Technical Bulletin

Information from Phibro Technical Services

AB20®: A Dependable, Research-Proven Product – New In Vitro Binding Studies

- **The practical goal of mycotoxin mitigation strategies is to reduce the negative impact of dietary mycotoxins on animal performance**
- **An adsorbent with the capability to bind multiple mycotoxins (as shown in this study) would be more likely to decrease the biological impact when multiple dietary mycotoxins are present**

Feed quality is important when it comes to livestock performance, especially when dealing with mycotoxins. It's no longer a case of if mycotoxins become an issue, but when.

They're Already There

There are multiple factors during the crop year that can influence the mycotoxin load in a particular feed ingredient. In fact, Jean-Pierre Jouany in 2007 identified 21 different factors during crop production from planting, harvest, storage and feeding that influence mycotoxin loads. However, if only one of those 21 factors is compromised, the feedstuff may become contaminated with mycotoxin-producing molds.

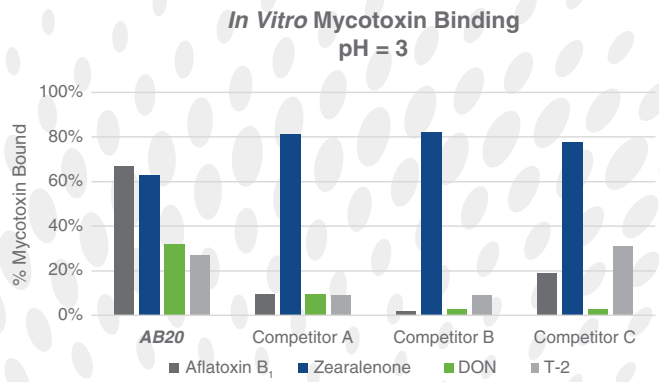
Nutritionists have concentrated on mitigating six major mycotoxins: aflatoxins, deoxynivalenol (DON; vomitoxin), zearalenone, fumonisins, T-2 toxin and ochratoxin. However, it was Streit et al. in 2013 that revealed the complications of mycotoxin contamination after analyzing 83 grain and silage samples for 139 different mycotoxins and metabolites. Results indicated there were from seven to 69 mycotoxins and metabolites that co-occurred. There are feed ingredients where one mycotoxin predominates, but this study indicates mycotoxin mitigation strategies must be able to handle multiple mycotoxins.

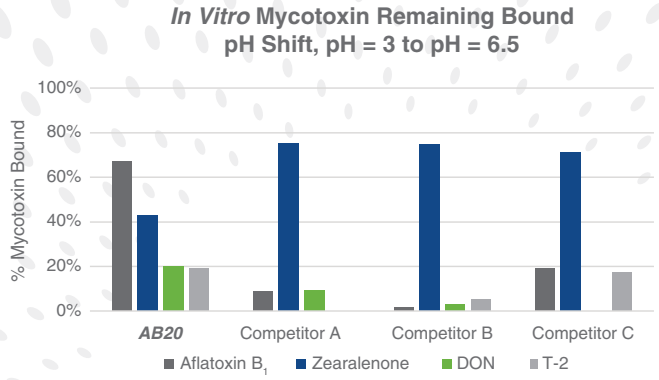
Addressing the Problem

Recent *in vitro* binding assays were conducted with the mycotoxins that are of most concern to dairy producers. Results for aflatoxin B_1, zearalenone, DON and T-2 toxin are reported.

Materials and Methods

In vitro analyses were conducted on market available products to assess the adsorption capacity in a modified ruminant pH model representing the pH shift





Phibro in-house laboratory analyses, 2018

from the abomasum to the small intestine. Adsorbent loadings were chosen to represent typical inclusion rates of adsorbents in feed.

Adsorption *in vitro* studies were determined through the analysis of free toxin by HPLC after the mycotoxin and adsorbent were incubated in a pH 3-buffered solution. Desorption *in vitro* studies were determined by subjecting the adsorbent with bound toxin, from the previous step, to a pH 6.5-buffered solution. This second treatment mimics pH changes found in ruminant digestive systems. Typically, luminal abomasal pH in a healthy animal ranges between 2.1 and 2.2 but increases to pH 3 within 6 hours after feeding (Constable et al., 2006). As digesta transfers from the abomasum to the small intestine, luminal pH steadily increases to greater than 6.5. Toxins that are not tightly bound to the adsorbent can be released, exposing the animal to effects of these toxins throughout the rest of the G.I. tract.

Results

These *in vitro* studies demonstrate that adsorbents have differing affinities for the various mycotoxins. After the pH shift to 6.5, the data show superior performance of ***AB20*** nutritional specialty product for aflatoxin B_1 and DON and superior or equivalent performance for T-2. Although the data show reduced performance for zearalenone, ***AB20*** retained more than 40% of the zearalenone, even after desorption.

Discussion

Although it's virtually impossible to inactivate all feed mycotoxins, the practical goal of mycotoxin mitigation strategies is to reduce the negative impact of dietary mycotoxins on animal performance.

Whitlow (2005) reported the levels of concern for several mycotoxins. Those levels represented concentrations of mycotoxins above which would cause symptoms to appear and decrease performance. If co-occurrence of mycotoxins is an issue, then those levels of concern may be underestimating the detrimental effect of mycotoxins (Szabó-Fodor et al., 2019). Hence, an adsorbent with the capability to bind multiple mycotoxins would be more likely to decrease the overall effective concentrations of dietary mycotoxins below those levels of concern.

AB20 provides a consistent, broad-based solution for multiple mycotoxin challenges.

References

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This information has been prepared for industry technical professionals.