



QMS

Quality in Microbiology Scheme

Scheme Description

LGC Standards Proficiency Testing

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0001

QMS Scheme Description

Record of issue status and modifications

ISSUE	ISSUE DATE	DETAILS	AUTHORISED BY
2	15/08/08	General review and update of scheme description	M. Whetton
3	Aug 2009	Operational issues common to all schemes moved into General Protocol. List of abbreviations added. New analytes added: Shigella and combined yeast and mould. Changed name of <i>E.sakazakii</i> to <i>Cronobacter sakazakii</i>	T.Noblett
4	Aug 2010	Added trial for Bifidobacterium. Included samples for microbial analysis of tea/herbs/spices trialled in previous year.	T.Noblett
5	Jan 2011	Added qualitative test for Enterobacteriaceae and updated address	T.Noblett
6	Aug 2011	Sample 16 -removed qualitative test for Enterobacteriaceae and E.coli. Added Bifidobacterium sample trialled in 2011. Added Presence/absence sample for E.coli, Enterobacteriaceae and coliforms.	Karen Cliff
7	Sep 2012	Updated units and ranges. Added enumeration tests for sample 18F/D	T.Noblett
8	Mar 2013	Added trial for the enumeration of <i>Campylobacter</i> species (sample 32)	T.Noblett
9	Sept 2013	Included microbiological method codes	T.Noblett
10	Sept 2014	Added <i>Staphylococcus</i> species and <i>Bacillus</i> species enumeration to sample 17. Added CampyCount method to sample 32. Added <i>Lactobacillus</i> species to sample 27. Inclusion of traceability information in Appendix A. Inclusion of subcontracting information in 'Test Materials' section.	K.Cliff
11	Sept 2015	Included samples previously included in QMIS, i.e. identification test, Salmonella serology, paper exercise. Methods updated Removed Hard copy report information	K.Cliff A. McCarthy
12	Aug 2016	Updated details for Sample 35 regarding setting of assigned value by formulation	T.Noblett

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 Microbiology (QMS) is to enable laboratories performing the microbiological analysis of food and dairy products to monitor their performance and compare it with that of their peers. QMS also aims to provide information to participants on technical issues and methodologies relating to testing of food and dairy products.

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

Test Materials

Details of test materials available in QMS 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 QMS 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 QMS 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

QMS 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.

QMS 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 (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 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.

APPENDIX A**Sample 03****Salmonella enumeration****Supplied as:**

1 x 10g skimmed milk powder

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of <i>Salmonella</i> species	XLD agar BG agar Plate count agar MPN	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0

Sample 04**Cronobacter species****Supplied as:**

1 x 25g skimmed milk powder

Analyte	Method	AV	Range	SDPA	Units	DP
Detection of <i>Cronobacter</i> species	Enrichment/culture PCR	Qual Form	0 to 1000	NA	cfu 25g ⁻¹	NA

Sample 05**Osmophilic yeast and mould****Supplied as:**

1 x 10g skimmed milk powder or oatmeal

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of osmophilic yeast Enumeration of osmophilic mould	Dichloran 18 agar Rose Bengal agar	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0

Sample 06**Salmonella species (detection)****Supplied as:**

1 x 25g skimmed milk powder or oatmeal

Analyte	Method	AV	Range	SDPA	Units	DP
Detection of <i>Salmonella</i> species	Enrichment/culture PCR VIDAS ELISA TECRA	Qual Form	0 to 1000	NA	cfu 25g ⁻¹	NA

QMS Scheme Description

Sample 07
Supplied as:

Listeria species (detection)
 1 x 25g skimmed milk powder or oatmeal

Analyte	Method	AV	Range	SDPA	Units	DP
Detection of <i>Listeria</i> species Detection of <i>L.monocytogenes</i>	Enrichment/culture PCR RAPID L.MONO VIDAS ELISA	Qual Form	0 to 1000	NA	cfu 25g ⁻¹	NA

Sample 08
Supplied as:

Listeria species (enumeration)
 1 x 10g skimmed milk powder or oatmeal

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of <i>Listeria</i> species Enumeration of <i>L.monocytogenes</i>	Aloa agar Palcam agar	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0

