

Annual Project Report August 2016 to August 2017

Project title	Monitoring of mycotoxins and other contaminants in UK cereals used in malting, milling and animal feed		
Project number	21130040		
Start date	August 2016	End date	August 2021

Project aim and objectives

To survey the incidence and levels of key contaminants in representative samples of UK-grown cereals and co-products, destined for milling, malt production, and animal feed to determine that they meet legal and guideline limits and that they are safe for human consumption.

Key messages emerging from the project

During the period August 2016 to August 2017, the project focused on monitoring of harvest and stored grain samples for trichothecenes, zearalenone, ochratoxin A, pesticides and metals. The samples included milling wheat, malting barley, food oats, feed wheat, wheatfeed, feed barley, feed oats, oatfeed and malt. Subsets of samples were also analysed for alternaria toxins, sterigmatocystin, and ergot alkaloids. Dioxins, PAHs and dioxin-like PCBs were analysed in selected feed samples. The data is not intended to provide a comprehensive monitoring of the UK grain harvest; the data represents levels likely to be found in each of the sample types within a given year of sampling. The following observations are made from the data reported in Tables 1-26.

- Mycotoxins – Deoxynivalenol (DON) was detected most frequently in wheat samples. All samples of wheatfeed were found to contain DON, although the mean level measured was 429 µg/kg. Milling wheat frequently contained DON above the detection limit (96% of samples), however, the mean level found was only 129 µg/kg. The maximum level found was 1006µg/kg; no sample exceeded the maximum level (ML). Oatfeed and food oats most frequently contained nivalenol, although the mean levels were 176 and 52 µg/kg, respectively. The highest level found was 451µg/kg in a sample of oatfeed. There are no legal limits for this mycotoxin.
- Masked forms of deoxynivalenol, T-2 toxin and zearalenone were also analysed. No residues of masked zearalenone compounds were found. T-2 glucoside was only detected in oats and oatfeed samples; the mean level found in oatfeed was 124 µg/kg and the maximum level found was 489 µg/kg. Deoxynivalenol glucoside was found mainly in wheat samples, although the mean levels were very low (31 µg/kg or lower). The highest level found was 168 µg/kg in the sample of milling wheat that contained the highest level of DON.

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- One sample (food oat) exceeded the ML for ochratoxin A (OTA) containing 5.7µg/kg and the highest level was observed in a sample of feed barley (14.6 µg/kg).
- Ergot alkaloids – A high incidence of ergot alkaloids was observed; wheatfeed and oat feed both had 100% incidence of detection of one or more ergot alkaloids, although the concentrations found in oatfeed were much lower than wheatfeed. The highest level was found in a milling wheat sample, although the mean level found in milling wheat was only 79 µg/kg. Currently, there are no maximum levels for ergot alkaloids.
- Pesticides - One residue of chlorpyrifos was observed above the maximum residue level (MRL) in an oats sample. Chlorpropham was detected in one malting barley sample (stored) and in one milling wheat sample (harvest).
- A high incidence of residues was found for PGRs and pipronyl butoxide (synergist). All these were within MRL, except one residue of chlormequat in an oat sample.
- Metals - No result exceeded statutory limits. One sample (feed oat) contained higher levels of aluminium, arsenic and lead compared to other feed, although it was within statutory limits. This was the first time aluminium was included in this survey.
- Dioxins, PAHs and PCBs – All feed concentrations were found to be low and below any regulated limits (where applicable).

