

Mycotoxin Risk Management in Animal Production– short version

5th International Animal Nutrition Congress,
December 11–14, 2025

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Mycotoxin Risk Management EMEA

Feed production in Turkey

Over 27.8 million tons in 2023

1. **Turkey compound feed production:**
 1. 1st in the EU
 2. 7th Globally
 3. Increased by 400% over the past 20 years
2. **The largest share:**
 1. Poultry (broilers and layers)
 2. Cattle/dairy and small ruminants.
3. **The top-3 animal products exported:**
 1. Poultry meat
 2. Milk cream
 3. Seabass

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MILLER *Refereed*
WORLD MILLING AND PULVER TECHNOLOGIES REFERRED MAGAZINE

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Turkey leads compound feed

production in EU, ranks 7th

worldwide

TÜRKİYEMBİR President Ülkü Karakuş

Key Challenges in Feed Production



1. Rising feed cost
2. Dependence on imported feed ingredients:
 - corn, soy and by-products (bran, pulp, etc.)
3. Reliance on imported breeding materials,
 - hatching eggs and day-old chicks (UK,FR,ES)
4. Poultry – avian influenza HPAI outbreaks
5. Cattle – FMD outbreaks
6. Animal movement restrictions
7. New strict feed safety and quality regulations

World Mycotoxin Survey

World Overview 2025 Jan-Sep

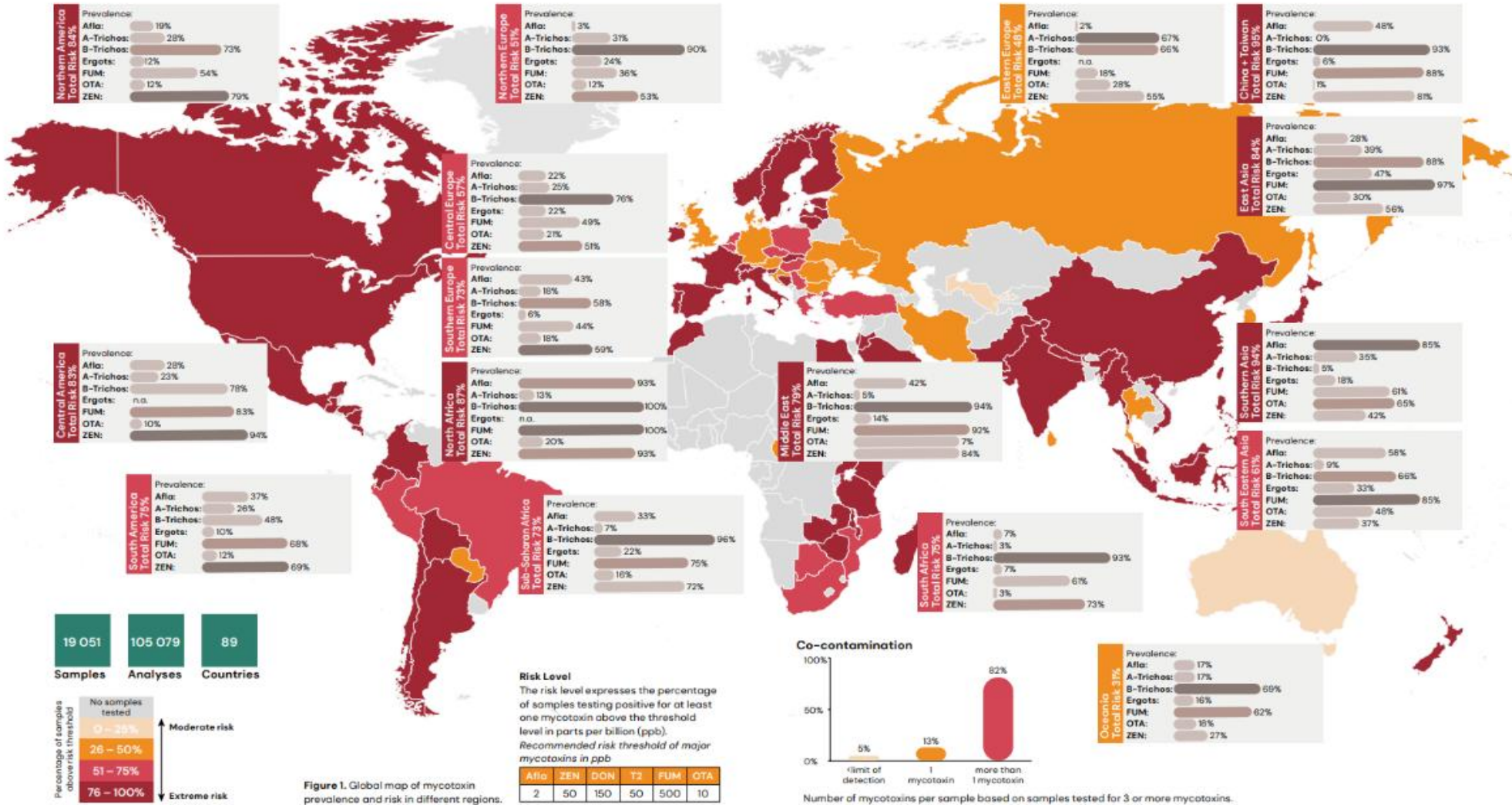


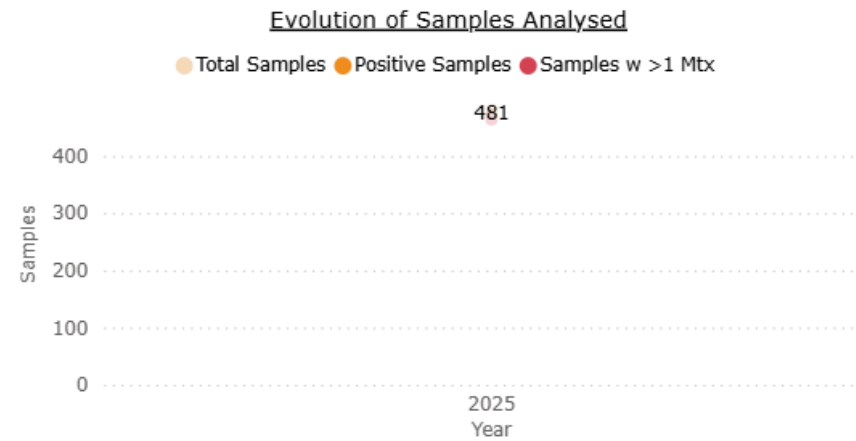
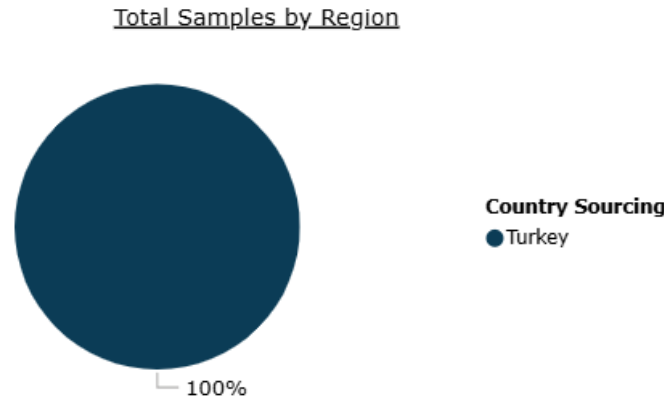
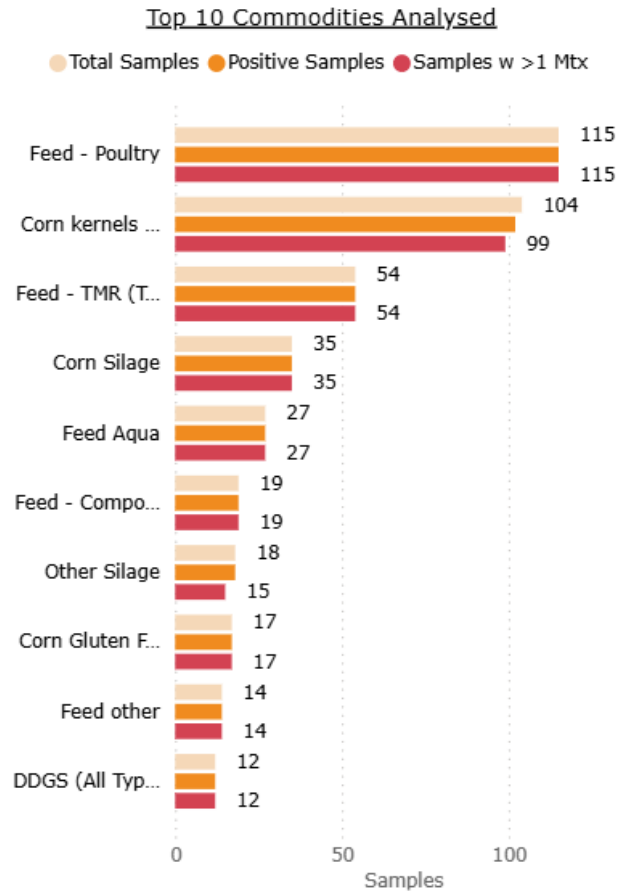
Figure 1. Global map of mycotoxin prevalence and risk in different regions.

