Annual Project Report
August 2024 to June 2025

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**	July 2025

Project aim and objectives

To survey the incidence and levels of key contaminants in samples of UK-grown 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. A small number of imported milling wheat samples were also included.

Key messages emerging from the project

During the period August 2024 to June 2025, the project focussed on monitoring of harvest and stored grain samples for trichothecenes, zearalenone, ochratoxin A, ergot alkaloids and pesticides. Subsets of malt (20), malting barley (20), food oats (17) and food barley (1) were also analysed for Alternaria toxins, beauvericin, enniatins and sterigmatocystin.

The samples analysed were milling wheat, malting barley, food oats, food barley, feed wheat, wheatfeed, feed barley, feed oats, oatfeed and roasted barley malt. The data is a representative sampling exercise but is not intended to provide a fully comprehensive monitoring of the UK grain harvest; the data represents typical levels likely to be found in each of the sample types within a given year of sampling. The results from the previous 8 years of this study are available on the AHDB website: https://ahdb.org.uk/monitoring-of-contaminants-in-uk-cereals-used-for-processing-food-and-animal-feed. Results from 2024/5 are presented below.

Summary of results from the reporting year

All analyses, were carried out using UKAS ISO17025 accredited methods. All data calculations presented in the following tables are reported as 'lower bound' values, i.e. any result less than the reporting limit has been presumed to be zero.

Results for key mycotoxins are shown below.

The minimum level recorded in the tables is the reporting limit, or the lowest measured value where 100% of samples contained a measurable level of analyte.

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Measurement uncertainty

The following measurement of uncertainty should be applied to all results received as part of this project. Specific MU measurements are available on request.

Method	Measurement of Uncertainty (%)
Trichothecenes	50
Zearalenone	50
Ergot Alkaloids	55
Ochratoxin A	50
Pesticides	50

Key outcomes

- Fusarium toxin levels in samples from the 2024 harvest were again very low.
- The mean ergot alkaloid concentration was higher in 2024 than the 9 year average for all products.
- Milling wheat samples contained the highest incidence of ergot alkaloids and at the highest concentrations. Three samples contained >1000ug/kg sum ergot alkaloids (1 less than 2023), and 18 samples were between 100 and 1000 ug/kg (5 more than 2023), 7 samples ranged from 50-100 ug/kg (1 more than 2023).
- One food oat sample exceeded the ML for OTA in unprocessed cereals.
- Sterigmatocystin and Alternaria mycotoxin results were reassuring, there was a low incidence of low concentrations detected.
- Enniatins results concurred with published data.
- Levels for pesticides remain low, and consistent with previous data.

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Fresh Harvest 2024 Samples - Mycotoxins

- Deoxynivalenol - Another year of low deoxynivalenol (DON) levels (Table 1) in 2024. All products except feed oats had a mean value lower than the 9 year average across the whole project. Incidence levels above the reporting limit (RL) were similar to levels seen over the past 3 years and ranged from 0% in food barley and 7% in food oats to 100% in wheat feed and oat feed. Milling wheat and malting barley had almost identical incidence, mean and max DON levels compared to 2023. Milling wheat 2024 vs 2023 (52% vs 50%, Max – 376 µg/kg vs 400 µg/kg, mean – 31 µg/kg vs 29.3 µg/kg). Malting barley 2024 vs 2023 (25% vs 28%, Max – 93.1 µg/kg vs 80.3 µg/kg, mean – 6.5 µg/kg vs 9.3 µg/kg). The maximum level measured in 2024 was 376 µg/kg in a sample of milling wheat, all other maximum levels were <164 µg/kg. A summary of the mean DON levels in fresh harvest samples over the duration of the project is given in Figure 1.

Table 1. Deoxynivalenol Harvest Results 2024

	No. of Samples Analysed	% > Reporting Limit	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Median Level µg/kg
Milling Wheat	50	52	<10	376	31.0	10.6
Feed Wheat	14	57	<10	34	14	14.7
Wheatfeed	20	100	26.7	151	74	67
Feed Barley	14	43	<10	49	14.9	<10
Malting Barley	40	25	<10	93.1	6.55	<10
Food Oats	29	7	<10	42	2	<10
Food Barley	1	0	<10	<10	<10	<10
Feed Oats	6	50	<10	48.9	20.1	<10
Oatfeed	6	100	11.8	163	82.4	67.5

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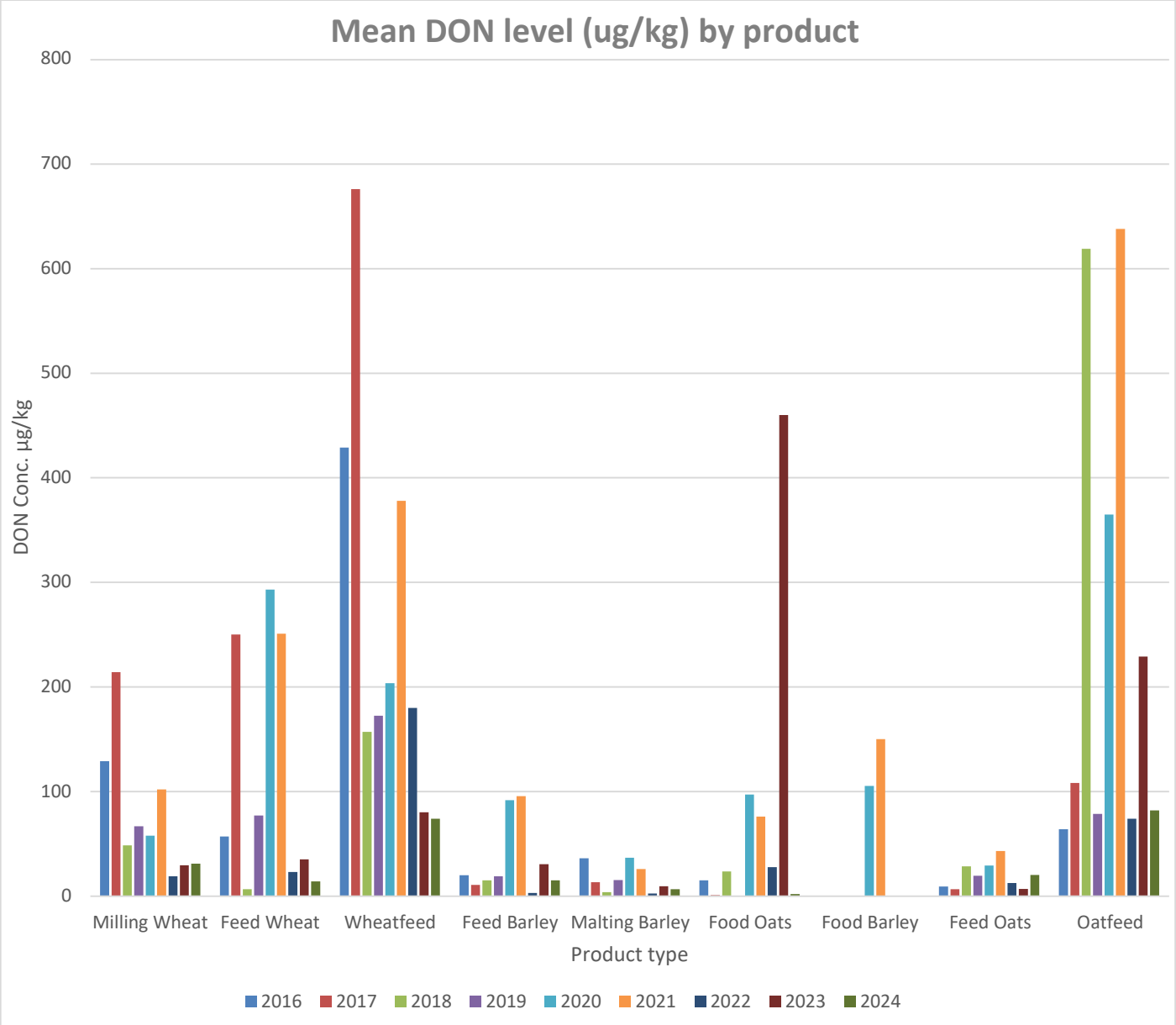
Figure 1. Mean DON levels (µg/kg) in fresh harvest samples by year



