



# QMAS

**Quality in Meat and Fish Analysis Scheme**

## **Scheme Description**

### **LGC**

#### **Proficiency Testing**

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Record of issue status and modifications

ISSUE	ISSUE DATE	DETAILS	AUTHORISED BY
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. Friscaro
13	Sept 2014	Removal of <i>Vibrio cholerae</i> 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.Friscaro 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
17	Sept 2017	Added two new multi-analyte microbiology samples 756 and 757, (each sample is a set of two), to go out four times per year Increase number of rounds for samples 735, 736, 737, 738, 746 to four times per year Add total anaerobic mesophilic count as analyte to sample 738 Change enumeration of sulphite-reducing clostridia to enumeration of sulphite-reducing bacteria in sample 738	T.Noblett
18	June 2018	Addition of Cholesterol and Saturated fat to sample 730 Addition of Cholesterol, saturated fat, iron and magnesium to sample 731 Method update for various micro samples	W. Gaunt
19	Aug 2018	SDPA values updated (chemistry). Updated method details to 'ALL' for microbiology samples and amended Methods paragraph. Listeria ID added to sample 737. Sample 758 Psychrotrophs added Sample 759 Listeria species enumeration added	W. Gaunt S. Xystouris A.Cheetham
20	Aug 2019	New samples 728 and 729 added, sample size reduced for 741, 742 & 747. Ranges adjusted for 732. Changed matrix quantity in samples 756 and 757 to minimum quantity rather than pre-weighed to exact amount.	W. Gaunt S. Xystouris T,Noblett
21	Oct 2019	Yeast and mould analyte added to sample 746	A.cheetham

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 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**

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 728\***

**Supplied as:**

**Nutritional analysis of fish product (e.g. breaded fish product)**

150g of fish

Analyte	Method	Range	AV	SDPA	Units	DP
Energy	All	All	Median	Robust SD	Kcal or KJ/100g	0
Fat	All	All	Median	Robust SD	%	2
Saturates	All	All	Median	Robust SD	%	2
Carbohydrate	All	All	Median	Robust SD	%	2
Dietary fibre	All	All	Median	Robust SD	%	2
Protein	All	All	Median	Robust SD	%	2
Salt	All	All	Median	Robust SD	%NaCl	2
Ash	All	All	Median	Robust SD	%	2
Moisture	All	All	Median	Robust SD	%	2

**Sample 729\***

**Supplied as:**

**Sulfur dioxide in meat and meat products**

50g meat/meat products

Analyte	Method	Range	AV	SDPA	Units	DP
Sulfur dioxide	HPLC, Spectrophotometry, Distillation (e.g. Monier Williams), IC	All	Median	Robust SD	mg/kg	0

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

**Sample 730**

**Supplied as:**

**Chemical analysis of meat and meat products**

150g of dried/cured meat

Analyte	Method	Range	AV	SDPA	Units	DP
Energy	All	All	Median	4% of AV	Kcal or KJ/100g	0
Total fat	All	All	Median	4% of AV (min 0.1%)	%	2
Saturates**	All	All	Median	Robust SD	%	2
Cholesterol**	All	All	Median	Robust SD	%	2
Carbohydrate	All	All	Median	Robust SD	%	2
Total sugars	All	All	Median	0.50%	%	2
Dietary fibre	All	All	Median	0.50%	%	2

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Analyte	Method	Range	AV	SDPA	Units	DP
Protein	All	All	Median	3% of AV (min 0.20%)	%	2
Salt	All	All	Median	6% of AV (min 0.15%)	%NaCl	2
Ash	All	All	Median	2% of AV (min 0.05%)	%	2
Moisture	All	All	Median	0.40%	%	2
Sodium	All	All	Median	0.10%	%	2
Phosphate	All	All	Median	0.10%	%PO <sub>4</sub>	2
pH	All	All	Median	0.10	pH units	2

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

**Sample 731**  
**Supplied as:**

**Chemical analysis of meat and meat products**  
 150g of precooked, raw or processed meat

Analyte	Method	Range	AV	SDPA	Units	DP
Energy	All	All	Median	3% of AV	Kcal or KJ/100g	0
Total fat	All	All	Median	4% of AV (min 0.1%)	%	2
Saturates**	All	All	Median	Robust SD	%	2
Cholesterol**	All	All	Median	Robust SD	%	2
Carbohydrate	All	All	Median	Robust SD	%	2
Total sugars	All	All	Median	0.50%	%	2
Dietary fibre	All	All	Median	0.50%	%	2
Protein	All	All	Median	3% of AV (min 0.20%)	%	2
Salt	All	All	Median	6% of AV (min 0.15%)	%NaCl	2
Ash	All	All	Median	2% of AV (min 0.05%)	%	2
Moisture	All	All	Median	0.40%	%	2
Sodium	All	All	Median	0.10%	%	2
Phosphate	All	All	Median	0.10%	%PO <sub>4</sub>	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
Iron	All	All	Median	Robust SD	mg/100g	2
Magnesium	All	All	Median	Robust SD	mg/100g	2

