EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023

EURL-PT-POP_2301-MP

FOOD

Report

PCDD/Fs and PCBs

(Report Version 1.1)

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EURL POPs

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Summary

Test sample	**FOOD:** Milk Powder [2301-MP]
Analytes of interest **Mandatory** for NRLs:	**PCDD/Fs** (17 2,3,7,8-substituted PCDD/Fs) **PCBs** (12 DL-PCBs, 6 NDL-PCBs)
Methods	**PCDD/Fs, DL-PCBs:** GC-HRMS, GC-MS/MS and alternative methods; Bioanalytical screening methods **NDL-PCBs:** Any kind of method
Participants	NRLs, OFLs, other official laboratories, commercial laboratories performing the analysis of samples taken by food business operators
Statistical evaluation	ISO 13528:2022 [1], IUPAC Protocol [2]
Report of final results	26 January 2024 (Version 1.0) 03 May 2024 (Version 1.1): **Modifications for LC 28 and 83**
Publication	EURL POPs reserves all rights to publish and present the anonymised results of the interlaboratory study in scientific journals and/or during conferences.

1. Structure of the proficiency test, test material and analytes

This proficiency test (PT) on the determination of **PCDD/Fs, PCBs, PBDEs, HBCDDs** and **PFASs** in **milk powder** was organized by the EURL for halogenated POPs in Feed and Food to be performed between February and April 2023. The objective was to assess analytical performance of laboratories and interlaboratory comparability of results from analyses of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in one sample of **milk powder**.

National Reference Laboratories (NRLs) for halogenated POPs in Feed and Food from EU member states were requested to participate as part of their work programme for 2023. NRLs were invited to encourage the participation of **Official Laboratories (OFLs)** from their member states as part of their duties following Article 101 of regulation (EU) 2017/625 of the European Parliament and of the Council of 15 March 2017. Furthermore, participation of OFLs allowed the extension of the data basis for calculation of assigned values and evaluation of results.

Other official laboratories and **commercial laboratories** performing the analysis of samples taken by food business operators were invited to participate in this proficiency test. The evaluated results were discussed by representatives of European Commission, NRLs and the EURL at the EURL/NRL workshop in May 2023 in Berlin, Germany.

1.1. Samples and coding

The test material was prepared from commercially available food and fortified with analytes of interest using analytical standards or technical mixtures of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs.

Milk powder	**Sample no. 2301-MP-xxx**

Each participant received about **90 g** of the test sample in a HDPE bottle.

1.2. Analytes of interest

Participants were requested to determine the following parameters:

- 17 2,3,7,8-substituted PCDD/Fs
- WHO-PCDD/F-TEQ (using WHO_{2005}-TEF)
- 12 dioxin-like PCBs
- WHO-PCB-TEQ (using WHO_{2005}-TEF)
- WHO-PCDD/F-PCB-TEQ (using WHO_{2005}-TEF)
- Six non-dioxin-like PCBs (indicator PCBs): PCB 28, 52, 101, 138, 153, 180
- Sum of six non-dioxin-like PCBs (indicator PCBs)
- PCDD/F-PCB-BEQ, PCDD/F-BEQ and/or PCB-BEQ, if applicable (using bioanalytical screening methods)

1.3. Methods

One or more of the following **detection methods** could be applied:

- GC-HRMS-, GC-MS/MS-methods or other alternative methods for PCDD/Fs and dioxin-like PCBs
- Bioanalytical screening methods for PCDD/Fs and dioxin-like PCBs
- Any kind of method for non-dioxin-like PCBs

1.4. Coding of laboratories and confidentiality

The identity of participating laboratories will be kept confidential.
For NRLs of EU member states, the suggested “protocol for management of underperformance in comparative testing or lack of collaboration of National Reference Laboratories (NRLs)” will be followed. The confidentiality of NRLs will be kept according to this protocol.
For OFLs of EU member states cooperating with NRL, the respective NRLs will inform the EURL for halogenated POPs about the participating OFLs and will receive the respective laboratory codes, invoices for participation fee and certificates of participation of the OFLs.

1.5. Results of PCDD/Fs and PCBs

1.5.1. Results of PCDD/Fs and PCBs determined by physico-chemical methods (GC-HRMS, GC-MS/MS, GC-LRMS, GC-ECD, …)

Laboratories should

- use their own reference standards for identification and quantification,
- report results for each analyte,
- report the limit of quantification (LOQ), at least for each non-quantified analyte,
- report upper, middle and lower bound results for WHO-PCDD/F-PCB-TEQ, WHO-PCDD/F-TEQ, WHO-PCB-TEQ and sum of six indicator PCBs,
- report if sample exceeds respective EU maximum or action levels for WHO-PCDD/F-PCB-TEQ, WHO-PCDD/F-TEQ and/or WHO-PCB-TEQ or the maximum level for the sum of six non-dioxin-like PCBs beyond reasonable doubt taking into account the measurement uncertainty,
- report the measurement uncertainty, applied for checking of compliance, for WHO-PCDD/F-PCB-TEQ, WHO-PCDD/F-TEQ, WHO-PCB-TEQ and the sum of six indicator PCBs,
- give method information and
- give information about the accreditation of the laboratory according to ISO/IEC 17025 *(for metrological traceability of consensus values of participants used as assigned values).*

Results had to be reported in **pg/g fat** for PCDD/Fs and dioxin-like PCBs and **ng/g fat** for non-dioxin-like PCBs. TEQ-based results have to be calculated using the WHO-TEFs of 2005 [3].

1.5.2. Results of PCDD/Fs and PCBs determined by bioanalytical screening methods

Laboratories should

- use their own reference standards,
- report if the samples are suspected to be noncompliant with EU legal limits and confirmation is required,
- report PCDD/F and/or PCB results in BEQ, if applicable,
- report the reporting limit, maximum / action level, which the evaluation is based on, and the bioassay cut-off, if applicable,
- give method information
- and give information about the accreditation of the laboratory according to ISO/IEC 17025.

Results had to be reported in **pg BEQ/g fat**, for PCDD/Fs and DL- PCBs.

2. Participating laboratories

This proficiency test was open for participation of:

- National Reference Laboratories (NRLs) of EU member states
- National Reference Laboratories of other European countries
- Official laboratories
- Commercial laboratories

129 laboratories registered for this proficiency test and reported 106 sets of results.

Table 1: Participating laboratories

Participating laboratories	Region	No. of participants
National Reference Laboratories	European Union Other Countries	28 4
Official Laboratories	European Union Other European Countries Africa Americas Asia Oceania	63 - - 3 - 1
Commercial Laboratories	European Union Other European Countries Africa Americas Asia Oceania	22 1 - 4 2 1
	Total	**129**

2.1. Number of reported results

Table 2: Reported results for PCDD/F and PCB sum parameters and lipid content

Reported results	WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum of six indicator PCBs	PCDD/F-PCB-BEQ [Bioanalytical screening methods]	Lipid content
All laboratories	**78**	**78**	**79**	**98**	**10**	**95**
NRLs	**18**	**18**	**18**	**23**	**5**	**23**

Table 3: Reported accreditation according to ISO/IEC 17025 by participants for PCDD/Fs and PCBs

Milk Powder	PCDD/Fs, PCBs [Physico-chemical methods]	PCDD/Fs, PCBs [Bioanalytical screening methods]
yes	91	8
no	2	2

2.2. Detection methods

The following detection methods were applied:

- GC-HRMS-, GC-MS/MS-, GC-LRMS-methods for PCDD/Fs and non-ortho PCBs
- GC-HRMS-, GC-MS/MS-, GC-LRMS-, GC-ECD-methods for mono-ortho-PCBs and indicator PCBs
- Bioanalytical screening methods for PCDD/Fs and dioxin-like PCBs

Table 4: Overview of physico-chemical detection methods for PCDD/Fs and PCBs applied by participants

Detection methods	PCDD/Fs	non-ortho-PCBs	mono-ortho-PCBs	Indicator PCBs
HRMS	55	55	51	43
MS/MS	13	14	13	28
LRMS	4	5	4	9
ECD	-	-	-	5

3. Test for sufficient homogeneity and stability

The test for sufficient homogeneity was performed according to ISO 13528:2022 [1] and the International Harmonized Protocol for the Proficiency Testing of Analytical Chemistry Laboratories [2].

Therefore, 10 portions of the test samples 2301-MP were analyzed in duplicate for PCDD/Fs and PCBs. The test for sufficient homogeneity was performed for the sum parameters WHO-PCDD/F-PCB-TEQ, WHO-PCDD/F-TEQ, WHO-PCB-TEQ, the sum of six non-dioxin-like PCBs and individual congeners. The test materials showed sufficient homogeneity for this proficiency test. The stability check of the analytes of interest applying room temperature storage was performed according to ISO 13528:2022 [1]. The test material showed sufficient stability for this proficiency test.

4. Determination of the assigned value

Statistical evaluation of the PT results was performed by the EURL for halogenated POPs in feed and food according to ISO 13528:2022 [1] and the International Harmonized Protocol for the Proficiency Testing of Analytical Chemistry Laboratories [2].

The determination of the assigned value was performed according [1] by estimating of the assigned value as the consensus of participants' results (using only results of physico-chemical methods). The Huber robust mean was taken as assigned value after excluding extreme outliers (outside the range of ± 50% of the median of all reported results) and examination of the distribution of the remaining results using histogram and Kernel density estimation, if necessary.

Assigned values were calculated for WHO-PCDD/F-PCB-TEQ, WHO-PCDD/F-TEQ, WHO-PCB-TEQ, the sum of six non-dioxin-like PCBs and individual PCDD/F and PCB congeners (including limits of quantification (LOQs)), if possible. Additionally the median of all values is calculated.

For individual congeners (including LOQs) assigned values were only calculated according to the above mentioned procedure, if more than 2/3 of all results were above the LOQ and less than 1/3 of all results (including LOQs) were outside the range of ± 50% of the median of all reported results. Levels for individual congeners were only used for evaluation and calculation if these levels were equal to or above the LOQ; otherwise the LOQ was used instead.

Due to high variation of participants' results, no assigned values could be calculated for:

- 1,2,3,7,8,9-HxCDD
- 1,2,3,7,8,9-HxCDF; 1,2,3,4,7,8,9-HpCDF
- PCB 28 and PCB 189

Since there are no traceable reference values available, the assigned values in this PT were calculated based on the Huber robust mean of the participants' results. Therefore, the assigned values are only traceable to these submitted results. Additionally the results of all participants reporting results and the results of participants having accreditation according ISO/IEC 17025 were compared for PCDD/F and PCB sum parameters. No significant differences between the assigned values calculated for both data sets were observed (Table 5).

Table 5: Comparison of assigned values for all participants and participants with reported accreditation according to ISO/IEC 17025 for PCDD/F and PCB sum parameters in milk powder 2301-MP

Sum parameters	Assigned value All participants	Assigned value ISO/IEC 17025 accreditation	Deviation
	pg/g, ng/g (fat)	pg/g, ng/g (fat)	%
WHO-PCDD/F-PCB-TEQ ub rep	2.40	2.40	-
WHO-PCDD/F-TEQ ub rep	1.26	1.27	<1
WHO-PCB-TEQ ub rep	1.14	1.15	<1
Sum Indicator PCBs ub rep	22.3	22.3	-

4.1. PCDD/Fs and PCBs – Sum parameters

The assigned values for the test sample 2301-MP were calculated as consensus of participants' results for the PCDD/F and PCB sum parameters, taking into account the calculation criteria described above.

Table 6: Assigned values for physico-chemical methods for PCDD/Fs and PCBs (rounded to three significant figures)

Test sample	WHO-PCDD/F-PCB-TEQ (ub)	WHO-PCDD/F-TEQ (ub)	WHO-PCB-TEQ (ub)	Sum Indicator PCBs (ub)
	pg/g (fat)			ng/g (fat)
Milk Powder (2301-MP)	2.40	1.26	1.14	22.3

Table 7: Assigned values for PCDD/Fs and DL-PCBs for comparison with BEQ results of bioanalytical screening methods (rounded to two significant figures)

Test sample	WHO-PCDD/F-PCB-TEQ (ub)	WHO-PCDD/F-TEQ (ub)	WHO-PCB-TEQ (ub)
	pg/g (fat)		
Milk Powder (2301-MP)	2.4	1.3	1.1

4.2. PCDD/Fs and PCBs – Individual congeners

The assigned values of individual congeners for the test sample 2301-MP were calculated as a consensus of the participants' results, taking into account the calculation criteria described above (Figure 1; tabular summary in Annex 1). The contribution of the assigned values of individual congeners to the WHO-PCDD/F-TEQ and WHO-PCB-TEQ for the test sample 2301-MP is shown in Figure 2.

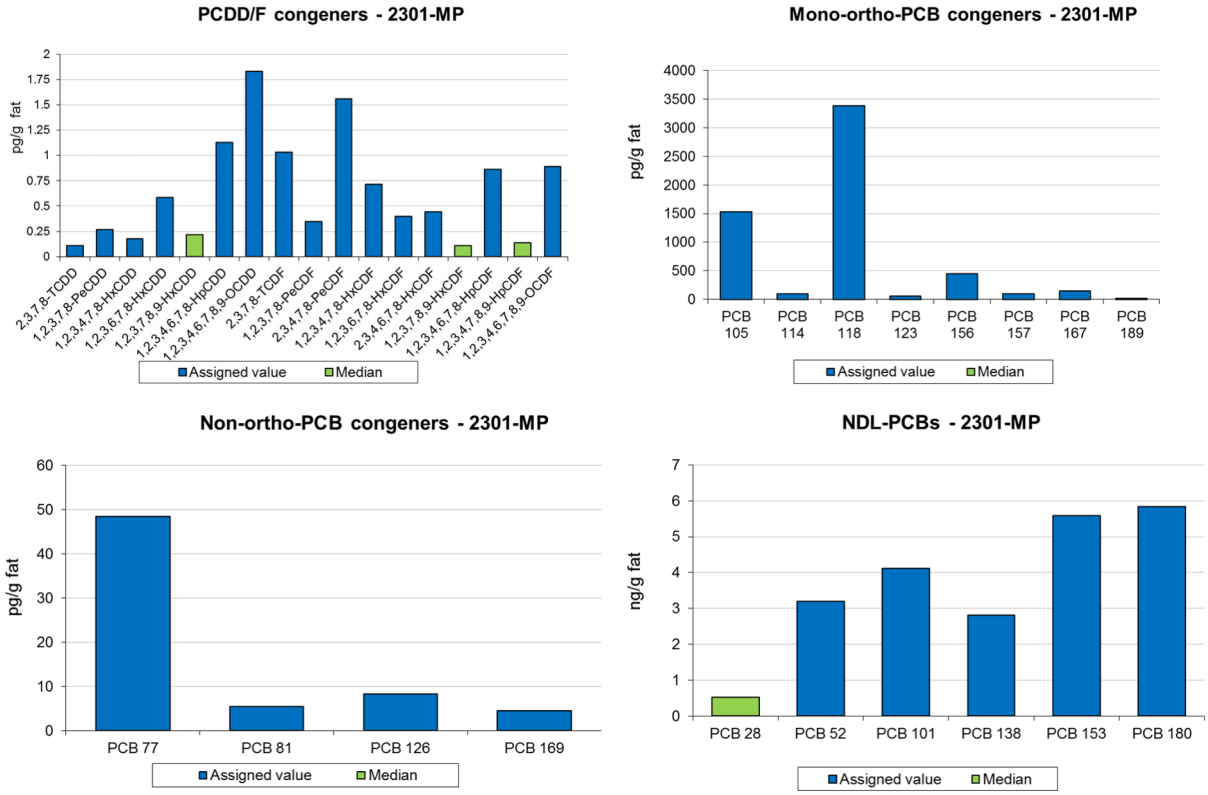

Figure 1: Assigned values (blue) and median values (green) for PCDD/F and PCB congeners for milk powder (2301-MP) [pg/g or ng/g (fat)]

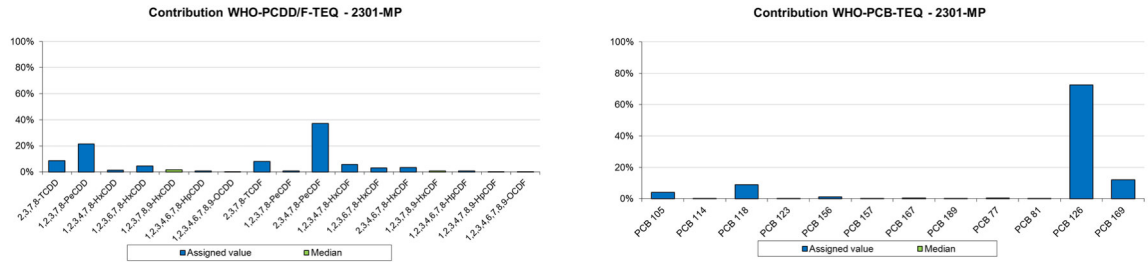

Figure 2: Contributions in % to WHO-PCDD/F-TEQ and WHO-PCB-TEQ for PCDD/F and PCB assigned (blue) and median (green) values for milk powder (2301-MP)

4.3. Lipid content

For the lipid content an assigned value of **9.24 %** for the test sample 2301-MP was calculated as a consensus of the participants' results, taking into account the calculation criteria described above.

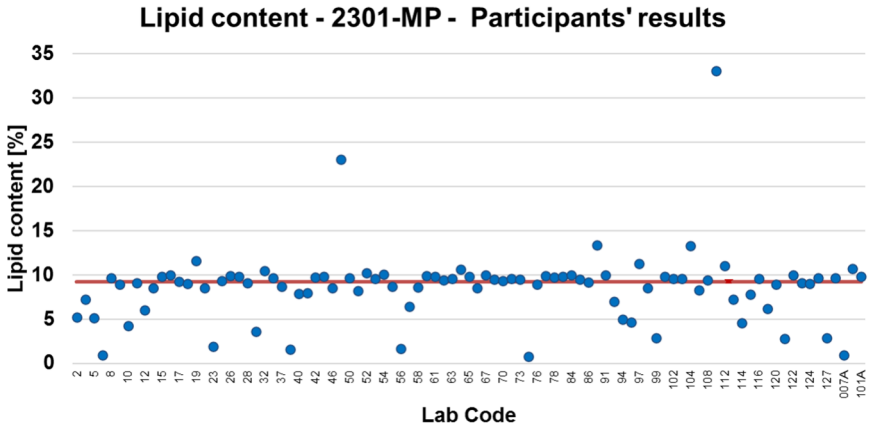

Figure 3: Participant's results (blue dots) compared to the assigned value (red line) of the lipid content in % for milk powder (2301-MP)

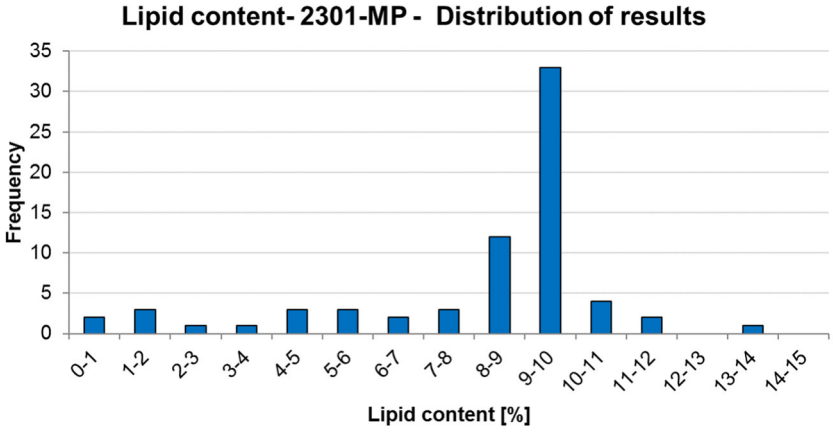

Figure 4: Frequency of reported values for the lipid content in % for milk powder (2301-MP)

4.4. Comparison of assigned values with legal limits

Maximum levels for food are defined in Commission Regulation (EC) No 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in foodstuff. Maximum levels for Dioxins and PCBs in Foodstuffs can be found under section 5. Action Level are defined in Commission Recommendation (2013) on the reduction of the presence of dioxins, furans and PCBs in feed and food, 2013/711/EU.

Table 8: Maximum levels according to Commission Regulation (EC) No 1881/2006 of 19 December 2006 (consolidated version of 1/1/2023) and Action Level according to Commission Recommendation 2013/711/EU:

Section 5: Dioxins and PCBs Foodstuffs	Unit	Maximum level	Action level
WHO-PCDD/F-PCB-TEQ	**pg/g fat**	**4.0**	**-**
WHO-PCDD/F-TEQ	**pg/g fat**	**2.0**	**1.75**
WHO-PCB-TEQ	**pg/g fat**	**-**	**2.0**
Sum of 6 non-dioxin-like PCBs (sum of PCB 28, 52, 101, 138, 153, 180)	**ng/g fat**	**40**	**-**

For the milk powder test sample 2301-MP the assigned values for the sum parameters WHO-PCDD/F-PCB-TEQ, WHO-PCDD/F-TEQ, WHO-PCB-TEQ and sum of six NDL-PCBs were in the range of 0.5 to 4 of the respective maximum levels and/or action levels (Figure 5).

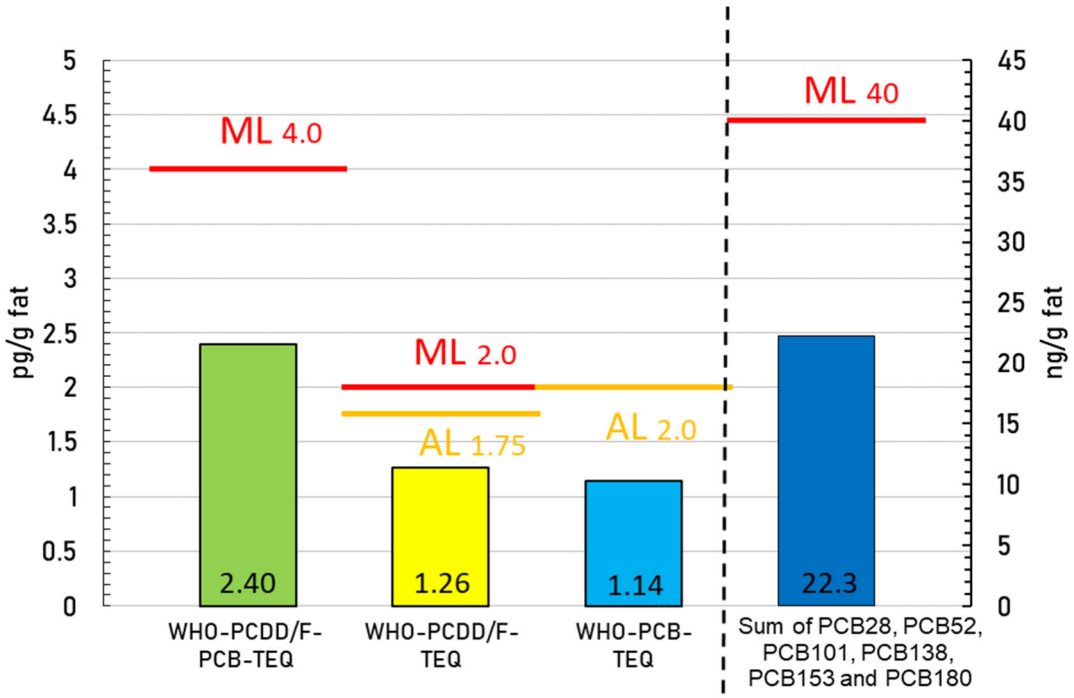

Figure 5: Comparison of the assigned values for sum parameters for milk powder (2301-MP) with maximum levels (red lines) and action levels (yellow line) [pg/g and ng/g (fat)]

5. Scoring of results – Z-scores

5.1. Participants' results for physico-chemical methods

5.1.1. Z-scores

Criteria for successful participation of laboratories using physico-chemical methods were based on the evaluation of the results of the sum parameters WHO-PCDD/F-TEQ, WHO-PCB-TEQ, WHO-PCDD/F-PCB-TEQ and the sum of six non-dioxin-like PCBs and evaluated individual congeners. The criteria will be applicable for sum parameter concentrations in the range (about 0.5 to 4 times) of the level of interest (maximum or action level).

For evaluation of results of physico-chemical methods the z-scores were calculated according to the following formula:

$$z = \frac{(x - x_a)}{\sigma_p}$$

x: *participant's result*
x_a: *assigned value*
σ_p: *fitness-for-purpose-based standard deviation for proficiency assessment*

For WHO-PCDD/F-TEQ, WHO-PCB-TEQ and WHO-PCDD/F-PCB-TEQ the standard deviation for proficiency assessment σ_p was defined as 10 %, for the sum of six non-dioxin-like PCBs (PCB 28, 52, 101, 138, 153 and 180) as 15 % and for evaluated individual PCDD/F, PCB congeners as 20 %.

