

Annual Project Report August 2017 to June 2018

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 samples of UK-grown and imported 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 consumption as food and feed.

Key messages emerging from the project

During the period August 2017 to June 2018, the project focussed on monitoring of harvest and stored grain samples for trichothecenes, zearalenone, ochratoxin A, pesticides and metals. Subsets of samples were also analysed for ergot alkaloids and PAHs. The samples included milling wheat, malting barley, food oats, food barley, feed wheat, wheatfeed, feed barley, feed oats, oatfeed and barley malt. 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 results were found:

- Mycotoxins – Deoxynivalenol (DON) was detected most frequently in wheat samples. All samples of wheatfeed and feed wheat were found to contain DON, although the mean levels measured were 676 and 250 µg/kg, respectively. Milling wheat frequently contained DON above the detection limit (98% of samples), however, the mean level found was only 214 µg/kg. The maximum level found was 2016 µg/kg in a wheatfeed, no sample exceeded the maximum level (ML). Very few samples of food oats (7%) and no samples of food barley contained DON above the reporting limit. Oatfeed (100%) and food oats (66%) most frequently contained nivalenol, although the mean levels were 325 and 89 µg/kg, respectively. The highest level found was 863 µg/kg in a sample of oatfeed. There are no legal limits for this mycotoxin. T-2 and HT-2 toxins were detected most frequently in oats (food and feed) and oatfeed, the mean levels found in food oats and feed oats were 478 and 225 µg/kg, respectively. The maximum level found in food oats was 1837 µg/kg, which exceeded the Indicative Level value in Commission Recommendation 2013/165. The highest level found was 2091 µg/kg in oatfeed.
- There was a higher incidence of zearalenone (ZON) this year than in the harvest samples from 2016. The majority of wheat samples contained detectable ZON, oatfeed and a small number of

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barley samples also contained ZON. The highest level in milling wheat was 327 µg/kg, which exceeded the level permitted in Commission Regulation (EC) No 1881/2006. The maximum level found was 916 µg/kg in feed wheat.

- Masked forms of DON, T-2 toxin and ZON were also analysed. No residues of masked ZON compounds were found. T-2 glucoside was detected in oats and oatfeed samples, the mean level found in oatfeed was 108 µg/kg and the maximum level found was 258 µg/kg. The highest level, 445 µg/kg, was found in a food oat sample. Deoxynivalenol glucoside was found mainly in wheat samples, although the mean levels were very low (51 µg/kg or lower). The highest level found was 306 µg/kg in the sample of milling wheat that also contained the highest level of DON.
- Wheatfeed (100%) and oatfeed (88%) most frequently contained OTA. The highest level, 11 µg/kg, was found in wheatfeed. Milling wheat, malting barley and malt had the lowest incidence of OTA. No samples exceeded the ML for OTA.
- Ergot alkaloids – A high incidence of ergot alkaloids was observed; oatfeed had 100% and wheatfeed 95% incidence of detection of one or more ergot alkaloids, although the mean concentrations found in oatfeed were much lower than wheatfeed, being 48 µg/kg and 243 µg/kg, respectively. The highest level of 862 µg/kg was found in a milling wheat sample, although the mean level milling wheat was only 79 µg/kg. Currently, there are no maximum levels for ergot alkaloids.
- One residue of chlorpropham was detected at 0.2 mg/kg in a feed barley sample. The maximum residue level (MRL) is set at 0.01 mg/kg for chlorpropham in barley. However, no MRLs are currently applicable for “products or part of products exclusively used for animal feed production”.
- One residue of DDAC (didecyldimethylammonium chloride) was detected at 0.17 mg/kg in a food oats sample. The (MRL is set at 0.1 mg/kg for this disinfectant in all foodstuff.
- A high incidence of residues was found for PGRs and piperonyl butoxide (synergist). All these were within MRL.
- Metals - No samples were found to exceed the regulatory maximum levels. In line with the previous year, Hg was not detected in any of the samples. Al, Ni, and Cu were detected in all samples at similar ranges to those found the previous year. Feed oats contained a higher percentage of detectable As, Cd and Pb than food oats, although the range in levels was similar.
- PAHs - Generally higher values were found in feed barley and feed oats However, all results were found to be within safe limits.