Sample 09
Supplied as:

Enterococci
 1 x 10g skimmed milk powder or oatmeal

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of Enterococci	KF agar KAA agar Slanetz & Bartley agar	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0

Sample 10
Supplied as:

Clostridium species
 1 x 10g skimmed milk powder or oatmeal

Analyte	Method	AV	Range	SDPA	Units	DP
Detection of <i>Clostridium</i> species	Enrichment/culture RC agar PCR	Qual Form	0 to 100,000	NA	cfu 10g ⁻¹	NA
Enumeration of <i>C.perfringens</i>	TSC agar OPSP agar IS agar	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0

QMS Scheme Description

Sample 11
Supplied as:**Spore counts**
1 x 10g skimmed milk powder or oatmeal

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of mesophilic aerobic spores	Plate count agar 30C	RMean	0 to 100,000	log ₁₀ 0.50	cfu g ⁻¹	0
Enumeration of thermophilic aerobic spores	Plate count agar 55C	RMean	0 to 100,000	log ₁₀ 0.50	cfu g ⁻¹	0

Sample 12
Supplied as:**Shigella species**
1 x 25g oatmeal

Analyte	Method	AV	Range	SDPA	Units	DP
Detection of <i>Shigella</i> species	Enrichment/culture RAPID TEST	Qual Form	0 to 1000	NA	cfu 25g ⁻¹	NA

Sample 13
Supplied as:**Vibrio species**
1 x 25g oatmeal

Analyte	Method	AV	Range	SDPA	Units	DP
Detection of <i>Vibrio</i> species Detection of <i>V. parahaemolyticus</i>	Enrichment/culture RAPID TEST	Qual Form	0 to 1000	NA	cfu 25g ⁻¹	NA

Sample 14
Supplied as:**Yersinia species**
1 x 25g skimmed milk powder

Analyte	Method	AV	Range	SDPA	Units	DP
Detection of <i>Y. enterocolitica</i>	Enrichment/culture RAPID TEST	Qual Form	0 to 1000	NA	cfu 25g ⁻¹	NA

Sample 15
Supplied as:**Anaerobes**
1 x 10g skimmed milk powder or oatmeal

Analyte	Method	AV	Range	SDPA	Units	DP
Total anaerobic mesophilic count	Plate count agar RC agar	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0

QMS Scheme Description

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of anaerobic sulphite-reducing bacteria	IS agar TSC agar	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0
Enumeration of mesophilic anaerobic spores	Plate count agar RC agar	RMean	0 to 100,000	log ₁₀ 0.50	cfu g ⁻¹	0

Sample 16

TVC/indicator organisms

Supplied as:

1 x 10g skimmed milk powder or oatmeal

Analyte	Method	AV	Range	SDPA	Units	DP
Total aerobic mesophilic count	Plate count agar Milk plate count agar Petrifilm	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0
Enumeration of coliforms	VRBA Petrifilm COLI ID MPN	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0
Enumeration of Enterobacteriaceae	VRBGA Petrifilm MPN	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0
Enumeration of <i>E. coli</i>	TBX agar VRBA Petrifilm COLI ID MPN	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0

Sample 17

Staphylococcus/Bacillus species

Supplied as:

1 x 10g skimmed milk powder or oatmeal

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of <i>Staphylococcus</i> species Enumeration of coagulase positive staphylococci	Baird parker agar Petrifilm Rapid Staph	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0
Enumeration of <i>Bacillus</i> species Enumeration of <i>B.cereus</i>	MYP agar PEMBA agar COMPASS BC agar Bacillus cereus agar	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0

QMS Scheme Description

Sample 18
Supplied as:

Low-level indicator organisms
1 x 10g skimmed milk powder or oatmeal

Analyte	Method	AV	Range	SDPA	Units	DP
Detection of <i>E.coli</i>	Enrichment/culture RAPID TEST MPN Petrifilm	Qual Form	0 to 1000	NA	cfu 10g ⁻¹	NA
Detection of Enterobacteriaceae	Enrichment/culture Petrifilm MPN	Qual Form	0 to 1000	NA	cfu 10g ⁻¹	NA
Detection of coliforms	Enrichment/culture COLI ID MPN Petrifilm	Qual Form	0 to 1000	NA	cfu 10g ⁻¹	NA
Enumeration of <i>E.coli</i>	TBX agar VRBA Petrifilm COLI ID MPN	RMean	0 to 1000	log ₁₀ 0.35	cfu g ⁻¹	0
Enumeration of Enterobacteriaceae	VRBGA Petrifilm MPN	RMean	0 to 1000	log ₁₀ 0.35	cfu g ⁻¹	0
Enumeration of coliforms	VRBA Petrifilm COLI ID MPN	RMean	0 to 1000	log ₁₀ 0.35	cfu g ⁻¹	0

Sample 20
Supplied as:

Thermotolerant coliforms
1 x 10g skimmed milk powder or oatmeal

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of <i>E. coli</i> Enumeration of thermotolerant coliforms	VRBA 44	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0

Sample 21
Supplied as:**Detection of Campylobacter species**
1 x 10ml vial to represent 25g sample

Analyte	Method	AV	Range	SDPA	Units	DP
Detection of <i>Campylobacter</i> species	Enrichment/culture	Qual Form	0 to 1000	NA	cfu 25g ⁻¹	NA

Sample 22
Supplied as:**E.coli O157**
1 x 25g skimmed milk powder or oatmeal

Analyte	Method	AV	Range	SDPA	Units	DP
Detection of <i>E.coli</i> O157	Enrichment/culture IMS REVEAL PCR ELISA VIDAS	Qual Form	0 to 1000	NA	cfu 25g ⁻¹	NA

Sample 23
Supplied as:**Yeast and Mould**
1 x 10g skimmed milk powder or oatmeal

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of yeast Enumeration of mould Enumeration of yeast and mould	OGYE agar Dichloran 18 agar Malt extract agar Rose Bengal agar DRBC agar YGC agar Petrifilm	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0

Sample 24
Supplied as:**Lactic acid bacteria**
1 x 10g skimmed milk powder or oatmeal

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of lactic acid bacteria	MRS agar AM agar Rogosa agar Petrifilm	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0

QMS Scheme Description

Sample 25
Supplied as: **Psychrotrophs**
1 x 10g oatmeal

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of aerobic psychrotrophs	Plate count agar 21 C Plate count agar 6.5 C	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0

Sample 26
Supplied as: **Pseudomonas species**
1 x 10g skimmed milk powder or oatmeal

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of <i>Pseudomonas</i> species	CF agar CN agar	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0

Sample 27
Supplied as: **Probiotic bacteria**
1 x 10ml vial to represent 10g sample (once reconstituted in 10ml diluent)

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of <i>Bifidobacterium</i> species	TOS-MUP agar	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0
Enumeration of <i>Lactobacillus</i> species	AM agar MRS agar MRS-OX agar Rogosa agar	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0

Sample 28
Supplied as: **Salmonella in tea**
1 x 10ml vial plus 25g tea matrix

Analyte	Method	AV	Range	SDPA	Units	DP
Detection of <i>Salmonella</i> species	Enrichment/culture PCR VIDAS ELISA TECRA	Qual Form	0 to 1000	NA	cfu 25g ⁻¹	NA

QMS Scheme Description

Sample 29
Supplied as:

Indicator organisms in tea
1 x 10ml vial plus 10g tea matrix

Analyte	Method	AV	Range	SDPA	Units	DP
Total aerobic mesophilic count	Plate count agar Milk plate count agar Petrifilm	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0
Enumeration of coliforms	VRBA Petrifilm COLI ID MPN	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0
Enumeration of coagulase positive staphylococci	Baird parker agar Petrifilm Rapid Staph	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0
Enumeration of yeast and mould	OGYE agar Dichloran 18 agar Malt extract agar Rose Bengal agar DRBC agar YGC agar Petrifilm	RMean	0 to 100,000	log ₁₀ 0.35	cfu g ⁻¹	0

Sample 30
Supplied as:

Salmonella in herbs
1 x 10ml vial plus 25g herb matrix

Analyte	Method	AV	Range	SDPA	Units	DP
Detection of <i>Salmonella</i> species	Enrichment/culture PCR VIDAS ELISA TECRA	Qual Form	0 to 1000	NA	cfu 25g ⁻¹	NA

