Product Survey of Cat Food for Mycotoxins

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1. Product Survey of Cat Food for Mycotoxins

Report of Product Survey of Cat Food for Mycotoxins for Food Standards Agency
Fera Science Ltd.

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3. Executive Summary

The Food Standards Agency commissioned Fera Science Ltd. to carry out a survey to obtain occurrence data for a range of mycotoxins in 20 dry and 20 wet cat food samples at two sampling time points.

The mycotoxins requested were aflatoxins, ochratoxin A (OTA), zearalenone (ZEN), deoxynivalenol (DON), T-2, HT-2, diacetoxyscirpenol (DAS), and neosolaniol (NEO). Two accredited methods were used to analyse for these mycotoxins and some additional *Fusarium* mycotoxins. ISO 17025 Flexible Scope accreditation was used to allow results to be reported as accredited to ISO17025. A third, non-accredited multi-mycotoxin LC-MS/MS screening method was also used to analyse the samples for a range of other mycotoxins.

For sampling period 1, low levels of aflatoxins B_1 and G_1 were detected in a small number of dry cat food samples. Ochratoxin A was also detected in a small number of dry cat food samples. The results for period 2 were similar, although more samples contained residues and the maximum level of ochratoxin A found (3.9 µg/kg) was higher than sampling period 1. None of the samples exceeded the maximum level for aflatoxin B_1 in complete animal feed or the guidance value for ochratoxin A in cat food. None of the wet cat food samples contained measurable levels of ochratoxin A or aflatoxins.

Zearalenone was the most prevalent mycotoxin in dry cat food samples in sampling period 1, it was found in 18 of the 20 samples tested at concentrations in the range 2.5 to 67.4 µg/kg. Deoxynivalenol was detected in 13 of 20 dry cat food samples at concentrations from 11.5 to 575 µg/kg. The highest level of T-2 and HT-2 in a dry cat food was 22.1 µg/kg. Low levels of ZEN and DON were detected in a small number of wet cat food samples. For the *Fusarium* toxins of specific interest diacetoxyscirpenol (DAS) and neosolaniol (NEO) were not detected in any sample. In addition, Fusarenon X, NIV, T-2 toxin-α-glucoside, α-zearalenol, and β-zearalenol were not detected in any sample. **No sample from sampling period 1 exceeded the guidance values for cat food set out in Retained Commission Recommendation (EU) 2016/1319 amending Retained EU Recommendation 2006/576/EC [3, 6].**

For sampling period 2, ZEN was detected in all 20 dry cat food samples tested in the range 3.2 to 286 µg/kg. Deoxynivalenol was detected in 13 out of 20 samples at concentrations from 12.4 to 379 µg/kg. There is no specific guidance value for deoxynivalenol in cat food, although there is a guidance value for compound feed for all animals of 5000 µg/kg [6]. There are guidance values for the sum of T-2 and HT-2 toxins, ZEN and ochratoxin A (OTA) [3]. No sample exceeded the guidance values for T-2 and HT-2 toxins. For this method measurement uncertainty for ZEN is ±20.8%. The highest ZEN result was 286 ± 59.5 µg/kg. This result exceeds the guidance value from Retained Commission Recommendation (EU) 2016/1319 for ZEN for ‘adult dogs and cats other than for reproduction’ of 200 µg/kg (3). DAS, Fusarenon X, NEO, NIV, T-2 toxin-α-glucoside, α-zearalenol, α-zearalenol-14-glucoside, β-zearalenol-14-glucoside, and ZEN-14-glucoside were not detected above their respective reporting limits in any sample of dry cat food in

this period. Very few residues of *Fusarium* mycotoxins were detected in the wet cat food in the second sampling period, and no sample exceeded the guidance values.

The results of the screening analyses showed a similar pattern to the other results, dry foods contained more residues than wet foods, although no sample exceeded any guidance values, where these exist, apart from the ZEN in one sample of dry food which exceeded the guidance value of 200 µg/kg. Mycotoxins from *Fusarium* species, including trichothecenes, beauvericin, enniatins, fumonisins and fusaric acid were detected in several samples of dry food. Enniatins and beauvericin were most frequently found. Two mycotoxins produced by *Penicillium* species (mycophenolic acid and roquefortine C) were detected at low levels in samples from period 1 but no *Penicillium* toxins were detected in the second sampling period. Four dry cat food samples contained multiple ergot alkaloids in sampling period 1 and two samples contained ergot alkaloids in sampling period 2. Tenuazonic acid was tentatively detected in several dry cat foods in period 1, although its identity was only confirmed in five samples. It was detected and its identity confirmed in two samples in period 2.

The wet cat food samples contained very few residues of mycotoxins. Two samples in period 1 and one sample in period 2 contained low levels of enniatins (beauvericin was not detected). No other *Fusarium* or *Penicillium* mycotoxins were detected. Tenuazonic acid was tentatively detected at low levels in three samples, however its presence was only confirmed in one sample and one sample contained ergot alkaloids in period 1.

In conclusion, mycotoxins were frequently detected in dry cat food samples, mycotoxins from several different fungi genera were detected, sometimes co-occurring in the same sample. In sampling period 1, nineteen dry samples contained multiple mycotoxins, ten samples contained ten or more mycotoxins, with as many as nineteen mycotoxins found in one sample. In sampling period 2, there was a similar pattern for dry samples. Twenty samples contained multiple mycotoxins, eight samples contained ten or more mycotoxins of which two contained seventeen mycotoxins each.

Overall, the wet samples contained very few or no mycotoxins but one sample in sampling period 1 contained 6 ergot alkaloid compounds.

One sample of dry food contained ZEN above the guidance value. No other samples contained mycotoxins above the legislative values in UK retained EU legislation or guidance values where these exist.

4. Introduction

4.1 Background to the study

In the summer of 2021, a rise in cases of feline pancytopenia was reported across the UK. Analysis of the cat food suspected to be linked to this increase was carried out however the testing was not able to definitively determine the cause. The FSA reported that:

“The results of extensive testing identified higher levels of mycotoxins in some samples of the recalled cat food. This includes specific compounds known as T-2 and HT-2. These products are no longer on sale.

Mycotoxins are found in some types of feed and food and do not, in themselves, indicate they are the cause of feline pancytopenia. No causative link between pancytopenia and the recalled cat food products has been established.”

Mycotoxins are naturally occurring toxins produced by certain moulds (fungi) and can be found in food and in animal feed. Several hundred different mycotoxins have been identified. Of these Group A trichothecenes (T-2, HT-2, and diacetoxyscirpenol (DAS)) have been reported to have increased toxic effects for cats (1, 2). Guidance levels for some mycotoxins were established in cat and dog food by Commission Recommendation (EU) 2016/1319 (3). A guidance value of 50 µg/kg for the sum of HT-2 and T-2 toxin was established as well as guidance values for ochratoxin A, deoxynivalenol, and ZEN. In addition, there are maximum levels for aflatoxin B_1 in force for animal feed set in Schedule 4 of the Animal Feed (Composition, Marketing and Use) Regulations 2015. A maximum level of 10 µg/kg applies for aflatoxin B_1 in complete feedstuffs.

4.2 Aims and Objectives of the Study

Following on from the above incident the Food Standards Agency (FSA) and Food Standards Scotland (FSS) commissioned work to develop an evidence base for current mycotoxin occurrence data within wet and dry cat food products. The aim of the study was to carry out a survey to obtain quantitative occurrence data for the following mycotoxins in 20 wet and 20 dry cat food products available on the UK market using accredited method(s) of analysis:

- Aflatoxins
- Ochratoxin A (OTA)
- Zearalenone (ZEN)
- Deoxynivalenol (DON)
- T-2
- HT-2
- Diacetoxyscirpenol (DAS)
- Neosolaniol (NEO)

Further semi-quantitative screening to determine the occurrence of any other mycotoxins and mycotoxin metabolites added valuable information to the evidence base. Fera's screening methodology included the following toxins: 3-Acetyl-deoxynivalenol, 15-Acetyl-deoxynivalenol, aflatoxin B_1, aflatoxin B_2, aflatoxin G_1, aflatoxin G_2, aflatoxin M_1, altenuene, alternariol, alternariol monomethyl ether, beauvericin, citrinin, cyclopiazonic acid, cytochalasin A, cytochalasin B, cytochalasin D, cytochalasin E, cytochalasin H, deepoxy-deoxynivalenol, deoxynivalenol, deoxynivalenol-3-glucoside, diacetoxyscirpenol, emodin, enniatin A, enniatin A_1, enniatin B, enniatin B_1, ergocornine, ergocorninine, ergocristine, ergocristinine, ergocryptine, ergocryptinine, ergometrine, ergometrinine, ergosine, ergosinine, ergotamine, ergotaminine, fumonisin B_1, fumonisin B_2, fumonisin B_3, fusarenon X, fusaric acid, gliotoxin, HT-2 toxin, meleagrin, moniliformin, mycophenolic acid, neosolaniol, 3- nitropropionic acid, nivalenol, ochratoxin A, patulin, penicillic acid, penitrem A, phomopsin A, roquefortine C, sterigmatocystin, T-2 toxin, tentoxin, tenuazonic acid, verruculogen, wortmannin, α-zearalanol, β-zearalanol, zearalanone, α-zearalenol, β-zearalenol and ZEN.

The study was repeated, sampling of forty samples (20 wet and 20 dry) was carried out at two different times to allow a comparison of the results and assess whether there were seasonal differences. Sampling period 1 was in July 2022, and sampling period 2 took place from December 2022 to January 2023. As far as possible, the same samples were bought during both sampling periods.

5. Methodology

5.1 Sampling

The sampling plan was developed in consultation with FSA/FSS who provided a list of suggested products. Sample purchase and collection was carried out across the UK by Hallmark. Twenty dry and twenty wet cat food samples were purchased covering both large and smaller/niche producers. Prioritisation of the products from larger suppliers were based on FSA data on consumer habits.

Sampling was conducted to comply with the requirements of retained Regulation (EC) 401/2006 laying down the methods of sampling and analysis for the official control of the levels of mycotoxins in foodstuffs (5) as this regulation contains a specific provision for sampling for mycotoxins at retail premises which is where all samples were obtained. While the products being sampled were animal feed not foodstuffs, this Regulation makes provision for representative sampling at the retail stage which is where these samples were collected, and therefore was agreed to be a suitable approach.

For wet samples, typically sold in foil trays, pouches or cans, Regulation 401/2006 specifies a minimum sample size of 1kg for retail products, made up of a minimum of 3 incremental samples. The incremental sample is defined as a single unit, e.g. can or pouch, etc. As an example, a sample could be comprised of, 10 x 100g pouches, all pouches of the same product (identical batch / lot code). Each sample was bought in duplicate to allow for further follow on tests if required. So, in the example given, 2 samples each of 10 x 100g pouches were purchased.

Sampling was carried out at two different times to allow a comparison of the results and assess whether there were seasonal differences. Sampling period 1 was in July 2022, and sampling period 2 took place from December 2022 to January 2023. The same samples were bought during both sampling periods as far as possible.

The purchased samples were photographed, and the sample details recorded, specifically:

- Unique sample number
- Product type
- GB Registration number (or importer reference code if non-GB)
- Date of purchase
- Brand
- Short description
- Batch and / or lot number
- Best before or use by information
- Total weight purchased
- Photographic evidence of packing and labelling

- Retailer information

were logged on the Hallmark sample database.

On receipt at the laboratory each sample was logged onto the Fera Laboratory Information Management System (LIMS) and was assigned a unique LIMS number. One of the duplicate samples was progressed for analysis. The second duplicate was stored as received. For several of the samples multi-pack products were obtained. In such cases one sample type was selected. The remainder were assigned LIMS numbers but were not tested. Samples analysed are listed in Annex A, Table 10 lists dry foods including those using insect meal as an ingredient and Table 11 lists wet and raw foods purchased during sampling period 1. Samples purchased in sampling period 2 are listed in Table 12 (dry food) and Table 13 (wet food).

5.2 Sample preparation

Aggregate samples were prepared from the incremental samples. For wet food, typically this involved the contents of 10 x 100g packs being combined and homogenised using a Robocoupe or Silverson homogeniser to produce a homogenous sample. The aggregate sample was then divided into two aliquots and stored in plastic containers in the freezer prior to analysis.

For dry food, the contents of at least 3 bags to prepare a sample of a minimum of 1 kg were milled, using a Retsch centrifugal mill, with a screen size of 1 mm to prepare a finely milled sample. Once milled the sample was mixed for approximately 30 minutes to ensure it was homogenous. The 1 kg of homogenised sample was divided into two aliquots and stored in the freezer prior to analysis.

The retained replicate sample was stored, unopened, in the recommended storage conditions for the product.

5.3 Aflatoxin and Ochratoxin A analysis

Analysis for aflatoxins B_1, B_2, G_1 and G_2 and ochratoxin A was carried out using In-house SOP FSG 261 Simultaneous determination of ochratoxin A and aflatoxins B_1, B_2, G_1 and G_2 using immunoaffinity column clean-up and HPLC with fluorescence detection. The methodology is accredited to ISO17025 within the current scope of the accreditation.