All commodities sourced in TR between Jan – Nov 2025

Overview of Samples

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Overview of Samples



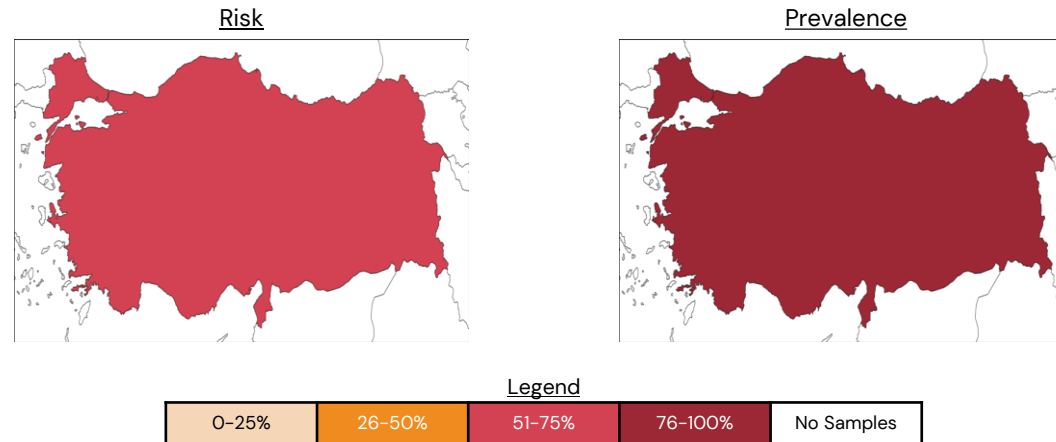
Sample Type	Total Samples
Feed - Poultry	115
Corn kernels (whole)/meal (ground)	104
Feed - TMR (Total Mixed Ration Ruminant)	54
Corn Silage	35
Feed Aqua	27
Feed - Compound Ruminant	19
Other Silage	18
Corn Gluten Feed/Meal	17
Feed other	14
DDGS (All Types except Corn)	12
Alfalfa Meal/Pellet	7
Wheat Grain	7
Barley (All Types)	6
Feed - Aqua	6
Soya Bean Meal (Extracted)	6
Soya Full Fat	6
Sunflower Meal (Extracted)	6
Hay (All Types)	5
Fish Meal	3
Total	481

Date of analysis	Location	Region/Subregion/Country	Mycotoxin Group	Mycotoxin	Test Method	Sample Type	Total Samples
01/01/2025 - 23/11/2025	Sourcing	TR	All	All	All	All	481

Contamination Map

All commodities sourced in TR between Jan - Dec 2025

Mycotoxin Group	Total samples	Prevalence	Threshold (ppb)	% Above risk threshold	Average of positives (ppb)	Median of positives (ppb)
Aflatoxins	542	39%	2	17%	7	2
A-Trichothecenes	530	13%	50	2%	30	25
B-Trichothecenes	542	73%	150	26%	289	105
Ergot Alkaloids	530	2%	30	0%	23	25
Fumonisin	542	86%	500	27%	651	280
OTA	530	33%	10	7%	11	5
ZEN	542	45%	50	4%	30	5
Group Total	542	95%	2	54%		



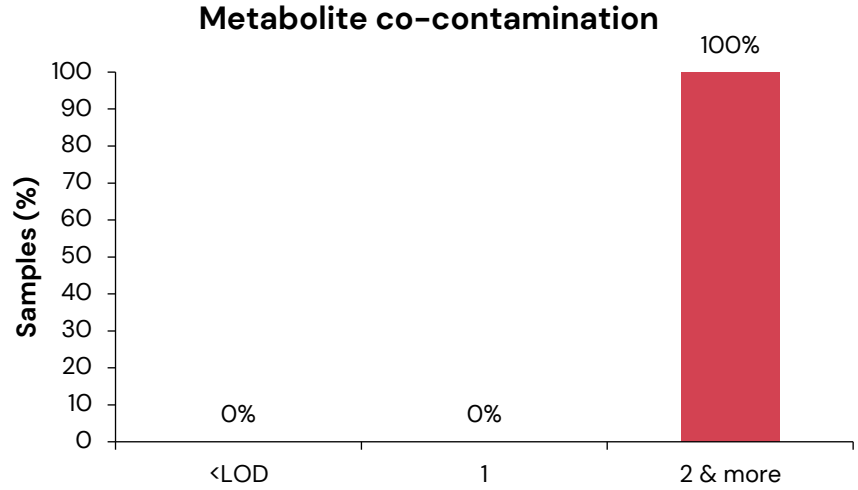
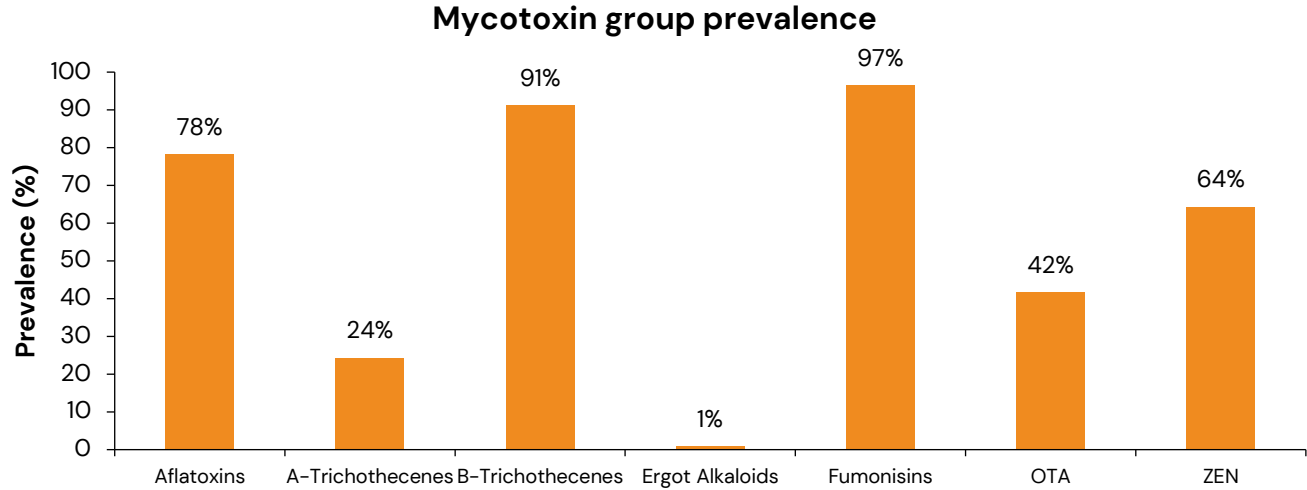
Detailed filter values can be found in the speaker notes below.

