

## International Mycotoxin Regulations

The Maximum, advisory and guidance levels for mycotoxins on maize, maize products and cereals from the European Union, USA and China are provided below for comparison purposes.

The European Union specifies the following maximum levels for mycotoxins on maize in foodstuffs:

### Aflatoxin

- Maize and rice to be subjected to sorting or other physical treatment before human consumption or used as an ingredient in foodstuffs, 5.0 µg/kg (B<sub>1</sub>) and 10.0 µg/kg (Sum of B<sub>1</sub>, B<sub>2</sub>, G<sub>1</sub> and G<sub>2</sub>).

### Fumonisin

- Unprocessed maize with the exception of unprocessed maize intended to be processed by wet milling, 4 000 µg/kg.
- Maize intended for direct human consumption, maize-based foods for direct consumption, with certain exceptions, 1 000 µg/kg.
- Maize-based breakfast cereals and maize-based snacks, 800 µg/kg.
- Processed maize-based foods and baby foods for infants and young children, 200 µg/kg.
- Milling fractions and other milling products with particle size > 500 µm not used for direct human consumption, 1 400 µg/kg.
- Milling fractions and other milling products with particle size < 500 µm not used for direct human consumption, 2 000 µg/kg.

### Deoxynivalenol (DON)

- Unprocessed maize, with the exception of unprocessed maize intended to be processed by wet milling, 1 750 µg/kg.
- Cereals intended for direct human consumption, cereal flour, bran and germ as end product marketed for direct human consumption, 750 µg/kg.
- Processed cereal based baby and baby foods for infants and young children, 200 µg/kg.
- Milling fractions of maize and other milling products with particle size > 500 µm not used for direct human consumption, 750 µg/kg.
- Milling fractions of maize and other milling products with particle size < 500 µm not used for direct human consumption, 1 250 µg/kg.

### Zearalenone

- Unprocessed maize with the exception of unprocessed maize intended to be processed by wet milling, 350 µg/kg.
- Cereals intended for direct human consumption, cereal flour, bran and germ as end product marketed for direct human consumption, 75 µg/kg.
- Maize intended for direct human consumption, maize-based snacks and maize-based breakfast cereals, 100 µg/kg.
- Processed maize-based foods for infants and young children, 20 µg/kg.
- Milling fractions and other milling products with particle size > 500 µm not used for direct human consumption, 200 µg/kg.
- Milling fractions and other milling products with particle size < 500 µm not used for direct human consumption, 300 µg/kg.

### Ochratoxin A

- Unprocessed cereals, 5 µg/kg.
- All products derived from unprocessed cereals, including processed cereal products and cereals intended for direct human consumption with the exception of food for infants and young children, 3 µg/kg. <sup>(1)</sup>

The European Union recommends the following maximum levels for Aflatoxin B<sub>1</sub> on products intended for animal feeds with a moisture content of 12%:

Complementary and complete feedingstuffs depending on the class and age of the animal, 5 – 20 µg/kg.

The European Union recommends the following guidance levels for mycotoxins on products intended for animal feeds with a moisture content of 12%:

#### **Fumonisin B<sub>1</sub> + B<sub>2</sub>**

- Maize and maize products, 60 000 µg/kg.
- Complementary and complete feedingstuffs depending on the class and age of animal, 5 000 – 50 000 µg/kg.

#### **Deoxynivalenol (DON)**

- Cereals and cereal products with the exception of maize by-products, 8 000 µg/kg.
- Maize by-products, 12 000 µg/kg.
- Complementary and complete feedingstuffs depending on the class and age of animal, 900 – 5 000 µg/kg.

#### **Zearalenone**

- Cereals and cereal products with the exception of maize by-products, 2 000 µg/kg.
- Maize by-products, 3 000 µg/kg.
- Complementary and complete feedingstuffs depending on the class of animal, 100 – 500 µg/kg.

#### **Ochratoxin A**

- Cereals and cereal products, 250 µg/kg.
- Complementary and complete feedingstuffs depending on the class of animal, 50 – 5000 µg/kg.<sup>(2)</sup>

In the USA, the Food and Drug Administration (FDA) actions levels for Aflatoxin in animal feeds vary between 20 µg/kg and 300 µg/kg, depending on the intended use (species of animal). The action level for all commodities intended for human consumption is 20 µg/kg (excluding Aflatoxin M<sub>1</sub> (milk) where the maximum level is 0.5 µg/kg).

Advisory maximum levels for DON in animal feed varies between 5 000 and 10 000 µg/kg in grains and grain by-products and 1 000 to 10 000 µg/kg in the complete diet, depending on the species of animal as well as the percentage portion of the diet represented by the grain. Distillers grains, brewers grains, gluten feeds and gluten meals should not exceed 30 000 µg/kg.<sup>(3)</sup>

Recommended maximum levels for Total Fumonisin (FB<sub>1</sub> + FB<sub>2</sub> + FB<sub>3</sub>) in maize and maize by-products used in animal feeds varies between 5 000 µg/kg and 100 000 µg/kg based on the class of animal and proportion of the diet (dry weight basis).