DON MLs from Assimilated Commission Regulation (EC) No 1881/2006:
Unprocessed cereals other than durum wheat, oats and maize – 1250 µg/kg
Unprocessed durum wheat and oats – 1750 µg/kg

The results described in this summary report are interim and relate to one year, except where stated. In all cases, the reports refer to projects that extend over a number of years.

- Nivalenol - Incidence of nivalenol (NIV) (Table 2) above the RL was greater in 2024 vs 2023, ranging from 0% and 7% (food barley and feed wheat) to 100% (oatfeed). Although incidence was up in almost all products, the mean values were broadly similar to those measured in 2023 and due to the way the results are displayed 6 of the 9 products have mean values lower than the LOQ. The greatest reduction was found in feed barley with the mean level reducing to 34.3 µg/kg in 2024 from 103 µg/kg in 2023. The greatest increase was found in food oats increasing from 73 µg/kg in 2023 to 158 µg/kg in 2024. The highest mean level (198 µg/kg) was found for oatfeed, this was almost identical to 2023 (197 µg/kg). The highest maximum value (1574 µg/kg) was found in a sample of oatfeed. This concentration was confirmed by repeat confirmatory analysis.

Table 2. Nivalenol Fresh Harvest 2024 Results

	No. of Samples Analysed	% > Reporting Limit	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Median Level µg/kg
Milling Wheat	50	12	<50	116	9.3	<50
Feed Wheat	14	7	<50	57	4	<50
Wheatfeed	20	60	<50	135	44	63
Feed Barley	14	14	<50	387	34.3	<50
Malting Barley	40	20	<50	130	16.9	<50
Food Oats	29	72	<50	1574	158	112
Food Barley	1	0	<50	<50	<50	<50
Feed Oats	6	17	<50	122	20.4	<50
Oatfeed	6	100	59.8	419	198	182

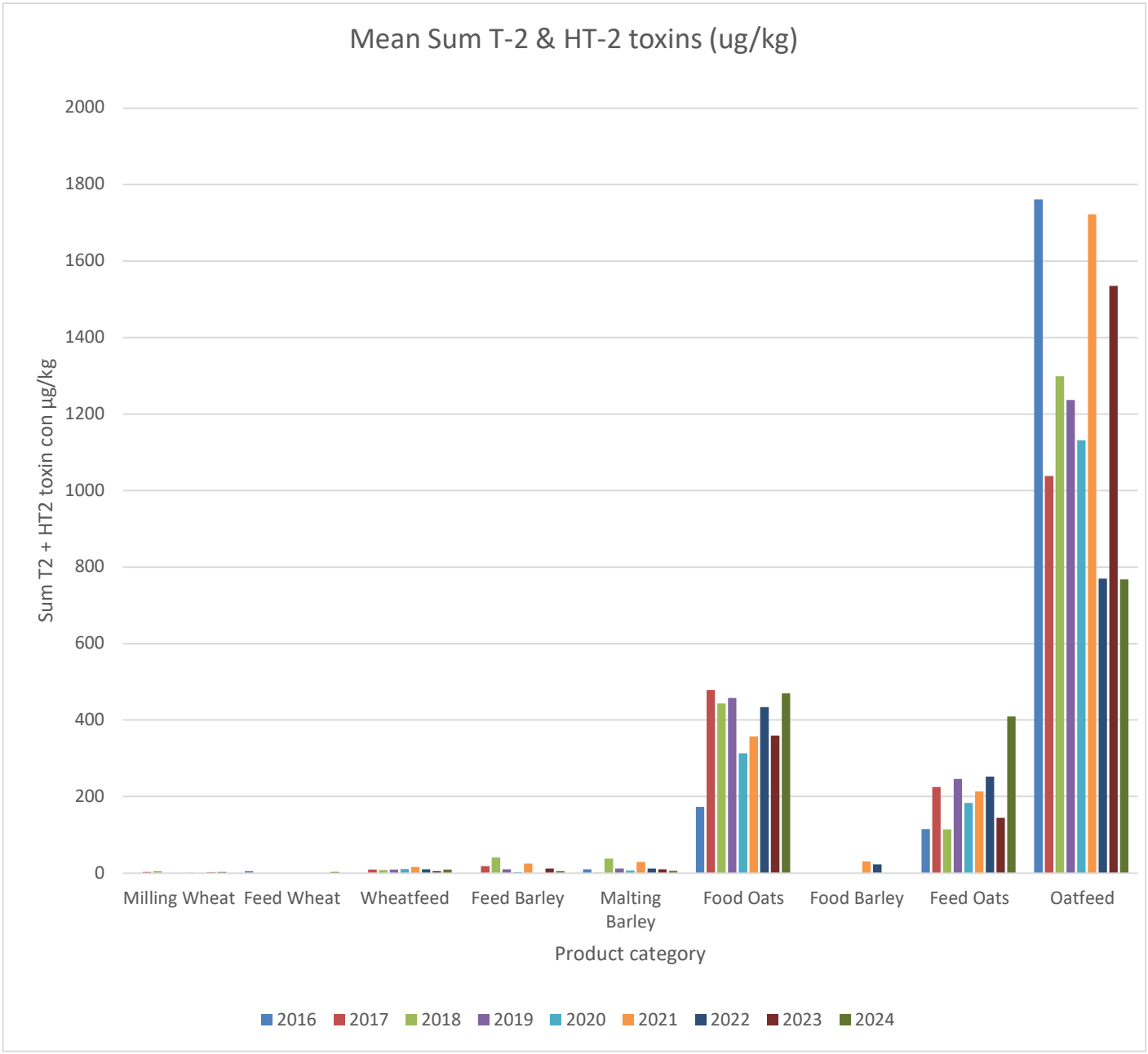
- Of the other Type B trichothecenes, 15-acetyl DON was not found above RL in any of the samples. 3-acetyl DON (Table 3) was detected in 1 sample of malting barley (12.6 µg/kg) and not found in any other product. Fusarenon X and Diacetoxyscirpenol were not detected in any sample received.