Z-scores for individual congeners were only calculated and reported if levels for these congeners are equal to or above the LOQ. Otherwise no z-scores will be given.

Interpretation of z-scores:

$\lvert z\text{-score} \rvert \leq 2$	*satisfactory performance*
$2 < \lvert z\text{-score} \rvert < 3$	*questionable performance (warning signal)*
$\lvert z\text{-score} \rvert \geq 3$	*unsatisfactory performance (action signal)*

5.1.2. PCDD/Fs and PCBs - Participants' z-scores

The concentrations of the sum parameters WHO-PCDD/F-PCB-TEQ, WHO-PCDD/F-TEQ, WHO-PCB-TEQ and sum of six NDL-PCBs for the test samples 2301-MP were in the range (about 0.5 to 4 times) of the respective maximum levels and/or action levels (tabular summaries of participants' results and z-scores see annex 2 and 3).

Table 9: Distribution of all participants' z-scores for sum parameters

Milk Powder (2301-MP)	WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum of six indicator PCBs
|z-score| ≤ 2	73 %	69 %	62 %	73 %
2 <|z-score| < 3	8 %	8 %	13 %	7 %
|z-score| ≥ 3	19 %	23 %	25 %	20 %

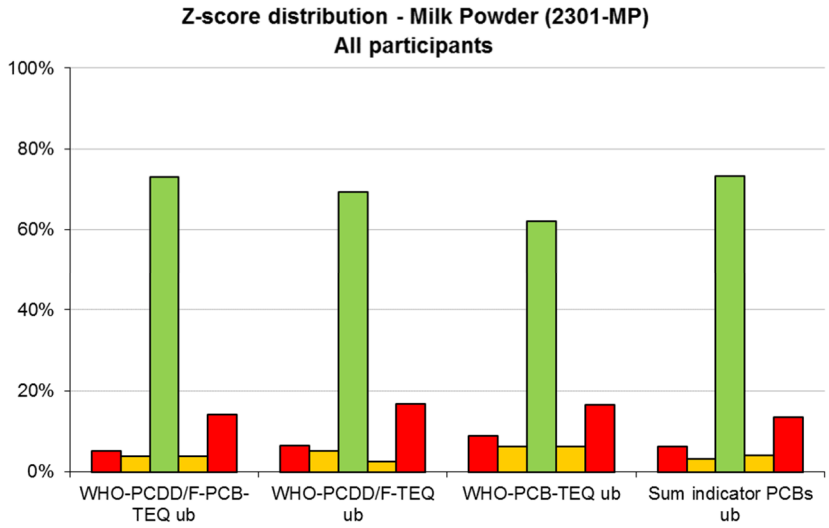

Figure 6: Distribution of all participants' z-scores and NRLs only for sum parameters for milk powder (2301-MP) [Green bars: -2 ≤ z-score ≤ 2, orange bars: -3 < z-score < -2, 2 < z-score < 3, red bars: z-score ≤ -3, z-score ≥ 3]

5.1.3. Comparison of reported and calculated sum parameters

In addition to the calculation of the sum parameters for reported individual PCDD/F and PCB congener values, the calculated sum parameters for PCDD/Fs and PCBs by the EURL were compared with the ones reported by each participant. As the reported sum parameters are decisive to compare the results with the legal limits, an incorrect calculation might lead to a wrong assessment of a sample. In case of a significant deviation of the reported sum parameter value from the (EURL) calculated one (deviation > 10 %) the laboratory has therefore not successfully participated in the PT according to the positive scoring system (see 5.1.5). This applies only for the sum parameters WHO-PCDD/F-PCB-TEQ, WHO-PCDD/F-TEQ, WHO-PCB-TEQ and sum of six NDL-PCBs as the assigned values for these parameters in the sample 2301-MP were in the range of 0.5 to 4 of the respective maximum levels and/or action levels.

Table 10: Difference between reported and calculated sum parameters for PCDD/Fs and PCBs for milk powder (2301-MP) given in percentage of participants' results

Milk Powder (2301-MP)	WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum of six indicator PCBs
Deviation ≤ 10 %	94%	95%	97%	97%
Deviation > 10 %	6%	5%	3%	3%

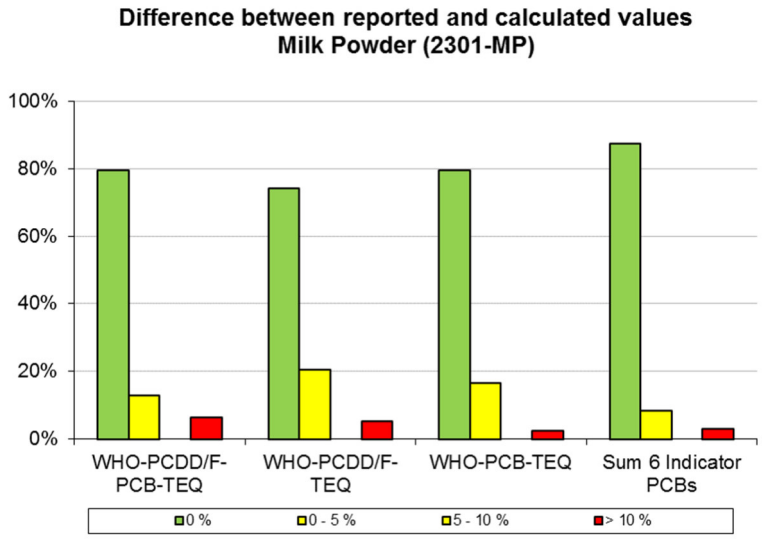

Figure 7: Difference between reported and calculated sum parameters for PCDD/Fs and PCBs for milk powder (2301-MP) given in percentage of participants' results [Green bars: 0%, yellow bars: 0-5 %, orange bars 5-10 %, red bars: > 10 %]

The comparison of the reported values and the calculated values by the EURL showed that 6% and 5% of the laboratories had differences greater than 10% between reported and calculated values for the WHO-PCDD/F-PCB-TEQ and the WHO-PCDD/F-TEQ, respectively.

5.1.4. Difference between upper and lower bound calculation

According to Commission Regulation (EU) 2017/644 the difference between upper bound level and lower bound level shall not exceed 20 % for confirmation of exceedance of maximum level or in case of need of action levels for PCDD/Fs and DL-PCBs. For indicator PCBs the difference between upper bound and lower bound levels for the sum of six indicator PCBs shall be ≤ 20 % at the level of interest. Participants with a larger deviation should review their analytical methods, especially with regard to sensitivity and limit of quantification.
For the test samples 2301-MP the assigned values for all sum parameters were below the respective maximum levels.

Table 11: Difference between upper and lower bound calculation for milk powder (2301-MP) given in percentage of participants' results

Milk Powder (2301-MP)	WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum of six indicator PCBs
0 – 10 %*	81%	70%	97%	93%
10 – 20 %*	6%	10%	-	4%
20 – 50 %*	12%	13%	-	1%
> 50 %*	-	5%	3%	2%

* Difference between upper and lower bound calculation

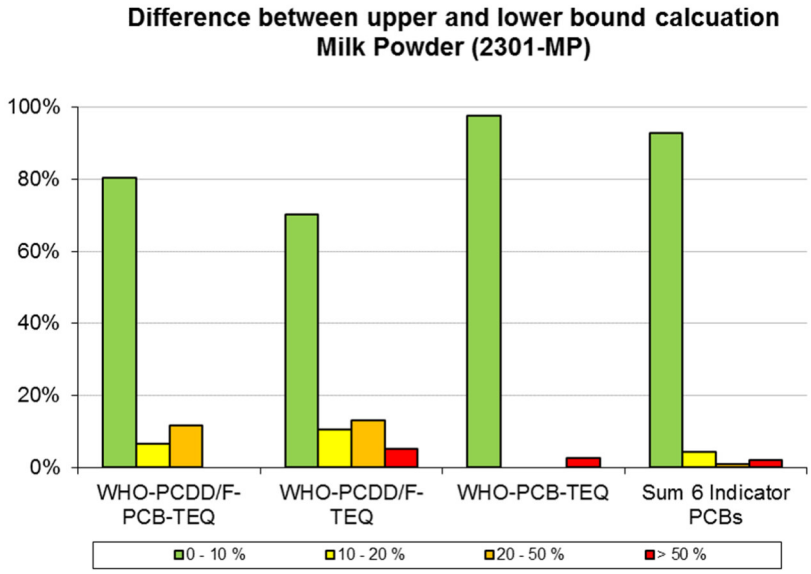

Figure 8: Difference between upper and lower bound calculation for milk powder (2301-MP) given in percentage of participants' results [Green bars: 0 – 10 %, yellow bars: 10 – 20 %, orange bars: 20 – 50 %, red bars: > 50 %]

5.1.5. Positive scoring system

The "positive scoring system" gives one assessment for each PT sample covering all relevant PCDD/F and PCB sum parameters and congeners.

The total score for the positive scoring system was calculated according to the following general principles:

- Calculation of z-scores for sum parameters and evaluated individual congeners
- Calculation of the positive scores according to the following table:

Positive scoring system	| z-score | ≤ 2	2 < | z-score | < 3	| z-score | ≥ 3
Individual congeners	**Positive score**	**Positive score**	**Positive score**
Contribution to sum parameter* > 10 %	12	6	0
Contribution to sum parameter* 3-10 %	8	4	0
Contribution to sum parameter* < 3 %	6	3	0
Not evaluated congeners	0	0	0

* separately for the respective sum parameters WHO-PCDD/F-TEQ, WHO-PCB-TEQ and the sum of six non-dioxin-like PCBs

- Calculation of maximum achievable scores (| z-score | ≤ 2) for PCDD/F and DL-PCB and non-dioxin-like PCB congeners separately:

$$Maximum\ Score = \sum_{i=1}^{n} Max.Score_{(>10\%)i} + \sum_{i=1}^{m} Max.Score_{(3-10\%)i} + \sum_{i=1}^{p} Max.Score_{(<3\ \%)i}$$

- Calculation of the participant's scores for PCDD/F and DL-PCB and non-dioxin-like PCB congeners separately:

$$Participant's\ Score = \sum_{i=1}^{n} Score_{(>10\%)i} + \sum_{i=1}^{m} Score_{(3-10\%)i} + \sum_{i=1}^{p} Score_{(<3\ \%)i}$$

- Calculation of achieved scoring percentage for each participant:

$$Participant's\ Scoring\ Percentage = \frac{Participant's\ score}{Maximum\ score} \cdot 100$$

- Criteria for successful participation:

Sum parameters:	≤ 1 parameter with | z-score | > 2, no parameter with | z-score | ≥ 3
PCDD/F congeners:	≥ 75 % of maximum score
DL-PCB congeners:	≥ 75 % of maximum score
Non-dioxin-like PCB congeners:	≥ 75 % of maximum score
Difference between reported and calculated results for sum parameters	≤ 10 %

The assessment based on the positive scoring system is performed for each PT test sample. A laboratory participates successfully in a PT for PCDD/Fs and PCBs, if all above mentioned criteria for the reported analytes are met for each PT test sample.

5.2. Participants' results for bioanalytical screening methods

According to Commission Regulation (EU) No 2017/644, "a screening method in principle classifies a sample as compliant or suspected to be non-compliant. For this, the calculated BEQ level is compared to the cut-off value […]. Samples below the cut-off value are declared compliant, samples equal or above the cut-off value as suspected to be non-compliant, requiring analysis by a confirmatory method".

Therefore, the main criterion for evaluation of results from bioanalytical screening methods is their ability to reliably identify compliant samples and samples suspected to be non-compliant with established legal limits.

For further evaluation of the performance of bioanalytical screening methods, bioassay-scores are applied: The reported BEQ-values derived from bioanalytical screening methods are compared with the WHO-TEQ assigned values calculated on basis of the results of physical-chemical methods for the concentration range of 0.5 to 2 times the level of interest.

Because bioanalytical screening methods focus mainly on distinguishing between compliant and potentially non-compliant samples, a direct comparison of bioassay-scores and z-scores is not possible. However, bioassay scores may serve as a tool to assess method performance within the scope of external quality control measures of the respective laboratory.

Bioassay-scores are calculated according to the following formula:

$$bioassay - score = \frac{(x - x_a)}{\sigma_{bioassay}}$$

x: *participant's result (BEQ from bioanalytical screening method)*
x_a: *assigned value (physical-chemical methods)*
$\sigma_{bioassay}$: *bioassay target deviation*

For PCDD/F-BEQ, PCB-BEQ and PCDD/F-PCB-BEQ the bioassay target deviation $\sigma_{Bioassay}$ was defined as 20%.

5.2.1. Assessment of analytical results

As a consequence of the comparison of the assigned values of the test sample 2301-MP with legal limits, the assessment of the analytical results using bioanalytical screening methods should read "compliant with the maximum level for WHO-PCDD/F-PCB-TEQ and WHO-PCDD/F-TEQ" .

Table 12: Evaluation of assigned values for milk powder

	WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ
2301-MP	< ML	< ML	< AL	< AL

Nine laboratories reported results using CALUX bioassay for PCDD/F-PCB-BEQ and hereof five also for PCDD/F-BEQ and five for PCB-BEQ.

Table 13: Participants' assessment of analytical results using bioanalytical screening methods for 2301-MP

Laboratories' assessment of analytical results	WHO-PCDD/F-PCB-TEQ Maximum level	WHO-PCDD/F-TEQ Maximum level	WHO-PCDD/F-TEQ Action level	WHO-PCB-TEQ Action level
Suspected to be non-compliant	-	1	1	2
Compliant	9	4	3	3

5.2.2. Participants' bioassay-scores

Concentrations for WHO-PCDD/F-PCB-TEQ, WHO-PCDD/F-TEQ and WHO-PCB-TEQ in the test sample 2301-MP are in the range (about 0.5 to 2 times) of the respective maximum levels and/or action levels.

Table 14: Distribution of participants' bioassay-scores for BEQ parameters for milk powder (2301-MP)

Percentage of participants' results	PCDD/F-PCB-BEQ	PCDD/F-BEQ	PCB/F-BEQ
|bioassay-score| ≤ 2	80%	67%	50%
2 < |bioassay-score| < 3	-	-	25%
|bioassay-score| ≥ 3	20%	33%	25%

6. Participants' feedback

A questionnaire for feedback from participants of this EURL proficiency test was available as online survey between 15 May 2023 and 23 June 2023. The survey was anonymous, but participants could also give their laboratory name. The identity of the laboratories is kept confidential. The survey included several questions related to different topics (participants' information, organization of the proficiency test, PT test samples and evaluation of results and summary of data) and a possibility to include comments and further suggestions. In total, 2 laboratories (1.5 % of all PT participants) replied to this survey.

Participants

Type of laboratory	Answers
National Reference Laboratory (NRL)	0
Official Laboratory (OFL)	0
Commercial laboratory	2
Other (e.g. research and development)	0
No Answer	0

General aspects

How satisfied are you with the organization of this proficiency test in general? Please rate the parts below according to your experience, with 0 stars meaning "no opinion" and 5 stars meaning "full satisfaction".

Announcement	
Instructions	
Sample shipment	
Reporting of results	
Preliminary report	

Specific aspects of this proficiency test

We would like to know a bit more about specific aspects of this proficiency test. Please rate the aspects below according to your experience, with 0 stars meaning "no opinion" and 5 stars meaning "full satisfaction".

Was all necessary information for participation and performance of the PT provided in an understandable way?	
Was the time frame acceptable?	
Was the handling of EUSurvey as webtool for reporting and source of instructions manageable?	
Was the evaluation of participant's results and the information in the preliminary report clear and comprehensible?	

Additional comments:

- report was very comprehensive and good; convoluted structure of the document does make it difficult to read
- it is easier with the webtool than sending email with an excel file
- the delay to give the preliminary results was very short

Was the selected sample adequate for the goal to assess analytical performance of laboratories in relevant matrices?

Choice of matrix	
Level of contamination	

7. Quality control

The Deutsche Akkreditierungsstelle GmbH attests that the provider of proficiency testing Chemisches und Veterinäruntersuchungsamt Freiburg, EU Reference Laboratory (EURL) for halogenated persistent organic pollutants (POPs) in feed and food is competent under the terms of DIN EN ISO/IEC 17043:2010 to carry out proficiency testing in the testing field of determination of halogenated persistent organic pollutants (POPs) in food and feed (Accreditation number: D-EP-18625-01-00).

8. Results of participants

An overview of the PCDD/F and PCB results for the PT test sample milk powder (2301-MP) are given in the following annexes. Laboratories are coded according to the laboratory codes sent after registration.

9. References

[1] ISO 13528:2022, Statistical methods for use in proficiency testing by interlaboratory comparisons, International Organization for Standardization

[2] M. Thompson, S.L.R. Ellison, R. Wood: The International Harmonized Protocol For The Proficiency Testing Of Analytical Chemistry Laboratories, Pure Appl. Chem., Vol. 78, No. 1, pp. 145-196, 2006.

[3] M. van den Berg et al., The 2005 World Health Organization Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds. Toxicological Sciences 93(2), 223-241 (2006)

10. Annex

Milk Powder – 2301-MP	
1	Assigned values – PCDD/F, PCB
2	Participants' results – Tables – PCDD/F, PCB
3	Participants' z-scores / bioassay-scores – Tables – PCDD/F, PCB
4	Participants' z-scores – Charts – PCDD/F, PCB
5	Scoring system – PCDD/F, PCB
6	Homogeneity and stability test – PCDD/F, PCB
7	Participants' methods – PCDD/F, PCB

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Annex 1: Assigned values of PCDD/Fs and PCBs

Test sample - Milk Powder (2301-MP)

Assigned values of sum parameters and individual congeners

Estimation of the assigned value as the consensus of participants' results
Assigned value = Huber robust mean after exlusion of extreme outliers

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Milk Powder (2301-MP)
Sum parameters - Results

Analyte	Result pg/g fat	**Assigned value** [outliers removed]	**Robust standard deviation** [outliers removed]	**Standard uncertainty** [outliers removed]	**No. of results contributing to assigned value**	**Median** [all values]
WHO-PCDD/F-PCB-TEQ upper bound rep		2.40	0.324	0.051	64	2.41
WHO-PCDD/F-PCB-TEQ lower bound rep		2.29	0.404	0.064	62	2.37
WHO-PCDD/F-PCB-TEQ upper bound cal		2.40	0.330	0.052	62	2.44
WHO-PCDD/F-PCB-TEQ lower bound cal		2.29	0.379	0.061	61	2.35

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Milk Powder (2301-MP)
PCDD/F - Assigned values

Analyte	Result pg/g fat	**Assigned value** [outliers removed]	**Robust standard deviation** [outliers removed]	**Standard uncertainty** [outliers removed]	**No. of results contributing to assigned value**	**Median** [all values]
WHO-PCDD/F-TEQ upper bound rep		1.26	0.195	0.031	63	1.27
WHO-PCDD/F-TEQ lower bound rep		1.17	0.277	0.044	61	1.20
WHO-PCDD/F-TEQ upper bound cal		1.27	0.200	0.032	61	1.27
WHO-PCDD/F-TEQ lower bound cal		1.18	0.261	0.042	60	1.19
2,3,7,8-TCDD		0.109	0.0220	0.0038	51	0.110
1,2,3,7,8-PeCDD		0.269	0.0587	0.0096	58	0.274
1,2,3,4,7,8-HxCDD		0.177	0.0407	0.0071	52	0.192
1,2,3,6,7,8-HxCDD		0.584	0.0910	0.015	60	0.599
1,2,3,7,8,9-HxCDD						0.217
1,2,3,4,6,7,8-HpCDD		1.13	0.239	0.038	61	1.16
1,2,3,4,6,7,8,9-OCDD		1.83	0.419	0.071	55	2.00
2,3,7,8-TCDF		1.03	0.170	0.027	60	1.05
1,2,3,7,8-PeCDF		0.348	0.0791	0.013	58	0.352
2,3,4,7,8-PeCDF		1.56	0.264	0.043	60	1.58
1,2,3,4,7,8-HxCDF		0.712	0.127	0.021	59	0.738
1,2,3,6,7,8-HxCDF		0.395	0.0807	0.013	59	0.410
2,3,4,6,7,8-HxCDF		0.440	0.0823	0.013	59	0.450
1,2,3,7,8,9-HxCDF						0.110
1,2,3,4,6,7,8-HpCDF		0.863	0.176	0.029	58	0.871
1,2,3,4,7,8,9-HpCDF						0.137
1,2,3,4,6,7,8,9-OCDF		0.891	0.182	0.031	53	0.930

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Milk Powder (2301-MP)
Dioxin-like PCB - Assigned values

Analyte	Result pg/g fat	**Assigned value** [outliers removed]	**Robust standard deviation** [outliers removed]	**Standard uncertainty** [outliers removed]	**No. of results contributing to assigned value**	**Median** [all values]
WHO-PCB-TEQ upper bound rep		1.14	0.192	0.031	61	1.18
WHO-PCB-TEQ lower bound rep		1.15	0.185	0.030	59	1.18
WHO-PCB-TEQ upper bound cal		1.15	0.184	0.030	60	1.17
WHO-PCB-TEQ lower bound cal		1.15	0.174	0.028	59	1.17
PCB 105		1530	237	37	64	1560
PCB 114		101	19.7	3.2	59	105
PCB 118		3390	476	76	62	3370
PCB 123		58.3	12.7	2.2	54	61.7
PCB 156		445	59.0	9.4	61	448
PCB 157		96.0	12.1	1.9	61	97.5
PCB 167		147	24.1	3.9	61	149
PCB 189						17.3
PCB 77		48.4	9.06	1.5	58	49.3
PCB 81		5.51	1.05	0.18	51	5.72
PCB 126		8.28	1.52	0.25	60	8.41
PCB 169		4.56	0.903	0.14	61	4.63

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Milk Powder (2301-MP)
Non dioxin-like PCB - Assigned values

Analyte	Result ng/g fat	**Assigned value** [outliers removed]	**Robust standard deviation** [outliers removed]	**Standard uncertainty** [outliers removed]	**No. of results contributing to assigned value**	**Median** [all values]
Sum Indicator PCBs upper bound rep		22.3	3.46	0.50	75	22.4
Sum Indicator PCBs lower bound rep		21.8	3.51	0.51	73	22.2
Sum Indicator PCBs upper bound cal		22.4	3.42	0.50	74	22.7
Sum Indicator PCBs lower bound cal		21.9	3.33	0.49	73	22.2
PCB 28						0.520
PCB 52		3.19	0.476	0.071	70	3.24
PCB 101		4.12	0.685	0.10	74	4.16
PCB 138		2.81	0.568	0.083	73	2.87
PCB 153		5.58	1.04	0.15	72	5.57
PCB 180		5.84	1.01	0.15	73	5.98

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Milk Powder (2301-MP)
WHO-TEQ - Assigned values - Bioanalytical screening methods

Analyte	Result pg BEQ/g fat	**Assigned value** [outliers removed]	**Robust standard deviation** [outliers removed]	**Standard uncertainty** [outliers removed]	**No. of results contributing to assigned value**	**Median** [all values]
WHO-PCDD/F-PCB-TEQ		2.4	0.32	0.051	64	2.4
WHO-PCDD/F-TEQ		1.3	0.20	0.031	63	1.3
WHO-PCB-TEQ		1.1	0.19	0.031	61	1.2

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Milk Powder (2301-MP)
Lipid content (PCDD/F, PCB) - Assigned value

Analyte	Result %	**Assigned value** [outliers removed]	**Robust standard deviation** [outliers removed]	**Standard uncertainty** [outliers removed]	**No. of results contributing to assigned value**	**Median** [all values]
Lipid content		9.24	0.996	0.14	77	9.32

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Annex 2: Participants' results of PCDD/Fs and PCBs

Test sample - Milk Powder (2301-MP)

* Modified/additional results reported after distribution of preliminary results to all participating laboratories

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Milk Powder (2301-MP)