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Summary of results from the reporting year

Table 1. Deoxynivalenol Harvest 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
Milling Wheat	50	98%	<10	1540	214	n/a	108
Feed Wheat	11	100%	14.2	1127	250	n/a	171
Wheatfeed	22	100%	28.4	2016	676	n/a	426
Feed Barley	11	36%	<10	58.9	10.7	<10	<10
Malting Barley	40	48%	<10	109	13.3	<10	<10
Food Oats	29	7%	<10	11.8	0.8	<10	<10
Food Barley	1	0%	<10	<10	n/a	n/a	n/a
Feed Oats	11	27%	<10	38.8	6.5	<10	<10
Oatfeed	10	100%	20.7	611	108	n/a	49.4

Table 2. Deoxynivalenol-3-Glucoside Harvest 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
Milling Wheat	50	62%	<10	306	30.1	<10	16.3
Feed Wheat	11	64%	<10	91.2	18.7	<10	14.4
Wheatfeed	22	91%	<10	184	51.2	<10	34.3
Feed Barley	11	27%	<10	15.4	4.0	<10	<10
Malting Barley	40	15%	<10	33.0	2.9	<10	<10
Food Oats	29	0%	<10	<10	<10	<10	<10
Food Barley	1	0%	<10	<10	n/a	n/a	n/a
Feed Oats	11	9%	<10	13.3	1.2	<10	<10
Oatfeed	10	40%	<10	104	15.4	<10	<10

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Table 3. Zearalenone Harvest 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
Milling Wheat	50	70%	<3	327	18.6	<3	7.4
Feed Wheat	11	82%	<2.5	916	114	<2.5	29.1
Wheatfeed	22	95%	<2.5	94.7	32.9	n/a	25.5
Feed Barley	11	9%	<2.5	5.5	0.5	<2.5	<2.5
Malting Barley	40	3%	<2.5	3.0	0.1	<2.5	<2.5
Food Oats	29	3%	<2.5	6.0	0.2	<2.5	<2.5
Food Barley	1	0%	<2.5	<2.5	n/a	n/a	n/a
Feed Oats	11	0%	<2.5	<2.5	<2.5	<2.5	<2.5
Oatfeed	10	50%	<2.5	63.5	9.5	<2.5	1.3

Table 4. HT-2 + T-2 Harvest 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
Milling Wheat	50	8%	<20	64.0	2.9	<20	<20
Feed Wheat	11	0%	<20	<20	<20	<20	<20
Wheatfeed	22	32%	<20	52.0	8.9	<20	<20
Feed Barley	11	27%	<20	69.7	18.2	<20	<20
Malting Barley	40	3%	<20	30.0	0.8	<20	<20
Food Oats	29	97%	<20	1837	478	n/a	278
Food Barley	1	0%	<20	<20	n/a	n/a	n/a
Feed Oats	11	82%	<20	716	225	<20	81.7
Oatfeed	10	100%	434	2091	1038	n/a	981

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Table 5. T-2-b3-Glucoside Harvest 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
Milling Wheat	50	0%	<10	<10	<10	<10	<10
Feed Wheat	11	0%	<10	<10	<10	<10	<10
Wheatfeed	22	0%	<10	<10	<10	<10	<10
Feed Barley	11	18%	<10	17.3	2.9	<10	<10
Malting Barley	40	0%	<10	<10	<10	<10	<10
Food Oats	29	69%	<10	445	61.5	<10	23.4
Food Barley	1	0%	<10	<10	n/a	n/a	n/a
Feed Oats	11	45%	<10	183	29.5	<10	<10
Oatfeed	10	100%	48.8	258	108	n/a	87.4