Summary of results from the reporting year

Table 1. Deoxynivalenol Harvest Results 2016

	No. of Samples Analysed	% > LOD	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Mode Level µg/kg	Median Level µg/kg
Milling Wheat	51	96%	< 20	1006	129	< 20	54
Feed Wheat	10	80%	< 10	180	57	NA	48
Wheatfeed	20	100%	28	819	429	NA	478
Feed barley	9	33%	< 10	85	20	< 10	< 10
Malting Barley	40	60%	< 25	117	36	< 25	29
Food Oats	30	23%	< 10	132	15	< 10	< 10
Feed Oats	10	40%	< 10	33	9	< 10	< 10
Oatfeed	11	100%	16	332	64	37	37

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Table 2. Deoxynivalenol-3-Glucoside Harvest Results 2016

	No. of Samples Analysed	% > LOD	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Mode Level µg/kg	Median Level µg/kg
Milling Wheat	51	41%	< 10	168	18	< 10	< 10
Feed Wheat	10	40%	< 10	32	9	< 10	< 10
Wheatfeed	20	65%	< 20	82	31	< 20	33
Feed barley	9	0%	< 10	< 10	< 10	< 10	< 10
Malting Barley	40	0%	< 20	< 20	< 20	< 20	< 20
Food Oats	30	7%	< 10	176	10	< 10	< 10
Feed Oats	10	0%	< 10	< 10	< 10	< 10	< 10
Oatfeed	8	0%	< 20	< 20	< 20	< 20	< 20

Table 3. Zearalenone Harvest Results 2016

	No. of Samples Analysed	% > LOD	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Mode Level µg/kg	Median Level µg/kg
Milling Wheat	51	24%	< 2.5	17	< 2.5	< 2.5	< 2.5
Feed wheat	10	50%	< 5	23	7	< 5	4
Wheatfeed	20	50%	< 5	33	6	< 5	3
Feed Barley	9	0%	< 2.5	< 25	< 25	< 25	< 25
Malting Barley	40	3%	< 2.5	6	< 2.5	< 2.5	< 2.5
Food Oats	30	3%	< 2.5	4	< 2.5	< 2.5	< 2.5
Feed Oats	10	20%	< 2.5	8	1	< 2.5	< 2.5
Oatfeed	11	0%	< 2.5	< 25	< 25	< 25	< 25

Table 4. HT-2 + T-2 Harvest Results 2016

	No. of Samples Analysed	% > LOD	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Mode Level µg/kg	Median Level µg/kg
Milling Wheat	51	0%	< 20	< 20	< 20	< 20	< 20
Feed Wheat	10	20%	< 20	32	5	< 20	< 20
Wheatfeed	20	0%	< 40	< 40	< 40	< 40	< 40
Feed Barley	9	0%	< 40	< 40	< 40	< 40	< 40
Malting Barley	40	38%	< 10	91	10	< 10	< 10
Food Oats	30	70%	< 20	1093	173	< 40	77
Feed Oats	10	60%	< 40	437	115	< 40	65
Oatfeed	11	100%	532	5787	1761	NA	1366

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Table 5. T-2-b3-Glucoside Harvest Results 2016

	No. of Samples Analysed	% > LOD	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Mode Level µg/kg	Median Level µg/kg
Milling Wheat	51	0%	< 10	< 10	< 10	< 10	< 10
Feed Wheat	10	0%	< 20	< 20	< 20	< 20	< 20
Wheatfeed	20	0%	< 10	< 10	< 10	< 10	< 10
Feed Barley	9	0%	< 20	< 20	< 20	< 20	< 20
Malting Barley	40	0%	< 20	< 20	< 20	< 20	< 20
Food Oats	30	27%	< 20	122	14	< 20	< 20
Feed Oats	10	20%	< 20	52	9	< 20	< 20
Oatfeed	11	100%	40	389	124	NA	86

Table 6. Nivalenol Harvest Results 2016

	No. of Samples Analysed	% > LOD	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Mode Level µg/kg	Median Level µg/kg
Milling Wheat	51	10%	< 50	116	< 50	< 50	< 50
Feed Wheat	10	0%	< 50	< 60	< 60	< 60	< 60
Wheatfeed	20	55%	< 50	274	89	< 60	87
Feed Barley	9	0%	< 50	< 50	< 50	< 50	< 50
Malting Barley	40	40%	< 25	206	31	< 25	< 25
Food Oats	30	30%	< 50	407	52	< 50	< 50
Feed Oats	10	0%	< 50	122	56	< 50	< 50
Oatfeed	11	91%	< 50	451	176	N/A	141

