

## ABSTRACT

Fumonisin (FUM) is a mycotoxin that produced by *Fusarium* fungi. Clinical symptoms of the toxin have been reported in both animals and humans. These include pulmonary edema and neural tube defects in pig, leukoencephalomalacia in horse, and abdominal pain and diarrhea in humans. Calibrin-Z (CAZ) is a highly-refined sorbent mineral with high affinity and capacity to sequester a wide range of the mycotoxins found in feed grains. The objective of this study was to investigate the protection of CAZ and modified CAZ against the negative effects of FUM in pigs. Seventy-two pigs with initial body weight of 11.8 kg were used in a 42 d study to evaluate the ability of 3 anti-mycotoxin additives (AMA), CAZ, CAZ + organic compound (COC), and CAZ + charcoal carbon (CCC), at increasing concentrations to reduce the effects of fumonisin B1 (FB1). There were 12 treatments (TRT) in the study with 6 replications per TRT. Individual pig was the experimental unit and data was analyzed using the Tukey test (difference = P 0.05). The 12 TRT were: 1) a control diet with no detectable mycotoxins (CON); 2) CON + 0.5% CAZ; 3) CON + 0.7% COC ; 4) CON + 0.7% CCC; 5) CON + 50 ppm FB1 (FUM50); 6) FUM50 + 0.25% CAZ; 7) FUM50 +0.5% CAZ; 8) FUM50 + 0.2% COC; 9) FUM50 + 0.5% COC; 10) FUM50 + 0.7% COC; 11) FUM50 + 0.5% CCC; 12) FUM50 + 0.7% CCC. Over the 42 d period ADFI was lower for pigs fed diets that contained FB1 and no AMA compared to those fed the CON diet. Adding CAZ, COC, or CCC, at any level, to the FB1 contaminated diet improved ADFI compared to the diet containing only FB1. Starting at week 4 of the experiment both ADG and body weight decreased when diets were contaminated with FB1 compared to those receiving the CON diet. Pigs fed the TRT with the highest level of the three AMAs had higher ADG and body weight than those fed TRT FUM50 and equal to those fed the uncontaminated CON. Pigs fed the lower level of AMAs had ADG and body weight between those fed the CON diet and the FUM50 TRT. There was no difference in the relative weight of the livers, feed conversion, or total plasma proteins between the TRT. The ratio between sphinganine and sphingosine (SA/SO) was higher in animals which received FB1 in the diet even with the inclusion of AMAs. Overall, fumonisin addition decreased feed intake and weight gain while adding the highest level of the Calibrin-Z and modified Calibrin-Z protected these measures to the level of the uncontaminated control. Relative liver weight was not affected by FB1 but the SA/SO ratio increased with FB1 contamination and was not affected by AMA addition.

## OBJECTIVE

The objective of this study was to evaluate the ability of 3 anti-mycotoxin additives, a commercially available processed clay only product, Calibrin-Z (CAZ), and two experimental Calibrin-Z based products; clay + organic compound (COC), and clay + carbon (CCC), at increasing concentrations to reduce the effects of Fumonisin B1 (FB1) in swine.

## TREATMENTS

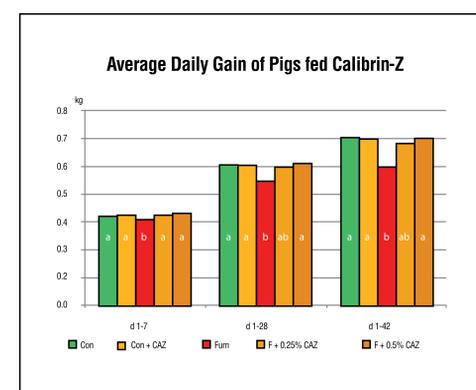
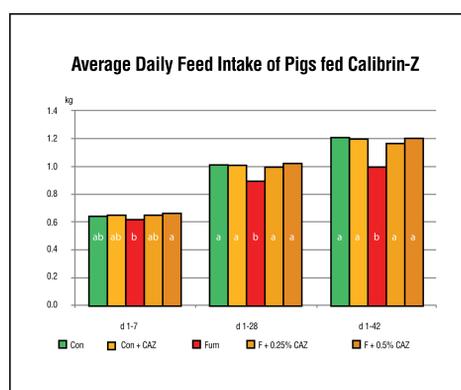
Treatments	Fumonisin B1, ppm	Anti-Mycotoxin Additives
1 (CON)	0	-----
2	0	0.5% CAZ
3	0	0.7% COC
4	0	0.7% CCC
5 (FUM50)	50	-----
6	50	0.25% CAZ
7	50	0.5% CAZ
8	50	0.2% COC
9	50	0.5% COC
10	50	0.7% COC
11	50	0.5% CCC
12	50	0.7% CCC