Sum parameters - Results

LC	Sample	Result pg/g fat	WHO-PCDD/F-PCB-TEQ reported		WHO-PCDD/F-PCB-TEQ calculated		WHO-PCDD/F-TEQ reported		WHO-PCDD/F-TEQ calculated		WHO-PCB-TEQ reported		WHO-PCB-TEQ calculated		Result ng/g fat	Sum 6 Indicator PCBs reported		Sum 6 Indicator PCBs calculated	
			upper bound	lower bound	upper bound	lower bound	upper bound	lower bound	upper bound	lower bound	upper bound	lower bound	upper bound	lower bound		upper bound	lower bound	upper bound	lower bound
1	2301-MP																		
2	2301-MP		2.2	2.2	2.2	2.14	1.1	1.1	1.13	1.07	1.1	1.1	1.07	1.07					
3	2301-MP															23.8	22.6	23.9	22.6
4	2301-MP		666	333	664	664	666	333	647	647	666	77	16.7	16.7		100	10	548	548
5	2301-MP		4.68	4.68	4.67	4.67	2.37	2.37	2.37	2.37	2.31	2.31	2.3	2.3		46.5	46.5	46.6	46.6
6	2301-MP																		
7	2301-MP															213	213	213	213
8	2301-MP		2.3	2.1	2.27	2.05	1.2	0.96	1.17	0.962	1.1	1.1	1.1	1.09		24	24	23.6	23.6
9	2301-MP		2.08	2.07	2.08	2.07	1	0.988	1	0.99	1.08	1.08	1.08	1.08		24.7	18.8	24.7	18.8
10	2301-MP															65.1	65.1	65.3	65.3
11	2301-MP		2.5	2.49	2.5	2.49	1.26	1.25	1.26	1.25	1.24	1.24	1.24	1.24		20.9	20.9	20.9	20.9
12	2301-MP		3.86	3.85	3.86	3.85	1.95	1.94	1.95	1.94	1.91	1.91	1.91	1.91		34.3	34.3	34.3	34.3
13	2301-MP		1.8	1.74	1.8	1.74	0.942	0.884	0.944	0.885	0.86	0.857	0.86	0.857		16.7	16.7	16700	16700
14	2301-MP		2.26	2.03	2.26	2.04	1.21	0.98	1.21	0.987	1.05	1.05	1.05	1.05		22.2	22.2	22.2	22.2
15	2301-MP		2.17	2.16	2.17	2.16	1.14	1.13	1.14	1.13	1.03	1.03	1.03	1.03		21.9	21.9	21.9	21.9
16	2301-MP															20.9	20.9	21	21
17	2301-MP		5.45	5.3	5.45	5.3	3.09	2.94	3.09	2.94	2.36	2.36	2.36	2.36		41.7	41.7	41.7	41.7
18	2301-MP		2.7	2.1	2.65	2.1	1.5	0.94	1.5	0.947	1.2	1.2	1.15	1.15		26	26	25.8	25.8
19	2301-MP		2.18	2.16	2.19	2.16	1.16	1.14	1.17	1.14	1.02	1.02	1.02	1.02		18.6	18.6	18.6	18.6
20	2301-MP																		
21	2301-MP															25.9	27.4	27.4	25.9
22	2301-MP															31.8	29.8	31.8	29.8
23	2301-MP		1.76	1.6	0.322	0.22	0.926	0.772	0.271	0.169	0.83	0.83	0.0509	0.0509		40.4	40.4	40.4	40.4
24	2301-MP																		
25	2301-MP															22.2	22.2	22.2	22.2
26	2301-MP															7.44	7.34	7.44	7.34
27	2301-MP		2.34	1.52	1.91	1.58	1.08	0.75	1.08	0.751	0.83	0.83	0.832	0.832		17.9	17.9	17.8	17.8
28	2301-MP																		
29	2301-MP		1.93	1.79	1.92	1.78	1.01	0.87	1.01	0.869	0.916	0.916	0.909	0.909		17	17	17	17
30	2301-MP		1.87	1.25	1.87	1.25	0.615	0.00026	0.616	0.000256	1.25	1.25	1.25	1.25		19.9	19.9	19.9	19.9
31	2301-MP																		
32	2301-MP		2.57	2.57	2.58	2.57	1.19	1.18	1.19	1.18	1.39	1.39	1.39	1.39		18.7	18.7	18.7	18.7
33	2301-MP																		
34	2301-MP		2.41	2.4	2.4	2.4	1.27	1.27	1.27	1.27	1.13	1.13	1.13	1.13		24.4	24.4	24.4	24.4
35	2301-MP																		
36	2301-MP																		
37	2301-MP		2.38	2.38	2.38	2.37	1.2	1.2	1.2	1.19	1.18	1.18	1.18	1.18		22.3	22.3	22.2	22.2
38	2301-MP		2.28		2.33	2.17	1.29		1.33	1.17	0.994		0.999	0.999		22		22.1	22.1
39	2301-MP																		
40	2301-MP		3.26	3.26	3.26	3.01	1.81	1.56	1.81	1.56	1.45	1.45	1.45	1.45		27.9	27.9	27.9	27.9
41	2301-MP		2.67	2.67	2.67	2.67	1.39	1.39	1.39	1.39	1.28	1.28	1.28	1.28		25.2	25.2	25.2	25.2
42	2301-MP		2.48	2.48	2.48	2.48	1.34	1.34	1.34	1.34	1.14	1.14	1.14	1.14		18.8	18.8	18.8	18.8
43	2301-MP															26	24	25.2	23.6
44	2301-MP		1.4	1.1	1.44	1.07	0.86	0.5	0.865	0.501	0.57	0.57	0.573	0.573		13.3	13.3	13.3	13.3
45	2301-MP																		
46	2301-MP		2.83	2.7	2.83	2.69	1.42	1.29	1.42	1.28	1.41	1.41	1.41	1.41		26.9	26.9	26.9	26.9
47	2301-MP		8.11	8.11	8.11	8.11	3.74	3.74	3.74	3.74	4.37	4.37	4.37	4.37		81.5	81.5	81.5	81.5
48	2301-MP		1.34	1.34	1.34	1.34	0.771	0.771	0.771	0.771	0.565	0.565	0.565	0.565		11	11	11	11
49	2301-MP																		
50	2301-MP		1.92	1.91	1.92	1.91	1.12	1.11	1.12	1.11	0.796	0.796	0.796	0.796		18	17	18	17
51	2301-MP		2.63	2.63	2.64	2.62	1.41	1.41	1.41	1.39	1.23	1.23	1.23	1.23		31.2	31.2	31.2	31.2
52	2301-MP		2.62	2.18	2.87	2.28	1.3	0.86	1.53	0.935	1.32	1.32	1.34	1.34		23.9	23.9	23.9	23.9
53	2301-MP		2.4	2.4	2.44	2.44	1.25	1.25	1.25	1.25	1.19	1.19	1.19	1.19		20	20	20.1	20.1
54	2301-MP		2.34	2.35	2.35	2.34	1.17	1.18	1.18	1.17	1.17	1.17	1.17	1.17					
55	2301-MP		2.52	2.51	2.52	2.51	1.33	1.32	1.33	1.32	1.19	1.19	1.19	1.19		20.5	20.5	20.5	20.5
56	2301-MP		1.39	1.37	1.38	1.37	0.75	0.74	0.751	0.74	0.63	0.63	0.633	0.633		11.7	11.7	11.7	11.7
57	2301-MP																	3	0
58	2301-MP		2.53	2.53	2.53	2.53	1.26	1.26	1.26	1.26	1.27	1.27	1.27	1.27		24	24	24	24
59	2301-MP																		
60	2301-MP		2.66	2.66	2.66	2.66	1.34	1.34	1.34	1.34	1.32	1.32	1.32	1.32		23.5	23.5	23.5	23.5
61	2301-MP		2.26	2.26	2.26	2.26	1.19	1.19	1.19	1.19	1.07	1.07	1.07	1.07					
62	2301-MP															21	21	21	21
63	2301-MP		2.36	2.22	2.36	2.22	1.33	1.19	1.33	1.19	1.03	1.03	1.03	1.03		21.6	21.6	21.6	21.6
64	2301-MP		2.32	2.26	2.31	2.26	1.23	1.18	1.23	1.18	1.08	1.08	1.08	1.08		21.5	21.5	21.5	21.5
65	2301-MP															15.6	15.6	15.6	15.6
66	2301-MP															25	25	25	25
67	2301-MP		2.04	2.04	2.04	2.04	1.46	1.46	1.46	1.46	0.581	0.581	0.581	0.581		22.3	22.3	22.3	22.3
68	2301-MP															29.1	24.7	29.1	24.7
69	2301-MP															25.2	25.2	25.2	25.2
70	2301-MP		2.31	1.73	2.32	1.73	1.27	0.69	1.28	0.69	1.04	1.04	1.04	1.04		12.7	12.7	12.7	12.7
71	2301-MP		2.29	2.29	2.36	2.35	1.22	1.22	1.23	1.22	1.07	1.07	1.13	1.13		19.5	19.5	19.5	19.5
72	2301-MP																		
73	2301-MP		2.77	2.65	2.77	2.65	1.32	1.2	1.32	1.2	1.45	1.45	1.45	1.45		26.2	26.2	26.2	26.2
74	2301-MP																		

Milk Powder (2301-MP)
Sum parameters - Results

LC	Sample	Result pg/g fat	WHO-PCDD/F-PCB-TEQ reported		WHO-PCDD/F-PCB-TEQ calculated		WHO-PCDD/F-TEQ reported		WHO-PCDD/F-TEQ calculated		WHO-PCB-TEQ reported		WHO-PCB-TEQ calculated		Result ng/g fat	Sum 6 Indicator PCBs reported		Sum 6 Indicator PCBs calculated	
			upper bound	lower bound	upper bound	lower bound	upper bound	lower bound	upper bound	lower bound	upper bound	lower bound	upper bound	lower bound		upper bound	lower bound	upper bound	lower bound
75	2301-MP																		
76	2301-MP		2.27	1.59	2.28	1.6	1.43	0.761	1.43	0.761	0.845	0.834	0.846	0.834		20.2	20.2	20.2	20.2
77	2301-MP		1.96	1.83	1.96	1.83	0.99	0.86	0.993	0.863	0.97	0.97	0.966	0.966		22.8	22.8	23.7	21.7
78	2301-MP		2.32	2.31	2.32	2.31	1.45	1.44	1.45	1.44	0.872	0.872	0.872	0.872		19.7	19.7	19.7	19.7
79	2301-MP																		
80	2301-MP		2.47	1.77	2.47	1.77	1.37	0.669	1.37	0.669	1.1	1.1	1.1	1.1		22.7	22.7	22.7	22.7
81	2301-MP		2.37	2.38	2.37	2.36	1.15	1.16	1.15	1.14	1.22	1.22	1.22	1.22		22.3	22.3	22.3	22.3
82	2301-MP																		
83	2301-MP		2.65	2.65	2.66	2.66	1.74	1.74	1.75	1.75	0.911	0.911	0.911	0.911		24.5	24.5	24.5	24.5
84	2301-MP		2.78	2.56	2.77	2.55	1.39	1.17	1.39	1.17	1.39	1.39	1.38	1.38		19.1	19.1	19.1	19.1
85	2301-MP		2.57	2.45	2.57	2.45	1.23	1.11	1.23	1.11	1.34	1.34	1.34	1.34		25.8	25.8	25.7	25.7
86	2301-MP		2.27	2.27	2.27	2.27	1.11	1.11	1.11	1.11	1.16	1.16	1.16	1.16		21.3	21.3	21.3	21.3
87	2301-MP																		
88	2301-MP		2.55	2.53	2.55	2.53	1.36	1.34	1.36	1.34	1.19	1.19	1.19	1.19		21.9	21.9	21.9	21.9
89	2301-MP																		
90	2301-MP																		
91	2301-MP															23.5	19.3	23.5	19.2
92	2301-MP		3.09	3.11	3.11	3.09	1.45	1.47	1.46	1.44	1.64	1.64	1.65	1.65		21.2	21.2	21.2	21.2
93	2301-MP																		
94	2301-MP		3.38	2.12	3.38	2.13	2.75	1.82	2.75	1.82	0.63	0.305	0.63	0.305		1.84	1.84	36800	36800
95	2301-MP																		
96	2301-MP		3.73	3.66	3.72	3.66	1.77	1.7	1.76	1.7	1.96	1.96	1.96	1.96		35.2	35.2	35.2	35.2
97	2301-MP																		
98	2301-MP		2.33	2.33	2.33	2.33	1.19	1.19	1.19	1.19	1.14	1.14	1.14	1.14		23.6	23.6	23.6	23.6
99	2301-MP		7.49	7.5	7.5	7.5	3.72	0	3.72	3.72	3.78	3.78	3.78	3.78		66.1	66.1	66	66
100	2301-MP																		
101	2301-MP		2.73	2.73	2.73	2.73	1.25	1.25	1.25	1.25	1.48	1.48	1.48	1.48		25.7	25.7	25.7	25.7
102	2301-MP		2.6	2.6	2.62	2.6	1.4	1.4	1.45	1.43	1.2	1.2	1.17	1.17					
103	2301-MP															23.8	21.8	23.8	21.8
104	2301-MP		2.16	1.77	2.15	1.77	1.03	0.647	1.02	0.646	1.13	1.12	1.13	1.12		18.4	17.9	18.4	17.9
105	2301-MP		2.96	2.95	3.94	3.93	1.38	1.37	2.36	2.35	1.58	1.58	1.58	1.58		26.1	26.1	26.1	26.1
106	2301-MP		2.34	2.28	2.33	2.27	1.04	0.977	1.04	0.975	1.3	1.3	1.29	1.29		15.3	15.3	15.3	15.3
107	2301-MP																		
108	2301-MP															25	24	25.4	24.4
109	2301-MP																		
110	2301-MP																		
111	2301-MP		0.74	0.5	0.891	0.47	0.43	0.19	0.587	0.166	0.31	0.31	0.304	0.304		6.73	6.73	6.71	6.71
112	2301-MP															20	17	19.9	17.2
113	2301-MP		2.95	2.95	2.95	2.95	1.71	1.71	1.71	1.71	1.24	1.24	1.24	1.24		19.8	19.8	19.8	19.8
114	2301-MP		2.55	2.54	2.55	2.54	1.46	1.45	1.46	1.45	1.09	1.09	1.09	1.09		21.1	19.9	21.1	19.9
115	2301-MP															30.2	30.2	30.8	30.8
116	2301-MP		2.7	2.7	2.7	2.7	1.58	1.58	1.58	1.58	1.12	1.12	1.12	1.12		21.1	21.1	21.1	21.1
117	2301-MP																		
118	2301-MP																		
119	2301-MP															10.2	9.18	10.2	9.18
120	2301-MP		2.29	2.28	2.3	2.29	1.07	1.06	1.08	1.07	1.22	1.22	1.22	1.22		21.3	21.3	21.3	21.3
121	2301-MP										3.25	3.25	3.25	3.25		79.2	79.2	79.2	79.2
122	2301-MP															30	10	30	10
123	2301-MP		2.73	2.73	2.73	2.73	1.54	1.53	1.54	1.54	1.2	1.19	1.19	1.19		20.8	20.8	20.8	20.8
124	2301-MP		2.47	2.47	2.47	2.46	1.26	1.25	1.26	1.25	1.21	1.21	1.21	1.21		22.5	22.5	22.5	22.5
125	2301-MP																		
126	2301-MP		2.34	2.34	2.34	2.34	1.22	1.22	1.22	1.22	1.12	1.12	1.12	1.12		23.3	23.3	23.3	23.3
127	2301-MP		7.33	7.33	7.33	7.33	3.9	3.9	3.9	3.9	3.43	3.43	3.43	3.43		64.8	64.8	64.8	64.8
128	2301-MP																		
129	2301-MP															23.6	23.6	23.6	23.6
7A	2301-MP		18.2	18.2	18.2	18.2	9.32	9.3	9.31	9.28	8.91	8.9	8.9	8.9		231	231	231	231
101A	2301-MP		2.39	2.39	2.39	2.39	1.25	1.25	1.25	1.25	1.14	1.14	1.14	1.14		25.7	25.7	25.7	25.7
30*	2301-MP		2.38	2.14	2.66	2.41	1.41	1.16	1.41	1.16	1.25	1.25	1.25	1.25		19.9	19.9	19.9	19.9
56*	2301-MP		2.43	2.4	2.42	2.41	1.31	1.3	1.31	1.3	1.1	1.1	1.11	1.11		20.5	20.5	20.5	20.5
104*	2301-MP		2.16	1.77	2.15	1.77	1.03	0.647	1.02	0.646	1.13	1.12	1.13	1.12		18.4	17.9	18.4	17.9

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EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Assessment of analytical results, Measurement uncertainty

		Assessment of analytical results					Measurement uncertainty [%]			
LC	Sample	Exceeds maximum level for **WHO-PCDD/F-PCB-TEQ**	Exceeds maximum level for **WHO-PCDD/F-TEQ**	Exceeds action level for **WHO-PCDD/F-TEQ**	Exceeds action level for **WHO-PCB-TEQ**	Exceeds maximum level for **Sum 6 Indicator PCBs**	WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum 6 Indicator PCBs
1	2301-MP									
2	2301-MP						±15		±15	
3	2301-MP									18.0
4	2301-MP	X	X	X	X	X	50.0	50.0	50.0	50.0
5	2301-MP						5.1	5.1	5.1	5.1
6	2301-MP									
7	2301-MP					X				40.0
8	2301-MP						7.7	9.9	10.0	7.2
9	2301-MP						15.5	14.0	16.8	13.500
10	2301-MP					x				28.5
11	2301-MP						17.0	18.0	16.0	15.0
12	2301-MP						20.0	25.0	22.0	21.0
13	2301-MP						20.0	15.0	15.0	15.0
14	2301-MP						20.0	20.0	20.0	40.0
15	2301-MP						50.0	31.4	39.6	31.6
16	2301-MP									
17	2301-MP						15.0	15.0	15.0	15.0
18	2301-MP						20.0	20.0	20.0	20.0
19	2301-MP						23.0	27.1	18.0	17.9
20	2301-MP									
21	2301-MP									32.0
22	2301-MP									18.6
23	2301-MP					X	40.0	40.0	40.0	40.0
24	2301-MP									
25	2301-MP									45.0
26	2301-MP									24.0
27	2301-MP						20.0	16.0	17.0	20.0
28	2301-MP									
29	2301-MP						30.0	30.0	30.0	30.0
30	2301-MP						28.4	24.6	14.3	14.3
31	2301-MP									
32	2301-MP							15.0	25.0	20.0
33	2301-MP									
34	2301-MP						18.5	18.0	19.0	19.0
35	2301-MP									
36	2301-MP									
37	2301-MP						20.0	20.0	20.0	20.0
38	2301-MP						25.0	25.0	28.0	13.0
39	2301-MP									
40	2301-MP						20.0	20.0	20.0	20.0
41	2301-MP						21.0	13.0	16.0	7.0
42	2301-MP						30.0	20.0	30.0	30.0
43	2301-MP									
44	2301-MP						25.0	35.0	30.0	20.0
45	2301-MP									
46	2301-MP						27.7	15.9	22.7	22.7
47	2301-MP	x	x	x	x	x	30.0	30.0	30.0	30.0
48	2301-MP						30.0	30.0	30.0	30.0
49	2301-MP									
50	2301-MP						23.0	30.0	18.0	7.0
51	2301-MP						30.0	30.0	30.0	
52	2301-MP									
53	2301-MP						19.1	19.6	18.6	21.8
54	2301-MP						25.0	25.0	25.0	
55	2301-MP						15.0	15.0	15.0	15.0
56	2301-MP						30.0	30.0	20.0	20.0
57	2301-MP									50.0
58	2301-MP						20.0	20.0	20.0	20.0
59	2301-MP									
60	2301-MP						40.0	40.0	40.0	40.0
61	2301-MP						30.0	30.0	30.0	
62	2301-MP									20.4
63	2301-MP						30.0	30.0	30.0	25.0
64	2301-MP						25.0	25.0	25.0	25.0
65	2301-MP									30.0
66	2301-MP									18.0
67	2301-MP						29.0	29.0	29.0	29.0
68	2301-MP									20.0
69	2301-MP									33.0
70	2301-MP						15.0		15.0	20.0
71	2301-MP						23.3	21.2	28.8	25.8
72	2301-MP									
73	2301-MP						44.0	44.0	44.0	44.0
74	2301-MP									

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EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Assessment of analytical results, Measurement uncertainty

LC	Sample	Assessment of analytical results					Measurement uncertainty [%]			
		Exceeds maximum level for **WHO-PCDD/F-PCB-TEQ**	Exceeds maximum level for **WHO-PCDD/F-TEQ**	Exceeds action level for **WHO-PCDD/F-TEQ**	Exceeds action level for **WHO-PCB-TEQ**	Exceeds maximum level for **Sum 6 Indicator PCBs**	WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum 6 Indicator PCBs
75	2301-MP									
76	2301-MP		x			x	30.0	30.0	30.0	30.0
77	2301-MP						24.2	22.0	10.0	10.0
78	2301-MP						20.0	20.0	20.0	20.0
79	2301-MP									
80	2301-MP						21.0	21.0	21.0	21.0
81	2301-MP						11.5	13.8	11.0	14.1
82	2301-MP									
83	2301-MP						11.3	17.2	23.1	12.5
84	2301-MP						17.0	25.0	17.0	6.0
85	2301-MP						38.0	24.0	30.0	53.0
86	2301-MP						20	20	20	20
87	2301-MP									
88	2301-MP						23	28	25	9
89	2301-MP									
90	2301-MP									
91	2301-MP					40 ng/g fat				43
92	2301-MP						30	30	30	30
93	2301-MP									
94	2301-MP		X	X			28	24	28	24
95	2301-MP									
96	2301-MP						19	17	22	25
97	2301-MP									
98	2301-MP						13	15	20	16
99	2301-MP		x	x		x	30	26	29	25
100	2301-MP									
101	2301-MP						15	16	14	15
102	2301-MP						30	30	30	
103	2301-MP									25
104	2301-MP							20	20	20
105	2301-MP						9	9	12	12
106	2301-MP						17	17	16	20
107	2301-MP									
108	2301-MP									12
109	2301-MP									
110	2301-MP									
111	2301-MP						0	0	0	3
112	2301-MP									17
113	2301-MP						44	44	44	44
114	2301-MP						38	38	38	28
115	2301-MP									17
116	2301-MP						19	25	30	30
117	2301-MP									
118	2301-MP									
119	2301-MP									28
120	2301-MP						28	27	29	25
121	2301-MP				X	X			31	12
122	2301-MP									88
123	2301-MP						39	31	28	38
124	2301-MP						21	21	21	30
125	2301-MP									
126	2301-MP						30	35	22	18
127	2301-MP	X	X	X	X	X	33	20	26	22
128	2301-MP									
129	2301-MP									30
7A	2301-MP	X	X	X	X	X	32	26	36	36
101A	2301-MP						15	16	14	15

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]

EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)

Difference between upper bound (ub) - lower bound (lb) calculation, Comparison of reported and calculated sum parameters