Feed – Poultry sourced in TR between Jan – Nov 2025



Contamination overview – main MTX groups

	Aflatoxins	A-Trichothecenes	B-Trichothecenes	Ergot Alkaloids	Fumonisin	OTA	ZEN
Total samples	115	115	115	115	115	115	115
Prevalence	78%	24%	91%	1%	97%	42%	64%
% Above risk threshold	29%	0%	38%	0%	31%	6%	1%
Threshold (ppb)	2	50	150	30	500	10	50
Average of positives (ppb)	2	24	183	15	392	7	8
Median of positives (ppb)	1	15	128	15	254	3	5
Maximum (ppb)	16	40	1,085	15	1,696	111	67



Detailed filter values can be found in the speaker notes below.

Feed Poultry Turkey 2025

Contamination overview –



Spectrum Top 50 Mycotoxin Ranking

Note: This page has been filtered for samples that have been tested for 10 or more mycotoxins.

Total Samples

115

Legend

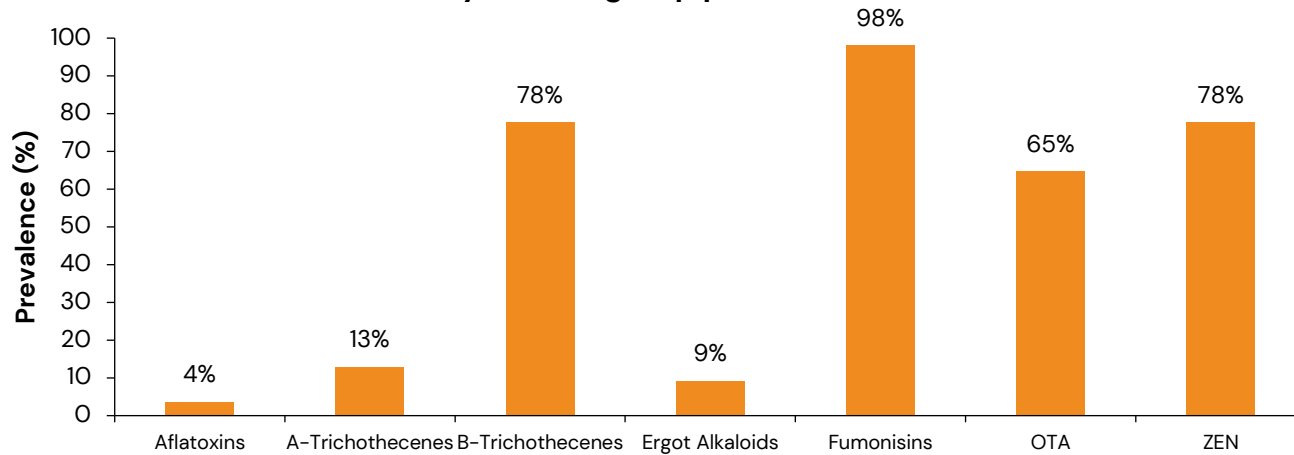
Aflatoxin B2, G1, G2 and M1	A-Trichothecenes
B-Trichothecenes	Emerging mycotoxins
Ergot alkaloids	Masked and modified mycotoxins
Ochratoxin B	Regulated or guideline mycotoxins
Zearalenone metabolites	

Mycotoxin	Prevalence Visual	Prevalence	Max of Positives (ppb)	Average Positives (ppb)
Fumonisin B1	[Progress bar]	97%	1,208	273
Fumonisin B2	[Progress bar]	93%	320	79
Moniliformin	[Progress bar]	92%	676	99
Deoxynivalenol	[Progress bar]	91%	1,085	181
Beauvericin	[Progress bar]	90%	111	21
Fumonisin B3	[Progress bar]	82%	183	50
Enniatin B	[Progress bar]	81%	127	7
Aflatoxin B1	[Progress bar]	78%	15	2
Zearalenone	[Progress bar]	64%	67	8
Enniatin B1	[Progress bar]	63%	26	2
Alternariol	[Progress bar]	63%	77	11
Ochratoxin A	[Progress bar]	42%	111	7
Enniatin A1	[Progress bar]	31%	8	2
Enniatin A	[Progress bar]	29%	4	2
T-2 Toxin	[Progress bar]	21%	15	15
Sterigmatocystin	[Progress bar]	13%	49	10
HT-2 Toxin	[Progress bar]	10%	25	25
Mycophenolic Acid	[Progress bar]	8%	25	25
Aflatoxin G1	[Progress bar]	6%	1	1
Aflatoxin B2	[Progress bar]	5%	1	1
15-Acetyldeoxynivalenol	[Progress bar]	3%	50	50
Deoxynivalenol-3-Glucoside	[Progress bar]	3%	25	25
Beta-Zearalenol	[Progress bar]	2%	13	13
Ochratoxin B	[Progress bar]	2%	2	2

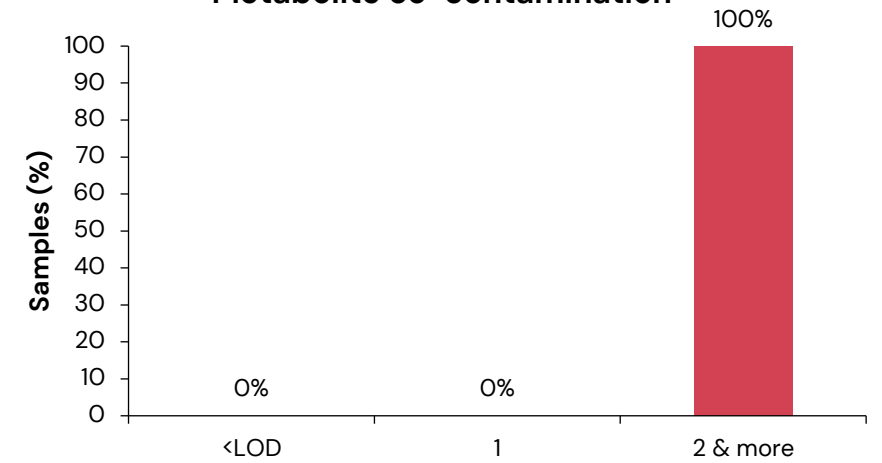
Feed – TMR sourced in TR between Jan – Nov 2025

	Aflatoxins	A-Trichothecenes	B-Trichothecenes	Ergot Alkaloids	Fumonisin	OTA	ZEN
Total samples	54	54	54	54	54	54	54
Prevalence	4%	13%	78%	9%	98%	65%	78%
% Above risk threshold	2%	0%	44%	2%	9%	9%	7%
Threshold (ppb)	2	50	150	30	500	10	50
Average of positives (ppb)	2	19	473	32	279	8	28
Median of positives (ppb)	2	15	187	25	114	5	15
Maximum (ppb)	3	34	4,095	59	2,548	104	196

Mycotoxin group prevalence



Metabolite co-contamination



Detailed filter values can be found in the speaker notes below.

Spectrum Top 50 Mycotoxin Ranking

Note: This page has been filtered for samples that have been tested for 10 or more mycotoxins.



