CODEX ALIMENTARIUS COMMISSION

Food and Agriculture Organization of the United Nations

World Health Organization

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Agenda Item 11a **CRD 12**

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JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON NUTRITION AND FOODS FOR SPECIAL DIETARY USES

Thirty-seventh Session
Bad Soden a.T. – Germany
23 – 27 November 2015

OTHER BUSINESS AND FUTURE WORK

A) METHODS OF ANALYSIS IN THE STANDARD FOR INFANT FORMULA AND FORMULAS FOR SPECIAL MEDICAL PURPOSES INTENDED FOR INFANTS (CODEX STAN 72-1981)

Comments of AOAC, ISO and IDF

AOAC, ISO and IDF

The Committee is requested to consider submitting the following eight methods of analysis for nutrients in infant formula (vitamin B12, myo-Inositol, chromium, selenium, molybdenum, nucleotides, vitamins A and E, fatty acid profile, iodine, and pantothenic acid) to CCMAS for technical review, typing, endorsement, and inclusion in the *Recommended Methods of Analysis and Sampling* (CODEX STAN 234-1999).

All methods are published as AOAC Official Methods of Analysis Final Action. In addition, all methods are published as ISO Standards or ISO|IDF Standards. Each method is collaboratively tested. In paragraph 1 below, the validation data as presented in the ISO standards or ISO|IDF Standards is given.
Paragraph 2 gives an overview of references to the AOAC Official Methods and publications of collaborative study reports by AOAC INTERNATIONAL.
Paragraph 3 explains how the results obtained with the analytical methods can be expressed in alignment with CODEX STAN 72-1981.

1. Validation data of 8 proposed methods.

ISO 20639:2015 technically equivalent to AOAC 2012.16

Infant formula and adult nutritionals -- Determination of pantothenic acid by ultra high performance liquid chromatography and tandem mass spectrometry method (UHPLC-MS/MS)

Annex_B_Precision_ data_ISO_20639.pdf

ISO 20637:2015 technically equivalent to AOAC 2011.18

Infant formula and adult nutritionals -- Determination of myo-inositol by liquid chromatography and pulsed amperometry

Annex_B_Precision_ data_ISO_20637.pdf

ISO 20634:2015 technically equivalent to AOAC 2011.10

Infant formula and adult nutritionals -- Determination of vitamin B12 by reversed phase high performance liquid chromatography (RP-HPLC)

Annex_B_Precision_
data_ISO_20634.pdf

ISO 20638:2015 technically equivalent to AOAC 2011.20

Infant formula -- Determination of nucleotides by liquid chromatography

Annex_B_Precision_
data_ISO_20638.pdf

ISO 20633:2015 technically equivalent to AOAC 2012.10

Infant formula and adult nutritionals -- Determination of vitamin E and vitamin A by normal phase high performance liquid chromatography

Annex_B_Precision_
data_ISO_20633.pdf

ISO 16958|IDF 231:2015 technically equivalent to AOAC 2012.13

Milk, milk products, infant formula and adult nutritionals -- Determination of fatty acids composition -- Capillary gas chromatographic method

Annex_B_Precision_
data_ISO_16958_IDF

ISO 20649|IDF 235:2015 technically equivalent to AOAC 2011.19

Infant formula and adult nutritionals -- Determination of chromium, selenium and molybdenum -- Inductively coupled plasma mass spectrometry (ICP-MS)

Annex_B_Precision_
data_ISO_20649_IDF

ISO 20647|IDF 234:2015 technically equivalent to AOAC 2012.15

Infant formula and adult nutritionals -- Determination of total iodine -- Inductively coupled plasma mass spectrometry (ICP-MS)

Annex_B_Precision_
data_ISO_20647_IDF

2. References to AOAC INTERNATIONAL Official Methods of Analysis – report from collaborative studies.

All references are available in the electronic version of the Journal of AOAC INTERNATIONAL. Two of the references are published in the printed version of the Journal of AOAC INTERNATIONAL. The remaining six are “in press”.

AOAC 2012.16
Martin, F., & Campos Giménez, E. (2015) J. AOAC Int. 98(6), in press.
http://aoac.publisher.ingentaconnect.com/content/aoac/jaoac/pre-prints/content-980405

AOAC 2011.18
Butler-Thompson, L. D-B., Jacobs, W.A., & Schimpf, K.J. (2015) J. AOAC Int. 98(6), in press.
http://aoac.publisher.ingentaconnect.com/content/aoac/jaoac/pre-prints/content-980403

AOAC 2011.10
Butler-Thompson, L. D-B., Jacobs, W.A., & Schimpf, K.J. (2015) J. AOAC Int. 98(6), in press.
(http://aoac.publisher.ingentaconnect.com/content/aoac/jaoac/pre-prints/content-9806-2)

AOAC 2011.20
Gill, B.D., & Indyk, H.E. (2015) J. AOAC Int. 98(4), 971-979.
http://dx.doi.org/10.5740/jaoacint.15-050

AOAC 2012.10
McMahon, A. (2016) J. AOAC Int. **99(1),** in press.
http://aoac.publisher.ingentaconnect.com/content/aoac/jaoac/pre-prints/content-9901-1

AOAC 2012.13
Golay, P-A., & Moulin, J. (2016) J. AOAC Int. 99(1), in press.
http://aoac.publisher.ingentaconnect.com/content/aoac/jaoac/pre-prints/content-9801-2

AOAC 2011.19
Pacquette, L., & Thompson, J. (2015) J. AOAC Int. 98(6), in press.
http://aoac.publisher.ingentaconnect.com/content/aoac/jaoac/pre-prints/content-980407

AOAC 2012.15
Zywicki, R.S., & Sullivan, D.M. (2015) J. AOAC Int. 98(5), 1407-1416
http://aoac.publisher.ingentaconnect.com/content/aoac/jaoac/pre-prints/content-9805-03

3. Expression of results by using proposed methods of analysis

Results obtained by using the proposed methods of analysis for nutrients in infant formula are calculated and expressed in amounts per 100g powder, or per 100g Ready To Feed (RTF) product. RTF samples can be from liquid origin. When RTF is reconstituted from powders, 25 grams of powdered infant formula is to be mixed with 200 grams of water.
In the CODEX Standard for Infant Formula (CODEX STAN 72-1981), the essential composition is expressed in amounts per 100 available kilocalories, and amounts per 100 available kilojoules.

By using the amount of kcal and kjoules per 100g powder, or RTF product, on the product label of the sample analyzed, the nutrient concentrations can be calculated and expressed in amounts per 100 kcalories or kjoules as follows:

$$w = \frac{v}{y} \; x \; 100 \; x \; f$$

w = nutrient concentration in mg/100 kcal or kjoules
v = nutrient concentration in mg/100g
y = amount of kcal or kjoules per 100g powder or RTF as indicated on sample package
f = dilution factor:
Example 1: In case of analysis of powders and of liquid Infant formula, f=1
Example 2: In case of reconstituted powders (25 g powder with 200 g of water), f=9

Annex B
(informative)

Precision data

The data given in Table B.1 were obtained in an interlaboratory study and published in 2015[1], in accordance with ISO 5725-2[2] and AOAC-IUPAC Harmonized Protocol for collaborative study procedures, to assess precision characteristics of a method of analysis.[3] The study was performed based on requirements given in Reference [4].

Table B.1 — Precision data for pantothenic acid

Sample	1[a]	2[b]	3[c,]	4[d]	5[e]	6[f]	7[g]	8[h]	9[i]	10[j]
Year of interlaboratory test	2014	2014	2014	2014	2014	2014	2014	2014	2014	2014
Number of laboratories retained after eliminating outliers	13	14	14	13	13	14	13	14	14	13
Mean value, $\bar{x}$, mg/100 g	2,59	3,85	6,96	8,07	5,04	5,91	0,549	6,65	2,07	1,57
Repeatability standard deviation s_r, mg/100 g	0,05	0,05	0,14	0,13	0,14	0,17	0,008	0,22	0,06	0,03
Reproducibility standard deviation s_R, mg/100 g	0,13	0,20	0,35	0,33	0,23	0,29	0,022	0,36	0,14	0,09
Coefficient of variation of repeatability, $C_{V,r}$, %	1,9	1,3	2,0	1,6	2,8	2,8	1,5	3,3	2,9	1,7
Coefficient of variation of reproducibility, $C_{V,R}$, %	5,0	5,3	5,1	4,1	4,7	4,9	4,1	5,4	7,0	5,5
Repeatability limit r [$r = 2{,}8 \times s_r$], mg/100 g	0,14	0,14	0,39	0,36	0,39	0,48	0,022	0,62	0,17	0,08
Reproducibility limit R [$R = 2{,}8 \times s_R$], mg/100 g	0,36	0,56	0,98	0,92	0,64	0,81	0,061	1,01	0,39	0,25
HorRat value, according to Reference [5]	0,51	0,57	0,60	0,50	0,53	0,57	0,33	0,63	0,69	0,52

[a] Adult nutritional powder milk protein based, [b] Infant formula powder partially hydrolysed soy based, [c] SRM 1849a, [d] Adult nutritional powder low fat, [e] Infant formula powder soy based, [f] Child formula powder, [g] Infant formula RTF milk based, [h] Infant elemental powder, [I] Adult nutritional RTF high fat, [j] Adult nutritional RTF high protein

RTF is ready-to-feed.

Annex B
(informative)

Precision data

The data given in Tables B.1, B.2 and B.3 were obtained in an interlaboratory study and published in 2015,[3] in accordance with ISO 5725-2[4] and the AOAC-IUPAC Harmonized Protocol for collaborative study procedures, to assess precision characteristics of a method of analysis.[5] The method was validated for the quantitation of free myo-inositol and myo-inositol from phosphatidylinositol in infant and adult nutritionals. Repeatability was determined from duplicate analyses performed on multiple days. Accuracy was determined from spike recovery experiments (free myo-inositol and myo-inositol from phosphatidylinositol). Instrument limits of detection and quantitation were determined statistically from injections of low-level standards and by spiking samples with low levels of free myo-inositol. The study was performed based on requirements given in Reference [6].

Table B.1 — Unbound (free) myo-inositol

Sample type	Total No. laboratories excluding outliers	Number of outlier laboratories	Total No. replicates accepted	Mean (mg/100 g RTF)	s_r	s_R	$C_{V,r}$	$C_{V,R}$	HorRat[a]
NIST SRM 1849a	10	0	22	412[b]	11,3	11,4	2,75	2,77	0,43
Infant formula powder soy-based	10	0	22	4,22	0,127	0,305	3,03	7,26	0,80
Infant formula powder milk-based	10	0	20	4,26	0,168	0,232	3,95	5,43	0,60
Infant formula RTF milk-based	9	0	20	7,17	0,095	0,207	1,33	2,89	0,34
Infant formula powder partial hydrolysed milk-based	10	0	22	3,65	0,035	0,412	0,97	11,4	1,22
Infant formula powder partial hydrolysed soy-based	10	0	22	3,11	0,089 9	0,389	2,92	12,61	1,32
Child formula powder	10	0	22	5,10	0,185	0,246	3,61	4,81	0,54
Infant elemental powder	10	0	22	5,10	0,227	0,318	4,45	6,24	0,71
Infant formula RTF milk-based, unfortified	9	0	20	3,17	0,058 2	0,091 0	1,84	2,87	0,30

[a] HorRat value, according to Reference [7].

[b] Results in mg/kg powder.

RTF is ready-to-feed.