Table 7. Total Ergot Alkaloids (n=12) Harvest Results 2016

	No. of Samples Analysed	% > LOD	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Mode Level µg/kg	Median Level µg/kg
Milling Wheat	51	71%	< 6	1435	79	< 6	6
Feed Wheat	10	60%	< 6	148	33	< 6	3
Wheatfeed	20	100%	50	1086	404	NA	372
Feed Barley	9	67%	< 6	69	15	< 6	3
Malting Barley	40	70%	< 6	275	32	< 6	3
Food Oats	30	60%	< 6	710	45	< 6	8
Feed Oats	10	70%	< 6	171	44	< 6	2
Oatfeed	11	100%	2	160	61	NA	61

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Table 8. Alternaria Toxins (n=5) Harvest Results 2016

	No. of Samples Analysed	% > LOD	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Mode Level µg/kg	Median Level µg/kg
Malting Barley ¹	40	10%	< 5	16	0.5	< 5	< 5
Food Oats ²	30	7%	<10	84	3	< 10	< 10

¹ Malting Barley data is summarised for alternariol and alternariol monomethyl ether, no other analytes detected. ² Food Oats data is summarised for tenuazonic acid, no other analytes detected

Table 9. Pesticides Harvest Results 2016

	No. of Samples Analysed	% > LOD	Single Pesticide Incidence % > LOD	Multiple Pesticide Incidence % > LOD
Milling Wheat ¹	51	98%	33%	65%
Feed Wheat ²	10	40%	40%	0%
Feed Barley ³	9	56%	56%	0%
Malting Barley ⁴	40	88%	38%	50%
Food Oats ⁵	30	93%	30%	63%
Feed Oats ⁶	10	90%	90%	0%

¹ Epoxiconazole (1) 0.01 mg/kg; Fenpropimorph (1) 0.01 mg/kg; Fluxapyroxad (2) 0.01 mg/kg; Tebuconazole (6) 0.01-0.02 mg/kg; Chlorpropham (45) 0.03-0.8 mg/kg; Mepiquat (1) 0.01 mg/kg; Trinexapac-ethyl (18) 0.01-0.05 mg/kg; Glyphosate (19) 0.1-1.4 mg/kg. 1 chlorpropham (1) 0.04 mg/kg, chlorpyrifos-methyl (3) 0.03-0.1 mg/kg, cypermethrin (2) 0.06-0.07 mg/kg, deltamethrin (7) 0.02-0.8 mg/kg, malathion (1) 0.05 mg/kg, pirimiphos butoxide (12) 0.01-13 mg/kg, pirimiphos-methyl (4) 0.03-0.6 mg/kg.

² Glyphosate (4) 0.1-1.8 mg/kg (not tested for other pesticides).

³ Glyphosate (5) 0.1-4.2 mg/kg (not tested for other pesticides).

⁴ Boscalid (1) 0.02 mg/kg; Cyprodinil (4) 0.01-0.09 mg/kg; Epoxiconazole (3) 0.01-0.03 mg/kg; Fluxapyroxad (1) 0.02 mg/kg; Spiroxamine (1) 0.01 mg/kg; Chlorpropham (22) 0.02-0.4 mg/kg; Mepiquat (10) 0.01-0.2 mg/kg; Trinexapac-ethyl (1) 0.02; Glyphosate (20) 0.2-3.0 mg/kg; deltamethrin (5) 0.02-0.4 mg/kg, imidacloprid (1) 0.02 mg/kg, isopyrazam (2) 0.01 mg/kg, piperonyl butoxide (6) 0.03-4.1 mg/kg, pirimiphos-methyl (1) 0.01 mg/kg, prochloraz (1) 0.05 mg/kg.

