CELMANAX™

IN VITRO STUDIES TO TEST THE ABILITY OF CELMANAX™ TO BIND VARIOUS MYCOTOXINS

Introduction: According to the Food and Agriculture Organization (FAO), at least 25% of the world's crops are contaminated with mycotoxins. Adsorption of mycotoxins present in feed is achieved predominantly by activated charcoal, aluminosilicates and yeast-based products. Clay based adsorbents are typically used at high concentrations (>1.0% of the diet) in animal feeds, thereby decreasing the nutritive value of the feed. In contrast, yeast products have a high affinity for mycotoxins and bind them at much lower concentrations than clay-based adsorbents while providing other performance enhancement properties. *In vitro* mycotoxin binding ability of CELMANAX,™ a hydrolyzed yeast product, was compared to a competitor yeast binder and aluminosilicates (HSCAS).

Objective: To determine the *in vitro* mycotoxin binding ability of CELMANAX, a competitor yeast product and HSCAS.

Materials and Methods: The mycotoxins at known concentration were placed in an aqueous solution and the concentration was confirmed by HPLC analysis. The mycotoxin binding was tested at pH 3.0 to simulate the stomach and upper intestine and pH 6.5 to simulate the rumen, lower intestine and hind gut. The adsorbent was placed in the solution containing the mycotoxin and vortexed at 15 minute intervals for a total of 60 minutes. After one hour, the adsorbent was removed by centrifugation, leaving the solution with any remaining unbound mycotoxin.

The concentration of any remaining mycotoxin was again determined by HPLC analysis.

A percent mycotoxin binding was calculated by determining the amount of mycotoxin bound and removed with the adsorbent compared to the original amount of mycotoxin in the solution.

The following mycotoxins and their concentrations were tested with the adsorbents:

Mycotoxin	Concentration
Aflatoxin B1	200 ppb
Zearalenone	200 ppb
T-2	2 ppm
Ochratoxin A	2 ppm
Fumonisin B1	20 ppm

Results: CELMANAX™ bound Aflatoxin B1 (70%), T-2 (80%), Zearalenone (85%), Fumonisin B1 (50%), and Ochratoxin A (90%) at pH 3.0 (Figure 1). Similar results were obtained when the binder was tested at pH 6.5. CELMANAX's mycotoxin binding capability was compared with a leading brand's product, with CELMANAX outperforming the leading brand. When the mycotoxin binding ability of CELMANAX was compared to HSCAS, all the mycotoxins, except aflatoxin, bound better with CELMANAX (Figure 2).

Conclusions: In an *in vitro* mycotoxin binding experiment, CELMANAX bound various mycotoxins and outperformed the leading brand and HSCAS.

Figure 1: **Comparison of CELMANAX™ and Another Commercial Mycotoxin Binder to Bind Mycotoxins**

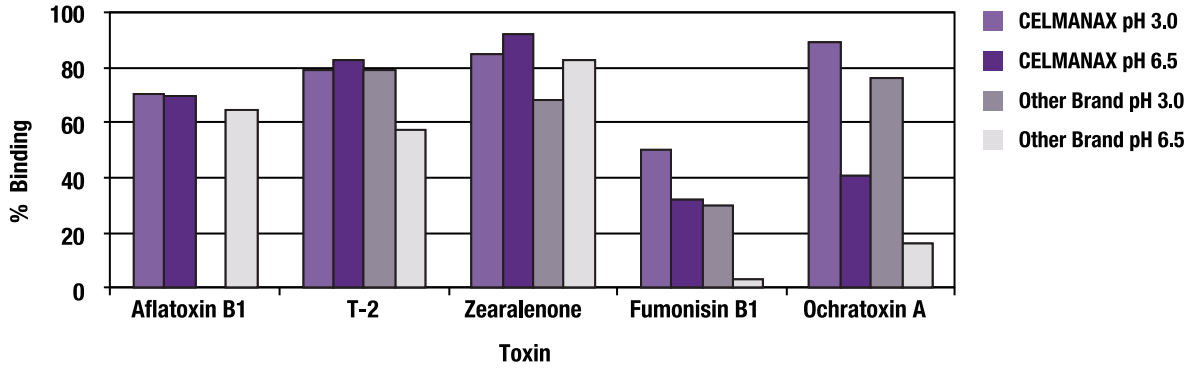
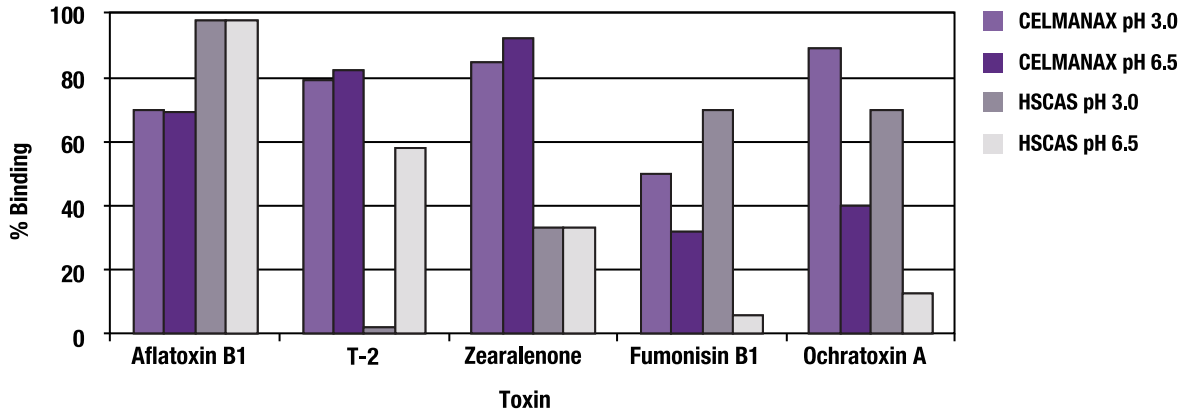


Figure 2: **Comparison of CELMANAX and HSCAS to Bind Mycotoxins**



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