Table B.2 — Myo-inositol bound as phosphatidylinositol

Sample type	Total No. laboratories excluding outliers	Number of outlier laboratories	Total No. replicates accepted	Mean (mg/100 g RTF)	s_r	s_R	$C_{V,r}$	$C_{V,R}$	HorRat[a]
NIST SRM 1849a	9	0	20	9,51[b]	1,82	2,62	18,7	26,8	2,36
Infant formula powder soy-based	9	0	20	2,10	0,150	0,501	6,94	23,2	2,30
Infant formula powder milk-based	9	0	18	0,667	0,026 1	0,172	3,92	25,9	2,15
Infant formula RTF milk-based	8	0	18	0,348	0,030 1	0,090 9	8,36	25,2	1,91
Infant formula powder partial hydrolysed milk-based	9	0	20	0,214	0,010 3	0,057 6	4,72	26,4	1,86
Infant formula powder partial hydrolysed soy-based	9	0	20	1,64	0,093 6	0,358	5,53	21,1	2,02
Child formula powder	9	0	20	0,328	0,023 4	0,087 8	6,89	25,8	1,94
Infant elemental powder	9	0	20	0,00	0,00	0,00	0,00	0,00	0,00
Infant formula RTF milk-based, unfortified	8	0	18	0,305	0,024 4	0,085 0	7,71	26,9	2,00

[a] HorRat value, according to Reference [7].

[b] Results in mg/kg powder.

RTF is ready-to-feed.

Table B.3 — Unbound (free) myo-inositol plus myo-inositol bound as phosphatidylinositol

Sample type	Total No. laboratories excluding outliers	Number of outlier laboratories	Total No. replicates accepted	Mean (mg/100 g RTF)	s_r	s_R	$C_{V,r}$	$C_{V,R}$	HorRat[a]
NIST SRM 1849a	9	0	20	422[b]	11,9	11,9	2,83	2,83	0,44
Infant formula powder soy-based	9	0	20	6,27	0,147	0,446	2,32	7,05	0,82
Infant formula powder milk-based	9	0	18	4,92	0,184	0,314	3,74	6,38	0,72
Infant formula RTF milk-based	8	0	18	7,50	0,106	0,218	1,41	2,90	0,35
Infant formula powder partial hydrolysed milk-based	9	0	20	3,84	0,035	0,426	0,91	11,2	1,21
Infant formula powder partial hydrolysed soy-based	9	0	20	4,71	0,152	0,357	3,22	7,55	0,84
Child formula powder	9	0	20	5,42	0,203	0,307	3,73	5,63	0,64
Infant elemental powder	9	0	20	5,08	0,237	0,324	4,67	6,40	0,72
Infant formula RTF milk-based, unfortified	8	0	18	3,46	0,065 9	0,128	1,90	3,70	0,39

[a] HorRat value, according to Reference [7].

[b] Results in mg/kg powder.

RTF is ready-to-feed.

Annex B
(informative)

Precision data

The data given in Table B.1 were obtained in an interlaboratory study and published in 2015,[1] in accordance with ISO 5725-2[2] and the AOAC-IUPAC Harmonized Protocol for collaborative study procedures, to assess precision characteristics of a method of analysis.[3] The study was performed based on requirements given in Reference.[4]

Table B.1 — Precision data for vitamin B_{12}

Sample	NIST SRM 1849a	1[a]	2[b]	3[c]	4[d]	5[e]	6[f]	7[g]	8[h]	9[i]	10[j]	11[k]
Year of interlaboratory test	2014	2014	2014	2014	2014	2014	2014	2014	2014	2014	2014	2014
Number of laboratories	11	9	10	11	10	10	10	10	11	10	9	10
Number of non-compliant laboratories	0	0	0	0	0	0	0	0	0	0	0	0
Number of laboratories retained after eliminating outliers	10	9	10	11	9	10	10	9	10	9	8	10
Number of outliers (laboratories)	1	0	0	0	1	0	0	1	1	1	1	0
Number of accepted results	20	18	20	22	18	20	20	14	20	18	16	20
Mean value, $\bar{x}$, µg/100 g	43,7[l]	0,272	0,300	0,373	0,543	0,250	0,636	1,48	0,428	0,227	0,967	1,08
Repeatability standard deviation s_r, µg/100 g	3,01[l]	0,0257	0,0270	0,0200	0,0169	0,0244	0,0348	0,122	0,0208	0,0111	0,0289	0,0730
Coefficient of variation of repeatability, $C_{V,r}$, %	6,90	9,46	8,99	5,35	3,11	9,77	5,47	8,23	4,85	4,90	2,98	6,74
Repeatability limit r [$r = 2{,}8 \times s_r$], µg/100 g	8,43[l]	0,0720	0,0756	0,0560	0,0473	0,0683	0,0974	0,342	0,0582	0,0311	0,0809	0,204
Reproducibility standard deviation s_R, µg/100 g	3,86[l]	0,0427	0,0416	0,0694	0,0603	0,0487	0,0587	0,171	0,0305	0,0202	0,0342	0,190
Coefficient of variation of reproducibility, $C_{V,R}$, %	8,84	15,7	13,8	18,6	11,1	19,5	9,23	11,5	7,13	8,90	3,54	17,5
Reproducibility limit R [$R = 2{,}8 \times s_R$], µg/100 g	10,8[l]	0,120	0,116	0,194	0,169	0,136	0,164	0,479	0,0854	0,0566	0,0958	0,532
HorRat value, according to Reference[5]	0,34	0,40	0,36	0,50	0,32	0,50	0,27	0,38	0,20	0,22	0,11	0,55

[a] infant formula RTF milk based, [b] adult nutritional powder milk based, [c] infant formula powder partial hydrolysed milk based, [d] infant elemental powder, [e] infant formula powder partial hydrolysed soy based, [f] adult nutritional powder low fat, [g] adult nutritional RTF high fat (single determinations for 4 laboratories because of mislabelled product cans), [h] infant formula powder soy based, [i] infant formula powder milk based, [j] child formula powder, [k] adult nutritional RTF high protein, [l] results in µg/kg powder.

RTF = ready-to-feed.

Annex B
(informative)

Precision data

The data given in Table B.1 to Table B.7 were obtained in an interlaboratory study and published in 2015,[3,4] in accordance with ISO 5725-2[5] and AOAC-IUPAC Harmonized Protocol for collaborative study procedures, to assess precision characteristics of a method of analysis.[6] The study was evaluated based on requirements given in Reference [7].

Table B.1 — Precision data for NIST 1849a certified reference material practice sample

Parameter	CMP	UMP	GMP	IMP	AMP
Total number of laboratories, n	12	12	12	11[a]	12
Total number of replicates, $2n$	24	24	24	22	24
Overall mean of all data (grand mean), $\bar{\bar{x}}$, mg/100 g	28,14	11,76	15,07	n/a	10,87
Repeatability standard deviation, s_r, mg/100 g	0,46	0,30	0,38	n/a	0,22
Reproducibility standard deviation, s_R, mg/100 g	1,36	0,59	0,68	n/a	0,47
Repeatability limit in SMPR	≤ 6 %	≤ 6 %	≤ 6 %	n/a	≤ 6 %
Coefficient of variation of repeatability, $C_{V,r}$, %	1,6	2,5	2,5	n/a	2,1
Reproducibility limit in SMPR	≤ 11 %	≤ 11 %	≤ 11 %	n/a	≤ 11 %
Coefficient of variation of reproducibility, $C_{V,R}$, %	4,8	5,0	4,5	n/a	4,4
HorRat value	0,7	0,6	0,6	n/a	0,6

[a] Less than 2/9 laboratories removed from statistical analysis.

n/a Not available.

Table B.2 — Precision data for lactose-free infant formula test sample

Parameter	CMP	UMP	GMP	IMP	AMP
Total number of laboratories, n	12	12	24	12	12
Total number of replicates, $2n$	24	24	1,45	24	24
Overall mean of all data (grand mean), $\bar{\bar{x}}$, mg/100 g	11,42	3,84	0,03	1,65	3,34
Repeatability standard deviation, s_r, mg/100 g	0.12	0,09	0,04	0,05	0,05
Reproducibility standard deviation, s_R, mg/100 g	0,89	0,30	24	0,10	0,09
Repeatability limit in SMPR	≤ 6 %	≤ 6 %	≤ 6 %	≤ 6 %	≤ 6 %
Coefficient of variation of repeatability, $C_{V,r}$, %	1,1 %	2,4 %	1,8 %	2,8 %	1,4 %
Reproducibility limit in SMPR	≤ 11 %	≤ 11 %	≤ 11 %	≤ 11 %	≤ 11 %
Coefficient of variation of reproducibility, $C_{V,R}$, %	7,8 %	7,9 %	2,8 %	6,1 %	2,7 %
HorRat value	1,0	0,9	0,3	0,6	0,3

Table B.3 — Precision data for starch-based infant formula test sample

Parameter	CMP	UMP	GMP	IMP	AMP
Total number of laboratories, n	11[a]	11[a]	11[a]	11[a]	11[a]
Total number of replicates, $2n$	22	22	22	22	22
Overall mean of all data (grand mean), $\bar{\bar{x}}$, mg/100 g	10,99	3,88	1,67	1,66	3,54
Repeatability standard deviation, s_r, mg/100 g	0,30	0,21	0,03	0,02	0,08
Reproducibility standard deviation, s_R, mg/100 g	0,81	0,31	0,07	0,17	0,11
Repeatability limit in SMPR	≤ 6 %	≤ 6 %	≤ 6 %	≤ 6 %	≤ 6 %
Coefficient of variation of repeatability, $C_{V,r}$, %	2,7 %	5,4 %	1,6 %	1,4 %	2,1 %
Reproducibility limit in SMPR	≤ 11 %	≤ 11 %	≤ 11 %	≤ 11 %	≤ 11 %
Coefficient of variation of reproducibility, $C_{V,R}$, %	7,4 %	8,4 %	4,2 %	10,3 %	3,0 %
HorRat value	0,9	0,9	0,4	1,0	0,3

[a] Less than 2/9 laboratories removed from statistical analysis.

Table B.4 — Precision data for hydrolysate-based infant formula test sample

Parameter	CMP	UMP	GMP	IMP	AMP
Total number of laboratories, n	12	12	12	11[a]	12
Total number of replicates, $2n$	24	24	24	22	24
Overall mean of all data (grand mean), $\bar{\bar{x}}$, mg/100 g	9,72	4,15	1,38	2,46	4,73
Repeatability standard deviation, s_r, mg/100 g	0,26	0,13	0,05	0,04	0,19
Reproducibility standard deviation, s_R, mg/100 g	0,69	0,36	0,11	0,13	0,30
Repeatability limit in SMPR	≤ 6 %	≤ 6 %	≤ 6 %	≤ 6 %	≤ 6 %
Coefficient of variation of repeatability, $C_{V,r}$, %	2,7 %	3,1 %	3,9 %	1,8 %	3,9 %
Reproducibility limit in SMPR	≤ 11 %	≤ 11 %	≤ 11 %	≤ 11 %	≤ 11 %
Coefficient of variation of reproducibility, $C_{V,R}$, %	7,1 %	8,7 %	7,7 %	5,5 %	6,2 %
HorRat value	0,9	1,0	0,7	0,6	0,7

[a] Less than 2/9 laboratories removed from statistical analysis.