Table 3. 3-Acetyl Deoxynivalenol Fresh Harvest 2024 Results

	No. of Samples Analysed	% > Reporting Limit	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Median Level µg/kg
Milling Wheat	50	0	<10	<10	<10	<10
Feed Wheat	14	0	<10	<10	<10	<10
Wheatfeed	20	0	<10	<10	<10	<10
Feed Barley	14	0	<10	<10	<10	<10
Malting Barley	40	3	<10	12.6	0.3	<10
Food Oats	29	0	<10	<10	<10	<10
Food Barley	1	0	<10	<10	<10	<10
Feed Oats	6	0	<10	<10	<10	<10
Oatfeed	6	0	<10	<10	<10	<10

- T-2 and HT-2 toxins - As in previous years T-2 and HT-2 toxins (Table 4) were detected most frequently in oat products (100% in oatfeed and food oats, 83% in feed oats). The highest levels were also found in these products with maximum values being 2758 µg/kg in food oats, 1577 µg/kg in oatfeed and 968 µg/kg in feed oats. Mean values for most products were similar to those measured in previous years however, for food oats and feed oats, the mean values in 2024 were the highest (feed oats – 409 µg/kg) or close to the highest (food oats – 470 µg/kg) values recorded during the project.
- In 2024, 2 food oats contained levels which would be ML exceedances for the sum of T-2 and HT-2 toxins if the proposed limit of 1250 µg/kg, as detailed in Commission Regulation (EU) 2024/1038, were applied within GB. Those values were 1331 µg/kg and 2758 µg/kg. Once MU was applied only the sample containing 2758 µg/kg would be an exceedance, representing 3% of the oat samples analysed.
- For the other products incidence levels ranged from 65% (wheat feed) to 20% or less (all other products). Mean values for all other products were below the reporting limit of 20 µg/kg. A summary of the mean T-2 and HT-2 toxins levels in fresh harvest samples over the duration of the project is given in Figure 2.

Figure 2. Mean T-2 and HT-2 toxins levels (µg/kg) in Fresh Harvest samples



No MLs in force in GB for sum T-2 and HT-2 toxins.

Sum T-2 and HT-2 MLs from Commission Regulation (EU) 2024/1038 range from 50 to 1250 µg/kg for unprocessed cereal grains.

Table 4. Sum of T-2 + HT-2 toxins Fresh Harvest 2024 Results

	No. of Samples Analysed	% > Reporting Limit	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Median Level µg/kg
Milling Wheat	50	16	<20	28	2.9	<20
Feed Wheat	14	14	<20	29	3	<20
Wheatfeed	20	65	<20	24	9	10
Feed Barley	14	14	<20	40	5.0	<20
Malting Barley	40	20	<20	63.7	5.4	<20
Food Oats	29	100	<20	2758	470	294
Food Barley	1	0	<20	<20	<20	<20
Feed Oats	6	83	<20	968	409	270.7
Oatfeed	6	100	479	1577	767	578

- For other type A trichothecenes, neosolaniol (Table 5) was only measured above the RL in oatfeed (100%), feed oats (50%) and food oats (45%). The highest maximum level measured was 94 µg/kg in a sample of food oats, but the mean was only 12 µg/kg and median <10 µg/kg, suggesting most samples were below the RL. The highest mean value was in oatfeed (21.1 µg/kg), this product also had a median of 18.1 µg/kg. All other non-oat products were below the RL. Diacetoxyscirpenol was not detected in any sample received.

Table 5. Neosolaniol Fresh Harvest Results 2024

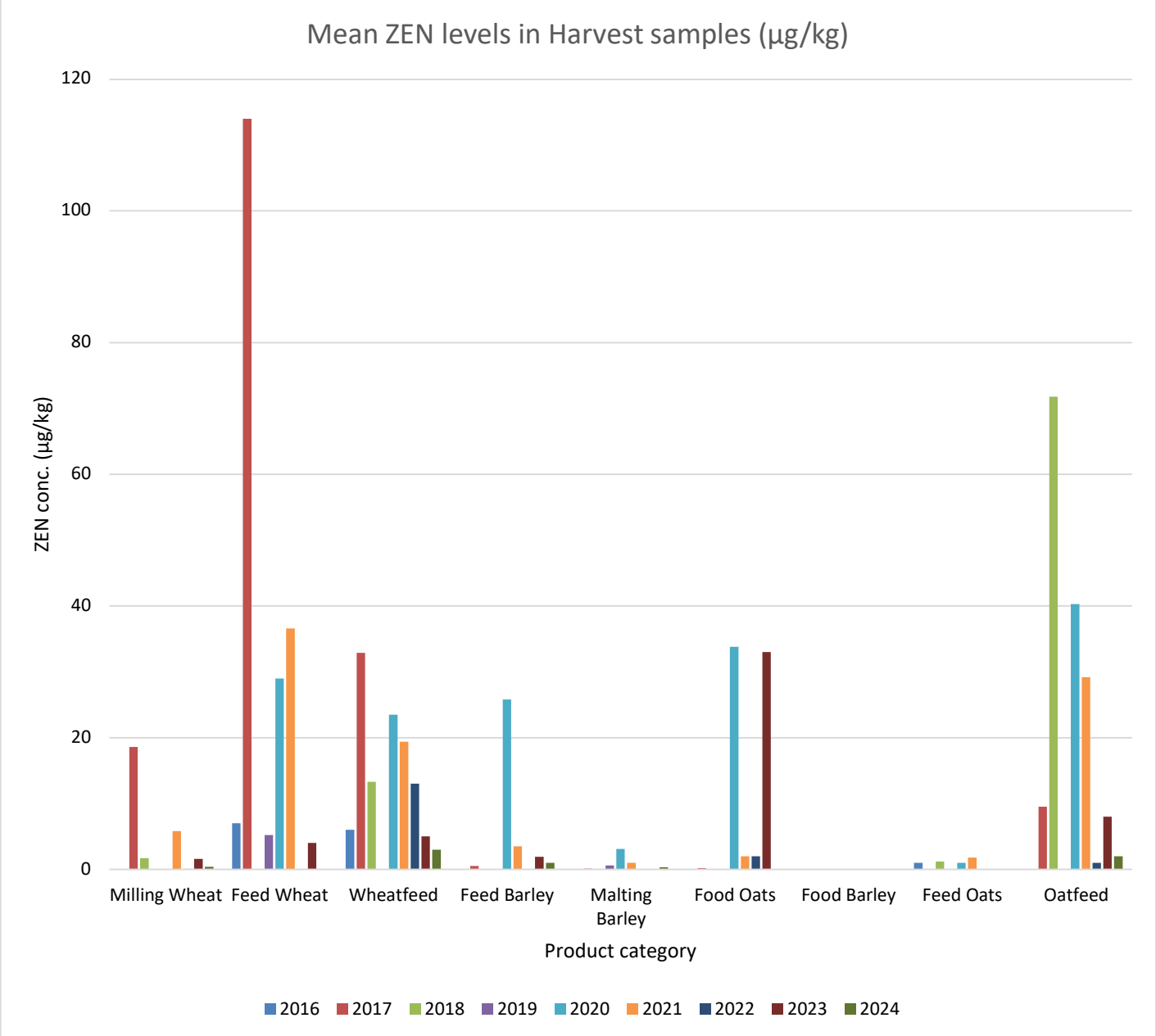
	No. of Samples Analysed	% > Reporting Limit	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Median Level µg/kg
Milling Wheat	50	0	<10	<10	<10	<10
Feed Wheat	14	0	<10	<10	<10	<10
Wheatfeed	20	0	<10	<10	<10	<10
Feed Barley	14	0	<10	<10	<10	<10
Malting Barley	40	0	<10	<10	<10	<10
Food Oats	29	45	<10	94	12	<10
Food Barley	1	0	<10	<10	<10	<10
Feed Oats	6	50	<10	28.7	9.2	6.4
Oatfeed	6	100	14.9	34.0	21.1	18.1