Sample 31
Supplied as:

Salmonella in spices
1 x 10ml vial plus 25g spice matrix

Analyte	Method	AV	Range	SDPA	Units	DP
Detection of <i>Salmonella</i> species	Enrichment/culture PCR VIDAS	Qual Form	0 to 1000	NA	cfu 25g ⁻¹	NA

QMS Scheme Description

Analyte	Method	AV	Range	SDPA	Units	DP
	ELISA TECRA					

Sample 32

Campylobacter enumeration

Supplied as:

1 x 10ml vial to represent 10g sample (once reconstituted in 10ml diluent)

Analyte	Method	AV	Range	SDPA	Units	DP
Enumeration of <i>Campylobacter</i> species	Karmali agar CCDA agar Skirrow agar CampyCount agar	RMean	0 to 100,000	NA	cfu g ⁻¹	0

Sample 33

Identification Test (non-pathogen)

Supplied as:

Participants will be provided with a vial of freeze-dried material containing a single organism which will need to be cultured on non-selective agar before test. The sample may contain biosafety level 1 or 2 organisms, including Staphylococcus, Bacillus and Clostridium, but will not contain the recognised food pathogens such as Salmonella, Listeria, Campylobacter or toxigenic *E.coli*. The organism may be identified to family, genus or species level.

Analyte	Method	AV	Range	SDPA	Units	DP
Identification of unknown organism	Morphological e.g Gram reaction, appearance Serological e.g. slide agglutination, ELISA Biochemical e.g. API, VITEK, Biolog Protein analysis e.g. electrophoresis Genotypic e.g. PCR, ribotyping, BAX Spectrometry e.g. MALDI-TOF	Formulation	NA	NA	NA	NA

Sample 34
Supplied as:**Salmonella identification**

Participants will be provided with a vial of freeze-dried material containing a strain of Salmonella which will need to be cultured on non-selective agar before test. The organisms should be identified to correct group or serovar

Analyte	Method	AV	Range	SDPA	Units	DP
Salmonella identification	Serological e.g. slide agglutination, ELISA Protein analysis e.g. electrophoresis Genotypic e.g. PCR, ribotyping, BAX Spectrometry e.g. MALDI-TOF	Formulation	NA	NA	NA	NA

Sample 35
Supplied as:**Paper exercise**

Participants will be provided with a photograph and a scenario in order to count the number of colonies and calculate the number of microorganisms in the original sample.

Analyte	Method	AV	Range	SDPA	Units	DP
Counting of colonies and calculation of number of microorganisms	Visual count only	Formulation	0 to 300	Greater of robust SD or log 0.05	cfu/ml or cfu/g	NA

ABBREVIATIONS FOR MICROBIOLOGICAL METHOD CODES

AM = Acidified MRS

BG = brilliant green agar

CCDA = Charcoal-cefoperazone-deoxycholate agar

CF = Ceftriaxone fucidin cephalosporin agar

CN = Ceftriaxone nalidixic acid agar

DRBC = dichloran rose Bengal

ELISA = Enzyme-linked immunosorbent assay

IMS = Immuno-magnetic separation

IS = Iron sulphite agar

KAA = Kanamycin aesculin agar

KF = KF Streptococcus agar

MPN = Most probable number

MYP = Mannitol Egg Yolk Polymyxin Agar

MRS = de Mann, Rogosa & Sharpe

MRS-OX = MRS Oxford

OGYE = Oxytetracycline-Glucose Yeast Extract agar

OPSP = Oleandomycin phosphate sulphadiazine polymyxin

PEMBA = Polymyxin-pyruvate-egg yolk-mannitol-bromthymol blue agar

PCR = Polymerase chain reaction

RC = Reinforced Clostridial agar

TBX = Tryptone Bile X-glucuronide agar

TOS MUP = TOS proprionate agar + LiMUP

TSC = Tryptone sulphite cycloserine agar

VRBA = Violet red bile agar

VRBGA = Violet red bile glucose agar

YGC = Yeast glucose chloramphenicol agar

XLD = Xylose lysine deoxycholate agar

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