Table B.5 — Precision data for soy-based infant formula test sample

Parameter	CMP[a]	UMP[a]	GMP[a]	IMP[a]	AMP[a]
Total number of laboratories, n	12	12	12	12	12
Total number of replicates, $2n$	24	24	24	24	24
Overall mean of all data (grand mean), $\bar{\bar{x}}$, mg/100 g	0,50	0,19	0,22	0,16	0,54
Repeatability standard deviation, s_r, mg/100 g	0,19	0,05	0,05	0,07	0,11
Reproducibility standard deviation, s_R, mg/100 g	0,34	0,14	0,18	0,25	0,30
Repeatability limit in SMPR	≤ 8 %	≤ 10 %	≤ 10 %	≤ 10 %	≤ 8 %
Coefficient of variation of repeatability, $C_{V,r}$, %	38,5 %	25,0 %	22,9	43,7 %	20,4 %
Reproducibility limit in SMPR	≤ 16 %	≤ 20 %	≤ 20 %	≤ 20 %	≤ 16 %
Coefficient of variation of reproducibility, $C_{V,R}$, %	67,1 %	72,0 %	82,7 %	156,2 %	55,7 %
HorRat value	5,3	5,0	5,8	10,5	4,5

NOTE Soy based infant formula was not fortified with nucleotides and contained endogenous levels only.

[a] Several laboratories reported 0 for these analytes which contributed significantly to poor precision.

Table B.6 — Precision data for whey-based infant formula test sample 1

Parameter	CMP	UMP	GMP	IMP	AMP
	Value	Value	Value	Value	Value
Total number of laboratories, n	12	12	12	10[a]	12
Total number of replicates, $2n$	24	24	24	18	24
Overall mean of all data (grand mean), $\bar{\bar{x}}$, mg/100 g	5,47	3,52	1,05	n/a	3,51
Repeatability standard deviation, s_r, mg/100 g	0,15	0,05	0,02	n/a	0,06
Reproducibility standard deviation, s_R, mg/100 g	0,48	0,31	0,04	n/a	0,18
Repeatability limit in SMPR	≤ 6 %	≤ 6 %	≤ 6 %	n/a	≤ 6 %
Coefficient of variation of repeatability, $C_{V,r}$, %	2,7 %	1,5 %	2,2 %	n/a	1,7 %
Reproducibility limit in SMPR	≤ 11 %	≤ 11 %	≤ 11 %	n/a	≤ 11 %
Coefficient of variation of reproducibility, $C_{V,R}$, %	8,7 %	8,8 %	4,1 %	n/a	5,0 %
HorRat value	1,0	0,9	0,4	n/a	0,5

[a] Less than 2/9 laboratories removed from statistical analysis.

n/a Not available.

Table B.7 — Precision data for whey-based infant formula test sample 2

Parameter	CMP	UMP	GMP	IMP	AMP
	Value	Value	Value	Value	Value
Total number of laboratories, n	11[a]	12	11[a]	10[a]	11[a]
Total number of replicates, $2n$	22	24	22	22	22
Overall mean of all data (grand mean), $\bar{\bar{x}}$, mg/100 g	5,43	3,54	1,05	n/a	3,51
Repeatability standard deviation, s_r, mg/100 g	0,09	0,11	0,04	n/a	0,05
Reproducibility standard deviation, s_R, mg/100 g	0,43	0,32	0,05	n/a	0,15
Repeatability limit in SMPR	≤ 6 %	≤ 6 %	≤ 6 %	n/a	≤ 6 %
Coefficient of variation of repeatability, $C_{V,r}$, %	1,6 %	3,2	3,4 %	n/a	1,3 %
Reproducibility limit in SMPR	≤ 11 %	≤ 11 %	≤ 11 %	n/a	≤ 11 %
Coefficient of variation of reproducibility, $C_{V,R}$, %	7,9 %	9,0 %	5,2 %	n/a	4,3 %
HorRat value	0,9	1,0	0,5	n/a	0,5

[a] Less than 2/9 laboratories removed from statistical analysis.

n/a Not available.

Annex B
(informative)

Precision data

The data given in Tables B.1, B.2 and B.3 were obtained in an interlaboratory study and published in 2015[2], in accordance with ISO 5725-2[3] and AOAC-IUPAC Harmonized Protocol for collaborative study procedures, to assess precision characteristics of a method of analysis.[4] The study was performed based on requirements given in References [5] and [6].

Table B.1 — Precision data for vitamin A acetate, (1[a] and 2[b]), and vitamin A palmitate, (3[c] to 8[h]) expressed as retinol

Sample	1[a]	2[b]	3[c, j]	4[d]	5[e]	6[f]	7[g]	8[h]
Year of interlaboratory test	2014	2014	2014	2014	2014	2014	2014	2014
Number of laboratories	15	15	15	15	15	15	15	15
Number of non-compliant laboratories	0	0	0	0	0	0	0	0
Number of laboratories retained after eliminating outliers	15	12	15	15	15	14	14	15
Number of outliers (laboratories)	0	3	0	0	0	1	1	0
Number of accepted results	30	24	30	30	30	28	28	30
Mean value, $\bar{x}$, µg/100 g RTF[i]	46,34	67,39	6,49	47,55	62,56	66,58	57,34	48,35
Repeatability standard deviation s_r, µg/100 g RTF	7,69	1,55	0,21	7,50	4,28	0,75	0,61	7,31
Reproducibility standard deviation s_R, µg/100 g RTF	10,48	8,04	0,52	10,33	6,04	4,33	4,13	7,86
Coefficient of variation of repeatability, $C_{V,r}$, %	16,60	2,30	3,26	15,78	6,84	1,13	1,06	15,13
Coefficient of variation of reproducibility, $C_{V,R}$, %	22,61	11,93	8,02	21,73	9,66	6,51	7,20	16,25
Repeatability limit r [$r = 2{,}8 \times s_r$], µg/100 g RTF	21,54	4,34	0,59	21,01	11,98	2,10	1,70	20,48
Reproducibility limit R [$R = 2{,}8 \times s_R$], µg/100 g RTF	29,34	22,52	1,46	28,92	16,91	12,13	11,56	21,99
HorRat value, according to Reference [7]	1,25	0,69	0,33	1,20	0,56	0,38	0,41	0,91

[a] Adult nutritional powder milk protein based, [b] Infant formula powder partially hydrolysed soy based, [c] SRM 1849a, [d] Adult nutritional powder low fat, [e] Infant formula powder soy based, [f] Infant formula powder milk based, [g] Infant formula RTF milk based, [h] Infant elemental powder, [i] RTF is ready-to-feed, [j] mg/kg powder

NOTE 1 The results are expressed as µg retinol per 100 g RTF.

NOTE 2 SRM 1849a values determined are lower than the certified values, possibly due to inadequate storage conditions during the collaborative studies. The certified value (7,68 mg/kg ± 0,23 mg/kg) was obtained during a single lab validation study for this material, see Reference [10].

Table B.2 — Precision data for vitamin E (α-tocopherol)

Sample	1[a]	2[b]	3[c, j]	4[d]	5[e]	6[f]	7[g]	8[h]
Year of interlaboratory test	2014	2014	2014	2014	2014	2014	2014	2014
Number of laboratories	15	15	15	15	15	15	15	15
Number of non-compliant laboratories	0	0	0	0	0	0	0	0
Number of laboratories retained after eliminating outliers	14	11	14	14	14	13	14	14
Number of outliers (laboratories)	1	4	1	1	1	0	1	1
Number of accepted results	28	22	28	28	28	26	28	28
Mean value, $\bar{x}$, mg/100 g RTF[i]	0,58	0,48	36,38	0,14	0,46	0,49	0,45	0,41
Repeatability standard deviation s_r, mg/100 g RTF	0,023	0,008	2,103	0,012	0,036	0,008	0,012	0,064
Reproducibility standard deviation s_R, mg/100 g RTF	0,052	0,057	4,539	0,061	0,040	0,279	0,035	0,072
Coefficient of variation of repeatability, $C_{V,r}$, %	3,99	1,67	5,78	8,90	7,89	1,57	2,59	15,48
Coefficient of variation of reproducibility, $C_{V,R}$, %	9,10	11,94	12,47	43,56	8,74	5,68	7,73	17,44
Repeatability limit r [$r = 2{,}8 \times s_r$], µg/100 g RTF	0,064	0,022	5,889	0,035	0,101	0,022	0,033	0,178
Reproducibility limit R [$R = 2{,}8 \times s_R$], µg/100 g RTF	0,147	0,159	12,71	0,170	0,112	0,078	0,098	0,201
HorRat value, according to Reference [7]	0,930	0,920	1,870	2,180	0,680	0,440	0,600	1,340

[a] Adult nutritional powder milk protein based, [b] Infant formula powder partially hydrolysed soy based, [c] SRM 1849a, [d] Adult nutritional powder low fat, [e] Infant formula powder soy based, [f] Infant formula powder milk based, [g] Infant formula RTF milk based, [h] Infant elemental powder, [i] RTF is ready-to-feed, [j] mg/kg powder

Table B.3 — Precision data for vitamin E (α-tocopheryl acetate)

Sample	1[a]	2[b]	3[c, j]	4[d]	5[e]	6[f]	7[g]	8[h]
Year of interlaboratory test	2014	2014	2014	2014	2014	2014	2014	2014
Number of laboratories	15	15	15	15	15	15	15	15
Number of non-compliant laboratories	0	0	0	0	0	0	0	0
Number of laboratories retained after eliminating outliers	14	15	14	13	14	13	13	15
Number of outliers (laboratories)	1	0	0	0	0	2	2	0
Number of accepted results	28	30	28	26	28	26	26	30
Mean value, $\bar{x}$, mg/100 g RTF[i]	12,73	1,80	172,89	1,84	1,30	1,44	1,56	1,79
Repeatability standard deviation s_r, mg/100 g RTF	0,489	0,066	3,374	0,388	0,022	0,021	0,009	0,061
Reproducibility standard deviation s_R, mg/100 g RTF	0,926	0,203	14,991	0,156	0,084	0,067	0,065	0,119
Coefficient of variation of repeatability, $C_{V,r}$, %	3,84	3,65	1,95	2,11	1,67	1,43	0,60	3,38
Coefficient of variation of reproducibility, $C_{V,R}$, %	7,28	11,25	8,67	8,50	6,47	4,62	4,15	6,66
Repeatability limit r [$r = 2{,}8 \times s_r$], µg/100 g RTF	1,369	0,184	9,447	0,109	0,061	0,058	0,026	0,170
Reproducibility limit R [$R = 2{,}8 \times s_R$], µg/100 g RTF	2,594	0,567	41,976	0,437	0,236	0,187	0,181	0,334
HorRat value, according to Reference [7]	0,330	1,070	0,580	0,810	0,580	0,420	0,380	0,630

[a] Adult nutritional powder milk protein based, [b] Infant formula powder partially hydrolysed soy based, [c] SRM 1849a, [d] Adult nutritional powder low fat, [e] Infant formula powder soy based, [f] Infant formula powder milk based, [g] Infant formula RTF milk based, [h] Infant elemental powder,. [i] RTF is ready-to-feed, [j] mg/kg powder

Annex C
(informative)

Results of an interlaboratory trial

An interlaboratory test on the precision of the method was organized in 2013 to 2014 by IDF/ISO and AOAC/SPIFAN in which 18 laboratories participated.[16] The values derived from this interlaboratory test may not be applicable to concentration ranges and matrices other than those given.

More information on the validation of the method can be found at http://standards.iso.org/iso/16958

The following 12 products were used for the collaborative trial:

1. Full cream milk powder (fat 26,27 %);
2. Full cream liquid milk (fat 3,55 %);
3. Full cream (fat 35,27 %);
4. Butter (fat 82,93 %);
5. Soft cheese (fat 13,29 %);
6. Infant formula powder (fat 25,67 %);
7. Adult nutritional milk protein powder (fat 17,44 %);
8. Infant formula partially hydrolyzed soy powder (fat 26,01 %);
9. Infant formula milk powder milk based (fat 28,38 %);
10. Infant formula RTF (liquid) milk based (fat 3,57 %);
11. Adult nutritional RTF (liquid) high protein (fat 3,58 %);
12. Adult nutritional RTF (liquid) high fat (fat 8,61 %).

