LGC AXIO PROFICIENCY TESTING

Scheme Description

Animal Feed (AFPS) Proficiency Testing Scheme

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RECORD OF ISSUE STATUS AND MODIFICATIONS

Issue	Issue Date	Details	Authorised by
12	Sept 2018	Addition of sample 13 fish-feed / aquaculture Updated method details to 'ALL' for microbiology samples and amended Methods paragraph.	W.Gaunt L. Chesters
13	Aug 2019	Energy added to sample 13. Analytes names updated for sample 13. New silage sample added. Sample 12 removed.	W.Gaunt S.Xystouris T.Noblett
14	September 2020	Unit for Energy changed Addition of new sample 15 for enumeration of yeast, mould, coagulase positive Staphylococci and *Bacillus cereus* and renamed as a contaminants sample. Removed yeast and mould parameters from sample 7 and replaced with lactic acid bacteria, renamed as a probiotic sample. Added total anaerobic count and sulphite-reducing clostridia parameters to sample 10.	S Xystouris C Taylor
15	April 2021	pH added as an analyte to samples 1,9 and 13	L Fielding
16	July 2021	Updated email address and UKAS logo. Crude fat in sample 1 structure updated.	A Collins W.Gaunt
17	March 2022	Added new sample 16 and 17 in kibble matrix	A Cheetham
18	Sep 2022	Amended sample numbers to use same number for same analyte to be consistent with QMS Added 3 new samples (Chemistry)	T Noblett S. Xystouris
19	Nov 2022	Amend the sample format for KB06 & KB07 Kibble matrix, to matrix and vial.	A.Eden
20	July 2023	Amend the sample format for AF06 & KB06 to matrix and 2 vials (A+B). Added cfu/g to the ranges for microbiology samples. Added reporting units. Added calorific value in sample 1.	M.Bell S. Xystouris
21	July 2024	Additional methods added to ADF and NDF in sample 1. General format of document updated. Removed references to Appendix A. Sample 14 removed. Samples 19 and 20 moved to QFCS.	R.Connolly N. Mason

Notes: Where this document has been translated, the English version shall remain the definitive version

SCHEME INFORMATION

Scheme Aims and Organisation

The primary aim of the Animal Feeds Proficiency Testing Scheme (AFPS) is to enable laboratories performing the analysis of animal feeds to monitor their performance and compare it with that of their peers. AFPS also aims to provide information to participants on technical issues and methodologies relating to testing of animal feedstuffs.

The AFPS scheme year operates from January to December. Further information about AFPS, including test material availability, round despatch dates and reporting deadlines, are available on the current AFPS application form.

Test Materials

Details of test materials available in AFPS are given in the 'Samples Available' section. The test parameters are continually reviewed to ensure they meet the needs of current laboratory testing and regulatory requirements.

Test material batches are tested for homogeneity for at least one test parameter where deemed appropriate. Details of homogeneity tests performed and results are given in the AFPS Scheme Reports.

Some aspects of the scheme, such as test material production, homogeneity testing and stability assessment, can from time to time be subcontracted. When subcontracting occurs, it is placed with a competent subcontractor and LGC is responsible for this work. The planning of the scheme, the evaluation of performance and the authorisation of the final report will never be subcontracted.

Statistical Analysis

Information on the statistics used in AFPS can be found in the General Protocol and in the Scheme Report. Methods for determining assigned values and the values for SDPA used for individual samples are given in the 'Samples Available' section.

Methods

Methods are listed PORTAL. Please select the most appropriate method from the list. If none of the methods are appropriate, then please report your method as 'Other' and record a brief description in the Comments Section in PORTAL.

Results and Reports

AFPS results are returned through our electronic reporting software, PORTAL, full instructions for which are provided by email.

AFPS reports will be available on the website within 10 working days of round closure. Participants will be emailed a link to the report when it is available.

DESCRIPTION OF ABBREVIATIONS USED

Assigned Value (AV)

The assigned value may be derived in the following ways:

- From the robust mean (median) of participant results (RMean). This is the median of participant results after the removal of test results that are inappropriate for statistical evaluation, e.g. miscalculations, transpositions and other gross errors. Generally, the assigned value will be set using results from all methods, unless the measurement is considered method-dependant, in which case the assigned value will be set by method and indicated in the report tables. For some analytes, where there is a recognised reference method for that type of measurement, this may be used as the assigned value for a particular analyte i.e. it would be applied to results obtained by any method.

