QMAS

Quality in Meat and Fish Analysis Scheme

Scheme Description

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Record of issue status and modifications

ISSUE	ISSUE DATE	DETAILS	AUTHORISED BY
2	01/09/08	Updated with UKAS logo for single scope (0001) and removed reference to scheme year. Additional sample types included.	T.Noblett
3	03/07/09	Operational issues common to all schemes moved into General Protocol. List of abbreviations added. New PORTAL system added. Trial samples added.	M. Whetton
4	Sept 10	Units updated for phosphate. General update of document format. Dietary fibre and total sugar added to 731	M. Whetton
5	23/03/11	Change of Address to Page 1	N.Stephenson
6	Aug 11	Updated to include new analytes for 2012 Updated to include sample 743 Name of scheme updated	M. Whetton R. Lathall N. Stephenson
7	July 2012	Added new samples 744 and 745 for micro	A.S.Eden
8	Sept 2012	Updated to include new analytes in 730 and 731 and new samples 747 and 748 Updated to include new sample 746	M. Whetton T. Noblett
9	Dec 2012	Updated to include new analytes in sample 745.	T. Noblett
10	Mar 2013	Updated to include new samples 749 & 750.	M. Whetton
11	July 2013	Updated to include new sample 751 for fish speciation.	M. Whetton
12	Sept 2013	pH added to sample 734. Information for 749, 751 & 752 updated. Included microbiological method codes	W.Gaunt S. Frisicaro
13	Sept 2014	Removal of *Vibrio cholerae* parameter from 745. New analytes added to 741, 742 & 747. Inclusion of traceability information in Appendix A. Inclusion of subcontracting information in 'Test Materials' section. Minor standardisation amendments, e.g. logo and email addresses.	S.Frisicaro W. Gaunt
14	Sept 2015	Added new trial sample Aeromonas species in fish (753). Updated test methods for all microbiology samples. Removed 751, revised sample 752 Removed Hard copy report information	A.Cheetham W. Gaunt A.McCarthy
15	Mar 2016	Clarification of units for sample 732. Updated to include Samples 754 and 755.	W. Gaunt S. Xystouris
16	Sept 2016	Removal of Aeromonas trial sample 753 from scheme. Proximates reorganised and general update of appendices	A.Cheetham W. Gaunt S. Xystouris

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

Scheme Aims and Organisation
The primary aim of the Quality in Meat and Fish Analysis Scheme (QMAS) is to enable laboratories performing the analysis of meat and fish products to monitor their performance and compare it with that of their peers. QMAS also aims to provide information to participants on technical issues and methodologies relating to the chemical and microbiological examination of meat and fish.

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

Test Materials
Details of test materials available in QMAS are given in Appendix A. 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 QMAS 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 QMAS 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 Appendix A

Methods
Methods are listed in Appendix A and 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.

Abbreviations for microbiological method codes can be found in Appendix A. The time and temperature of incubation does not need to be reported.

Results and Reports
QMAS results are returned through our electronic reporting software, PORTAL, full instructions for which are provided by email. However, participants may request result submission forms on which to report and return results if they are unable to report through electronic means. This will incur an additional charge.

QMAS 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.

APPENDIX A - 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 as illustrated 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 (Formulation). 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. These are the units 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.

Chemistry samples

Sample 730 **Chemical analysis of meat and meat based products**
Supplied as: 150g of dried/cured meat test material

Analyte	Method	Range	AV	SDPA	Units	DP
Energy	All	All	Median	Robust SD	Kcal or kJ/100g	0
Fat	All	All	Median	4% of AV	%	2
Carbohydrate	All	All	Median	Robust SD	%	2
Total sugars	All	All	Median	2.00%	%	2
Dietary fibre	All	All	Median	0.50%	%	2
Protein	All	All	Median	2% of AV	%	2
Salt	All	All	Median	5% of AV (min 0.15%)	%	2
Ash	All	All	Median	0.10%	%	2
Moisture	All	All	Median	0.40%	%	2
Sodium	All	All	Median	0.10%	%	2
Phosphate	All	All	Median	Robust SD	$\%PO_4$	2
pH	All	All	Median	0.10	pH units	2