LC	Sample	Difference between upper and lower bound calculation for reported sum parameters [%]				Difference between reported and calculated upper bound sum parameters [%]				Correct calculation	Difference between reported and calculated lower bound sum parameters [%]				Correct calculation
		WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum 6 Indicator PCBs	WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum 6 Indicator PCBs	(deviation ≤ 10 %)	WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum 6 Indicator PCBs	(deviation ≤ 10 %)
1	2301-MP														
2	2301-MP	0.0	0.0	0.0		0.0	3.0	3.0		yes	3.0	3.0	3.0		yes
3	2301-MP				5.0				0.0	yes				0.0	yes
4	2301-MP	50	50	88	90	0	3	3888	82	no	50	49	361	98	no
5	2301-MP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
6	2301-MP														
7	2301-MP				0.0				0.0	yes				0.0	yes
8	2301-MP	8.7	20	0.0	0.0	1.0	3.0	0.0	2.0	yes	2.0	0.0	1.0	2.0	yes
9	2301-MP	0.5	1.2	0.0	23.9	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
10	2301-MP				0.0				0.0	yes				0.0	yes
11	2301-MP	0.4	0.8	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
12	2301-MP	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
13	2301-MP	3.3	6.2	0.3	0.0	0.0	0.0	0.0	100	no	0.0	0.0	0.0	100	no
14	2301-MP	10	19	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	1.0	0.0	0.0	yes
15	2301-MP	0.5	0.9	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
16	2301-MP				0.0				0.0	yes				0.0	yes
17	2301-MP	2.8	4.9	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
18	2301-MP	22	37	0.0	0.0	2.0	0.0	4.0	1.0	yes	0.0	1.0	4.0	1.0	yes
19	2301-MP	0.9	1.7	0.0	0.0	0.0	1.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
20	2301-MP														
21	2301-MP				-5.8				5.0	yes				6.0	yes
22	2301-MP				6.3				0.0	yes				0.0	yes
23	2301-MP	9.1	16.6	0.0	0.0	447	242	1531	0	no	627	357	1531	0	no
24	2301-MP														
25	2301-MP				0.0				0.0	yes				0.0	yes
26	2301-MP				1.3				0.0	yes				0.0	yes
27	2301-MP	35	31	0.0	0.0	23	0.0	0.0	1.0	no	4.0	0.0	0.0	1.0	yes
28	2301-MP														
29	2301-MP	7.3	13.9	0.0	0.0	1.0	0.0	1.0	0.0	yes	1.0	0.0	1.0	0.0	yes
30	2301-MP	33	100	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	2.0	0.0	0.0	yes
31	2301-MP														
32	2301-MP	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
33	2301-MP														
34	2301-MP	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
35	2301-MP														
36	2301-MP														
37	2301-MP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	1.0	0.0	0.0	yes
38	2301-MP					2.0	3.0	1.0	0.0	yes					
39	2301-MP														
40	2301-MP	0.0	14	0.0	0.0	0.0	0.0	0.0	0.0	yes	8.0	0.0	0.0	0.0	yes
41	2301-MP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
42	2301-MP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
43	2301-MP				7.7				3.0	yes				2.0	yes
44	2301-MP	21	42	0.0	0.0	3.0	1.0	1.0	0.0	yes	3.0	0.0	1.0	0.0	yes
45	2301-MP														
46	2301-MP	4.6	9.2	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	1.0	0.0	0.0	yes
47	2301-MP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
48	2301-MP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
49	2301-MP														
50	2301-MP	0.5	0.9	0.0	5.6	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
51	2301-MP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	1.0	0.0	0.0	yes
52	2301-MP	17	34	0.0	0.0	9.0	15.0	1.0	0.0	no	4.0	8.0	1.0	0.0	yes
53	2301-MP	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	yes	2.0	0.0	0.0	0.0	yes
54	2301-MP	-0.4	-0.9	0.0		0.0	1.0	0.0		yes	0.0	1.0	0.0		yes
55	2301-MP	0.4	0.8	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
56	2301-MP	1.4	1.3	0.0	0.0	1.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
57	2301-MP														
58	2301-MP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
59	2301-MP														
60	2301-MP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
61	2301-MP	0.0	0.0	0.0		0.0	0.0	0.0		yes	0.0	0.0	0.0		yes
62	2301-MP				0.0				0.0	yes				0.0	yes
63	2301-MP	5.9	10.5	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
64	2301-MP	2.6	4.1	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
65	2301-MP				0.0				0.0	yes				0.0	yes
66	2301-MP				0.0				0.0	yes				0.0	yes
67	2301-MP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
68	2301-MP				15.1				0.0	yes				0.0	yes
69	2301-MP				0.0				0.0	yes				0.0	yes
70	2301-MP	25.1	45.7	0.0	0.0	0.0	1.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
71	2301-MP	0.0	0.0	0.0	0.0	3.0	1.0	5.0	0.0	yes	3.0	0.0	5.0	0.0	yes
72	2301-MP														
73	2301-MP	4.3	9.1	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
74	2301-MP														

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]

EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)

Difference between upper bound (ub) - lower bound (lb) calculation, Comparison of reported and calculated sum parameters

LC	Sample	Difference between upper and lower bound calculation for reported sum parameters [%]				Difference between reported and calculated upper bound sum parameters [%]				Correct calculation	Difference between reported and calculated lower bound sum parameters [%]				Correct calculation
		WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum 6 Indicator PCBs	WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum 6 Indicator PCBs	(deviation ≤ 10 %)	WHO-PCDD/F-PCB-TEQ	WHO-PCDD/F-TEQ	WHO-PCB-TEQ	Sum 6 Indicator PCBs	(deviation ≤ 10 %)
75	2301-MP														
76	2301-MP	30	47	1.3	0.0	0.0	0.0	0.0	0.0	yes	1.0	0.0	0.0	0.0	yes
77	2301-MP	6.6	13.1	0.0	0.0	0.0	0.0	0.0	4.0	yes	0.0	0.0	0.0	5.0	yes
78	2301-MP	0.4	0.7	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
79	2301-MP														
80	2301-MP	28	51	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
81	2301-MP	-0.4	-0.9	0.0	0.0	0.0	0.0	0.0	0.0	yes	1.0	2.0	0.0	0.0	yes
82	2301-MP														
83	2301-MP	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	yes	0.0	1.0	0.0	0.0	yes
84	2301-MP	7.9	15.8	0.0	0.0	0.0	0.0	1.0	0.0	yes	0.0	0.0	1.0	0.0	yes
85	2301-MP	4.7	9.8	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
86	2301-MP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
87	2301-MP														
88	2301-MP	0.8	1.5	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
89	2301-MP														
90	2301-MP														
91	2301-MP				17.9				0.0	yes				1.0	yes
92	2301-MP	-0.6	-1.4	0.0	0.0	1.0	1.0	1.0	0.0	yes	1.0	2.0	1.0	0.0	yes
93	2301-MP														
94	2301-MP	37.3	33.8	51.6	0.0	0.0	0.0	0.0	100.0	no	0.0	0.0	0.0	100.0	no
95	2301-MP														
96	2301-MP	1.9	4.0	0.0	0.0	0.0	1.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
97	2301-MP														
98	2301-MP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
99	2301-MP	-0.1	100	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	100.0	0.0	0.0	no
100	2301-MP														
101	2301-MP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
102	2301-MP	0.0	0.0	0.0		1.0	3.0	3.0		yes	0.0	2.0	3.0		yes
103	2301-MP				8.4				0.0	yes				0.0	yes
104	2301-MP	18.1	37.2	0.9	2.7	0.0	1.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
105	2301-MP	0.3	0.7	0.0	0.0	25.0	42.0	0.0	0.0	no	25.0	42.0	0.0	0.0	no
106	2301-MP	2.6	6.1	0.0	0.0	0.0	0.0	1.0	0.0	yes	0.0	0.0	1.0	0.0	yes
107	2301-MP														
108	2301-MP				4.0				2.0	yes				2.0	yes
109	2301-MP														
110	2301-MP														
111	2301-MP	32	56	0.0	0.0	17	27	2.0	0.0	no	6.0	14	2.0	0.0	no
112	2301-MP				15.0				1.0	yes				1.0	yes
113	2301-MP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
114	2301-MP	0.4	0.7	0.0	5.7	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
115	2301-MP				0.0				2.0	yes				2.0	yes
116	2301-MP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
117	2301-MP														
118	2301-MP														
119	2301-MP				10				0.0	yes				0.0	yes
120	2301-MP	0.4	0.9	0.0	0	0.0	1.0	0.0	0.0	yes	0.0	1.0	0.0	0.0	yes
121	2301-MP			0.0	0			0.0	0.0	yes			0.0	0.0	yes
122	2301-MP				67				0.0	yes				0.0	yes
123	2301-MP	0.0	0.6	0.8	0	0.0	0.0	1.0	0.0	yes	0.0	1.0	0.0	0.0	yes
124	2301-MP	0.0	0.8	0.0	0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
125	2301-MP														
126	2301-MP	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
127	2301-MP	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
128	2301-MP														
129	2301-MP				0				0.0	yes				0.0	yes
7A	2301-MP	0.0	0.2	0.1	0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
101A	2301-MP	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	yes	0.0	0.0	0.0	0.0	yes
30*	2301-MP	10.1	17.7	0.0	0.0	11.0	0.0	0.0	0.0	no	11.0	0.0	0.0	0.0	no
56*	2301-MP	1	1	0	0	0	0	1	0	yes	0	0	1	0	yes
104*	2301-MP	18	37	1	3	0	1	0	0	yes	0	0	0	0	yes

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]

EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)

PCDD/F - Results

LC	Sample	Result pg/g fat	WHO-PCDD/F-TEQ reported upper bound	WHO-PCDD/F-TEQ reported lower bound	WHO-PCDD/F-TEQ calculated upper bound	WHO-PCDD/F-TEQ calculated lower bound	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	2,3,4,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	OCDF
1	2301-MP																						
2	2301-MP		1.1	1.1	1.13	1.07	< 0.05	0.38	0.16	0.55	0.25	0.81	< 1	0.86	0.16	1.2	0.57	0.28	0.4	< 0.1	0.62	< 0.09	0.53
3	2301-MP																						
4	2301-MP		666	333	647	647	176	165	630	222	155	231	555	33	777	61	322	444	311	471	205	77	44
5	2301-MP		2.37	2.37	2.37	2.37	0.292	0.176	0.664	1.21	0.42	2.27	3.4	2.09	0.786	3.46	1.44	0.902	1.04	0.217	1.74	0.217	1.83
6	2301-MP																						
7	2301-MP																						
8	2301-MP		1.2	0.96	1.17	0.962	< 0.13	0.23	< 0.25	0.53	< 0.25	0.98	1.5	0.92	0.32	1.4	0.63	0.36	0.4	< 0.25	0.82	< 0.25	0.79
9	2301-MP		1	0.988	1	0.99	0.089	0.214	0.127	0.475	0.137	0.936	1.1	0.833	0.24	1.3	0.557	0.266	0.326	< 0.096	0.747	< 0.178	0.777
10	2301-MP																						
11	2301-MP		1.26	1.25	1.26	1.25	0.121	0.266	0.158	0.527	0.184	1.2	1.57	0.912	0.328	1.66	0.754	0.372	0.454	< 0.041	0.749	< 0.03	0.832
12	2301-MP		1.95	1.94	1.95	1.94	0.164	0.438	0.248	0.984	0.319	1.82	2.45	1.53	0.49	2.51	1.16	0.522	0.613	< 0.12	1.34	0.097	1.31
13	2301-MP		0.942	0.884	0.944	0.885	< 0.05	0.212	0.253	0.472	< 0.05	0.833	< 2	0.802	0.213	1.22	0.608	0.274	0.34	0.11	0.676	< 0.2	< 2
14	2301-MP		1.21	0.98	1.21	0.987	< 0.195	0.244	< 0.165	0.502	0.166	0.847	< 1.8	0.873	0.323	1.42	0.656	0.337	0.381	< 0.082	0.741	< 0.096	0.59
15	2301-MP		1.14	1.13	1.14	1.13	0.127	0.276	0.165	0.484	0.19	1.03	1.67	0.928	0.322	1.28	0.639	0.363	0.382	< 0.11	0.736	< 0.11	0.779
16	2301-MP																						
17	2301-MP		3.09	2.94	3.09	2.94	0.245	0.669	< 0.495	1.29	< 0.495	2.76	4.31	2.48	0.824	4.1	1.62	0.781	1.06	< 0.495	1.92	< 0.495	1.42
18	2301-MP		1.5	0.94	1.5	0.947	< 0.18	< 0.19	< 0.092	< 0.26	< 0.45	< 5.6	3.7	1.3	0.36	1.8	1	0.64	0.85	< 0.47	1.5	< 0.21	3.4
19	2301-MP		1.16	1.14	1.17	1.14	0.0919	0.251	< 0.233	0.626	0.311	0.99	1.68	0.927	0.241	1.43	0.652	0.37	0.407	0.135	0.793	< 0.137	0.763
20	2301-MP																						
21	2301-MP																						
22	2301-MP																						
23	2301-MP		0.926	0.772	0.271	0.169	< 0.048	< 0.048	< 0.0108	< 0.0096	< 0.0192	0.0135	0.000787	0.102	0.00942	0.475	0.0909	0.0286	< 0.0144	0.0429	0.00772	< 0.00468	0.000221
24	2301-MP																						
25	2301-MP																						
26	2301-MP																						
27	2301-MP		1.08	0.75	1.08	0.751	< 0.15	< 0.12	< 0.18	0.6	0.46	0.66	3.78	1.11	< 0.14	1.4	0.49	< 0.16	0.43	< 0.17	1.3	< 0.2	2.56
28	2301-MP																						
29	2301-MP		1.01	0.87	1.01	0.869	< 0.1	0.18	0.211	0.487	< 0.2	0.916	1.43	0.819	0.246	1.29	0.615	0.314	0.338	< 0.2	0.688	< 0.3	0.748
30	2301-MP		0.615	0.00026	0.616	0.000256	< 0.145	< 0.298	< 0.131	< 0.133	< 0.137	< 0.197	< 0.403	< 0.164	< 0.203	< 0.182	< 0.113	< 0.118	< 0.0982	< 0.145	< 0.27	< 0.326	0.852
31	2301-MP																						
32	2301-MP		1.19	1.18	1.19	1.18	0.103	0.23	0.22	0.479	0.217	1.09	1.3	0.993	0.448	1.59	0.65	0.361	0.373	0.111	0.849	< 0.146	0.732
33	2301-MP																						
34	2301-MP		1.27	1.27	1.27	1.27	0.15	0.33	0.216	0.66	0.24	1.15	2.24	0.84	0.342	1.32	0.732	0.438	0.462	< 0.06	0.84	< 0.15	0.93
35	2301-MP																						
36	2301-MP																						
37	2301-MP		1.2	1.2	1.2	1.19	0.0875	0.283	0.166	0.585	0.205	1.06	1.71	1.01	0.352	1.51	0.719	0.369	0.355	< 0.0636	0.825	< 0.127	0.671
38	2301-MP		1.29		1.33	1.17	< 0.1	0.26	< 0.2	0.588	< 0.2	0.929	1.51	1.04	0.276	1.84	0.769	0.378	0.486	< 0.2	0.871	< 0.25	0.888
39	2301-MP																						
40	2301-MP		1.81	1.56	1.81	1.56	< 0.232	0.401	0.225	0.705	0.203	1.62	2.09	1.26	0.345	2.27	0.947	0.472	0.62	< 0.116	0.949	< 0.302	1.05
41	2301-MP		1.39	1.39	1.39	1.39	0.104	0.308	0.192	0.644	0.22	1.16	1.77	1.06	0.385	1.85	0.834	0.428	0.444	0.0347	0.916	0.0588	0.877
42	2301-MP		1.34	1.34	1.34	1.34	0.14	0.302	0.186	0.613	0.199	1.11	1.48	1.2	0.394	1.59	0.735	0.412	0.475	0.0861	0.767	0.0863	0.715
43	2301-MP																						
44	2301-MP		0.86	0.5	0.865	0.501	< 0.15	< 0.15	< 0.1	0.24	< 0.4	0.59	< 3	0.77	0.42	0.97	0.52	0.2	0.13	< 0.1	0.56	< 0.2	< 3
45	2301-MP																						
46	2301-MP		1.42	1.29	1.42	1.28	< 0.1	0.235	< 0.15	0.614	0.155	1.39	2.09	1.43	0.477	2.02	0.935	0.465	0.45	< 0.15	0.995	< 0.25	0.942
47	2301-MP		3.74	3.74	3.74	3.74	0.302	0.756	0.306	1.88	0.466	4.29	5.85	1.38	1.04	5.42	2.86	1.19	0.08	1.28	3.41	0.327	3.22
48	2301-MP		0.771	0.771	0.771	0.771	0.034	0.256	0.127	0.392	0.12	0.805	1.28	0.523	0.157	0.779	0.441	0.304	0.257	0.114	0.533	0.087	0.453
49	2301-MP																						
50	2301-MP		1.12	1.11	1.12	1.11	0.082	0.26	0.15	0.51	0.13	1.02	1.51	0.96	0.31	1.45	0.6	0.33	0.38	< 0.1	0.76	< 0.1	0.95
51	2301-MP		1.41	1.41	1.41	1.39	0.111	0.288	0.198	0.695	0.205	1.26	2.02	1.14	0.374	1.87	0.822	0.446	0.488	< 0.133	0.994	< 0.13	0.884
52	2301-MP		1.3	0.86	1.53	0.935	0.11	< 0.5	< 0.5	0.513	< 0.2	1.12	2.74	1.1	0.326	1.59	0.714	0.473	0.359	< 0.2	1.02	< 0.2	1.07
53	2301-MP		1.25	1.25	1.25	1.25	0.09	0.25	0.17	0.71	0.16	1.24	2.05	1.17	0.3	1.64	0.82	0.37	0.44	< 0.05	0.83	0.07	0.89
54	2301-MP		1.17	1.18	1.18	1.17	0.08	0.25	0.16	0.57	0.19	1.1	1.8	1	0.33	1.6	0.7	0.31	0.38	< 0.05	0.75	< 0.06	0.82
55	2301-MP		1.33	1.32	1.33	1.32	0.098	0.264	0.199	0.566	0.191	1.17	1.69	1.15	0.348	1.82	0.787	0.429	0.475	< 0.073	0.927	< 0.061	0.863
56	2301-MP		0.75	0.74	0.751	0.74	0.077	0.12	0.165	0.266	0.166	0.868	1.54	0.566	0.248	0.975	0.48	0.35	0.284	< 0.11	0.497	0.08	0.295
57	2301-MP																						
58	2301-MP		1.26	1.26	1.26	1.26	0.09	0.293	0.214	0.573	0.182	1.65	3.34	1.13	0.319	1.53	0.698	0.429	0.537	0.039	1.03	0.044	1.05
59	2301-MP																						
60	2301-MP		1.34	1.34	1.34	1.34	0.122	0.282	0.172	0.628	0.222	1.13	1.74	1.14	0.381	1.71	0.813	0.457	0.464	< 0.05	0.859	0.0706	0.787
61	2301-MP		1.19	1.19	1.19	1.19	0.086	0.255	0.157	0.562	0.201	1	1.38	1.12	0.312	1.49	0.72	0.394	0.457	0.086	0.729	0.041	0.677
62	2301-MP																						
63	2301-MP		1.33	1.19	1.33	1.19	< 0.101	0.291	< 0.131	0.607	< 0.115	1.23	1.89	1.21	0.413	1.58	0.807	0.65	0.682	< 0.127	0.832	< 0.125	0.962
64	2301-MP		1.23	1.18	1.23	1.18	0.12	0.28	0.34	0.5	< 0.31	0.95	1.5	1.16	0.39	1.41	0.55	0.34	0.38	< 0.22	0.75	< 0.161	0.99
65	2301-MP																						
66	2301-MP																						
67	2301-MP		1.46	1.46	1.46	1.46	0.389	0.241	0.178	0.533	0.23	1.1	1.31	1.05	0.266	1.51	0.711	0.296	0.443	0.077	0.702	0.174	1.2
68	2301-MP																						
69	2301-MP																						
70	2301-MP		1.27	0.69	1.28	0.69	< 0.1	< 0.2	< 0.5	0.69	< 0.5	1.36	< 2	0.87	< 0.5	1.49	0.73	< 0.5	< 0.5	< 0.5	< 1	< 1	< 2
71	2301-MP		1.22	1.22	1.23	1.22	0.1	0.274	0.123	0.612	0.215	1.32	2.13	0.989	0.358	1.57	0.659	0.345	0.395	< 0.08	1.17	< 0.3	1.17
72	2301-MP																						
73	2301-MP		1.32	1.2	1.32	1.2	< 0.1	0.317	0.252	0.7	0.263	1.24	1.91	0.882	0.356	1.56	0.74	0.419	0.52	< 0.2	0.987	< 0.2	1.56
74	2301-MP																						

Milk Powder (2301-MP)
PCDD/F - Results

LC	Sample	Result pg/g fat	WHO-PCDD/F-TEQ reported upper bound	WHO-PCDD/F-TEQ reported lower bound	WHO-PCDD/F-TEQ calculated upper bound	WHO-PCDD/F-TEQ calculated lower bound	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	2,3,4,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	OCDF
75	2301-MP																						
76	2301-MP		1.43	0.761	1.43	0.761	0.235	< 0.422	< 0.381	< 0.435	< 0.43	1.42	5.04	2.1	0.577	0.901	< 0.246	< 0.236	< 0.339	< 0.358	0.956	0.309	0.606
77	2301-MP		0.99	0.86	0.993	0.863	< 0.1	0.22	< 0.1	0.34	< 0.1	0.65	1.37	0.99	0.41	1.24	0.49	0.25	0.38	< 0.1	0.53	0.12	1.02
78	2301-MP		1.45	1.44	1.45	1.44	0.058	0.39	0.42	0.657	0.229	1.32	2.44	0.959	0.527	1.67	0.87	0.56	0.79	< 0.05	1.38	< 0.05	0.457
79	2301-MP																						
80	2301-MP		1.37	0.669	1.37	0.669	< 0.3	< 0.3	< 0.3	0.485	< 0.3	0.885	1.82	0.861	< 0.3	1.32	0.55	0.325	0.338	< 0.3	0.712	< 0.4	0.68
81	2301-MP		1.15	1.16	1.15	1.14	0.09	0.22	0.16	0.59	0.19	0.97	1.45	0.97	0.27	1.48	0.74	0.45	0.5	< 0.1	0.79	< 0.1	0.8
82	2301-MP																						
83	2301-MP		1.74	1.74	1.75	1.75	0.13	0.396	0.203	0.677	0.256	1.46	3.13	1.72	0.456	2.18	1.03	0.576	0.652	0.114	1.13	0.146	1.05
84	2301-MP		1.39	1.17	1.39	1.17	< 0.174	0.32	< 0.21	0.593	0.3	1.41	2.01	1.01	0.355	1.53	0.753	0.421	0.478	< 0.234	1.02	< 0.379	1.16
85	2301-MP		1.23	1.11	1.23	1.11	< 0.1	0.3	0.22	0.6	0.29	1.1	2	0.86	0.33	1.4	0.72	0.41	0.47	< 0.2	0.95	< 0.2	1.5
86	2301-MP		1.11	1.11	1.11	1.11	0.108	0.244	0.146	0.498	0.151	0.9	1.66	0.979	0.253	1.39	0.629	0.367	0.365	0.063	0.738	0.093	0.624
87	2301-MP																						
88	2301-MP		1.36	1.34	1.36	1.34	0.128	0.261	0.188	0.643	0.175	1.17	1.98	0.808	0.433	1.86	0.786	0.48	0.484	< 0.164	0.935	0.127	0.877
89	2301-MP																						
90	2301-MP																						
91	2301-MP																						
92	2301-MP		1.45	1.47	1.46	1.44	< 0.0185	0.21	0.17	0.83	0.22	1.12	3.18	1.65	0.42	2.24	1.18	0.59	< 0.021	0.56	1.49	0.2	1.58
93	2301-MP																						
94	2301-MP		2.75	1.82	2.75	1.82	0.11	< 0.865	< 0.328	0.999	< 0.366	3.38	9.85	1.51	0.741	3.53	1.54	0.678	0.452	0.486	2.01	< 0.331	2.54
95	2301-MP																						
96	2301-MP		1.77	1.7	1.76	1.7	< 0.0545	0.399	0.394	0.76	0.237	1.54	4.28	1.78	0.45	2.44	1.11	0.355	0.614	< 0.0781	1.21	0.108	1.07
97	2301-MP																						
98	2301-MP		1.19	1.19	1.19	1.19	0.0921	0.259	0.658	0.623	0.173	1.01	2.43	0.955	0.271	1.4	0.738	0.339	0.425	0.0467	0.81	0.0593	0.824
99	2301-MP		3.72	0	3.72	3.72	0.26	0.65	0.46	1.45	0.6	3.19	5.29	4.29	0.96	5.28	1.98	1.06	1.48	< 0.05	2.58	0.18	1.86
100	2301-MP																						
101	2301-MP		1.25	1.25	1.25	1.25	0.125	0.263	0.186	0.586	0.119	0.783	1.35	1.08	0.258	1.59	0.758	0.376	0.46	0.043	0.866	0.043	0.934
102	2301-MP		1.4	1.4	1.45	1.43	0.17	0.34	< 0.06	0.67	0.26	1.4	2.4	1.1	0.47	1.7	0.8	0.43	0.48	< 0.11	0.85	< 0.11	1.2
103	2301-MP																						
104	2301-MP		1.03	0.647	1.02	0.646	< 0.1	< 0.17	< 0.3	0.481	< 0.4	< 1.2	< 2.1	0.755	0.269	1.3	0.514	0.292	< 0.2	0.372	0.661	< 0.5	< 1
105	2301-MP		1.38	1.37	2.36	2.35	0.12	0.35	0.17	0.69	0.16	1.3	2.1	1.4	33	1.5	0.81	0.42	0.54	< 0.05	1.2	< 0.05	0.91
106	2301-MP		1.04	0.977	1.04	0.975	< 0.0108	< 0.0415	0.202	0.802	< 0.0643	1.55	4.42	1.14	0.345	1.71	1.02	0.476	0.542	< 0.0385	1.59	< 0.0718	1.34
107	2301-MP																						
108	2301-MP																						
109	2301-MP																						
110	2301-MP																						
111	2301-MP		0.43	0.19	0.587	0.166	< 0.32	< 0.0482	< 0.121	0.417	< 0.121	0.221	0.123	0.134	< 0.121	0.127	< 0.121	< 0.121	0.285	0.354	< 0.121	0.62	0.324
112	2301-MP																						
113	2301-MP		1.71	1.71	1.71	1.71	0.13	0.44	0.44	0.6	0.25	1.21	2.31	1.06	0.36	2.29	0.78	0.43	0.5	0.11	0.98	0.071	0.98
114	2301-MP		1.46	1.45	1.46	1.45	0.121	0.324	0.173	0.583	0.239	1.34	1.94	1.19	0.772	1.81	0.923	0.485	0.537	< 0.127	1.11	0.149	0.856
115	2301-MP																						
116	2301-MP		1.58	1.58	1.58	1.58	0.127	0.397	0.222	0.619	0.241	1.45	2.12	1.13	0.398	2.03	0.755	0.52	0.527	0.0979	1.06	0.145	1.17
117	2301-MP																						
118	2301-MP																						
119	2301-MP																						
120	2301-MP		1.07	1.06	1.08	1.07	0.1	0.19	0.15	0.52	0.14	1.22	1.47	0.91	0.31	1.46	0.63	0.36	0.42	< 0.05	0.8	0.1	0.79
121	2301-MP																						
122	2301-MP																						
123	2301-MP		1.54	1.53	1.54	1.54	0.137	0.328	0.602	0.657	0.205	1.27	2.42	1.07	0.424	1.93	0.753	0.465	0.616	0.151	1.23	0.068	0.931
124	2301-MP		1.26	1.25	1.26	1.25	0.089	0.277	0.166	0.599	0.222	1.23	2.24	1.13	0.391	1.6	0.743	0.427	0.438	< 0.055	0.929	0.066	0.834
125	2301-MP																						
126	2301-MP		1.22	1.22	1.22	1.22	0.0899	0.218	0.119	0.606	0.246	1.15	1.88	1.02	0.308	1.77	0.666	0.407	0.416	0.057	0.984	0.0658	0.755
127	2301-MP		3.9	3.9	3.9	3.9	0.267	1.11	0.442	1.76	0.522	3.55	5.29	3.17	1.2	4.51	2.18	1.13	1.28	0.205	2.66	0.275	2.33
128	2301-MP																						
129	2301-MP																						
7A	2301-MP		9.32	9.3	9.31	9.28	0.89	1.82	1.37	3.43	1.63	8.11	12.3	8.33	2.77	12.2	5.42	3.09	3.52	< 0.26	6.58	< 0.4	6.73
101A	2301-MP		1.25	1.25	1.25	1.25	0.125	0.263	0.186	0.586	0.119	0.783	1.35	1.08	0.258	1.59	0.758	0.376	0.46	0.043	0.866	0.043	0.934
30*	2301-MP		1.41	1.16	1.41	1.16	0.189	< 0.203	0.182	0.302	< 0.209	0.247	3.76	1.61	< 0.254	2.12	0.487	0.377	0.219	< 0.113	1.17	< 0.402	1.26
56*	2301-MP		1.31	1.3	1.31	1.3	0.135	0.21	0.289	0.466	0.291	1.52	2.7	0.991	0.434	1.71	0.84	0.613	0.497	< 0.11	0.87	0.14	0.516
104*	2301-MP		1.03	0.647	1.02	0.646	< 0.1	< 0.17	< 0.3	0.481	< 0.4	< 1.2	< 2.1	0.755	0.269	1.3	0.514	0.292	0.372	< 0.2	0.661	< 0.5	< 1