The following abbreviations are used in the tables:

No. of laboratories	is the number of lab value considered
Mean	is mean value calculated, in g/100 g product
s_r	is the repeatability standard deviation, in g/100 g product
RSD_r	is the relative repeatability standard deviation, in %
r	is the repeatability, in g/100 g products
S_R	is the reproducibility standard deviation, in g/100 g product
RSD_R	is the relative reproducibility standard deviation, in %
R	is the reproducibility, in g/100 g product

Table C.1 contains data from the collaborative study, calculated as g fatty acids/100 g product for the group of labelled fatty acids (*trans* fatty acids (TFA), saturated fatty acids (SFA), monounsaturated fatty acids (MUFA), polyunsaturated fatty acids (PUFA), omega-3, omega-6, and omega-9) and individual

fatty acids (linoleic acid (LA), α-linolenic acid (ALA), arachidonic acid (ARA), eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA)).

Table C.1 — Precision data for the group of labelled fatty acids

Sample no.	Product	No. of laboratories	Mean	s_r	RSD_r	r	s_R	RSD_R	R
***Trans* fatty acids (TFA) total**									
1	Full cream milk powder	17	1,032	0,035	3,4	0,098	0,115	11,2	0,322
2	Full liquid milk	17	0,167	0,005	2,8	0,013	0,015	8,7	0,041
3	Full cream	17	1,624	0,061	3,7	0,170	0,178	11,0	0,500
4	Butter	17	4,235	0,128	3,0	0,357	0,440	10,4	1,233
5	Cheese (extracted fat)	12	5,056	0,174	3,4	0,486	0,562	11,1	1,573
6	IF powder	16	0,073	0,007	9,8	0,020	0,024	32,9	0,067
7	Adult nutritional milk protein powder	15	0,056	0,007	13,0	0,020	0,013	23,5	0,037
8	IF partially hydrolyzed soy powder	18	0,091	0,015	16,6	0,042	0,036	40,0	0,101
9	IF milk based powder	17	0,109	0,007	6,4	0,019	0,032	29,2	0,089
10	IF RTF (liquid) milk based	17	0,027	0,002	8,0	0,006	0,006	21,3	0,016
11	Adult nutritional RTF (liquid) high protein	16	0,009	0,001	5,4	0,001	0,004	38,5	0,010
12	Adult nutritional RTF (liquid) high fat	11	0,010	0,001	10,0	0,003	0,004	42,5	0,012
Saturated fatty acids (SFA)									
1	Full cream milk powder	18	15,116	0,255	1,7	0,713	0,588	3,9	1,646
2	Full milk	17	1,999	0,018	0,9	0,050	0,079	4,0	0,222
3	Full cream	18	20,307	0,657	3,2	1,838	1,161	5,7	3,251
4	Butter	18	48,527	0,938	1,9	2,625	2,431	5,0	6,806
5	Cheese (extracted fat)	11	57,777	1,075	1,9	3,010	3,009	5,2	8,424
6	IF powder	16	7,309	0,106	1,4	0,297	0,174	2,4	0,486
7	Adult nutritional milk protein powder	17	1,753	0,035	2,0	0,097	0,114	6,5	0,319
8	IF partially hydrolyzed soy powder	18	9,841	0,231	2,3	0,646	0,580	5,9	1,623
9	IF milk based powder	16	11,247	0,157	1,4	0,440	0,216	1,9	0,604
10	IF RTF (liquid) milk based	16	1,433	0,018	1,2	0,050	0,033	2,3	0,091
11	Adult nutritional RTF (liquid) high protein	18	1,430	0,051	3,6	0,144	0,072	5,0	0,202
12	Adult nutritional RTF (liquid) high fat	17	1,945	0,060	3,1	0,168	0,085	4,4	0,238
Monounsaturated fatty acids (MUFA)									
1	Full cream milk powder	17	5,411	0,137	2,5	0,385	0,230	4,3	0,644
2	Full liquid milk	17	0,717	0,009	1,2	0,025	0,051	7,1	0,142
3	Full cream	18	7,253	0,265	3,7	0,743	0,638	8,8	1,787
4	Butter	17	17,041	0,535	3,1	1,498	0,881	5,2	2,468
5	Cheese (extracted fat)	11	18,894	0,356	1,9	0,997	1,309	6,9	3,666
6	IF powder	16	11,148	0,236	2,1	0,661	0,629	5,6	1,760
7	Adult nutritional milk protein powder	16	10,574	0,242	2,3	0,678	0,590	5,6	1,653
8	IF partially hydrolyzed soy powder	16	7,230	0,115	1,6	0,323	0,354	4,9	0,990
9	IF milk based powder	17	9,213	0,265	2,9	0,742	0,381	4,1	1,067
10	IF RTF (liquid) milk based	15	1,174	0,014	1,2	0,039	0,055	4,7	0,154
11	Adult Nutritional RTF (liquid) high protein	17	0,966	0,034	3,5	0,094	0,083	8,6	0,234
12	Adult Nutritional RTF (liquid) high fat	15	4,552	0,115	2,5	0,322	0,228	5,0	0,639

Table C.1 *(continued)*

Sample no.	Product	No. of laboratories	Mean	s_r	RSD_r	r	s_R	RSD_R	R
Polyunsaturated fatty acids (PUFA)									
1	Full cream milk powder	14	0,751	0,013	1,7	0,035	0,040	5,4	0,113
2	Full liquid milk	18	0,107	0,004	3,4	0,010	0,007	7,0	0,021
3	Full cream	15	1,040	0,036	3,4	0,100	0,072	6,9	0,201
4	Butter	18	2,775	0,070	2,5	0,195	0,206	7,4	0,576
5	Cheese (extracted fat)	12	2,795	0,070	2,5	0,197	0,312	11,2	0,874
6	IF powder	16	4,292	0,074	1,7	0,206	0,117	2,7	0,328
7	Adult nutritional milk protein powder	17	2,912	0,060	2,1	0,169	0,149	5,1	0,416
8	IF partially hydrolyzed soy powder	18	6,063	0,293	4,8	0,822	0,537	8,9	1,505
9	IF milk based powder	18	5,340	0,160	3,0	0,448	0,245	4,6	0,685
10	IF RTF (liquid) milk based	16	0,639	0,010	1,5	0,027	0,033	5,1	0,091
11	Adult nutritional RTF (liquid) high protein	18	0,692	0,027	3,9	0,076	0,039	5,7	0,110
12	Adult Nutritional RTF (liquid) High fat	17	1,129	0,046	4,0	0,128	0,060	5,3	0,169
Omega-3 fatty acids (ω-3)									
1	Full cream milk powder	18	0,147	0,006	3,9	0,016	0,011	7,3	0,030
2	Full liquid milk	16	0,022	0,000	1,8	0,001	0,001	6,4	0,004
3	Full cream	17	0,235	0,008	3,6	0,024	0,022	9,2	0,061
4	Butter	18	0,637	0,017	2,7	0,049	0,041	6,4	0,114
5	Cheese (extracted fat)	12	0,580	0,011	2,0	0,032	0,068	11,7	0,190
6	IF powder	16	0,524	0,008	1,5	0,022	0,023	4,5	0,066
7	Adult nutritional milk protein powder	17	0,494	0,010	2,0	0,028	0,029	5,8	0,080
8	IF partially hydrolyzed soy powder	17	0,643	0,030	4,6	0,083	0,052	8,1	0,147
9	IF milk based powder	18	0,569	0,022	3,9	0,062	0,030	5,3	0,085
10	IF RTF (liquid) milk based	18	0,059	0,004	7,0	0,012	0,005	8,4	0,014
11	Adult nutritional RTF (liquid) high protein	18	0,121	0,006	4,8	0,016	0,008	6,6	0,022
12	Adult nutritional RTF (liquid) high fat	17	0,110	0,005	4,2	0,013	0,008	7,5	0,023
Omega-6 fatty acids (ω-6)									
1	Full cream milk powder	16	0,387	0,013	3,2	0,035	0,019	5,0	0,054
2	Full liquid milk	18	0,051	0,002	3,8	0,005	0,003	6,6	0,009
3	Full cream	15	0,478	0,024	4,9	0,066	0,037	7,8	0,104
4	Butter	17	1,172	0,029	2,4	0,080	0,074	6,3	0,207
5	Cheese (extracted fat)	11	1,262	0,033	2,6	0,093	0,066	5,2	0,183
6	IF powder	16	3,764	0,071	1,9	0,200	0,108	2,9	0,301
7	Adult nutritional milk protein powder	17	2,414	0,051	2,1	0,144	0,127	5,3	0,357
8	IF partially hydrolyzed soy powder	18	5,419	0,252	4,7	0,706	0,486	9,0	1,360
9	IF milk based powder	18	4,764	0,140	2,9	0,393	0,220	4,6	0,615
10	IF RTF (liquid) milk based	16	0,579	0,008	1,4	0,023	0,029	5,0	0,080
11	Adult nutritional RTF (liquid) high protein	18	0,571	0,022	3,8	0,061	0,033	5,8	0,093
12	Adult nutritional RTF (liquid) high fat	17	1,019	0,041	4,0	0,115	0,054	5,3	0,151
Omega-9 fatty acids (ω-9)									
1	Full cream milk powder	17	4,786	0,135	2,8	0,377	0,211	4,4	0,590
2	Full liquid milk	17	0,631	0,008	1,3	0,024	0,049	7,7	0,136

Table C.1 *(continued)*

Sample no.	Product	No. of laboratories	Mean	s_r	RSD_r	r	s_R	RSD_R	R
3	Full cream	18	6,400	0,242	3,8	0,678	0,578	9,0	1,620
4	Butter	17	15,033	0,416	2,8	1,165	0,782	5,2	2,190
5	Cheese (extracted fat)	11	16,538	0,306	1,9	0,857	1,150	7,0	3,221
6	IF powder	16	11,104	0,238	2,1	0,666	0,629	5,7	1,761
7	Adult nutritional milk protein powder	16	10,542	0,241	2,3	0,676	0,588	5,6	1,646
8	IF partially hydrolyzed soy powder	16	7,195	0,115	1,6	0,323	0,352	4,9	0,985
9	IF milk based powder	17	9,166	0,264	2,9	0,740	0,379	4,1	1,061
10	IF RTF (liquid) milk based	15	1,169	0,014	1,2	0,038	0,055	4,7	0,154
11	Adult nutritional RTF (liquid) high protein	17	0,961	0,034	3,5	0,094	0,083	8,6	0,232
12	Adult nutritional RTF (liquid) high fat	15	4,543	0,115	2,5	0,321	0,228	5,0	0,639
Linoleic acid (LA, C18:2 n-6)									
1	Full cream milk powder	17	0,339	0,009	2,6	0,024	0,021	6,3	0,059
2	Full liquid milk	18	0,044	0,002	3,5	0,004	0,003	7,6	0,009
3	Full cream	16	0,421	0,019	4,6	0,054	0,046	10,9	0,129
4	Butter	18	1,025	0,033	3,3	0,094	0,079	7,8	0,223
5	Cheese (extracted fat)	11	1,036	0,025	2,4	0,071	0,122	11,8	0,343
6	IF powder	16	3,690	0,065	1,8	0,182	0,104	2,8	0,293
7	Adult nutritional milk protein powder	17	2,406	0,051	2,1	0,144	0,127	5,3	0,356
8	IF partially hydrolyzed soy powder	18	5,253	0,239	4,6	0,670	0,446	8,5	1,248
9	IF milk based powder	18	4,584	0,131	2,8	0,366	0,196	4,3	0,550
10	IF RTF (liquid) milk based	16	0,553	0,007	1,2	0,019	0,028	5,0	0,077
11	Adult nutritional RTF (liquid) high protein	18	0,569	0,021	3,7	0,059	0,033	5,8	0,093
12	Adult nutritional RTF (liquid) high fat	17	1,017	0,041	4,0	0,115	0,054	5,3	0,150
α-Linolenic acid (ALA, C18:3 n-3)									
1	Full cream milk powder	18	0,130	0,004	3,2	0,012	0,007	5,6	0,021
2	Full liquid milk	18	0,020	0,001	3,0	0,002	0,002	8,6	0,005
3	Full cream	17	0,210	0,007	3,4	0,020	0,016	7,6	0,044
4	Butter	18	0,574	0,017	2,9	0,047	0,035	6,2	0,099
5	Cheese (extracted fat)	12	0,508	0,009	1,8	0,025	0,048	9,5	0,136
6	IF powder	16	0,457	0,006	1,4	0,018	0,022	4,9	0,063
7	Adult nutritional milk protein powder	17	0,493	0,010	2,0	0,028	0,029	5,8	0,080
8	IF partially hydrolyzed soy powder	15	0,570	0,011	1,9	0,031	0,035	6,2	0,099
9	IF milk based powder	18	0,482	0,015	3,1	0,042	0,023	4,9	0,066
10	IF RTF (liquid) milk based	18	0,048	0,003	6,0	0,008	0,004	7,7	0,010
11	Adult nutritional RTF (liquid) high protein	18	0,121	0,006	4,8	0,016	0,008	6,6	0,022
12	Adult nutritional RTF (liquid) high fat	17	0,109	0,004	3,8	0,012	0,007	6,2	0,019
Arachidonic acid (ARA, C20:4 n-6)									
1	Full cream milk powder	15	0,025	0,001	4,2	0,003	0,006	25,4	0,018
2	Full liquid milk	15	0,003	0,000	3,2	0,000	0,001	19,0	0,002
3	Full cream	15	0,031	0,002	8,0	0,007	0,007	23,9	0,021
4	Butter	16	0,072	0,002	2,7	0,005	0,018	24,6	0,049
5	Cheese (extracted fat)	12	0,089	0,018	20,7	0,051	0,030	33,7	0,084

