

ARTICLE: NUTRIAD Poland 2017 mycotoxin survey in maize

Mycotoxins are a hidden danger in animal feed. Mycotoxin and mould contamination of crops and feed negatively impacts feed quality and crop production. As much as 20% of the world's cereal grains are generally known to be contaminated with measurable levels of mycotoxins (Placha *et al.*, 2009).



Picture 1: Maize harvested in Eastern Russia 2017
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The 2017 NUTRIAD Mycotoxin Survey included 81 maize samples from across Poland. All samples were collected almost immediately after the harvest from farms or animal feed production sites. Sample providers were advised to follow the principles of good sampling (Richard, 2000). Analytical personnel and/or laboratory staff were not involved in the sampling and did not influence any part of this procedure. More than 480 analyses were conducted to test for the occurrence of the 7 mycotoxins most frequently found in agricultural commodities intended for animal production. The survey provided an insight into the incidences of aflatoxin B₁ (Afb₁), ochratoxin A (OTA), zearalenone (ZEN), deoxynivalenol (DON), T-2 toxin, HT-2 toxin and fumonisins (FUM).

All 7 mycotoxins were analyzed by liquid chromatography tandem mass spectrometry (LC MS/MS). For the purpose of data analysis, non-detection levels were based on the limits of quantification (LOQ) of the test method for each mycotoxin: AfB1 <1 µg/kg; ZEN <10 µg/kg; DON <50 µg/kg; FUM <50 µg/kg; OTA <0,5 µg/kg; T-2 toxin + HT2-toxin <20 µg/kg.

Results

The results showed that 100% of the maize samples were contaminated with DON and 94% with ZEN (Table 1, Figure 1). Unexpectedly, 72 % of the samples contained FUM. None of the samples were contaminated with OTA. The average concentrations of all the recovered mycotoxins were medium (>LOQ but below EU recommendation levels). However, the maximum concentration of T-2 toxin/HT-2 toxin detected by this survey was 932 µg/kg which is several times higher than the maximum recommended concentration of T-2 toxin in unprocessed maize of 200 µg/kg set by the Commission regulation 165/2013. The highest concentration of DON detected in one of the samples reached 3510 µg/kg. The average concentration of ZEN, a mycotoxin affecting fertility performance of all animal species, peaked at 257 µg/kg which is high, especially for sows and piglets. As expected, the results showed a significantly high average concentration of DON, 1198 µg/kg. Several samples were concurrently contaminated with 2 to 4 mycotoxins which may lead to synergistic interactions. The maximum concentration of FUM toxin found in one of the maize samples was 4920 µg/kg. This high concentration is unusual in Poland and may have a significant effect on the health and performance of farm animals, especially swine and horses. Only 5% of samples were contaminated with low levels of aflatoxin B₁. Several samples were contaminated with the mycotoxins nivalenol, 3 and 15 acetyl-deoxynivalenol but these mycotoxins were included in the report.

Table 1 - Mycotoxin contamination of maize in Poland

	AfB1	DON	ZEN	T-2 toxin + HT-2 toxin	OTA	FUM
Number of tests	81	81	81	81	81	81
% of positive	5	100	94	33	0	72
Average of positive [µg/kg]	1,4	1198	257	130	0	606
Maximum [µg/kg]	2	3510	1330	932	0	4920

AfB₁=aflatoxin B₁; DON=deoxynivalenol; FUM=fumonisin; OTA=ochratoxin A; ZEN=zearalenone