  Traceability: Assigned values which are derived from the participant results, or a sub-set of the results are not traceable to an international measurement standard. The uncertainty of assigned values derived in this way is estimated from the participant results, according to ISO 13528.

- From a formulation value (Form). This denotes the use of an assigned value derived from sample preparation details, where known and exact quantities of analyte have been used to prepare the sample.

  Traceability: Assigned values calculated from the formulation of the test sample are traceable, via an unbroken metrological traceability chain, to an international measurement standard. The measurement uncertainty of the assigned value is calculated using the contributions from each calibration in the traceability chain.

- From a qualitative formulation (Qual Form). This applies to qualitative tests where the assigned value is simply based on the presence/absence of the analyte in the test material.

  Traceability: Assigned values calculated from the qualitative formulation of the test sample are traceable to a certified reference standard or a microbiological reference strain.

- From expert labs (Expert). The assigned value for the analyte is provided by an 'expert' laboratory.

  Traceability: Assigned values provided by an 'expert' laboratory may be traceable to an international measurement standard, according to the laboratory and the method used. The uncertainty of measurement for an assigned value produced in this way will be provided by the laboratory undertaking the analysis. Details of traceability and the associated uncertainty will be provided in the report for the scheme/round.

Range

This indicates the concentration range at which the analyte may be present in the test material.

SDPA

The SDPA represents the 'standard deviation for proficiency assessment' which is used to assess participant performance for the measurement of each analyte. This may be a fixed value (as stated), a percentage (%) of the assigned value or based on the robust standard deviation of the participant measurement results, either across all methods or by method depending on whether the measurement made is method dependent (see assigned value).

Units

This indicates the units used for the assessment of data and in which participants should report their results. For some analytes in some schemes participants may have a choice of which units to report their results, however, the units stipulated in this scheme description are the default units to which any results reported using allowable alternative results will be converted to.

DP

This indicates the number of decimal places to which participants should report their measurement results.

SAMPLES AVAILABLE

CHEMISTRY

Sample PT-AF-01 **Nutritional analysis in animal feed**
Supplied as: 125g sample of animal feed

Analyte	Method	AV	Range	SDPA	Units	DP
Moisture	Oven drying, Vacuum oven	RMean	All	0.5	%	2
Crude protein	Dumas, Kjeldahl	RMean	All	5% of AV	%	2
Crude fat	Direct extraction	RMean	All	10% of AV	%	2
	Acid hydrolysis	RMean	All	10% of AV	%	2
Crude ash	AOAC 942-05, EC 152/2009	RMean	All	5% of AV	%	2
Ash insoluble in hydrochloric acid	EC 152/2009	RMean	All	20% of AV	%	3
Sugars	EC 152/2009	RMean	All	20% of AV	%	3
Crude fibre	EC 152/2009, Fibre analyser (e.g. Fiibretec), Gafta method10:0, ISO 6865	RMean	All	10% of AV	%	3
Starch	Enzymetric, Polarimetric	RMean	All	10% of AV	%	2
ADF	ISO 13906, AOAC973.18	RMean	All	10% of AV	%	2
NDF	ISO 16472, AOAC 2002.04	RMean	All	10% of AV	%	2
PPD (Pepsin protein digestibility)	AOAC 971.09, ISO 6655	RMean	All	10% of AV	% of total protein	2
pH	pH meter	RMean	All	0.10	-	2
Calorific value	Bomb calorimeter, Calorimeter	RMean	All	Robust SD	kilocalories per kg	0

Sample PT-AF-02 **Minerals and elements in animal feed**
Supplied as: 125g sample of animal feed

Analyte	Method	AV	Range	SDPA	Units	DP
Arsenic	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	20%	mg/kg	3
Cadmium	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	mg/kg	3
Calcium	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	g/kg	2
Chloride	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	5%	g/kg	2
Chromium	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	20%	mg/kg	2
Cobalt	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	20%	mg/kg	3
Copper	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	mg/kg	2
Iron	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	mg/kg	1