Mycotoxin	Prevalence Visual	Prevalence	Max of Positives (ppb)	Average Positives (ppb)
Enniatin B	<div style="width: 100%;"></div>	100%	439	28
Fumonisin B1	<div style="width: 98%;"></div>	98%	1,855	181
Beauvericin	<div style="width: 96%;"></div>	96%	204	29
Enniatin B1	<div style="width: 93%;"></div>	93%	211	14
Fumonisin B2	<div style="width: 89%;"></div>	89%	571	79
Deoxynivalenol	<div style="width: 78%;"></div>	78%	3,869	420
Zearalenone	<div style="width: 78%;"></div>	78%	196	28
Alternariol	<div style="width: 72%;"></div>	72%	146	29
Ochratoxin A	<div style="width: 65%;"></div>	65%	104	8
Enniatin A1	<div style="width: 56%;"></div>	56%	114	11
Moniliformin	<div style="width: 54%;"></div>	54%	137	28
Fumonisin B3	<div style="width: 44%;"></div>	44%	232	59
Sterigmatocystin	<div style="width: 24%;"></div>	24%	23	7
Mycophenolic Acid	<div style="width: 22%;"></div>	22%	300	63
Deoxynivalenol-3-Glucoside	<div style="width: 20%;"></div>	20%	414	99
Enniatin A	<div style="width: 15%;"></div>	15%	96	20
HT-2 Toxin	<div style="width: 11%;"></div>	11%	34	18
Nivalenol	<div style="width: 11%;"></div>	11%	436	147
Ergometrine	<div style="width: 9%;"></div>	9%	59	32
15-Acetyldeoxynivalenol	<div style="width: 7%;"></div>	7%	123	61
Alpha-Zearalenol	<div style="width: 6%;"></div>	6%	30	20
Aflatoxin B1	<div style="width: 4%;"></div>	4%	3	2
T-2 Toxin	<div style="width: 4%;"></div>	4%	13	13
Beta-Zearalenol	<div style="width: 2%;"></div>	2%	26	26

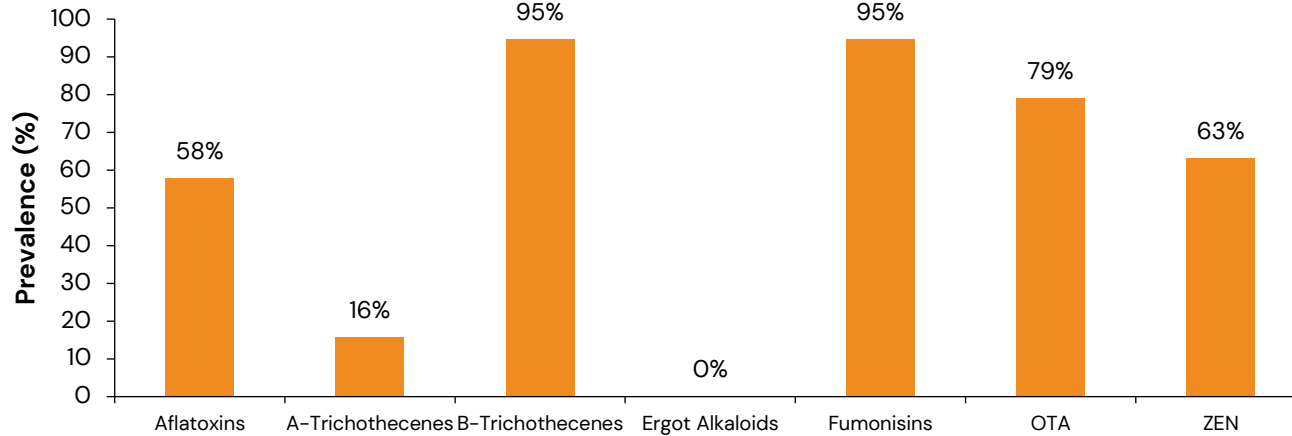
Contamination overview

internal

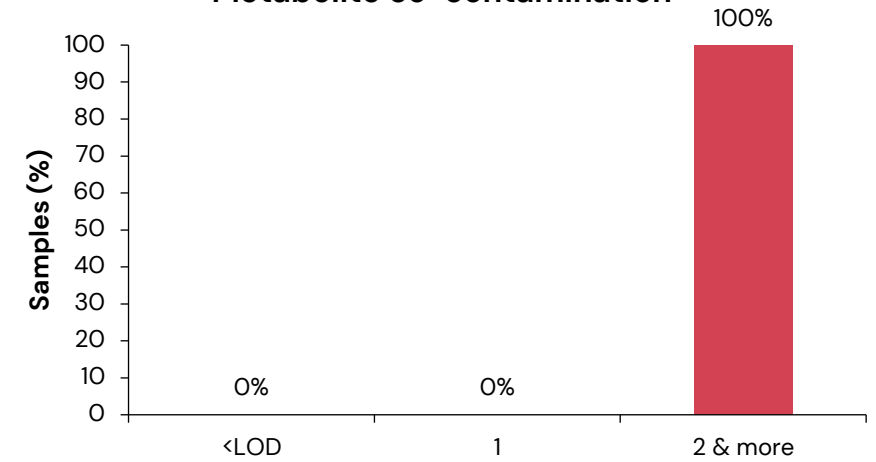
Feed – Compound Ruminant sourced in TR between Jan – Nov 2025

	Aflatoxins	A-Trichothecenes	B-Trichothecenes	Ergot Alkaloids	Fumonisin	OTA	ZEN
Total samples	19	19	19	19	19	19	19
Prevalence	58%	16%	95%	0%	95%	79%	63%
% Above risk threshold	11%	0%	42%	0%	11%	26%	0%
Threshold (ppb)	2	50	150	30	500	10	50
Average of positives (ppb)	2	22	302		218	9	13
Median of positives (ppb)	1	25	126		157	6	14
Maximum (ppb)	14	25	1,322		656	32	26

Mycotoxin group prevalence



Metabolite co-contamination



Detailed filter values can be found in the speaker notes below.