Table 6. Nivalenol Harvest 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
Milling Wheat	50	14%	<50	166	10.3	<50	<50
Feed Wheat	11	27%	<50	66.2	16.7	<50	<50
Wheatfeed	22	41%	<50	112	27.8	<50	<50
Feed Barley	11	55%	<100	265	82.9	<100	100
Malting Barley	40	20%	<100	302	28.7	<100	<100
Food Oats	29	66%	<50	405	88.8	<50	77.9
Food Barley	1	0%	<50	<50	n/a	n/a	n/a
Feed Oats	11	36%	<50	141	35.9	<50	<50
Oatfeed	10	100%	140	863	325	n/a	239

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Table 7. Total Ergot Alkaloids (n=12) Harvest 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
Milling Wheat	50	52%	<6.0	862	79.4	<6.0	5.1
Feed Wheat	11	45%	<6.0	140	24.3	<6.0	<6.0
Wheatfeed	22	95%	<6.0	633	243	n/a	205
Feed Barley	11	55%	<6.0	383	71.4	<6.0	8.7
Malting Barley	40	30%	<6.0	63.1	7.4	<6.0	<6.0
Food Oats	29	48%	<6.0	97.8	8.6	<6.0	<6.0
Food Barley	1	0%	<6.0	<6.0	<6.0	n/a	<6.0
Feed Oats	11	18%	<6.0	407	43.6	<6.0	<6.0
Oatfeed	10	100%	16.3	111	48.4	n/a	43.1

Table 8. Pesticides Harvest Results 2017

	No. of Samples Analysed	% > LOD	Single Pesticide Incidence % > LOD	Multiple Pesticide Incidence % > LOD
Milling Wheat ¹	50	96%	34%	62%
Malting Barley ²	40	93%	35%	58%
Food Oats ³	29	90%	17%	72%
Barley ⁴	1	100%	0%	100%
Feed Wheat ⁵	11	18%	18%	0%
Feed Barley ⁶	11	55%	55%	0%
Feed Oats ⁷	11	64%	64%	0%

¹ Boscalid (2) 0.01-0.02mg/kg; Fenpropimorph (1) 0.01mg/kg; Fluxapyroxad (2) 0.01mg/kg; Tebuconazole (10) 0.01-0.05mg/kg; Chloromequat (45) 0.02-0.8mg/kg; Mepiquat (2) 0.03-0.1mg/kg; Trinexapac-ethyl (12) 0.01-0.07mg/kg; Glyphosate (14) 0.2-0.9mg/kg.

² Bixafen (2) 0.01mg/kg; Boscalid (1) 0.04mg/kg; Cyprodinil (5) 0.01-0.3mg/kg; Epoxiconazole (1) 0.01mg/kg; Fluxapyroxad (2) 0.01-0.03mg/kg; Tebuconazole (2) 0.01-0.02mg/kg; Chloromequat (20) 0.01-1.5mg/kg; Mepiquat (14) 0.02-0.7mg/kg; Trinexapac-ethyl (6) 0.01-0.05mg/kg; Glyphosate (26) 0.2-3.8mg/kg.

³ Azoxystrobin (1) 0.03mg/kg; Bixafen (1) 0.02mg/kg; Cyproconazole (2) 0.02mg/kg; Epoxiconazole (5) 0.01-0.05mg/kg; Tebuconazole (5) 0.01-0.1mg/kg; Chloromequat (22) 0.03-5.3mg/kg; Mepiquat (9) 0.02-1.0mg/kg; Trinexapac-ethyl (2) 0.01mg/kg; Glyphosate (14) 0.2-6.7mg/kg.

⁴ Cyprodinil (1) 0.02mg/kg; Chloromequat (1) 0.1mg/kg; Mepiquat (1) 0.1mg/kg; Trinexapac-ethyl (1) 0.01mg/kg; Glyphosate (1) 1.4mg/kg.

⁵ Glyphosate (2) 0.4-1.2mg/kg (not tested for other pesticides).

⁶ Glyphosate (6) 0.1-4.9mg/kg (not tested for other pesticides).

⁷ Glyphosate (7) 0.3-4.6mg/kg (not tested for other pesticides).