Analyte	Method	AV	Range	SDPA	Units	DP
Lead	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	20%	mg/kg	3
Magnesium	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	g/kg	2
Manganese	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	mg/kg	1
Mercury	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	20%	mg/kg	3
Phosphorus	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	g/kg	2
Potassium	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	g/kg	2
Selenium	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	20%	mg/kg	3
Sodium	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	g/kg	2
Zinc	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	mg/kg	1

Sample PT-AF-05* **Mycotoxins in animal feed**
Supplied as: 125g sample of animal feed

Analyte	Method	AV	Range	SDPA	Units	DP
Aflatoxin B_1	HPLC, LC-MS, LC-MS/MS, ELISA	RMean	All	Robust SD	µg/kg	2
Aflatoxin B_2	HPLC, LC-MS, LC-MS/MS, ELISA	RMean	All	Robust SD	µg/kg	2
Aflatoxin G_1	HPLC, LC-MS, LC-MS/MS, ELISA	RMean	All	Robust SD	µg/kg	2
Aflatoxin G_2	HPLC, LC-MS, LC-MS/MS, ELISA	RMean	All	Robust SD	µg/kg	2
Total Aflatoxins	HPLC, LC-MS, LC-MS/MS, ELISA	RMean	All	Robust SD	µg/kg	2
Ochratoxin A	HPLC, LC-MS, LC-MS/MS, ELISA	RMean	All	Robust SD	µg/kg	2

*Please note that these samples are not currently within the scope of LGC's UKAS accreditation.

Sample PT-AF-08* **Minerals and trace elements in premix materials**
Supplied as: 125g sample of premix

Analyte	Method	AV	Range	SDPA	Units	DP
Arsenic	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	20%	mg/kg	2
Cadmium	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	mg/kg	2
Calcium	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	g/kg	2
Chloride	AAS, Colorimetry, ICP-	RMean	All	5%	g/kg	2

Analyte	Method	AV	Range	SDPA	Units	DP
	OES, ICP-MS					
Chromium	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	20%	mg/kg	2
Cobalt	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	20%	mg/kg	2
Copper	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	mg/kg	2
Iron	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	mg/kg	1
Lead	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	20%	mg/kg	2
Magnesium	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	g/kg	2
Manganese	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	mg/kg	1
Mercury	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	20%	mg/kg	2
Phosphorus	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	g/kg	2
Potassium	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	g/kg	2
Selenium	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	20%	mg/kg	2
Sodium	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	g/kg	2
Zinc	AAS, Colorimetry, ICP-OES, ICP-MS	RMean	All	10%	mg/kg	1

*Please note that these samples are not currently within the scope of LGC's UKAS accreditation.

Sample PT-AF-09* **Nutritional analysis of wet pet food**
Supplied as: 125g sample of wet pet food

Analyte	Method	AV	Range	SDPA	Units	DP
Moisture	Oven drying, Vacuum oven	RMean	All	5	%	2
Crude protein	Dumas, Kjeldahl	RMean	All	5%	%	2
Crude fat	Direct extraction, Acid hydrolysis	RMean	All	10%	%	2
Crude ash	Various	RMean	All	5%	%	2
Ash insoluble in hydrochloric acid	Various	RMean	All	20%	%	2
Sugars	Various	RMean	All	20%	%	2
Crude fibre	Various	RMean	All	10%	%	3
Starch	Enzymatic, Polarimetric	RMean	All	10%	%	2
pH	pH meter	RMean	All	0.10	-	2

*Please note that these samples are not currently within the scope of LGC's UKAS accreditation.

Sample PT-AF-13* **Nutritional analysis of fish feed samples**
Supplied as: 125g sample of fish feed

Analyte	Method	AV	Range	SDPA	Units	DP
Energy	Calculation	RMean	All	Robust SD	kJ/100g or kcal/100g	2
Moisture	Oven drying, Vacuum oven	RMean	All	Robust SD	%	2
Crude protein	Dumas, Kjeldahl	RMean	All	Robust SD	%	2
Crude fat	Direct extraction, Acid hydrolysis and extraction	RMean	All	Robust SD	%	2
Crude ash	Drying at 500°C Drying at 525°C Drying at 550°C	RMean	All	Robust SD	%	2
Crude fibre	Various	RMean	All	Robust SD	%	3
pH	pH meter	RMean	All	0.10	-	2

*Please note that these samples are not currently within the scope of LGC's UKAS accreditation.