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Dioxin-like PCB - Results

LC	Sample	Result pg/g fat	WHO-PCB-TEQ reported upper bound	WHO-PCB-TEQ reported lower bound	WHO-PCB-TEQ calculated upper bound	WHO-PCB-TEQ calculated lower bound	PCB 105	PCB 114	PCB 118	PCB 123	PCB 156	PCB 157	PCB 167	PCB 189	PCB 77	PCB 81	PCB 126	PCB 169
1	2301-MP																	
2	2301-MP		1.1	1.1	1.07	1.07	1430	100	3220	47	420	95	140	15	36	4.4	7.8	4.1
3	2301-MP																	
4	2301-MP		666	77	16.7	16.7	888	1110	675	666	812	555	786	678	145	111	101	211
5	2301-MP		2.31	2.31	2.3	2.3	3200	204	6770	113	870	195	263	29	94.7	31.1	16.7	8.79
6	2301-MP																	
7	2301-MP																	
8	2301-MP		1.1	1.1	1.1	1.09	1700	84	3800	47	430	110	170	16	49	< 10	7.5	4.9
9	2301-MP		1.08	1.08	1.08	1.08	1800	122	3920	64.7	455	92.9	142	14.5	107	7.7	7.67	3.42
10	2301-MP																	
11	2301-MP		1.24	1.24	1.24	1.24	1620	74.3	3670	58.9	471	105	145	17.5	48.1	6.4	8.7	6.05
12	2301-MP		1.91	1.91	1.91	1.91	2130	143	4780	85.6	610	143	260	26.7	71.5	8.53	14.2	7.7
13	2301-MP		0.86	0.857	0.86	0.857	1060	64.5	2220	49.5	287	69.4	94.8	12.3	33.2	< 10	6.37	3.36
14	2301-MP		1.05	1.05	1.05	1.05	1550	81	3490	< 66	408	97	135	< 42	54	5.34	7.4	4.36
15	2301-MP		1.03	1.03	1.03	1.03	1540	93.3	3300	64.6	410	84.5	133	< 27.6	37.2	2.89	7.2	4.39
16	2301-MP																	
17	2301-MP		2.36	2.36	2.36	2.36	3210	221	7480	95	885	199	306	< 39.6	88.1	10.4	16.9	9.41
18	2301-MP		1.2	1.2	1.15	1.15	1800	85	3200	53	510	110	180	22	61	6.5	8.1	5.2
19	2301-MP		1.02	1.02	1.02	1.02	1340	89.1	3110	52.7	407	93.2	130	17.5	42.2	4.86	7.42	3.81
20	2301-MP																	
21	2301-MP																	
22	2301-MP																	
23	2301-MP		0.83	0.83	0.0509	0.0509	0.0575	0.00368	0.127	0.000403	0.0133	0.0026	0.00423	0.000455	0.00418	< 0.00027	0.463	0.154
24	2301-MP																	
25	2301-MP																	
26	2301-MP																	
27	2301-MP		0.83	0.83	0.832	0.832	1360	90.8	2930	61.7	493	105	159	13.7	3.2	2.58	5.52	4.08
28	2301-MP																	
29	2301-MP		0.916	0.916	0.909	0.909	1270	97.4	2800	44.4	333	79.1	108	11.9	37.2	3.9	6.51	3.7
30	2301-MP		1.25	1.25	1.25	1.25	1290	91.4	3000	60.3	409	85.8	113	12.6	43.7	4.32	9.82	3.75
31	2301-MP																	
32	2301-MP		1.39	1.39	1.39	1.39	1640	78.7	3120	105	426	97.9	143	15.2	49.7	36.4	9.85	7.3
33	2301-MP																	
34	2301-MP		1.13	1.13	1.13	1.13	1570	83.3	3760	56	445	95.1	144	15.2	51.5	4.8	8.02	4.66
35	2301-MP																	
36	2301-MP																	
37	2301-MP		1.18	1.18	1.18	1.18	1620	102	3770	56.1	460	98.3	153	16.3	46.5	5.61	8.48	4.6
38	2301-MP		0.994		0.999	0.999	1510	99	3210	41	381	90	204	14	47.6	5.2	7	4.2
39	2301-MP																	
40	2301-MP		1.45	1.45	1.45	1.45	1760	68.7	3630	59.6	482	110	180	96.7	54	5.85	10.8	5.69
41	2301-MP		1.28	1.28	1.28	1.28	1670	94.9	3620	30.4	465	102	152	27.9	52.7	5.85	9.17	5.63
42	2301-MP		1.14	1.14	1.14	1.14	1390	94.7	3040	53.7	409	88	135	16.3	45.4	5.72	8.3	4.76
43	2301-MP																	
44	2301-MP		0.57	0.57	0.573	0.573	848	68.7	1870	30.8	214	50.3	79.4	8.3	24.6	2.3	4	2.5
45	2301-MP																	
46	2301-MP		1.41	1.41	1.41	1.41	2050	135	4270	71.8	488	116	155	15.2	62.2	7.59	10.3	5.19
47	2301-MP		4.37	4.37	4.37	4.37	5800	350	12300	116	1600	417	1100	51.7	154	20.3	31.4	18.5
48	2301-MP		0.565	0.565	0.565	0.565	837	47.4	1700	64	223	46.9	75.6	7.09	27.6	3.49	3.74	3.25
49	2301-MP																	
50	2301-MP		0.796	0.796	0.796	0.796	1380	106	2780	34.3	365	71.8	126	11.3	39.5	2	5.32	3.79
51	2301-MP		1.23	1.23	1.23	1.23	2070	124	4480	60.8	561	121	151	18.2	60.1	5.77	8.44	4.91
52	2301-MP		1.32	1.32	1.34	1.34	1610	88	3720	58.2	594	92.4	144	11.8	57.4	6.43	10	4.84
53	2301-MP		1.19	1.19	1.19	1.19	1450	90	3350	45	425	86	144	< 12	43	5.5	8.7	5
54	2301-MP		1.17	1.17	1.17	1.17	1690	106	3590	62	414	88	162	15	49	5.8	8.4	4.6
55	2301-MP		1.19	1.19	1.19	1.19	1530	104	3350	66	431	99.3	153	< 21.5	45.4	5.58	8.61	4.92
56	2301-MP		0.63	0.63	0.633	0.633	805	57.1	1950	36.8	247	54.5	78.4	10.4	25.2	2.27	4.57	2.52
57	2301-MP																	
58	2301-MP		1.27	1.27	1.27	1.27	1500	117	3520	61	477	82	174	26	63.4	6.16	9.28	5.32
59	2301-MP																	
60	2301-MP		1.32	1.32	1.32	1.32	1710	101	3560	52.5	455	100	147	16.2	54.1	7.01	9.8	4.93
61	2301-MP		1.07	1.07	1.07	1.07	1190	76.9	2640	50.9	342	76.8	121	12	43.3	4.68	8.15	3.76
62	2301-MP																	
63	2301-MP		1.03	1.03	1.03	1.03	1530	108	3310	43.7	450	99.9	147	16.2	43.7	6.02	7.35	3.95
64	2301-MP		1.08	1.08	1.08	1.08	1410	128	3130	35	260	95	193	16.4	44.6	5.24	7.83	4.52
65	2301-MP																	
66	2301-MP																	
67	2301-MP		0.581	0.581	0.581	0.581	1470	195	< 0.5	< 0.5	500	62.1	128	18.6	24.2	2.58	4.28	2.62
68	2301-MP																	
69	2301-MP																	
70	2301-MP		1.04	1.04	1.04	1.04	1190	90.8	2860	< 50	387	90.5	130	< 50	42.2	4.39	7.68	4.13
71	2301-MP		1.07	1.07	1.13	1.13	1380	83.7	2960	43.5	406	88.7	141	14.6	41.9	4	7.68	6.64
72	2301-MP																	
73	2301-MP		1.45	1.45	1.45	1.45	1670	107	3680	56.6	439	99.3	150	17.4	52.6	4.85	10.9	5.46
74	2301-MP																	

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Dioxin-like PCB - Results

LC	Sample	Result pg/g fat	WHO-PCB-TEQ reported upper bound	WHO-PCB-TEQ reported lower bound	WHO-PCB-TEQ calculated upper bound	WHO-PCB-TEQ calculated lower bound	PCB 105	PCB 114	PCB 118	PCB 123	PCB 156	PCB 157	PCB 167	PCB 189	PCB 77	PCB 81	PCB 126	PCB 169
75	2301-MP																	
76	2301-MP		0.845	0.834	0.846	0.834	1370	< 153	3040	< 167	396	88	107	< 75.3	32.6	1.78	6.41	1.3
77	2301-MP		0.97	0.97	0.966	0.966	2230	160	4590	444	639	92.3	191	739	34.3	4.09	5.99	3
78	2301-MP		0.872	0.872	0.872	0.872	1290	95	2720	40.6	396	93.6	140	12.6	35.4	4.25	6.15	3.61
79	2301-MP																	
80	2301-MP		1.1	1.1	1.1	1.1	1510	98.5	3190	80.2	465	92.8	478	305	45.6	5.04	7.71	4.45
81	2301-MP		1.22	1.22	1.22	1.22	1530	139	3370	79	435	101	197	17	48	5.6	9	4.5
82	2301-MP																	
83	2301-MP		0.911	0.911	0.911	0.911	1320	115	3190	55	472	89.1	148	18	106	21.9	6.32	3.32
84	2301-MP		1.39	1.39	1.38	1.38	1570	101	3760	79	443	102	164	29.6	56.2	5.44	10.2	5.6
85	2301-MP		1.34	1.34	1.34	1.34	1450	107	3490	56	436	99	146	16	54	4.4	10.5	3.7
86	2301-MP		1.16	1.16	1.16	1.16	1560	114	3510	77.2	416	95.4	150	16.2	49.6	5.44	8.42	4.5
87	2301-MP																	
88	2301-MP		1.19	1.19	1.19	1.19	1600	113	3700	63.1	467	105	101	16.2	50.8	6.01	8.67	4.52
89	2301-MP																	
90	2301-MP																	
91	2301-MP																	
92	2301-MP		1.64	1.64	1.65	1.65	2070	136	4980	72.1	578	144	214	23.8	82.7	9.16	12.1	5.95
93	2301-MP																	
94	2301-MP		0.63	0.305	0.63	0.305	2460	196	5130	114	746	163	902	< 7.91	57.4	25.2	< 2.97	< 0.944
95	2301-MP																	
96	2301-MP		1.96	1.96	1.96	1.96	2550	168	5820	108	726	265	229	31.2	81.8	7.4	14.5	6.81
97	2301-MP																	
98	2301-MP		1.14	1.14	1.14	1.14	1570	103	3210	64.3	521	116	165	19.1	52.7	6.37	8.01	5.2
99	2301-MP		3.78	3.78	3.78	3.78	4950	313	11900	218	1220	304	416	43.2	183	19.4	28.2	11.7
100	2301-MP																	
101	2301-MP		1.48	1.48	1.48	1.48	1810	112	3860	66	488	105	148	17.3	44.8	5.6	11.1	5.51
102	2301-MP		1.2	1.2	1.17	1.17	1450	118	3270	41.4	444	96.6	122	19.6	60.1	6.2	8.6	4.6
103	2301-MP																	
104	2301-MP		1.13	1.12	1.13	1.12	1470	< 200	3230	57.6	381	< 100	141	< 30	45.7	< 11	8.23	4.5
105	2301-MP		1.58	1.58	1.58	1.58	2040	128	4450	85	553	147	162	17.3	67.3	7.05	11.8	5.62
106	2301-MP		1.3	1.3	1.29	1.29	1690	105	3360	325	478	105	170	19.3	48.5	5.89	9.47	5.05
107	2301-MP																	
108	2301-MP								3.6									
109	2301-MP																	
110	2301-MP																	
111	2301-MP		0.31	0.31	0.304	0.304	177	24.7	1090	17.6	122	26.9	41	4.57	12.6	1.27	2.17	1.35
112	2301-MP																	
113	2301-MP		1.24	1.24	1.24	1.24	1900	126	3930	71.7	628	117	187	22.1	50.4	6.31	8.7	5.23
114	2301-MP		1.09	1.09	1.09	1.09	1350	85.4	2910	268	382	92	161	104	69.8	45.7	7.47	5.41
115	2301-MP																	
116	2301-MP		1.12	1.12	1.12	1.12	1420	92.6	3260	61.7	410	84.1	145	17.7	48.7	5.61	7.97	5.11
117	2301-MP																	
118	2301-MP																	
119	2301-MP																	
120	2301-MP		1.22	1.22	1.22	1.22	1750	79.3	3790	63.4	492	114	138	13.8	52.7	5.02	8.73	4.87
121	2301-MP		3.25	3.25	3.25	3.25	5730	356	11800	180	1480	358	514	47.7	185	19.4	22.2	12.9
122	2301-MP																	
123	2301-MP		1.2	1.19	1.19	1.19	1450	105	3710	93.7	418	90.6	143	14.3	49.4	4.56	8.96	3.71
124	2301-MP		1.21	1.21	1.21	1.21	1640	117	3550	70.9	475	102	166	18.9	53.3	6.1	8.76	4.88
125	2301-MP																	
126	2301-MP		1.12	1.12	1.12	1.12	1600	113	3500	61.9	477	96.7	157	16.4	49.1	5.72	7.97	4.53
127	2301-MP		3.43	3.43	3.43	3.43	5110	206	10800	412	1270	298	510	54.1	153	16.8	24.1	14.7
128	2301-MP																	
129	2301-MP																	
7A	2301-MP		8.91	8.9	8.9	8.9	13200	1110	29500	900	3800	778	1270	125	370	47	61.7	38.7
101A	2301-MP		1.14	1.14	1.14	1.14	1810	112	3860	66	488	105	148	17.3	44.8	5.6	7.7	5.51
30*	2301-MP		1.25	1.25	1.25	1.25	1290	91.4	3000	60.3	409	85.8	113	12.6	43.7	4.32	9.82	3.75
56*	2301-MP		1.1	1.1	1.11	1.11	1410	100	3410	64.4	432	95.4	137	18.2	44.1	3.97	8	4.41
104*	2301-MP		1.13	1.12	1.13	1.12	1470	< 200	3230	57.6	381	< 100	141	< 30	45.7	< 11	8.23	4.5

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EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Non dioxin-like PCB - Results

LC	Sample	Result ng/g fat	Sum 6 Indicator PCBs reported upper bound	Sum 6 Indicator PCBs reported lower bound	Sum 6 Indicator PCBs calculated upper bound	Sum 6 Indicator PCBs calculated lower bound	PCB 28	PCB 52	PCB 101	PCB 138	PCB 153	PCB 180
1	2301-MP											
2	2301-MP											
3	2301-MP		23.8	22.6	23.9	22.6	< 1.25	3.2	3.73	3.53	5.92	6.22
4	2301-MP		100	10	548	548	102	89	77	97	91	92
5	2301-MP		46.5	46.5	46.6	46.6	0.597	7.05	8.62	5.69	11.5	13.1
6	2301-MP											
7	2301-MP		213	213	213	213	5.9	25.8	47.7	51.3	34.2	48
8	2301-MP		24	24	23.6	23.6	0.36	3.4	4.8	2.8	5.7	6.5
9	2301-MP		24.7	18.8	24.7	18.8	< 1.74	< 4.14	3.88	2.82	5.71	6.38
10	2301-MP		65.1	65.1	65.3	65.3	9.31	10.5	10.9	7.66	14.4	12.5
11	2301-MP		20.9	20.9	20.9	20.9	0.403	3.03	3.77	2.56	5.13	5.98
12	2301-MP		34.3	34.3	34.3	34.3	0.466	5.09	5.74	4.27	8.63	10.1
13	2301-MP		16.7	16.7	16700	16700	348	2250	3020	2220	4140	4750
14	2301-MP		22.2	22.2	22.2	22.2	0.59	3.3	4.2	2.8	5.4	5.9
15	2301-MP		21.9	21.9	21.9	21.9	0.264	3.18	3.81	2.25	5.49	6.91
16	2301-MP		20.9	20.9	21	21	0.62	2.79	3.5	2.94	5.65	5.49
17	2301-MP		41.7	41.7	41.7	41.7	1.81	7.12	8.75	6.09	8.38	9.57
18	2301-MP		26	26	25.8	25.8	0.97	3.6	4.8	4.1	5.5	6.8
19	2301-MP		18.6	18.6	18.6	18.6	0.293	2.91	3.45	2.22	4.77	4.94
20	2301-MP											
21	2301-MP		25.9	27.4	27.4	25.9	< 1.5	3.5	4.9	3.4	7.2	6.9
22	2301-MP		31.8	29.8	31.8	29.8	< 2	5.4	5.74	4.41	6.27	7.95
23	2301-MP		40.4	40.4	40.4	40.4	1.52	5.52	7.28	4.83	10.1	11.1
24	2301-MP											
25	2301-MP		22.2	22.2	22.2	22.2	0.736	3.42	4.05	3.03	5	5.97
26	2301-MP		7.44	7.34	7.44	7.34	< 0.1	0.97	1.19	1.91	0.97	2.3
27	2301-MP		17.9	17.9	17.8	17.8	0.73	3.07	3.08	2.29	4.54	4.13
28	2301-MP											
29	2301-MP		17	17	17	17	0.319	2.37	3.11	2.26	4.24	4.67
30	2301-MP		19.9	19.9	19.9	19.9	0.545	3.29	3.4	2.53	5.14	5
31	2301-MP											
32	2301-MP		18.7	18.7	18.7	18.7	0.419	2.7	3.43	2.48	4.68	5
33	2301-MP											
34	2301-MP		24.4	24.4	24.4	24.4	0.383	3.52	4	2.89	7.25	6.36
35	2301-MP											
36	2301-MP											
37	2301-MP		22.3	22.3	22.2	22.2	0.247	3.03	4.13	2.74	6.05	6.05
38	2301-MP		22		22.1	22.1	0.4	3.5	4.9	2.7	5.2	5.4
39	2301-MP											
40	2301-MP		27.9	27.9	27.9	27.9	0.368	4.04	4.72	3.45	7.27	8.1
41	2301-MP		25.2	25.2	25.2	25.2	0.435	3.37	4.44	3.13	6.53	7.3
42	2301-MP		18.8	18.8	18.8	18.8	0.32	2.68	3.45	2.3	4.89	5.2
43	2301-MP		26	24	25.2	23.6	< 1.6	3.6	4.2	2.7	6.9	6.2
44	2301-MP		13.3	13.3	13.3	13.3	0.43	1.8	2.7	1.6	3.4	3.4
45	2301-MP											
46	2301-MP		26.9	26.9	26.9	26.9	0.942	3.44	4.57	3.02	7.65	7.27
47	2301-MP		81.5	81.5	81.5	81.5	1.66	12.2	16	11.4	19.4	20.8
48	2301-MP		11	11	11	11	0.263	1.48	1.98	1.73	2.9	2.64
49	2301-MP											
50	2301-MP		18	17	18	17	< 1	2.6	4.1	2.8	4.3	3.2
51	2301-MP		31.2	31.2	31.2	31.2	0.489	4.35	5.85	4.3	7.62	8.62
52	2301-MP		23.9	23.9	23.9	23.9	0.33	3.37	4.25	2.96	6.31	6.72
53	2301-MP		20	20	20.1	20.1	0.4	3.1	3.8	2.4	4.9	5.5
54	2301-MP											
55	2301-MP		20.5	20.5	20.5	20.5	0.249	3.02	3.82	2.57	5.19	5.61
56	2301-MP		11.7	11.7	11.7	11.7	0.7	1.7	1.98	1.37	2.66	3.29
57	2301-MP				3	0	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
58	2301-MP		24	24	24	24	0.46	3.46	4.39	3.72	5.86	6.07
59	2301-MP											
60	2301-MP		23.5	23.5	23.5	23.5	0.435	3.51	4.15	2.98	6.25	6.22
61	2301-MP											
62	2301-MP		21	21	21	21	0.55	3.06	3.86	3.22	5.07	5.24
63	2301-MP		21.6	21.6	21.6	21.6	0.842	3.03	3.92	3.05	5.06	5.67
64	2301-MP		21.5	21.5	21.5	21.5	0.37	2.99	4.62	2.45	5.23	5.85
65	2301-MP		15.6	15.6	15.6	15.6	0.213	2.53	3.05	1.84	4.08	3.91
66	2301-MP		25	25	25	25	0.6	2.64	4.92	3.54	6.87	6.46
67	2301-MP		22.3	22.3	22.3	22.3	0.343	3.17	4.28	2.87	7.07	4.53
68	2301-MP		29.1	24.7	29.1	24.7	< 4.41	3.88	4.16	4.5	5.82	6.37
69	2301-MP		25.2	25.2	25.2	25.2	0.542	3.58	4.81	3.43	6.4	6.47
70	2301-MP		12.7	12.7	12.7	12.7	0.24	1.33	2.08	2.55	2.64	3.82
71	2301-MP		19.5	19.5	19.5	19.5	0.397	2.81	3.44	2.51	5.07	5.23
72	2301-MP											
73	2301-MP		26.2	26.2	26.2	26.2	0.4	4.1	5.1	3.3	6.7	6.6
74	2301-MP											

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Milk Powder (2301-MP)
Non dioxin-like PCB - Results

