The European mycotoxin situation threatening poultry producers

by Radka Borutova, Business Development Manager, NutriAd, Belgium.

The current mycotoxin situation in the EU is dramatic and any corn or wheat imported from Eastern or Central Europe might contain extremely high concentrations of deoxynivalenol (DON) and zearalenone (ZEN).

Both DON and ZEN mycotoxins belong to fusarium mycotoxins which are structurally diverse and a chemically distinct group of fungal metabolites.

Economically important fusarium mycotoxins include trichothecenes, zearalenone and fumonisins.

DON (vomitoxin) and its acetylated forms are the most commonly found trichothecenes in grains used for poultry feeds.

The results of a recent NutriAd mycotoxin survey showed that 100% of maize samples collected in Poland in January 2015 were contaminated with DON and ZEN. None of the samples contained aflatoxin B1 (AfB1) and ochratoxin A (OTA).

Exactly 25% of samples contained FB1. The average concentrations of all discovered mycotoxins were medium to high, while the highest concentration of DON found in one of the samples reached 7900µg/kg. T-2 toxin, a mycotoxin extremely toxic in poultry was found in 63% of the samples; its maximum concentration reached 120µg/kg.

This level of concentration could be significantly high for poultry or other monogastric animal species. Of even more interest was contamination by zearalenone; 100% of samples were contaminated and the highest analysed concentration was 2600µg/kg.

The average ZEN contamination was 291µg/kg and this level can be considered medium to high risk for breeding poultry.

Fusarium mycotoxin

These days poultry diets contain much higher inclusion of maize and maize byproducts of DDGS than swine diets.

This information forces us to think about how feed containing medium to high concentration of fusarium mycotoxins will affect poultry. Earlier experiments, conducted for short periods or using single purified compounds, showed that poultry were resistant to DON.

More recent experiments, utilising naturally contaminated grains fed to poultry for extended periods, have shown that combinations of fusarium mycotoxins pose significant risks to poultry performance and health. Turkeys appear to be more sensitive to fusarium mycotoxicoses than chickens, while ducks have been shown to be the most resistant poultry species.

Sensitivity of turkeys

Turkeys are more sensitive to fusarium mycotoxins than other avian species. Earlier reports suggested that turkey poults could tolerate 5mg/kg DON in naturally contaminated wheat based diets without any significant changes in feed intake or body weight gain. However, increasing proportions of artificially contaminated wheat in turkey diets up to 5.4mg/kg DON and 0.4mg/kg ZEN resulted in a dose dependent decrease in body weight gain.

Even lower levels of DON, combined with 15-acetyl-DON and ZEN, in naturally contaminated diets caused decreased body weight gain, increased plasma uric acid, and increased relative weight of the gizzard and bursa of Fabricius. Feeding highly contaminated grains to turkeys for 12 weeks reduced growth rates in all growth phases. Body weight gain decreased as early as the third week of feeding.

Fusarium mycotoxins affect cell-mediated immunity more than humoral immunity. Deoxynivalenol can induce changes in brain neurochemistry which may be related to altered behaviour and emotional stress in turkeys. Comparable findings in brain neurochemistry have been described in layers fed naturally contaminated diets.

Feeding naturally contaminated diets containing 3.3mg/kg DON, and lesser amounts of 15-acetyl-DON and ZEN, reduced villus heights in the duodenum of turkey poults in the starter phase and in the jejunum in both the starter and grower phases. These birds had reduced growth rate. To conclude, the main negative effects of fusarium mycotoxins in turkey are decreased daily weight gain, lower final weight and finally worse FCR. Can these negative mycotoxin effects be prevented?

Successful solution

In an experiment 1,596, one-day-old Hybrid tom turkeys were randomly placed into 38 floor pens (42 poults/pen). Each pen was assigned to one of five treatments in a randomised complete block design with pen blocked by room and location within room. Basal feed was prepared using uncontaminated or naturally contaminated maize. The treatments were applied to a standard turkey starter diet (Table. 1).

