

BRIEFING NOTE

Aflatoxins

January 2022

Summary

Aflatoxins are a mycotoxin produced by fungi species typically found in hot and humid climates that can affect some grains. Wheat is not predisposed to aflatoxin production and wheat used by UK millers is grown in temperate climates where the risk of aflatoxin production is low. Extensive monitoring shows that aflatoxins are not found in wheat used by UK millers and that testing for these contaminants is unnecessary.

Background

Aflatoxins are naturally occurring mycotoxins produced by the moulds *Aspergillus flavus* and *Aspergillus parasiticus*, fungi species typically found in hot and humid climates. Although these fungi are usually found on dead and decaying vegetation, they can also affect food crops in the field, and poor storage of harvested material can also contribute to their growth, which is linked to production of aflatoxins and contamination of the foodstuff.

There are thought to be 14 aflatoxins that occur in nature, but there are five most relevant to human health as they can be found in food, these are aflatoxin B1, B2, G1, G2 and M1 (sometimes referred to as AFB1, AFB2, AFG1, AFG2 and AFM1 respectively).

The risk of aflatoxin production is higher in countries with humid and warm climates and where storage conditions are not cool and dry. The fat content of the food commodity is also thought to be closely linked to *Aspergillus* growth and aflatoxin production, with foods high in fats and grown in warm conditions, such as nuts, particularly at risk. Wheat, on the other hand, is typically grown in temperate climates and has a very low fat content, so the potential for aflatoxin production is low.

Legislation

[EU regulation \(EC\) No 1881/2006](#) sets out maximum limits for mycotoxins in food, including limits for aflatoxins. There are limits that apply generally to cereals, including wheat. These limits apply to EU member states and were transferred into UK law as part of the UK's exit from the EU. In 2022, the Food Standards Agency (FSA) will review the aflatoxin limits for ready-to-eat peanuts and processed cereal-based foods for infants and young children.

Foodstuff	Maximum limit (µg/kg)		
	B1	Sum of B1, B2, G1 and G2	M1
All cereals and all products derived from cereals, including processed cereal products. Separate levels apply to rice, maize and processed cereal based foods for infants and young children	2.0	4.0	-
Processed cereal-based foods and baby foods for infants and young children	0.1	-	-

Relevance to millers

The wheat used by UK milling companies is very low risk for aflatoxins as it is grown in temperate conditions, stored in cool and dry conditions to minimise quality loss and is innately not conducive to aflatoxin production as wheat grain has a low fat content. Despite the low risk, some customers ask for aflatoxin monitoring, which consistently shows that for the overwhelming majority of samples, no aflatoxins are detected. In the rare instances where aflatoxins have been found, the levels are well below the legal limits.

Monitoring data

UK milling companies submit aflatoxin monitoring data to UK Flour Millers. These data include wheat and flour test results over a number of harvest years. These data include UK and imported wheat as well as flours milled from UK and imported wheat. The majority of samples were tested for individual aflatoxins (B1, B2, G1, G2) with results given as the sum of the mycotoxins.

For all but two of the samples submitted (99.4%), no aflatoxins were detected above the limit of detection. A breakdown of results is given below, by sample type and by year of testing. The results are presented as the sum of aflatoxin results, rather than each aflatoxin individually. Where aflatoxins were detected in two samples, further commentary is given.

Results by sample type			Sum of aflatoxin results ($\mu\text{g}/\text{kg}$)		
Sample type	Samples (n)	% below LOD	Mean	Minimum	Maximum
White flour	241	99.6%	<LOD	<LOD	0.11
Brown flour	7	100%	<LOD	<LOD	<LOD
Wholemeal flour	13	100%	<LOD	<LOD	<LOD
Wheat	96	99%	<LOD	<LOD	0.06
All samples	357	99.4%	<LOD	<LOD	0.11

Results by year (all sample types)			Sum of aflatoxin results ($\mu\text{g}/\text{kg}$)		
Year of testing	Samples (n)	% below LOD	Mean	Minimum	Maximum
2021	51	100%	<LOD	<LOD	<LOD
2020	115	98%	<LOD	<LOD	0.11
2019	36	100%	<LOD	<LOD	<LOD
2018	4	100%	<LOD	<LOD	<LOD
2017	34	100%	<LOD	<LOD	<LOD
2016	84	100%	<LOD	<LOD	<LOD
2015	25	100%	<LOD	<LOD	<LOD
2014	5	100%	<LOD	<LOD	<LOD
2013	3	100%	<LOD	<LOD	<LOD
All samples	357	99.4%	<LOD	<LOD	0.11

Of the 357 samples tested, aflatoxins were detected in one wheat sample ($B1 = 0.09 \mu\text{g}/\text{kg}$) and one white flour sample ($B1 = 0.11 \mu\text{g}/\text{kg}$). These account for a minority of the total sample set and the results are well below the current maximum levels for these mycotoxins.

Implications for millers

The extensive aflatoxin monitoring dataset gathered by UK Flour Millers shows that these mycotoxins do not affect wheat or flour and in the rare instances where an aflatoxin has been detected (0.6% of all samples), the levels found are significantly lower than the legal limits.

These data show that aflatoxin monitoring is not necessary for wheat used by UK millers or flour produced by UK millers.