or stress, with growth further promoted by warm and wet weather conditions, particularly during reproductive and early kernel development (Mansfield et al., 2008). Weather patterns at harvest also play a role in mold growth and mycotoxin production. To identify Penicillium species, look for blue/green molds.

A POTENTIAL "TOXIC TRIANGLE"

Under ideal conditions, rumen microorganisms have the potential to naturally degrade a certain amount of the ingested mycotoxins. However, the rumen may not always be an ideal buffer for mycotoxins.

When the rumen passage rate is increased, this may reduce mycotoxin degradation capacity. If multiple mycotoxins are combined, the overall toxicity may be greater than the capacity of the rumen organisms to degrade mycotoxins.

And when Penicillium mycotoxins are present, their antibiotic-like effect on the rumen microflora may result in a destabilized rumen environment, which has poor ability to break down other mycotoxins that are present. This is a concern for 2017 corn silage, which contains a number of mycotoxin groups, including Penicillium mycotoxins.

DETECTION OF PENICILLIUM MYCOTOXINS

Feedstuffs and rations may be visibly moldy in some cases, but in other situations, it is much less obvious. As a result, laboratory analysis is critical for determining type and concentration of mycotoxins.

Furthermore, the Penicillium group of mycotoxins cannot be detected with rapid test kit technology and instead must be quantified using more advanced laboratory techniques such as those used by the Alltech 37+® mycotoxin analysis.

A MORE RECENT PICTURE OF MYCOTOXINS IN CORN SILAGE

Recently analyzed corn silage samples (January and March 2018) from New York show increased levels of some mycotoxins compared to the results obtained at harvest. The other Penicilliums continue to be a frequent contaminant of corn silage, being found in 67 percent of recent samples with an average of 310 parts per billion (ppb) and a maximum detected value of 714 ppb.

However, there are several other mycotoxin groups that also play a role. The type B trichothecenes have continued to remain a frequent mycotoxin group in 100 percent of samples, with an increase in the average concentration to 4,203 ppb and a maximum detected value to 9,236 ppb.

Interestingly, aflatoxin B1 has become a mycotoxin of concern, being detected in almost half of the corn silage samples recently analyzed. In these positive samples, aflatoxin B1 is at an average of 15 ppb, with a maximum detected of 95 ppb.

Consumption of these groups of mycotoxins can cause cows to have reduced feed intake, altered rumen functions, gut damage and variable manure quality. Cows may also show immune suppression, altered reproductive performance and decreased milk production or quality. Furthermore, aflatoxin B1 could be a concern for milk quality as it may transfer into the milk as the metabolite aflatoxin M1.

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