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

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**Sample 732**  
**Supplied as:**

**Nitrate and nitrite analysis of meat and meat products**  
 30g of freeze dried meat

Analyte	Method	Range	AV	SDPA	Units	DP
Nitrate	All	20–500 mg/kg	Median	0 to 60ppm: 15ppm >60ppm: 25% AV	mg/kg (as NaNO <sub>3</sub> )	1
Nitrite	All	1-100 mg/kg	Median	0-20ppm: 5ppm >20ppm 25% AV	mg/kg (as NaNO <sub>2</sub> )	1

**Sample 733**  
**Supplied as:**

**Chemical analysis of meat and meat products**  
 150g of meat

Analyte	Method	Range	AV	SDPA	Units	DP
Hydroxyproline	All	All	Median	0.05%	%	2
Starch	All	All	Median	Robust SD	%	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**  
**Supplied as:**

**Chemical analysis of fish (fresh or processed)**  
 150g of fish

Analyte	Method	Range	AV	SDPA	Units	DP
Fat	All	All	Median	0.25%	%	2
Protein	All	All	Median	3% of AV (min 0.20%)	%	2
Salt	All	All	Median	0.15%	%	2
Ash	All	All	Median	0.10%	%	2
Moisture	All	All	Median	0.40%	%	2
pH	All	All	Median	0.10	pH units	2



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**Sample 741**  
**Supplied as:**

**Elements in seafood (other than fish)**  
 50g of seafood

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	10% AV	mg/kg (PO <sub>4</sub> )	2
Zinc	All	All	Median	10% AV	mg/kg	2

**Sample 742**  
**Supplied as:**

**Elements in fish (fresh or processed)**  
 50g of fish

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	10% AV	mg/kg (PO <sub>4</sub> )	2
Zinc	All	All	Median	10% AV	mg/kg	2

**Sample 747\***  
**Supplied as:**

**Elements in meat**  
 50g of processed meat

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

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**Sample 748\***  
**Supplied as:**

**Quality parameters in fresh fish**  
 150g of fish

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\***  
**Supplied as:**

**Meat authenticity**  
 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\***  
**Supplied as:**

**Fish identification**  
 4 x 20g fish (fresh, cooked or processed product)

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

**Sample 754\***  
**Supplied as:**

**Chloramphenicol in seafood**  
 50g prawns

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

**Sample 755\***  
**Supplied as:**

**Ractopamine (β-agonist) in meat**  
 100g beef

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

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**Microbiological samples**

**Sample 735**

**Supplied as:**

**Indicator organisms in meat and meat based products**

10g of lyophilised meat

Analyte	Method	Range	AV	SDPA	Units	DP
Total aerobic mesophilic count	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0
Enumeration of Enterobacteriaceae	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0
Enumeration of Coliforms	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0
Enumeration of <i>Escherichia coli</i>	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0

**Sample 736**

**Supplied as:**

**Detection of Salmonella in meat and meat based products**

25g of lyophilised meat

Analyte	Method	Range	AV	SDPA	Units	DP
Detection of <i>Salmonella</i> species	All	0 to 1,000	Qual Form	N/A	cfu 25g <sup>-1</sup>	N/A

**Sample 737**

**Supplied as:**

**Detection of Listeria in meat and meat based products**

25g of lyophilised meat

Analyte	Method	Range	AV	SDPA	Units	DP
Detection of <i>Listeria</i> species	All	0 to 1,000	Qual Form	N/A	cfu 25g <sup>-1</sup>	N/A
Detection of <i>Listeria monocytogenes</i>						
Identification of <i>Listeria</i> species	All	0 to 1,000	Formulation	N/A	N/A	N/A

**Sample 738**

**Supplied as:**

**Clostridium and staphylococci in meat and meat based products**

10g of lyophilised meat

Analyte	Method	Range	AV	SDPA	Units	DP
Total anaerobic mesophilic count	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0
Enumeration of <i>Clostridium perfringens</i>	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0
Enumeration of sulphite-reducing bacteria	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0

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Analyte	Method	Range	AV	SDPA	Units	DP
Enumeration of coagulase positive staphylococci	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0