⁵ Azoxystrobin (1) 0.02 mg/kg; Epoxiconazole (4) 0.02-0.04 mg/kg; Tebuconazole (4) 0.02-0.4 mg/kg; Chlorpropham (26) 0.01-10 mg/kg; Mepiquat (5) 0.01-0.3 mg/kg; Trinexapac-ethyl (1) 0.05 mg/kg; Glyphosate (19) 0.1-10 mg/kg, piperonyl butoxide (1) 0.01 mg/kg, pyraclostrobin (2) 0.02-0.03 mg/kg.

⁶ Glyphosate(9) 0.5-3.9 mg/kg (not tested for other pesticides).

Table 10. Chlorpropham & Pesticide Stored Sample Results 2016-2017

	No. of Samples Analysed	% > LOD	Single Pesticide Incidence % > LOD	Multiple Pesticide Incidence % > LOD
Malting Barley ¹	20	20%	20%	0%
Malt ²	20	20%	20%	0%

¹ chlorpropham (1) 0.05 mg/kg, deltamethrin (3) 0.07-0.2 mg/kg, bixafen (1) 0.01mg/kg, cyprodinil (3) 0.01-0.06mg/kg, piperonyl butoxide (8) 0.01-3.2 mg/kg

² deltamethrin (4) 0.06-0.2 mg/kg, bixafen (1) 0.01 mg/kg, cyprodinil (2) 0.01-0.02 mg/kg, piperonyl butoxide (4) 0.09-0.5 mg/kg.

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Table 11. Field Mycotoxins Stored Sample Results 2016-2017

	No. of Samples Analysed	% > LOD	Minimum Level mg/kg	Maximum Level mg/kg	Mean Level mg/kg	Mode Level mg/kg	Median Level mg/kg
Deoxynivalenol							
Malting barley	20	55	<10	88	19	<10	12
Malt	20	25	<10	28	5	<10	<10
Zearalenone							
Malting barley	20	5	<2.5	6	0.3	<2.5	<2.5
Malt	20	0	<2.5	<2.5	<2.5	<2.5	<2.5
HT-2 +T2							
Malting barley	20	5	<40	136	<40	<40	<40
Malt	20	0	<40	<40	<40	<40	<40
NIV							
Malting barley	20	19	<50	240	28	<50	<50
Malt	19	0	<50	<50	<50	<50	<50

FUS-X, 3Ac DON and NEO tested and all results < detection limits

Table 12. Ochratoxin A Stored Sample Results 2016-2017

	No. of Samples Analysed	% > LOD	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Mode Level µg/kg	Median Level µg/kg
Malting barley	20	5	<0.2	0.4	0.02	<0.2	<0.2
Malt	20	15	<0.2	0.6	0.07	<0.2	<0.2

Table 13. Malting Barley Metals Stored Sample Results 2016-2017

	No. of Samples Analysed	% > LOD	Minimum Level mg/kg	Maximum Level mg/kg	Mean Level mg/kg	Mode Level mg/kg	Median Level mg/kg
Al	20	100%	0.7	15.8	3.4	1.1	2.8
Ni	20	100%	0.1	0.2	0.2	0.16	0.2
Cu	20	100%	2.2	4	2.9	2.5	2.7
As	20	10%	<0.01	0.01	<0.01	<0.01	<0.01
Cd	20	35%	<0.01	0.03	0.01	<0.01	<0.01
Hg	20	0%	<0.01	<0.01	<0.01	<0.01	<0.01
Pb	20	20%	<0.01	0.02	<0.01	<0.01	<0.01

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Table 14. Malt Metals Stored Sample Results 2016-2017

	No. of Samples Analysed	% > LOD	Minimum Level mg/kg	Maximum Level mg/kg	Mean Level mg/kg	Mode Level mg/kg	Median Level mg/kg
Al	20	100%	0.7	10.4	3.1	4.2	2.4
Ni	20	100%	0.2	0.4	0.3	0.22	0.3
Cu	20	100%	2.3	3.9	3	2.7	3
As	20	20%	<0.01	0.02	<0.01	<0.01	<0.01
Cd	20	60%	<0.01	0.03	0.01	0.01	0.01
Hg	20	0%	<0.01	<0.01	<0.01	<0.01	<0.01
Pb	20	40%	<0.01	0.02	0.01	<0.01	<0.01