Sample 731 **Chemical analysis of meat and meat based products**
Supplied as: 150g of precooked, raw or processed meat test material

Analyte	Method	Range	AV	SDPA	Units	DP
Energy	All	All	Median	Robust SD	Kcal or kJ/100g	0
Fat	All	All	Median	4% of AV	%	2
Carbohydrate	All	All	Median	Robust SD	%	2
Total sugars	All	All	Median	2.00%	%	2
Dietary fibre	All	All	Median	0.50%	%	2
Protein	All	All	Median	2% of AV	%	2
Salt	All	All	Median	5% of AV (min 0.15%)	%	2
Ash	All	All	Median	0.10%	%	2
Moisture	All	All	Median	0.40%	%	2
Sodium	All	All	Median	0.10%	%	2
Phosphate	All	All	Median	Robust SD	$\%PO_4$	2
pH	All	All	Median	0.10	pH units	2
Calcium	All	All	Median	Robust SD	mg/100g	2
Potassium	All	All	Median	Robust SD	mg/100g	2

Sample 732   **Nitrate and nitrite analysis of meat and meat based products**
Supplied as: 30g of lyophilised meat

Analyte	Method	Range	AV	SDPA	Units	DP
Nitrate	All	0 to 60ppm >60ppm	Median	15ppm 25% AV	mg/kg (as $NaNO_3$)	1
Nitrite	All	0-20ppm >20ppm	Median	5ppm 25% AV	mg/kg (as $NaNO_2$)	1

Sample 733   **Chemical analysis of meat and meat based products**
Supplied as: 150g of meat test material

Analyte	Method	Range	AV	SDPA	Units	DP
Hydroxyproline	All	All	Median	0.025%	%	2
Total fat	All	All	Median	4% of AV (min 0.15)	g/100g*	2
Saturates	All	All	Median	20% of AV	g/100g*	2
Mono-unsaturates	All	All	Median	20% of AV	g/100g*	2
Poly-unsaturates	All	All	Median	20% of AV	g/100g*	2
Total trans fatty acids	All	All	Median	Robust SD	g/100g*	2

*All results must to be reported as the concentration determined in test material provided.

Sample 734   **Chemical analysis of fish and fish based products**
Supplied as: 150g of fish test material

Analyte	Method	Range	AV	SDPA	Units	DP
Fat	All	All	Median	4% of AV (min 0.15%)	%	2
Protein	All	All	Median	2% of AV (min 0.10%)	%	2
Salt	All	All	Median	5% of AV (min 0.15%)	%	2
Ash	All	All	Median	0.20%	%	2
Moisture	All	All	Median	0.40%	%	2
pH	All	All	Median	0.10	pH units	2

Sample 741   **Elements analysis in shellfish**
Supplied as: 150g of shellfish test material

Analyte	Method	Range	AV	SDPA	Units	DP
Total Arsenic	All	All	Median	10% AV	mg/kg	2
Cadmium	All	All	Median	10% AV	mg/kg	2

Mercury	All	All	Median	10% AV	mg/kg	2
Lead	All	All	Median	10% AV	mg/kg	2
Phosphorus	All	All	Median	Robust SD	mg/kg (PO$_4$)	2
Zinc	All	All	Median	Robust SD	mg/kg	2

Sample 742   **Elements analysis in fish and fish based products**
Supplied as: 150g of fish test material

Analyte	Method	Range	AV	SDPA	Units	DP
Total Arsenic	All	All	Median	10% AV	mg/kg	2
Cadmium	All	All	Median	10% AV	mg/kg	2
Mercury	All	All	Median	10% AV	mg/kg	2
Lead	All	All	Median	10% AV	mg/kg	2
Phosphorus	All	All	Median	Robust SD	mg/kg (PO$_4$)	2
Zinc	All	All	Median	Robust SD	mg/kg	2

Sample 747*   **Elements analysis in meat**
Supplied as: 150g of meat based test material

Analyte	Method	Range	AV	SDPA	Units	DP
Total Arsenic	All	All	Median	10% AV	mg/kg	2
Cadmium	All	All	Median	10% AV	mg/kg	2
Mercury	All	All	Median	10% AV	mg/kg	2
Lead	All	All	Median	10% AV	mg/kg	2
Zinc	All	All	Median	Robust SD	mg/kg	2