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Table 9. Pesticides Harvest Additional Compounds 2017

	No. of Samples Analysed	% > LOD	Single Pesticide Incidence % > LOD	Multiple Pesticide Incidence % > LOD
Milling Wheat ¹	50	36%	14%	22%
Malting Barley ²	40	30%	22%	8%
Food Oats ³	29	24%	21%	3%
Barley ⁴	1	100%	0%	100%

¹ Chlorpyrifos-methyl (4) 0.01-0.02mg/kg; Cypermethrin (5) 0.01-0.1mg/kg; Deltamethrin (6) 0.03-0.6mg/kg; Malathion (3) 0.02-0.05mg/kg; Piperonyl butoxide (12) 0.01-6.0mg/kg; Pirimiphos-methyl (4) 0.04-0.9mg/kg.

² Chlorpyrifos-methyl (2) 0.01-0.02mg/kg; Deltamethrin (3) 0.02-0.3mg/kg; Isopyrazam (2) 0.02-0.04mg/kg; Piperonyl butoxide (6) 0.01-2.7mg/kg; Pyraclostrobin (2) 0.01-0.01mg/kg.

³ Carbendazim (1) 0.02mg/kg; Chlorpyrifos-methyl (1) 0.01mg/kg; **DDAC (2) 0.07-0.2mg/kg**; Deltamethrin (1) 0.03mg/kg; Piperonyl butoxide (1) 0.4mg/kg; Pyraclostrobin (2) 0.02mg/kg.

1 residue of DDAC (didecyltrimethylammonium chloride) was detected at 0.17 mg/kg in a food oats sample. The maximum residue level (MRL) is set at 0.1 mg/kg for this disinfectant in all foodstuff.

⁴ Deltamethrin (1) 0.03mg/kg; Piperonyl butoxide (1) 0.2mg/kg.

Table 10. Chlorpropham & Pesticides Stored Sample Results 2017-2018

	No. of Samples Analysed	% > LOD	Single Pesticide Incidence % > LOD	Multiple Pesticide Incidence % > LOD
Malting Barley ¹	20	20%	20%	0%
Malt ²	20	15%	15%	0%

¹ Deltamethrin (4) 0.02-0.3mg/kg.

² Deltamethrin (3) 0.02-0.3mg/kg.

Table 11. Pesticides Stored Additional Compounds 2017-2018

	No. of Samples Analysed	% > LOD	Single Pesticide Incidence % > LOD	Multiple Pesticide Incidence % > LOD
Malting Barley ¹	20	60%	50%	10%
Malt ²	20	35%	35%	0%

¹ Bixafen (2) 0.01-0.02mg/kg; Cyprodinil (3) 0.01mg/kg; Fluxapyroxad (1) 0.01mg/kg; Piperonyl butoxide (8) 0.01-3.6mg/kg; Tebuconazole (1) 0.03mg/kg.

² Bixafen (1) 0.02mg/kg; Cyprodinil (2) 0.01-0.03mg/kg; Piperonyl butoxide (3) 0.04-0.8mg/kg; Tebuconazole (1) 0.02mg/kg.

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Table 12. Field Mycotoxins Stored Sample Results 2017-2018

	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	45%	<10	177.5	17.8	<10	<10
Malt	20	30%	<10	56.1	11.0	<10	<10
Zearalenone							
Malting Barley	20	5%	<2.5	23.7	1.2	<2.5	<2.5
Malt	20	10%	<2.5	17.7	1.4	<2.5	<2.5
HT-2 +T2							
Malting Barley	20	30%	<20	31.7	5.2	<20	<20
Malt	20	0%	<20	<20	<20	<20	<20
NIV							
Malting Barley	20	20%	<50	181.5	18.4	<50	<50
Malt	20	5%	<100	129.4	6.5	<100	<100

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

Table 13. Ochratoxin A Stored Sample Results 2017-2018

	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	0%	<0.2	<0.2	<0.2	<0.2	<0.2
Malt	20	15%	<0.2	1.5	0.1	<0.2	<0.2

Table 14. Chlorpropham Stored Sample Results 2018

	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	25	0%	<0.01	<0.01	<0.01	<0.01	<0.01

Table 15. Pesticides Stored Additional Compounds 2018

	No. of Samples Analysed	% > LOD	Single Pesticide Incidence % > LOD	Multiple Pesticide Incidence % > LOD
Milling Wheat	25	24%	16%	8%
Chlorpyrifos-methyl (3) 0.02-0.04mg/kg; Deltamethrin (3) 0.02-0.07mg/kg; Malathion (1) 0.01mg/kg; Pirimiphos-methyl (1) 0.04mg/kg.				