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Table 1. Experimental design.

Treatments	DON (µg/kg)	Mycotoxin deactivator
Control	-	-
DON	9120	-
DON + UnikePlus	9120	1.5 kg/ton
DON + Product A*	9120	1.5 kg/ton
DON + Product B**	9120	1.5 kg/ton

* Product A: based on yeast cell walls ** Product B: based on diatomaceous earth, bentonite, inactivated yeasts, silymarin and algae extract

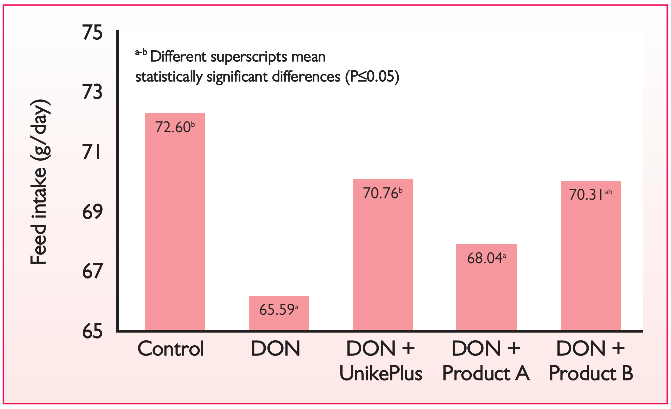

Fig. 1. The effect of DON and mycotoxin deactivators on daily feed intake in young turkey poults (g).

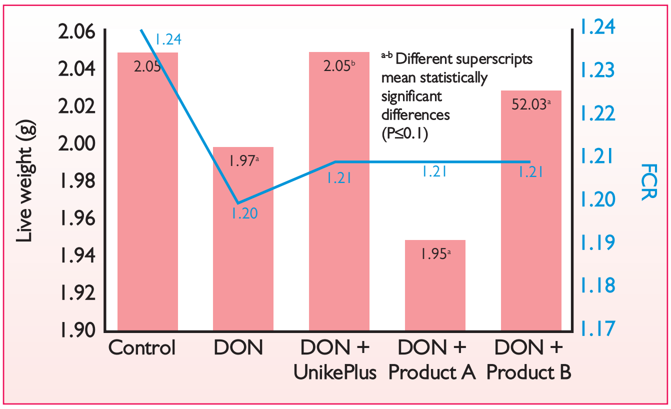

Fig. 2. The effect of DON and mycotoxin deactivators on body weight (g) and FCR of young turkey poults.

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Turkey poults and feeders were weighed by pen at placement, and then once per week throughout the five-week trial. Data was analysed by ANOVA with contrasts used to compare the DON treatment to each of the three products.

Turkeys fed the UnikePlus treatment consumed more feed compared to those fed the DON contaminated diet (Fig. 1). However, feed consumption of birds fed Products A or B was not different from the DON treatment (P>0.10). With higher average daily feed intake, birds assigned to the UnikePlus treatment had higher average daily gain and higher final body weight compared to the highest DON treatment (Fig. 2; P<0.10).

The rate of average daily gain and body weight of turkeys fed the other two additives (Products A or B) were not different from the high DON diet. There were no statistically significant differences in feed efficiency between treatments (Fig. 2).

Conclusion

This trial demonstrated the negative influence that DON (and possibly other trichothecenes) has on feed consumption and the subsequent impact this has on the feed intake and growth in young turkey poults. The mycotoxin deactivator UnikePlus reduced these negative effects and clearly performed better than two other common brands of mycotoxin deactivators. This year, special attention should be paid to contamination of feeds by DON and ZEN and appropriate measures taken to mitigate against the effects of their presence in animal feeds.

The last possible line of defence is the detoxification of mycotoxins in vivo. The addition of proven mycotoxin deactivators to animal feeds is a very common method to prevent mycotoxicosis and is an effective strategy to keep mycotoxin risk low under any and all conditions. ■

References are available from the author on request