Mycotoxin Report

Biomin®

Survey Report 2015

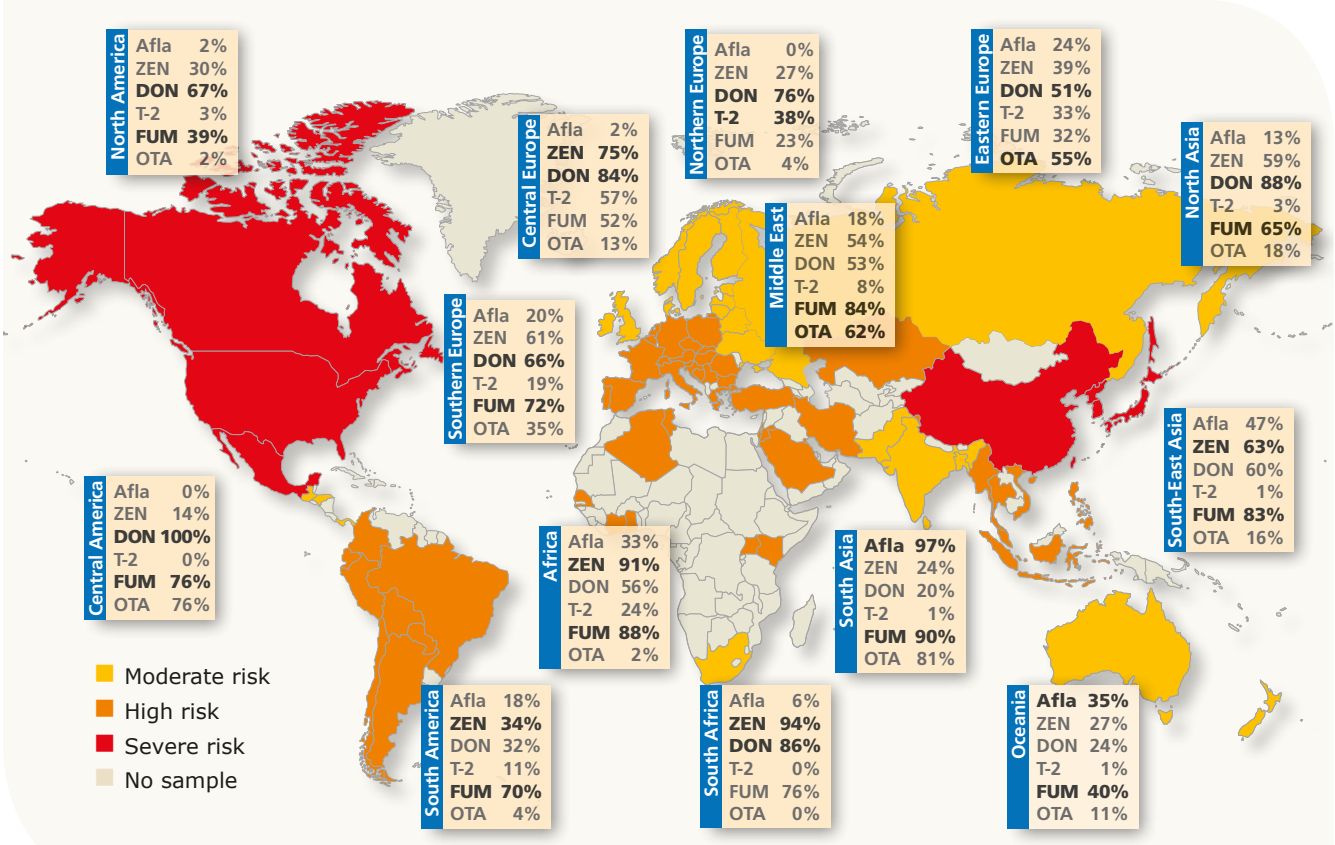
Your personal Mycotoxin Risk Management tool

Mycotoxin Survey 2015

The latest BIOMIN Mycotoxin Survey covers 8271 agricultural commodity samples from 75 countries worldwide in 2015. Over 31492 analyses have been conducted to identify the presence of mycotoxins worldwide and their potential risk to livestock animal production. The survey results provide an insight on the incidence of aflatoxins (Afla), zearalenone (ZEN), deoxynivalenol (DON), T-2 toxin (T-2), fumonisins (FUM) and ochratoxin A (OTA) in the primary components used for feed which include maize (corn), wheat, barley, soybean meal, dried distillers grains (DDGS) and silage, among others.