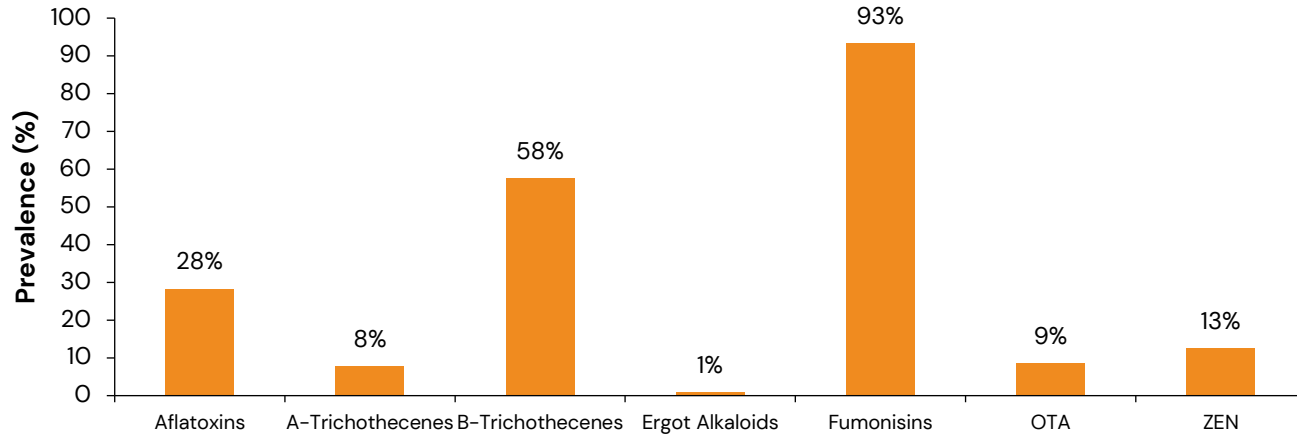
Contamination overview

internal

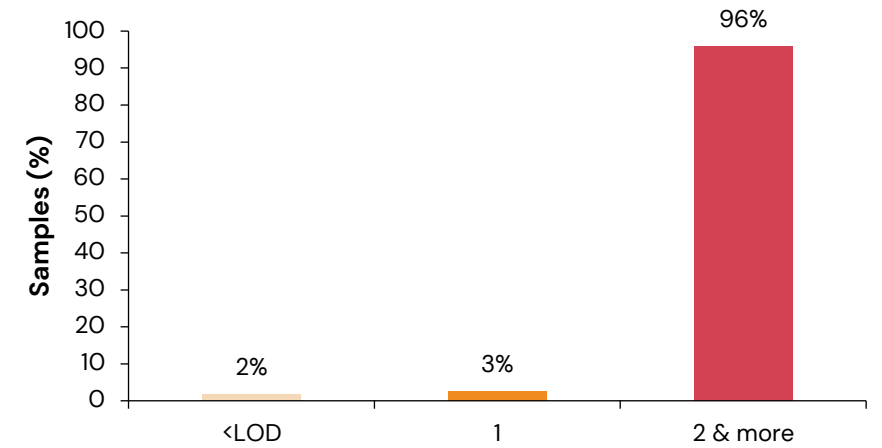
Corn kernels (whole)/meal (ground) sourced in TR between Jan – Nov 2025

	Aflatoxins	A-Trichothecenes	B-Trichothecenes	Ergot Alkaloids	Fumonisin	OTA	ZEN
Total samples	120	115	120	115	120	115	120
Prevalence	28%	8%	57%	1%	93%	9%	12%
% Above risk threshold	20%	2%	8%	0%	44%	3%	2%
Threshold (ppb)	2	50	150	30	500	10	50
Average of positives (ppb)	24	34	92	3	1,044	53	22
Median of positives (ppb)	5	25	55	3	441	4	12
Maximum (ppb)	135	69	983	3	6,560	338	111

Mycotoxin group prevalence



Metabolite co-contamination



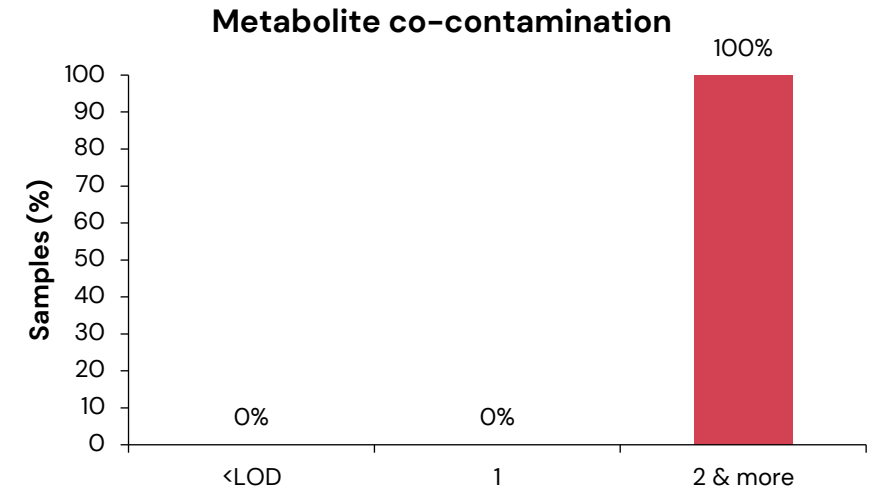
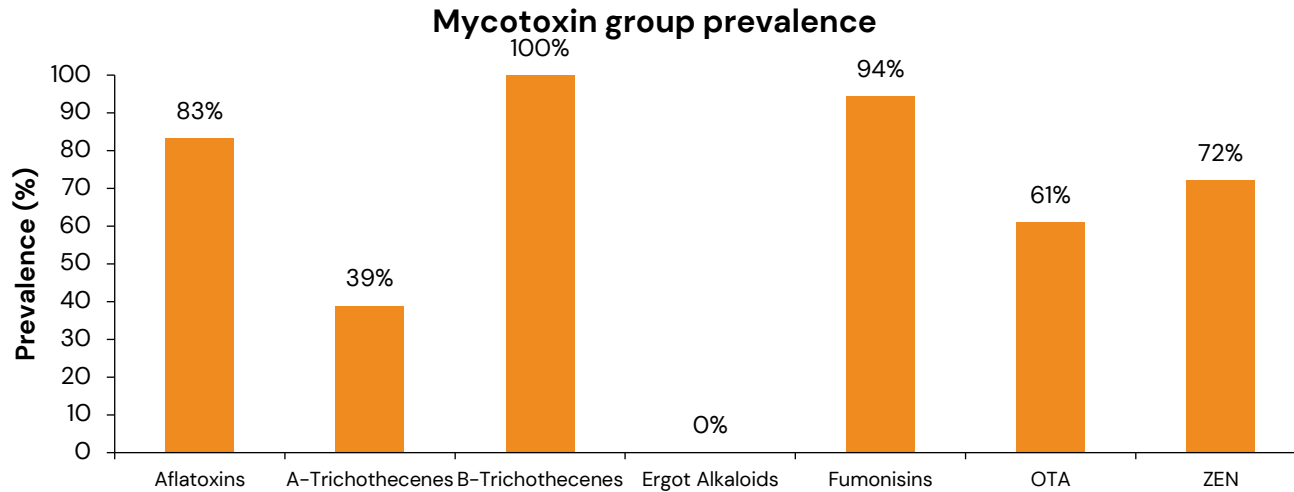
Detailed filter values can be found in the speaker notes below.

Contamination overview

internal

Corn Gluten Feed/Meal sourced in TR between Jan - Nov 2025

	Aflatoxins	A-Trichothecenes	B-Trichothecenes	Ergot Alkaloids	Fumonisin	OTA	ZEN
Total samples	18	18	18	18	18	18	18
Prevalence	83%	39%	100%	0%	94%	61%	72%
% Above risk threshold	67%	11%	44%	0%	78%	33%	17%
Threshold (ppb)	2	50	150	30	500	10	50
Average of positives (ppb)	12	44	1,097		2,607	23	131
Median of positives (ppb)	9	40	139		2,769	10	19
Maximum (ppb)	53	77	16,121		5,094	132	1,109