- Zearalenone - Incidence levels of zearalenone (ZEN) were generally low for all product types. The highest incidence levels were found in oatfeed (67%) and wheatfeed (50%), with the other 7 product types having incidence levels of <8%. (Table 6). Mean values were very similar to levels seen over the past 3 years, and for most products have been on the decline since highs of 2018, 2019 and 2020. The highest mean value was 3 µg/kg (wheatfeed), however the highest maximum level measured was in a sample of feed barley (14 µg/kg). All other products had mean levels <RL. A summary of the mean ZEN levels in fresh harvest samples over the duration of the project is given in Figure 3.

Table 6. Zearalenone Fresh Harvest 2024 Results

	No. of Samples Analysed	% > Reporting Limit	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Median Level µg/kg
Milling Wheat	50	6	<2.5	11	0.4	<2.5
Feed Wheat	14	7	<2.5	3	<2.5	<2.5
Wheatfeed	20	50	<2.5	10	3	<2.5
Feed Barley	14	7	<2.5	14	1.0	<2.5
Malting Barley	40	5	<2.5	9.5	0.3	<2.5
Food Oats	29	0	<2.5	<2.5	<2.5	<2.5
Food Barley	1	0	<2.5	<2.5	<2.5	<2.5
Feed Oats	6	0	<2.5	<2.5	<2.5	<2.5
Oatfeed	6	67	<2.5	3.9	2.1	2.9

Figure 3. Mean ZEN levels (µg/kg) in Fresh Harvest Samples



ZEN MLs from Assimilated Commission Regulation (EC) No 1881/2006:
Unprocessed cereals other than maize – 100 µg/kg

- Masked mycotoxins – Masked (also known as modified) forms of deoxynivalenol, T-2 toxin and zearalenone were also analysed. Deoxynivalenol 3-glucoside (DON3G) was found mainly in oatfeed and wheatfeed samples (Table 7). Incidence above the RL ranged from 83% (oatfeed) to 5% (malting barley). Feed wheat, food and feed oats and food barley samples did not contain any DON3G. Only oatfeed had a mean value >RL (11.2 µg/kg), mean values in 2024 were broadly similar to previous years of the project. No unusually high results were measured in 2024, with the highest maximum value being 42 µg/kg in a sample of milling wheat, compared to last year's maximum value of 2020 µg/kg in a sample of food oats.

Table 7. Deoxynivalenol-3-Glucoside Fresh Harvest 2024 Results

	No. of Samples Analysed	% > Reporting Limit	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Median Level µg/kg
Milling Wheat	50	8	<10	42	2.4	n/a
Feed Wheat	14	0	<10	<10	<10	<10
Wheatfeed	20	40	<10	18	6	<10
Feed Barley	14	29	<10	20	4.7	<10
Malting Barley	40	5	<10	29.9	1.26	<10
Food Oats	29	0	<10	<10	<10	<10
Food Barley	1	0	<10	<10	<10	<10
Feed Oats	6	0	<10	<10	<10	<10
Oatfeed	6	83	<10	16.9	11.2	12.5

- T-2 glucoside (Table 8) was regularly detected in oatfeed (100%), food oats (59%) and feed oats (50%) plus a small incidence in malting barley (8%). Three products had mean values greater than the RL with oatfeed being the highest (99.9 µg/kg), followed by food oats (59 µg/kg) and feed oats (41.2 µg/kg). The highest maximum value measured was 308 µg/kg in a sample of food oats. Mean values are similar to those measured in previous years.
- Zearalenone-14-glucoside, α-zearalenol and β-zearalenol and their glucosides were not detected in any products.

Table 8. T-2-α3-Glucoside Fresh Harvest 2024 Results

	No. of Samples Analysed	% > Reporting Limit	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Median Level µg/kg
Milling Wheat	50	0	<10	<10	<10	<10
Feed Wheat	14	0	<10	<10	<10	<10
Wheatfeed	20	0	<10	<10	<10	<10
Feed Barley	14	0	<10	<10	<10	<10
Malting Barley	40	8	<10	23.7	1.17	<10
Food Oats	29	59	<10	308	59	22
Food Barley	1	0	<10	<10	<10	<10
Feed Oats	6	50	<10	148	41.2	19.4
Oatfeed	6	100	53.2	170	99.9	95.7

