

SAFETY OF MYCOTOXIN BINDERS IN POULTRY

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Traditionally, anti-mycotoxin additives have been used for decades to prevent the harmful effects caused by mycotoxins.

Historically, one of the main concerns has been the possibility of negatively affecting performance parameters, through the absorption of essential nutrients, such as minerals and vitamins, within the gastrointestinal tract.

Under commercial conditions, there are cases of farms that have reported that some products are capable of affecting the ideal level of birds' productivity.



Considering all these factors, it is crucial to review the results of *in vivo* tests when evaluating the mycotoxin binders to be used in the feed.

To understand whether these products affect production efficiency *per se*, it is necessary to pay attention to the treatment used in the experimental design. This only contains the control feed without mycotoxins and the evaluated binder's inclusion.

If any decrease is identified in daily body weight gain, feed intake, feed conversion ratio and some other parameters, there is a chance that the additive is causing deleterious effects on the birds in the experiment.



Among the research reviewed in this article, we include the evaluations of two types of anti-mycotoxin additives.

→ **A traditional clay**

→ **A modified clay**



 **ADBWG** = average daily body weight gain

 **ADFI** = average daily feed intake

 **FCR** = feed conversion ratio

 **N/M** = No measured

TREATMENT

TREATMENT	Bone ash	Calcium in the bones (%)	Phosphorus in the bones (%)	ADBWG	ADFI	FCR
1. Control	45.95 ^a	23.87 ^a	8.71 ^a	54.8 ^a	105.3 ^a	1.92 ^a
2. Control + 0.25% Modified clay	44.20 ^a	25.11 ^a	8.66 ^a	51.3 ^a	103.0 ^a	2.01 ^a
3. Control + 1.25 ppm T-2	N/M	N/M	N/M	44.9 ^b	98.4 ^b	2.19 ^b
4. Control + 1.25 ppm T-2 + 0.25% modified clay	N/M	N/M	N/M	53.5 ^a	101.4 ^b	1.90 ^a

^{a, b} Means within columns without common superscripts differ significantly (P ≤ 0,05)

In several tests carried out in different experimental research institutions located in different countries, **their effects on the bone composition and skin pigmentation in broilers were evaluated.** The last cited research measured the effect on performance parameters and bones in ducks.

Effect of a modified clay on the bone composition and performance parameters in broilers

One of the trial objectives was to determine the effect of the anti-mycotoxin additive on bone composition. Thirty-two five-day-old male broilers were used in the experiment. Performance was evaluated up to 38 days of age. Ash, calcium, and phosphorus in the bone were measured in all broilers from treatments **1 and 2.** (Casarin et al. 2006 International Poultry Forum. Atlanta, GA, USA).

Effects of a modified clay and **T2 toxin** on bone composition and performance of 38-day-old broilers fed experimental diets for 33 days.



Effect of a modified clay in broiler skin pigmentation

This experiment evaluated the effect on the skin pigmentation on the carcass before refrigeration in commercial broilers

(Forat et al. IIIA, Querétaro, México. 2011/ unpublished).



During the first 14 days, no pigment was included in the diet, and from 14 to 49 days, 60 ppm of total xanthophyll were added. All diets included 60 ppm salinomycin. Skin color was measured at 49 days of age with the Minolta CR 300 method.

The results indicated that no significant differences were detected in the skin color when the group treated with the modified clay was compared with the treatment that only included xanthophyll.



Effect of a modified clay on broilers performance at 49 days of age.



TREATMENT	ADBWG	ADFI	FCR
Control	2987 ^a	6056 ^a	2.03 ^a
Control + xanthophyll	2987 ^a	6032 ^a	2.02 ^a
Control + xanthophyll + 1 kg/MT modified clay	2982 ^a	6027 ^a	2.06 ^a

-  **MT** = Metric tons
-  **ADBWG** = Average daily body weight gain
-  **ADFI** = Average daily feed intake
-  **FCR** = Feed conversion ratio

^a Values within a column with different letters are significantly different ($P < 0,05$)

Effect of a modified clay on skin pigmentation of broilers at 49 days after evaluation with a Minolta camera



TREATMENT	Lightness	Red ^{a*}	Yellow ^{b*}	Chroma (Orange) ^{c*}
Control	74.2 ^a	5.1 ^a	19.9 ^a	20.6 ^a
Control + xanthophyll	70.0 ^b	3.0 ^a ^b	41.6 ^b	41.9 ^b
Control + xanthophyll + 1 kg/MT Modified Clay	71.4 ^b	1.4 ^b	41.1 ^b	41.2 ^b

^a Values within a column with different letters are significantly different ($P < 0,05$)

Effect of a traditional clay on bone structure, target organs and performance in ducks

One day-old commercial ducks were fed a diet naturally contaminated with 120 ppb AFL at the Khon Kaen University poultry research farm in Thailand (Wongtangintharn, S. et al. XXV Worlds Poultry Congress. Beijing, China. 2016).

The objective was to demonstrate the safety of natural clay in highly susceptible animals such as ducks, based on the effect on performance, bone strength, liver characteristics and protection of target organs.



When Clay (2.5 kg/MT) was added to the diet, without the inclusion of AFL (**treatment 2**) a better performance was obtained in some parameters and bone structure than in the group where mycotoxin and Clay were not added (**treatment 1**).



When Clay (2.5 kg/MT) plus 120 ppb AFL (**treatment 5**) was tested, it showed significantly better performance, target organ protection, and bone strength than ducks receiving only AFL on diet (**treatment 3**).



Effect of a traditional clay and Aflatoxin on performance and bone strength in ducks of 4 weeks of age

TREATMENT	Feed intake g	Body weight gain g	FCR g/g	Viability %	Tibial bone porosity
1. Control	2777 ^a	1630 ^a	1.70 ^a	97.5 ^a	1.08 ^b
2. Control + 2.5 kg/TMT Natural clay	2776 ^a	1660 ^a	1.67 ^a	100 ^a	1.03 ^a
3. 120 ppb AFL	2595 ^c	1406 ^c	1.85 ^b	87.5 ^b	1.70 ^c
4. 120 ppb AFL + 1.5 kg/MT Natural Clay	2680 ^b	1533 ^b	1.75 ^{ab}	100 ^a	1.25 ^d
5. 120 ppb AFL + 2.5 kg/MT Natural Clay	2826 ^a	1629 ^a	1.74 ^{ab}	97.5 ^a	1.17 ^c
6. 120 ppb AFL + 3.5 kg/MT Natural Clay	2845 ^a	1644 ^a	1.73 ^{ab}	97.5 ^a	1.14 ^c

^{a, b, c} Means within a column without a common superscript differ significantly ($P < 0.05$)

In conclusion, in the experiments reviewed in this article, no negative effects were detected on the productive results neither in the bone structure of the birds evaluated when including two types of commercial anti-mycotoxin additives.



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