5.3.1 Sample analysis – aflatoxins and ochratoxin A

In summary, samples (5 g of cat food) were extracted by shaking with water and acetonitrile. Salts (magnesium Sulphate, sodium citrate, sodium citrate sesquihydrate and sodium chloride) were added and the mixture shaken, this was centrifuged and the acetonitrile extract was defatted using hexane. A portion of the acetonitrile extract was diluted using phosphate-buffered saline (PBS) and unwanted matrix removed by immunoaffinity column (IAC) (Aflaochra Prep Immunoaffinity Columns: R-Biopharm Rhône Ltd.) prior to analysis. Samples were analysed by reverse phase HPLC with fluorescence detection.

A blank sample and two spiked samples (spiked at 5 µg/kg with each of the aflatoxins and ochratoxin A) were prepared and extracted and analysed as described above in each batch as quality control samples.

5.4 Fusarium Mycotoxin analysis

Analysis for 3-Acetyldeoxynivalenol (3-AcDON), 15-Acetyldeoxynivalenol (15-AcDON), deoxynivalenol (DON), deoxynivalenol-3-glucoside (DON-3-Glc), diacetoxyscirpenol (DAS), fusarenon X (FUSX), HT-2 toxin (HT2), neosolaniol (NEO), nivalenol (NIV), T-2 toxin (T2), T-2 toxin-α-glucoside (T2-α-Glc), zearalenone (ZEN), α-zearalenol (α-ZOL), β-zearalenol (β-ZOL), zearalenone-14-glucoside (ZEN-14-Glc), α-zearalenol-14-glucoside (α-ZOL-14-Glc) and β-zearalenol-14-glucoside (β-ZOL-14-Glc) was carried out using In-house SOP FSG 818 Method for the extraction and LC-MSMS analysis of 17 mycotoxins.

In addition to the mycotoxins requested this method also allows determination of 3- and 15-acetyl-deoxynivalenol, fusarenon X, and zearalenone related compounds. Although the methodology is accredited to ISO17025, the current scope of the accreditation does not include the matrices being tested here and so additional analyses were carried out to attain accreditation by flexible scope.

Target reporting limits (RL) for the analytes in the method are given in Table 1.

Table 1. Reporting limits for method FSG 818

Compound	**Target Reporting Limit / µg/kg**
3-Acetyldeoxynivalenol	10
15-Acetyldeoxynivalenol	20
Deoxynivalenol	10
Deoxynivalenol-3-glucoside	10
Diacetoxyscirpenol	10
Fusarenon X	10
HT-2 toxin	10
Neosolaniol	10
Nivalenol	50
T-2 toxin	10
T-2 toxin-α-glucoside	10
Zearalenone	2.5
α-zearalenol	2.5
β-zearalenol	2.5
zearalenone-14-glucoside	5
α-zearalenol-14-glucoside	5

Compound	Target Reporting Limit / µg/kg
β-zearalenol-14-glucoside	5

5.4.1 Flexible scope validation – *Fusarium* mycotoxins

Replicate wet and dry cat food samples were spiked with the suite of 17 *Fusarium* mycotoxins at 1, 2 and 20 times the reporting limit for each analyte (2 spikes at each concentration for wet cat food and the same for dry cat food). These were extracted and analysed as described in Section 5.3.2 to derive in-house validation data for the method. A blank sample was extracted and analysed in the same way. Results of these analyses are presented in Annex B, Table 14 to Table 17.

5.4.2 Sample analysis – *Fusarium* mycotoxins

The samples (5 g of cat food) were extracted by shaking for 2 hours with 84:16 acetonitrile: water v/v (20 ml). The mixture was centrifuged, and an aliquot of the extract was applied to an Oasis HLB Solid Phase Extraction (SPE) cartridge. An aliquot of the eluate was evaporated to dryness under nitrogen and reconstituted in 100 µL internal standard mix (100 µL acetonitrile containing ^{13}C isotopically labelled standards). Vials were vortex mixed, then water was added and further vortex mixed. After mixing the sample extracts were filtered through 0.22 µm PTFE syringe filters into a suitable vial before being analysed using LC-MS/MS (Liquid Chromatography – tandem quadrupole Mass Spectrometry).

5.5 Multi-mycotoxin screen

The screening method can analyse for circa 60 mycotoxins. In addition to the mycotoxins requested by quantitative methods it also includes mycotoxins from the following groups: ergot alkaloids, cytochalasins, enniatins and beauvericin, *Alternaria* toxins, fumonisins, sterigmatocystin, other *Fusarium* toxins such as moniliformin and fusaric acid, and *Penicillium* toxins such as patulin, penitrem A, penicillic acid, verruculogen, and roquefortine. LOQs are higher for this method for the specified analytes as it is a ‘dilute & shoot’ method with no sample matrix removal or pre-concentration. The full list of the mycotoxins included in the multi-mycotoxin screening method and the level of interest for each analyte are given in Table 2. The Level of interest (LOI) was set for each analyte during method development, it varied according to the working linear range of the analyte and also takes into account any maximum levels that may apply for animal feed. Therefore, the LOI for aflatoxin B_1 is set at 5 µg/kg, the lowest maximum level from Directive 2002/32 (4), while other mycotoxins are lower or higher due to their response in the mass spectrometer. It is not the same as the limit of quantification (LOQ) for the method, in most cases this is 0.25 or 0.5 x LOI.

Table 2. Level of Interest (LOI) for Mycotoxins in Multi-mycotoxin screening method

Compound	**Level of Interest / µg/kg**
3-Acetyl-deoxynivalenol	100
15-Acetyl-deoxynivalenol	100
Aflatoxin B1	5
Aflatoxin B2	5
Aflatoxin G1	5
Aflatoxin G2	5
Aflatoxin M1	5
Aflatoxin M2	5
Altenuene	100
Alternariol	100
Alternariol monomethyl ether	100
Beauvericin	10
Citrinin	100
Cyclopiazonic acid	100
Cytochalasin A	100
Cytochalasin B	100
Cytochalasin D	100
Cytochalasin E	100
Cytochalasin H	100
Deepoxy-deoxynivalenol	100
Deoxynivalenol	100
Deoxynivalenol-3-glucoside	100
Diacetoxyscirpenol	100
Emodin	100
Enniatin A	10
Enniatin A1	10
Enniatin B	10
Enniatin B1	10
Ergocornine	50
Ergocorninine	10
Ergocristine	50
Ergocristinine	10

Compound	Level of Interest / µg/kg
Ergocryptine	50
Ergocryptinine	10
Ergometrine	50
Ergometrinine	10
Ergosine	50
Ergosinine	10
Ergotamine	50
Ergotaminine	10
Fumonisin B1	100
Fumonisin B2	100
Fumonisin B3	100
Fusarenon X	100
Fusaric acid	100
Gliotoxin	500
HT2 toxin	100
Meleagrin	100
Moniliformin	100
Mycophenolic acid	100
Neosolaniol	100
Nivalenol	200
Ochratoxin A	50
Patulin	500
Penicillic acid	100
Penitrem A	100
Phomopsin A	100
Roquefortine C	10
Sterigmatocystin	5
T2 toxin	100
Tentoxin	100
Tenuazonic Acid	100
Verruculogen	100
Wortmannin	100

Compound	Level of Interest / µg/kg
α-Zearalanol	50
β-Zearalanol	50
Zearalanone	50
α-Zearalenol	50
β-Zearalenol	50
Zearalenone	50

The method is not accredited, and so limited in-house validation data was derived prior to sample analysis.

5.5.1 In-house validation – multi-mycotoxin screening method

Unspiked wet and dry cat food samples were analysed along with samples spiked at twice the level of interest for each analyte, 6 replicates were spiked for both wet and dry food.

5.5.2 Sample analysis – multi-mycotoxin screening method

In summary, samples were extracted using a mixture of acetonitrile : water : acetic acid for 2 hours on an orbital shaker. Following the extraction, samples were centrifuged. An aliquot of the supernatant was transferred to a glass vial and diluted with an equal volume of a mixture of acetonitrile : water : acetic acid to produce a mixture that contained acetonitrile and water in equal proportions. Diluted sample extracts were filtered by syringe filter (0.22 µm, nylon) and collected in glass autosampler vials for analysis.

Analysis was carried out by LC-MS/MS using a Waters UPLC system with a XEVO TQ-S mass spectrometer. Three analytical runs, two using neutral mobile phase conditions (with the MS operated in positive and negative mode) and one using acidic conditions (with the MS operated in positive mode), were required to ensure optimum chromatographic performance and ionisation of analytes.

6. Results and Discussion

6.1 Samples

Details of the cat food samples purchased for inclusion in this survey are provided in Annex A. Dry cat food including those containing insect protein are listed in Table 10 and Table 12 for sampling periods 1 and 2 respectively and Table 11 and Table 13, for wet and raw samples for periods 1 and 2 respectively. Duplicate samples were purchased. For the multi-pack products all items were assigned LIMS numbers but only one sample type was taken forward for analysis. For clarity Annex A only includes the details of the multi-pack sample selected for analysis.

6.2 Aflatoxin and Ochratoxin A results

6.2.1 Results of sampling period 1

The reporting limit for all aflatoxins and ochratoxin A using this methodology was 0.2 µg/kg. For most samples no aflatoxins or ochratoxin A were detected. The concentrations of ochratoxin A found at quantifiable concentrations are given in Table 3, results are reported corrected for recovery. The concentrations of aflatoxin B_1 and G_1 found at quantifiable concentrations are given in Table 4, results are reported corrected for recovery. Retained Regulation EC No. 401/2006, laying down methods of sampling and analysis for the official control of the levels of mycotoxins in foodstuffs stipulates the acceptable range of recovery for mycotoxins, this varies depending on the mycotoxin and concentration range. Acceptable values are usually from 70-110%, but can range from 50-130% in some circumstances.

Full results for aflatoxins and ochratoxin A are given in Table 18 (dry cat food) and Table 19 (wet cat food) in Annex C.

The highest level of ochratoxin A found was 1.9 µg/kg (S22-035130), which is below the guidance value of 10 µg/kg in Recommendation 2016/1319 (3). Several dry samples contained aflatoxins, aflatoxin B_1 was the predominant aflatoxin detected, it was measured in nine dry cat food samples at levels from 0.2-2.4 µg/kg. This is the only mycotoxin for which a maximum level is set in retained EU Directive 2002/32/EC (4), all samples in this study were below the maximum level of 10 µg/kg set for complete feed.

Table 3. Ochratoxin A concentrations measured in cat food samples, sampling period 1, µg/kg, corrected for recovery.

Sample number	Sample type	Ochratoxin A (µg/kg)
S22-035130	Dry	1.9
S22-035138	Dry	0.4
S22-035208	Dry	1.0
S22-035228	Dry	0.4
S22-035294	Dry	0.6
S22-035296	Dry	0.3
S22-035911	Dry	0.5

Table 4. Aflatoxin B_1 and aflatoxin G_1 concentrations measured in cat food samples, sampling period 1, µg/kg, corrected for recovery.

Sample	Sample type	Aflatoxin B_1 (µg/kg)	Aflatoxin G_1 (µg/kg)
S22-034958	Dry	0.4	<0.2
S22-035079	Dry	0.3	<0.2
S22-035130	Dry	2.4	0.2
S22-035134	Dry	0.2	<0.2
S22-035138	Dry	0.2	<0.2
S22-035228	Dry	0.7	<0.2
S22-035296	Dry	2.2	<0.2
S22-035911	Dry	0.2	<0.2
S22-035913	Dry	1.4	<0.2

6.2.2 Results of sampling period 2

None of the wet cat food samples from this sampling period contained measurable levels of ochratoxin A or aflatoxins when analysed using SOP 261. A higher number of residues of aflatoxins and ochratoxin A were detected in dry samples for sampling period 2 compared to sampling period 1. All dry samples, except S23-001925 contained a quantifiable concentration of ochratoxin A. Thirteen dry samples contained aflatoxin above the RL. The concentrations of aflatoxin B_1, G_1, total aflatoxins and ochratoxin A found at quantifiable concentrations are given in Table 5, results are reported corrected for recovery.

Full results for aflatoxins and ochratoxin A are given in Table 20 (dry cat food) and Table 21 (wet cat food).

The highest level of ochratoxin A found was 3.9 µg/kg (S23-001974), which is below the guidance value of 10 µg/kg in Recommendation 2016/1319 (3). Aflatoxin B_1 was the predominant aflatoxin detected, it was measured in thirteen dry cat food samples at levels from 0.2-2.8 µg/kg. This is the only mycotoxin for which a maximum level is set in retained EU Directive 2002/32/EC (4), all samples in this study were below the maximum level of 10 µg/kg set for complete feed.

Table 5. Aflatoxin B_1, aflatoxin G_1 and ochratoxin A concentrations measured in dry cat food samples sampling period 2, µg/kg, corrected for recovery.

