The mycotoxin risk and the effects of mycotoxins in breeders

The term mycotoxin became very prominent in the early 1960s when an outbreak of an 'unknown' disease killed over 100,000 poultry birds in the United Kingdom. This was due to mycotoxins. Since that incident many papers have been published on the impact of mycotoxins on poultry and there is no doubt that mycotoxins can be detrimental to poultry.

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There are several hundred identified mycotoxins, and under practical conditions, poultry feed may have detectable levels of certain mycotoxins. Regarding the poultry breeder industry, it is important to understand which mycotoxins are the most prevalent, which present a real risk, what is the impact, and what are the solutions to reduce and mitigate this risk.

Mycotoxin risk and impact on breeders

For poultry producers around the world, proactive risk management is vital to protecting animal health and farm profitability by winning the battle against mycotoxins in feed. Producers need comprehensive data on contaminants and their risks to implement the best mycotoxin mitigation measures.

Cargill's world mycotoxin report contains more than 300,000 mycotoxin analyses which are captured annually across 150 feed plants, on-farm samples, and storage locations. Cargill hosts the largest mycotoxin contamination database in the world, providing information on the most problematic mycotoxins with their level of contamination and performance risk rates, and species sensitivity when exposed to a given mycotoxin.

In our 2022 report, 29% of analyses revealed mycotoxin levels above breeder performance risk threshold. Not surprisingly, the highest mycotoxin risk for breeders is zearalenone (ZEN), due to its prevalence and impact. Some 51% of ZEN samples were above the breeder performance risk.

Deoxynivalenol (DON) and fumonisin (FUM) are the next most prevalent mycotoxins presenting a performance risk to breeder industry (Fig. 1).

Mycotoxins may impact breeders through multiple angles. Some result in acute and obvious symptoms such as reduced feed intake, impact on egg production and quality, and lower fertility and hatchability.

There is also increasing evidence that mycotoxins have subclinical and indirect effect on performance loss as a result of potential impact on gut health and immune system.

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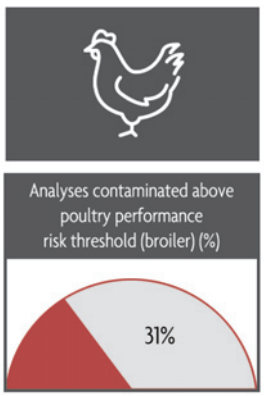
Fig. 1. Cargill World Mycotoxin Report.



Performance risk threshold			
Toxin	Broiler	Breeder	Layer
AFL	15	15	15
FUM	500	1,000	1,000
OTA	20	25	25
T2	25	50	50
DON	400	400	400
ZEN	50	35	35

Toxin	Total analyses	Analyses contaminated above broiler performance threshold (%)		
		Broiler	Breeder	Layer
AFL	94,526	8	8	8
FUM	44,812	40	25	25
OTA	9,660	1	1	1
T2	11,674	30	15	15
DON	103,521	45	45	45
ZEN	46,816	42	51	51
Total	311,009	31	29	29

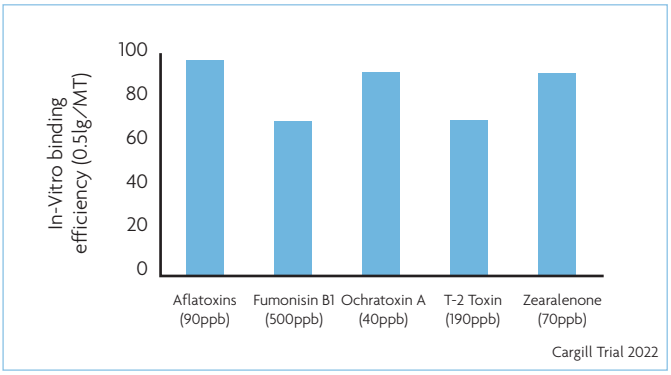


Fig. 2. Notox LS in-vitro binding efficiency (%).

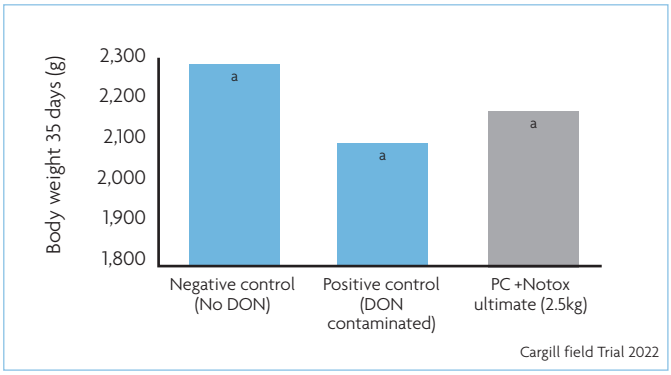


Fig. 3. Notox Ultimate efficacy trial. Body weight at 35 days.

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Recently the European Food Safety Authority (EFSA) reassessed the DON thresholds levels to affect poultry performance, which indicates that poultry may suffer performance loss from DON at levels significantly lower than those determined in 2017.

Based on a metanalysis of several hundred scientific articles and internal research, Cargill colleagues formulated specific equations estimating symptoms and the reductions in animal performance as a function of the mycotoxin concentration in the ingredients or finished feed.

For instance, 50ppb ZEN in a 4+ week breeder diet may reduce performance by 0.5% and a lower vaccine response.

As little as 250ppb ZEN could reduce performance by 2% with the following possible symptoms: prolapse of the oviduct, ovarian cysts, cloaca enlargement, and embryonic mortalities.

The data from these studies enable us to quantify adverse effects of multiple mycotoxins – even at low levels – and establish performance risk thresholds.

The most critical periods for mycotoxin mitigation in breeders are early stage – up to four weeks of age – and during production peak. Any situation that would increase metabolic stress is more likely to create conditions for mycotoxins to be detrimental.

Mitigating mycotoxins issues

Along with a good control plan and understanding of real risk and impact, it is important to be equipped with the right mycotoxin mitigant products. Cargill has developed a comprehensive portfolio of narrow and large spectrum anti-mycotoxin agents backed by extensive research.

To prevent uptake of mycotoxins in the gastrointestinal tract several technologies can be used.

Certain advanced binding technologies could be extremely efficient against polar and non-polar mycotoxins such as aflatoxin, fumonisin, ochratoxin, T2 toxins, and zearalenone.

For example, the product Notox LS from Cargill demonstrates high mycotoxin binding efficiency (Fig. 2).

Several in vivo poultry studies demonstrated the effectiveness of Cargill anti-mycotoxin solutions to support in preventing negative effects of mycotoxins.

In a recent poultry experiment, Cargill assessed the impact of high DON exposure and in vivo impact of Notox Ultimate supplementation in a DON challenge condition.

The high DON level had clear deleterious impact on poultry performance, liver and gut health, and immunity. Although DON is an extraordinarily complex mycotoxin to tackle, Notox Ultimate supported the mitigation of its negative impact (Fig. 3).

Conclusion

Cargill's in-house analysis and mycotoxin database paired with our mycotoxin proficiency enable us to best understand contamination and risk levels despite having asymptomatic animals. Everyday Cargill helps customers identify and mitigate mycotoxins with data-backed insights to maximise performance and outcomes for their animals and their bottom line. ■