Sample PT-AF-18* **Anti-oxidants in copra oil**
Supplied as: 50g of copra oil

Analyte	Method	AV	Range	SDPA	Units	DP
Peroxide value	Titration	RMean	All	Robust SD	mEq O2 /kg sample	2
Butylated hydroxyanisole (BHA)	GC-MS	RMean	All	Robust SD	µg/g	2
Butylated hydroxytoluene (BHT)	GC-MS	RMean	All	Robust SD	µg/g	2

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MICROBIOLOGY

Sample PT-AF-06 (A&B) **Salmonella presence/absence**
Supplied as: 06AF- 2 x 10ml vial plus minimum 50g of simulated animal feed matrix
06KB- 2 x 10ml vial plus minimum 50g dried petfood/kibble matrix

Analyte	Method	AV	Range cfu/g	SDPA	Reporting units	DP
Detection of *Salmonella* species	ALL	Qual Form	0 to 1,000	N/A	Detected/Not Detected 25g	N/A

Sample PT-AF-07 **Microbiological quality indicators and probiotics**
Supplied as: 07AF -10g sample of simulated animal feed
07KB -10g dried petfood/kibble + 10ml vial

Analyte	Method	AV	Range cfu/g	SDPA	Reporting units	DP
Total viable count	ALL	RMean	0 to 100,000	$\log_{10}$ 0.35	cfu/g	0
Enumeration of Enterobacteriaceae	ALL	RMean	0 to 100,000	$\log_{10}$ 0.35	cfu/g	0
Enumeration of coliforms	ALL	RMean	0 to 100,000	$\log_{10}$ 0.35	cfu/g	0
Enumeration of *Escherichia coli*	ALL	RMean	0 to 100,000	$\log_{10}$ 0.35	cfu/g	0
Enumeration of lactic acid bacteria	ALL	RMean	0 to 100,000	$\log_{10}$ 0.35	cfu/g	0

Sample PT-AF-10 **Clostridium perfringens/species**
Supplied as: 1 x 10g sample of simulated animal feed

Analyte	Method	AV	Range cfu/g	SDPA	Reporting units	DP
Total anaerobic count	ALL	RMean	0 to 100,000	$\log_{10}$ 0.35	cfu/g	0
Enumeration of sulphite-reducing Clostridia	ALL	RMean	0 to 100,000	$\log_{10}$ 0.35	cfu/g	0
Enumeration of *Clostridium perfringens*	ALL	RMean	0 to 100,000	$\log_{10}$ 0.35	cfu/g	0
Enumeration of *Clostridium* species	ALL	RMean	0 to 100,000	$\log_{10}$ 0.35	cfu/g	0

Sample PT-AF-11 **Listeria monocytogenes/species**
Supplied as: 1 x 25g sample of simulated animal feed

Analyte	Method	AV	Range cfu/g	SDPA	Reporting units	DP
Detection of *Listeria* species	ALL	Qual Form	0 to 1000	NA	Detected/Not Detected 25g	NA
Detection of *L.monocytogenes*	ALL	Qual Form	0 to 1000	NA	Detected/Not Detected 25g	NA

Sample PT-AF-15 **Microbiological Contaminants**
Supplied as: 1 x 10g sample of simulated animal feed

Analyte	Method	AV	Range cfu/g	SDPA	Reporting units	DP
Enumeration of coagulase positive Staphylococci	ALL	RMean	0 to 100,000	$\log_{10}$ 0.35	cfu/g	0
Enumeration of *Bacillus cereus*	ALL	RMean	0 to 100,000	$\log_{10}$ 0.35	cfu/g	0
Enumeration of yeast; mould; yeast and mould	ALL	RMean	0 to 100,000	$\log_{10}$ 0.35	cfu/g	0