Protect your birds from the biggest mycotoxin dangers

Today's poultry producers need to know more than whether their feed contains mycotoxins. Technological improvements in mycotoxin detection tools have opened up a new reality in terms of mycotoxins in poultry production.

by Dr Simone Schaumberger, Mycotoxin Risk Management Product Manager, Biomin. biomin.net

Identifying the biggest threats to poultry production requires an understanding of the occurrence of mycotoxins in the field, concentration levels and sensitivity in commercial poultry species.

Survey results

There is probably no definitively safe level of mycotoxins in livestock feed, yet mycotoxins are present in most poultry diet components.

According to the 2015 Biomin Mycotoxin Survey, covering over 8,000 samples taken from 75 countries, a full 84% of corn, wheat, soybean samples and finished feed samples taken worldwide contained at least one mycotoxin.

Table 1 details the concentrations of the mycotoxins found in each of these feed types.

Fig. 1 (on page 33) shows the percentage of samples that tested positive for each of the six major mycotoxins in the primary components used for poultry feed: finished feed, maize (corn), wheat and soy.

Comparing the occurrence and concentration levels of major mycotoxins as a function of poultry species' sensitivity provides a detailed picture of the most significant mycotoxin dangers to birds.

The dots on Fig. 1 indicate the percentage of samples registering concentrations in excess of maximum risk thresholds, for example at levels known to impair bird health or performance.

Table 2 details the risk threshold levels and negative effects of these mycotoxins in poultry.

Table 1. Mycotoxin concentrations measured in poultry feed commodities.

	Afla	ZEN	DON	T-2	FUM	OTA
Finished feed						
Number of samples tested	2111	2605	2745	1677	1863	1427
Average of positives (ppb)	25	218	756	14	729	7
Maximum (ppb)	490	9432	16510	346	15383	259
Maize						
Number of samples tested	1663	1849	1759	866	1266	802
Average of positives (ppb)	39	334	1595	69	2017	8
Maximum (ppb)	733	8888	19180	484	36489	200
Wheat						
Number of samples tested	396	645	770	342	331	278
Average of positives (ppb)	5	98	960	21	356	3
Maximum (ppb)	161	3274	15976	163	5334	9
Soy						
Number of samples tested	140	152	153	185	133	124
Average of positives (ppb)	8	48	312	35	129	1
Maximum (ppb)	220	372	1147	117	2300	4

Biggest threats

According to the latest annual results of the Biomin Mycotoxin Survey, the top current mycotoxin threats to poultry worldwide are:

- Deoxynivalenol.
- Zearalenone.
- Fumonisins.
- Aflatoxins.
- T-2 toxin.
- Ochratoxin A.

The risks posed by deoxynivalenol (DON, aka vomitoxin) and oestrogenic zearalenone (ZEN) may come as no surprise. However, the fumonisin (FUM) levels in corn stand out.

Recent scientific findings focusing on subclinical effects of fumonisins suggest that the intestinal tract of birds is very sensitive to fumonisin exposure.

Amplified harm

The wide diversity of mycotoxins contaminating agricultural commodities presents a variety of different negative impacts in livestock at even low levels of exposure.

The survey results showed that two or more mycotoxins were identified in 53% of all samples.

The presence of multiple mycotoxins can result in synergistic or additive toxic effects on the ani-

Continued on page 33

Table 2. Overview of recommended risk threshold (RRT) levels for major mycotoxins and examples of specific effects in poultry.