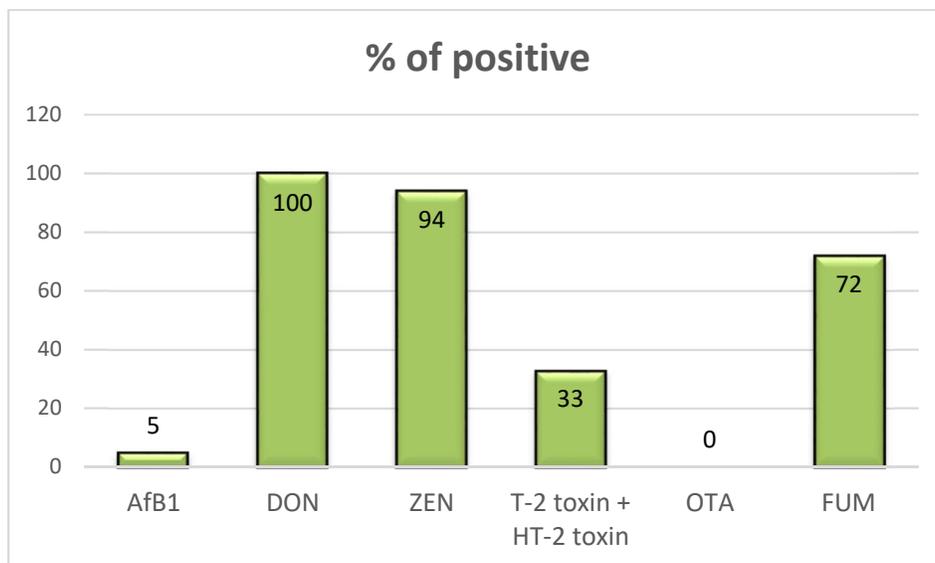


Figure 1 - Percentage of positive samples

AfB₁=aflatoxin B₁; DON=deoxynivalenol; FUM=fumonisin; OTA=ochratoxin A; ZEN=zearalenone

Comparing the contamination levels of DON and ZEN in maize for the years 2014, 2015, 2016 to 2017, it can be seen that the contamination levels in 2017 were significantly higher than in the previous 2 years but similar to the contamination levels in 2014 (Figure 2).

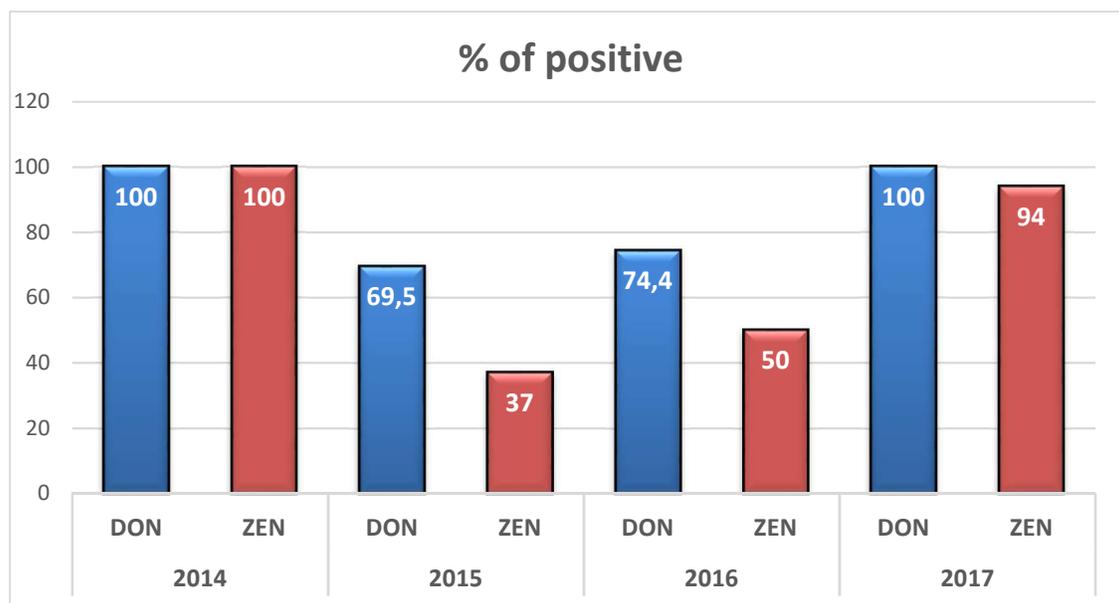


Figure 2 - Percentage of positive samples for the years 2014, 2015, 2016 and 2017 (>LOQ)

DON=deoxynivalenol; ZEN=zearalenone

Conclusion

The NUTRIAD 2017 mycotoxin survey concluded that the year's maize produce in Poland was of poor quality in terms of mycotoxin contamination. This is comparable with the results from 2014. Based on the results of this survey which was conducted immediately after the 2017 harvest, the year's maize crop in Poland should not automatically be considered safe for inclusion into finished feed rations for all animal species. A degree of vigilance is prudent.

Vigilance is always advisable as cereals in animal feeds originate from many sources. Some continental European cereals and South American soya harvested in 2017 have been shown to be contaminated with medium to high concentrations of mycotoxins.

The last possible line of defense 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.

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