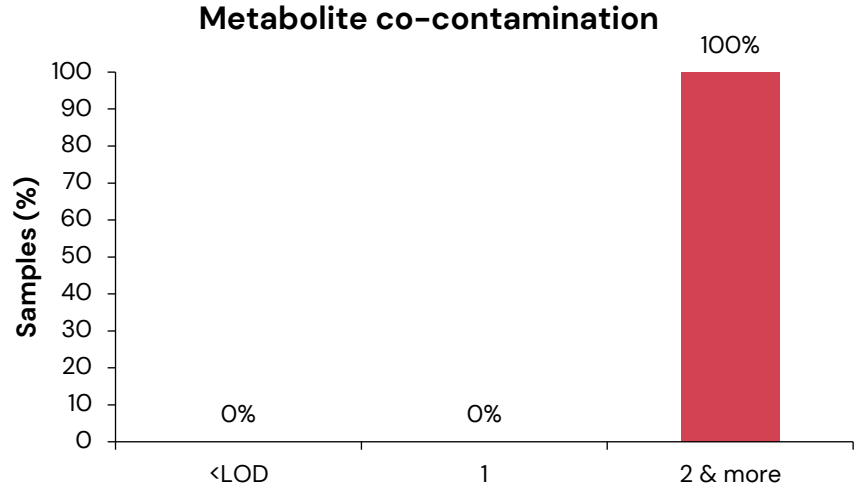
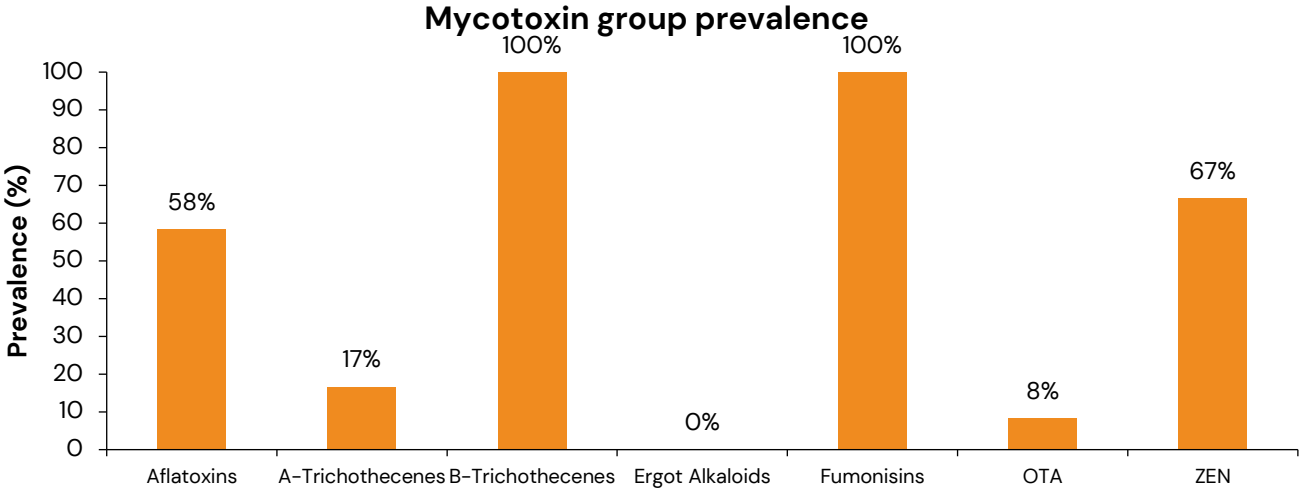
Detailed filter values can be found in the speaker notes below.

Contamination overview

internal

DDGS (All Types except Corn) sourced in TR between Jan – Nov 2025

	Aflatoxins	A-Trichothecenes	B-Trichothecenes	Ergot Alkaloids	Fumonisin	OTA	ZEN
Total samples	12	12	12	12	12	12	12
Prevalence	58%	17%	100%	0%	100%	8%	67%
% Above risk threshold	17%	0%	92%	0%	58%	8%	67%
Threshold (ppb)	2	50	150	30	500	10	50
Average of positives (ppb)	2	28	1,877		1,610	12	229
Median of positives (ppb)	1	28	706		1,369	12	154
Maximum (ppb)	6	40	8,678		4,661	12	700



Detailed filter values can be found in the speaker notes below.

Mycotoxin deactivating strategy

Requirement for mycotoxin deactivating products

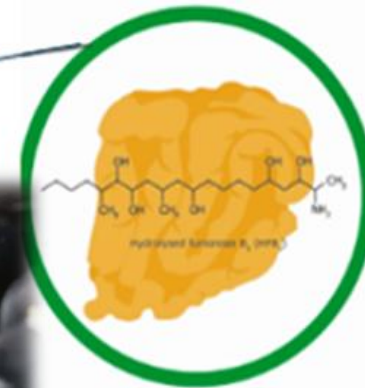
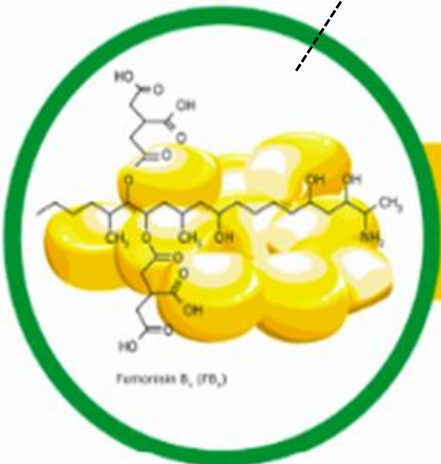


- safe
- good technological properties
- high detoxification activity
- regulatory approval



- stable in feed
- withstand processing of feed
- **no negative impact**

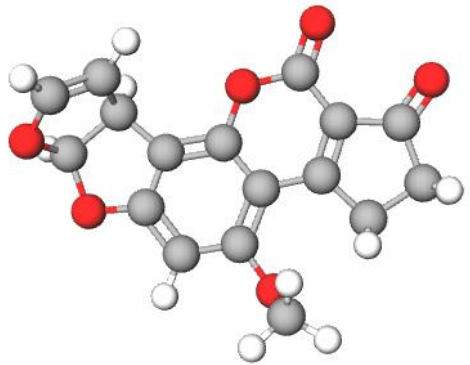
- GIT compatible & stable
- **reaction – fast, specific & complete**
- product & metabolites –safe



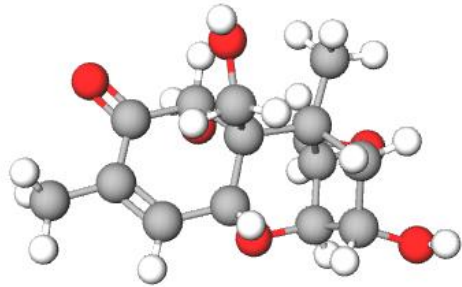
Mycotoxins – diversity in structures

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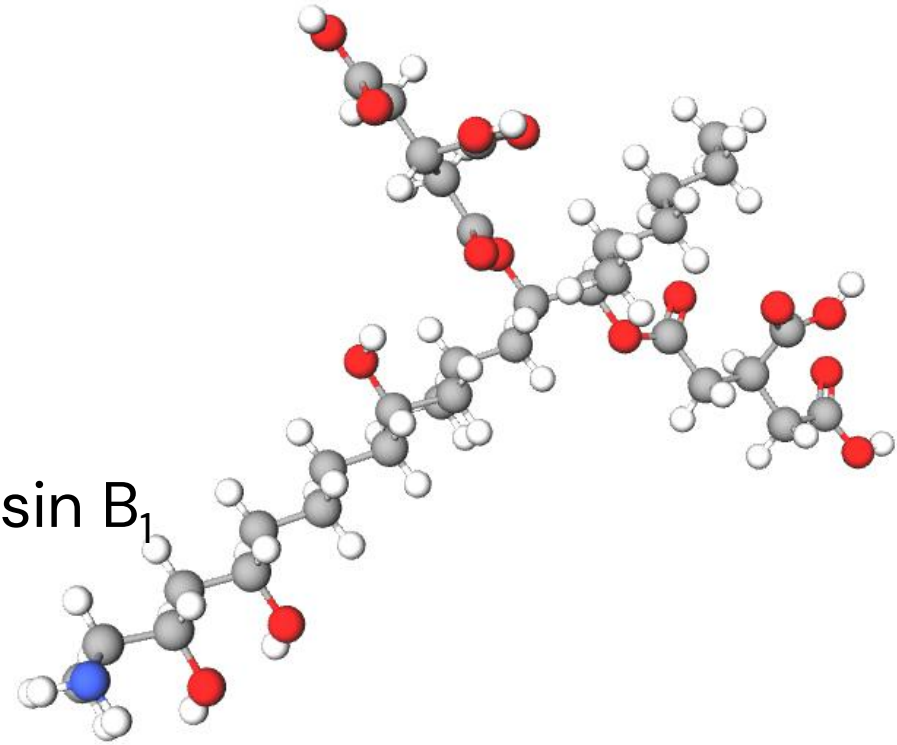
Need for a toolbox of different detoxification strategies