## MATERIALS & METHODS

- 72 pigs
  - Initial weight = 11.8 kg
  - Housed Individually
- 42 d study
- Cultured Fumonisin – 0 or 50 ppm
- 12 treatments, 6 replications
- Data Collected
  - Feed Consumed, Weight Gain
  - Relative Liver Weight
  - Total Plasma Proteins, Sphinganine: Sphingosine Ratio

## RESULTS

- Feed Intake was lower for pigs fed the diet containing FB1 and no Anti-Mycotoxin Additive compared to those fed the control diet
  - Adding any of the test Anti-Mycotoxin Additive at any level improved Feed Intake compared to the FB1 diet
- From week 4 Average Daily Gain and Body Weight were lower when FB1 was added to the control diet
  - Pigs fed the highest levels of the Anti-Mycotoxin Additives had Gain and Body Weight higher than those fed the FB1 diet and equal to those fed the Control diet
  - Pigs fed the lower level of AMAs had ADG and Body Weight between those fed the CON diet and the FUM50 treatments
- There was no difference in feed conversion, relative liver weight, or total plasma proteins between treatments
- Sphinganine and sphingosine ration was higher in diets with FB1 even when Anti-Mycotoxin Additives were added



Growth performance of young pigs fed diets with Fumonisin B<sub>1</sub> and Anti-Mycotoxin Additives

Treatment	Fumonisin B <sub>1</sub> , ppm											
	0						50					
	CAZ			COC			CAZ			COC		
	Anti-Mycotoxin Additive											
AMA%												
	0.5			0.7			0.25			0.5		
ADFI, kg	1.21 <sup>a</sup>	1.20 <sup>a</sup>	1.21 <sup>a</sup>	1.20 <sup>a</sup>	0.99 <sup>b</sup>	1.17 <sup>a</sup>	1.20 <sup>a</sup>	1.16 <sup>a</sup>	1.17 <sup>a</sup>	1.20 <sup>a</sup>	1.16 <sup>a</sup>	1.18 <sup>a</sup>
Gain, kg	41.18 <sup>a</sup>	40.2 <sup>a</sup>	40.9 <sup>a</sup>	40.9 <sup>a</sup>	34.5 <sup>b</sup>	39.3 <sup>ab</sup>	39.9 <sup>a</sup>	38.1 <sup>ab</sup>	38.6 <sup>ab</sup>	40.1 <sup>a</sup>	39.3 <sup>ab</sup>	40.2 <sup>a</sup>
ADG, kg	0.70 <sup>a</sup>	0.68 <sup>a</sup>	0.69 <sup>a</sup>	0.69 <sup>a</sup>	0.55 <sup>b</sup>	0.66 <sup>ab</sup>	0.67 <sup>a</sup>	0.63 <sup>ab</sup>	0.64 <sup>ab</sup>	0.68 <sup>a</sup>	0.65 <sup>ab</sup>	0.67 <sup>a</sup>
Feed:ga in	1.74 <sup>a</sup>	1.78 <sup>a</sup>	1.75 <sup>a</sup>	1.74 <sup>a</sup>	1.83 <sup>a</sup>	1.79 <sup>a</sup>	1.80 <sup>a</sup>	1.85 <sup>a</sup>	1.83 <sup>a</sup>	1.77 <sup>a</sup>	1.79 <sup>a</sup>	1.76 <sup>a</sup>
Relative Liver Wt <sup>c</sup>	2.44 <sup>a</sup>	2.35 <sup>a</sup>	2.32 <sup>a</sup>	2.39 <sup>a</sup>	2.57 <sup>a</sup>	2.71 <sup>a</sup>	2.47 <sup>a</sup>	2.54 <sup>a</sup>	2.55 <sup>a</sup>	2.37 <sup>a</sup>	2.32 <sup>a</sup>	2.34 <sup>a</sup>
Plasma Protein	10.12 <sup>a</sup>	9.85 <sup>a</sup>	9.52 <sup>a</sup>	9.86 <sup>a</sup>	10.55 <sup>a</sup>	10.92 <sup>a</sup>	10.86 <sup>a</sup>	10.85 <sup>a</sup>	10.98 <sup>a</sup>	11.77 <sup>a</sup>	11.20 <sup>a</sup>	10.87 <sup>a</sup>
SA:SO	2.53 <sup>b</sup>	1.78 <sup>b</sup>	2.32 <sup>b</sup>	2.39 <sup>b</sup>	8.74 <sup>a</sup>	8.00 <sup>a</sup>	7.87 <sup>a</sup>	6.55 <sup>a</sup>	9.04 <sup>a</sup>	7.49 <sup>a</sup>	7.45 <sup>a</sup>	7.05 <sup>a</sup>

<sup>a</sup>Rows with different letters differ P < 0.05.

## CONCLUSIONS

Adding Calibrin-Z and modified Calibrin-Z prevented the negative effects of Fumonisin in the diet on feed intake and weight gain but the SA/SO ratio increased with FB1 contamination and was not affected by AMA addition.