LC	Sample	Result ng/g fat	Sum 6 Indicator PCBs reported upper bound	Sum 6 Indicator PCBs reported lower bound	Sum 6 Indicator PCBs calculated upper bound	Sum 6 Indicator PCBs calculated lower bound	PCB 28	PCB 52	PCB 101	PCB 138	PCB 153	PCB 180
75	2301-MP											
76	2301-MP		20.2	20.2	20.2	20.2	0.725	3.23	3.38	2.6	5.09	5.2
77	2301-MP		22.8	22.8	23.7	21.7	< 2	3.97	5.3	3.98	4.51	3.92
78	2301-MP		19.7	19.7	19.7	19.7	0.348	3.22	3.69	2.29	4.95	5.22
79	2301-MP											
80	2301-MP		22.7	22.7	22.7	22.7	0.323	3.07	4.05	2.85	6.62	5.81
81	2301-MP		22.3	22.3	22.3	22.3	0.9	3.23	4.06	3.04	5.17	5.88
82	2301-MP											
83	2301-MP		24.5	24.5	24.5	24.5	3.88	3.41	4.28	3.29	4.27	5.33
84	2301-MP		19.1	19.1	19.1	19.1	0.354	3.37	3.82	2.46	3.6	5.54
85	2301-MP		25.8	25.8	25.7	25.7	0.4	4.1	5.2	2.8	6.7	6.5
86	2301-MP		21.3	21.3	21.3	21.3	0.435	3.07	3.7	2.54	5.44	6.09
87	2301-MP											
88	2301-MP		21.9	21.9	21.9	21.9	0.378	3.21	4.4	2.03	6.36	5.56
89	2301-MP											
90	2301-MP											
91	2301-MP		23.5	19.3	23.5	19.2	< 1.6	2.74	3.71	< 2.7	5.4	7.3
92	2301-MP		21.2	21.2	21.2	21.2	0.52	2.94	4.23	2.47	5.31	5.7
93	2301-MP											
94	2301-MP		1.84	1.84	36800	36800	1140	5300	7700	4270	8410	9980
95	2301-MP											
96	2301-MP		35.2	35.2	35.2	35.2	0.621	5.13	6.65	4.23	8.87	9.71
97	2301-MP											
98	2301-MP		23.6	23.6	23.6	23.6	0.368	3.24	4.16	2.52	6.5	6.8
99	2301-MP		66.1	66.1	66	66	2.66	10.4	14.1	9.18	15.5	14.2
100	2301-MP											
101	2301-MP		25.7	25.7	25.7	25.7	0.3	3.81	4.8	3.08	6.47	7.27
102	2301-MP											
103	2301-MP		23.8	21.8	23.8	21.8	< 2.08	3.04	3.91	3	5.93	5.88
104	2301-MP		18.4	17.9	18.4	17.9	< 0.5	2.67	3.34	2.32	4.99	4.59
105	2301-MP		26.1	26.1	26.1	26.1	0.79	4.17	5.04	3.2	6.28	6.63
106	2301-MP		15.3	15.3	15.3	15.3	0.255	2.31	3.51	1.93	3.03	4.28
107	2301-MP											
108	2301-MP		25	24	25.4	24.4	< 1	3.3	4.4	3.5	6.8	6.4
109	2301-MP											
110	2301-MP											
111	2301-MP		6.73	6.73	6.71	6.71	0.11	1.01	1.23	0.82	1.72	1.82
112	2301-MP		20	17	19.9	17.2	< 0.9	< 0.9	3.07	< 0.9	3.07	11.1
113	2301-MP		19.8	19.8	19.8	19.8	0.36	3.15	3.38	2.53	5.04	5.3
114	2301-MP		21.1	19.9	21.1	19.9	< 1.2	3	3.7	5.7	2.2	5.3
115	2301-MP		30.2	30.2	30.8	30.8	0.8	5	5.9	3.7	7.8	7.6
116	2301-MP		21.1	21.1	21.1	21.1	0.391	3.07	3.88	2.49	5.53	5.73
117	2301-MP											
118	2301-MP											
119	2301-MP		10.2	9.18	10.2	9.18	< 1	1.66	1.58	1.54	2.22	2.18
120	2301-MP		21.3	21.3	21.3	21.3	0.4	2.79	4.13	2.81	5.57	5.59
121	2301-MP		79.2	79.2	79.2	79.2	1.34	12.6	15.2	11	16.7	22.4
122	2301-MP		30	10	30	10	< 5	< 5	< 5	< 5	5.01	5.01
123	2301-MP		20.8	20.8	20.8	20.8	0.337	1.71	4.56	2.47	5.03	6.7
124	2301-MP		22.5	22.5	22.5	22.5	0.47	3.33	4.2	2.87	5.62	5.97
125	2301-MP											
126	2301-MP		23.3	23.3	23.3	23.3	0.414	4.32	4.14	3.08	5.5	5.81
127	2301-MP		64.8	64.8	64.8	64.8	1.1	9.73	11.7	9.4	15.5	17.4
128	2301-MP											
129	2301-MP		23.6	23.6	23.6	23.6	0.686	3.1	4.39	3.59	5.69	6.15
7A	2301-MP		231	231	231	231	6.68	29.5	51.5	55.8	36.3	50.8
101A	2301-MP		25.7	25.7	25.7	25.7	0.3	3.81	4.8	3.08	6.47	7.27
30*	2301-MP		19.9	19.9	19.9	19.9	0.545	3.29	3.4	2.53	5.14	5
56*	2301-MP		20.5	20.5	20.5	20.5	1.23	2.98	3.47	2.4	4.66	5.76
104*	2301-MP		18.4	17.9	18.4	17.9	< 0.5	2.67	3.34	2.32	4.99	4.59

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Bioanalytical screening methods - Results, Assessment of analytical results

LC	Sample	Result pg BEQ/g fat	PCDD/Fs + DL-PCBs	PCDD/Fs	DL-PCBs	Assessment of analytical results: Sample suspected to be noncompliant with … Maximum Level PCDD/Fs+DL-PCBs	Maximum Level PCDD/Fs	Action Level PCDD/Fs	Action Level DL-PCBs	Reporting Limit PCDD/Fs+ DL-PCBs	PCDD/Fs	DL-PCBs	Maximum Level on which evaluation is based on PCDD/Fs+ DL-PCBs	PCDD/Fs	DL-PCBs	Action Level on which evaluation is based on PCDD/Fs+ DL-PCBs	PCDD/Fs	DL-PCBs	Bioassay Cut-off Maximum Level PCDD/Fs+ DL-PCBs	PCDD/Fs	Bioassay Cut-off Action Level PCDD/Fs	DL-PCBs
1	2301-MP																					
2	2301-MP																					
3	2301-MP																					
4	2301-MP																					
5	2301-MP																					
6	2301-MP																					
7	2301-MP																					
8	2301-MP																					
9	2301-MP		1.9			no	no			0.9			4									
10	2301-MP																					
11	2301-MP																					
12	2301-MP																					
13	2301-MP																					
14	2301-MP																					
15	2301-MP																					
16	2301-MP																					
17	2301-MP																					
18	2301-MP																					
19	2301-MP																					
20	2301-MP																					
21	2301-MP																					
22	2301-MP																					
23	2301-MP																					
24	2301-MP																					
25	2301-MP																					
26	2301-MP																					
27	2301-MP																					
28	2301-MP																					
29	2301-MP																					
30	2301-MP																					
31	2301-MP																					
32	2301-MP																					
33	2301-MP																					
34	2301-MP																					
35	2301-MP																					
36	2301-MP																					
37	2301-MP																					
38	2301-MP																					
39	2301-MP		20			no	-	-	-	13												
40	2301-MP																					
41	2301-MP																					
42	2301-MP																					
43	2301-MP																					
44	2301-MP																					
45	2301-MP																					
46	2301-MP		2.6	1.3	1.3	no	no	no	no	1.34	0.64	0.7	4	2			1.75	2	2.98	1.73	1.31	1.5
47	2301-MP																					
48	2301-MP																					
49	2301-MP																					
50	2301-MP																					
51	2301-MP																					
52	2301-MP																					
53	2301-MP																					
54	2301-MP																					
55	2301-MP		2.8			no				1			4	2			1.75	2				
56	2301-MP																					
57	2301-MP																					
58	2301-MP		1.5							0.5									0.5			
59	2301-MP																					
60	2301-MP																					
61	2301-MP																					
62	2301-MP																					
63	2301-MP																					
64	2301-MP																					
65	2301-MP																					
66	2301-MP		2.8			no				0.54			4						2.7			
67	2301-MP		2.8	1.6	1.2	no	no	no	no	0.5	0.25	0.25	5.5	2.5			1.75	2		1.75		
68	2301-MP																					
69	2301-MP																					
70	2301-MP																					
71	2301-MP																					
72	2301-MP																					
73	2301-MP																					
74	2301-MP		0	0	0	no	no	no	no	0.1	0.1	0.1	5.5	5.5	5.5	2.5	2.5	2.5				

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Bioanalytical screening methods - Results, Assessment of analytical results

LC	Sample	Result pg BEQ/g fat	PCDD/Fs + DL-PCBs	PCDD/Fs	DL-PCBs	Assessment of analytical results: Sample suspected to be noncompliant with … Maximum Level PCDD/Fs+DL-PCBs	Maximum Level PCDD/Fs	Action Level PCDD/Fs	Action Level DL-PCBs	Reporting Limit PCDD/Fs+ DL-PCBs	Reporting Limit PCDD/Fs	Reporting Limit DL-PCBs	Maximum Level on which evaluation is based on PCDD/Fs+ DL-PCBs	Maximum Level on which evaluation is based on PCDD/Fs	Maximum Level on which evaluation is based on DL-PCBs	Action Level on which evaluation is based on PCDD/Fs+ DL-PCBs	Action Level on which evaluation is based on PCDD/Fs	Action Level on which evaluation is based on DL-PCBs	Bioassay Cut-off Maximum Level PCDD/Fs+ DL-PCBs	Bioassay Cut-off Maximum Level PCDD/Fs	Bioassay Cut-off Action Level PCDD/Fs	Bioassay Cut-off Action Level DL-PCBs
75	2301-MP																					
76	2301-MP																					
77	2301-MP																					
78	2301-MP																					
79	2301-MP																					
80	2301-MP																					
81	2301-MP																					
82	2301-MP																					
83	2301-MP																					
84	2301-MP																					
85	2301-MP																					
86	2301-MP																					
87	2301-MP																					
88	2301-MP																					
89	2301-MP																					
90	2301-MP																					
91	2301-MP																					
92	2301-MP																					
93	2301-MP																					
94	2301-MP																					
95	2301-MP																					
96	2301-MP																					
97	2301-MP		2.7		1.7	no			yes	1.47		0.64	4	2			1.75	2	2.67	1.33	1.17	1.33
98	2301-MP																					
99	2301-MP																					
100	2301-MP																					
101	2301-MP																					
102	2301-MP																					
103	2301-MP																					
104	2301-MP																					
105	2301-MP																					
106	2301-MP																					
107	2301-MP																					
108	2301-MP																					
109	2301-MP																					
110	2301-MP																					
111	2301-MP																					
112	2301-MP																					
113	2301-MP																					
114	2301-MP																					
115	2301-MP																					
116	2301-MP																					
117	2301-MP																					
118	2301-MP																					
119	2301-MP																					
120	2301-MP																					
121	2301-MP																					
122	2301-MP																					
123	2301-MP																					
124	2301-MP																					
125	2301-MP																					
126	2301-MP																					
127	2301-MP																					
128	2301-MP																					
129	2301-MP																					
7A	2301-MP																					
97A	2301-MP		2.4			no	yes	yes	yes	1.5			4.0	2.0			1.8	2.0	1.5	1.5	1.3	1.5

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Lipid content - Results

LC	Sample	Result %	Lipid content Physico-chemical methods	Lipid content Bioanalytical methods	Lipid content Mean
1	2301-MP				
2	2301-MP		5.2		5.2
3	2301-MP		7.2		7.2
4	2301-MP				
5	2301-MP		5.2		5.2
6	2301-MP				
7	2301-MP		1.0		1.0
8	2301-MP		9.7		9.7
9	2301-MP		9.3	8.5	8.9
10	2301-MP		4.2		4.2
11	2301-MP		9.1		9.1
12	2301-MP		6.0		6.0
13	2301-MP				
14	2301-MP		8.5		8.5
15	2301-MP		9.8		9.8
16	2301-MP		10.0		10.0
17	2301-MP		9.2		9.2
18	2301-MP		9.0		9.0
19	2301-MP		11.6		11.6
20	2301-MP				
21	2301-MP		8.5		8.5
22	2301-MP				
23	2301-MP		1.9		1.9
24	2301-MP				
25	2301-MP		9.3		9.3
26	2301-MP		9.9		9.9
27	2301-MP		9.8		9.8
28	2301-MP				
29	2301-MP				
30	2301-MP		3.6		3.6
31	2301-MP				
32	2301-MP		10.5		10.5
33	2301-MP				
34	2301-MP		9.7		9.7
35	2301-MP				
36	2301-MP				
37	2301-MP		8.7		8.7
38	2301-MP				
39	2301-MP			1.6	1.6
40	2301-MP		7.9		7.9
41	2301-MP		8.0		8.0
42	2301-MP		9.8		9.8
43	2301-MP		9.8		9.8
44	2301-MP				
45	2301-MP				
46	2301-MP		8.9	8.2	8.6
47	2301-MP				
48	2301-MP		23.0		23.0
49	2301-MP				
50	2301-MP		9.7		9.7
51	2301-MP		8.2		8.2
52	2301-MP		10.2		10.2
53	2301-MP		9.6		9.6
54	2301-MP		10.1		10.1
55	2301-MP		8.7	8.7	8.7
56	2301-MP		1.7		1.7
57	2301-MP		6.4		6.4
58	2301-MP		8.6	8.6	8.6
59	2301-MP				
60	2301-MP		9.9		9.9
61	2301-MP		9.8		9.8
62	2301-MP		9.4		9.4
63	2301-MP		9.6		9.6
64	2301-MP		10.6		10.6
65	2301-MP		9.8		9.8
66	2301-MP		8.5	8.5	8.5
67	2301-MP		10.0	10.0	10.0
68	2301-MP		9.5		9.5
69	2301-MP				
70	2301-MP		9.3		9.3
71	2301-MP		9.6		9.6
72	2301-MP				
73	2301-MP		9.5		9.5
74	2301-MP			0.8	0.8

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Lipid content - Results

LC	Sample	Result %	Lipid content Physico-chemical methods	Lipid content Bioanalytical methods	Lipid content Mean
75	2301-MP				
76	2301-MP		8.9		8.9
77	2301-MP		9.9		9.9
78	2301-MP		9.8		9.8
79	2301-MP				
80	2301-MP		9.9		9.9
81	2301-MP				
82	2301-MP				
83	2301-MP		9.1		9.1
84	2301-MP		10.0		10.0
85	2301-MP		9.5		9.5
86	2301-MP		9.2		9.2
87	2301-MP				
88	2301-MP		13.4		13.4
89	2301-MP				
90	2301-MP				
91	2301-MP		10.0		10.0
92	2301-MP		7.0		7.0
93	2301-MP				
94	2301-MP		5.0		5.0
95	2301-MP				
96	2301-MP		4.7		4.7
97	2301-MP			11.3	11.3
98	2301-MP		8.5		8.5
99	2301-MP		2.9		2.9
100	2301-MP				
101	2301-MP		9.8		9.8
102	2301-MP		9.6		9.6
103	2301-MP		9.6		9.6
104	2301-MP		13.3		13.3
105	2301-MP				
106	2301-MP		8.3		8.3
107	2301-MP				
108	2301-MP		9.4		9.4
109	2301-MP				
110	2301-MP				
111	2301-MP		33.1		33.1
112	2301-MP		11.1		11.1
113	2301-MP		7.2		7.2
114	2301-MP		4.6		4.6
115	2301-MP		7.8		7.8
116	2301-MP		9.6		9.6
117	2301-MP				
118	2301-MP				
119	2301-MP		6.2		6.2
120	2301-MP		8.9		8.9
121	2301-MP		2.8		2.8
122	2301-MP		10.0		10.0
123	2301-MP		9.1		9.1
124	2301-MP		9.0		9.0
125	2301-MP				
126	2301-MP		9.7		9.7
127	2301-MP		2.9		2.9
128	2301-MP				
129	2301-MP		9.7		9.7
7A	2301-MP		0.9		0.9
97A	2301-MP			10.7	10.7
101A	2301-MP		9.8		9.8
2*	2301-MP		10.4		10.4
56*	2301-MP		9.7		9.7

EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food
03 May 2024

Annex 3: Participants' z-scores and bioassay-scores of PCDD/Fs and PCBs - Tables

Test sample - Milk Powder (2301-MP)

Z-scores of sum parameters and individual results

Calculation of z-score on basis of assigned value

$z = (x - x_a) / \sigma_p$

x_a: assigned value
x: participant's result
σ_p: fitness-for-purpose-based standard deviation for proficiency assessment
10%: WHO-PCDD/F-TEQ, WHO-PCB-TEQ and WHO-PCDD/F-PCB-TEQ
15%: Sum of six indicator PCBs (PCB 28, 52, 101, 138, 153, 180)
20%: Evaluated individual PCDD/F and PCB congeners

Bioassay-scores of BEQ results

Calculation of bioassay-score on basis of assigned value from physical-chemical methods

bioassay-score $= (x - x_a) / \sigma_{bioassay}$

x_a: assigned value (pyhsical-chemical methods)
x: participant's result (BEQ from bioanalytical screening method)
$\sigma_{bioassay}$: bioassay target deviation
20%: PCDD/F-PCB-BEQ, PCDD/F-BEQ and PCB-BEQ

* Modified/additional results reported after distribution of preliminary results to all participating laboratories

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Sum parameters - Z-scores

LC	Sample	Z-score [σ_p = 10 %]	WHO-PCDD/F-PCB-TEQ reported		WHO-PCDD/F-PCB-TEQ calculated		WHO-PCDD/F-TEQ reported		WHO-PCDD/F-TEQ calculated		WHO-PCB-TEQ reported		WHO-PCB-TEQ calculated		Z-score [σ_p = 15 %]	Sum Indicator PCBs reported		Sum Indicator PCBs calculated	
			upper bound	lower bound	upper bound	lower bound	upper bound	lower bound	upper bound	lower bound	upper bound	lower bound	upper bound	lower bound		upper bound	lower bound	upper bound	lower bound
1	2301-MP																		
2	2301-MP		-0.8	-0.4	-0.8	-0.7	-1.3	-0.6	-1.1	-0.9	-0.4	-0.4	-0.7	-0.7					
3	2301-MP															0.4	0.2	0.4	0.2
4	2301-MP		2765.0	1444.1	2756.7	2889.6	5275.7	2836.2	5084.5	5473.1	5832.1	659.6	135.2	135.2		23.2	-3.6	156.4	160.2
5	2301-MP		9.5	10.4	9.5	10.4	8.8	10.3	8.7	10.1	10.3	10.1	10.0	10.0		7.2	7.6	7.2	7.5
6	2301-MP																		
7	2301-MP															57.0	58.5	56.7	58.2
8	2301-MP		-0.4	-0.8	-0.5	-1.0	-0.5	-1.8	-0.8	-1.8	-0.4	-0.4	-0.4	-0.5		0.5	0.7	0.4	0.5
9	2301-MP		-1.3	-1.0	-1.3	-1.0	-2.1	-1.6	-2.1	-1.6	-0.5	-0.6	-0.6	-0.6		0.7	-0.9	0.7	-0.9
10	2301-MP															12.8	13.2	12.8	13.2
11	2301-MP		0.4	0.9	0.4	0.9	0.0	0.7	-0.1	0.6	0.9	0.8	0.8	0.8		-0.4	-0.3	-0.4	-0.3
12	2301-MP		6.1	6.8	6.1	6.8	5.5	6.6	5.4	6.4	6.8	6.6	6.6	6.6		3.6	3.8	3.5	3.8
13	2301-MP		-2.5	-2.4	-2.5	-2.4	-2.5	-2.4	-2.6	-2.5	-2.5	-2.5	-2.5	-2.5		-1.7	-1.6	4963.6	5077.0
14	2301-MP		-0.6	-1.1	-0.6	-1.1	-0.4	-1.6	-0.5	-1.6	-0.8	-0.9	-0.9	-0.9		0.0	0.1	-0.1	0.1
15	2301-MP		-1.0	-0.6	-1.0	-0.6	-1.0	-0.3	-1.0	-0.4	-1.0	-1.0	-1.0	-1.0		-0.1	0.0	-0.1	0.0
16	2301-MP															-0.4	-0.3	-0.4	-0.3
17	2301-MP		12.7	13.1	12.7	13.1	14.5	15.1	14.3	14.9	10.7	10.5	10.5	10.5		5.8	6.1	5.7	6.0
18	2301-MP		1.3	-0.8	1.0	-0.8	1.9	-2.0	1.8	-2.0	0.5	0.4	0.0	0.0		1.1	1.3	1.0	1.2
19	2301-MP		-0.9	-0.6	-0.9	-0.6	-0.8	-0.3	-0.8	-0.3	-1.1	-1.1	-1.1	-1.1		-1.1	-1.0	-1.1	-1.0
20	2301-MP																		
21	2301-MP															1.1	1.7	1.5	1.2
22	2301-MP															2.8	2.4	2.8	2.4
23	2301-MP		-2.7	-3.0	-8.7	-9.0	-2.7	-3.4	-7.9	-8.6	-2.7	-2.8	-9.6	-9.6		5.4	5.7	5.4	5.6
24	2301-MP																		
25	2301-MP															0.0	0.1	-0.1	0.1
26	2301-MP															-4.4	-4.4	-4.5	-4.4
27	2301-MP		-0.3	-3.4	-2.0	-3.1	-1.4	-3.6	-1.5	-3.6	-2.7	-2.8	-2.8	-2.8		-1.3	-1.2	-1.4	-1.2
28	2301-MP																		
29	2301-MP		-2.0	-2.2	-2.0	-2.2	-2.0	-2.6	-2.0	-2.6	-2.0	-2.0	-2.1	-2.1		-1.6	-1.5	-1.6	-1.5
30	2301-MP		-2.2	-4.5	-2.2	-4.5	-5.1	-10.0	-5.1	-10.0	1.0	0.9	0.9	0.9		-0.7	-0.6	-0.7	-0.6
31	2301-MP																		
32	2301-MP		0.7	1.2	0.8	1.2	-0.6	0.1	-0.6	0.0	2.2	2.1	2.1	2.1		-1.1	-0.9	-1.1	-1.0
33	2301-MP																		
34	2301-MP		0.0	0.5	0.0	0.5	0.1	0.9	0.0	0.8	-0.1	-0.2	-0.2	-0.2		0.6	0.8	0.6	0.8
35	2301-MP																		
36	2301-MP																		
37	2301-MP		-0.1	0.4	-0.1	0.3	-0.5	0.3	-0.6	0.1	0.4	0.3	0.3	0.3		0.0	0.2	-0.1	0.1
38	2301-MP		-0.5		-0.3	-0.5	0.2		0.5	-0.1	-1.3		-1.3	-1.3		-0.1		-0.1	0.1
39	2301-MP																		
40	2301-MP		3.6	4.2	3.6	3.1	4.4	3.3	4.3	3.2	2.7	2.6	2.6	2.6		1.7	1.9	1.6	1.8
41	2301-MP		1.1	1.7	1.1	1.7	1.0	1.9	0.9	1.8	1.2	1.1	1.1	1.1		0.9	1.0	0.8	1.0
42	2301-MP		0.3	0.8	0.3	0.8	0.6	1.5	0.6	1.4	0.0	-0.1	-0.1	-0.1		-1.0	-0.9	-1.1	-0.9
43	2301-MP															1.1	0.7	0.8	0.5
44	2301-MP		-4.2	-5.2	-4.0	-5.3	-3.2	-5.7	-3.2	-5.8	-5.0	-5.0	-5.0	-5.0		-2.7	-2.6	-2.7	-2.6
45	2301-MP																		
46	2301-MP		1.8	1.8	1.8	1.7	1.3	1.0	1.2	0.8	2.4	2.3	2.3	2.3		1.4	1.6	1.3	1.5
47	2301-MP		23.8	25.4	23.8	25.4	19.7	22.0	19.4	21.7	28.3	28.0	28.0	28.0		17.7	18.3	17.6	18.1
48	2301-MP		-4.4	-4.1	-4.4	-4.1	-3.9	-3.4	-3.9	-3.5	-5.0	-5.1	-5.1	-5.1		-3.4	-3.3	-3.4	-3.3
49	2301-MP																		
50	2301-MP		-2.0	-1.7	-2.0	-1.7	-1.1	-0.5	-1.2	-0.6	-3.0	-3.1	-3.1	-3.1		-1.3	-1.5	-1.3	-1.5
51	2301-MP		1.0	1.5	1.0	1.4	1.2	2.1	1.1	1.8	0.8	0.7	0.7	0.7		2.7	2.9	2.6	2.8
52	2301-MP		0.9	-0.5	2.0	0.0	0.3	-2.6	2.0	-2.1	1.6	1.5	1.7	1.7		0.5	0.6	0.4	0.6
53	2301-MP		0.0	0.5	0.2	0.7	-0.1	0.7	-0.2	0.6	0.4	0.3	0.3	0.3		-0.7	-0.6	-0.7	-0.5
54	2301-MP		-0.3	0.3	-0.2	0.2	-0.7	0.1	-0.7	-0.1	0.3	0.2	0.2	0.2					
55	2301-MP		0.5	1.0	0.5	1.0	0.6	1.3	0.5	1.2	0.4	0.3	0.3	0.3		-0.5	-0.4	-0.6	-0.4
56	2301-MP		-4.2	-4.0	-4.3	-4.0	-4.0	-3.7	-4.1	-3.7	-4.5	-4.5	-4.5	-4.5		-3.2	-3.1	-3.2	-3.1
57	2301-MP																	-5.8	-6.7
58	2301-MP		0.5	1.0	0.5	1.0	0.0	0.8	-0.1	0.7	1.1	1.0	1.0	1.0		0.5	0.7	0.5	0.6
59	2301-MP																		
60	2301-MP		1.1	1.6	1.1	1.6	0.6	1.5	0.6	1.4	1.6	1.5	1.5	1.5		0.4	0.5	0.3	0.5
61	2301-MP		-0.6	-0.1	-0.6	-0.1	-0.6	0.2	-0.6	0.1	-0.6	-0.7	-0.7	-0.7					
62	2301-MP															-0.4	-0.2	-0.4	-0.3
63	2301-MP		-0.2	-0.3	-0.2	-0.3	0.6	0.2	0.5	0.1	-1.0	-1.0	-1.0	-1.0		-0.2	-0.1	-0.2	-0.1
64	2301-MP		-0.3	-0.1	-0.4	-0.1	-0.2	0.1	-0.3	0.0	-0.5	-0.6	-0.6	-0.6		-0.2	-0.1	-0.3	-0.1
65	2301-MP															-2.0	-1.9	-2.0	-1.9
66	2301-MP															0.8	1.0	0.8	0.9
67	2301-MP		-1.5	-1.1	-1.5	-1.1	1.6	2.5	1.5	2.4	-4.9	-4.9	-4.9	-4.9		0.0	0.2	0.0	0.1
68	2301-MP															2.0	0.9	2.0	0.9
69	2301-MP															0.9	1.0	0.8	1.0
70	2301-MP		-0.4	-2.4	-0.3	-2.4	0.1	-4.1	0.1	-4.2	-0.9	-1.0	-1.0	-1.0		-2.9	-2.8	-2.9	-2.8
71	2301-MP		-0.5	0.0	-0.2	0.3	-0.3	0.4	-0.3	0.3	-0.6	-0.7	-0.2	-0.2		-0.8	-0.7	-0.9	-0.7
72	2301-MP																		
73	2301-MP		1.5	1.6	1.5	1.6	0.5	0.3	0.4	0.2	2.7	2.6	2.6	2.6		1.2	1.3	1.1	1.3
74	2301-MP																		