Mycotoxin	RRT (ppb)	Examples of effects in poultry
Afla	20	• Decreased hatchability of eggs • Increased susceptibility to bruising during processing • Pale bird syndrome • Decreased resistance to environmental and microbial stressors, increased susceptibility to diseases
ZEN	50	• Reduced ovary size • Reduced egg production • Reduced testes size and weight • Behavioural changes
DON	200	• Feed refusal • Impaired gut health, diarrhoea and pasty vents • Decreased resistance to environmental and microbial stressors, increased susceptibility to diseases
T-2	50	• Feed refusal • Decreased resistance to environmental and microbial stressors (E. coli, C. perfringens), increased susceptibility to diseases • Abnormal wing positioning and lack of reflexes • Beak, mouth and gizzard lesions
FUM	1500	• Impaired growth, impaired feed conversion • Decreased egg production and quality of eggs • Impaired intestinal health, diarrhoea
OTA	10	• Reduced egg production, egg weight and egg shell quality, blood and meat spots in the eggs • Retarded growth, increased feed conversion • Renal dysfunction, increased water consumption • Liver damage

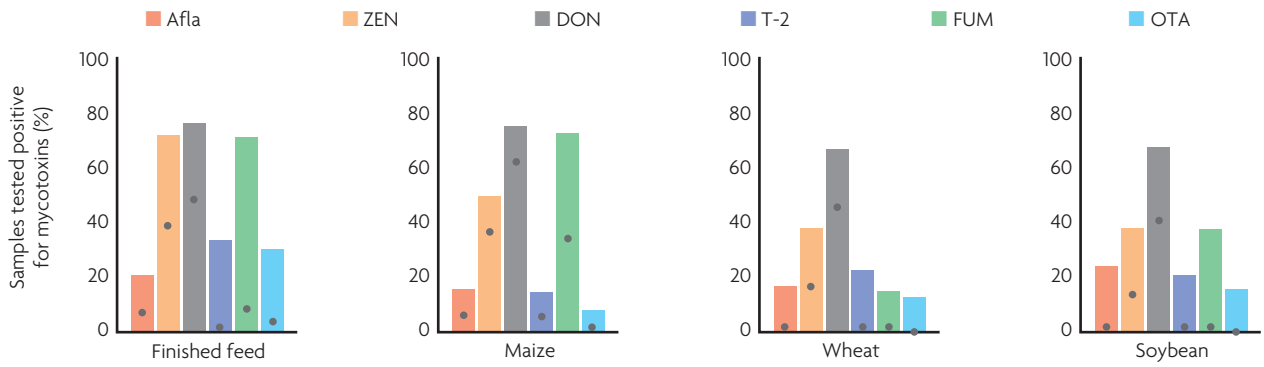

Fig. 1. Prevalence of mycotoxins in poultry feed commodities. Bars represent the percentage of contaminated samples. Dots display the occurrence of mycotoxins above the risk threshold.

Continued from page 31
mals consuming the affected feedstuffs.

The situation may be further aggravated when birds are exposed to pathogens or when by-products in feeds further contribute to the total load of inflammatory agents to which animals are exposed.

Binders are not enough

A conventional binder cannot adequately address the risks to global poultry production cited above.

A single component approach of a binder only works effectively on adsorbable mycotoxins such as aflatoxins and ergot alkaloids.

A recent scientific review highlights that trichothecenes (DON, T-2 toxin), ZEN and FUM are known to be inefficiently held by binders, instead requiring other solutions.

The most scientifically advanced method to counter mycotoxins is biotransformation, implemented using innovative feed additive ingredients that target a single mycotoxin type and renders it irreversibly non-toxic.

As an example of the latest research achievements, a purified fumonisin esterase enzyme (FUM*zyme*) was developed that specifically cleaves the two tricarballylic acid side chains from the fumonisin molecule.

This hydrolysation renders fumonisins non-toxic, protecting birds from FUM related problems, such as liver damage and weakened immune systems.

Bioprotection provides immune support and counters the harmful effects of mycotoxins that cannot be adsorbed or biotransformed.

Multi-strategy approach

Given that there are no definitively safe levels of mycotoxins, different strategies should be combined in order to target each mycotoxin present in feed.

A multi-component strategy is therefore necessary to counteract the range of mycotoxins in the animal.

With many feed additives commercially available, producers would do well to evaluate the efficacy of any proposed solution to harmful mycotoxins. ■