Table C.1 *(continued)*

Sample no.	Product	No. of laboratories	Mean	s_r	RSD_r	r	s_R	RSD_R	R
6	IF powder	15	0,059	0,004	6,2	0,010	0,006	10,7	0,018
7	Adult nutritional milk protein powder	Not detectable/not evaluated							
8	IF partially hydrolyzed soy powder	15	0,146	0,004	3,0	0,012	0,011	7,3	0,030
9	IF milk based powder	16	0,165	0,006	3,8	0,018	0,010	6,3	0,029
10	IF RTF (liquid) milk based	13	0,023	0,000	2,1	0,001	0,001	3,6	0,002
11	Adult nutritional RTF (liquid) high protein	Not detectable/not evaluated							
12	Adult nRTF (liquid) high fat	Not detectable/not evaluated							
Eicosapentaenoic acid (EPA, C20:5 n-3)									
1	Full cream milk powder	16	0,016	0,002	13,4	0,006	0,004	26,8	0,012
2	Full liquid milk	14	0,002	0,000	6,8	0,000	0,000	10,3	0,001
3	Full cream	14	0,023	0,001	5,0	0,003	0,004	17,3	0,011
4	Butter	15	0,055	0,003	5,5	0,009	0,007	13,4	0,021
5	Cheese (extracted fat)	12	0,069	0,007	10,6	0,020	0,018	25,3	0,049
6	IF powder	11	0,012	0,001	6,8	0,002	0,001	8,3	0,003
7	Adult nutritional milk protein powder	Not detectable/not evaluated							
8	IF partially hydrolyzed soy powder	Not detectable/not evaluated							
9	IF milk based powder	Not detectable/not evaluated							
10	IF RTF (liquid) milk based	Not detectable/not evaluated							
11	Adult nutritional RTF (liquid) high protein	Not detectable/not evaluated							
12	Adult nutritional RTF (liquid) high fat	Not detectable/not evaluated							
Docosahexaenoic acid (DHA, C22:6 n-3)									
1	Full cream milk powder	Not detectable/not evaluated							
2	Full liquid milk	Not detectable/not evaluated							
3	Full cream	Not detectable/not evaluated							
4	Butter	Not detectable/not evaluated							
5	Cheese (extracted fat)	Not detectable/not evaluated							
6	IF powder	16	0,055	0,003	6,0	0,009	0,005	8,5	0,013
7	Adult nutritional milk protein powder	Not detectable/not evaluated							
8	IF partially hydrolyzed soy powder	18	0,070	0,010	13,8	0,027	0,010	14,6	0,029
9	IF milk based powder	17	0,087	0,005	5,5	0,013	0,005	5,5	0,013
10	IF RTF (liquid) milk based	14	0,011	0,000	2,5	0,001	0,001	6,8	0,002
11	Adult nutritional RTF (liquid) high protein	Not detectable/not evaluated							
12	Adult nutritional RTF (liquid) high fat	Not detectable/not evaluated							

Table C.2 contains data from the collaborative study, calculated as g fatty acids/100 g product for all other individual fatty acids (except those given in Table C.1).

Table C.2 — Precision data for all other individual fatty acids

Sample no.	Product	No. of laboratories	Mean	S_r	RSD_r	r	s_R	RSD_R	R
C4:0									
1	Full cream milk powder	16	0,846	0,025	2,9	0,069	0,103	12,2	0,289
2	Full milk	16	0,115	0,002	2,1	0,007	0,013	11,4	0,037
3	Full cream	17	1,215	0,072	5,9	0,202	0,119	9,8	0,334
4	Butter	16	2,934	0,087	3,0	0,243	0,407	13,9	1,139
5	Cheese (extracted fat)	13	3,028	0,161	5,3	0,451	0,451	14,9	1,263
6	IF powder	Not detectable/not evaluated							
7	Adult nutritional milk protein powder	Not detectable/not evaluated							
8	IF partially hydrolyzed soy powder	Not detectable/not evaluated							
9	IF milk based powder	Not detectable/not evaluated							
10	IF RTF (liquid) milk based	Not detectable/not evaluated							
11	Adult nutritional RTF (liquid) high protein	Not detectable/not evaluated							
12	Adult nutritional RTF (liquid) high fat	Not detectable/not evaluated							
C6:0									
1	Full cream milk powder	17	0,500	0,009	1,8	0,025	0,021	4,1	0,058
2	Full liquid milk	17	0,068	0,001	1,1	0,002	0,003	3,8	0,007
3	Full cream	18	0,695	0,025	3,5	0,069	0,040	5,7	0,111
4	Butter	18	1,682	0,041	2,4	0,114	0,088	5,2	0,245
5	Cheese (extracted fat)	12	1,967	0,054	2,8	0,152	0,095	4,9	0,267
6	IF powder	17	0,039	0,003	7,1	0,008	0,004	10,7	0,012
7	Adult nutritional milk protein powder	12	0,005	0,001	12,8	0,002	0,002	30,4	0,004
8	IF partially hydrolyzed soy powder	18	0,033	0,002	5,4	0,005	0,005	14,1	0,013
9	IF milk based powder	18	0,042	0,003	6,1	0,007	0,006	15,1	0,018
10	IF RTF (liquid) milk based	17	0,005	0,000	2,2	0,000	0,001	11,3	0,002
11	Adult nutritional RTF (liquid) high protein	13	0,002	0,000	4,1	0,000	0,000	13,2	0,001
12	Adult nutritional RTF (liquid) high fat	8	0,002	0,000	12,2	0,001	0,001	32,8	0,002
C8:0									
1	Full cream milk powder	17	0,291	0,003	1,1	0,009	0,008	2,8	0,023
2	Full liquid milk	18	0,040	0,000	1,1	0,001	0,001	3,0	0,003
3	Full cream	18	0,403	0,014	3,5	0,039	0,021	5,2	0,058
4	Butter	17	0,972	0,022	2,3	0,061	0,029	3,0	0,081
5	Cheese (extracted fat)	11	1,230	0,019	1,5	0,053	0,049	4,0	0,137
6	IF powder	16	0,446	0,009	2,1	0,026	0,014	3,1	0,039
7	Adult nutritional milk protein powder	17	0,042	0,001	1,4	0,002	0,002	5,5	0,007
8	IF partially hydrolyzed soy powder	16	0,382	0,003	0,8	0,008	0,016	4,1	0,044
9	IF milk based powder	17	0,415	0,008	1,8	0,021	0,020	4,7	0,055
10	IF RTF (liquid) milk based	16	0,051	0,001	1,5	0,002	0,002	3,6	0,005
11	Adult nutritional RTF (liquid) high protein	18	0,708	0,027	3,8	0,076	0,039	5,4	0,108
12	Adult nutritional RTF (liquid) high fat	16	0,821	0,017	2,1	0,048	0,030	3,6	0,083
C10:0									

Table C.2 *(continued)*

Sample no.	Product	No. of laboratories	Mean	S_r	RSD_r	r	s_R	RSD_R	R
1	Full cream milk powder	17	0,642	0,006	0,9	0,017	0,016	2,5	0,045
2	Full liquid milk	18	0,089	0,000	0,5	0,001	0,002	2,7	0,007
3	Full cream	17	0,880	0,033	3,7	0,092	0,042	4,8	0,118
4	Butter	17	2,146	0,027	1,2	0,075	0,068	3,2	0,189
5	Cheese (extracted fat)	11	2,972	0,040	1,3	0,111	0,091	3,1	0,256
6	IF powder	17	0,348	0,007	1,9	0,019	0,012	3,4	0,033
7	Adult nutritional milk protein powder	16	0,039	0,001	2,2	0,002	0,002	4,6	0,005
8	IF partially hydrolyzed soy powder	17	0,294	0,004	1,4	0,012	0,014	4,9	0,040
9	IF milk based powder	17	0,325	0,006	1,8	0,016	0,013	4,1	0,037
10	IF RTF (liquid) milk based	18	0,040	0,001	1,4	0,002	0,002	5,2	0,006
11	Adult nutritional RTF (liquid) high protein	18	0,501	0,017	3,5	0,049	0,024	4,8	0,067
12	Adult nutritional RTF (liquid) high fat	16	0,578	0,013	2,2	0,036	0,020	3,4	0,055
C12:0									
1	Full cream milk powder	17	0,733	0,008	1,1	0,023	0,020	2,7	0,055
2	Full liquid milk	18	0,101	0,001	1,0	0,003	0,003	2,6	0,007
3	Full cream	18	1,002	0,036	3,6	0,102	0,050	4,9	0,139
4	Butter	17	2,447	0,031	1,3	0,086	0,084	3,4	0,235
5	Cheese (extracted fat)	12	3,543	0,090	2,5	0,252	0,123	3,5	0,346
6	IF powder	17	2,670	0,050	1,9	0,140	0,071	2,7	0,199
7	Adult nutritional milk protein powder	17	0,075	0,001	1,5	0,003	0,004	4,9	0,010
8	IF partially hydrolyzed soy powder	16	2,192	0,017	0,8	0,049	0,048	2,2	0,135
9	IF milk based powder	16	2,454	0,016	0,6	0,044	0,030	1,2	0,085
10	IF RTF (liquid) milk based	16	0,293	0,002	0,7	0,006	0,005	1,7	0,014
11	Adult nutritional RTF (liquid) high protein	17	0,013	0,000	2,8	0,001	0,001	5,7	0,002
12	Adult nutritional RTF (liquid) high fat	16	0,016	0,000	2,6	0,001	0,002	10,9	0,005
C14:0									
1	Full cream milk powder	17	2,509	0,033	1,3	0,091	0,064	2,6	0,180
2	Full liquid milk	18	0,336	0,004	1,3	0,012	0,010	2,9	0,027
3	Full cream	18	3,375	0,121	3,6	0,339	0,174	5,2	0,488
4	Butter	18	8,241	0,147	1,8	0,412	0,323	3,9	0,905
5	Cheese (extracted fat)	12	10,485	0,352	3,4	0,987	0,474	4,5	1,327
6	IF powder	16	1,105	0,020	1,8	0,055	0,028	2,6	0,079
7	Adult nutritional milk protein powder	17	0,069	0,001	1,8	0,004	0,003	5,0	0,010
8	IF partially hydrolyzed soy powder	17	0,928	0,012	1,2	0,032	0,033	3,5	0,091
9	IF milk based powder	16	1,106	0,009	0,8	0,026	0,022	2,0	0,063
10	IF RTF (liquid) milk based	15	0,133	0,001	1,0	0,004	0,002	1,7	0,006
11	Adult nutritional RTF (liquid) high protein	17	0,008	0,000	2,9	0,001	0,000	5,2	0,001
12	Adult nutritional RTF (liquid) high fat	16	0,011	0,000	3,7	0,001	0,001	7,3	0,002
C14:1 n-5									
1	Full cream milk powder	16	0,227	0,004	1,8	0,012	0,010	4,3	0,028
2	Full liquid milk	17	0,032	0,001	1,9	0,002	0,001	3,7	0,003
3	Full cream	17	0,315	0,013	4,3	0,038	0,019	6,1	0,054