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EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Sum parameters - Z-scores

LC	Sample	Z-score [σ_p = 10 %]	WHO-PCDD/F-PCB-TEQ reported		WHO-PCDD/F-PCB-TEQ calculated		WHO-PCDD/F-TEQ reported		WHO-PCDD/F-TEQ calculated		WHO-PCB-TEQ reported		WHO-PCB-TEQ calculated		Z-score [σ_p = 15 %]	Sum Indicator PCBs reported		Sum Indicator PCBs calculated	
			upper bound	lower bound	upper bound	lower bound	upper bound	lower bound	upper bound	lower bound	upper bound	lower bound	upper bound	lower bound		upper bound	lower bound	upper bound	lower bound
75	2301-MP																		
76	2301-MP		-0.5	-3.1	-0.5	-3.0	1.3	-3.5	1.3	-3.6	-2.6	-2.7	-2.6	-2.7		-0.6	-0.5	-0.7	-0.5
77	2301-MP		-1.8	-2.0	-1.8	-2.0	-2.1	-2.6	-2.2	-2.7	-1.5	-1.6	-1.6	-1.6		0.1	0.3	0.4	-0.1
78	2301-MP		-0.3	0.1	-0.3	0.1	1.5	2.3	1.4	2.2	-2.4	-2.4	-2.4	-2.4		-0.8	-0.6	-0.8	-0.7
79	2301-MP																		
80	2301-MP		0.3	-2.3	0.3	-2.3	0.9	-4.3	0.8	-4.3	-0.4	-0.4	-0.4	-0.4		0.1	0.3	0.1	0.2
81	2301-MP		-0.1	0.4	-0.1	0.3	-0.9	-0.1	-0.9	-0.3	0.7	0.6	0.6	0.6		0.0	0.2	0.0	0.1
82	2301-MP																		
83	2301-MP		1.0	1.6	1.1	1.6	3.8	4.9	3.8	4.8	-2.0	-2.1	-2.1	-2.1		0.7	0.8	0.6	0.8
84	2301-MP		1.6	1.2	1.5	1.1	1.0	0.0	0.9	-0.1	2.2	2.1	2.0	2.0		-1.0	-0.8	-1.0	-0.9
85	2301-MP		0.7	0.7	0.7	0.7	-0.2	-0.5	-0.3	-0.6	1.8	1.7	1.7	1.7		1.0	1.2	1.0	1.2
86	2301-MP		-0.5	-0.1	-0.5	-0.1	-1.2	-0.5	-1.3	-0.6	0.2	0.1	0.1	0.1		-0.3	-0.2	-0.3	-0.2
87	2301-MP																		
88	2301-MP		0.6	1.0	0.6	1.0	0.8	1.5	0.7	1.4	0.4	0.3	0.3	0.3		-0.1	0.0	-0.1	0.0
89	2301-MP																		
90	2301-MP																		
91	2301-MP															0.4	-0.8	0.3	-0.8
92	2301-MP		2.9	3.6	3.0	3.5	1.5	2.6	1.5	2.2	4.4	4.3	4.3	4.3		-0.3	-0.2	-0.4	-0.2
93	2301-MP																		
94	2301-MP		4.1	-0.7	4.1	-0.7	11.8	5.6	11.7	5.4	-4.5	-7.3	-4.5	-7.3		-6.1	-6.1	10945.7	11195.8
95	2301-MP																		
96	2301-MP		5.5	6.0	5.5	6.0	4.0	4.5	3.9	4.4	7.2	7.0	7.0	7.0		3.9	4.1	3.8	4.0
97	2301-MP																		
98	2301-MP		-0.3	0.2	-0.3	0.2	-0.6	0.2	-0.6	0.1	0.0	-0.1	-0.1	-0.1		0.4	0.6	0.4	0.5
99	2301-MP		21.2	22.8	21.3	22.8	19.5	-10.0	19.3	21.5	23.2	22.9	22.9	22.9		13.1	13.5	13.0	13.4
100	2301-MP																		
101	2301-MP		1.4	1.9	1.4	1.9	-0.1	0.7	-0.2	0.6	3.0	2.9	2.9	2.9		1.0	1.2	1.0	1.2
102	2301-MP		0.8	1.4	0.9	1.4	1.1	2.0	1.4	2.1	0.5	0.4	0.2	0.2					
103	2301-MP															0.4	0.0	0.4	0.0
104	2301-MP		-1.0	-2.3	-1.0	-2.3	-1.8	-4.5	-2.0	-4.5	-0.1	-0.3	-0.2	-0.3		-1.2	-1.2	-1.2	-1.2
105	2301-MP		2.3	2.9	6.4	7.2	1.0	1.7	8.6	9.9	3.9	3.7	3.7	3.7		1.1	1.3	1.1	1.3
106	2301-MP		-0.3	0.0	-0.3	-0.1	-1.7	-1.6	-1.8	-1.7	1.4	1.3	1.2	1.2		-2.1	-2.0	-2.1	-2.0
107	2301-MP																		
108	2301-MP															0.8	0.7	0.9	0.8
109	2301-MP																		
110	2301-MP																		
111	2301-MP		-6.9	-7.8	-6.3	-7.9	-6.6	-8.4	-5.4	-8.6	-7.3	-7.3	-7.4	-7.4		-4.7	-4.6	-4.7	-4.6
112	2301-MP															-0.7	-1.5	-0.7	-1.4
113	2301-MP		2.3	2.9	2.3	2.9	3.6	4.6	3.5	4.5	0.9	0.8	0.8	0.8		-0.7	-0.6	-0.8	-0.6
114	2301-MP		0.6	1.1	0.6	1.1	1.6	2.4	1.5	2.3	-0.4	-0.5	-0.5	-0.5		-0.4	-0.6	-0.4	-0.6
115	2301-MP															2.4	2.6	2.5	2.7
116	2301-MP		1.3	1.8	1.3	1.8	2.5	3.5	2.4	3.4	-0.2	-0.3	-0.3	-0.3		-0.4	-0.2	-0.4	-0.2
117	2301-MP																		
118	2301-MP																		
119	2301-MP															-3.6	-3.9	-3.6	-3.9
120	2301-MP		-0.5	0.0	-0.4	0.0	-1.5	-0.9	-1.5	-0.9	0.7	0.6	0.6	0.6		-0.3	-0.2	-0.3	-0.2
121	2301-MP										18.5	18.3	18.3	18.3		17.0	17.6	16.9	17.4
122	2301-MP															2.3	-3.6	2.3	-3.6
123	2301-MP		1.4	1.9	1.4	1.9	2.2	3.1	2.1	3.1	0.5	0.3	0.3	0.3		-0.4	-0.3	-0.5	-0.3
124	2301-MP		0.3	0.8	0.3	0.7	0.0	0.7	-0.1	0.6	0.6	0.5	0.5	0.5		0.1	0.2	0.0	0.2
125	2301-MP																		
126	2301-MP		-0.3	0.2	-0.3	0.2	-0.3	0.4	-0.4	0.3	-0.2	-0.3	-0.3	-0.3		0.3	0.5	0.3	0.4
127	2301-MP		20.5	22.0	20.5	22.0	21.0	23.3	20.7	23.1	20.1	19.8	19.8	19.8		12.7	13.1	12.6	13.1
128	2301-MP																		
129	2301-MP															0.4	0.6	0.4	0.5
7A	2301-MP		65.8	69.5	65.8	69.5	64.0	69.5	63.3	68.6	68.2	67.4	67.4	67.4		62.4	64.0	62.1	63.7
101A	2301-MP		0.0	0.4	0.0	0.4	-0.1	0.7	-0.2	0.6	0.0	-0.1	-0.1	-0.1		1.0	1.2	1.0	1.2
30*	2301-MP		-0.1	-0.7	1.1	0.5	1.2	-0.1	1.1	-0.2	1.0	0.9	0.9	0.9		-0.7	-0.6	-0.7	-0.6
56*	2301-MP		0.1	0.5	0.1	0.5	0.4	1.1	0.3	1.0	-0.4	-0.4	-0.3	-0.3		-0.5	-0.4	-0.6	-0.4
104*	2301-MP		-1.0	-2.3	-1.0	-2.3	-1.8	-4.5	-2.0	-4.5	-0.1	-0.3	-0.2	-0.3		-1.2	-1.2	-1.2	-1.2

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
PCDD/F - Z-scores

LC	Sample	Z-score [σ_p = 10 %]	WHO-PCDD/F-TEQ reported		WHO-PCDD/F-TEQ calculated		Z-score [σ_p = 20 %]	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	2,3,4,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	OCDF
			upper bound	lower bound	upper bound	lower bound																		
1	2301-MP																							
2	2301-MP		-1.3	-0.6	-1.1	-0.9			2.1	-0.5	-0.3		-1.4		-0.8	-2.7	-1.2	-1.0	-1.5	-0.5		-1.4		-2.0
3	2301-MP																							
4	2301-MP		5275.7	2836.2	5084.5	5473.1		8068.4	3061.9	17791.6	1895.7		1017.1	1511.4	155.2	11158.8	190.5	2256.2	5615.3	3529.1		1182.7		241.9
5	2301-MP		8.8	10.3	8.7	10.1		8.4	-1.7	13.8	5.4		5.0	4.3	5.1	6.3	6.1	5.1	6.4	6.8		5.1		5.3
6	2301-MP																							
7	2301-MP																							
8	2301-MP		-0.5	-1.8	-0.8	-1.8			-0.7		-0.5		-0.7	-0.9	-0.5	-0.4	-0.5	-0.6	-0.4	-0.5		-0.2		-0.6
9	2301-MP		-2.1	-1.6	-2.1	-1.6		-0.9	-1.0	-1.4	-0.9		-0.9	-2.0	-1.0	-1.6	-0.8	-1.1	-1.6	-1.3		-0.7		-0.6
10	2301-MP																							
11	2301-MP		0.0	0.7	-0.1	0.6		0.6	-0.1	-0.5	-0.5		0.3	-0.7	-0.6	-0.3	0.3	0.3	-0.3	0.2		-0.7		-0.3
12	2301-MP		5.5	6.6	5.4	6.4		2.5	3.1	2.0	3.4		3.1	1.7	2.4	2.0	3.0	3.1	1.6	2.0		2.8		2.4
13	2301-MP		-2.5	-2.4	-2.6	-2.5			-1.1	2.1	-1.0		-1.3		-1.1	-1.9	-1.1	-0.7	-1.5	-1.1		-1.1		
14	2301-MP		-0.4	-1.6	-0.5	-1.6			-0.5		-0.7		-1.3		-0.8	-0.4	-0.4	-0.4	-0.7	-0.7		-0.7		-1.7
15	2301-MP		-1.0	-0.3	-1.0	-0.4		0.8	0.1	-0.3	-0.9		-0.4	-0.4	-0.5	-0.4	-0.9	-0.5	-0.4	-0.7		-0.7		-0.6
16	2301-MP																							
17	2301-MP		14.5	15.1	14.3	14.9		6.2	7.4		6.0		7.2	6.8	7.0	6.8	8.1	6.4	4.9	7.0		6.1		3.0
18	2301-MP		1.9	-2.0	1.8	-2.0								5.1	1.3	0.2	0.8	2.0	3.1	4.7		3.7		14.1
19	2301-MP		-0.8	-0.3	-0.8	-0.3		-0.8	-0.3		0.4		-0.6	-0.4	-0.5	-1.5	-0.4	-0.4	-0.3	-0.4		-0.4		-0.7
20	2301-MP																							
21	2301-MP																							
22	2301-MP																							
23	2301-MP		-2.7	-3.4	-7.9	-8.6							-4.9	-5.0	-4.5	-4.9	-3.5	-4.4	-4.6			-5.0		-5.0
24	2301-MP																							
25	2301-MP																							
26	2301-MP																							
27	2301-MP		-1.4	-3.6	-1.5	-3.6					0.1		-2.1	5.3	0.4		-0.5	-1.6		-0.1		2.5		9.4
28	2301-MP																							
29	2301-MP		-2.0	-2.6	-2.0	-2.6			-1.7	1.0	-0.8		-0.9	-1.1	-1.0	-1.5	-0.9	-0.7	-1.0	-1.2		-1.0		-0.8
30	2301-MP		-5.1	-10.0	-5.1	-10.0																		-0.2
31	2301-MP																							
32	2301-MP		-0.6	0.1	-0.6	0.0		-0.3	-0.7	1.2	-0.9		-0.2	-1.4	-0.2	1.4	0.1	-0.4	-0.4	-0.8		-0.1		-0.9
33	2301-MP																							
34	2301-MP		0.1	0.9	0.0	0.8		1.9	1.1	1.1	0.7		0.1	1.1	-0.9	-0.1	-0.8	0.1	0.5	0.3		-0.1		0.2
35	2301-MP																							
36	2301-MP																							
37	2301-MP		-0.5	0.3	-0.6	0.1		-1.0	0.3	-0.3	0.0		-0.3	-0.3	-0.1	0.1	-0.2	0.0	-0.3	-1.0		-0.2		-1.2
38	2301-MP		0.2		0.5	-0.1			-0.2		0.0		-0.9	-0.9	0.0	-1.0	0.9	0.4	-0.2	0.5		0.0		0.0
39	2301-MP																							
40	2301-MP		4.4	3.3	4.3	3.2			2.5	1.4	1.0		2.2	0.7	1.1	0.0	2.3	1.7	1.0	2.0		0.5		0.9
41	2301-MP		1.0	1.9	0.9	1.8		-0.2	0.7	0.4	0.5		0.1	-0.2	0.1	0.5	0.9	0.9	0.4	0.0		0.3		-0.1
42	2301-MP		0.6	1.5	0.6	1.4		1.4	0.6	0.3	0.2		-0.1	-1.0	0.8	0.7	0.1	0.2	0.2	0.4		-0.6		-1.0
43	2301-MP																							
44	2301-MP		-3.2	-5.7	-3.2	-5.8					-2.9		-2.4		-1.3	1.0	-1.9	-1.3	-2.5	-3.5		-1.8		
45	2301-MP																							
46	2301-MP		1.3	1.0	1.2	0.8			-0.6		0.3		1.2	0.7	1.9	1.9	1.5	1.6	0.9	0.1		0.8		0.3
47	2301-MP		19.7	22.0	19.4	21.7		8.9	9.1	3.6	11.1		14.0	11.0	1.7	9.9	12.4	15.1	10.1	-4.1		14.8		13.1
48	2301-MP		-3.9	-3.4	-3.9	-3.5		-3.4	-0.2	-1.4	-1.6		-1.4	-1.5	-2.5	-2.7	-2.5	-1.9	-1.2	-2.1		-1.9		-2.5
49	2301-MP																							
50	2301-MP		-1.1	-0.5	-1.2	-0.6		-1.2	-0.2	-0.8	-0.6		-0.5	-0.9	-0.3	-0.5	-0.4	-0.8	-0.8	-0.7		-0.6		0.3
51	2301-MP		1.2	2.1	1.1	1.8		0.1	0.4	0.6	1.0		0.6	0.5	0.5	0.4	1.0	0.8	0.6	0.5		0.8		0.0
52	2301-MP		0.3	-2.6	2.0	-2.1		0.0			-0.6		0.0	2.5	0.3	-0.3	0.1	0.0	1.0	-0.9		0.9		1.0
53	2301-MP		-0.1	0.7	-0.2	0.6		-0.9	-0.4	-0.2	1.1		0.5	0.6	0.7	-0.7	0.3	0.8	-0.3	0.0		-0.2		0.0
54	2301-MP		-0.7	0.1	-0.7	-0.1		-1.3	-0.4	-0.5	-0.1		-0.1	-0.1	-0.1	-0.3	0.1	-0.1	-1.1	-0.7		-0.7		-0.4
55	2301-MP		0.6	1.3	0.5	1.2		-0.5	-0.1	0.6	-0.2		0.2	-0.4	0.6	0.0	0.8	0.5	0.4	0.4		0.4		-0.2
56	2301-MP		-4.0	-3.7	-4.1	-3.7		-1.5	-2.8	-0.3	-2.7		-1.2	-0.8	-2.3	-1.4	-1.9	-1.6	-0.6	-1.8		-2.1		-3.3
57	2301-MP																							
58	2301-MP		0.0	0.8	-0.1	0.7		-0.9	0.4	1.0	-0.1		2.3	4.1	0.5	-0.4	-0.1	-0.1	0.4	1.1		1.0		0.9
59	2301-MP																							
60	2301-MP		0.6	1.5	0.6	1.4		0.6	0.2	-0.1	0.4		0.0	-0.2	0.5	0.5	0.5	0.7	0.8	0.3		0.0		-0.6
61	2301-MP		-0.6	0.2	-0.6	0.1		-1.1	-0.3	-0.6	-0.2		-0.6	-1.2	0.4	-0.5	-0.2	0.1	0.0	0.2		-0.8		-1.2
62	2301-MP																							
63	2301-MP		0.6	0.2	0.5	0.1			0.4		0.2		0.4	0.2	0.9	0.9	0.1	0.7	3.2	2.8		-0.2		0.4
64	2301-MP		-0.2	0.1	-0.3	0.0		0.5	0.2	4.6	-0.7		-0.8	-0.9	0.6	0.6	-0.5	-1.1	-0.7	-0.7		-0.7		0.6
65	2301-MP																							
66	2301-MP																							
67	2301-MP		1.6	2.5	1.5	2.4		12.8	-0.5	0.0	-0.4		-0.1	-1.4	0.1	-1.2	-0.2	0.0	-1.3	0.0		-0.9		1.7
68	2301-MP																							
69	2301-MP																							
70	2301-MP		0.1	-4.1	0.1	-4.2					0.9		1.0		-0.8		-0.2	0.1						
71	2301-MP		-0.3	0.4	-0.3	0.3		-0.4	0.1	-1.5	0.2		0.8	0.8	-0.2	0.1	0.0	-0.4	-0.6	-0.5		1.8		1.6
72	2301-MP																							
73	2301-MP		0.5	0.3	0.4	0.2			0.9	2.1	1.0		0.5	0.2	-0.7	0.1	0.0	0.2	0.3	0.9		0.7		3.8
74	2301-MP																							