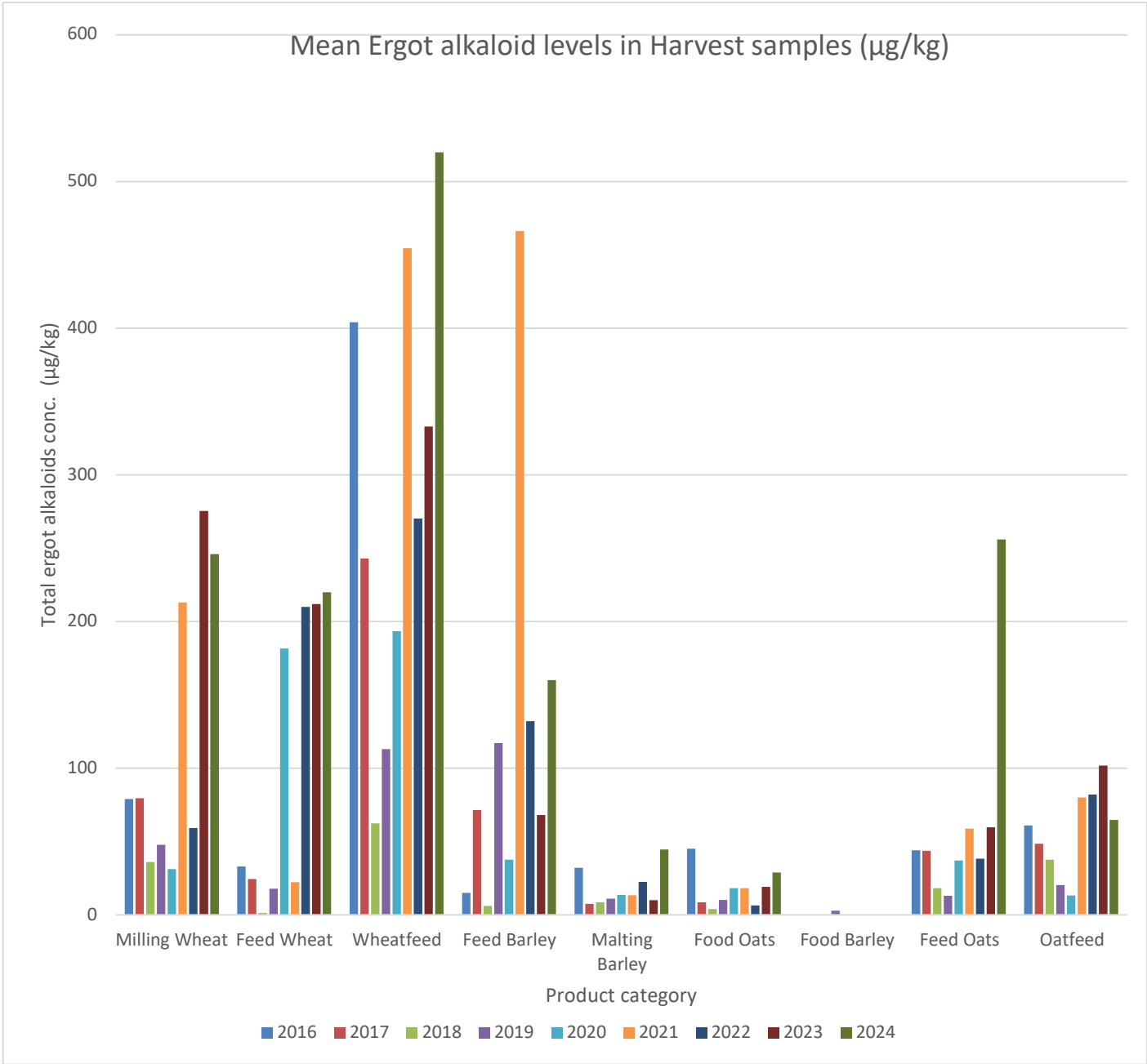
- Ergot alkaloids - Incidence of ergot alkaloids ranged from 45% in food oats to 100% in wheatfeed (Table 9). The one sample of food barley did not contain ergot alkaloids above the RL. Mean levels observed in 2024 were higher for all products except oat feed and milling wheat when compared to 2023, however, both oat feed and milling wheat had values similar to those recorded in 2023. For all products the mean values in 2024 are higher than the 9 year average. It is worth noting that for most products there does appear to be a positive trend developing over the project, with ergot alkaloid mean values increasing year on year. The highest maximum level measured in 2024 was 2631 µg/kg in a sample of milling wheat, and several products contained maximum levels greater than 1000 µg/kg (Wheatfeed – 1697 µg/kg, feed barley – 1672 µg/kg, feed oats – 1471 µg/kg, feed wheat – 1218 µg/kg).
- Regulation (EU) 2021/1399 introduced maximum levels for ergot alkaloids in some cereal products for human consumption. These levels came into force in the EU on 1st January 2022, but do not apply in GB. The limits for the products analysed in this study range from 50 µg/kg to 150 µg/kg. Several of the products tested during the 2024/2025 period exceed these levels. For milling wheat, at least 50% of the samples tested would not comply with these EU limits. A summary of the mean sum ergot alkaloid levels in fresh harvest samples over the duration of the project is given in Figure 4.

Table 9. Total Ergot Alkaloids (n=12) Fresh Harvest 2024 Results

	No. of Samples Analysed	% > Reporting Limit	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Median Level µg/kg
Milling Wheat	50	82	<6.0	2631	242	71.8
Feed Wheat	14	71	<6.0	1218	220	21.5
Wheatfeed	20	100	18.2	1697	520	424
Feed Barley	14	57	<6.0	1672	160	3.5
Malting Barley	40	50	<6.0	442	44.5	0.2
Food Oats	29	45	<6.0	277	28.9	<6.0
Food Barley	1	0	<6.0	<6.0	<6.0	<6.0
Feed Oats	6	50	<6.0	1471	255	3.0
Oatfeed	6	83	<6.0	110	64.7	83.5

This is a combined value calculated from the sum of the individual 12 alkaloids. The LOQ of each alkaloid is 0.5 µg/kg. Where no residues are detected the LOQ values are combined to give a sum LOQ, of 6.0 µg/kg. Where individual alkaloids are quantified above the LOQ, the sum is calculated from those values with results below the LOQ presumed to be equal to zero (lower bound result), which can result in values of less than 6.0 µg/kg being reported.

Figure 4. Mean sum ergot alkaloid levels (µg/kg) in harvest samples



No MLs in force in GB for sum ergot alkaloids.

Sum Ergot alkaloids MLs from Commission Regulation (EU) 2023/915 range from 50 to 150 µg/kg for milling products of cereals.

Stored Samples from Harvest 2024 – Mycotoxins

- Ochratoxin A – the incidence of Ochratoxin A (OTA) (Table 10) in stored samples ranged from 5% (feed wheat) to 100% (wheatfeed), this is similar to incidence levels seen throughout the project. The highest level in 2024 was found in a sample of food oats, measured at 15.4 µg/kg which was an ML exceedance after MU was applied. This result was atypical for food oats, with the incidence and mean levels being 13% and 0.6 µg/kg respectively. No other sample analysed for OTA measured above the ML. All other products (except oatfeed – 67%) had incidence levels less than 20%. Mean values across those products ranged from 0.04 to 0.8 µg/kg. The maximum level for OTA in cereals for direct human consumption (Assimilated Commission Regulation (EC) No 1881.2006) is 3 µg/kg and 5 µg/kg for unprocessed cereals.

Table 10. Ochratoxin A Results – Stored samples 2025 (Harvest 2024)

	No. of Samples Analysed	% > Reporting Limit	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Median Level µg/kg
Malting Barley	20	10	<0.2	1.7	0.1	<0.2
Malt	20	20	<0.2	1.4	0.1	<0.2
Milling Wheat (January)	25	12	<0.2	0.9	0.08	<0.2
Milling Wheat (March)	25	8	<0.2	0.7	0.04	<0.2
Feed Wheat	40	5	<0.2	5.8	0.2	<0.2
Wheat Feed	12	100	0.4	2.2	0.8	0.8
Feed Barley	36	17	<0.2	2.0	0.2	<0.2
Food Oats	30	13	<0.2	15.4	0.6	<0.2
Feed Oats	6	17	<0.2	1.3	0.2	<0.2
Oatfeed	6	67	<0.2	1.0	0.4	<0.2

- Fusarium mycotoxins - Matched pairs of malting barley and malt were also analysed for Fusarium mycotoxins, however, very little was detected (Table 11). In the malt samples, only DON and DON3G were detected (35% and 55% incidence respectively). Although the mean values were both relatively low (DON 5.9 µg/kg and DON3G 14.9 µg/kg), they were the highest mean values recorded since 2021-2022.