Main findings

- Livestock production in North America and North Asia faces severe threat from mycotoxin contamination.
- South America, Central Europe, Southern Europe, Middle East, Africa and South-East Asia all face high threat from mycotoxins.
- Globally, deoxynivalenol poses the most frequent threat to livestock though levels of fumonisins and zearalenone also present a cause for concern.



Mycotoxins displayed: aflatoxins (Afla), zearalenone (ZEN), deoxynivalenol (DON), T-2 toxin (T-2), fumonisins (FUM) and ochratoxin A (OTA)

Figure 1. *Threat of mycotoxin-related risks to livestock for the six most common mycotoxins based upon threshold levels per mycotoxin according to most sensitive species.* ***Low risk*** *indicates that average levels of single mycotoxin presence for a given zone do not exceed minimum risk thresholds for livestock. The average level does not preclude specific, severe instances of mycotoxin contamination in farm or fields locally, nor does it account for the negative impacts of multiple mycotoxin presence.* ***Moderate risk*** *indicates the presence of one to two major mycotoxins at levels known to cause harm in animals.* ***High risk*** *indicates the presence of three to four major mycotoxins at levels known to cause harm in animals.* ***Severe risk*** *indicates the presence of five or more major mycotoxin at levels known to cause harm in animals.*

Mycotoxin analysis: occurrence versus risk

Mycotoxin testing and analysis methods have advanced considerably over the last years resulting in highly sensitive state-of-the-art techniques used as part of the BIOMIN Mycotoxin Survey (Spectrum 380®: LC-MS/MS based multi-mycotoxin analysis), which now permit the simultaneous detection of over 380 mycotoxins or metabolites. Because of the powerful sensitivity of these tools, the latest results feature a mycotoxin risk map not only based upon the presence of mycotoxins, but also on their contamination levels associated with known health risks to livestock.

Figure 1 provides the mycotoxin occurrence data for each region as a percentage of all samples tested. A region's overall risk level is determined by the number of single mycotoxins with average contamination levels (measured in parts per billion, ppb) in excess of the maximum risk threshold levels for livestock (2 ppb for Afla, 10 ppb for OTA, 50 ppb for ZEN and for T-2, 150 ppb for DON and 500 ppb for FUM). The risk thresholds proposed take in accordance practical experience in the field and in scientific investigations reflecting as closely as possible field situations and take into account the most sensitive species for each mycotoxin. The global mycotoxin trends rely upon single mycotoxin occurrence, therefore these risk indications may actually understate the threat posed by mycotoxins to animals given their known synergistic effects (the presence of multiple mycotoxins compounds the potential harm) and subclinical effects (even low levels of mycotoxin contamination can impair animal health and performance).

Global mycotoxin trends

In 2015, 84 % of all samples contained at least one mycotoxin and over 50 % contaminated more. As in previous years, DON and FUM are once again the main mycotoxins present in over half of the samples tested worldwide. DON poses the most frequent threat to livestock with a prevalence of 73 % and average contamination level of 1090 ppb. 56 % of all samples exceed the risk thresholds for livestock. Levels of FUM (found in 61 % of samples, 1089 ppb on average) and ZEN (56 % of samples, 253 ppb on average) also present a cause for concern. 21 % of samples tested contained FUM in concentrations that exceed risk threshold levels. 31 % of samples tested contained ZEN in concentrations that exceed risk threshold levels.

