Improved performance of broilers and layers with a premium mycotoxin binder in Africa

A broad spectrum mycotoxin binder improves performance of broilers and layers

Mycotoxins are secondary metabolites produced by certain moulds (e.g., *Aspergillus*, *Fusarium*, and *Penicillium*) and pose a serious challenge on the performance and health of different poultry species. Mycotoxicosis results in reduced feed intake and feed efficiency, as well as immune suppression, negative effects on reproduction, hepatotoxicity, mortality, and consequently economic losses[1].

There are different types of mycotoxins of importance for poultry production, with worldwide distribution. The most commonly detected mycotoxins are aflatoxins (AF), trichothecenes (T-2, HT-2, DON), fumonisins (FUM) and zearalenones (ZEA)[2]. Nearly 70% of the total production of foodgrains in India is retained at farm level where the storage conditions enhance the chances of mould development and thereby mycotoxin production[3].

Mycotoxins can occur individually or in combination (co-occurrence), causing synergistic, additive, or antagonistic effects. Thereafter, it is recommended to prevent mycotoxicosis.

Commercial mycotoxin binders are primarily based on adsorbents (binding of mycotoxins in the intestinal tract). Some mycotoxins, the high-polar ones (AF, FUM) are easily bound by clays. The non-polar mycotoxins (ZEA) can be bound by yeast-derived products. However, complete adsorption of some mycotoxins (e.g. trichothecenes) is not possible. Therefore, to prevent the growth of mould in stored feed, to tackle the occurrence of difficult binding mycotoxins and, thereby, to protect tissues impaired by mycotoxicosis (e.g. liver and intestine), a broad spectrum solution is advisable. **Excential Toxin Plus** (ETP) is one of the best binding mycotoxin mixtures[4], consisting of five synergistically working ingredients, with inhibition of mould growth, adsorption properties, support of intestinal integrity and hepatoprotection.

With the aim to evaluate the effects of ETP on the performance of broilers (Senegal) and layers (Togo), two studies were conducted by Orffa in collaboration with two universities in Africa.

The mycotoxin binder improves the zootechnical performance of broilers – a study in Senegal

A 42-day study was conducted in collaboration with the School of Veterinary Medicine of the University of Dakar, using a total of 600 day-old Cobb 500 broilers. The birds were fed a corn-groundnut meal-based diet. Feed and water were provided *ad libitum*. The experiment was divided into two periods: day 0-10 (adaptation) and day 11-42 (experiment). On day 11, the birds were randomly assigned to one of the three treatments (4 pens/treatment, 50 birds/pen) according to the content of ETP in the feed (0, 1 or 5 kg/ton). The supplemented groundnut meal was selected based on its high aflatoxin concentration (160.4 µg aflatoxin/kg). Supplementation of 1 kg/t of ETP resulted in an improvement of +2.4% in final body weight ($p < 0.1$) and -5.6% in feed conversion ratio (FCR) (Table 1). The high dosage of the mycotoxin binder (5kg/t) did not affect final body weight but reduced FCR by -4.0%. It is expected that in commercial circumstances, where the levels of AF in the feed are higher and different mycotoxins co-occur, the effects of ETP will be more apparent.

Table 1. Zootechnical performance of broilers during days 0-42 when supplemented with different dosages of a mycotoxin binder

	Control	1 kg/t ETP	5 kg/t ETP
Body weight, kg	1.97^{x}	2.02^{y}	1.96^{x}
Average daily gain, g/d	55.3	57.5	55.5
Average daily feed intake, g/d	143.0	140.4	139.8
Feed conversion ratio, kg/kg	2.520	2.380	2.420

ETP = Excential Toxin PLus
Row with different suberscript (x,y) tend to differ ($p < 0.1$).

Laying performance is improved with supplementation of a mycotoxin binder – a study in Togo

A total of 840 Isa Brown old (62-74 weeks) and young (47-59 weeks) laying hens, with an average body weight of 1.75 kg, were used in a 12-week study conducted, in collaboration with the Regional Centre of Excellence in Avian Sciences (CERSA, University of Lomé). The hens were fed a corn-soybean-based diet. Feed and water were provided *ad libitum*. The first four weeks of the study the hens were allowed to adapt. From week five, the hens were randomly assigned to one of the four treatments (6 pens/treatment, 35 hens/pen): T1, young hens control; T2, as T1 + 1.5 kg/t ETP; T3, old hens control; T4, as T3 + 1.5 kg/t ETP. Compared to the controls, supplementation of 1.5 kg/t of ETP resulted in significantly improved egg production, especially in old hens (+8.7% ($p<0.05$); +2.4% for young hens), and significantly reduced FCR for both old (-9.2%) and young (-4.6%) hens (Table 2). In old hens, ETP improved egg weight by +4.0g, due to a significant improvement in albumen and shell weight ($p<0.05$).

Table 2. Effect of a toxin binder on performance and egg parameters of hens in different ages

	Old hens		Young hens	
	Control, T1	ETP, T2	Control, T3	ETP, T4
Performance				
Average daily feed intake, g/d	112.5	110.9	112.5	110.1
Egg production rate, %	64.5^{a}	70.1^{b}	70.1^{b}	71.8^{b}
Feed conversion ratio, kg/kg	2.881^{b}	2.615^{a}	2.642^{b}	2.520^{a}
Egg parameters				
Egg weight, g	59.4	63.4	59.0	60.8
Yolk weight, g	15.2	15.6	15.5	15.4
Albumen weight, g	36.3^{a}	39.6^{b}	35.6^{a}	37.6^{ab}
Shell weight, g	7.9^{a}	8.5^{b}	7.9^{a}	7.7^{a}

ETP = Excential Toxin Plus
Row with different superscript (a,b) differ significantly ($p < 0.05$).

The production of mycotoxins is related to environmental conditions and vary year to year. Environmental conditions in India encourage the proliferation of mould species, with mycotoxins having been identified as contaminants of crops before harvest as well during harvest and storage. Furthermore, co-occurrence of mycotoxins in poultry feed seems to be common in India, posing a higher risk of negative effects on the health and productivity of poultry. Considering that contaminated feed removal is not an economical solution, the inclusion of a mycotoxin solution to adsorb the mycotoxins and alleviate their effects in the birds seems to be the best option.

Giseli Heim
Team Leader Central Technical Management
+31 610006277 heim@orffa.com

Mohit Agarwal
General Manager
+91 99535 80008 agarwal@orffa.com

Reference:
[1] Gbashi, S., *et al.* 2019. Mycotoxins-Impact and Management Strategies. IntechOpen; London, UK: 2019. Available online: Mycotoxins - Impact and Management Strategies | IntechOpen.
[2] Mokubedi, S.M., *et al.*, 2019. Analysis of mycotoxins contamination in poultry feeds manufactured in selected provinces of South Africa using UHPLC-MS/MS. *Toxins*, 11(8): 452
[3] Goyal, R., K., *et al.* Prevention and control of mycotoxins in foodgrain in India. Available online: Mycotoxin prevention and control in foodgrains - Prevention and control of mycotoxins in foodgrains in India (fao.org)
[4] Bruneel, B. & Heim, G. 2021. Benchmark study of premium mycotoxin binders. *All About Feed*. Available online: Benchmark study of premium mycotoxin binders - All About Feed