Recommended maximum levels for Total Fumonisin (FB<sub>1</sub> + FB<sub>2</sub> + FB<sub>3</sub>) in human foods are as follows: Degermed dry milled maize products (e.g. flaking grits, maize grits, maize meal, maize flour with fat content of < 2.25%, dry weight basis), 2 000 µg/kg. Whole or partially degermed dry milled maize products (e.g. flaking grits, maize grits, maize meal, maize flour with fat content of > 2.25%, dry weight basis), 4 000 µg/kg. Dry milled maize bran, 4 000 µg/kg. Cleaned maize intended for popcorn and masa production, 3 000 and 4 000 µg/kg respectively.<sup>(4)</sup>

In China, the maximum level for Aflatoxin in maize is 20 µg/kg, maize flour and maize products, is 20 µg/kg. The maximum levels for DON and Zearalenone in maize and maize flour is 1 000 µg/kg and 60 µg/kg respectively. In grains and milled grain products, the maximum level of Ochratoxin A allowed is 5 µg/kg.<sup>(5)</sup>

The following information was obtained from the Mycotoxins.info webpage supported by Biomin:<sup>(6)</sup>

Country	Commodity	Sum of mycotoxins	Limit (µg/kg)	
China	Corn, peanut meal, cottonseed meal, rapeseed meal	Aflatoxin	<50	
	Soybean meal		<30	
	Complementary, complete and concentrated feeding stuffs for piglets		<10	
	Complementary, complete and concentrated feeding stuffs for fattening pigs		<20	
	Complementary, complete and concentrated feeding stuffs for young broilers, chicks		<10	
	Complementary, complete and concentrated feeding stuffs for broilers, layers		<20	
	Complementary, complete and concentrated feeding stuffs for young ducks, ducklings		<10	
	Complementary, complete and concentrated feeding stuffs for ducks, layers		<15	
	Complementary, complete and concentrated feeding stuffs for quails		<20	
	Supplementary feeding stuffs for dairy cattle		<10	
	Supplementary feeding stuffs for beef cattle		<50	
	Complementary and complete feeding stuffs, corn		Ochratoxin A	<100
	Complementary and complete feeding stuffs, corn		Zearalenone	<500
	Complementary and complete feeding stuffs for swine		T-2 Toxin	<1 000
	Complementary and complete feeding stuffs for poultry	<1 000		
	Complementary and complete feeding stuffs for swine	Deoxynivalenol	<1 000	
	Complementary and complete feeding stuffs for calves		<1 000	
	Complementary and complete feeding stuffs for lactating animals		<1 000	
Complementary and complete feeding stuffs for cattle	<5 000			
Complementary and complete feeding stuffs for poultry	<5 000			
Republic of Korea	Feeds for young calves, dairy, piglet, grower, layer/broiler breeders, milk replacer, fiber source for ruminants and all other diets for young animals.	Aflatoxin B <sub>1</sub> , B <sub>2</sub> , G <sub>1</sub> , G <sub>2</sub>	10	
	All other compound feeds except premix products		20	
	All plant originated materials		50	
	All compound feeds	Ochratoxin A	200	
	All plant originated materials		250	
	All swine diets	Deoxynivalenol	900	
	All young ruminant diets		2 000	
	All other compound feeds except premix products		5 000	
	All plant originated		10 000	
	Swine diets for piglet, grower, gilt, gestation, lactation	Zearalenone	100	
	All other swine diets		250	
	Ruminant diets		500	
	All other feeds		1 000	
	All plant originated materials	Fumonisin	3 000	
	Diets for swine, horse and rabbit, milk replacer, pet		5 000	
	Aquaculture		10 000	
	Ruminant diets except young calves, fiber diets		50 000	
	All other compound feeds except premix products		30 000	
	All compound diets	T-2/HT-2	250	
	Oat, oat processed materials		2 000	
All other plant originated materials except oat	500			

<b>Japan</b>	Corn	Aflatoxin	20
	Formula feed for cattle (except dairy cattle and calves), pig (except piglet), domestic fowl (except chicken and broiler), quails		20
	Formula feed for suckling period		20
	Formula feed for dairy cattle		10
	Formula feed	Zearalenone	1 000
	Formula feed (cows over 3 months after birth)	Deoxynivalenol	4 000
	Formula feed (except for cows over 3 months after birth)		1 000
<b>Taiwan, Republic of China</b>	peanut, corn, maize	Aflatoxin B <sub>1</sub> , B <sub>2</sub> , G <sub>1</sub> , G <sub>2</sub>	15
	rice, sorghum, legumes, nuts, wheat and barley, oats		10
	other foods		10
	maize (raw material)	50	
	all feedstuffs	Aflatoxin B <sub>1</sub>	25 - 100

### References:

1. COMMISSION REGULATION (EC) No 1881/226 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs.
2. COMMISSION RECOMMENDATION 2006/576/EC of 17 August 2006 on the presence of deoxynivalenol, zearalenone, ochratoxin A, T-2 and HT-2 and fumonisins in products intended for animal feeding.
3. FDA Mycotoxin Regulatory Guidance, A Guide for Grain Elevators, Feed Manufacturers, Grain Processors and Exporters, August 2011.
4. <http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/ChemicalContaminantsMetalsNaturalToxinsPesticides/ucm109231.htm>.
5. National Food Safety Standard, Maximum Levels of Mycotoxins in Foods, GB 2761-2012.
6. <http://www.mycotoxins.info/en/regulations/>.