Sample	Sample type	Aflatoxin B_1 (µg/kg)	Aflatoxin G_1 (µg/kg)	Total Aflatoxin (µg/kg)	Ochratoxin A (µg/kg)
S23-001280	Dry	**0.2**	<0.2 (0.1)	**0.2**	**0.8**
S23-001282	Dry	<0.2	<0.2	<0.8	**0.8**
S23-001289	Dry	**0.2**	<0.2	**0.2**	**2.2**
S23-001327	Dry	<0.2	<0.2	<0.8	**0.5**
S23-001382	Dry	**0.2**	<0.2 (0.1)	**0.2**	**0.4**
S23-001900	Dry	**0.3**	<0.2	**0.3**	**1.5**
S23-001902	Dry	**0.3**	<0.2	**0.3**	**0.4**
S23-001905	Dry	**0.5**	**0.2**	**0.7**	**0.4**
S23-001917	Dry	**0.2**	<0.2 (0.1)	**0.2**	**0.9**
S23-001919	Dry	**0.4**	**0.2**	**0.5**	**0.8**
S23-001921	Dry	**0.2**	<0.2	**0.2**	**0.5**
S23-001923	Dry	<0.2	<0.2	<0.8	**0.8**
S23-001968	Dry	<0.2	<0.2	<0.8	**0.5**
S23-001972	Dry	<0.2 (0.1)	<0.2	<0.8	**1.0**
S23-001974	Dry	**0.4**	<0.2 (0.1)	**0.6**	**3.9**
S23-001977	Dry	**2.8**	**0.2**	**3.2**	**3.7**
S23-001980	Dry	<0.2	<0.2	<0.8	**0.3**
S23-001991	Dry	**1.0**	<0.2	**1.0**	**1.0**
S23-002260	Dry	**0.2**	<0.2	**0.2**	**1.1**

6.3 *Fusarium* mycotoxin results – FSG 818

6.3.1 Flexible Scope validation results

Additional spiked samples were analysed to allow ISO 17025 Flexible Scope accreditation to be obtained for the method FSG 818 for wet and dry cat food. The results are

summarised in Annex B, Tables 14-17. These were fully satisfactory to allow the results of the survey to be reported as accredited using Flexible Scope accreditation.

The full results of the analysis of the survey samples for 3-acetyldeoxynivalenol, 15-acetyldeoxynivalenol, DON, deoxynivalenol-3-glucoside, DAS, Fusarenon X, HT-2 toxin, NEO, NIV, T-2 toxin and T-2 toxin-α-glucoside, ZEN, α-zearalenol, β-zearalenol, ZEN-14-glucoside, α-zearalenol-14-glucoside and β-zearalenol-14-glucoside are given in Annex C Table 23 (dry cat food) and Table 24 (wet cat food) for sampling period 1 and Table 25 (dry cat food) and Table 26 (wet cat food) for sampling period 2. All results are reported corrected for recovery.

6.3.2 Dry cat food results – sampling period 1

DAS, Fusarenon X, NEO, NIV, T-2 toxin-α-glucoside, α-zearalenol, and β-zearalenol were not detected above their respective reporting limits in any sample of dry cat food. Measurable levels of other mycotoxins were detected in all except one of the dry cat food samples (Sample S22-035079).

ZEN was the most prevalent mycotoxin, it was detected in 18 of the 20 dry cat food samples tested at concentrations in the range 2.5 to 67.4 µg/kg. Deoxynivalenol was detected in 13 out of 20 samples at concentrations from 11.5 to 575 µg/kg.

The highest concentration of any individual mycotoxin determined using this method was deoxynivalenol in sample S22-035027 (575 µg/kg). This sample also contained deoxynivalenol-3-glucoside (67 µg/kg), 3-AcDON (21.7 µg/kg), 15-AcDON (273 µg/kg), the highest level of ZEN (67.4 µg/kg) and T-2 and HT-2 toxins (sum 22.1 µg/kg). There is no guidance value for deoxynivalenol specifically in cat food, but there are guidance values for sum T-2 and HT-2 toxins and ZEN, this sample contains less than these guidance values. The ingredients list for this product states maize as the first ingredient, it also contains maize gluten meal, these products are known to often contain *Fusarium* mycotoxins such as DON and its acetylated forms as well as ZEN. The full results for dry cat food from sampling period 1 are given in Table 23 in Annex C.

6.3.3 Wet cat food results – sampling period 1

3-acetyldeoxynivalenol, 15-acetyldeoxynivalenol, deoxynivalenol-3-glucoside, DAS, Fusarenon X, HT-2 toxin, NEO, NIV, T-2 toxin and T-2 toxin-α-glucoside, α-zearalenol, β-zearalenol, ZEN-14-glucoside, α-zearalenol-14-glucoside and β-zearalenol-14-glucoside were not detected above the respective reporting limits in any wet cat food sample.

Three out of the twenty wet cat food samples contained measurable levels of ZEN (samples S22-035013 - raw, S22-035019 - raw and S22-036518 – wet) in the range 3.0 to 6.3 µg/kg. One sample (S22-036518 – wet) also contained deoxynivalenol (10.3 µg/kg). No other *Fusarium* mycotoxins were detected in any wet cat food.

The full results for wet cat food from sampling period 1 are in Table 24 in Annex C.

6.3.4 Dry cat food results – sampling period 2

DAS, Fusarenon X, NEO, NIV, T-2 toxin-α-glucoside, α-zearalenol, α-zearalenol-14-glucoside, β-zearalenol-14-glucoside, and ZEN-14-glucoside were not detected above their respective reporting limits in any sample of dry cat food. Measurable levels of at least one mycotoxin were detected in all dry cat food samples tested.

ZEN was detected in all 20 dry cat food samples tested at concentrations in the range 3.2 to 286 µg/kg. Deoxynivalenol was detected in 13 out of 20 samples at concentrations from 12.4 to 379 µg/kg. Three other samples also contained low levels of deoxynivalenol between the LOD and RL.

The highest concentration of any individual mycotoxin determined using this method was deoxynivalenol in sample S23-001919 (379 µg/kg). This sample also contained deoxynivalenol-3-glucoside (26.2 µg/kg), 3-AcDON (12.1 µg/kg), 15-AcDON (76.6 µg/kg), the highest level of ZEN (286 µg/kg), β-zearalenol (4.2 µg/kg) and T-2 and HT-2 toxins (sum 34.2 µg/kg). There is no specific guidance value for deoxynivalenol in cat food, but there are guidance values for sum T-2 and HT-2 toxins and ZEN. This sample contains less than the guidance values for T-2 and HT-2 toxins. The measurement uncertainty for ZEN for this method is 20.8%, making the result for sample S23-001919 286 ± 59.5 µg/kg. The 95% concentration range which this result lies in is 227-345 µg/kg. This result exceeds the guidance value from Retained Commission Recommendation (EU) 2016/1319 for ZEN for ‘adult dogs and cats other than for reproduction’ of 200 µg/kg (3). The ingredients list for this product states maize as the first ingredient, it also contains maize gluten meal. These are products that have been found to contain *Fusarium* mycotoxins such as DON and its acetylated forms as well as ZEN. The full results for dry cat food from sampling period 2 are given in Table 25 in Annex C.

6.3.5 Wet cat food results – sampling period 2

No *Fusarium* mycotoxins were detected in any wet cat food above the respective reporting limits for sampling period 2.

The full results for wet cat food from sampling period 2 are in Table 26 in Annex C.

6.4 Multi-mycotoxin screen results

The multi-mycotoxin screening method was developed for the analysis of animal feed materials and has been used for screening of a range of commodities, including animal feed materials, insect protein, by-products of insect production (frass), bird food and some dry cat foods. Replicate spiked samples (n=6) were undertaken at 2x Reporting Limit for both wet and dry cat foods to demonstrate the method was fit for purpose.

6.4.1 Multi-mycotoxin results for dry cat food – sampling period 1

For dry cat food the following mycotoxins in Table 6 were screened for and not detected at the following reporting limits:

Table 6. Mycotoxins screened for and not detected in dry cat food.

Reporting limit	Mycotoxins not detected at this level
<1.25 µg/kg	Aflatoxin B_1, Aflatoxin B_2, Aflatoxin G_1, Aflatoxin G_2, Aflatoxin M_1
<12.5 µg/kg	Ergometrine, Ochratoxin A, a-Zearalanol, b-Zearalanol, Zearalanone, a-Zearalenol, b-Zearalenol
<25 µg/kg	Altenuene, Alternariol, Alternariol_Monomethyl_Ether, Citrinin, Cyclopiazonic_Acid, Cytochalasin A, Cytochalasin B, Cytochalasin C, Cytochalasin D, Cytochalasin E, Deepoxy-Deoxynivalenol, Diacetoxyscirpenol, Emodin, Fusarenon X, HT-2 Toxin, Meleagrin, Moniliformin, Neosolaniol, Penicillic Acid, Penitrem A, Phomopsin A, T-2 Toxin, Tentoxin, Verruculogen, Wortmannin
<50 µg/kg	Nivalenol
<125 µg/kg	Gliotoxin, Patulin
<200 µg/kg	Moniliformin

Beauvericin and enniatins were the most frequently detected mycotoxins, these are ubiquitous and are frequently detected in cereals and other commodities. They are produced by *Fusarium* species. Beauvericin was detected in 16 out of 20 dry cat food samples, levels measured ranged from 8.1 to >160 µg/kg, the highest value was above the range of the calibration graph. Enniatins were detected in between 8 (enniatin A) and 18 samples (enniatins B and B_1), the highest levels found were for enniatin B_1, the highest concentration was over 290 µg/kg (over calibration graph range).

Again ZEN was prevalent, it was measured in 7 out of 20 dry cat food samples, it should be noted the reporting limit for this method is five times greater than method FSG 818 so lower level residues that were measured using method FSG 818 were not detected. Other mycotoxins produced by *Fusarium* species detected were DON, DON-3Glc, Fusaric acid and fumonisins B_1, B_2 and B_3.

Sample S22-035228 contained the highest levels of fumonisins (1184 µg/kg sum fumonisins B_1, B_2 and B_3), these mycotoxins are mainly associated with maize, however maize was not explicitly mentioned in the ingredients list, only “cereals”. Sample S22-035027 also contained fumonisins (452 µg/kg fumonisins B_1 and B_2), this product contains maize and maize gluten meal, so these findings are unsurprising. These samples were both made by the same manufacturer. Sample S22-035913 also contained over 500 µg/kg fumonisins B_1 and B_2, maize is listed as an ingredient of this product. There are no guidance values for fumonisins for cat food. Fusaric acid was confirmed in nine samples at

levels from 37.5 to 213 µg/kg, it was also detected in five other samples although its identity was not confirmed in those samples.

Four dry cat food samples contained ergot alkaloids, the profiles of the specific individual alkaloids detected were different in each sample. One sample (S22-034758) contained over 400 µg/kg sum ergot alkaloids, the sum was made up of 10 different ergot alkaloids. The first product listed in the ingredients was “cereals”. This sample also contained the highest level of cytochalasin H detected (580 µg/kg), but only low levels of beauvericin and enniatins and no other mycotoxins. There are no guidance values for these mycotoxins in cat food.

Mycotoxins produced by *Penicillium* species were also detected in some samples, mycophenolic acid was detected in 3 samples and roquefortine C in one. Sample S22-035228 contained both compounds, and S22035027 contained mycophenolic acid.

Tenuazonic acid, an *Alternaria* toxin, was detected frequently (19 out of 20 samples), although in the majority of cases the compound identity was not confirmed by mass spectrometry (ion ratio) suggesting there may have been an interfering compound in some of the samples. Five samples did contain confirmed residues, levels ranged from 99 – 304 µg/kg, although it should be noted the recovery was low so these values should be treated with some caution. A summary of results of the mycotoxins detected is given in Annex C, Table 27.

6.4.2 Multi-mycotoxin results for wet cat food – sampling period 1

For wet cat food the following mycotoxins in Table 7 were screened for and not detected at the following reporting limits.

Table 7. Mycotoxins screened for and not detected in wet cat food.