- In the malting barley samples, more residues were detected but incidences were low (DON – 30%, T-2-α3-glucoside – 10%, HT-2 +T-2 – 15%, NIV – 20%). Mean and maximum levels were broadly similar to values measured in previous years. Only NIV had one of the highest maximum values measured during the life of the project (349 µg/kg).

Table 11. Field Mycotoxins Malting Barley & Malt Results (Harvest 2024)

	No. of Samples Analysed	% > Reporting Limit	Minimum Level µg/kg***	Maximum Level µg/kg	Mean Level µg/kg	Median Level µg/kg
Deoxynivalenol						
Malting Barley	20	30	<10	30.0	5.1	<10
Malt	20	35	<10	31.5	5.9	<10
Deoxynivalenol-3-Glucoside						
Malting Barley	20	0	<10	<10	<10	<10
Malt	20	55	<10	46.3	14.9	<10
3-Acetyl Deoxynivalenol						
Malting Barley	20	0	<10	<10	<10	<10
Malt	20	0	<10	<10	<10	<10
15-Acetyl Deoxynivalenol						
Malting Barley	20	0	<20	<20	<20	<20
Malt	20	0	<20	<20	<20	<20
T-2-α3-Glucoside						
Malting Barley	20	10	<10	<10	1.3	<10
Malt	20	0	<10	<10	<10	<10
HT-2 + T-2						
Malting Barley	20	15	<20	58.9	6.3	<20
Malt	20	0	<20	<20	<20	<20
Nivalenol						
Malting Barley	20	20	<50	349	28.8	<50
Malt	20	0	<50	<50	<50	<50

*** Reporting limits vary by toxin due to individual response of each toxin.

- Additional mycotoxin analyses – In response to an expected data call from EFSA, some additional analysis was carried out on the stored samples received from MAGB and BOBMA.

- BOBMA samples - eighteen samples were analysed for Alternaria toxins, enniatins, beauvericin and sterigmatocystin. Alternaria toxin analysis results are reported in Table 12. Results are reported for Tenuazonic acid (TeA), alternariol (AOH), alternaria methyl ether (AME) and tentoxin (TEN). Incidence levels were quite low with only TeA (17%) and AOH (11%) residues above the RL and only TeA returned a mean value (1.8 µg/kg) above the RL. The highest concentration measured was 20.8 µg/kg TeA.

Table 12. Alternaria toxins – Stored Food oats (Harvest 2024)

	No. of Samples Analysed	% > Reporting Limit	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Median Level µg/kg
Tenuazonic Acid (TeA)	18	17	<1	20.8	1.8	<1
Alternariol (AOH)	18	11	<1	6.4	0.4	<1
Alternariol monomethylether (AME)	18	0	<1	<1	<1	<1
Tentoxin (TEN)	18	0	<1	<1	<1	<1

- Results for enniatins in oats (Table 13) were considerably lower than those measured in barley. Enniatin B1 was the most abundant as it was detected in all samples, it also had the highest mean concentration (59 µg/kg) and the highest maximum value (344 µg/kg). For the other 3 analytes, incidence ranged from 28% (Enniatin A) to 94% (Enniatin B). The mean and max values also varied, enniatin A was the lowest (Mean – 2.6 µg/kg, max – 22.4 µg/kg), enniatin A1 occurred more frequently and at higher concentrations (Mean – 17.3 µg/kg, max – 128 µg/kg) and enniatin B concentrations were higher again (Mean – 38 µg/kg, max – 142 µg/kg).
- Of the 18 samples analysed for beauvericin 89% had measurable residues. The mean value was 24 µg/kg and the maximum value measured was 106 µg/kg.
- 18 samples were also analysed for sterigmatocystin, results are presented in Table 14. Incidence level above RL was only 17% (3 samples). Mean level was 0.2 µg/kg and the maximum value measured was 2.3 µg/kg.

Table 13. Enniatins + Beauvericin – Stored Food oats (Harvest 2024)

	No. of Samples Analysed	% > Reporting Limit	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Median Level µg/kg
Enniatin A	18	28	<2.5	22.4	2.6	<2.5
Enniatin A1	18	67	<2.5	128	17.3	5
Enniatin B	18	94	<2.5	142	38	26
Enniatin B1	18	100	3	344	59	21
Beauvericin	18	89	<2.5	106	24	18

Table 14. Sterigmatocystin – Stored Food oats (Harvest 2024)

	No. of Samples Analysed	% > Reporting Limit	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Median Level µg/kg
Food oats	18	17	<0.25	2.3	0.2	<0.25

- MAGB samples – Twenty matched pairs of malt and malting barley were analysed for enniatins (Table 15). Incidence, mean and max values for enniatin A was very similar for both sets of samples. However, for the other 3 enniatins measured, Enniatin A1, B and B1, the mean and max values varied quite considerably between malt and malting barley although the incidence levels were very similar (90%-100%). The highest maximum values were all found in malting barley samples; they were 1555 µg/kg (enniatin B), 2574 µg/kg (enniatin A1) and 3897 µg/kg (enniatin B1). Although the results seem high, they are in line with current research regarding enniatins in barley grains, with reports suggesting that levels are reduced in the malt sample post-kiln. The measured concentrations for enniatins in malt in this study were lower than in malting barley, supporting the published findings. There are no maximum levels for these mycotoxins, EFSA concluded that acute exposure to beauvericin and enniatins do not indicate concern for human health, evidence and data gaps were identified which the call for data will partly address.

Table 15. Enniatins – Malt and Malting barley 2024-2025

	No. of Samples Analysed	% > Reporting Limit	Minimum Level µg/kg	Maximum Level µg/kg	Mean Level µg/kg	Median Level µg/kg
Enniatin A						
Malting Barley	20	45	<5	41.2	6.2	<5
Malt	20	50	<5	44.1	7.8	3
Enniatin A1						
Malting Barley	20	100	34	2574	423.4	256
Malt	20	95	0	182	44.7	32
Enniatin B						
Malting Barley	20	100	70	1555	692	765
Malt	20	90	0	666	154	103
Enniatin B1						
Malting Barley	20	100	89	3897	997	829
Malt	20	100	13	1936	391	250

Pesticide Results from Harvest 2024

- Summarised pesticide results are presented in Tables 16 – 22.
- One sample of Food Oats (fresh harvest) contained a residue of propamocarb at 0.010 mg/kg. The maximum residue level (MRL) is set at 0.01* mg/kg for propamocarb in oats. The residue is at the MRL and not an exceedance if measurement uncertainty (±50%) is taken into account.
- Other than the one sample of Food Oats with a propamocarb residue, no other samples contained any residues at or above their corresponding MRLs.
- A high incidence of residues (97) was found for the plant growth regulator chlormequat. None of these residues exceeded their corresponding MRLs.
- Other most frequently found residues were: synergist piperonyl butoxide (79), fungicide tebuconazole (67), herbicide glyphosate (60), plant growth regulator mepiquat (48), and insecticide deltamethrin (37). None of these residues exceeded their corresponding MRLs. No MRL is set for piperonyl butoxide.
- 126 residues were detected in feed or crops to be used for animal feed. No MRLs are currently applicable for “products or part of products exclusively used for animal feed production”.