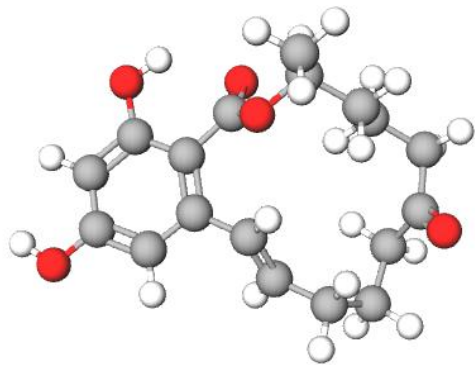
Aflatoxin



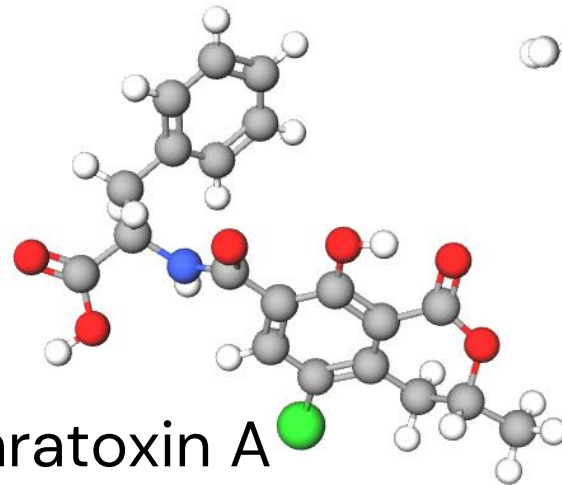
Deoxynivalenol



Fumonisin B₁



Zearalenone

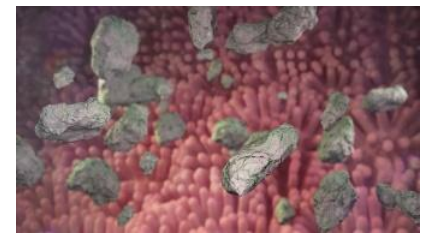


Ochratoxin A

<http://molview.org>

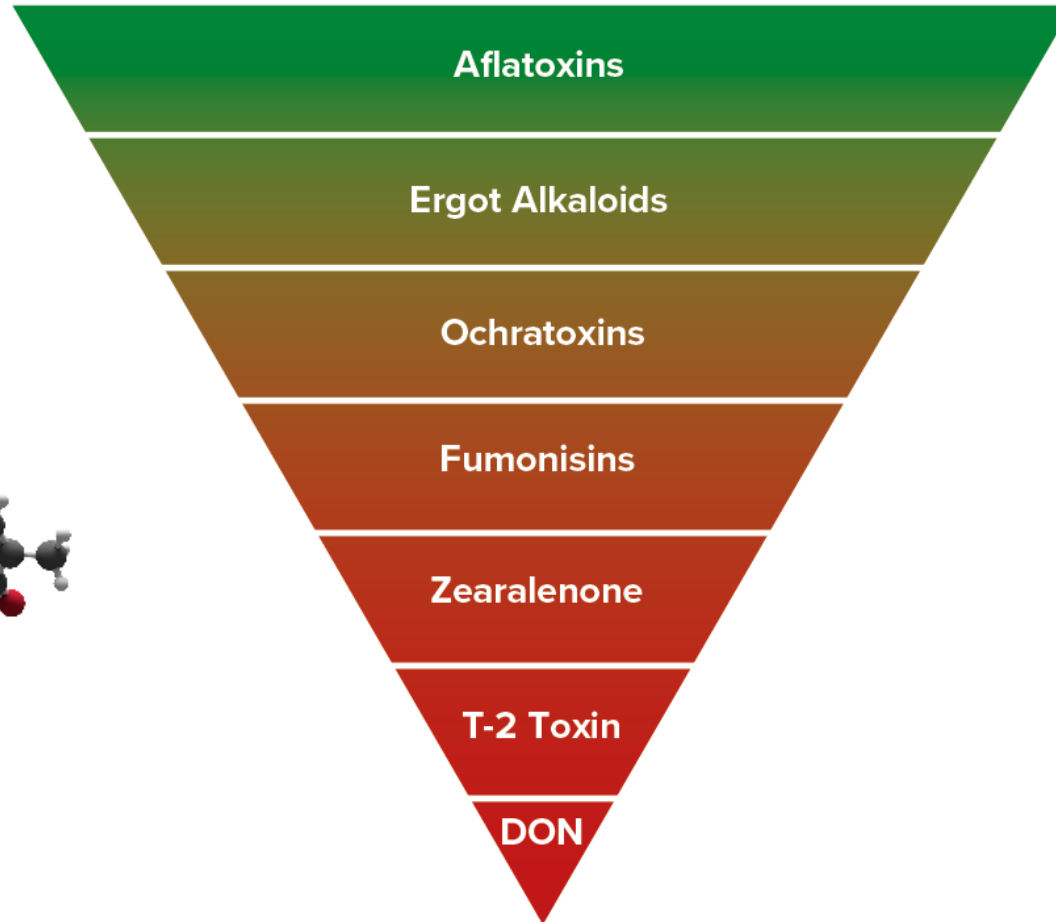
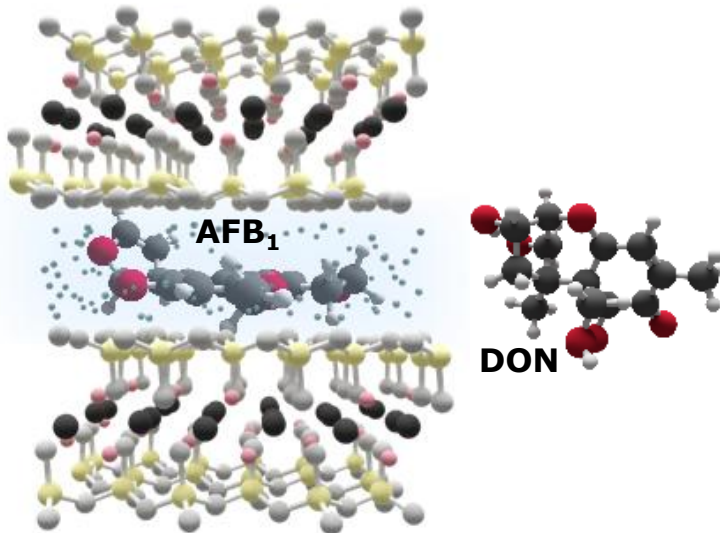
dsm-firmenich ●●●

Adsorption (elimination of toxins)



EU authorized bentonite enables the elimination of the toxin by adsorption

COMMISSION IMPLEMENTING REGULATION (EU) No 1060/2013
of 29 October 2013
concerning the authorisation of bentonite as a feed additive for all animal species