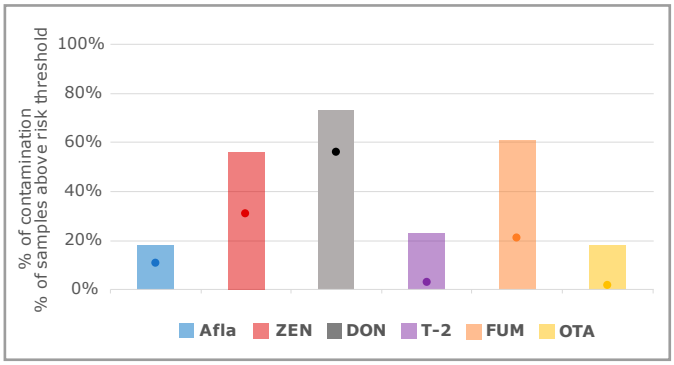


Figure 2. *Worldwide prevalence of major mycotoxins. Bars represent the % of contaminated samples. Dots display the occurrence of mycotoxins above the risk threshold*

Afla were present in 18 % of samples at 40 ppb on average, 11 % of all samples exceeded the risk thresholds. T-2 was found in 23 % of samples at an average of 26 ppb. Positive occurrence was 18 % for OTA at an average of 7 ppb with more than 10 % of these exceeding risk threshold levels. *Figure 2* displays the occurrence of positive samples and occurrence above risk threshold levels.

Regional insights

Figure 3 provides a more detailed view of mycotoxins occurrence by geographic regions, highlighting the specific threats posed by mycotoxins that can vary from one region to another. Overall, Europe and Asia face the most severe threat of mycotoxin-related risks to livestock. Both regions registered average concentrations of at least five major mycotoxins exceeding the risk threshold levels. Deoxynivalenol is the most prevalent mycotoxin for all regions except South America and Middle East, where fumonisins poses the highest risk to livestock production.

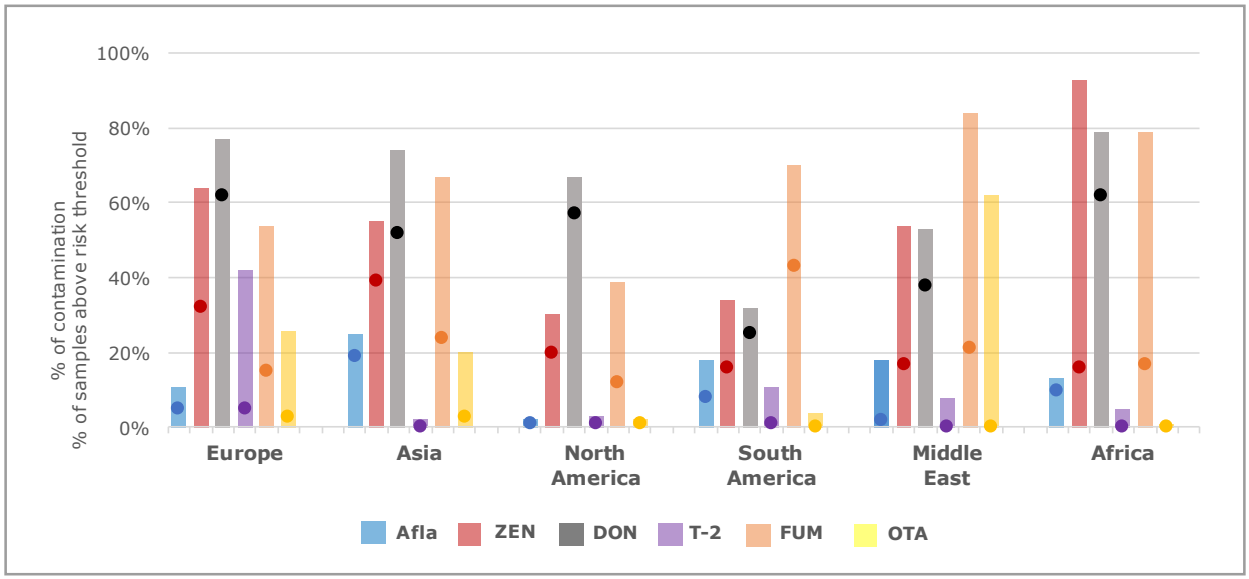


Figure 3. *Prevalence of major mycotoxins by region. Bars represent the % of contaminated samples. Dots display the occurrence of mycotoxins above the risk threshold*

Table 1 provides further information on the number of samples tested, average contamination levels and maximum contamination values.