- Figure 5 shows the distribution of 464 residues detected in the 374 samples tested. 143 samples (38%) contained no residues and 231 samples (62%) of the samples contained between 1 and 6 residues.

Figure 5. Summary of pesticides residues:

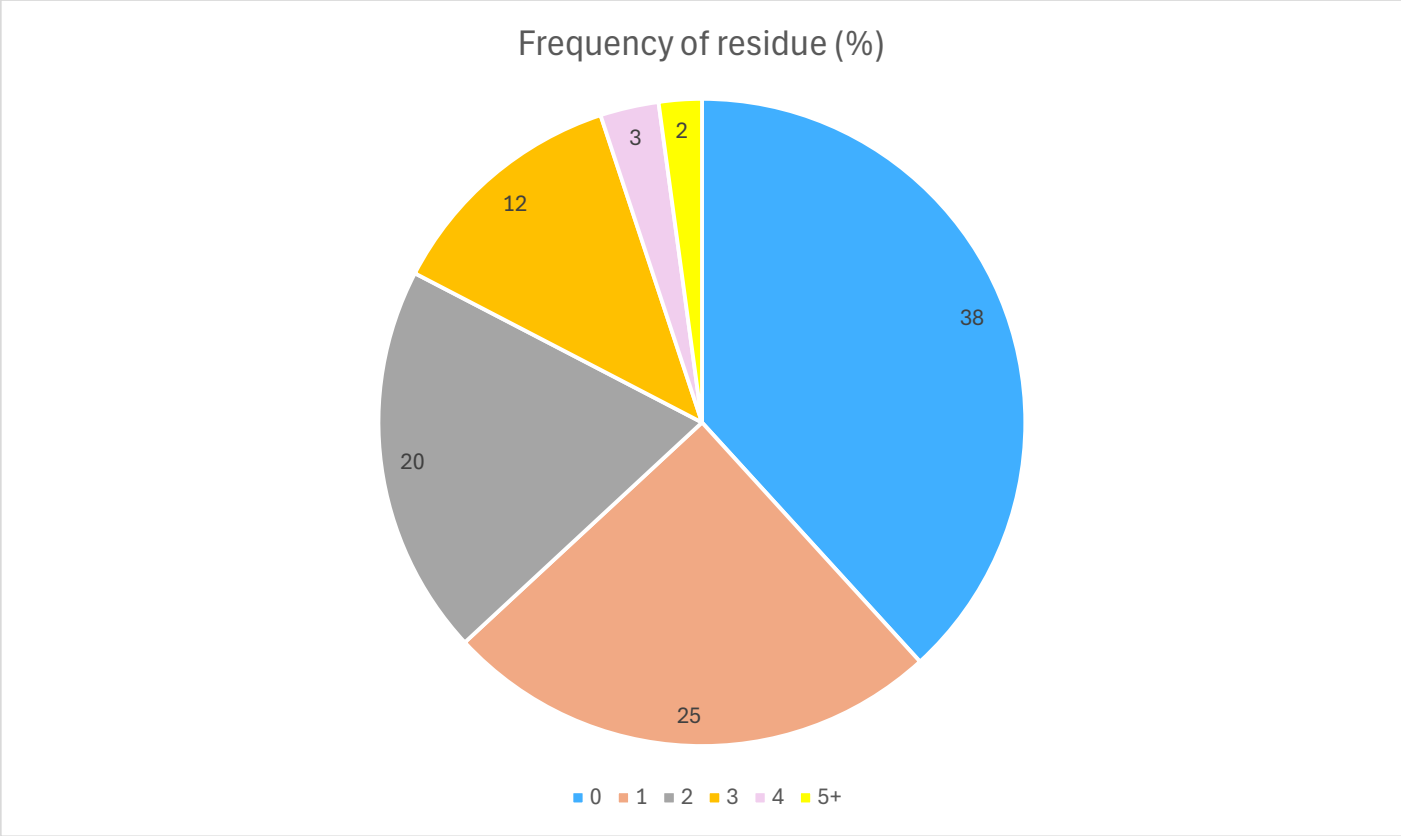


Table 16. Pesticides Results Fresh Harvest 2024

	No. of Samples Analysed	% > LOD	Single Pesticide Incidence % > LOD	Multiple Pesticide Incidence % > LOD
Milling Wheat [1]	50	94	28	66
Malting Barley [2]	40	17.5	15	2.5
Food Oats [3]	29	76	24	52
Barley [4]	1	100	100	0
Feed Wheat [5]	14	29	29	
Feed Barley [6]	14	57	57	
Feed Oats [7]	6	50	50	

[1] azoxystrobin (2) 0.010, 0.014 mg/kg; chlormequat (45) 0.011-0.94 mg/kg; glyphosate (16) 0.12-1.2 mg/kg; mepiquat (13) 0.010-0.25 mg/kg; tebuconazole (22) 0.010-0.070 mg/kg.

[2] azoxystrobin (1) 0.010 mg/kg; bixafen (2) 0.010-0.022 mg/kg; fluxapyroxad (3) 0.011-0.016 mg/kg; prothioconazole (1) 0.013mg/kg; tebuconazole (1) 0.010 mg/kg.

[3] azoxystrobin (2) 0.017, 0.019 mg/kg; chlormequat (18) 0.030-4.3 mg/kg; fluxapyroxad (1) 0.029 mg/kg; glyphosate (10) 0.15-3.3 mg/kg; mepiquat (7) 0.24-1.1 mg/kg; prothioconazole (1) 0.018 mg/kg; tebuconazole (2) 0.021, 0.023 mg/kg.

[4] Glyphosate (1) 1.4 mg/kg.

[5] Glyphosate (4) 0.15-1.9 mg/kg (not tested for other pesticides).

[6] Glyphosate (8) 0.79-3.9 mg/kg (not tested for other pesticides).

[7] Glyphosate (3) 1.4-5.7 mg/kg (not tested for other pesticides).

Table 17. Additional Compounds Fresh Harvest Results 2024

	No. of Samples Analysed	% > LOD	Single Pesticide Incidence % > LOD	Multiple Pesticide Incidence % > LOD
Milling Wheat [1]	50	24	14	10
Malting Barley [2]	40	33	20	13
Food Oats [3]	29	7	7	0
Barley [4]	1	0	0	0
Feed Wheat [5]				
Feed Barley [6]				
Feed Oats [7]				

[1] cypermethrin (1) 0.014 mg/kg; deltamethrin (4) 0.010-0.32 mg/kg; piperonyl butoxide (11) 0.010-1.7; pirimiphos-methyl (1) 0.071 mg/kg; pyraclostrobin (1) 0.011 mg/kg.

