

Technical Bulletin

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Calibrin[®]-Z Adsorbs Fumonisin *Research conducted at SAMITEC Institute*

Introduction

Fumonisin is a mycotoxin of concern to livestock, especially swine. High levels can adversely affect overall performance with specific negative impact to organs including the liver and lungs. In vivo evaluations are the best method to accurately assess the biological efficacy of mycotoxin binders. Therefore, this study was conducted to evaluate the Fumonisin-binding performance of Calibrin[®]-Z in pigs. Results demonstrate significant protective action against the deleterious biological effect of Fumonisin exposure.

Procedure

Eighteen healthy piglets with an average initial weight of 11.8 kg were evaluated over a period of 42 days. The piglets were randomly assigned to three treatment groups, equating to six replicates per group.

Animals were housed in 18 pens equipped with semi-automatic feeders and automatic drip feeders. Temperature control and adequate ventilation was maintained throughout the study period.

Diets were iso-nutritional and formulated in accordance with the nutritional requirements of the National Research Council (NRC 1998). No mycotoxin was detected in the feed used.

Treatments

Control

(No Fumonisin and no Calibrin-Z)

Fumonisin

(Control + 50 ppm Fumonisin)

Fumonisin + Calibrin-Z

(50 ppm Fumonisin + 0.5% Calibrin-Z)

STUDY PROTOCOL

The Brazilian institution where this study was conducted uses a high mycotoxin inclusion rate model to realistically assess anti-mycotoxin efficacy. The high challenge inclusion is deemed a necessary counter-measure to the tightly controlled testing environment and general good health of study animals.

In this evaluation, a binder:toxin ratio of 100:1 was evaluated to determine baseline efficacy. In practice, Amlan International recommends using 1 kg Calibrin-Z per metric ton of feed to provide the most comprehensive protection in a real world environment.

CALIBRIN-Z COMPONENTS

Activated montmorillonite

Amlan montmorillonite processed under optimized time, temperature and pressure conditions to maximize adsorptive detoxification properties.

The following data was collected to determine efficacy of Calibrin-Z in swine:

TABLE 1

Performance Parameters

Animal Performance

- Average Daily Feed Intake
- Average Daily Gain
- Final Weight
- Feed Conversion

Organ Development

- Relative Liver Weight
- Relative Lung Weight

Results and Discussion

Animal Performance Data

TABLE 2

Comparative Animal Performance^{1,2,3}

Treatment	Avg. Daily Feed Intake	Final Weight	Avg. Daily Gain
Control	1.207 ^a	41.18 ^a	0.696 ^a
Fumonisin	0.993 ^b	34.54 ^b	0.551 ^b
Fumonisin + Calibrin-Z	1.204 ^a	39.85 ^a	0.669 ^a

¹ Data reflected is the average value over the course of the 42-day study. Numbers in columns with different superscripts differ P < 0.05.

² Fumonisin was added to the diets at 50 ppm.

³ Calibrin-Z was added to the diet at 0.5%.

Pigs fed the Fumonisin + Calibrin-Z treatment demonstrated statistically equivalent Animal Performance criteria compared with the Control. The group receiving Fumonisin revealed consistent and statistically poorer performance compared with both the Control and the Calibrin-Z groups for weight and feed intake parameters. There was no significant difference in feed conversion caused by treatment.

Adding Calibrin-Z to a fumonisin contaminated diet improved average daily feed intake by 21.2%, weight gain by 21.4%, and end weight by 15.4% compared to pigs fed Fumonisin with no Calibrin-Z. The pigs fed Calibrin-Z weighed 5.31 kg more than the pigs fed 50 ppm Fumonisin alone at the end

of the 42-day study.

Looking at Biological Protection as determined by the equation below:

$$\text{Biological Protection \%} = \frac{\text{Binder} - \text{Test}}{\text{Control} - \text{Test}} \times 100$$

Calibrin-Z provided Biological Protection of 98.6% and 80% for Average Daily Feed Intake and Final Weight, respectively.

FIGURE 1

Average Daily Feed Intake, kg

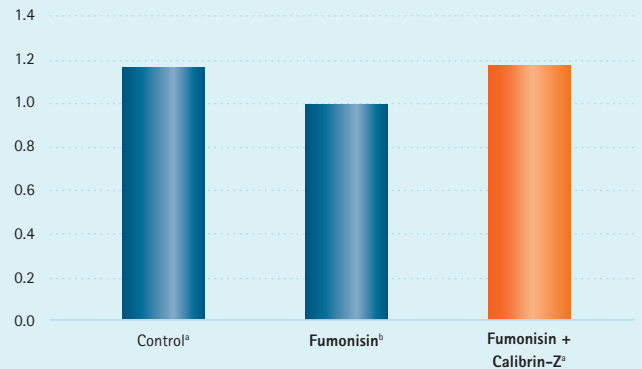


FIGURE 2

Final Weight, kg

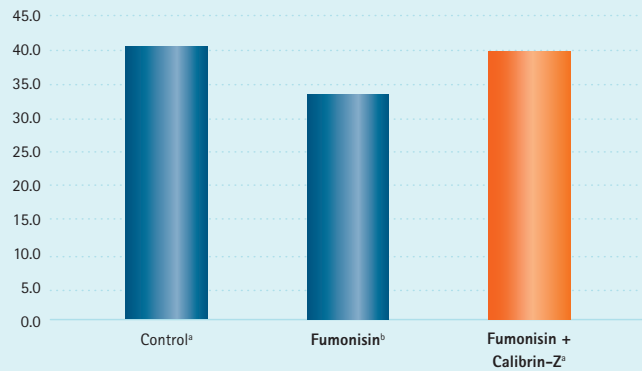


TABLE 3

Organ Development^{1,2,3}

Treatment	Relative Liver Weight	Relative Lung Weight
Control	2.44	1.09
Fumonisin	2.57	1.37
Fumonisin + Calibrin-Z	2.47	1.14

¹ Weights are relative to the final body wt of the pigs. There was no statistical difference between the treatments.

² Fumonisin was added to the diets at 50 ppm.

³ Calibrin-Z was added to the diet at 0.5%.

There was no statistical difference in relative Liver/Lung weight compared with the control group over the 42-day study.

Study Findings

Calibrin-Z demonstrated significant *in vivo* protection based on animal performance compared with Fumonisin treated pigs receiving no anti-mycotoxin binder.

Under controlled conditions, with a high Fumonisin challenge level, the Calibrin-Z treated pigs performed equivalent to the control group. This group also demonstrated 15.4% greater average weight compared to the Fumonisin challenge only study group. These results indicate the routine use of Calibrin-Z will reduce the costly negative effects of Fumonisin on the health and productivity of pigs.

Company Note

Amlan International recommends a standard inclusion rate of 1 kg Calibrin-Z per metric ton of feed. Although the company has determined this inclusion rate to be effective in combating typical mycotoxin contamination levels, consultation with an Amlan representative is recommended to determine the optimal inclusion rate for a specified region.

About the Testing Facility

The SAMITEC Institute (Institute of Analytical and Microbiological Technology, Santa Maria, Brazil) was founded to meet the progressive increase in the demand for quality microbiological and mycotoxicological analyses. The Institute has strict criteria for compliance and adherence to good laboratory practices and ISO / IEC 17025.



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