Table C.2 *(continued)*

Sample no.	Product	No. of laboratories	Mean	S_r	RSD_r	r	s_R	RSD_R	R
4	Butter	16	0,777	0,018	2,3	0,050	0,038	4,9	0,106
5	Cheese (extracted fat)	10	0,924	0,019	2,0	0,053	0,038	4,1	0,106
6	IF powder	Not detectable/not evaluated							
7	Adult nutritional milk protein powder	9	0,002	0,000	10,7	0,001	0,001	31,0	0,002
8	IF partially hydrolyzed soy powder	Not detectable/not evaluated							
9	IF milk based powder	10	0,004	0,000	13,4	0,001	0,001	26,9	0,003
10	IF RTF (liquid) milk based	Not detectable/not evaluated							
11	Adult nutritional RTF (liquid) high protein	Not detectable/not evaluated							
12	Adult nutritional RTF (liquid) high fat	Not detectable/not evaluated							
C15:0									
1	Full cream milk powder	18	0,279	0,008	2,9	0,022	0,059	21,0	0,164
2	Full liquid milk	18	0,038	0,001	2,8	0,003	0,008	21,2	0,023
3	Full cream	14	0,359	0,008	2,2	0,022	0,011	3,0	0,030
4	Butter	14	0,866	0,008	1,0	0,023	0,019	2,2	0,053
5	Cheese (extracted fat)	13	1,283	0,057	4,4	0,160	0,349	27,2	0,976
6	IF powder	14	0,009	0,000	5,0	0,001	0,002	20,2	0,005
7	Adult nutritional milk protein powder	14	0,008	0,001	6,4	0,001	0,001	13,5	0,003
8	IF partially hydrolyzed soy powder	13	0,009	0,001	6,6	0,002	0,001	7,9	0,002
9	IF milk based powder	14	0,013	0,001	4,4	0,002	0,002	15,4	0,006
10	IF RTF (liquid) milk based	15	0,002	0,000	4,8	0,000	0,000	14,9	0,001
11	Adult nutritional RTF (liquid) high protein	14	0,001	0,000	6,8	0,000	0,000	14,3	0,001
12	Adult nutritional RTF (liquid) high fat	13	0,002	0,000	12,8	0,001	0,000	15,7	0,001
C16:0									
1	Full cream milk powder	18	6,775	0,120	1,8	0,336	0,267	3,9	0,748
2	Full liquid milk	16	0,892	0,010	1,1	0,027	0,027	3,1	0,076
3	Full cream	18	8,988	0,286	3,2	0,800	0,522	5,8	1,462
4	Butter	18	21,349	0,506	2,4	1,416	1,101	5,2	3,083
5	Cheese (extracted fat)	12	23,523	0,533	2,3	1,493	2,413	10,3	6,756
6	IF powder	16	1,790	0,034	1,9	0,095	0,076	4,2	0,212
7	Adult nutritional milk protein powder	17	0,878	0,018	2,1	0,051	0,054	6,1	0,151
8	IF partially hydrolyzed soy powder	16	5,010	0,070	1,4	0,196	0,221	4,4	0,618
9	IF milk based powder	17	5,621	0,128	2,3	0,358	0,188	3,3	0,526
10	IF RTF (liquid) milk based	16	0,739	0,010	1,3	0,027	0,023	3,2	0,065
11	Adult nutritional RTF (liquid) high protein	17	0,136	0,004	2,8	0,011	0,008	5,7	0,022
12	Adult nutritional RTF (liquid) high fat	17	0,321	0,013	4,0	0,036	0,019	5,9	0,053
C16:1 n-7									
1	Full cream milk powder	17	0,327	0,008	2,5	0,022	0,016	4,9	0,045
2	Full liquid milk	17	0,046	0,001	1,1	0,001	0,002	5,2	0,007
3	Full cream	18	0,461	0,018	4,0	0,052	0,038	8,2	0,106
4	Butter	18	1,060	0,029	2,7	0,081	0,077	7,3	0,216
5	Cheese (extracted fat)	14	1,144	0,091	8,0	0,255	0,178	15,5	0,497
6	IF powder	16	0,037	0,002	4,6	0,005	0,003	8,0	0,008

Table C.2 *(continued)*

Sample no.	Product	No. of laboratories	Mean	S_r	RSD_r	r	s_R	RSD_R	R
7	Adult nutritional milk protein powder	18	0,026	0,001	5,1	0,004	0,003	11,7	0,009
8	IF partially hydrolyzed soy powder	18	0,030	0,002	6,4	0,005	0,003	10,3	0,009
9	IF milk based powder	16	0,040	0,001	3,6	0,004	0,004	9,8	0,011
10	IF RTF (liquid) milk based	16	0,004	0,000	5,6	0,001	0,000	7,7	0,001
11	Adult nutritional RTF (liquid) high protein	17	0,004	0,000	6,6	0,001	0,001	12,0	0,001
12	Adult nutritional RTF (liquid) high fat	15	0,007	0,000	4,1	0,001	0,001	8,1	0,002
C17:0									
1	Full cream milk powder	14	0,129	0,004	3,2	0,011	0,007	5,7	0,021
2	Full liquid milk	16	0,019	0,001	4,6	0,002	0,010	54,5	0,029
3	Full cream	14	0,174	0,007	4,0	0,019	0,014	8,2	0,040
4	Butter	18	0,503	0,026	5,1	0,072	0,281	55,9	0,787
5	Cheese (extracted fat)	13	0,614	0,035	5,7	0,098	0,404	65,8	1,131
6	IF powder	14	0,011	0,001	9,9	0,003	0,003	30,6	0,009
7	Adult nutritional milk protein powder	16	0,009	0,001	8,4	0,002	0,002	25,7	0,006
8	IF partially hydrolyzed soy powder	17	0,019	0,001	7,1	0,004	0,002	10,0	0,005
9	IF milk based powder	17	0,022	0,002	8,0	0,005	0,003	14,1	0,009
10	IF RTF (liquid) milk based	16	0,003	0,000	7,6	0,001	0,000	10,4	0,001
11	Adult nutritional RTF (liquid) high protein	15	0,001	0,000	25,4	0,001	0,000	29,9	0,001
12	Adult nutritional RTF (liquid) high fat	11	0,002	0,000	10,5	0,001	0,000	16,6	0,001
C17:1									
1	Full cream milk powder	12	0,054	0,002	3,1	0,005	0,003	5,1	0,008
2	Full liquid milk	15	0,007	0,000	5,2	0,001	0,001	11,3	0,002
3	Full cream	13	0,072	0,003	3,5	0,007	0,007	10,3	0,021
4	Butter	12	0,170	0,006	3,6	0,017	0,016	9,7	0,046
5	Cheese (extracted fat)	9	0,203	0,009	4,3	0,025	0,028	14,0	0,079
6	IF powder	Not detectable/not evaluated							
7	Adult nutritional milk protein powder	11	0,008	0,001	12,4	0,003	0,003	30,9	0,007
8	IF partially hydrolyzed soy powder	10	0,008	0,001	8,8	0,002	0,002	20,4	0,005
9	IF milk based powder	9	0,009	0,001	8,0	0,002	0,002	17,1	0,004
10	IF RTF (liquid) milk based	8	0,001	0,000	9,0	0,000	0,000	16,9	0,000
11	Adult nutritional RTF (liquid) high protein	Not detectable/not evaluated							
12	Adult nutritional RTF (liquid) high fat	8	0,003	0,000	11,7	0,001	0,001	30,7	0,002
C18:0									
1	Full cream Milk powder	18	2,363	0,073	3,1	0,204	0,091	3,9	0,255
2	Full liquid milk	16	0,315	0,005	1,4	0,013	0,011	3,4	0,030
3	Full cream	18	3,165	0,126	4,0	0,352	0,206	6,5	0,578
4	Butter	18	7,305	0,245	3,3	0,685	0,356	4,9	0,997
5	Cheese (extracted fat)	12	8,223	0,180	2,2	0,505	0,897	10,9	2,511
6	IF powder	16	0,690	0,014	2,0	0,039	0,028	4,0	0,078
7	Adult nutritional milk protein powder	17	0,445	0,010	2,2	0,028	0,027	6,0	0,075
8	IF partially hydrolyzed soy powder	16	0,938	0,016	1,7	0,046	0,051	5,4	0,142
9	IF milk based powder	17	1,075	0,030	2,8	0,085	0,042	3,9	0,117