[2] 2,4-D (1) 0.017 mg/kg; benzovindiflupyr (1) 0.030 mg/kg; cypermethrin (1) 0.15 mg/kg; deltamethrin (3) 0.14-0.84 mg/kg; fluopyram (1) 0.031 mg/kg; MCPA (2) 0.035, 0.055 mg/kg; piperonyl butoxide (10) 0.011-11 mg/kg; pydiflumetofen (1) 0.044 mg/kg; pyraclostrobin (1) 0.010 mg/kg.

[3] benzovindiflupyr (1) 0.010 mg/kg; **propamocarb (1) 0.010 mg/kg (MRL set at 0.01 mg/kg)**.

[4] No additional residues detected.

[5] Glyphosate only (Not tested for other pesticides).

[6] Glyphosate only (Not tested for other pesticides).

[7] Glyphosate only (Not tested for other pesticides).

Table 18. Pesticides Malting Barley & Malt Stored Sample Results (Harvest 2024)

	No. of Samples Analysed	% > LOD	Single Pesticide Incidence % > LOD	Multiple Pesticide Incidence % > LOD
Malt [1]	20	100	30%	70%
Malting Barley [2]	20	100	10%	90%
[1] chlormequat (16) 0.010-0.70 mg/kg; deltamethrin (5) 0.048-0.13 mg/kg; glyphosate (4) 0.11-0.32 mg/kg; mepiquat (15) 0.016-0.38 mg/kg. [2] chlormequat (18) 0.021-1.0 mg/kg; deltamethrin (2) 0.082, 0.14 mg/kg; glyphosate (14) 0.10-3.6 mg/kg; mepiquat (13) 0.029-0.28 mg/kg.				

Table 19. Pesticides Malting Barley & Malt Additional Compounds Results (Harvest 2024)

	No. of Samples Analysed	% > LOD	Single Pesticide Incidence % > LOD	Multiple Pesticide Incidence % > LOD
Malt [1]	20	45	45	0
Malting Barley [2]	20	30	30	
[1] benzovindiflupyr (1) 0.011 mg/kg; bixafen (1) 0.010 mg/kg; piperonyl butoxide (7) 0.012-0.60 mg/kg. [2] MCPA (1) 0.015 mg/kg; piperonyl butoxide (5) 0.017-0.88 mg/kg.				

Table 20. Chlorpropham & Additional Compounds Stored Sample Results (Harvest 2024)

	No. of Samples Analysed	% > LOD	Single Pesticide Incidence % > LOD	Multiple Pesticide Incidence % > LOD
Milling Wheat (Jan)	25	0	0	0
No residues of chlorpropham detected.				
Milling Wheat (Mar)	25	12	8	4
Cypermethrin (3) 0.023-0.056 mg/kg; deltamethrin (1) 0.012 mg/kg.				

Table 21. Pesticides Results Stored Samples (Harvest 2024)

	No. of Samples Analysed	% > LOD	Single Pesticide Incidence % > LOD	Multiple Pesticide Incidence % > LOD
Food Oats [1]	30	20	20	0
Milling Wheat [2]	25	4	4	0
Feed Wheat [3]	40	15	15	0
Wheatfeed [4]	12	58	50	8
Feed Barley [5]	36	28	28	0
Feed Oats [6]	6	0	0	0
Oatfeed [7]	6	67	67	0

[1] cypermethrin (2) 0.024, 0.043 mg/kg; deltamethrin (3) 0.019-0.13 mg/kg; pirimiphos-methyl (1) 0.11 mg/kg..

[2] deltamethrin (1) 0.081 mg/kg.

[3] deltamethrin (5) 0.021-0.17 mg/kg; pirimiphos-methyl (1) 0.013 mg/kg.

[4] cypermethrin (1) 0.027 mg/kg; deltamethrin (5) 0.025-0.099 mg/kg; malathion (1) 0.014 mg/kg; pirimiphos-methyl (2) 0.022, 0.025 mg/kg.

[5] cypermethrin (1) 0.029 mg/kg; deltamethrin (8) 0.014-0.21 mg/kg; pirimiphos-methyl (1) 0.12 mg/kg.

6 No residues detected.

[7] pirimiphos-methyl (4) 0.024-0.057 mg/kg.

No MRLs are set for feed or crops meant for animal feed in UK or EU

Table 22. Pesticides Results Additional Compounds Stored Samples (Harvest 2024)

	No. of Samples Analysed	% > LOD	Single Pesticide Incidence % > LOD	Multiple Pesticide Incidence % > LOD
Food Oats [1]	30	33.4	26.7	6.7
Milling Wheat [2]	25	72	56	16
Feed Wheat [3]	40	33	20	13
Wheatfeed [4]	12	91.6	58.3	33.3
Feed Barley [5]	36	64	22	42
Feed Oats [6]	6	67	67	0
Oatfeed [7]	6	67	67	0

[1] fluxapyroxad (1) 0.043 mg/kg; metazachlor (1) 0.018 mg/kg; piperonyl butoxide (5) 0.065-0.86 mg/kg; tebuconazole (5) 0.012, 0.022 mg/kg.

[2] azoxystrobin (1) 0.011 mg/kg; boscalid (1) 0.011 mg/kg; fluxapyroxad (1) 0.022 mg/kg; piperonyl butoxide (5) 0.017-0.54 mg/kg; tebuconazole (15) 0.011-0.051 mg/kg.

[3] azoxystrobin (1) 0.013 mg/kg; piperonyl butoxide (6) 0.012-0.91 mg/kg; tebuconazole (11) 0.012-0.056 mg/kg.

[4] piperonyl butoxide (9) 0.053-0.82 mg/kg; tebuconazole (6) 0.010-0.017 mg/kg.

[5] azoxystrobin (1) 0.018 mg/kg; benzovindiflupyr (2) 0.013, 0.016 mg/kg; bixafen (2) 0.015, 0.036 mg/kg; fluopyram (1) 0.014 mg/kg; fluroxypyr (2) 0.027, 0.049 mg/kg; fluxapyroxad (7) 0.010-0.038 mg/kg; mefentrifluconazole (1) 0.021 mg/kg; piperonyl butoxide (16) 0.010-1.4 mg/kg; prothioconazole-desthio (2) 0.012, 0.016 mg/kg; pyraclostrobin (2) 0.014, 0.045 mg/kg; spiroxamine (1) 0.011 mg/kg; tebuconazole (4) 0.011-0.027 mg/kg.

[6] azoxystrobin (2) 0.013, 0.015 mg/kg; piperonyl butoxide (2) 0.018, 0.054 mg/kg.

[7] piperonyl butoxide (3) 0.017-0.065 mg/kg; tebuconazole (1) 0.018 mg/kg.

No MRLs are set for feed or crops meant for animal feed in UK or EU