Table 15. Chlorpropham Stored Sample Results 2017

	No. of Samples Analysed	% > LOD	Minimum Level mg/kg	Maximum Level mg/kg	Mean Level mg/kg	Mode Level mg/kg	Median Level mg/kg
Milling Wheat	29	0	<0.01	<0.01	<0.01	<0.01	<0.01

chlorpyrifos (1) 0.05 mg/kg, chlorpyrifos-methyl (1) 0.01 mg/kg, cypermethrin (2) 0.04-0.1 mg/kg, pirimiphos methyl (3) 0.02-0.07 mg/kg.

Table 16. Milling Wheat Stored Sample Results 2017

	No. of Samples Analysed	% > LOD	Minimum Level mg/kg	Maximum Level mg/kg	Mean Level mg/kg	Mode Level mg/kg	Median Level mg/kg
Al	29	93%	<0.5	35.8	4	0.8	2
Ni	29	100%	0.03	0.52	0.13	0.14	0.11
Cu	29	100%	2.4	4.6	3.51	3.5	3.5
As	29	24%	<0.01	0.03	<0.01	<0.01	<0.01
Cd	29	100%	0.01	0.09	0.04	0.04	0.04
Hg	29	0%	<0.01	<0.01	<0.01	<0.01	<0.01
Pb	29	17%	<0.01	0.05	<0.01	<0.01	<0.01

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Table 17. Ochratoxin A Stored Sample Results 2017

	No. of Samples Analysed	% > LOD	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Mode Level µg/kg	Median Level µg/kg
Food Oats	30	7	<0.2	5.7	0.23	<0.2	<0.2
Milling Wheat (January)	29	3	<0.8	1	0.03	<0.8	<0.8
Milling Wheat (March)	30	6	<0.2	0.4	0.02	<0.2	<0.2
Feed Wheat	40	13	<0.2	1.4	0.1	<0.2	<0.2
Wheat Feed	11	91	<0.2	2.1	0.8	0.7	0.7
Feed Barley	29	14	<0.2	14.6	0.6	<0.2	<0.2
Feed Oats	10	20	<0.2	0.9	0.1	<0.2	<0.2
Oat feed	10	70	<0.2	7.5	1.8	<0.2	1.1

Table 18. Pesticides Stored Sample Results 2017

	No. of Samples Analysed	% > LOD	Single Pesticide Incidence % > LOD	Multiple Pesticide Incidence % > LOD
Milling Wheat ¹	31	29%	23%	6%
Wheat Feed ²	11	54%	27%	27%
Feed Wheat ³	40	15%	10%	5%
Feed Barley ⁴	29	17%	14%	3%
Feed Oats ⁵	10	10%	10%	0%
Oat feed ⁶	10	50%	30%	20%
Food Oats ⁷	30	10%	7%	3%

