

# EFFICACY OF AN ANTI-MYCOTOXIN ADDITIVE IN PREVENTING THE TOXICITY OF AFLATOXIN IN DUCKS

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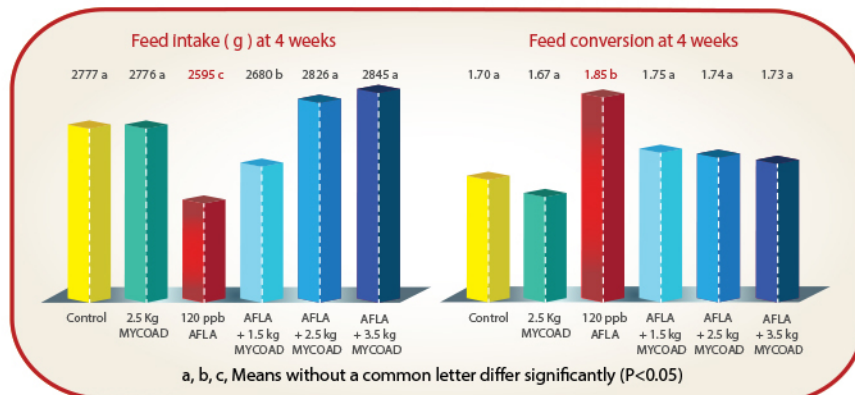
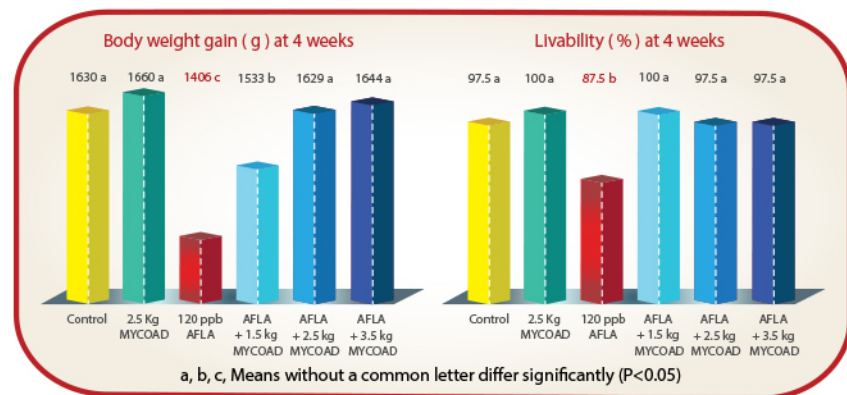
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## INTRODUCTION

Ducks are considered one of the most susceptible avian species to aflatoxins (AFLA). The toxic effects of AFLA include mortality, loss of appetite, retarded growth, web-toe hemorrhages, and ataxia. Liver is the main target organ, being enlarged, fatty, pale, friable, and / or hemorrhagic (3). The use of anti-mycotoxin additives is a practical approach to reduce the negative effects of mycotoxins. The efficacy of these products must be evaluated conducting *in vivo* experiments (performance and target organ protection), since studies *in vitro* have no correlation with results obtained with animals (8). The use of 2.5 kg of MYCOAD / ton of feed (0.25%) has been proven to prevent the toxic effects of AFLA, ochratoxin, T-2 toxin, and fumonisin in broilers (1, 2, 4, 5). The objective of this experiment was to evaluate the efficacy of different levels of MYCOAD in preventing the deleterious effects of natural AFLA in ducks.

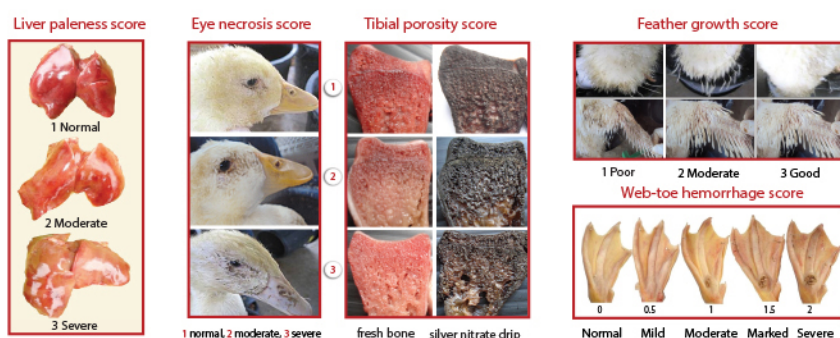
## MATERIALS AND METHODS

This experiment was conducted at Khon Kaen University's Poultry Research Farm in Thailand. A total of 240 day-old meat-type ducks (Cherry Valley) were placed on floor pens with continuous light; randomly distributed into 6 treatments with 2 replications of 20 ducks each. Ducks were fed a corn-soy diet tested free of mycotoxins; using a 300 ppb natural AFLA containing corn to generate the contaminated diets. Treatments were: < 30 ppb AFLA (control); < 30 ppb + 0.25% MYCOAD; 120 ppb AFLA; and 120 ppb AFLA diets supplemented with 0.15, 0.25 and 0.35% MYCOAD. Feed and water were provided ad libitum. At 4 weeks of age, livability, productive performance, organ conditions, and blood parameters were measured. All data were submitted to ANOVA and differences between means compared by Duncan's multiple range test (P < 0.05) (7).



