QCS

Quality in Chocolate and Cocoa Scheme

Scheme Description

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Record of issue status and modifications

ISSUE	ISSUE DATE	DETAILS	AUTHORISED BY
14	Sept 2016	General update of appendices	W.Gaunt
15	Sept 2017	Amended accreditation status for sample 718 – Cadmium and Lead now accredited.	H. Newbrook
16	Sept 2018	SDPA values updated Updated method details to 'ALL' for microbiology samples and amended methods paragraph	W. Gaunt S. Xystouris L. Chesters
17	Aug 2019	New analytes added for 715, 716. New sample 719 Cadmium in chocolate added	W. Gaunt S. Xystouris
18	Sept 2020	New analyte (caffeine) added for 716.	W. Gaunt
19	Oct 2020	Increase to the number of round 717 from once a year to twice a year.	K.Osbiston
20	Jul 2021	Reduced samples 710,711 and 712 from 3 samples down to 2; now sample 710 with A and B components. New sample 720; Salmonella in 375g cocoa powder for 1 round per annum. Addition of pH in sample 716 Updated email address and UKAS logo	C. Taylor S Xystouris L Fielding A Collins
21	Oct 2021	Changed format of sample 720 to vial plus minimum 375g cocoa powder matrix	C. Taylor
22	Apr 22	Added total dietary fibre as an analyte to sample 715	L.Fielding
23	Sept 2022	Update of samples 715 energy SDPA to 1% Addition of lactose in sample 715	L.Fielding
24	Sept 2023	SPDA update for 715 water activity 710 and 714 updated to x2 vials and x1 matrix samples. Microbiology samples updated to state Range cfu/g and 'Reporting units'. Cocoa added to scheme name. 713 updated to vial and matrix. Added elements in 719 and changed the name of the sample to accommodate the changes.	L.Fielding M.Bell S. Xystouris
25	Dec 2023	Samples CT-710 and CT-713 amended to be ready-to-test samples. Added additional CT-714-M sample as ready-to-test version.	N Mason

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 Chocolate Scheme (QCS) is to enable laboratories performing the analysis of chocolate and related products to monitor their performance and compare it with that of their peers. QCS also aims to provide information to participants on technical issues and methodologies relating to testing of chocolate and related products.

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

Test Materials
Details of test materials available in QCS 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 QCS 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 QCS 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
QCS results are returned through our electronic reporting software, PORTAL, full instructions for which are provided by email.

QCS 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 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.

APPENDIX A

Sample PT-CT-710 (A & B) **Presence/absence of Salmonella in Chocolate**
Supplied as: 2 x 25g of grated chocolate

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

Sample PT-CT-713 **Enumeration of Indicator Organisms in Cocoa Powder**
Supplied as: 10g of cocoa powder

Analyte	Method	AV	Range cfu/g	SDPA	Reporting units	DP
Total aerobic mesophilic count	All	RMean	0 to 100,000	$\log_{10}$ 0.35	cfu/g	0
Enumeration of Enterococci	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 yeast Enumeration of mould	All	Rmean	0 to 100,000	$\log_{10}$ 0.35	cfu/g	0

Sample PT-CT-714 (A & B) **Presence/absence of Salmonella in Cocoa Powder**
Supplied as: 2 x 10ml vial plus minimum 50g of cocoa powder matrix

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

Sample PT-CT-714-M (A&B) **Presence/absence of Salmonella in Cocoa Powder**
Supplied as: 2 x 25g of cocoa powder matrix