Table C.2 *(continued)*

Sample no.	Product	No. of laboratories	Mean	S_r	RSD_r	r	s_R	RSD_R	R
10	IF RTF (liquid) milk based	15	0,146	0,002	1,5	0,006	0,004	3,0	0,012
11	Adult nutritional RTF (liquid) high protein	17	0,042	0,002	3,8	0,004	0,003	6,2	0,007
12	Adult nutritional RTF (liquid) high fat	17	0,129	0,005	4,1	0,015	0,008	5,9	0,021
C18:1 TFA									
1	Full cream milk powder	18	0,845	0,036	4,3	0,102	0,063	7,5	0,176
2	Full liquid milk	18	0,134	0,004	3,1	0,011	0,010	7,6	0,028
3	Full cream	18	1,323	0,070	5,3	0,197	0,128	9,7	0,358
4	Butter	17	3,415	0,128	3,7	0,358	0,231	6,8	0,647
5	Cheese (extracted fat)	12	4,131	0,118	2,9	0,330	0,409	9,9	1,144
6	IF powder	11	0,016	0,001	7,5	0,003	0,005	28,4	0,013
7	Adult nutritional milk protein powder	16	0,034	0,002	6,7	0,006	0,006	17,5	0,017
8	IF partially hydrolyzed soy powder	11	0,015	0,001	6,0	0,003	0,005	31,9	0,014
9	IF milk based powder	14	0,033	0,002	6,1	0,006	0,006	17,0	0,016
10	IF RTF (liquid) milk based	16	0,013	0,001	5,7	0,002	0,002	16,4	0,006
11	Adult nutritional RTF (liquid) high protein	16	0,003	0,000	13,4	0,001	0,001	36,2	0,003
12	Adult nutritional RTF (liquid) high fat	9	0,005	0,000	5,8	0,001	0,002	31,6	0,005
C18:1 n-9/7									
1	Full cream milk powder	17	4,760	0,132	2,8	0,369	0,210	4,4	0,587
2	Full liquid milk	17	0,628	0,008	1,4	0,024	0,049	7,8	0,137
3	Full cream	18	6,369	0,239	3,7	0,669	0,572	9,0	1,602
4	Butter	17	14,961	0,417	2,8	1,166	0,773	5,2	2,165
5	Cheese (extracted fat)	11	16,468	0,304	1,8	0,852	1,146	7,0	3,207
6	IF powder	16	10,992	0,233	2,1	0,653	0,627	5,7	1,757
7	Adult nutritional milk protein powder	16	10,438	0,240	2,3	0,671	0,582	5,6	1,630
8	IF partially hydrolyzed soy powder	16	7,146	0,115	1,6	0,322	0,371	5,2	1,038
9	IF milk based powder	17	9,109	0,263	2,9	0,736	0,384	4,2	1,075
10	IF RTF (liquid) milk based	15	1,163	0,014	1,2	0,038	0,055	4,8	0,155
11	Adult nutritional RTF (liquid) high protein	17	0,940	0,033	3,5	0,091	0,082	8,7	0,228
12	Adult nutritional RTF (liquid) high fat	15	4,506	0,114	2,5	0,320	0,227	5,0	0,637
C18:2 TFA									
1	Full cream milk powder	18	0,178	0,017	9,7	0,048	0,061	34,2	0,170
2	Full liquid milk	17	0,031	0,001	4,3	0,004	0,009	29,0	0,025
3	Full cream	18	0,306	0,032	10,5	0,090	0,102	33,2	0,285
4	Butter	17	0,784	0,021	2,7	0,059	0,261	33,3	0,731
5	Cheese (extracted fat)	13	0,888	0,084	9,4	0,234	0,326	36,7	0,912
6	IF powder	17	0,027	0,002	7,6	0,006	0,006	23,6	0,018
7	Adult nutritional milk protein powder	13	0,012	0,001	6,9	0,002	0,003	27,9	0,009
8	IF partially hydrolyzed soy powder	16	0,041	0,004	9,8	0,011	0,005	11,6	0,013
9	IF milk based powder	16	0,056	0,004	7,6	0,012	0,007	11,9	0,019
10	IF RTF (liquid) milk based	17	0,010	0,001	9,1	0,003	0,001	11,0	0,003
11	Adult nutritional RTF (liquid) high protein	16	0,003	0,000	8,9	0,001	0,001	25,1	0,002
12	Adult nutritional RTF (liquid) high fat	12	0,003	0,000	8,6	0,001	0,001	34,5	0,003

Table C.2 *(continued)*

Sample no.	Product	No. of laboratories	Mean	S_r	RSD_r	r	s_R	RSD_R	R
C18:2 conj. (CLA)									
1	Full cream milk powder	16	0,200	0,009	4,5	0,025	0,017	8,6	0,048
2	Full liquid milk	18	0,034	0,001	4,5	0,004	0,003	9,4	0,009
3	Full cream	17	0,339	0,014	4,2	0,040	0,032	9,5	0,090
4	Butter	18	0,945	0,029	3,1	0,081	0,074	7,9	0,208
5	Cheese (extracted fat)	12	1,017	0,027	2,6	0,075	0,106	10,5	0,298
6	IF powder	Not detectable/not evaluated							
7	Adult nutritional milk protein powder	Not detectable/not evaluated							
8	IF partially hydrolyzed soy powder	Not detectable/not evaluated							
9	IF milk based powder	Not detectable/not evaluated							
10	IF RTF (liquid) milk based	Not detectable/not evaluated							
11	Adult nutritional RTF (liquid) high protein	Not detectable/not evaluated							
12	Adult nutritional RTF (liquid) high fat	Not detectable/not evaluated							
C18:3 n-6									
1	Full cream milk powder	Not detectable/not evaluated							
2	Full liquid milk	Not detectable/not evaluated							
3	Full cream	Not detectable/not evaluated							
4	Butter	Not detectable/not evaluated							
5	Cheese (extracted fat)	Not detectable/not evaluated							
6	IF powder	Not detectable/not evaluated							
7	Adult nutritional milk protein powder	Not detectable / not evaluated							
8	IF partially hydrolyzed soy powder	8	0,010	0,000	4,2	0,001	0,001	6,2	0,002
9	IF milk based powder	12	0,013	0,001	10,9	0,004	0,003	23,3	0,009
10	IF RTF (liquid) milk based	13	0,002	0,000	11,2	0,001	0,001	30,6	0,001
11	Adult nutritional RTF (liquid) high protein	Not detectable/not evaluated							
12	Adult nutritional RTF (liquid) high fat	Not detectable/not evaluated							
C18:3 TFA									
1	Full cream milk powder	Not detectable/not evaluated							
2	Full liquid milk	Not detectable/not evaluated							
3	Full cream	Not detectable/not evaluated							
4	Butter	Not detectable/not evaluated							
5	Cheese (extracted fat)	Not detectable/not evaluated							
6	IF powder	11	0,035	0,002	6,8	0,007	0,010	28,5	0,028
7	Adult nutritional milk protein powder	12	0,013	0,001	6,9	0,003	0,006	41,9	0,016
8	IF partially hydrolyzed soy powder	15	0,047	0,010	20,5	0,027	0,026	55,4	0,072
9	IF milk based powder	11	0,034	0,002	5,7	0,005	0,023	68,4	0,065
10	IF RTF (liquid) milk based	18	0,005	0,001	26,8	0,003	0,003	72,9	0,009
11	Adult nutritional RTF (liquid) high protein	13	0,005	0,000	6,1	0,001	0,002	38,6	0,005
12	Adult nutritional RTF (liquid) high fat	11	0,003	0,001	23,6	0,002	0,002	50,9	0,005
C20:0									
1	Full cream milk powder	18	0,037	0,003	7,4	0,008	0,004	10,6	0,011
2	Full liquid milk	16	0,005	0,000	5,2	0,001	0,001	11,9	0,002

Table C.2 *(continued)*

Sample no.	Product	No. of laboratories	Mean	S_r	RSD_r	r	s_R	RSD_R	R
3	Full cream	17	0,047	0,005	11,3	0,015	0,008	17,8	0,024
4	Butter	17	0,110	0,004	3,5	0,011	0,012	10,8	0,033
5	Cheese (extracted fat)	12	0,116	0,004	3,2	0,010	0,023	19,6	0,064
6	IF powder	17	0,068	0,004	5,1	0,010	0,006	8,2	0,016
7	Adult nutritional milk protein powder	17	0,055	0,002	4,2	0,007	0,005	9,5	0,015
8	IF partially hydrolyzed soy powder	16	0,073	0,002	2,8	0,006	0,007	10,1	0,021
9	IF milk based powder	17	0,080	0,004	4,8	0,011	0,005	6,7	0,015
10	IF RTF (liquid) milk based	18	0,010	0,001	7,5	0,002	0,001	9,4	0,003
11	Adult nutritional RTF (liquid) high protein	17	0,010	0,001	6,9	0,002	0,001	10,1	0,003
12	Adult nutritional RTF (liquid) high fat	16	0,028	0,001	5,0	0,004	0,002	6,5	0,005
C20:1 n-9									
1	Full cream milk powder	14	0,021	0,004	18,8	0,011	0,014	66,8	0,040
2	Full liquid milk	15	0,003	0,000	7,6	0,001	0,002	58,6	0,005
3	Full cream	15	0,031	0,004	11,5	0,010	0,019	61,5	0,054
4	Butter	15	0,069	0,008	11,3	0,022	0,041	59,6	0,116
5	Cheese (extracted fat)	11	0,069	0,003	5,0	0,010	0,039	56,3	0,109
6	IF powder	16	0,101	0,005	5,2	0,015	0,012	11,6	0,033
7	Adult nutritional milk protein powder	17	0,093	0,003	2,9	0,008	0,008	8,4	0,022
8	IF partially hydrolyzed soy powder	15	0,042	0,003	6,7	0,008	0,007	17,9	0,021
9	IF milk based powder	16	0,046	0,005	10,3	0,013	0,007	15,8	0,020
10	IF RTF (liquid) milk based	17	0,006	0,001	10,4	0,002	0,001	21,4	0,004
11	Adult nutritional RTF (liquid) high protein	17	0,018	0,001	5,3	0,003	0,001	8,4	0,004
12	Adult nutritional RTF (liquid) high fat	15	0,029	0,001	4,4	0,004	0,002	7,7	0,006
C20:2 n-6									
1	Full cream milk powder	Not detectable/not evaluated							
2	Full liquid milk	Not detectable/not evaluated							
3	Full cream	10	0,008	0,002	26,6	0,006	0,002	32,0	0,007
4	Butter	13	0,016	0,001	6,0	0,003	0,002	14,3	0,007
5	Cheese (extracted fat)	Not detectable/not evaluated							
6	IF powder	10	0,006	0,001	10,1	0,002	0,001	21,1	0,004
7	Adult nutritional milk protein powder	11	0,004	0,000	8,2	0,001	0,001	20,1	0,002
8	IF partially hydrolyzed soy powder	10	0,006	0,001	9,9	0,002	0,002	28,8	0,005
9	IF milk based powder	9	0,005	0,000	8,6	0,001	0,001	14,1	0,002
10	IF RTF (liquid) milk based	8	0,001	0,000	6,6	0,000	0,000	19,6	0,000
11	Adult nutritional RTF (liquid) high protein	10	0,001	0,000	15,4	0,000	0,000	16,3	0,000
12	Adult nutritional RTF (liquid) high fat	8	0,001	0,000	5,3	0,000	0,000	31,0	0,001
C20:3 n-6									
1	Full cream milk powder	13	0,015	0,002	10,5	0,005	0,002	10,5	0,005
2	Full liquid milk	15	0,002	0,000	6,7	0,000	0,000	6,9	0,000
3	Full cream	14	0,019	0,002	10,4	0,006	0,003	15,6	0,008
4	Butter	12	0,042	0,001	3,0	0,003	0,004	8,8	0,010
5	Cheese (extracted fat)	10	0,051	0,003	6,8	0,010	0,009	18,1	0,026