***Table 1** – Detailed results of mycotoxin occurrence by region*

		Afla	ZEN	DON	T-2	FUM	OTA
Europe	Number of samples tested	1 163	2 894	3 684	2 051	1 543	1 188
	% of contaminated samples	11 %	64 %	77 %	42 %	54 %	26 %
	Average of positives (ppb)	6	213	1 288	25	898	7
	Maximum (ppb)	153	8 888	34 861	685	15 383	150
Asia	Number of samples tested	2 360	2 357	2 420	1 077	1 824	1 454
	% of contaminated samples	25 %	55 %	74 %	2 %	67 %	20 %
	Average of positives (ppb)	59	368	857	39	1 032	7
	Maximum (ppb)	9 404	9 432	84 860	171	16 258	259
North America	Number of samples tested	484	495	359	354	481	423
	% of contaminated samples	2 %	30 %	67 %	3 %	39 %	2 %
	Average of positives (ppb)	16	244	1 132	44	974	32
	Maximum (ppb)	108	12 900	26 294	223	16 300	200
South America	Number of samples tested	995	668	333	411	444	202
	% of contaminated samples	18 %	34 %	32 %	11 %	70 %	4 %
	Average of positives (ppb)	6	131	545	28	2 235	2
	Maximum (ppb)	138	2 593	4 195	65	36 489	12
Middle East	Number of samples tested	94	115	117	40	80	26
	% of contaminated samples	18 %	54 %	53 %	8 %	84 %	62 %
	Average of positives (ppb)	1	62	446	20	513	3
	Maximum (ppb)	8	367	1 983	45	2 534	9
Africa	Number of samples tested	182	183	182	182	183	182
	% of contaminated samples	13 %	93 %	79 %	5 %	79 %	1 %
	Average of positives (ppb)	43	41	486	8	599	0
	Maximum (ppb)	258	858	4 974	47	4 368	0

Feedstuffs

Finished feed, maize (corn) and DDGS are the commodities most affected by mycotoxins, with the average contamination levels of Afla, ZEN, DON, T-2 and FUM all above risk threshold levels (*Figure 4*). DON constitutes the most frequent threat to commodities used for feed, followed by ZEN and FUM. *Table 2* provides further information on the number of samples tested, average contamination levels and maximum contamination values.

