BRIEFING DOCUMENT

AHDB Contaminants Monitoring Project

Updated January 2023

Summary

This AHDB-funded project (previously known as Project 3779) has been operating in its current format since 2002. The data it provides allows the industry to demonstrate due diligence and, along with additional testing commissioned by UK Flour Millers as required, is a source of reassurance for millers' customers that the raw material used by UK flour mills is safe. The vast majority of samples in all categories are well below legal maximum limits, across seasons.

Contaminants Monitoring Project

The Agriculture and Horticulture Development Board (AHDB) Contaminants Monitoring Project is a levy-payer research project that monitors levels of contaminants in cereals destined for the food and animal feed markets. The project analyses agrochemical (pesticide) residues, heavy metals and mycotoxins. The schedule of analyses can vary slightly year to year as some additional contaminants may be included when funding is available. Until 2016, the analyses were carried out by Campden BRI. Since then, the analyses have been carried out by Fera Science.

Samples are collected and analysed in three batches, September (post-harvest), January (stored), and March (stored). Analyses are tailored to suit the respective batches, for example storage insecticides are not tested on September samples as wheat is unlikely to have been treated so early after harvest. Results are sent to UK Flour Millers members and are also summarised on the AHDB website. This data compliments contaminant due diligence monitoring undertaken by UK Flour Millers and helps to ensure the quality and safety of grain deliveries to UK mills.

The data consistently show the vast majority of milling wheat samples comply with all legal limits.

Separate UKFM briefing documents are available for all of the substances measured by this project, providing background on why they can be found in wheat, as well as information on legal maximum limits and compliance. For UKFM members, copies are available upon request by contacting: JoeBrennan@ukflourmillers.org

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Agrochemical residues

Samples are analysed in September for the agrochemicals that are applied pre-harvest, and in March for storage insecticides. Whilst residues for plant growth regulators and some insecticides are regularly seen, they are always well below the maximum residue levels (MRLs). The table below gives the results from the last three years. Agrochemical monitoring is complimented by the work of Defra's Expert Committee on Pesticide Residues in Food (PRiF), which produces a report each quarter examining levels of pesticide residues in foods, including flour and bread. Further information can be found in the 'Pesticide residues in wheat and flour' briefing document. A separate briefing document on glyphosate is also available.

Harvest Year	Active ingredient	% of samples containing residue	Mean level (mg/kg)*	Max level (mg/kg)	% samples exceeding MRL
2022	Chlormequat	92%	0.32	0.82	0%
	Mepiquat	12%	0.01	0.15	0%
	Glyphosate	18%	0.07	0.55	0%
	Imazaquin	0%	0.00	0.00	0%
	Chlorpropham	4%	0.00	0.03	2%
	Chlorpyrifos	tbc	tbc	tbc	tbc
	Chlorpyrifos-methyl	tbc	tbc	tbc	tbc
	Cypermethrin	tbc	tbc	tbc	tbc
	Deltamethrin	tbc	tbc	tbc	tbc
	Malathion	tbc	tbc	tbc	tbc
	Pirimiphos-methyl	tbc	tbc	tbc	tbc
2021	Chlormequat	88%	0.14	0.42	0%
	Mepiquat	16%	0.01	0.17	0%
	Glyphosate	41%	0.23	1.18	0%
	Imazaquin	0%	0.00	0.00	0%
	Chlorpropham	2%	0.00	0.03	2%
	Chlorpyrifos	0%	0.00	0.00	0%
	Chlorpyrifos-methyl	0%	0.00	0.00	0%
	Cypermethrin	0%	0.00	0.00	0%
	Deltamethrin	8%	0.00	0.04	0%
	Malathion	0%	0.00	0.00	0%
	Pirimiphos-methyl	0%	0.00	0.00	0%
2020	Chlormequat	90%	0.38	1.11	0%
	Mepiquat	14%	0.36	0.36	0%
	Glyphosate	37%	0.18	1.20	0%
	Imazaquin	0%	0.00	0.00	0%
	Chlorpropham	0%	0.00	0.00	0%
	Chlorpyrifos	0%	0.00	0.00	0%
	Chlorpyrifos-methyl	0%	0.00	0.00	0%
	Cypermethrin	4%	0.00	0.04	0%
	Deltamethrin	16%	0.02	0.31	0%
	Malathion	0%	0.00	0.00	0%
	Pirimiphos-methyl	8%	0.01	0.31	0%

Heavy metals

Wheat samples are tested for heavy metals every other year. Results show that milling wheat is not a significant source of heavy metals. Mean levels of the most toxic heavy metals remain low and well below the legal limits. Additional information on heavy metals and maximum limits applying in GB versus NI/EU can be found in the 'Heavy metals' briefing document.

Arsenic								
Harvest year	**2012**	**2014**	**2015**	**2016**	**2018**	**2020**	**2021**	**2022**
No. of samples	51	75	20	60	50	25	25	25
% of samples > LOD (0.01mg/kg)	51%	4%	35%	15%	30%	16%	28%	20%
Mean (mg/kg)	0.019	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Maximum (mg/kg)	0.05	0.02	0.01	0.03	0.08	0.16	0.07	0.03
% samples above ML	0%	0%	0%	0%	0%	0%	0%	0%
GB and NI/EU Maximum limit (ML)	1.0mg/kg							

Lead								
Harvest year	**2012**	**2014**	**2015**	**2016**	**2018**	**2020**	**2021**	**2022**
No. of samples	51	75	20	60	50	25	25	25
% of samples > LOD (0.01mg/kg)	28%	15%	10%	15%	28%	32%	32%	16%
Mean (mg/kg)	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Maximum (mg/kg)	0.04	0.06	0.01	0.05	0.03	0.05	0.12	0.09
% samples above ML	0%	0%	0%	0%	0%	0%	0%	0%
GB and NI/EU Maximum limit (ML)	0.2mg/kg							