¹ Chlorpyrifos (1) 0.01mg/kg; Chlorpyrifos-methyl (4) 0.01-0.06mg/kg; Cypermethrins (3) 0.04-0.13mg/kg; Deltamethrin (5) 0.02-0.16mg/kg; Malathion (1) 0.04mg/kg; Pirimiphos-methyl (2) 0.28-0.63mg/kg, carbendazim (1) 0.01 mg/kg, clothianidin (1) 0.01 mg/kg, fluxapyroxad (1) 0.02 mg/kg, piperonyl butoxide (8) 0.01-2.0 mg/kg, tebuconazole (3) 0.01-0.03 mg/kg. ² Chlorpyrifos-methyl (3) 0.01-0.02mg/kg; Cypermethrins (1) 0.06mg/kg; Deltamethrin (4) 0.04-0.07mg/kg; Pirimiphos-methyl (3) 0.14-0.21mg/kg, piperonyl butoxide (9) 0.02-1.0 mg/kg, tebuconazole (1) 0.01 mg/kg. ³ Deltamethrin (4) 0.02-0.09mg/kg; Pirimiphos-methyl (4) 0.02-1.3mg/kg piperonyl butoxide (11) 0.01-1.1 mg/kg, tebuconazole (2) 0.01 mg/kg. ⁴ Chlorpyrifos-methyl (1) 0.02mg/kg; Deltamethrin (2) 0.02-0.1mg/kg; Pirimiphos-methyl (3) 0.01-1mg/kg, bixafen (3) 0.01-0.07 mg/kg, boscalid (1) 0.01 mg/kg, cyprodinil (4) 0.02-0.2 mg/kg, fluxapyroxad (1) 0.01 mg/kg, isopyrazam (2) 0.01-0.02 mg/kg, piperonyl butoxide (8) 0.02-1.1 mg/kg, pyraclostrobin (1) 0.02 mg/kg, spiroxamine (2) 0.01-0.04 mg/kg, tebuconazole (1) 0.03 mg/kg. ⁵ Pirimiphos-methyl (1) 0.09mg/kg, epoxiconazole (1) 0.03 mg/kg, fluxapyroxad (1) 0.03 mg/kg, piperonyl butoxide (2) 0.01-0.07 mg/kg. ⁶ Chlorpyrifos (1) 0.02mg/kg; Chlorpyrifos-methyl (1) 0.01mg/kg; Deltamethrin (2) 0.02-0.07mg/kg; Pirimiphos-methyl (3) 0.02-0.16mg/kg, piperonyl butoxide (10) 0.01-0.7 mg/kg, tebuconazole (3) 0.01 mg/kg. ⁷ Chlorpyrifos (1) 0.07mg/kg; Chlorpyrifos-methyl (1) 0.01mg/kg; Deltamethrin (1) 0.2mg/kg; Pirimiphos-methyl (1) 0.01mg/kg, epoxiconazole (3) 0.02-0.03 mg/kg, piperonyl butoxide (3) 0.01-2.2 mg/kg, pyraclostrobin (1) 0.02 mg/kg, tebuconazole (1) 0.2 mg/kg.

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Table 19. Food Oats Metals Stored Sample Results 2017

	No. of Samples Analysed	% > LOD	Minimum Level mg/kg	Maximum Level mg/kg	Mean Level mg/kg	Mode Level mg/kg	Median Level mg/kg
Al	30	100%	0.9	37.5	10.39	2.4	7.1
Ni	30	100%	1.42	3.77	2.10	1.49	1.95
Cu	30	100%	2.0	3.7	2.9	3.4	2.9
As	30	53%	<0.01	0.03	0.01	<0.01	0.01
Cd	30	33%	<0.01	0.03	0.01	<0.01	<0.01
Hg	30	0%	<0.01	<0.01	<0.01	<0.01	<0.01
Pb	30	60%	<0.01	0.04	0.01	<0.01	0.01

Table 20. Milling Wheat Metals Stored Sample Results 2017

	No. of Samples Analysed	% > LOD	Minimum Level mg/kg	Maximum Level mg/kg	Mean Level mg/kg	Mode Level mg/kg	Median Level mg/kg
Al	31	97%	<0.5	37.6	4.71	2.7	2.7
Ni	31	100%	0.05	0.3	0.12	0.12	0.1
Cu	31	100%	2.5	4.5	3.27	3.2	3.2
As	31	23%	<0.01	0.02	<0.01	<0.01	<0.01
Cd	31	100%	0.01	0.07	0.04	0.04	0.04
Hg	31	0%	<0.01	<0.01	<0.01	<0.01	<0.01
Pb	31	13%	<0.01	0.03	<0.01	<0.01	<0.01