Sample 748*   **Quality parameters in fish**
Supplied as: 150g of fish based test material

Analyte	Method	Range	AV	SDPA	Units	DP
Histamine	All	All	Median	Robust SD	mg/kg	2
Total volatile nitrogen (TVN)	All	All	Median	Robust SD	mg/100g	2
Trimethylamine (TMA)	All	All	Median	Robust SD	mg/100g	2

Sample 749* **Meat authenticity**
Supplied as: 2 x set of 6 samples (2g each) - various concentrations

Analyte	Method	Range	AV	SDPA	Units	DP
Presence/Absence	PCR & ELISA	0-100%	Formulation	N/A	-	-
Quantification (% to 2 decimal places)	PCR & ELISA	0-100%	Median	Robust SD	%	2

Sample 752* **Fish identification**
Supplied as: 4 x 20g samples

Analyte	Method	Range	AV	SDPA	Units	DP
Fish species identification	PCR & ELISA	-	Formulation	N/A	-	-

Sample 754* **Chloramphenicol in seafood**
Supplied as: 50g prawn material

Analyte	Method	Range	AV	SDPA	Units	DP
Chloramphenicol	All	All	Median	Robust SD	µg/kg	2

Sample 755* **Ractopamine (β-agonist) in meat**
Supplied as: 100g beef material

Analyte	Method	Range	AV	SDPA	Units	DP
Ractopamine	All	All	Median	Robust SD	µg/kg	2

*currently not included in LGC's UKAS Scope of Accreditation

Microbiological samples
Sample 735   **Indicator organisms in meat and meat-based products**
Supplied as: 10g of lyophilised meat

Analyte	Method	Range	AV	SDPA	Units	DP
Total aerobic mesophilic count	Plate count agar Milk plate count agar Impedance TEMPO Petrifilm	0 to 100,000	RMean	$\log_{10}$ 0.35	cfu g^{-1}	0
Enumeration of Enterobacteriaceae	VRBGA Petrifilm MPN TEMPO	0 to 100,000	RMean	$\log_{10}$ 0.35	cfu g^{-1}	0
Enumeration of Coliforms	VRBA Petrifilm MPN COLI ID Chromogenic agar	0 to 100,000	RMean	$\log_{10}$ 0.35	cfu g^{-1}	0
Enumeration of *Escherichia coli*	TBX COLI ID VRBA Petrifilm Chromogenic agar MPN	0 to 100,000	RMean	$\log_{10}$ 0.35	cfu g^{-1}	0

Sample 736   **Presence/absence of Salmonella in meat and meat-based products**
Supplied as: 25g of lyophilised meat

Analyte	Method	Range	AV	SDPA	Units	DP
Detection of *Salmonella* species	Enrichment/culture VIDAS PCR ELISA TECRA Rapid test (various) Chromogenic agar	0 to 1000	Qual Form	N/A	cfu $25g^{-1}$	N/A

Sample 737   **Presence/absence of Listeria in meat and meat-based products**
Supplied as: 25g of lyophilised meat

Analyte	Method	Range	AV	SDPA	Units	DP
Detection of *Listeria* species	Enrichment/culture	0 to 1000	Qual Form	N/A	cfu 25g^{-1}	N/A
Detection of *Listeria monocytogenes*						

Sample 738   **Clostridium and staphylococci in meat and meat-based products**
Supplied as: 10g of lyophilised meat

Analyte	Method	Range	AV	SDPA	Units	DP
Enumeration of *Clostridium perfringens*	TSC agar OPSP agar IS agar	0 to 100,000	RMean	log$_{10}$ 0.35	cfu g^{-1}	0
Enumeration of Sulphite-reducing Clostridia	IS agar TSC agar OPSP agar	0 to 100,000	RMean	log$_{10}$ 0.35	cfu g^{-1}	0
Enumeration of Coagulase positive staphylococci	BP agar BP & RPF agar Petrifilm RAPID staph.	0 to 100,000	RMean	log$_{10}$ 0.35	cfu g^{-1}	0

Sample 739   **Indicator organisms in fish and fish-based products**
Supplied as: 10g of lyophilised fish or shellfish material plus vial