Cadmium								
Harvest year	**2012**	**2014**	**2015**	**2016**	**2018**	**2020**	**2021**	**2022**
No. of samples	51	75	20	60	60	25	25	25
% of samples > LOD (0.01mg/kg)	100%	100%	100%	100%	100%	100%	100%	100%
Mean (mg/kg)	0.05	0.04	0.04	0.04	0.04	0.05	0.04	0.04
Maximum (mg/kg)	0.11	0.11	0.07	0.09	0.09	0.14	0.09	0.09
% samples above NI/EU ML (0.1mg/kg)	4%	1%	0%	0%	0%	4%	0%	0%
% samples above GB ML (0.2mg/kg)	0%	0%	0%	0%	0%	0%	0%	0%

Mercury								
Harvest year	**2012**	**2014**	**2015**	**2016**	**2018**	**2020**	**2021**	**2022**
No. of samples	51	75	20	60	50	25	25	25
% of samples > LOD (0.01mg/kg)	0%	3%	0%	0%	0%	0%	0%	0%
Mean (mg/kg)	<0.01	0.001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Maximum (mg/kg)	0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
GB and NI/EU Maximum limit (ML)	None - no legal limits in cereals							

Nickel							
Harvest year	**2014**	**2015**	**2016**	**2018**	**2020**	**2021**	**2022**
No. of samples	75	20	60	50	25	25	25
% of samples > LOD (0.01 mg/kg)	100%	100%	100%	100%	100%	100%	100%
Mean (mg/kg)	0.1	0.12	0.13	0.17	0.31	0.27	0.18
Maximum (mg/kg)	0.31	0.19	0.52	0.32	1.21	1.34	0.44
% samples above GB ML (N/A)	No GB limit						
% samples above proposed NI/EU ML (0.5mg/kg)	0%	0%	0%	0%	16%	12%	0%

Mycotoxins

Separate briefing documents exist for each of the mycotoxins tested within the AHDB Contaminant Monitoring Project, providing additional detail on maximum limits, amongst other information.

Ochratoxin A

Milling wheat samples			OTA (µg/kg)			
Year	(n)	%<LOD	Mean*	Median	Min	Max
2021	50	98%	0.2	<0.2	<0.2	2.0
2020	51	88%	0.4	<0.2	<0.2	9.9
2019	51	84%	0.4	<0.2	<0.2	4.1
2018	50	92%	0.2	<0.2	<0.2	2.8
2017	50	84%	0.3	<0.2	<0.2	4.4
2016	60	97%	0.3	<0.2	<0.2	1.0
2015	100	93%	0.1	<0.1	<0.1	4.6
2014	100	87%	0.3	<0.1	<0.1	9.9
2013	99	84%	0.6	<0.1	<0.1	41.7
2012	100	88%	0.2	<0.1	<0.1	9.1
2011	96	94%	0.1	<0.1	<0.1	3.6
2010	60	85%	0.4	<0.1	<0.1	11.7
2009	50	92%	0.2	<0.1	<0.1	4.8
2008	100	93%	0.3	<0.1	<0.1	10.4
2007	103	93%	0.1	<0.1	<0.1	1.8

*mean results are calculated by assuming results <LOD are equal to LOD*0.5

Deoxynivalenol (DON)

Milling wheat tested via AHDB Contaminant Monitoring Project							
Year	Samples (n)	LOQ (µg/kg)	% samples tested positive	Mean* (µg/kg)	Median* (µg/kg)	Minimum (µg/kg)	Maximum (µg/kg)
2022	50	10	52%	21	10	<10	174
2021	51	10	90%	102	61	<10	620
2020	50	10	88%	58	27	<10	537
2019	50	10	76%	68	25	<10	798
2018	50	10	50%	51	8	<10	420
2017	50	10	98%	214	108	<10	1,540
2016	51	5	96%	129	54	9	1,006
2015	75	10	51%	41	10	<10	632
2014	75	10	92%	110	58	<10	755
2013	76	10	99%	214	122	<10	1,040
2012	51	10	100%	402	210	24	2,780
2011	47	10	32%	13	5	<10	87
2010	42	10	48%	25	5	<10	138

Zearalenone (ZON)

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	2.5	2%	1	1	<2.5	3
2021	51	2.5	35%	7	1	<2.5	119
2020	50	2.5	16%	3	1	<2.5	37
2019	50	2.5	22%	2	1	<2.5	19
2018	50	2.5	12%	3	1	<2.5	22
2017	50	2.5	28%	19	7	<2.5	327
2016	51	2.5	24%	2	1	<2.5	17
2015	75	2	8%	1	1	<2	8
2014	75	2	15%	1	1	<2	10
2013	76	2	62%	6	3	<2	65
2012	51	2	63%	17	3	<2	234
2011	47	2	4%	5	5	<2	4
2010	42	2	21%	2	1	<2	12

T2-HT2

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

Ergot alkaloids

INTAKE WHEAT			Ergot alkaloids (µg/kg)	
Harvest year	Samples (n)	% samples containing ergot alkaloids	Mean level	Median level
2022	50	40%	63	<LOD
2021	51	71%	211	65
2020	51	40%	33	<LOD
2019	50	46%	49	<LOD
2018	50	28%	38	<LOD
2017	50	78%	90	8
2016	51	71%	79	8
2015	74	41%	174	<LOD
2014	75	45%	60	<LOD
2013	76	49%	64	<LOD
2012	51	25%	73	<LOD