**Sample 739**

**Indicator organisms in fish and fish based products**

**Supplied as:**

1 x 10ml vial plus 10g of lyophilised fish or shellfish material

Analyte	Method	Range	AV	SDPA	Units	DP
Total aerobic mesophilic count	All	0 to 1,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0
Enumeration of Enterobacteriaceae	All	0 to 1,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0
Enumeration of <i>Escherichia coli</i>	All	0 to 1,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0
Enumeration of coagulase positive staphylococci	All	0 to 1,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0

**Sample 740**

**Detection of Salmonella in fish and shellfish products**

**Supplied as:**

1 x 10ml vial plus 25g of lyophilised fish or shellfish material

Analyte	Method	Range	AV	SDPA	Units	DP
Detection of <i>Salmonella</i> species	All	0 to 1,000	Qual Form	N/A	cfu 25g <sup>-1</sup>	N/A

**Sample 743**

**Detection of Campylobacter in meat and meat based products**

**Supplied as:**

1 x 10ml vial plus 25g of lyophilised meat

Analyte	Method	Range	AV	SDPA	Units	DP
Detection of <i>Campylobacter</i> species	All	0 to 1,000	Qual Form	N/A	cfu 25g <sup>-1</sup>	N/A

**Sample 744**

**Detection of E.coli O157 in meat and meat based products**

**Supplied as:**

1 x 10ml vial plus 25g of lyophilised meat

Analyte	Method	Range	AV	SDPA	Units	DP
Detection of <i>E.coli</i> O157	All	0 to 1,000	Qual Form	N/A	cfu 25g <sup>-1</sup>	N/A

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**Sample 745**  
**Supplied as:**

**Detection of *Vibrio* in fish and shellfish products**  
1 x 10ml vial plus 25g of lyophilised fish or shellfish material

Analyte	Method	Range	AV	SDPA	Units	DP
Detection of <i>Vibrio</i> species Detection of <i>Vibrio parahaemolyticus</i>	All	0 to 1,000	Qual Form	N/A	cfu 25g <sup>-1</sup>	N/A

**Sample 746**  
**Supplied as:**

**Spoilage organisms in meat and meat based products**  
10g of lyophilised meat

Analyte	Method	Range	AV	SDPA	Units	DP
Enumeration of <i>Pseudomonas</i> species	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0
Enumeration of lactic acid bacteria	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0
Enumeration of yeast Enumeration of mould Enumeration of yeast and mould	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0

**Sample 756 (A & B)**  
**Supplied as:**

**Quantitative Package**  
2 x 10ml vial plus minimum 20g meat powder matrix

Analyte	Method	Range	AV	SDPA	Units	DP
Total aerobic mesophilic count	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0
Enumeration of total coliforms	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0
Enumeration of Enterobacteriaceae	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0
Enumeration of <i>E. coli</i>	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0
Enumeration of <i>B.cereus</i>	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0
Enumeration of coagulase positive staphylococci	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0
Detection of coagulase positive staphylococci	All	0 to 100,000	Qual Form	N/A	cfu 10g <sup>-1</sup>	N/A
Enumeration of yeast Enumeration of mould Enumeration of yeast and mould	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0

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**Sample 757(A & B)**

**Supplied as:**

**Qualitative Package**

2 x 10ml vial plus minimum 200g meat powder matrix

Analyte	Method	Range	AV	SDPA	Units	DP
Detection of <i>E. coli</i> O157	All	0 to 1,000	Qual Form	N/A	cfu 25g <sup>-1</sup>	N/A
Detection of <i>Listeria</i> species Detection of <i>Listeria monocytogenes</i>	All	0 to 1,000	Qual Form	N/A	cfu 25g <sup>-1</sup>	N/A
Identification of <i>Listeria</i> species	All	0 to 1,000	Formulation	N/A	N/A	N/A
Detection of <i>Salmonella</i> species	All	0 to 1,000	Qual Form	N/A	cfu 25g <sup>-1</sup>	N/A

**Sample 758**

**Supplied as:**

**Psychrotrophs**

10g of lyophilised meat

Analyte	Method	Range	AV	SDPA	Units	DP
Enumeration of aerobic psychrotrophs	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0

**Sample 759**

**Supplied as:**

**Enumeration of *Listeria* species**

10g of lyophilised meat

Analyte	Method	Range	AV	SDPA	Units	DP
Enumeration of <i>Listeria</i> species Enumeration of <i>L.monocytogenes</i>	All	0 to 100,000	RMean	log <sub>10</sub> 0.35	cfu g <sup>-1</sup>	0