## RESULTS AND DISCUSSION

Results at 28 days of age indicated that ducks fed 120 ppb AFLA presented significant lower body weight gain (-13.7%), reduced feed intake (-6.5%), poorer feed conversion (+8.8%), and increased mortality (+10.3%) compared to ducks fed control diet. Significant deleterious effects of AFLA were observed also in feather growth, eye necrosis, web-toe hemorrhage, leg deformity, tibia bone porosity, liver paleness and fat content, organ weights, hematology and serum biochemical values. The addition of 0.15% MYCOAD decreased mortality and partially recovered the toxic effects of 120 ppb of AFLA. Supplementation of 0.25% MYCOAD was required to significantly prevent all the deleterious effects of AFLA. No further protection was observed with 0.35% MYCOAD. These results are in agreement with previous reports (1, 4) indicating the efficacy of MYCOAD in reducing the toxicity of AFLA in broilers. The protective action of MYCOAD appears to involve sequestration of AFLA so that is not available for intestinal absorption by the ducks, as suggested by Phillips et al. (6).



Effect of MYCOAD and aflatoxin on different organs of 4 week-old ducks.

Treatment	Heart % BW	Pancreas % BW	Kidneys % BW	Spleen % BW	Liver % BW	Liver paleness	Liver fat %
Control	0.57 a	0.39 a	0.90 a	1.11 a	2.31 a	1.10 a	16.0 a
Control + 2.5 kg MYCOAD	0.57 a	0.38 a	0.89 a	1.10 a	2.26 a	1.09 a	15.8 a
120 ppb AFLA	0.71 b	0.49 b	1.52 b	1.21 b	2.85 c	1.87 d	22.4 c
120 ppb AFLA + 1.5 kg MYCOAD	0.63 ab	0.44 ab	1.10 ab	1.13 a	2.60 b	1.36 c	17.6 b
120 ppb AFLA + 2.5 kg MYCOAD	0.59 a	0.42 ab	0.96 ab	1.12 a	2.43 ab	1.29 bc	16.8 ab
120 ppb AFLA + 3.5 kg MYCOAD	0.58 a	0.41 ab	0.92 ab	1.12 a	2.40 ab	1.19 ab	16.5 a

a, b, c Means within a column without a common letter differ significantly (P<0.05)

BW = body weight.

Effect of MYCOAD and aflatoxin on chronic toxicity of 4 week-old ducks.

Treatment	Feather growth	Web-toe hemorrhage	Eye necrosis	Tibial bone porosity	Leg deformities
Control	2.71 a	0.07 a	1.03 ab	1.08 b	0.49 a
Control + 2.5 kg MYCOAD	2.74 a	0.06 a	1.01 a	1.03 a	0.45 a
120 ppb AFLA	1.69 d	0.50 d	1.85 d	1.70 e	1.81 c
120 ppb AFLA + 1.5 kg MYCOAD	2.43 c	0.25 c	1.43 c	1.25 d	0.70 b
120 ppb AFLA + 2.5 kg MYCOAD	2.52 bc	0.17 b	1.17 b	1.17 c	0.61 ab
120 ppb AFLA + 3.5 kg MYCOAD	2.63 ab	0.15 b	1.10 b	1.14 c	0.56 ab

a, b, c, d, e Means within a column without a common letter differ significantly (P<0.05)

Leg deformities score: 0 Normal, 1 One leg slightly deformed, 2 Both legs slightly deformed, 3 One leg slightly and one severely deformed, 4 Both legs severely deformed

## CONCLUSIONS

- Feeding a duck diet with 120 ppb natural AFLA for the first 4 weeks of age affected productive performance with many toxicity damages and even mortality.
- The addition of 1.5 kg of MYCOAD / ton of feed partially recovered the performance and toxic effects of 120 ppb AFLA; however 2.5 kg of MYCOAD were required to completely prevent all the deleterious effects of 120 ppb AFLA. No further protection was observed with 3.5 kg of MYCOAD.
- The addition of 2.5 kg of MYCOAD to the control diet did not affect any parameter measured, demonstrating that the product does not interfere with nutrient absorption. In fact, it improved bone structure and the productive performance of ducks.

Effect of MYCOAD and aflatoxin on hematology and serum biochemical values.

Treatment	Hemoglobin g/dl	Hematocrit %	Glucose mg/dl	Protein mg/dl	Ca mg/dl	P mg/dl
Control	11.9 a	33.0 a	179 a	3.45 a	13.3 a	7.6 a
Control + 2.5 kg MYCOAD	12.3 a	33.5 a	181 a	3.55 a	13.8 a	7.7 a
120 ppb AFLA	8.2 c	25.0 c	150 d	2.40 d	11.6 c	5.9 c
120 ppb AFLA + 1.5 kg MYCOAD	9.7 b	29.5 b	166 c	2.98 c	11.9 bc	7.0 b
120 ppb AFLA + 2.5 kg MYCOAD	10.5 b	30.0 ab	170 bc	3.15 bc	12.7 b	7.1 ab
120 ppb AFLA + 3.5 kg MYCOAD	11.5 a	31.5 ab	174 ab	3.28 ab	13.1 ab	7.4 ab

a, b, c, d Means within a column without a common superscript differ significantly (P<0.05)

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