Table C.2 *(continued)*

Sample no.	Product	No. of laboratories	Mean	S_r	RSD_r	r	s_R	RSD_R	R
6	IF powder	Not detectable/not evaluated							
7	Adult nutritional milk protein powder	Not detectable/not evaluated							
8	IF partially hydrolyzed soy powder	10	0,012	0,000	3,9	0,001	0,001	8,0	0,003
9	IF milk based powder	12	0,014	0,001	6,1	0,002	0,002	17,0	0,007
10	IF RTF (liquid) milk based	14	0,002	0,000	6,5	0,000	0,000	19,1	0,001
11	Adult nutritional RTF (liquid) high protein	Not detectable/not evaluated							
12	Adult nutritional RTF (liquid) high fat	Not detectable/not evaluated							
C22:0									
1	Full cream milk powder	14	0,015	0,001	7,5	0,003	0,003	23,2	0,010
2	Full liquid milk	13	0,002	0,000	6,3	0,000	0,000	13,1	0,001
3	Full cream	15	0,021	0,002	8,9	0,005	0,006	30,6	0,018
4	Butter	13	0,045	0,001	3,2	0,004	0,010	22,9	0,029
5	Cheese (extracted fat)	9	0,051	0,003	5,2	0,007	0,011	22,1	0,031
6	IF powder	16	0,109	0,005	4,7	0,014	0,012	10,7	0,033
7	Adult nutritional milk protein powder	16	0,096	0,004	4,5	0,012	0,010	10,0	0,027
8	IF partially hydrolyzed soy powder	15	0,042	0,002	4,7	0,006	0,004	10,5	0,012
9	IF milk based powder	17	0,044	0,007	14,7	0,018	0,007	15,8	0,020
10	IF RTF (liquid) milk based	16	0,008	0,001	11,4	0,003	0,001	12,6	0,003
11	Adult nutritional RTF (liquid) high protein	17	0,005	0,001	11,6	0,002	0,001	12,5	0,002
12	Adult nutritional RTF (liquid) high fat	15	0,019	0,001	4,3	0,002	0,001	7,2	0,004
C22:1 n-9									
1	Full cream milk powder	Not detectable/not evaluated							
2	Full liquid milk	Not detectable/not evaluated							
3	Full cream	Not detectable/not evaluated							
4	Butter	Not detectable/not evaluated							
5	Cheese (extracted fat)	Not detectable/not evaluated							
6	IF powder	11	0,009	0,001	12,1	0,003	0,002	23,8	0,006
7	Adult nutritional milk protein powder	12	0,006	0,001	12,7	0,002	0,001	16,9	0,003
8	IF partially hydrolyzed soy powder	Not detectable/not evaluated							
9	IF milk based powder	Not detectable/not evaluated							
10	IF RTF (liquid) milk based	Not detectable/not evaluated							
11	Adult nutritional RTF (liquid) high protein	Not detectable/not evaluated							
12	Adult nutritional RTF (liquid) high fat	Not detectable/not evaluated							
C24:0									
1	Full cream milk powder	12	0,010	0,002	18,1	0,005	0,003	25,3	0,007
2	Full liquid milk	11	0,001	0,000	10,8	0,000	0,000	15,3	0,001
3	Full cream	13	0,014	0,002	16,9	0,007	0,006	42,3	0,017
4	Butter	12	0,030	0,002	6,2	0,005	0,005	18,2	0,015
5	Cheese (extracted fat)	8	0,031	0,003	10,0	0,009	0,005	15,8	0,014
6	IF powder	16	0,042	0,004	9,8	0,011	0,007	16,2	0,019
7	Adult nutritional milk protein powder	16	0,036	0,003	8,5	0,009	0,005	14,3	0,015
8	IF partially hydrolyzed soy powder	15	0,024	0,002	9,1	0,006	0,004	18,5	0,012

Table C.2 *(continued)*

Sample no.	Product	No. of laboratories	Mean	S_r	RSD_r	r	s_R	RSD_R	R
9	IF milk based powder	14	0,025	0,002	7,6	0,005	0,003	13,7	0,010
10	IF RTF (liquid) milk based	16	0,004	0,001	15,5	0,002	0,001	15,6	0,002
11	Adult nutritional RTF (liquid) high protein	15	0,003	0,000	8,4	0,001	0,000	11,3	0,001
12	Adult nutritional RTF (liquid) high fat	16	0,011	0,001	7,3	0,002	0,001	11,8	0,004
C24:1 n-9									
1	Full cream milk powder	Not detectable/not evaluated							
2	Full liquid milk	Not detectable/not evaluated							
3	Full cream	Not detectable/not evaluated							
4	Butter	Not detectable/not evaluated							
5	Cheese (extracted fat)	Not detectable/not evaluated							
6	IF powder	11	0,010	0,001	6,2	0,002	0,002	16,5	0,005
7	Adult nutritional milk protein powder	10	0,009	0,001	12,2	0,003	0,001	12,8	0,003
8	IF partially hydrolyzed soy powder	Not detectable/not evaluated							
9	IF milk based powder	9	0,007	0,001	10,8	0,002	0,001	14,0	0,003
10	IF RTF (liquid) milk based	Not detectable/not evaluated							
11	Adult nutritional RTF (liquid) high protein	16	0,002	0,000	10,4	0,001	0,000	20,8	0,001
12	Adult nutritional RTF (liquid) high fat	14	0,011	0,001	5,7	0,002	0,001	9,6	0,003

Table C.3 — Precision data from the collaborative study for total fatty acids

Sample no.	Product	No. of laboratories	Mean	S_r	RSD_r	r	s_R	RSD_R	R
1	Full cream milk powder	18	22,825	0,379	1,7	1,061	0,993	4,4	2,782
2	Full liquid milk	17	3,076	0,028	0,9	0,079	0,136	4,4	0,381
3	Full cream	18	31,146	1,031	3,3	2,886	1,920	6,2	5,376
4	Butter	18	74,566	1,393	1,9	3,901	3,717	5,0	10,407
5	Cheese (extracted fat)	14	83,851	6,712	8,0	18,795	12,072	14,4	33,802
6	IF powder	16	22,867	0,401	1,8	1,122	0,811	3,5	2,270
7	Adult nutritional milk protein powder	18	15,452	0,598	3,9	1,675	1,478	9,6	4,139
8	IF partially hydrolyzed soy powder	16	23,353	0,382	1,6	1,070	1,002	4,3	2,806
9	IF milk based powder	17	25,915	0,621	2,4	1,738	0,885	3,4	2,478
10	IF RTF (liquid) milk based	16	3,250	0,036	1,1	0,102	0,170	5,2	0,477
11	Adult nutritional RTF (liquid) high protein	18	3,104	0,098	3,2	0,275	0,152	4,9	0,426
12	Adult nutritional RTF (liquid) high fat	17	7,617	0,331	4,4	0,928	0,406	5,3	1,138

Table C.4 gives precision data from the collaborative study, calculated as percentage of Performance of transesterification (Pt) (recovery of C13:0 TAG internal standard versus C11:0 FAME internal standard).

Table C.4 — Precision data from the collaborative study, performance of transesterification

Sample no.	Product	No. of laboratories	Mean	S_r	RSD_r	r	s_R	RSD_R	R
1	Full cream milk powder	17	98,9	0,6	0,6	1,8	1,6	1,6	4,5
2	Full liquid milk	18	99,1	0,7	0,7	1,9	1,2	1,2	3,4
3	Full cream	17	99,6	0,5	0,5	1,4	1,1	1,1	3,1
4	Butter	17	99,5	0,5	0,5	1,4	1,2	1,2	3,3
5	Cheese (extracted fat)	14	100,0	1,0	1,0	2,9	2,7	2,7	7,6
6	IF powder	15	99,5	0,7	0,7	2,0	1,1	1,1	3,1
7	Adult nutritional milk protein powder	18	99,7	0,7	0,7	1,9	1,2	1,2	3,4
8	IF partially hydrolyzed soy powder	16	99,5	0,2	0,2	0,6	1,0	1,0	2,9
9	IF milk based powder	16	99,4	0,4	0,4	1,0	1,2	1,2	3,4
10	IF RTF (liquid) milk based	17	99,9	0,7	0,7	1,9	1,2	1,2	3,4
11	Adult nutritional RTF (liquid) high protein	16	99,8	0,6	0,6	1,7	0,9	0,9	2,6
12	Adult nutritional RTF (liquid) high fat	17	100,0	0,6	0,6	1,8	0,9	0,9	2,6

Annex A
(informative)

Precision data

The data given in Table A.1 were obtained in an interlaboratory study and published in 2015,[6] in accordance with ISO 5725-2[7] and AOAC-IUPAC Harmonized Protocol for collaborative study procedures, to assess precision characteristics of a method of analysis.[8] The method exhibited excellent performance across eight laboratories, seven times two samples and five different models of ICP-MS instruments. A nominal eight laboratories participated in this study, although for some analytes in some matrices, there may be less than eight results because of outlier rejection (Cr had three matrices with seven laboratories, Mo had two with seven laboratories and Se had all eight laboratories reporting at least one replicate result for all matrices).

Table A.1 — Precision data for chromium, molybdenum and selenium

Sample[h]	1[a]	2[b]	3[c]	4[d]	5[e]	6[f]	7[g]	Mean
Chromium (PLOQ = 20 ng/g)								
Mean result (ng/g)	16	48	140	130	30	24	< < 20	
Repeatability relative standard deviation, RSD_r, %	3,4	4,7	2,1	7,0	5,5	3,8	< PLOQ	4,4
Reproducibility relative standard deviation, RSD_R, %	12,1	7,1	5,8	8,1	9,2	13,4	< PLOQ	9,3
HorRat value	0,57	0,39	0,27	0,37	0,48	0,67	< PLOQ	0,46
Molybdenum (PLOQ = 20 ng/g)								
Mean result (ng/g)	33	63	190	150	30	18	20	
Repeatability relative standard deviation, RSD_r, %	1,0	1,6	1,2	1,0	3,3	1,7	3,3	1,9
Reproducibility relative standard deviation, RSD_R, %	7,9	3,1	3,8	3,0	4,6	7,9	6,7	5,3
HorRat value	0,42	0,18	0,19	0,14	0,24	0,38	0,33	0,27
Selenium (PLOQ = 10 ng/g)								
Mean result (ng/g)	24	30	133	93	24	23	27	
Repeatability relative standard deviation, RSD_r, %	6,1	5,9	4,7	2,3	3,8	6,4	2,4	4,5
Reproducibility relative standard deviation, RSD_R, %	6,1	7,2	5,0	8,1	7,3	9,3	2,5	6,5
HorRat value	0,31	0,37	0,23	0,36	0,37	0,46	0,13	0,32

[a] Adult milk protein, [b] Adult powder, low fat, [c] Adult RTF, high fat, [d] Adult nutritional RTF, high protein, [e] Child formula powder, [f] Infant elemental, [g] Infant milk powder, [h] Sample concentrations are indicated on an as-fed basis (25 g of powder diluted + 200 ml of water).

Annex A
(informative)

Precision data

The data given in Table A.1 were obtained in an interlaboratory study and published in 2015,[2] in accordance with ISO 5725-2[3] and AOAC-IUPAC Harmonized Protocol for collaborative study procedures, to assess precision characteristics of a method of analysis.[4]

Table A.1 — Precision data for iodine

Sample	1[a]	2[b]	3[c]	4[d]	5[e]	6[f]	7[g,j]
Year of interlaboratory test	2014	2014	2014	2014	2014	2014	2014
Number of laboratories retained after eliminating outliers	13	11	11	13	11	11	12
Number of outliers (laboratories)[k]	0	2	2	0	2	2	1
Mean value, $\bar{x}$, µg/100 g [i]	5,48	12,4	18,5	5,45	3,47	7,03	1,24
Repeatability standard deviation s_r, µg/100 g	0,262	0,313	0,693	0,226	0,135	0,137	0,010
Reproducibility standard deviation s_R, µg/100 g	0,507	0,945	1,39	0,626	0,278	0,503	0,067
Repeatability relative standard deviation, RSD_r, %	4,78	2,53	3,75	4,16	3,87	1,94	0,77
Reproducibility relative standard deviation, RSD_R, %	9,25	7,62	7,54	11,5	8,01	7,15	5,42
Repeatability limit r [$r = 2,8 \times s_r$], µg/100 g	0,734	0,876	1,94	0,633	0,378	0,384	0,028
Reproducibility limit R [$R = 2,8 \times s_R$], µg/100 g	1,42	2,65	3,89	1,75	0,778	1,41	0,188
HorRat value, according to Reference [5]	1,06	0,98	1,03	1,31	0,85	0,85	0,35

[a] Infant formula RTF, milk based-1, [b] Infant formula powder,soy based, [c] Infant formula powder, milk based, [d] Infant formula RTF, milk based-2, [e] Child formula powder, [f] Adult nutritional powder, low fat, [g] NIST SRM 1849a, [i] Result expressed as µg/100 g reconstituted final product, [j] Result expressed as mg/kg, [k] Values from outlier laboratories were not used in statistical calculations.