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Table 16. Ochratoxin A Stored Sample Results 2018

	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 (January)	25	28%	<0.2	3.9	0.3	<0.2	<0.2
Milling Wheat (March)	25	4%	<0.2	4.0	0.2	<0.2	<0.2
Feed Wheat	40	40%	<0.2	4.8	0.5	<0.2	<0.2
Wheat Feed	10	100%	0.2	11.0	2.4	0.5	1.5
Feed Barley	30	33%	<0.2	9.2	0.8	<0.2	<0.2
Food Oats	30	27%	<0.2	0.8	0.1	<0.2	<0.2
Feed Oats	10	20%	<0.2	7.0	0.7	<0.2	<0.2
Oatfeed	8	88%	<0.2	1.9	0.7	0.3, 0.4 *	0.4

* multimodal

Table 17. Pesticides Stored Sample Results 2018

	No. of Samples Analysed	% > LOD	Single Pesticide Incidence % > LOD	Multiple Pesticide Incidence % > LOD
Milling Wheat ¹	25	24%	16%	8%
Food Oats ²	30	0%	0%	0%
Feed Wheat ³	40	13%	13%	0%
Feed Barley ⁴	30	20%	13%	7%
Wheatfeed ⁵	10	60%	20%	40%
Feed Oats ⁶	10	20%	20%	0%
Oatfeed ⁷	8	63%	63%	0%

¹ Chlorpyrifos-methyl (2) 0.08-0.5mg/kg; Cypermethrin (2) 0.4-0.5mg/kg; Deltamethrin (4) 0.02-0.3mg/kg; Malathion (1) 0.02mg/kg; Pirimiphos-methyl (1) 0.07mg/kg.

² No residues found.

³ Chlorpyrifos-methyl (4) 0.01-0.04mg/kg; Pirimiphos-methyl (1) 0.03mg/kg.

⁴ **Chlorpropham (1) 0.2mg/kg**; Chlorpyrifos-methyl (2) 0.01-0.02mg/kg; Deltamethrin (4) 0.03-0.2mg/kg; Pirimiphos-methyl (1) 0.01mg/kg.

One residue of chlorpropham detected at 0.2 mg/kg in a feed barley sample. The maximum residue level (MRL) is set at 0.01 mg/kg for chlorpropham in barley. However, no MRLs are currently applicable for "products or part of products exclusively used for animal feed production".

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018R0062&from=EN>

⁵ Chlorpyrifos-methyl (3) 0.03-0.2mg/kg; Cypermethrin (1) 0.07mg/kg; Deltamethrin (5) 0.01-0.03mg/kg; Pirimiphos-methyl (4) 0.03-0.4mg/kg.

⁶ Deltamethrin (1) 0.3mg/kg; Pirimiphos-methyl (1) 4.7mg/kg.

⁷ Chlorpyrifos-methyl (1) 0.01mg/kg; Deltamethrin (3) 0.02-0.03mg/kg; Pirimiphos-methyl (1) 0.02mg/kg.

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Table 18. Pesticides Stored Additional Compounds

	No. of Samples Analysed	% > LOD	Single Pesticide Incidence % > LOD	Multiple Pesticide Incidence % > LOD
Milling Wheat ¹	25	44%	28%	16%
Food Oats ²	30	40%	23%	17%
Feed Wheat ³	40	55%	43%	13%
Feed Barley ⁴	30	63%	37%	27%
Wheatfeed ⁵	10	90%	30%	60%
Feed Oats ⁶	10	60%	40%	20%
Oatfeed ⁷	8	63%	13%	50%

¹ Boscalid (1) 0.01mg/kg; Epoxiconazole (1) 0.01mg/kg; Piperonyl butoxide (5) 0.09-3.4mg/kg; Tebuconazole (8) 0.01-0.05mg/kg.