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

Sample PT-CT-715 **Chocolate analysis**
Supplied as: 150g of chocolate

Analyte	Method	AV	Range	SDPA	Units	DP
Water activity	Water activity meter	RMean	<0.2 0.2 to 0.8 >0.8	0.050 0.020 0.010	A_w	3
Moisture	All	RMean	All	0.20%	%	2
Energy	All	RMean	All	1%	kcal or kJ/100g	0
Fat	All	RMean	All	0.40%	%	2
Saturates	All	RMean	All	Robust SD	%	2
Total nitrogen	All	RMean	All	4% of AV	%	2
Carbohydrate	All	RMean	All	Robust SD	%	2
Total sugars	All	RMean	All	2.00%	%	2
Fructose	All	RMean	All	Robust SD	%	2
Glucose	All	RMean	All	Robust SD	%	2
Sucrose	All	RMean	All	Robust SD	%	2
Lactose*	HPAEC-PAD, HPLC, Other(please specify)	RMean	All	Robust SD	as % lactose monohydrate	2
Salt (from sodium)	All	RMean	All	Robust SD	% (NaCl)	2
Sodium	All	RMean	All	Robust SD	%	3
Butyric acid	All	RMean	All	Robust SD	%	2
Theobromine	All	RMean	0 to 0.5 >0.5	10% of AV Robust SD	%	2
Total dietary fibre	All	Rmean	All	0.5	%	2

Sample PT-CT-716 **Cocoa Powder analysis**
Supplied as: 150g of cocoa powder

Analyte	Method	AV	Range	SDPA	Units	DP
pH	All	RMean	All	Robust SD	-	2
Energy	All	RMean	All	Robust SD	kcal or kJ/100g	0
Fat	All	RMean	All	0.40	%	2
Saturates	All	RMean	All	Robust SD	%	2
Total nitrogen	All	RMean	All	4% of AV	%	2
Carbohydrate	All	RMean	All	Robust SD	%	2
Total sugars	All	RMean	All	2.00	%	2

Analyte	Method	AV	Range	SDPA	Units	DP
Fructose	All	RMean	All	Robust SD	%	2
Glucose	All	RMean	All	Robust SD	%	2
Sucrose	All	RMean	All	20%	%	2
Salt (from sodium)	All	RMean	All	Robust SD	% (NaCl)	2
Sodium	All	RMean	All	Robust SD	%	2
Ash	All	RMean	All	0.25	%	2
Moisture	All	RMean	All	0.30	%	2
Theobromine	All	RMean	All	0.20	%	2
Caffeine	All	RMean	All	Robust SD	mg/100g	2

Sample PT-CT-717 **Enumeration of Indicator Organisms in Chocolate**
Supplied as: 10g of chocolate

Analyte	Method	AV	Range cfu/g	SDPA	Reporting units	DP
Total aerobic mesophilic count	All	RMean	0 to 100,000	$\log_{10}$ 0.35	cfu/g	0
Enumeration of Enterococci	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 yeast Enumeration of mould	All	RMean	0 to 100,000	$\log_{10}$ 0.35	cfu/g	0

Sample PT-CT-718 **Elements in cocoa powder**
Supplied as: 10g cocoa powder

Analyte	Method	Range	AV	SDPA	Units	DP
Total Arsenic*	All	All	RMean	Robust SD	mg/kg	3
Cadmium	All	All	RMean	Robust SD	mg/kg	3
Lead	All	All	RMean	Robust SD	mg/kg	3

Sample PT-CT-719 **Elements in chocolate including Cd and Pb**
Supplied as: 20g dark chocolate

Analyte	Method	Range	AV	SDPA	Units	DP
Cadmium*	All	All	RMean	Robust SD	mg/kg	3
Lead*	All	All	RMean	Robust SD	mg/kg	3
Iron*	All	All	RMean	Robust SD	mg/kg	2
Calcium*	All	All	RMean	Robust SD	mg/kg	1
Chromium*	All	All	RMean	Robust SD	mg/kg	3

Sample PT-CT-720 **Presence/absence of Salmonella in cocoa powder**
Supplied as: 1 x 10ml vial plus minimum 375g cocoa powder matrix

Analyte	Method	AV	Range cfu/g	SDPA	Units	DP
Detection of *Salmonella* species	All	Qual Form	0 to 1,000	NA	Detected/Not detected 375g	NA

*Not included in LGC's UKAS Scope of Accreditation