UK FLOUR MILLERS

BRIEFING DOCUMENT

T2 and HT2 mycotoxins

Updated April 2022

Summary

T2 and HT2 are mycotoxins produced by several fungi of the genus *Fusarium*. If consumed in high enough quantities they can cause negative health effects in animals and humans. 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 set maximum legal limits that will apply to products sold in EU and NI from 01 January 2023. Monitoring data suggest the proposed limits will not pose a compliance issue for UK flour and flour-based products. UK Flour Millers is closely monitoring whether maximum limits will be agreed for the GB market.

T2-HT2

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 HT2 and T2 levels tend to occur at relatively low levels in wheat but at much higher levels in oats.

Agronomic factors that impact upon HT2 and T2 in harvested oats were previous crop, cultivation and variety. Analysis of the previous cropping history showed there was a stepwise increase in HT2-T2 as the cereal intensity of the rotation increased. Variety was an important factor with higher levels and a wider range detected on winter compared to spring varieties of oats.

Fusarium langsethiae infections do not cause the bleached ears resulting in grains that are pink or white and shrivelled, but instead cause ears with a blotchy appearance.

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. If these are agreed, and it is expected they will, the limits will come into effect from 01 January 2023. As these will come into effect after the UK's withdrawal from the EU, they will not apply to GB products, but will apply to product sold into NI or EU member states. It is not clear whether the UK food safety regulator will set T2-HT2 maximum levels that align with the upcoming EU limits. UK Flour Millers will continue to monitor this closely and inform milling companies as the situation develops.

Product category	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
Bread, pastries, biscuits, cereal snacks, pasta	25	20
Cereal-based foods for infants & young children	15	10
Wheat for direct human consumption	50	20

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:

				(µg/kg)			
Year	Samples (n)	LOD	% samples above LOD	Mean*	Median	Min	Max
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)

Levels in wheat are low, although it is hard to quantify 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:

White flour			(µg /kg)			
Year	Samples (n)	% samples tested above LOD	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

Wholemeal flour			(µg /kg)			
Year	Samples (n)	% samples tested above LOD	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

Brown flour			(µg /kg)			
Year	Samples (n)	% samples tested above LOD	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. 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.

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