² Boscalid (1) 0.06mg/kg; Cyproconazole (1) 0.01mg/kg; Epoxiconazole (3) 0.01-0.02mg/kg; Fluxapyroxad (1) 0.02mg/kg; Pendimethalin (1) 0.01mg/kg; Piperonyl butoxide (2) 0.02-0.03mg/kg; Pyraclostrobin (2) 0.01-0.03mg/kg; Tebuconazole (6) 0.01-0.2mg/kg.

³ Boscalid (1) 0.01mg/kg; Epoxiconazole (1) 0.01mg/kg; Fluroxypyr (1) 0.01mg/kg; Fluxapyroxad (4) 0.01-0.02mg/kg; Isoproturon (1) 0.01mg/kg; Piperonyl butoxide (1) 0.03mg/kg; Tebuconazole (19) 0.01-0.07mg/kg.

⁴ Azoxystrobin (1) 0.02mg/kg; Bixafen (1) 0.02mg/kg; Cyprodinil (6) 0.01-0.4mg/kg; Epoxiconazole (1) 0.02mg/kg; Fluoxastrobilin (1) 0.01mg/kg; Fluxapyroxad (4) 0.01-0.05mg/kg; Isoprazam (3) 0.03-0.04mg/kg; Piperonyl butoxide (10) 0.01-2.5mg/kg; Pyraclostrobin (1) 0.01mg/kg; Spiroxamine (1) 0.01mg/kg; Triclopyr (1) 0.01mg/kg.

⁵ Piperonyl butoxide (8) 0.01-0.4mg/kg; Tebuconazole (7) 0.01-0.02mg/kg.

⁶ Azoxystrobin (2) 0.02-0.06mg/kg; Boscalid (1) 0.03mg/kg; Cyproconazole (1) 0.04mg/kg; Fluroxypyr (1) 0.01mg/kg; Piperonyl butoxide (3) 0.02-2.5mg/kg; Pyraclostrobin (1) 0.03mg/kg; Triclopyr (1) 0.01mg/kg.

⁷ Azoxystrobin (1) 0.02mg/kg; Cyproconazole (2) 0.01mg/kg; Piperonyl butoxide (5) 0.02-0.3mg/kg; Tebuconazole (4) 0.01-0.03mg/kg.

Table 19. PAH Stored Sample Results 2018

Matrix	No. of samples analysed	Analytes	Min/Max Range Upper bound (µg/kg) as received
Feed Barley	15	Sum of PAH 4	0.21 - 4.65
		benzo(a)pyrene	<0.06 - 1.13
Feed Oats	10	Sum of PAH 4	0.55 - 6.15
		benzo(a)pyrene	0.13 - 1.31
Feed Wheat	20	Sum of PAH 4	0.16 - 6.29
		benzo(a)pyrene	<0.06 - 1.55

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Table 20. Feed Oats Metals Stored Sample Results 2018

	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%	3.2	180.8	34.1	7.8	12.0
Ni	10	100%	0.9	8.2	3.3	no mode	2.6
Cu	10	100%	2.8	4.2	3.6	3.3	3.6
As	10	70%	<0.01	0.07	0.02	<0.01	0.02
Cd	10	80%	<0.01	0.04	0.02	0.01	0.01
Hg	10	0%	<0.01	<0.01	<0.01	<0.01	<0.01
Pb	10	90%	<0.01	0.10	0.04	0.02	0.03

Table 21. Food Oats Metals Stored Sample Results 2018

	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%	1.6	76.7	11.6	7.6	6.1
Ni	30	100%	1.5	5.5	2.6	2.5	2.5
Cu	30	100%	2.1	4.2	3.1	3.2	3.0
As	30	33%	<0.01	0.04	0.01	<0.01	<0.01
Cd	30	63%	<0.01	0.05	0.02	<0.01	0.01
Hg	30	0%	<0.01	<0.01	<0.01	<0.01	<0.01
Pb	30	80%	<0.01	0.11	0.02	0.01	0.01

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