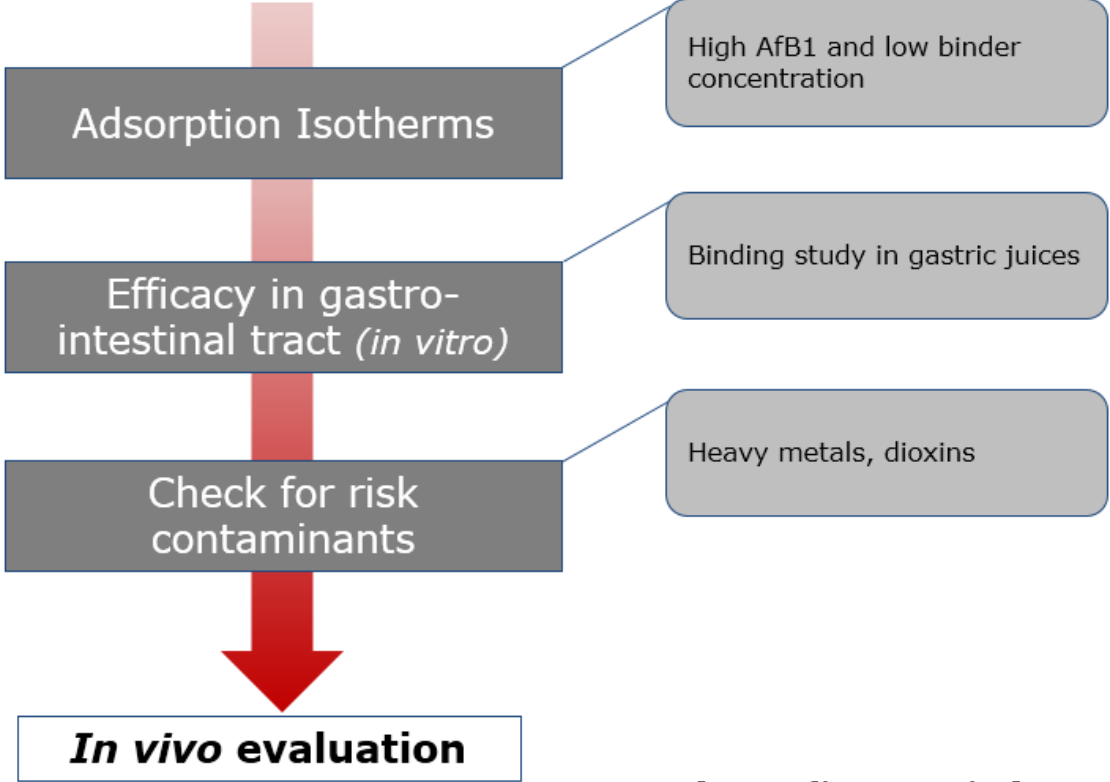
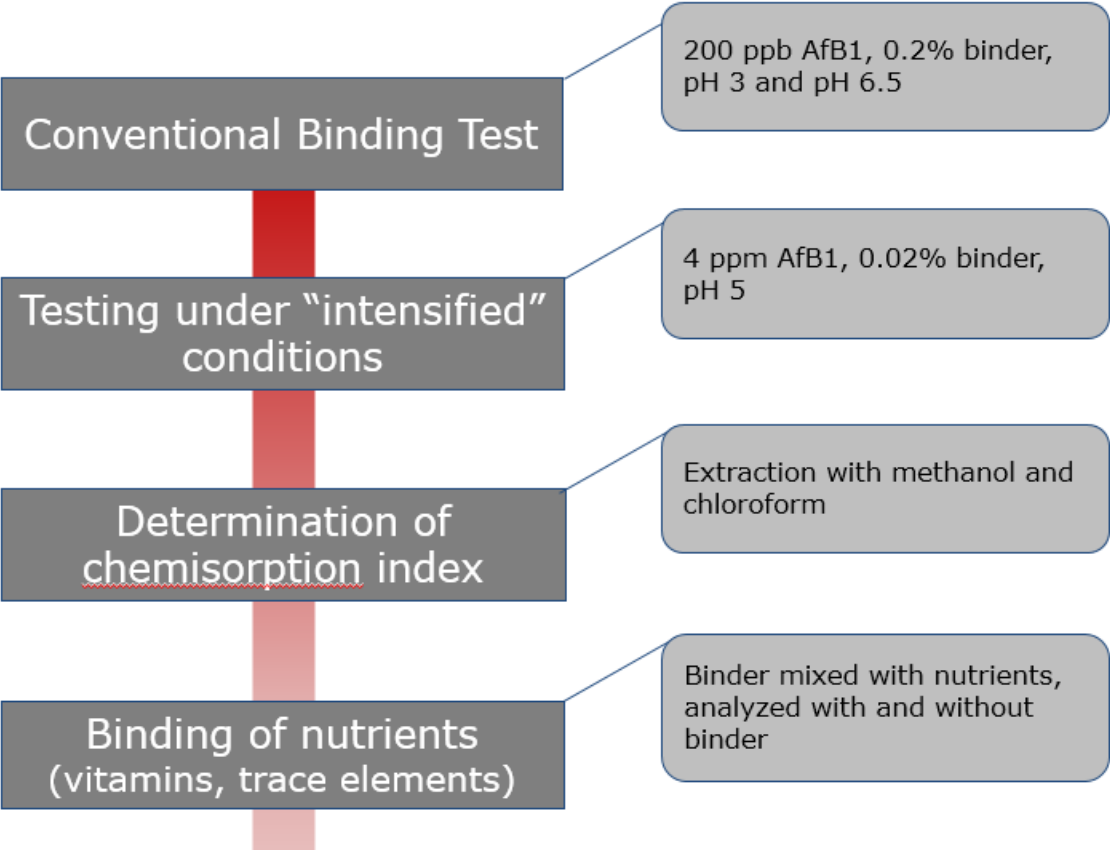


- 1 polarity
- 2 functional groups
- 3 planarity

Adsorption efficacy

Hahn *et al.* 2015;
Vekiru *et al.* 2014; EU Regulation 1060/2013;
Frühauf *et al.* 2012;
Vekiru *et al.* 2010;
Deng *et al.* 2010;
Friend *et al.* 1984;
Kubena *et al.* 1990, 1991, 1993;
Bursian *et al.* 1992;
Williams *et al.* 1994;
Phillips *et al.* 1995;
Ramos *et al.* 1996;
Scott *et al.* 1998

Stringent evaluation of binding – testing scheme



Mycofix[®] product line - The absolute protection against mycotoxins

internal

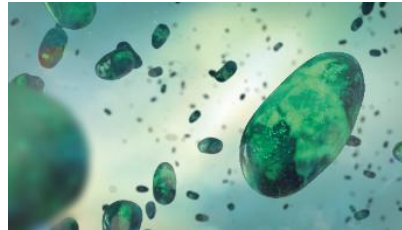


Biotransformation

A unique combination of patented specific enzymes and biological components converts mycotoxins into nontoxic, environmentally-safe metabolites in the digestive tract of animals.



FUMzyme[®] - purified enzyme degrades FUM



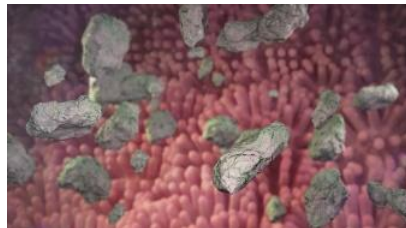
Biomin[®] BBSH[®] 797 DSM 11798 degrades trichothecenes



Biological constituent deactivation of zearalenone



Adsorption



Synergistic blend of minerals

Adsorbs Aflatoxins, Ergot alkaloids and endotoxins



Bioprotection



Biomin[®] Bioprotection Mix

Supports the liver, immune system and intestinal integrity

Sjn: delete?

Cost of Mycotoxin solution for cattle



**Mycofix Plus
20-40g/cow**



Mycofix® Select /Plus 5.E –

Dose recommendations

Contamination

- Moderate: 0.5 – 0.75 kg/t
 - Medium: 1.0 – 1.5 kg/t
 - High: 2.0 kg/t
-
- Pullets and laying hens
 - Broilers, turkeys and ducks

