

BRIEFING DOCUMENT

T2 and HT2 mycotoxins

Updated January 2023

Summary

T2 and HT2 are mycotoxins produced by several fungi of the genus *Fusarium*. They can be found as natural contaminants in a range of cereals including wheat, barley, oats, maize and rye, although in the UK the highest levels are found in oats.

There are currently only ‘indicative’ levels for these mycotoxins in cereals and cereal-based products, but the European Commission (EC) has proposed maximum limits that will apply to products sold in EU and NI from 01 July 2024. Monitoring data suggest the proposed limits will not pose a compliance issue for UK flour and flour-based products sold into these markets.

Background

The mycotoxins T2 and HT2, sometimes referred to as ‘T2-HT2’, mainly occur in grains such as wheat, barley, oats, rye and maize. In the UK their occurrence is associated with *Fusarium langsethiae*, which is one of the fungi causing Fusarium headblight in cereals. The incidence of this species of *Fusarium* fungi is strongly associated with wet and cold conditions during flowering and drier conditions during July and August before harvest. In the UK T2-HT2 levels tend to occur at relatively low levels in wheat but at higher levels in oats.

Legislation

Currently ‘indicative levels’ for T2-HT2 in cereals and cereal-based products apply in GB, NI and EU member states. These set out a threshold that if exceeded should result in an investigation but would not lead to a recall or withdrawal of product from the market.

The European Commission has proposed maximum levels for T2-HT2 in cereals and cereal-based products, to come into effect from 01 July 2024. Although these are only proposed, it is expected they will be agreed by EU member states. If agreed, these will come into effect after the UK’s withdrawal from the EU and will not apply to GB products but will apply to products sold into NI or EU member states. T2-HT2 mycotoxins are currently being risk assessed by the UK food safety regulator, the Food Standards Agency. The FSA has previously said that GB maximum limits will not automatically align with those published by the EU but will be dependent on the UK risk assessment process. UK Flour Millers will continue to monitor this situation closely, share T2-HT2 monitoring data with the FSA, and inform milling companies as the situation develops.

Product category	T2-HT2 mycotoxins	
	Current GB, NI and EU indicative levels (µg/kg)	Proposed EU and NI maximum levels (µg/kg)
Unprocessed wheat	100	50
Cereal bran (except oats)	100	50
Flour	50	20
Breakfast cereals	75	20
Processed oats	200	100*
Bread, pastries, biscuits, cereal snacks, pasta	25	20
Cereal-based foods for infants & young children	15	10
Wheat for direct human consumption	50	20

*The proposed processed oats ML is still under discussion.

Monitoring data

The presence of T2-HT2 has been routinely surveyed as part of the AHDB Contaminants Monitoring project where very low levels of these mycotoxins have been identified in milling wheat samples. The limit of detection is 10 µg/kg for each of T2 and HT2 and the results for wheat are summarised below:

Milling wheat tested via AHDB Contaminant Monitoring Project							
Year	Samples (n)	LOD (µg /kg)	% samples tested positive	Mean* (µg /kg)	Median (µg /kg)	Minimum (µg /kg)	Maximum (µg /kg)
2022	50	20	0%	10	<20	<20	<20
2021	51	20	2%	10	<20	<20	17
2020	50	20	4%	11	<20	<20	50
2019	50	20	8%	11	<20	<20	43
2018	50	20	12%	14	<20	<20	139
2017	50	20	8%	12	<20	<20	64
2016	51	20	0%	10	<20	<20	<20
2015	75	20	0%	10	<20	<20	<20
2014	75	20	0%	10	<20	<20	<20
2013	76	20	4%	11	<20	<20	50
2012	51	20	2%	10	<20	<20	27
2011	47	20	0%	10	<20	<20	<20

*middle bound used to calculate mean (result <LOD assumed to be LOD*0.5)

These data show levels of T2-HT2 in milling wheat are very low, although it is hard to quantify exactly how low as the limit of detection (10µg/kg) for each of T2 and HT-2 is relatively high and the majority of results are below this limit.

A number of millers test flour for T2-HT2 alongside other mycotoxins as part of their due diligence monitoring. As such, a significant body of data on levels of these mycotoxins in flour is available, showing that levels are on average well below the proposed EU maximum limits.

White flour			(µg /kg)			
Year	Samples (n)	% samples tested positive	Mean*	Median	Minimum	Maximum
2019	30	0%	7	<20	<1	<20
2018	29	3%	10	<20	<20	24
2017	28	0%	10	<20	<20	<20
2016	10	0%	10	<20	<20	<20
2015	12	0%	10	<20	<20	<20
2014	35	0%	10	<20	<20	<20
2013	31	0%	10	<20	<20	<20

*middle bound used to calculate mean (result <LOD assumed to be LOD*0.5)

Wholemeal flour			(µg /kg)			
Year	Samples (n)	% samples tested positive	Mean*	Median	Minimum	Maximum
2019	13	8%	12	<20	<1	45
2018	15	33%	16	<20	<20	29
2017	9	11%	12	<20	<20	24
2016	2	0%	10	<20	<20	<20
2015	5	0%	10	<20	<20	<20
2014	23	0%	10	<20	<20	<20
2013	15	0%	10	<20	<20	<20

*middle bound used to calculate mean (result <LOD assumed to be LOD*0.5)

Brown flour			(µg /kg)			
Year	Samples (n)	% samples tested positive	Mean*	Median	Minimum	Maximum
2019	1	0%	10	<20	<20	<20
2018	7	0%	10	<20	<20	<20
2017	1	0%	10	<20	<20	<20
2016	4	0%	10	<20	<20	<20

*middle bound used to calculate mean (result <LOD assumed to be LOD*0.5)

Like other *Fusarium* mycotoxins, T2-HT2 is concentrated in the outer layers of the wheat kernel and as such slightly higher levels are found in wholemeal flours compared to white flours, where these outer layers are removed from the final product. Overall, these data indicate that the proposed EU maximum levels would not pose a compliance issue for GB flour or flour-based products sold into NI or EU member states.

Future work

UK Flour Millers will continue to monitor and report on the levels of T2-HT2 detected in wheat and flour. The proposed maximum limits will only apply to products sold into NI or EU markets, but UK Flour Millers will maintain a close dialogue with the Food Standards Agency so the milling industry is prepared for any potential maximum levels that may apply to GB products. UK Flour Millers is a member of the UK Mycotoxin Stakeholder Group, made up of stakeholders from across the grain chain, which continues to meet on a regular basis to discuss and manage the risk presented by T2-HT2 and ensure the safety of the cereal products.

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