Analyte	Method	Range	AV	SDPA	Units	DP
Total aerobic mesophilic count	Plate count agar Petrifilm Impedance TEMPO	0 to 1000	RMean	$\log_{10}$ 0.35	cfu g^{-1}	0
Enumeration of Enterobacteriaceae	VRBGA Petrifilm MPN TEMPO	0 to 1000	RMean	$\log_{10}$ 0.35	cfu g^{-1}	0
Enumeration of *Escherichia coli*	TBX COLI ID Petrifilm Chromogenic agar	0 to 100	RMean	$\log_{10}$ 0.35	cfu g^{-1}	0
Enumeration of Coagulase positive staphylococci	BP agar BP & RPF agar Petrifilm Rapid Staph.	0 to 1000	RMean	$\log_{10}$ 0.35	cfu g^{-1}	0

Sample 740   **Presence/absence of Salmonella in fish and shellfish products**
Supplied as: 25g of lyophilised fish or shellfish material plus vial

Analyte	Method	Range	AV	SDPA	Units	DP
Detection of *Salmonella* species	Enrichment/culture VIDAS PCR ELISA TECRA	0 to 1000	Qual Form	N/A	cfu 25g^{-1}	N/A

Sample 743   **Presence/absence of Campylobacter in meat and meat-based products**
Supplied as: 25g of lyophilised meat plus vial

Analyte	Method	Range	AV	SDPA	Units	DP
Detection of *Campylobacter* species	Enrichment/culture PCR	0 to 1000	Qual Form	N/A	cfu 25g^{-1}	N/A

Sample 744   **Presence/absence of E.coli O157 in meat and meat-based products**
Supplied as: 25g of lyophilised meat plus vial

Analyte	Method	Range	AV	SDPA	Units	DP
Detection of *E.coli* O157	Enrichment/culture PCR VIDAS ELISA REVEAL	0 to 1,000	Qual Form	N/A	cfu 25g^{-1}	N/A

Sample 745   **Presence/absence of Vibrio in fish and shellfish products**
Supplied as: 25g of lyophilised fish or shellfish material plus vial

Analyte	Method	Range	AV	SDPA	Units	DP
Detection of *Vibrio* species	Enrichment/culture	0 to 1000	Qual Form	N/A	cfu 25g^{-1}	N/A
Detection of *Vibrio parahaemolyticus*	Enrichment/culture	0 to 1000	Qual Form	N/A	cfu 25g^{-1}	N/A

Sample 746   **Spoilage organisms in meat and meat-based products**
Supplied as: 10g of lyophilised meat

Analyte	Method	Range	AV	SDPA	Units	DP
Enumeration of *Pseudomonas*	CN agar CFC agar	0 to 100,000	RMean	$\log_{10}$ 0.35	cfu g^{-1}	0
Enumeration of Lactic acid bacteria	MRS agar Petrifilm Rogosa agar	0 to 100,000	RMean	$\log_{10}$ 0.35	cfu g^{-1}	0
Enumeration of Yeast Enumeration of Mould	DG18 agar DRBC agar RB agar YGC agar OGYE MEA Petrifilm	0 to 100,000	RMean	$\log_{10}$ 0.35	cfu g^{-1}	0

ABBREVIATIONS FOR MICROBIOLOGICAL METHOD CODES

BP = Baird parker
CFC = cetrimide, fucidin, cephalosporin agar
CN = cetrimide, nalidixic acid agar
DG18 = Dichloran 18% glycerol
DRBC = Dichloran rose bengal chloramphenicol
IS = Iron sulphite
MPN = Most probable number
PCR = Polymerase chain reaction
OPSP=Oleandomycin Polymixin Sulphadiazine Perfringens

RB = Rose bengal
RPF = Rabbit plasma fibrinogen
TBX = Tryptone bile x-glucuronide
TSC = Tryptone sulphite cycloserine
VRBA = Violet red bile
VRBGA = Violet red glucose
YGC = Yeast glucose chloramphenicol
OGYE= Oxytetracycline glucose yeast extract
MEA=Malt Extract Agar

All analytes will also have 'OTHER' as a method choice in case your method is not listed