Reporting limit	**Mycotoxins not detected at this level**
<1.25 µg/kg	Aflatoxin B_1, Aflatoxin B_2, Aflatoxin G_1, Aflatoxin G_2, Aflatoxin M_1, sterigmatocystin
<2.5 µg/kg	Beauvericin, Enniatin A, Ergometrinine, Ergotaminine, Roquefortine C
<12.5 µg/kg	Ergocornine, Ergocryptine, Ergometrine, Ergotamine, Ochratoxin A, Zearalenone, a-Zearalanol, b-Zearalanol, Zearalanone, a-Zearalenol, b-Zearalenol
<25 µg/kg	Altenuene, Alternariol, Alternariol_Monomethyl_Ether, Citrinin, Cyclopiazonic_Acid, Cytochalasin A, Cytochalasin B, Cytochalasin C,

Reporting limit	Mycotoxins not detected at this level
	Cytochalasin D, Cytochalasin E, Cytochalasin H, Deepoxy-Deoxynivalenol, Deoxynivalenol, Deoxynivalenol-3-Glucoside, Emodin, Diacetoxyscirpenol, Fumonisin B_1, Fumonisin B_2, Fumonisin B_3, Fusarenon X, Fusaric_Acid, HT-2 Toxin, Meleagrin, Moniliformin, Mycophenolic Acid, Neosolaniol, Penicillic Acid, Penitrem A, Phomopsin A, T-2 Toxin, Tentoxin, Verruculogen, Wortmannin
<50 µg/kg	Acetyl-Deoxynivalenol (3- and 15-), Nivalenol,
<125 µg/kg	Gliotoxin, Patulin
<200 µg/kg	Moniliformin

Very few residues of any mycotoxins were detected in the wet cat food samples. Two samples contained low levels of enniatins (beauvericin was not detected). No other *Fusarium* or *Penicillium* mycotoxins were detected. Three samples contained low levels of tenuazonic acid, only one was confirmed by ion ratio, this was sample S22-035011 at 65 µg/kg, the recovery for wet food was within the usual acceptable range of 70-110%. One sample contained ergot alkaloids (S22-036510, 101 µg/kg sum). Overall wet cat food samples contained very few or no mycotoxins. A summary of findings of mycotoxins is given in Annex C, Table 28.

6.4.3 Multi-mycotoxin results for dry cat food – sampling period 2

For dry cat food the following mycotoxins in Table 8 were screened for and not detected at the following reporting limits:

Table 8. Mycotoxins screened for and not detected in dry cat food.

Reporting limit	Mycotoxins not detected at this level
<1.25 µg/kg	Aflatoxin B_2, Aflatoxin G_1, Aflatoxin G_2, Aflatoxin M_1
<2.5 µg/kg	Ergometrinine
<5 µg/kg	Roquefortine C
<12.5 µg/kg	Ergometrine, Ochratoxin A, α-Zearalanol, β-Zearalanol, Zearalanone, a-Zearalenol, b-Zearalenol

Reporting limit	Mycotoxins not detected at this level
<25 µg/kg	Altenuene, Alternariol_Monomethyl_Ether, Citrinin, Cyclopiazonic_Acid, Cytochalasin A, Cytochalasin C, Cytochalasin D, Cytochalasin E, Deepoxy-Deoxynivalenol, Diacetoxyscirpenol, Emodin, Fusarenon X, Fumonisin B3, HT-2 Toxin, Meleagrin, Mycophenolic Acid, Neosolaniol, Penicillic Acid, Penitrem A, Phomopsin A, T-2 Toxin, Tentoxin, Verruculogen, Wortmannin
<50 µg/kg	Acetyl-Deoxynivalenol, Nivalenol
<125 µg/kg	Patulin
<250 µg/kg	Gliotoxin
<500 µg/kg	3-nitro propionic acid

Fewer mycotoxins were detected than for sampling period 1. As for sampling period 1, beauvericin and enniatins were the most frequently detected mycotoxins. Beauvericin was detected in 14 out of 20 dry cat food samples, levels measured ranged from 6.6 to 98.9 µg/kg. Enniatins were detected in between 6 (enniatin A) and 17 samples (enniatin B_1), the highest levels found were for enniatin B_1, the highest concentration was over 203 µg/kg (over calibration graph range).

ZEN was measured in 9 out of 20 dry cat food samples using this method. As noted previously, the reporting limit for this method is higher than method FSG 818 so lower level residues that were measured using FSG 818 were not detected. Sample S23-001919 was found to contain 257 µg/kg ZEN using this method which is in agreement with the value found using FSG 818 and confirming the presence of ZEN in this sample.

Other mycotoxins produced by *Fusarium* species detected were DON, DON-3Glc, Fusaric acid and fumonisins B_1, and B_2. Three samples contained residues that were tentatively identified as moniliformin, but these were not confirmed.

Sample S23-001977 contained the highest levels of fumonisins (349 µg/kg sum fumonisins B_1, and B_2), and aflatoxin B_1 (2.6 µg/kg), these mycotoxins are associated with maize. Sample S23-001919 also contained fumonisins (277 µg/kg fumonisins B_1 and B_2), the highest ZEN and deoxynivalenol and DON-3-Glc levels, as well as fusaric acid, beauvericin and enniatins. The identity of DON-3-Glc was not confirmed, but it often co-occurs with DON, and was detected using the other method (FSG 818). This product contains maize and maize gluten meal, and the results are similar to results for a sample containing these ingredients analysed in the first sampling period. There is a guidance value for fumonisins of 5 mg/kg (5000 µg/kg) for complete feedingstuffs for pet animals as set out in Retained EU Recommendation 2006/576/EC [6].

Two dry cat food samples contained ergot alkaloids, the profiles of the specific individual alkaloids detected were different in each sample. One sample (S23-001921) contained 364 µg/kg sum ergot alkaloids, the sum was made up of 10 different ergot alkaloids. The first product listed in the ingredients was “cereals”. This sample also contained the highest level of sterigmatocystin detected (18.4 µg/kg), but only a low level of enniatin B_1 and no other mycotoxins. There are no guidance values for these mycotoxins in cat food.

Mycotoxins produced by *Penicillium* species were not detected in this sampling period.

Tenuazonic acid, an *Alternaria* toxin, was detected in 2 out of 20 samples at levels of 121 and 194 µg/kg. One sample also contained a low level of alternariol. Summarised results for dry cat food are given in Table 29 in Annex C.

6.4.4 Multi-mycotoxin results for wet cat food – sampling period 2

For wet cat food the following mycotoxins were screened for and not detected at the following reporting limits.

Table 9. Mycotoxins screened for and not detected in wet cat food.

Reporting limit	**Mycotoxins not detected at this level**
<1.25 µg/kg	Aflatoxin B_1, Aflatoxin B_2, Aflatoxin G_1, Aflatoxin G_2, Aflatoxin M_1, Sterigmatocystin
<2.5 µg/kg	Beauvericin, Enniatin A, Enniatin A_1, Ergocorninine, Ergometrinine, Ergotaminine
<5 µg/kg	Roquefortine C
<12.5 µg/kg	Ergocryptine, Ergometrine, Ergotamine, Ochratoxin A, Zearalenone, a-Zearalanol, b-Zearalanol, Zearalanone, a-Zearalenol, b-Zearalenol
<25 µg/kg	Altenuene, Alternariol, Alternariol_Monomethyl_Ether, Cyclopiazonic_Acid, Cytochalasin B, Cytochalasin C, Cytochalasin D, Cytochalasin E, Cytochalasin H, Deepoxy-Deoxynivalenol, Deoxynivalenol, Deoxynivalenol-3-Glucoside, Emodin, Diacetoxyscirpenol, Fumonisin B_1, Fumonisin B_2, Fumonisin B_3, Fusarenon X, Fusaric_Acid, HT-2 Toxin, Meleagrin, Mycophenolic Acid, Neosolaniol, Penicillic Acid, Penitrem A,

Reporting limit	Mycotoxins not detected at this level
	T-2 Toxin, Tentoxin, Tenuazonic acid, Verruculogen, Wortmannin
<50 µg/kg	Acetyl-Deoxynivalenol (3- and 15-), Nivalenol, Phomopsin A
<100 µg/kg	Citrinin, Cytochalasin A
<250 µg/kg	Gliotoxin, Patulin
<500 µg/kg	3-Nitropropionic Acid

Very few residues of any mycotoxins were detected in the wet cat food samples. One sample contained low levels of enniatins B and B_1 (beauvericin was not detected). Three samples contained residues tentatively identified as moniliformin. These were not confirmed and may in fact be artefacts or interferences as no other mycotoxins were found in these samples.

No other mycotoxins were detected in any of the wet cat food samples tested for this sampling period. Summarised results of residues detected are given in Table 30 in Annex C.

7. Summary and Conclusions

1. Forty samples of cat food (20 dry and 20 wet) were analysed at two sampling time points, for a range of mycotoxins, with a focus on aflatoxins, ochratoxin A (OTA), zearalenone (ZEN), deoxynivalenol (DON), T-2, HT-2, diacetoxyscirpenol (DAS), and neosolaniol (NEO). Two accredited methods were used to analyse for these mycotoxins and some additional *Fusarium* mycotoxins. Flexible scope accreditation was used to allow results to be reported as accredited to ISO17025.

2. For sampling period 1, low levels of aflatoxins B_1 and G_1 were detected in a small number of dry cat food samples. Ochratoxin A was also detected in a small number of dry cat food samples. The results for period 2 were similar, although more samples contained residues and the maximum level of ochratoxin A found (3.9 µg/kg) was higher than sampling period 1. None of the samples exceeded the maximum level for aflatoxin B_1 in complete animal feed or the guidance value for ochratoxin A in cat food. None of the wet cat food samples contained measurable levels of ochratoxin A or aflatoxins.

3. For sampling period 1, the *Fusarium* toxins of specific interest diacetoxyscirpenol (DAS) and neosolaniol (NEO) were not detected in any sample. In addition, Fusarenon X, NIV, T-2 toxin-α-glucoside, α-zearalenol, and β-zearalenol were not detected in any sample. ZEN was the most prevalent in dry cat food samples in 18 of the 20 samples tested at concentrations in the range 2.5 to 67.4 µg/kg. Deoxynivalenol was detected in 13 out of 20 dry cat food samples at concentrations from 11.5 to 575 µg/kg. The highest level of T-2 and HT-2 was 22.1 µg/kg in a dry cat food. No sample exceeded the guidance values for these mycotoxins.

4. For sampling period 2, DAS, Fusarenon X, NEO, NIV, T-2 toxin-α-glucoside, α-zearalenol, α-zearalenol-14-glucoside, β-zearalenol-14-glucoside, and ZEN-14-glucoside were not detected above their respective reporting limits in any sample of dry cat food. ZEN was detected in all 20 dry cat food samples tested in the range 3.2 to 286 µg/kg. Deoxynivalenol was detected in 13 out of 20 samples at concentrations from 12.4 to 379 µg/kg. There is no specific guidance value for deoxynivalenol in cat food, but there are guidance values for sum T-2 and HT-2 toxins and ZEN. No sample exceeded the guidance values for T-2 and HT-2 toxins. For this method measurement uncertainty for ZEN is ±20.8%, making the result for sample S23-001919 286 ± 59.5 µg/kg. This result exceeds the guidance value from Retained Commission Recommendation (EU) 2016/1319 for ZEN for ‘adult dogs and cats other than for reproduction’ of 200 µg/kg (3).

5. Very few residues of *Fusarium* mycotoxins were detected in the wet cat food from both sampling periods, and no sample exceeded the guidance values.

6. A third, non-accredited multi-mycotoxin LC-MS/MS screening method was also used to analyse the samples. The results of these analyses showed a similar pattern to the other results, dry foods contained more residues than wet foods. The ZEN concentration was confirmed in sample S23-001919 using this method. No other sample exceeded any guidance values where these exist. Mycotoxins from *Fusarium* species, including trichothecenes, beauvericin, enniatins, fumonisins and fusaric acid were detected in several samples of dry food. Enniatins and beauvericin were most frequently found. Two

mycotoxins produced by *Penicillium* species were detected at low levels in samples from period 1 but no *Penicillium* toxins were detected in the second sampling period. Four dry cat food samples contained multiple ergot alkaloids in sampling period 1 and two samples contained ergot alkaloids in sampling period 2. Tenuazonic acid was tentatively detected in several dry cat foods in period 1, although it's identity was only confirmed in five samples. It was detected and its identity confirmed in two samples in period 2.

6. The wet cat food samples contained very few residues of mycotoxins. Two samples in period 1 and one sample in period 2 contained low levels of enniatins (beauvericin was not detected). Moniliform was detected in three samples in period 2 but it's identity was not confirmed. No other *Fusarium* or *Penicillium* mycotoxins were detected. Tenuazonic acid was tentatively detected at low levels in three samples in period 1, although its identity was only confirmed in one sample confirmed by mass spectrometry (ion ratio), and one sample contained ergot alkaloids.

7. Mycotoxins were frequently detected in dry cat food samples, mycotoxins from several different fungi genera were detected, sometimes co-occurring in the same sample. Overall wet cat food samples contained very few or no mycotoxins. One dry sample contained ZEN above the guidance value.