Table 21. Feed Barley Metals Stored Sample Results 2017

	No. of Samples Analysed	% > LOD	Minimum Level mg/kg	Maximum Level mg/kg	Mean Level mg/kg	Mode Level mg/kg	Median Level mg/kg
Al	11	100%	3.3	60.3	17.92	N/A	8.9
Ni	11	100%	0.19	0.58	0.3	0.27	0.27
Cu	11	100%	2.5	5.1	3.62	3.7	3.7
As	11	18%	<0.01	0.02	<0.01	<0.01	<0.01
Cd	11	73%	<0.01	0.03	0.01	0.02	0.02
Hg	11	0%	<0.01	<0.01	<0.01	<0.01	<0.01
Pb	11	82%	<0.01	0.06	0.02	0.02	0.02

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Table 22. Feed Oats Metals Stored Sample Results 2017

	No. of Samples Analysed	% > LOD	Minimum Level mg/kg	Maximum Level mg/kg	Mean Level mg/kg	Mode Level mg/kg	Median Level mg/kg
Al	10	100%	4.9	664.5	80.02	N/A	13.95
Ni	10	100%	0.84	5.34	3.27	N/A	3.29
Cu	10	100%	2.9	4.4	3.49	3.4	3.45
As	10	80%	<0.01	0.28	0.04	0.01	0.02
Cd	10	60%	<0.01	0.03	0.01	<0.01	0.01
Hg	10	0%	<0.01	<0.01	<0.01	<0.01	<0.01
Pb	10	100%	0.01	0.36	0.06	0.01	0.03
iAs	2	100%	0.04	0.3	0.17	N/A	0.17

Table 23. Feed Wheat Metals Stored Sample Results 2017

	No. of Samples Analysed	% > LOD	Minimum Level mg/kg	Maximum Level mg/kg	Mean Level mg/kg	Mode Level mg/kg	Median Level mg/kg
Al	10	100%	0.9	3.7	2	1	1.7
Ni	10	100%	0.07	0.13	0.1	0.09	0.09
Cu	10	100%	2.4	3.8	2.95	2.7	2.8
As	10	10%	<0.01	0.01	<0.01	<0.01	<0.01
Cd	10	100%	0.02	0.06	0.04	0.04	0.04
Hg	10	0%	<0.01	<0.01	<0.01	<0.01	<0.01
Pb	10	0%	<0.01	<0.01	<0.01	<0.01	<0.01

Table 24. Food Oats Sterigmatocystin Stored Sample Results 2017

	No. of Samples Analysed	% > LOD	Minimum Level mg/kg	Maximum Level mg/kg	Mean Level mg/kg	Mode Level mg/kg	Median Level mg/kg
Food Oats	30	37	<0.2	8.7	0.56	<0.2	<0.2

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Table 25. Dioxins Furans PCBs Stored Sample Results 2017

	No. of samples analysed	Min/Max Range Upper bound TEQ (ng/kg) as received	
Feed Barley	29	Dioxins and furans	0.03 - 0.03
		DL-PCBs	0.02 - 0.02
		Sum Dioxins/furans/DL-PCBS	0.05 - 0.05
		Sum of ICES-6 (µg/kg)	0.06 - 0.15
Feed Wheat	40	Dioxins and furans	0.03 - 0.03
		DL-PCBs	0.02 - 0.02
		Sum Dioxins/furans/DL-PCBS	0.05 - 0.05
		Sum of ICES-6 (µg/kg)	0.06 - 0.07
Feed Oats	10	Dioxins and furans	0.03 - 0.03
		DL-PCBs	0.02 - 0.02
		Sum Dioxins/furans/DL-PCBS	0.05 - 0.05
		Sum of ICES-6 (µg/kg)	0.06 - 0.06

Table 26. PAH Stored Sample Results 2017

	No. of samples analysed	Min/Max Range Upper bound (µg/kg) as received	
Feed Barley	29	Sum of PAH 4	0.13 - 7.5
		benzo(a)pyrene	<0.04 - 1.83
Feed Wheat	40	Sum of PAH 4	0.12 - 2.87
		benzo(a)pyrene	<0.04 - 0.58
Feed Oats	10	Sum of PAH 4	0.63 - 8.06 ²
		benzo(a)pyrene	0.13 - 2.59 ¹

¹ Indicative value
² Includes indicative value from ¹ above

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