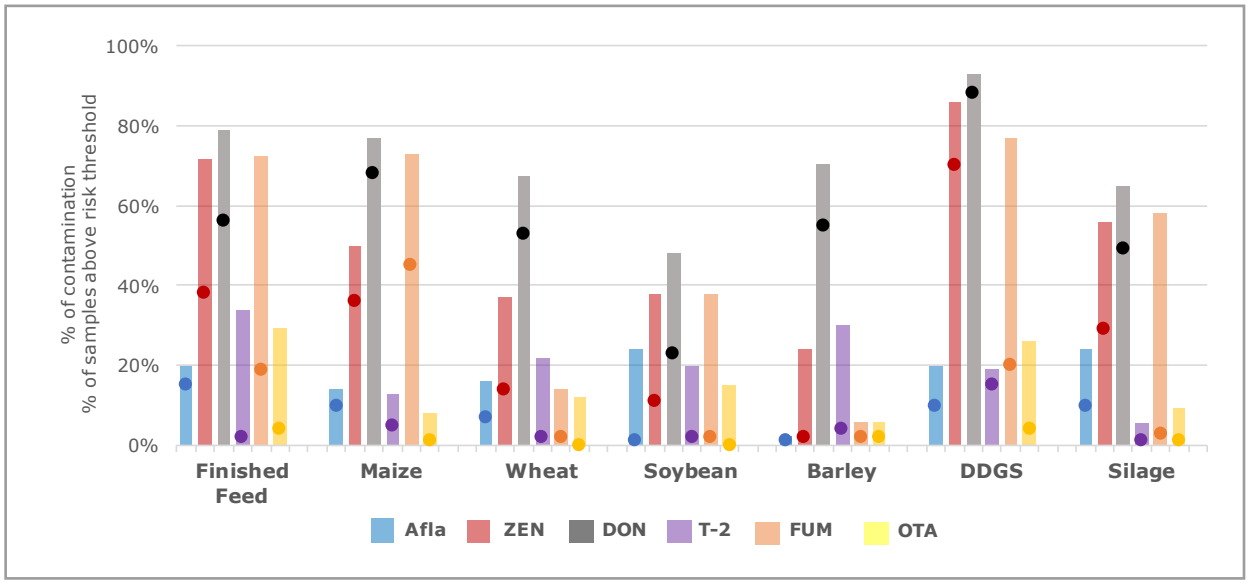


***Figure 4.** Mycotoxin occurrence per agricultural commodity*

Table 2 *– Detailed results of mycotoxin occurrence by agricultural commodity*

		Afla	ZEN	DON	T-2	FUM	OTA
Finished Feed	Number of samples tested	2 111	2 605	2 745	1 678	1 863	1 428
	% of contaminated samples	20 %	71 %	79 %	34 %	72 %	29 %
	Average of positives (ppb)	25	218	756	14	729	7
	Maximum (ppb)	490	9 432	16 510	346	15 383	259
Maize	Number of samples tested	1 610	1 764	1 666	813	1 209	755
	% of contaminated samples	13 %	48 %	76 %	12 %	74 %	7 %
	Average of positives (ppb)	41	310	1547	76	2 017	7
	Maximum (ppb)	733	8 888	19 180	484	36 489	200
Wheat	Number of samples tested	396	645	770	342	331	278
	% of contaminated samples	16 %	37 %	68 %	22 %	14 %	12 %
	Average of positives (ppb)	5	98	960	21	356	3
	Maximum (ppb)	161	3 274	15 976	163	5 334	9
Soybean	Number of samples tested	140	152	153	185	133	124
	% of contaminated samples	24 %	38 %	48 %	20 %	38 %	15 %
	Average of positives (ppb)	8	48	312	35	129	1
	Maximum (ppb)	220	372	1 147	117	2 300	4
Barley	Number of samples tested	97	370	464	220	108	101
	% of contaminated samples	2 %	24 %	70 %	30 %	6 %	6 %
	Average of positives (ppb)	2	29	332	25	634	30
	Maximum (ppb)	4	758	3 451	160	2 574	150
DDGS	Number of samples tested	83	101	92	47	69	47
	% of contaminated samples	20	86 %	93 %	19 %	77 %	26 %
	Average of positives (ppb)	10	755	3 336	110	1 152	6
	Maximum (ppb)	62	7 279	64 588	383	8 709	19
Corn silage	Number of samples tested	394	463	556	388	414	373
	% of contaminated samples	24 %	56 %	65 %	5%	57 %	9 %
	Average of positives (ppb)	5	236	1 514	65	210	4
	Maximum (ppb)	153	6 239	34 861	685	5 683	32

> ABOUT THE SURVEY

The annual BIOMIN Mycotoxin Survey, the longest running and most comprehensive of its kind, covers 8271 agricultural commodity samples from 75 countries, based on thousands of analyses conducted to identify the presence and potential risk posed to livestock animal production by mycotoxins worldwide.

> ACKNOWLEDGEMENT

Special thanks go to Biofarma Feedlab, Argentina for sharing their mycotoxin analysis results being part of this survey.

> DISCLAIMER: BIOMIN GmbH and the authors had no influence on the sampling process of the investigated samples. Therefore, the contamination levels found in the samples do not necessarily reflect the actual contamination level of these regions/ commodities. However, the samples provide more insight into the range and levels of mycotoxins which can be found in diverse commodities of various regions.

> ABOUT BIOMIN

BIOMIN is a world-leading company focusing on livestock health and nutrition. Leveraging on the latest technologies and extensive R&D, BIOMIN offers sustainable quality products which include solutions for mycotoxin risk management and gut performance which address dietary requirements for livestock.

> Impressum:

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