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Annex A: Sample details

Table 10. Dry cat food samples analysed for mycotoxins – Sampling period 1

Fera LIMS No.	Hallmark Sample Number	Sampling Area	Product type	Date of purchase	Best before date	Sample total weight (g)
S22-034744	3012883-A	Wales	Dry	05/07/22	14/09/23	4,800
S22-034758	3012884-A	Wales	Dry	05/07/22	30/11/23	4,500
S22-034777	3012849-A	North	Dry	06/07/22	30/11/23	18,000
S22-034958	3012965-A	South	Dry	13/07/22	24/08/23	2,250
S22-035027	864891-A	Scotland	Dry	07/07/22	31/12/23	9,000
S22-035077	864889-A	Scotland	Dry	06/07/22	30/04/23	4,800
S22-035079	864894-A	Scotland	Dry	06/07/22	01/12/23	4,500

Fera LIMS No.	Hallmark Sample Number	Sampling Area	Product type	Date of purchase	Best before date	Sample total weight (g)
S22-035112	3012848-A	North	Dry	06/07/22	31/05/23	6,000
S22-035124	3009370-A	online	Dry	08/07/22	26/02/23	2,400
S22-035130	864851-A	South	Dry	11/07/22	30/05/23	2,700
S22-035134	865085-A	Scotland	Dry	07/07/22	07/11/23	2,400
S22-035138	864893-B	Scotland	Dry	06/07/22	29/09/23	4,850
S22-035147	3012962-B	South	Dry	11/07/22	02/02/23	2,250
S22-035208	864765-A	online	Dry	19/07/22	17/12/23	9,000

Fera LIMS No.	Hallmark Sample Number	Sampling Area	Product type	Date of purchase	Best before date	Sample total weight (g)
S22-035226	864800-B	online	Dry	17/07/22	08/03/23	2,250
S22-035228	864783-A	online	Dry	17/07/22	30/06/24	9,000
S22-035294	3012966-A	online	Dry	14/07/22	28/02/23	2,400
S22-035296	864805-A	online	Dry	17/07/22	25/11/23	12,000
S22-035911	3012830-A	online	Dry	26/07/22	20/10/22	5,100
S22-035913	3012829-A	online	Dry	27/07/22	13/06/23	2,400

Table 11. Wet and raw cat food samples analysed for mycotoxins – Sampling Period 1

Fera LIMS No.	Hallmark Sample Number	Sampling Area	Product type	Date of purchase	Best before date	Sample total weight (g)
S22-034953	864814-A	online	Wet	13/07/22	27/01/23	2,700
S22-034746	3012885-A	Wales	Wet	05/07/22	08/03/24	2,250
S22-034760	3038419-A	Wales	Wet	05/07/22	31/10/24	3,120
S22-034964	864815-A	South	Raw	13/07/22	03/05/23	10,000
S22-035011	3012964-A	online	Wet	13/07/22	20/12/23	2,550
S22-035013	3012963-A	online	Raw	12/07/22	23/03/23	10,000

Fera LIMS No.	Hallmark Sample Number	Sampling Area	Product type	Date of purchase	Best before date	Sample total weight (g)
S22-035019	3012853-A	online	Raw	12/07/22	04/07/23	3,600
S22-035103	864888-A	Scotland	Wet	06/07/22	30/04/24	2,040
S22-035105	865084-A	Scotland	Wet	06/07/22	18/05/24	2,000
S22-035126	864853-B	online	Wet	08/07/22	31/10/24	2,040
S22-035128	3009367-A	South	Wet	10/07/22	23/04/24	2,400
S22-035424	864746-A	online	Wet	21/07/22	13/09/23	1,800

Fera LIMS No.	Hallmark Sample Number	Sampling Area	Product type	Date of purchase	Best before date	Sample total weight (g)
S22-035426	3012831-A	online	Wet	21/07/22	04/01/24	2,240
S22-035915	3012828-A	South	Wet	26/07/22	29/11/23	2,040
S22-036502	864892-G	Scotland	Wet	07/07/22	31/01/24	2,000
S22-036510	864887-G	Scotland	Wet	06/07/22	30/04/24	2,200
S22-036518	3012847-G	North	Wet	06/07/22	26/05/24	1,700
S22-036526	864890-G	Scotland	Wet	06/07/22	30/04/24	2,000

Fera LIMS No.	Hallmark Sample Number	Sampling Area	Product type	Date of purchase	Best before date	Sample total weight (g)
S22-036531	3012961-A	South	Wet	11/07/22	25/11/24	2,240
S22-036535	3009369-A	South	Wet	09/07/22	01/02/24	8,000

Table 12. Dry cat food samples analysed for mycotoxins – Sampling period 2

FERA LIMS No.	Hallmark Sample Number	Sampling Area	Product type	Date of purchase	Best Before Date	Total weight (g)
S23-001280	2999440 A	South	Dry	20/12/2022	01/08/2023	2250
S23-001282	2999443 A	online	Dry	12/01/2023	03/11/2023	2400
S23-001289	2999441 A	online	Dry	13/01/2023	09/12/2023	2400

FERA LIMS No.	Hallmark Sample Number	Sampling Area	Product type	Date of purchase	Best Before Date	Total weight (g)
S23-001327	826128 A	Wales	Dry	15/01/2023	29/11/2023	4800

FERA LIMS No.	Hallmark Sample Number	Sampling Area	Product type	Date of purchase	Best Before Date	Total weight (g)
S23-001382	2999442A	online	Dry	12/01/2023	04/05/2024	12000
S23-001900	2995988A	Scotland	Dry	11/01/2023	26/03/2024	4500
S23-001902	2995989A	Scotland	Dry	11/01/2023	30/03/2023	4800
S23-001905	2995987A	Scotland	Dry	18/01/2023	16/04/2024	2400
S23-001917	3047640A	Scotland	Dry	11/01/2023	04/06/2024	4950
S23-001919	3047641A	Scotland	Dry	18/01/2023	30/06/2024	9000
S23-001921	3011255A	North	Dry	11/01/2023	31/12/2023	6000
S23-001923	2999444A	online	Dry	11/01/2023	26/02/2024	2250

FERA LIMS No.	Hallmark Sample Number	Sampling Area	Product type	Date of purchase	Best Before Date	Total weight (g)
S23-001925	2999448 A	South	Dry	11/01/2023	21/03/2024	2250
S23-001968	794644 A	online	Dry	20/01/2023	17/05/2024	9000

FERA LIMS No.	Hallmark Sample Number	Sampling Area	Product type	Date of purchase	Best Before Date	Total weight (g)
S20-001972	2997660 A	South	Dry	31/12/2022	06/06/2024	2700
S23-001974	794643 A	online	Dry	23/01/2023	31/10/2024	9000
S23-001977	2996036 A	South	Dry	20/01/2023	01/06/2024	18000
S23-001980	825316 A	Wales	Dry	10/01/2023	30/06/2024	4500
S23-001991	2999434 A	online	Dry	17/01/2023	20/07/2023	2400
S23-002260	823379 A	online	Dry	27/01/2023	20/04/2024	5100

Table 13. Wet and raw cat food samples analysed for mycotoxins – Sampling Period 2

FERA LIMS No.	Hallmark Sample Number	Sampling Area	Product type	Date of purchase	Best Before Date	Total weight (g)
S23-001284	794701 A	online	Wet	12/01/2023	31/10/2024	2040
S23-001287	794700 A	online	Wet	12/01/2023	25/03/2024	2240
S23-001325	825317 A	Wales	Wet	13/01/2023	17/11/2024	2250
S23-001332	3011269 (1) A	North	Wet	18/01/2023	03/05/2025	2240

FERA LIMS No.	Hallmark Sample Number	Sampling Area	Product type	Date of purchase	Best Before Date	Total weight (g)
S23-001339	2995985 A	Scotland	Wet	11/01/2023	18/10/2024	2000
S23-001341	3047637 (1) A	Scotland	Wet	11/01/2023	31/12/2024	8800
S23-001913	2995986 A	Scotland	Wet	14/01/2023	30/11/2024	2040
S23-001915	2999431 A	online	Wet	23/01/2023	07/12/2024	2100
S23-001932	794702 A	online	Wet	11/01/2023	28/05/2023	2700

FERA LIMS No.	Hallmark Sample Number	Sampling Area	Product type	Date of purchase	Best Before Date	Total weight (g)
S23-001934	2999445 A	South	Wet	20/12/2022	01/06/2024	2400
S23-001970	2999430 A	online	Wet	25/01/2023	21/01/2024	3230
S23-001984	825314 A	Wales	Wet	13/01/2023	22/04/2025	3120
S23-002262	3012846 (1) A	North	Wet	11/01/2023	25/10/2024	2550
S23-002275	3047639 (1) A	Scotland	Wet	11/01/2023	30/11/2024	8000
S23-002294	3047636 (1) A	Scotland	Wet	11/01/2023	30/11/2024	2000
S23-002311	2996018 (1) A	South	Wet	29/01/2023	29/11/2024	9599

FERA LIMS No.	Hallmark Sample Number	Sampling Area	Product type	Date of purchase	Best Before Date	Total weight (g)
S23-002448	2999433 A	online	Raw	17/01/2023	12/01/2024	3600
S23-002455	2999432 A	online	Wet	19/01/2023	12/04/2024	2500
S23-002457	794699 A	online	Raw	12/01/2023	04/10/2023	10000
S23-002459	794681 A	South	Raw	16/01/2023	10/01/2024	10000

Annex B: Results of Validation analyses

Table 14. Part 1. Validation data for method FSG 818 dry cat food, recovery values (%)

Validation data	a-ZOL	b-ZOL	a-ZOL-14-glc	b-ZOL-14-glc	ZEN	ZEN-14-glc	HT-2	T-2	T-2 a3-glc
SPIKE - DRY - 1 x RL	39.2	41.0	64.5	60.9	88.3	57.9	96.1	100.3	70.4
SPIKE - DRY - 1 x RL	44.5	47.1	58.9	57.5	148.6	53.9	124.5	109.4	73.9
SPIKE - DRY - 2 x RL	32.8	42.7	58.9	53.7	79.6	57.4	91.2	96.1	72.2
SPIKE - DRY - 2 x RL	34.9	41.1	55.5	49.9	93.5	56.2	101.2	99.9	75.7
SPIKE - DRY - 20 x RL	27.7	36.3	54.7	54.4	80.4	61.2	96.7	104.1	77.2
SPIKE - DRY - 20 x RL	27.6	36.1	55.6	55.6	77.1	61.4	99.6	104.3	77.7
Mean Recovery (%)	34.5	40.7	58.0	55.3	94.6	58.0	101.5	102.4	74.5
Standard deviation	6.6	4.2	3.7	3.7	27.1	2.9	11.7	4.6	2.9
CV (%)	19.2	10.2	6.3	6.7	28.7	5.0	11.6	4.5	3.9

Table 14 contd. Part 1. Validation data for method FSG 818 dry cat food, recovery values (%)

Validation data	3-AcDON	15-AcDON	DON	DON-3-glc	DAS	FUS X	NEO	NIV
SPIKE - DRY - 1 x RL	116.6	71.0	nr	51.5	99.8	61.2	91.8	84.4
SPIKE - DRY - 1 x RL	107.8	114.6	nr	58.1	99.3	56.9	94.5	85.6
SPIKE - DRY - 2 x RL	90.1	75.1	76.8	45.7	95.0	60.2	92.3	87.9
SPIKE - DRY - 2 x RL	95.7	88.6	124.0	53.8	96.4	62.1	95.2	76.2
SPIKE - DRY - 20 x RL	91.4	84.6	98.0	45.3	103.3	62.9	94.0	87.5
SPIKE - DRY - 20 x RL	92.2	86.2	100.0	44.6	101.5	61.9	93.5	90.2
Mean Recovery (%)	99.0	86.7	99.7	49.8	99.2	60.9	93.5	85.3
Standard deviation	10.8	15.3	19.3	5.5	3.1	2.1	1.3	4.9
CV (%)	10.9	17.6	19.4	11.0	3.1	3.5	1.4	5.7

nr – no result, background residue in sample higher than spike level

Table 15. Part 1. Validation data for method FSG 818 wet cat food, recovery values (%)

Validation data	a-ZOL	b-ZOL	a-ZOL-14-glc	b-ZOL-14-glc	ZEN	ZEN-14-glc	HT-2	T-2 Toxin	T-2 a3-glc
SPIKE - WET - 1 x RL	32.6	29.1	66.2	64.0	38.5	63.7	78.5	80.0	83.8
SPIKE - WET - 1 x RL	29.2	30.4	70.9	70.6	28.7	70.1	81.9	79.1	82.0
SPIKE - WET - 2 x RL	28.2	34.5	64.8	56.7	30.9	63.9	78.3	76.5	84.8
SPIKE - WET - 2 x RL	24.8	30.8	62.9	60.1	28.2	66.1	80.2	76.1	82.3
SPIKE - WET - 20 x RL	27.3	34.0	69.6	57.7	27.2	65.8	83.3	77.8	85.9
SPIKE - WET - 20 x RL	23.2	32.6	67.2	58.4	23.5	71.3	80.4	77.6	82.7
Mean recovery (%)	27.6	31.9	66.9	61.2	29.5	66.8	80.4	77.8	83.6
Standard deviation	3.3	2.2	3.0	5.3	5.0	3.2	1.9	1.5	1.5
CV	12.0	6.8	4.4	8.6	17.0	4.8	2.4	2.0	1.8

Validation data	3-AcDON	15-AcDON	DON	DAS	FUS X	NEO	NIV	DON-3-glc
SPIKE - WET - 1 x RL	78.6	100.3	90.2	81.2	64.9	88.8	43.7	100.0
SPIKE - WET - 1 x RL	74.2	92.1	95.9	80.2	67.1	90.4	80.5	95.9
SPIKE - WET - 2 x RL	73.6	95.1	85.4	77.0	66.3	95.5	79.3	96.8
SPIKE - WET - 2 x RL	70.5	95.6	83.8	77.1	74.0	97.1	82.1	96.8
SPIKE - WET - 20 x RL	75.9	105.0	83.0	79.0	75.8	97.2	83.1	95.0
SPIKE - WET - 20 x RL	70.3	97.1	80.8	77.0	72.5	95.2	83.7	93.3
Mean Recovery (%)	73.8	97.6	86.5	78.6	70.1	94.0	75.4	96.3
Standard deviation	3.2	4.5	5.6	1.8	4.6	3.6	15.6	2.2
CV	4.3	4.6	6.5	2.3	6.5	3.8	20.7	2.3

Table 16. Part 2. Validation data for method FSG 818 dry cat food, recovery values (%)

Validation data	a-ZOL	b-ZOL	a-ZOL-14-glc	b-ZOL-14-glc	ZEN	ZEN-14-glc	HT-2	T-2	T-2 a3-glc
SPIKE - DRY - 1 x RL	54.5	69.1	97.3	112.8	nr	153.7	126.7	108.4	71.7
SPIKE - DRY - 1 x RL	64.5	65.9	102.1	104.2	nr	150.3	113.1	106.2	71.9
SPIKE - DRY - 2 x RL	48.6	61.7	82.7	82.6	nr	109.6	133.3	114.7	61.4
SPIKE - DRY - 2 x RL	46.2	57.3	77.2	82.1	nr	106.1	123.4	114.2	59.4
SPIKE - DRY - 20 x RL	37.6	46.1	61.7	63.5	66.3	74.4	119.7	116.7	53.5
SPIKE - DRY - 20 x RL	38.3	48.0	61.0	65.3	69.0	74.9	115.2	117.1	55.3
Mean Recovery (%)	48.3	58.0	80.3	85.1	67.6	111.5	121.9	112.9	62.2
Standard deviation	10.2	9.4	17.3	20.0	2.0	34.7	7.5	4.5	8.0
CV (%)	21.1	16.2	21.5	23.6	2.9	31.2	6.2	4.0	12.8

Validation data	3-AcDON	15-AcDON	DON	DON-3-glc	DAS	FUS X	NEO	NIV
SPIKE - DRY - 1 x RL	105.9	83.5	96.5	58.0	95.8	34.0	18.3	77.1
SPIKE - DRY - 1 x RL	118.5	70.3	70.7	68.9	98.9	35.6	17.8	81.0
SPIKE - DRY - 2 x RL	102.8	80.4	98.9	47.7	108.7	27.3	21.0	65.1
SPIKE - DRY - 2 x RL	101.5	82.4	93.7	48.1	100.1	29.5	21.7	72.8
SPIKE - DRY - 20 x RL	116.3	81.4	105.4	32.3	103.7	23.8	24.6	82.7
SPIKE - DRY - 20 x RL	97.5	74	121.9	33.0	106.6	24.4	23.8	81.5
Mean Recovery (%)	107.1	78.6	97.9	48.0	102.3	29.1	21.2	76.7
Standard deviation	8.4	5.3	16.7	14.2	4.9	4.9	2.8	6.8
CV (%)	7.9	6.7	17.1	29.6	4.8	16.9	13.2	8.8

nr – no result, background interference in sample higher than spike level

Table 17. Part 2. Validation data for method FSG 818 wet cat food, recovery values (%)

Validation data	a-ZOL	b-ZOL	a-ZOL-14-glc	b-ZOL-14-glc	ZEN	ZEN-14-glc	HT-2	T-2 Toxin	T-2 a3-glc
SPIKE - WET - 1 x RL	45.9	60.2	73.5	106.5	62.3	91.2	86.4	83.7	82.9
SPIKE - WET - 1 x RL	53.5	64.6	78.0	115.3	61.2	99.8	95.7	86.5	91.1
SPIKE - WET - 2 x RL	38.9	50.4	55.3	83.7	54.6	76.1	100.9	89.4	74.0
SPIKE - WET - 2 x RL	35.4	50.1	58.4	89.6	47.7	80.5	91.3	91.8	80.5
SPIKE - WET - 20 x RL	26.3	35.1	39.3	66.6	40.2	61.2	97.2	91.5	67.7
SPIKE - WET - 20 x RL	30.3	41.4	45.2	72.8	44.3	67.1	95.7	92.6	75.3
Mean recovery (%)	38.4	50.3	58.3	89.1	42.2	79.3	94.5	89.2	78.6
Standard deviation	10.1	11.1	15.2	18.9	9.1	14.5	5.0	3.5	8.1
CV	26.2	22.0	26.1	21.2	21.6	18.3	5.3	3.9	10.3

Validation data	3-AcDON	15-AcDON	DON	DAS	FUS X	NEO	NIV	DON-3-glc
SPIKE - WET - 1 x RL	93.9	94.5	92.8	79.8	26.6	48.4	94.1	96.3
SPIKE - WET - 1 x RL	93.3	77.3	106.7	84.7	44.7	57.9	85.4	110.4
SPIKE - WET - 2 x RL	82.9	90.2	94.4	81.0	25.8	52.6	88.4	89.9
SPIKE - WET - 2 x RL	91.5	93.4	98.6	84.1	40.5	61.7	87.0	95.3
SPIKE - WET - 20 x RL	88.1	97.4	102.0	84.1	22.2	53.8	86.1	85.0
SPIKE - WET - 20 x RL	91.6	105.9	98.2	89.6	39.5	64.5	81.9	91.7
Mean Recovery (%)	90.2	93.1	98.8	83.9	33.2	56.5	87.2	94.8
Standard deviation	4.1	9.4	5.1	3.4	9.5	6.0	4.0	8.7
CV	4.6	10.1	5.1	4.1	28.5	10.6	4.6	9.1

Annex C: Tables

Table 18. Ochratoxin A and Aflatoxin concentrations measured in dry cat food samples, sampling period 1. Results in µg/kg, corrected for recovery

Sample	Aflatoxin B_1	Aflatoxin B_2	Aflatoxin G_1	Aflatoxin G2	Total Aflatoxin	OTA
S22-034744	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-034758	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-034777	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-034958	**0.4**	<0.2	<0.2	<0.2	**0.4**	<0.2
S22-035027	<0.2 (0.1)	<0.2	<0.2	<0.2	<0.8	<0.2
S22-035077	<0.2 (0.1)	<0.2	<0.2	<0.2	<0.8	<0.2
S22-035079	**0.3**	<0.2	<0.2	<0.2	**0.3**	<0.2
S22-035112	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-035124	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-035130	**2.4**	<0.2 (0.1)	**0.2**	<0.2	**2.6**	**1.9**
S22-035134	**0.2**	<0.2	<0.2	<0.2	**0.2**	<0.2
S22-035138	**0.2**	<0.2	<0.2	<0.2	**0.2**	**0.4**
S22-035147	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-035208	<0.2 (0.1)	<0.2	<0.2	<0.2	<0.8	**1.0**
S22-035226	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-035228	**0.7**	<0.2	<0.2	<0.2	**0.7**	**0.4**
S22-035294	<0.2	<0.2	<0.2	<0.2	<0.8	**0.6**
S22-035296	**2.2**	<0.2 (0.1)	<0.2	<0.2	**2.2**	**0.3**
S22-035911	**0.2**	<0.2	<0.2	<0.2 (0.1)	**0.2**	**0.5**
S22-035913	**1.4**	<0.2	<0.2	<0.2	**1.4**	<0.2

() results in parenthesis are for information only - indicative of presence of analyte below the LOQ

Table 19. Ochratoxin A and Aflatoxin concentrations measured in wet cat food samples, sampling period 1. Results in µg/kg, corrected for recovery

Sample	Aflatoxin B_1	Aflatoxin B_2	Aflatoxin G_1	Aflatoxin G_2	Total aflatoxin	OTA
S22-034746	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-034760	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-034953	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-034964	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-035011	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-035013	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-035019	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-035103	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-035105	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-035126	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-035128	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-035424	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-035426	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-035915	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-036502	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-036510	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-036518	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-036526	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-036531	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S22-036535	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2

Table 20. Ochratoxin A and Aflatoxin concentrations measured in dry cat food samples, sampling period 2. Results in µg/kg, corrected for recovery

Sample	Aflatoxin B_1	Aflatoxin B_2	Aflatoxin G_1	Aflatoxin G_2	Total aflatoxin	OTA
S23-001280	**0.2**	<0.2 (0.1)	<0.2 (0.1)	<0.2	**0.2**	**0.8**
S23-001282	<0.2	<0.2	<0.2	<0.2	<0.8	**0.8**
S23-001289	**0.2**	<0.2	<0.2	<0.2	**0.2**	**2.2**
S23-001327	<0.2	<0.2	<0.2	<0.2	<0.8	**0.5**
S23-001382	**0.2**	<0.2 (0.1)	<0.2 (0.1)	<0.2 (0.1)	**0.2**	**0.4**
S23-001900	**0.3**	<0.2	<0.2	<0.2	**0.3**	**1.5**
S23-001902	**0.3**	<0.2 (0.1)	<0.2	<0.2	**0.3**	**0.4**
S23-001905	**0.5**	<0.2 (0.1)	**0.2**	<0.2	**0.7**	**0.4**
S23-001917	**0.2**	<0.2 (0.1)	<0.2 (0.1)	<0.2	**0.2**	**0.9**
S23-001919	**0.4**	<0.2	**0.2**	<0.2	**0.5**	**0.8**
S23-001921	**0.2**	<0.2	<0.2	<0.2	**0.2**	**0.5**
S23-001923	<0.2	<0.2	<0.2	<0.2	<0.8	**0.8**
S23-001925	<0.2 (0.1)	<0.2	<0.2	<0.2	<0.8	<0.2 (0.1)
S23-001968	<0.2	<0.2	<0.2	<0.2	<0.8	**0.5**
S23-001972	<0.2 (0.1)	<0.2	<0.2	<0.2	<0.8	**1.0**
S23-001974	**0.4**	<0.2	<0.2 (0.1)	**0.2**	**0.6**	**3.9**
S23-001977	**2.8**	**0.2**	**0.2**	<0.2	**3.2**	**3.7**
S23-001980	<0.2	<0.2	<0.2	<0.2	<0.8	**0.3**
S23-001991	**1.0**	<0.2	<0.2	<0.2	**1.0**	**1.0**
S23-002260	**0.2**	<0.2	<0.2	<0.2	**0.2**	**1.1**

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Table 21. Ochratoxin A and Aflatoxin concentrations measured in wet cat food samples, sampling period 2. Results in µg/kg, corrected for recovery.

Sample	Aflatoxin B_1	Aflatoxin B_2	Aflatoxin G_1	Aflatoxin G_2	Total aflatoxin	Ochratoxin A
S23-001284	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S23-001287	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S23-001325	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S23-001332	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S23-001339	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S23-001341	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S23-001913	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S23-001915	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S23-001932	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S23-001934	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S23-001970	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S23-001984	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S23-002262	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S23-002275	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S23-002294	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S23-002311	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S23-002448	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S23-002455	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S23-002457	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2
S23-002459	<0.2	<0.2	<0.2	<0.2	<0.8	<0.2

Table 22. QC recovery data for Aflatoxin and Ochratoxin A method.

Mean recovery (%) n=2	Aflatoxin B1	Aflatoxin B2	Aflatoxin G1	Aflatoxin G2	OTA
Wet food part 1	94	91	90	78	79
Dry food part 1	74	71	68	62	72
Wet food part 2	82	79	73	77	85
Dry food part 2	103	90	82	85	85

Table 23. *Fusarium* toxin concentrations in dry cat food samples, sampling period 1, µg/kg, corrected for recovery.

LIMS No.	Deoxynivalenol-3-glucoside	a-Zearalenol	b-Zearalenol	a-Zearalenol-14-glucoside	b-Zearalenol-14-glucoside	Zearalenone	Zearalenone-14-glucoside	3-Acetyl deoxynivalenol	15-Acetyl deoxynivalenol	Deoxynivalenol	Diacetoxy scirpenol	Fusarenon X	HT-2 Toxin	Neosolaniol	Nivalenol	T-2 Toxin	T-2 Toxin-b3-glucoside	Sum T-2 and HT-2
S22-034744	**37.8**	<2.5	<2.5	<5	<5	**20.1**	<5	<10	**49.1**	**269**	<10	<10	**13.5**	<10	<50	<10 (8.0)	<10	**21.5**
S22-034758	**11.8**	<2.5	<2.5	<5	<5	**9.0**	<5	<10	<20	**41.2**	<10	<10	<10	<10	<50	<10	<10	<20
S22-034777	**10.4**	<2.5	<2.5	<5	7.7	**35.0**	<5	<10	<20	**76.3**	<10	<10	<10	<10	<50	<10	<10	<20
S22-034958	<10	<2.5	<2.5	<5	<5	**25.8**	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-035027	**67.0**	<2.5	<2.5	<5	<5	**67.4**	<5	**21.7**	**273**	**575**	<10	<10	**12.5**	<10	<50	<10 (9.6)	<10	**22.1**
S22-035077	<10	<2.5	<2.5	<5	<5	**2.5**	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-035079	<10	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-035112	<10	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	**53.0**	<10	<10	<10	<10	<50	<10	<10	<20
S22-035124	<10	<2.5	<2.5	<5	<5	**2.9**	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20

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LIMS No.	Deoxynivalenol-3-glucoside	a-Zearalenol	b-Zearalenol	a-Zearalenol-14-glucoside	b-Zearalenol-14-glucoside	Zearalenone	Zearalenone-14-glucoside	3-Acetyl deoxynivalenol	15-Acetyl deoxynivalenol	Deoxynivalenol	Diacetoxy scirpenol	Fusarenon X	HT-2 Toxin	Neosolaniol	Nivalenol	T-2 Toxin	T-2 Toxin-b3-glucoside	Sum T-2 and HT-2
S22-035130	<10	<2.5	<2.5	<5	<5	**13.2**	**6.2**	<10	<20	**11.5**	<10	<10	<10	<10	<50	<10	<10	<20
S22-035134	**17.3**	<2.5	<2.5	<5	<5	**16.9**	<5	<10	**23.4**	**83.5**	<10	<10	<10	<10	<50	<10	<10	<20
S22-035138	**19.2**	<2.5	<2.5	<5	<5	**6.9**	<5	<10	<20	**87.6**	<10	<10	<10 (8.2)	<10	<50	<10	<10	<20 (8.2)
S22-035147	<10	<2.5	<2.5	**9.8**	<5	**20.4**	<5	<10	<20	**43.4**	<10	<10	<10	<10	<50	<10	<10	<20
S22-035208	<10	<2.5	<2.5	<5	<5	**8.7**	**7.6**	<10	<20	**12.0**	<10	<10	<10	<10	<50	<10	<10	<20
S22-035226	<10	<2.5	<2.5	<5	<5	**7.0**	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-035228	**27.1**	<2.5	<2.5	<5	<5	**61.6**	<5	**12.8**	**67.7**	**201**	<10	<10	**14.4**	<10	<50	**14.0**	<10	**28.4**
S22-035294	**23.2**	<2.5	<2.5	<5	<5	**7.3**	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-035296	**27.3**	<2.5	<2.5	<5	<5	**15.7**	<5	<10	<20	**107**	<10	<10	<10	<10	<50	<10	<10	<20
S22-035911	<10	<2.5	<2.5	<5	<5	**5.7**	**5.5**	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-035913	**14.0**	<2.5	<2.5	<5	<5	**2.8**	<5	<10	<20	**49.2**	<10	<10	<10	<10	<50	<10	<10	<20

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Table 24. *Fusarium* toxin concentrations in wet cat food samples, sampling period 1, µg/kg, corrected for recovery.

LIMS No.	Deoxynivalenol-3-glucoside	a-Zearalenol	b-Zearalenol	a-Zearalenol-14-glucoside	b-Zearalenol-14-glucoside	Zearalenone	Zearalenone-14-glucoside	3-Acetyl deoxynivalenol	15-Acetyl deoxynivalenol	Deoxynivalenol	Diacetoxy scirpenol	Fusarenon X	HT-2 Toxin	Neosolaniol	Nivalenol	T-2 Toxin	T-2 Toxin-b3-glucoside	Sum T-2 and HT-2
S22-034746	<10	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-034760	<10	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-034953	<10	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-034964	<10	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-035011	<10	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-035013	<10	<2.5	<2.5	<5	<5	**3.8**	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-035019	<10	<2.5	<2.5	<5	<5	**6.3**	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-035103	<10	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-035105	<10	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20

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LIMS No.	Deoxynivalenol-3-glucoside	a-Zearalenol	b-Zearalenol	a-Zearalenol-14-glucoside	b-Zearalenol-14-glucoside	Zearalenone	Zearalenone-14-glucoside	3-Acetyl deoxynivalenol	15-Acetyl deoxynivalenol	Deoxynivalenol	Diacetoxy scirpenol	Fusarenon X	HT-2 Toxin	Neosolaniol	Nivalenol	T-2 Toxin	T-2 Toxin-b3-glucoside	Sum T-2 and HT-2
S22-035126	<10	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-035128	<10	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-035424	<10	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-035426	<10	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-035915	<10	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-036502	<10	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-036510	<10	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10 (9.3)	<10	<10	<10	<10	<50	<10	<10	<20
S22-036518	<10	<2.5	<2.5	<5	<5	**3.0**	<5	<10	<20	**10.3**	<10	<10	<10	<10	<50	<10	<10	<20
S22-036526	<10	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-036531	<10	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S22-036535	<10	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20

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Table 25. *Fusarium* toxin concentrations in dry cat food samples, sampling period 2, µg/kg, corrected for recovery.

LIMS No.	Deoxynivalenol-3-glucoside	a-Zearalenol	b-Zearalenol	a-Zearalenol-14-glucoside	b-Zearalenol-14-glucoside	Zearalenone	Zearalenone-14-glucoside	3-Acetyl deoxynivalenol	15-Acetyl deoxynivalenol	Deoxynivalenol	Diacetoxy scirpenol	Fusarenon X	HT-2 Toxin	Neosolaniol	Nivalenol	T-2 Toxin	T-2 Toxin-b3-glucoside	Sum T-2 and HT-2
S23-001280	**5.9**	<2.5	<2.5	<5	<5	**45.6**	<5	<10	**21.5**	**47.0**	<10	<10	<10 (6.5)	<10	<50	<10	<10	<20 (6.5)
S23-001282	**8.0**	<2.5	<2.5	<5	<5	**10.0**	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-001289	**13.0**	<2.5	<2.5	<5	<5	**49.0**	<5	<10	**18.2**	**22.4**	<10	<10	<10	<10	<50	<10	<10	<20
S23-001327	**16.9**	<2.5	<2.5	<5	<5	**22.9**	<5	<10	**58.0**	**265**	<10	<10	**18.4**	<10	<50	**12.2**	<10	**30.6**
S23-001382	**14.3**	<2.5	<2.5	<5	<5	**25.4**	<5	<10 (6.3)	**14.6**	**101**	<10	<10	<10 (4.2)	<10	<50	<10	<10	<20 (4.2)
S23-001900	<5	<2.5	<2.5	<5	<5	**3.2**	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-001902	<5	<2.5	<2.5	<5	<5	**5.1**	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-001905	**5.3**	<2.5	<2.5	<5	<5	**8.2**	<5	<10	<20	**13.8**	<10	<10	<10	<10	<50	<10	<10	<20
S23-001917	**11.4**	<2.5	<2.5	<5	<5	**7.4**	<5	<10 (5.6)	<20	**135**	<10	<10	<10 (5.0)	<10	<50	<10	<10	<20

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LIMS No.	Deoxynivalenol-3-glucoside	a-Zearalenol	b-Zearalenol	a-Zearalenol-14-glucoside	b-Zearalenol-14-glucoside	Zearalenone	Zearalenone-14-glucoside	3-Acetyl deoxynivalenol	15-Acetyl deoxynivalenol	Deoxynivalenol	Diacetoxy scirpenol	Fusarenon X	HT-2 Toxin	Neosolaniol	Nivalenol	T-2 Toxin	T-2 Toxin-b3-glucoside	Sum T-2 and HT-2
S23-001919	**26.2**	<2.5	**4.2**	<5	<5	**286***	<5	**12.1**	**76.6**	**379**	<10	<10	**20.5**	<10	<50	**13.7**	<10	**34.2**
S23-001921	**17.7**	<2.5	<2.5	<5	<5	**3.4**	<5	<10	<20	<10 (7.9)	<10	<10	<10	<10	<50	<10	<10	<20
S23-001923	<5	<2.5	<2.5	<5	<5	**10.5**	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-001925	<5	<2.5	<2.5 (2.4)	<5	<5	**62.5**	<5	<10	**15.2**	**35.6**	<10	<10	<10	<10	<50	<10	<10	<20
S23-001968	<5	<2.5	<2.5	<5	<5	**6.4**	<5	<10	<20	**8.7**	<10	<10	<10	<10	<50	<10	<10	<20
S23-001972	**5.5**	<2.5	<2.5	<5	<5	**51.3**	<5	<10	<20	**31.9**	<10	<10	<10	<10	<50	<10	<10	<20
S23-001974	**8.8**	<2.5	<2.5 (2.2)	<5	<5	**45.5**	<5	<10	**31.2**	**78.5**	<10	<10	**13.7**	<10	<50	12.0	<10	**25.7**
S23-001977	**5.9**	<2.5	2.7	<5	<5	**108**	<5	<10	**13.8**	**36.5**	<10	<10	**9.2**	<10	<50	<10 (6.6)	<10	**15.8**
S23-001980	**6.0**	<2.5	<2.5	<5	<5	**7.2**	<5	<10	<20	**12.4**	<10	<10	<10	<10	<50	<10	<10	<20
S23-001991	**13.2**	<2.5	<2.5	<5	<5	**23.9**	<5	<10	**23.7**	**122**	<10	<10	<10	<10	<50	<10	<10	<20
S23-002260	<5	<2.5	<2.5	<5	<5	10.3	<5	<10	<20	6.6	<10	<10	<10	<10	<50	<10	<10	<20

* Result ± MU = 286 ± 59.5 µg/kg. Lower limit = 226.5 µg/kg is above the Guidance level of 200 µg/kg.

Table 26. *Fusarium* toxin concentrations in wet cat food samples – Sampling period 2, µg/kg, corrected for recovery.

LIMS No.	Deoxynivalenol-3-glucoside	a-Zearalenol	b-Zearalenol	a-Zearalenol-14-glucoside	b-Zearalenol-14-glucoside	Zearalenone	Zearalenone-14-glucoside	3-Acetyl deoxynivalenol	15-Acetyl deoxynivalenol	Deoxynivalenol	Diacetoxy scirpenol	Fusarenon X	HT-2 Toxin	Neosolaniol	Nivalenol	T-2 Toxin	T-2 Toxin-b3-glucoside	Sum T-2 and HT-2
S23-001284	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-001287	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-001325	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-001332	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-001339	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-001341	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-001913	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-001915	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-001932	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20

LIMS No.	Deoxynivalenol-3-glucoside	a-Zearalenol	b-Zearalenol	a-Zearalenol-14-glucoside	b-Zearalenol-14-glucoside	Zearalenone	Zearalenone-14-glucoside	3-Acetyldeoxyniva	15-Acetyldeoxyniva	Deoxynivalenol	Diacetoxyscirpenol	Fusarenon X	HT-2 Toxin	Neosolaniol	Nivalenol	T-2 Toxin	T-2 Toxin-b3-glucoside	Sum T-2 and HT-2
S23-001934	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-001970	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-001984	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-002262	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-002275	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-002294	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-002311	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-002448	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-002455	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-002457	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20
S23-002459	<5	<2.5	<2.5	<5	<5	<2.5	<5	<10	<20	<10	<10	<10	<10	<10	<50	<10	<10	<20

Table 27. Sampling period 1, summarised multi-residue mycotoxin concentrations measured in dry cat food samples – residues detected, µg/kg, recovery corrected.

Sample	Acetyl-Deoxynivalenol (3- and 15-)	Beauvericin	Cytochalasin H	Deoxynivalenol	Enniatin A	Enniatin A1	Enniatin B	Enniatin B1	Deoxynivalenol-3-glucoside	Zearalenone
S22-034744	<50	**12.9**	<25	**87.2**	<2.5	<2.5	**4.6**	<2.5	**75.9**	**27.3**
S22-034758	<50	**16.2**	**580**	**<25 (16.1q)**	<2.5	**14.7**	**20.5**	**49.4**	<25	<12.5
S22-034777	<50	**90.4**	<25	**27.2(q)**	<2.5	**16.4**	**25.9**	**54.9**	<25	**37.4**
S22-034958	<50	**17.1**	<25	**<25 (12.1q)**	**26.9**	**55.2**	**60.1**	**152**	<25	**25.4**
S22-035027	52.6 (i)	**72.9**	<25	**239**	<2.5	<2.5	**4.7**	**7.4**	**103**	**77.8**
S22-035077	<50	<2.5	<25	<25	<2.5	<2.5	**4.8**	**8.4**	<25	<12.5
S22-035079	<50	<2.5	<25	<25	<2.5	<2.5	<2.5	<2.5	<25	<12.5
S22-035112	<50	<2.5	<25	**<25 (17.9q)**	<2.5	<2.5	**7.7**	**8.4**	<25	<12.5
S22-035124	<50	**8.1**	<25	<25	**23.6**	**49.6**	**53.9**	**143**	<25	<12.5
S22-035130	<50	**14.7**	<25	<25	**19.8**	**29.8**	**30.7**	**81.7**	<25	<12.5
S22-035134	<50	**24.1**	<25	**38.4**	<2.5	**8.4**	**12.2**	**25.5**	<25	**20.9**
S22-035138	<50	**18.5**	<25	**41.1**	**5.5**	**27.6**	**53.8**	**102**	<25	<12.5
S22-035147	<50	**31.9**	<25	**<25 (16.2q)**	**14.5**	**11.6**	**10.9**	**18.0**	<25	**24.0**
S22-035208	<50	<2.5	<25	<25	<2.5	<2.5	**5.5**	**8.3**	<25	<12.5
S22-035226	<50	**15.5**	<25	<25	**22.8**	**46.5**	**54.6**	**144**	<25	<12.5
S22-035228	<50	**163(q)**	<25	**121.1**	<2.5	**5.2**	**10.7**	**19.3**	**52.6**	**82.0**
S22-035294	<50	**26.8**	<25	<25	**38.7**	**95.2**	**105**	**293 (q)**	<25	<12.5
S22-035296	<50	**19.2**	<25	**53.5**	<2.5	<2.5	<2.5	**4.6**	<25	<12.5
S22-035911	<50	**25.5**	<25	<25	**42.2**	**89.6**	**109**	**275 (q)**	<25	<12.5
S22-035913	<50	**50.2**	<25	**26.7q**	<2.5	<2.5	**10.2**	**13.7**	<25	<12.5

(i) indicative, identity not confirmed, (q) initial results outside calibration graph, therefore results are semi-quantitative

Table 27 continued. Sampling period 1, summarised mycotoxin concentrations measured in dry cat food samples – residues detected, µg/kg, recovery corrected.

Sample	Fumonisin B1	Fumonisin B2	Fumonisin B3	Fusaric Acid	Mycophenolic Acid	Roquefortine C	Sterigmatocystin	Tenuazonic Acid
S22-034744	<25	<25	<25	40.4(i)	<25	<2.5	<1.25	**260**
S22-034758	<25	<25	<25	<25	<25	<2.5	<1.25	<25
S22-034777	**129**	<25	<25	**46.6(q)**	<25	<2.5	<1.25	85.6(i)
S22-034958	<25	<25	<25	**89.7**	<25	<2.5	<1.25	**142(q)**
S22-035027	**324**	**128**	<25	**199**	**48.2**	<2.5	<1.25	103(i)
S22-035077	<25	<25	<25	<25	<25	<2.5	<1.25	113(i)
S22-035079	<25	<25	<25	<25	<25	<2.5	<1.25	81.5(i)
S22-035112	<25	<25	<25	<25	<25	<2.5	<1.25	89.7(i)
S22-035124	<25	<25	<25	**77.6**	<25	<2.5	<1.25	113(i)
S22-035130	<25	<25	<25	**117**	<25	<2.5	<1.25	**144(q)**
S22-035134	<25	<25	<25	28.6(i)	<25	<2.5	<1.25	97.3(i)
S22-035138	**93.3**	<25	<25	28.0(i)	<25	<2.5	<1.25	**98.5(q)**
S22-035147	**86.3**	<25	<25	49.3(i)	**46.2**	<2.5	<1.25	92.1(i)
S22-035208	<25	<25	<25	<25	<25	<2.5	<1.25	75.6(i)
S22-035226	<25	<25	<25	**64.9**	<25	<2.5	**2.2(q)**	119(i)
S22-035228	**698**	**379**	**107**	**213**	**57.2**	**10.4**	<1.25	108(i)
S22-035294	<25	<25	<25	**118**	<25	<2.5	<1.25	153(i)
S22-035296	<25	<25	<25	<25	<25	<2.5	<1.25	96.2(i)
S22-035911	<25	<25	<25	252(i)	<25	<2.5	<1.25	**304**
S22-035913	**449**	**107**	<25	**37.5(q)**	<25	<2.5	<1.25	**135(q)**

(i) indicative, identity not confirmed, (q) initial results outside calibration graph, therefore results are semi-quantitative

Table 27 continued. Sampling period 1, summarised mycotoxin concentrations measured in dry cat food samples – residues detected, µg/kg, recovery corrected.

Sample	Ergocornine	Ergocorninine	Ergocristine	Ergocristinine	Ergocryptine	Ergocryptinine	Ergometrine	Ergometrinine	Ergosine	Ergosinine	Ergotamine	Ergotaminine
S22-034758	**42.7**	**12.6**	**92.0**	**27.9**	**53.9**	**9.3**	<12.5	<2.5	**82.0**	**19.3**	**62.2**	**12.3**
S22-034777	<12.5	<2.5	**32.4**	**7.1**	<12.5	<2.5	<12.5	<2.5	<12.5	**5.9**	**20.9**	<2.5
S22-035134	**29.6**	**6.3**	<12.5	<2.5	<12.5	<2.5	<12.5	<2.5	<12.5	<2.5	<12.5	<2.5
S22-035913	<12.5	**4.1**	<12.5	<2.5	<12.5	**3.9**	<12.5	<2.5	<12.5	<2.5	<12.5	<2.5

Table 28. Sampling period 1, summarised semi-quantitative mycotoxin concentrations measured in wet cat food samples – residues detected

Sample	Enniatin A1	Enniatin B	Enniatin B1	Tenuazonic Acid	Ergocorninine	Ergocristine	Ergocristinine	Ergocryptinine	Ergosine	Ergosinine
S22-035011	<2.5	<2.5	<2.5	**65**	<2.5	<12.5	<2.5	<2.5	<12.5	<2.5
S22-035013	<2.5	<2.5	<2.5	**65.1(q)**	<2.5	<12.5	<2.5	<2.5	<12.5	<2.5
S22-036510	<2.5	**9.4**	**15.1**	<25	**6.0**	**46.7**	**9.3**	**4.8**	**27.3**	**6.6**
S22-036518	**9.6**	**35.4**	**48.1**	<25	<2.5	<12.5	<2.5	<2.5	<12.5	<2.5
S22-036531	<2.5	<2.5	<2.5	**25.6(i)(q)**	<2.5	<12.5	<2.5	<2.5	<12.5	<2.5

(i) indicative, identity not confirmed, (q) initial results outside calibration graph, therefore results are semi-quantitative

Table 29. Sampling period 2, summarised mycotoxin concentrations measured in dry cat food samples – residues detected, µg/kg, recovery corrected.

Sample	Aflatoxin B1	Beauvericin	Cytochalasin B	Cytochalasin H	Deoxynivalenol	Enniatin A	Enniatin A1	Enniatin B	Enniatin B1	Deoxynivalenol -3-glucoside	Zearalenone
S23-001280	<1.25	**21.5**	<25	<25	<25	<2.5	<2.5	5.6	8.9	<25	**49**
S23-001282	<1.25	**9.3**	<25	<25	<25	**14.6**	**42.6**	**46.9**	**104**	<25	<12.5
S23-001289	<1.25	**19.6**	<25	<25	<25	**28.7**	**77.3**	**79.9**	**180q**	<25	**51**
S23-001327	<1.25	<2.5	<25	<25	**157**	<2.5	<2.5	<2.5	<2.5	<25	<12.5
S23-001382	<1.25	**5.2**	<25	<25	**62.6**	**5.6**	**24.7**	**30.7**	**70.2**	<25	**29**
S23-001902	<1.25	<2.5	<25	<25	<25	<2.5	<2.5	**4.2**	**6.0**	<25	<12.5
S23-001905	<1.25	**8.6**	<25	<25	<25	<2.5	<2.5	<2.5	**5.2**	<25	<12.5
S23-001917	<1.25	**7.0**	<25	<25	**93.3**	<2.5	**9.2**	**21.2**	**31.0**	<25	<12.5
S23-001919	<1.25	**77.9**	<25	<25	**210**	<2.5	<2.5	**8.9**	**12.6**	**114**	**257**
S23-001921	<1.25	<2.5	<25	<25	<25	<2.5	<2.5	<2.5	**5.9**	<25	<12.5
S23-001923	<1.25	**8.7**	<25	<25	<25	**8.6**	**17.6**	**18.5**	**39.6**	<25	<12.5
S23-001925	<1.25	<2.5	<25	<25	<25	<2.5	<2.5	<2.5	**6.6**	<25	**52**
S23-001972	<1.25	**9.9**	<25	<25	<25	**28.2**	**76.9**	**95.7**	**203 (q)**	<25	**53**
S23-001974	<1.25	**98.9**	<25	<25	**99.2**	<2.5	**5.2**	**9.2**	**12.9**	<25	**54**
S23-001977	**2.6**	**68.2**	<25	**296**	<25	<2.5	**6.7**	**12.6**	**20.6**	<25	**144**
S23-001980	<1.25	**6.6**	<25	**354**	<25	<2.5	<2.5	<2.5	**5.3**	<25	<12.5
S23-001991	<1.25	**25.3**	**78.3**	<25	**109**	<2.5	<2.5	<2.5	**4.6**	<25	**30**
S23-002260	<1.25	**17.1**	<25	<25	<50	**28.6**	**6.7**	**88.4**	**170 (q)**	<25	<12.5

(i) indicative, identity not confirmed, (q) initial results outside calibration graph, therefore results are semi-quantitative

Table 29. contd. Sampling period 2, summarised mycotoxin concentrations measured in dry cat food samples – residues detected, µg/kg, recovery corrected.

Sample	Moniliformin	Fumonisin B1	Fumonisin B2	Fusaric Acid	Sterigmatocystin	Alternariol	Tenuazonic Acid
S23-001282	<200	<25	<25	127 (i)	<1.25	<25	<25
S23-001289	219 (i)	<25	<25	71 (i)	<1.25	<25	<25
S23-001327	<200	<25	<25	<25	<1.25	**52**	**121**
S23-001919	<200	**206**	**71**	**160**	<1.25	<25	<25
S23-001921	<200	<25	<25	<25	**18.4**	<25	<25
S23-001972	489 (i)	<25	<25	**156**	<1.25	<25	<50
S23-001974	<200	**196**	**122**	**226**	<1.25	<25	<50
S23-001977	<200	**240**	**109**	**136**	<1.25	<25	<50
S23-002260	339 (i)	<25	<25	308 (i)	<1.25	<25	**194**

Table 29. contd. Sampling period 2, summarised semi-quantitative mycotoxin concentrations measured in dry cat food samples, µg/kg, recovery corrected.

Sample	Ergocornine	Ergocorninine	Ergocristine	Ergocristinine	Ergocryptine	Ergocryptinine	Ergometrine	Ergometrinine	Ergosine	Ergosinine	Ergotamine	Ergotaminine
S23-001921	**32.9**	**6.0**	**99.7**	**15.7**	**28.4**	**5.4**	<12.5	<2.5	**93.3**	**19.6**	**52.9**	**9.8**
S23-001923	<12.5	<2.5	**45.1**	**5.7**	<12.5	<2.5	<12.5	<2.5	**23.5**	<2.5	<12.5	<2.5

Table 30. Sampling period 2, summarised mycotoxin concentrations measured in wet cat food samples – residues detected, µg/kg, recovery corrected.

Sample	Enniatin B	Enniatin B1	Moniliformin
S23-001341	<2.5	<2.5	610(i)
S23-001970	<2.5	<2.5	724(i)
S23-001984	<2.5	<2.5	<200
S23-002262	**6.9**	**15.4**	457(i)

(i) indicative, identity not confirmed, (q) initial results outside calibration graph, therefore results are semi-quantitative

Annex D: References

1. Lutsky I, Mor N. (1981) Experimental alimentary toxic aleukia in cats. Lab Anim Sci. 1981 Feb;31(1):43-7. PMID: 7195959.

2. Lutsky, I., Mor, N., Yagen, B., Avraham Z. Joffe, A. Z., (1978). The role of T-2 toxin in experimental alimentary toxic aleukia: A toxicity study in cats, Toxicology and Applied Pharmacology, Volume 43, Issue 1, 1978, Pages 111-124, ISSN 0041-008X, https://doi.org/10.1016/S0041-008X(78)80036-2.

3. Retained Commission Recommendation (EU) 2016/1319 of 29 July 2016 amending Recommendation 2006/576/EC as regards deoxynivalenol, zearalenone and ochratoxin A in pet food.

4. Retained Directive 2002/32/EC of the European Parliament and of the Council of 7 May 2002 on undesirable substances in animal feed.

5. Commission Regulation (EC) No 401/2006 of 23 February 2006 laying down the methods of sampling and analysis for the official control of the levels of mycotoxins in foodstuffs (Text with EEA relevance).

6. Commission Recommendation of 17 August 2006 on the presence of deoxynivalenol, zearalenone, ochratoxin (PDF) A, T-2 and HT-2 and fumonisins in products intended for animal feeding (2006/576/EC).

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