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
PCDD/F - Z-scores

LC	Sample	Z-score [σ_p = 10 %]	WHO-PCDD/F-TEQ reported		WHO-PCDD/F-TEQ calculated		Z-score [σ_p = 20 %]	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	2,3,4,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	OCDF
			upper bound	lower bound	upper bound	lower bound																		
75	2301-MP																							
76	2301-MP		1.3	-3.5	1.3	-3.6		5.8					1.3	8.8	5.2	3.3	-2.1					0.5		-1.6
77	2301-MP		-2.1	-2.6	-2.2	-2.7			-0.9		-2.1		-2.1	-1.3	-0.2	0.9	-1.0	-1.6	-1.8	-0.7		-1.9		0.7
78	2301-MP		1.5	2.3	1.4	2.2		-2.3	2.2	6.9	0.6		0.8	1.7	-0.3	2.6	0.4	1.1	2.1	4.0		3.0		-2.4
79	2301-MP																							
80	2301-MP		0.9	-4.3	0.8	-4.3					-0.8		-1.1	0.0	-0.8		-0.8	-1.1	-0.9	-1.2		-0.9		-1.2
81	2301-MP		-0.9	-0.1	-0.9	-0.3		-0.9	-0.9	-0.5	0.1		-0.7	-1.0	-0.3	-1.1	-0.3	0.2	0.7	0.7		-0.4		-0.5
82	2301-MP																							
83	2301-MP		3.8	4.9	3.8	4.8		1.0	2.4	0.7	0.8		1.5	3.6	3.3	1.6	2.0	2.2	2.3	2.4		1.5		0.9
84	2301-MP		1.0	0.0	0.9	-0.1			0.9		0.1		1.2	0.5	-0.1	0.1	-0.1	0.3	0.3	0.4		0.9		1.5
85	2301-MP		-0.2	-0.5	-0.3	-0.6			0.6	1.2	0.1		-0.1	0.5	-0.8	-0.3	-0.5	0.1	0.2	0.3		0.5		3.4
86	2301-MP		-1.2	-0.5	-1.3	-0.6		0.0	-0.5	-0.9	-0.7		-1.0	-0.5	-0.2	-1.4	-0.5	-0.6	-0.4	-0.9		-0.7		-1.5
87	2301-MP																							
88	2301-MP		0.8	1.5	0.7	1.4		0.9	-0.1	0.3	0.5		0.2	0.4	-1.1	1.2	1.0	0.5	1.1	0.5		0.4		-0.1
89	2301-MP																							
90	2301-MP																							
91	2301-MP																							
92	2301-MP		1.5	2.6	1.5	2.2			-1.1	-0.2	2.1		0.0	3.7	3.0	1.0	2.2	3.3	2.5			3.6		3.9
93	2301-MP																							
94	2301-MP		11.8	5.6	11.7	5.4		0.0			3.6		10.0	21.9	2.3	5.6	6.3	5.8	3.6	0.1		6.6		9.3
95	2301-MP																							
96	2301-MP		4.0	4.5	3.9	4.4			2.4	6.1	1.5		1.8	6.7	3.6	1.5	2.8	2.8	-0.5	2.0		2.0		1.0
97	2301-MP																							
98	2301-MP		-0.6	0.2	-0.6	0.1		-0.8	-0.2	13.6	0.3		-0.5	1.6	-0.4	-1.1	-0.5	0.2	-0.7	-0.2		-0.3		-0.4
99	2301-MP		19.5	-10.0	19.3	21.5		6.9	7.1	8.0	7.4		9.1	9.5	15.8	8.8	11.9	8.9	8.4	11.8		9.9		5.4
100	2301-MP																							
101	2301-MP		-0.1	0.7	-0.2	0.6		0.7	-0.1	0.3	0.0		-1.5	-1.3	0.2	-1.3	0.1	0.3	-0.2	0.2		0.0		0.2
102	2301-MP		1.1	2.0	1.4	2.1		2.8	1.3		0.7		1.2	1.6	0.3	1.8	0.4	0.6	0.4	0.5		-0.1		1.7
103	2301-MP																							
104	2301-MP		-1.8	-4.5	-2.0	-4.5					-0.9				-1.3	-1.1	-0.8	-1.4	-1.3			-1.2		
105	2301-MP		1.0	1.7	8.6	9.9		0.5	1.5	-0.2	0.9		0.8	0.7	1.8	469.1	-0.2	0.7	0.3	1.1		2.0		0.1
106	2301-MP		-1.7	-1.6	-1.8	-1.7				0.7	1.9		1.9	7.1	0.5	0.0	0.5	2.2	1.0	1.2		4.2		2.5
107	2301-MP																							
108	2301-MP																							
109	2301-MP																							
110	2301-MP																							
111	2301-MP		-6.6	-8.4	-5.4	-8.6					-1.4		-4.0	-4.7	-4.3		-4.6			-1.8				-3.2
112	2301-MP																							
113	2301-MP		3.6	4.6	3.5	4.5		1.0	3.2	7.4	0.1		0.4	1.3	0.1	0.2	2.3	0.5	0.4	0.7		0.7		0.5
114	2301-MP		1.6	2.4	1.5	2.3		0.6	1.0	-0.1	0.0		0.9	0.3	0.8	6.1	0.8	1.5	1.1	1.1		1.4		-0.2
115	2301-MP																							
116	2301-MP		2.5	3.5	2.4	3.4		0.8	2.4	1.3	0.3		1.4	0.8	0.5	0.7	1.5	0.3	1.6	1.0		1.1		1.6
117	2301-MP																							
118	2301-MP																							
119	2301-MP																							
120	2301-MP		-1.5	-0.9	-1.5	-0.9		-0.4	-1.5	-0.8	-0.5		0.4	-1.0	-0.6	-0.5	-0.3	-0.6	-0.4	-0.2		-0.4		-0.6
121	2301-MP																							
122	2301-MP																							
123	2301-MP		2.2	3.1	2.1	3.1		1.3	1.1	12.0	0.6		0.6	1.6	0.2	1.1	1.2	0.3	0.9	2.0		2.1		0.2
124	2301-MP		0.0	0.7	-0.1	0.6		-0.9	0.1	-0.3	0.1		0.4	1.1	0.5	0.6	0.1	0.2	0.4	0.0		0.4		-0.3
125	2301-MP																							
126	2301-MP		-0.3	0.4	-0.4	0.3		-0.9	-0.9	-1.6	0.2		0.1	0.1	0.0	-0.6	0.7	-0.3	0.2	-0.3		0.7		-0.8
127	2301-MP		21.0	23.3	20.7	23.1		7.2	15.6	7.5	10.1		10.7	9.5	10.4	12.2	9.5	10.3	9.3	9.5		10.4		8.1
128	2301-MP																							
129	2301-MP																							
7A	2301-MP		64.0	69.5	63.3	68.6		35.8	28.8	33.7	24.4		30.9	28.6	35.4	34.8	34.1	33.1	34.1	35.0		33.1		32.8
101A	2301-MP		-0.1	0.7	-0.2	0.6		0.7	-0.1	0.3	0.0		-1.5	-1.3	0.2	-1.3	0.1	0.3	-0.2	0.2		0.0		0.2
30*	2301-MP		1.2	-0.1	1.1	-0.2		3.7		0.1	-2.4		-3.9	5.3	2.8		1.8	-1.6	-0.2	-2.5		1.8		2.1
56*	2301-MP		0.4	1.1	0.3	1.0		1.2	-1.1	3.2	-1.0		1.7	2.4	-0.2	1.2	0.5	0.9	2.8	0.6		0.0		-2.1
104*	2301-MP		-1.8	-4.5	-2.0	-4.5					-0.9				-1.3	-1.1	-0.8	-1.4	-1.3	-0.8		-1.2		

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Dioxin-like PCB - Z-scores

LC	Sample	Z-score [σ_p = 10 %]	WHO-PCB-TEQ reported upper bound	WHO-PCB-TEQ reported lower bound	WHO-PCB-TEQ calculated upper bound	WHO-PCB-TEQ calculated lower bound	Z-score [σ_p = 20 %]	PCB 105	PCB 114	PCB 118	PCB 123	PCB 156	PCB 157	PCB 167	PCB 189	PCB 77	PCB 81	PCB 126	PCB 169
1	2301-MP																		
2	2301-MP		-0.4	-0.4	-0.7	-0.7		-0.3	0.0	-0.3	-1.0	-0.3	-0.1	-0.2		-1.3	-1.0	-0.3	-0.5
3	2301-MP																		
4	2301-MP		5832.1	659.6	135.2	135.2		-2.1	50.0	-4.0	52.1	4.1	23.9	21.7		10.0	95.7	56.0	226.4
5	2301-MP		10.3	10.1	10.0	10.0		5.5	5.1	5.0	4.7	4.8	5.2	3.9		4.8	23.2	5.1	4.6
6	2301-MP																		
7	2301-MP																		
8	2301-MP		-0.4	-0.4	-0.4	-0.5		0.6	-0.8	0.6	-1.0	-0.2	0.7	0.8		0.1		-0.5	0.4
9	2301-MP		-0.5	-0.6	-0.6	-0.6		0.9	1.0	0.8	0.5	0.1	-0.2	-0.2		6.1	2.0	-0.4	-1.3
10	2301-MP																		
11	2301-MP		0.9	0.8	0.8	0.8		0.3	-1.3	0.4	0.1	0.3	0.5	-0.1		0.0	0.8	0.3	1.6
12	2301-MP		6.8	6.6	6.6	6.6		2.0	2.1	2.1	2.3	1.9	2.4	3.8		2.4	2.7	3.6	3.4
13	2301-MP		-2.5	-2.5	-2.5	-2.5		-1.5	-1.8	-1.7	-0.8	-1.8	-1.4	-1.8		-1.6		-1.2	-1.3
14	2301-MP		-0.8	-0.9	-0.9	-0.9		0.1	-1.0	0.1		-0.4	0.1	-0.4		0.6	-0.2	-0.5	-0.2
15	2301-MP		-1.0	-1.0	-1.0	-1.0		0.0	-0.4	-0.1	0.5	-0.4	-0.6	-0.5		-1.2	-2.4	-0.7	-0.2
16	2301-MP																		
17	2301-MP		10.7	10.5	10.5	10.5		5.5	5.9	6.0	3.1	4.9	5.4	5.4		4.1	4.4	5.2	5.3
18	2301-MP		0.5	0.4	0.0	0.0		0.9	-0.8	-0.3	-0.5	0.7	0.7	1.1		1.3	0.9	-0.1	0.7
19	2301-MP		-1.1	-1.1	-1.1	-1.1		-0.6	-0.6	-0.4	-0.5	-0.4	-0.1	-0.6		-0.6	-0.6	-0.5	-0.8
20	2301-MP																		
21	2301-MP																		
22	2301-MP																		
23	2301-MP		-2.7	-2.8	-9.6	-9.6		-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0		-5.0		-4.7	-4.8
24	2301-MP																		
25	2301-MP																		
26	2301-MP																		
27	2301-MP		-2.7	-2.8	-2.8	-2.8		-0.6	-0.5	-0.7	0.3	0.5	0.5	0.4		-4.7	-2.7	-1.7	-0.5
28	2301-MP																		
29	2301-MP		-2.0	-2.0	-2.1	-2.1		-0.8	-0.2	-0.9	-1.2	-1.3	-0.9	-1.3		-1.2	-1.5	-1.1	-0.9
30	2301-MP		1.0	0.9	0.9	0.9		-0.8	-0.5	-0.6	0.2	-0.4	-0.5	-1.2		-0.5	-1.1	0.9	-0.9
31	2301-MP																		
32	2301-MP		2.2	2.1	2.1	2.1		0.4	-1.1	-0.4	4.0	-0.2	0.1	-0.1		0.1	28.0	0.9	3.0
33	2301-MP																		
34	2301-MP		-0.1	-0.2	-0.2	-0.2		0.1	-0.9	0.5	-0.2	0.0	0.0	-0.1		0.3	-0.6	-0.2	0.1
35	2301-MP																		
36	2301-MP																		
37	2301-MP		0.4	0.3	0.3	0.3		0.3	0.0	0.6	-0.2	0.2	0.1	0.2		-0.2	0.1	0.1	0.0
38	2301-MP		-1.3		-1.3	-1.3		-0.1	-0.1	-0.3	-1.5	-0.7	-0.3	1.9		-0.1	-0.3	-0.8	-0.4
39	2301-MP																		
40	2301-MP		2.7	2.6	2.6	2.6		0.8	-1.6	0.4	0.1	0.4	0.7	1.1		0.6	0.3	1.5	1.2
41	2301-MP		1.2	1.1	1.1	1.1		0.5	-0.3	0.3	-2.4	0.2	0.3	0.2		0.4	0.3	0.5	1.2
42	2301-MP		0.0	-0.1	-0.1	-0.1		-0.5	-0.3	-0.5	-0.4	-0.4	-0.4	-0.4		-0.3	0.2	0.0	0.2
43	2301-MP																		
44	2301-MP		-5.0	-5.0	-5.0	-5.0		-2.2	-1.6	-2.2	-2.4	-2.6	-2.4	-2.3		-2.5	-2.9	-2.6	-2.3
45	2301-MP																		
46	2301-MP		2.4	2.3	2.3	2.3		1.7	1.7	1.3	1.2	0.5	1.0	0.3		1.4	1.9	1.2	0.7
47	2301-MP		28.3	28.0	28.0	28.0		14.0	12.3	13.1	4.9	13.0	16.7	32.4		10.9	13.4	14.0	15.3
48	2301-MP		-5.0	-5.1	-5.1	-5.1		-2.3	-2.7	-2.5	0.5	-2.5	-2.6	-2.4		-2.1	-1.8	-2.7	-1.4
49	2301-MP																		
50	2301-MP		-3.0	-3.1	-3.1	-3.1		-0.5	0.2	-0.9	-2.1	-0.9	-1.3	-0.7		-0.9	-3.2	-1.8	-0.8
51	2301-MP		0.8	0.7	0.7	0.7		1.8	1.1	1.6	0.2	1.3	1.3	0.1		1.2	0.2	0.1	0.4
52	2301-MP		1.6	1.5	1.7	1.7		0.3	-0.6	0.5	0.0	1.7	-0.2	-0.1		0.9	0.8	1.0	0.3
53	2301-MP		0.4	0.3	0.3	0.3		-0.3	-0.5	-0.1	-1.1	-0.2	-0.5	-0.1		-0.6	0.0	0.3	0.5
54	2301-MP		0.3	0.2	0.2	0.2		0.5	0.2	0.3	0.3	-0.3	-0.4	0.5		0.1	0.3	0.1	0.0
55	2301-MP		0.4	0.3	0.3	0.3		0.0	0.1	-0.1	0.7	-0.2	0.2	0.2		-0.3	0.1	0.2	0.4
56	2301-MP		-4.5	-4.5	-4.5	-4.5		-2.4	-2.2	-2.1	-1.8	-2.2	-2.2	-2.3		-2.4	-2.9	-2.2	-2.2
57	2301-MP																		
58	2301-MP		1.1	1.0	1.0	1.0		-0.1	0.8	0.2	0.2	0.4	-0.7	0.9		1.5	0.6	0.6	0.8
59	2301-MP																		
60	2301-MP		1.6	1.5	1.5	1.5		0.6	0.0	0.3	-0.5	0.1	0.2	0.0		0.6	1.4	0.9	0.4
61	2301-MP		-0.6	-0.7	-0.7	-0.7		-1.1	-1.2	-1.1	-0.6	-1.2	-1.0	-0.9		-0.5	-0.8	-0.1	-0.9
62	2301-MP																		
63	2301-MP		-1.0	-1.0	-1.0	-1.0		0.0	0.3	-0.1	-1.3	0.1	0.2	0.0		-0.5	0.5	-0.6	-0.7
64	2301-MP		-0.5	-0.6	-0.6	-0.6		-0.4	1.3	-0.4	-2.0	-2.1	-0.1	1.6		-0.4	-0.2	-0.3	0.0
65	2301-MP																		
66	2301-MP																		
67	2301-MP		-4.9	-4.9	-4.9	-4.9		-0.2	4.7			0.6	-1.8	-0.6		-2.5	-2.7	-2.4	-2.1
68	2301-MP																		
69	2301-MP																		
70	2301-MP		-0.9	-1.0	-1.0	-1.0		-1.1	-0.5	-0.8		-0.7	-0.3	-0.6		-0.6	-1.0	-0.4	-0.5
71	2301-MP		-0.6	-0.7	-0.2	-0.2		-0.5	-0.9	-0.6	-1.3	-0.4	-0.4	-0.2		-0.7	-1.4	-0.4	2.3
72	2301-MP																		
73	2301-MP		2.7	2.6	2.6	2.6		0.5	0.3	0.4	-0.1	-0.1	0.2	0.1		0.4	-0.6	1.6	1.0
74	2301-MP																		

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Dioxin-like PCB - Z-scores

LC	Sample	Z-score [σ_p = 10 %]	WHO-PCB-TEQ reported upper bound	WHO-PCB-TEQ reported lower bound	WHO-PCB-TEQ calculated upper bound	WHO-PCB-TEQ calculated lower bound	Z-score [σ_p = 20 %]	PCB 105	PCB 114	PCB 118	PCB 123	PCB 156	PCB 157	PCB 167	PCB 189	PCB 77	PCB 81	PCB 126	PCB 169
75	2301-MP																		
76	2301-MP		-2.6	-2.7	-2.6	-2.7		-0.5		-0.5		-0.6	-0.4	-1.4		-1.6	-3.4	-1.1	-3.6
77	2301-MP		-1.5	-1.6	-1.6	-1.6		2.3	2.9	1.8	33.1	2.2	-0.2	1.5		-1.5	-1.3	-1.4	-1.7
78	2301-MP		-2.4	-2.4	-2.4	-2.4		-0.8	-0.3	-1.0	-1.5	-0.6	-0.1	-0.2		-1.3	-1.1	-1.3	-1.0
79	2301-MP																		
80	2301-MP		-0.4	-0.4	-0.4	-0.4		-0.1	-0.1	-0.3	1.9	0.2	-0.2	11.3		-0.3	-0.4	-0.3	-0.1
81	2301-MP		0.7	0.6	0.6	0.6		0.0	1.9	0.0	1.8	-0.1	0.3	1.7		0.0	0.1	0.4	-0.1
82	2301-MP																		
83	2301-MP		-2.0	-2.1	-2.1	-2.1		-0.7	0.7	-0.3	-0.3	0.3	-0.4	0.0		6.0	14.9	-1.2	-1.4
84	2301-MP		2.2	2.1	2.0	2.0		0.1	0.0	0.5	1.8	0.0	0.3	0.6		0.8	-0.1	1.2	1.1
85	2301-MP		1.8	1.7	1.7	1.7		-0.3	0.3	0.1	-0.2	-0.1	0.2	0.0		0.6	-1.0	1.3	-0.9
86	2301-MP		0.2	0.1	0.1	0.1		0.1	0.6	0.2	1.6	-0.3	0.0	0.1		0.1	-0.1	0.1	-0.1
87	2301-MP																		
88	2301-MP		0.4	0.3	0.3	0.3		0.2	0.6	0.5	0.4	0.2	0.5	-1.6		0.2	0.5	0.2	0.0
89	2301-MP																		
90	2301-MP																		
91	2301-MP																		
92	2301-MP		4.4	4.3	4.3	4.3		1.8	1.7	2.3	1.2	1.5	2.5	2.3		3.5	3.3	2.3	1.5
93	2301-MP																		
94	2301-MP		-4.5	-7.3	-4.5	-7.3		3.0	4.7	2.6	4.8	3.4	3.5	25.7		0.9	17.9		
95	2301-MP																		
96	2301-MP		7.2	7.0	7.0	7.0		3.3	3.3	3.6	4.3	3.2	8.8	2.8		3.5	1.7	3.8	2.5
97	2301-MP																		
98	2301-MP		0.0	-0.1	-0.1	-0.1		0.1	0.1	-0.3	0.5	0.9	1.0	0.6		0.4	0.8	-0.2	0.7
99	2301-MP		23.2	22.9	22.9	22.9		11.2	10.5	12.6	13.7	8.7	10.8	9.1		13.9	12.6	12.0	7.8
100	2301-MP																		
101	2301-MP		3.0	2.9	2.9	2.9		0.9	0.5	0.7	0.7	0.5	0.5	0.0		-0.4	0.1	1.7	1.0
102	2301-MP		0.5	0.4	0.2	0.2		-0.3	0.8	-0.2	-1.4	0.0	0.0	-0.9		1.2	0.6	0.2	0.0
103	2301-MP																		
104	2301-MP		-0.1	-0.3	-0.2	-0.3		-0.2		-0.2	-0.1	-0.7		-0.2		-0.3		0.0	-0.1
105	2301-MP		3.9	3.7	3.7	3.7		1.7	1.3	1.6	2.3	1.2	2.7	0.5		2.0	1.4	2.1	1.2
106	2301-MP		1.4	1.3	1.2	1.2		0.5	0.2	0.0	22.9	0.4	0.5	0.8		0.0	0.3	0.7	0.5
107	2301-MP																		
108	2301-MP									-5.0									
109	2301-MP																		
110	2301-MP																		
111	2301-MP		-7.3	-7.3	-7.4	-7.4		-4.4	-3.8	-3.4	-3.5	-3.6	-3.6	-3.6		-3.7	-3.8	-3.7	-3.5
112	2301-MP																		
113	2301-MP		0.9	0.8	0.8	0.8		1.2	1.2	0.8	1.1	2.1	1.1	1.4		0.2	0.7	0.3	0.7
114	2301-MP		-0.4	-0.5	-0.5	-0.5		-0.6	-0.8	-0.7	18.0	-0.7	-0.2	0.5		2.2	36.5	-0.5	0.9
115	2301-MP																		
116	2301-MP		-0.2	-0.3	-0.3	-0.3		-0.4	-0.4	-0.2	0.3	-0.4	-0.6	-0.1		0.0	0.1	-0.2	0.6
117	2301-MP																		
118	2301-MP																		
119	2301-MP																		
120	2301-MP		0.7	0.6	0.6	0.6		0.7	-1.1	0.6	0.4	0.5	0.9	-0.3		0.4	-0.4	0.3	0.3
121	2301-MP		18.5	18.3	18.3	18.3		13.7	12.6	12.4	10.4	11.6	13.6	12.5		14.1	12.6	8.4	9.1
122	2301-MP																		
123	2301-MP		0.5	0.3	0.3	0.3		-0.3	0.2	0.5	3.0	-0.3	-0.3	-0.1		0.1	-0.9	0.4	-0.9
124	2301-MP		0.6	0.5	0.5	0.5		0.4	0.8	0.2	1.1	0.3	0.3	0.6		0.5	0.5	0.3	0.4
125	2301-MP																		
126	2301-MP		-0.2	-0.3	-0.3	-0.3		0.2	0.6	0.2	0.3	0.4	0.0	0.3		0.1	0.2	-0.2	0.0
127	2301-MP		20.1	19.8	19.8	19.8		11.7	5.2	10.9	30.3	9.3	10.5	12.3		10.8	10.2	9.6	11.1
128	2301-MP																		
129	2301-MP																		
7A	2301-MP		68.2	67.4	67.4	67.4		38.1	50.0	38.5	72.2	37.7	35.5	38.2		33.2	37.6	32.3	37.4
101A	2301-MP		0.0	-0.1	-0.1	-0.1		0.9	0.5	0.7	0.7	0.5	0.5	0.0		-0.4	0.1	-0.4	1.0
30*	2301-MP		1.0	0.9	0.9	0.9		-0.8	-0.5	-0.6	0.2	-0.4	-0.5	-1.2		-0.5	-1.1	0.9	-0.9
56*	2301-MP		-0.4	-0.4	-0.3	-0.3		-0.4	0.0	0.0	0.5	-0.1	0.0	-0.3		-0.4	-1.4	-0.2	-0.2
104*	2301-MP		-0.1	-0.3	-0.2	-0.3		-0.2		-0.2	-0.1	-0.7		-0.2		-0.3		0.0	-0.1

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Non dioxin-like PCB - Z-scores

LC	Sample	Z-score [σ_p = 15 %]	Sum Indicator PCBs reported upper bound	Sum Indicator PCBs reported lower bound	Sum Indicator PCBs calculated upper bound	Sum Indicator PCBs calculated lower bound	Z-score [σ_p = 20 %]	PCB 28	PCB 52	PCB 101	PCB 138	PCB 153	PCB 180
1	2301-MP												
2	2301-MP												
3	2301-MP		0.4	0.2	0.4	0.2			0.0	-0.5	1.3	0.3	0.3
4	2301-MP		23.2	-3.6	156.4	160.2			134.5	88.4	167.6	76.5	73.8
5	2301-MP		7.2	7.6	7.2	7.5			6.1	5.5	5.1	5.3	6.2
6	2301-MP												
7	2301-MP		57.0	58.5	56.7	58.2			35.4	52.9	86.3	25.6	36.1
8	2301-MP		0.5	0.7	0.4	0.5			0.3	0.8	0.0	0.1	0.6
9	2301-MP		0.7	-0.9	0.7	-0.9				-0.3	0.0	0.1	0.5
10	2301-MP		13	13	13	13			11.5	8.2	9	8	5.7
11	2301-MP		-0.4	-0.3	-0.4	-0.3			-0.3	-0.4	-0.4	-0.4	0.1
12	2301-MP		3.6	3.8	3.5	3.8			3.0	2.0	2.6	2.7	3.6
13	2301-MP		-2	-1.6	4964	5077.0			3521.6	3660.0	3945.2	3704.7	4061.8
14	2301-MP		0.0	0.1	-0.1	0.1			0.2	0.1	0.0	-0.2	0.1
15	2301-MP		-0.1	0.0	-0.1	0.0			0.0	-0.4	-1.0	-0.1	0.9
16	2301-MP		-0.4	-0.3	-0.4	-0.3			-0.6	-0.8	0.2	0.1	-0.3
17	2301-MP		5.8	6.1	5.7	6.0			6.2	5.6	5.8	2.5	3.2
18	2301-MP		1.1	1.3	1.0	1.2			0.6	0.8	2.3	-0.1	0.8
19	2301-MP		-1.1	-1.0	-1.1	-1.0			-0.4	-0.8	-1.0	-0.7	-0.8
20	2301-MP												
21	2301-MP		1.1	1.7	1.5	1.2			0.5	0.9	1.0	1.5	0.9
22	2301-MP		2.8	2.4	2.8	2.4			3.5	2.0	2.8	0.6	1.8
23	2301-MP		5.4	5.7	5.4	5.6			3.7	3.8	3.6	4.1	4.5
24	2301-MP												
25	2301-MP		0.0	0.1	-0.1	0.1			0.4	-0.1	0.4	-0.5	0.1
26	2301-MP		-4.4	-4.4	-4.5	-4.4			-3.5	-3.6	-1.6	-4.1	-3.0
27	2301-MP		-1.3	-1.2	-1.4	-1.2			-0.2	-1.3	-0.9	-0.9	-1.5
28	2301-MP												
29	2301-MP		-1.6	-1.5	-1.6	-1.5			-1.3	-1.2	-1.0	-1.2	-1.0
30	2301-MP		-0.7	-0.6	-0.7	-0.6			0.2	-0.9	-0.5	-0.4	-0.7
31	2301-MP												
32	2301-MP		-1	-1	-1	-1			-0.8	-0.8	-0.6	-0.8	-0.7
33	2301-MP												
34	2301-MP		0.6	0.8	0.6	0.8			0.5	-0.1	0.1	1.5	0.4
35	2301-MP												
36	2301-MP												
37	2301-MP		0.0	0.2	-0.1	0.1			-0.3	0.0	-0.1	0.4	0.2
38	2301-MP		-0.1		-0.1	0.1			0.5	0.9	-0.2	-0.3	-0.4
39	2301-MP												
40	2301-MP		1.7	1.9	1.6	1.8			1.3	0.7	1.1	1.5	1.9
41	2301-MP		0.9	1.0	0.8	1.0			0.3	0.4	0.6	0.9	1.3
42	2301-MP		-1.0	-0.9	-1.1	-0.9			-0.8	-0.8	-0.9	-0.6	-0.5
43	2301-MP		1.1	0.7	0.8	0.5			0.6	0.1	-0.2	1.2	0.3
44	2301-MP		-2.7	-2.6	-2.7	-2.6			-2.2	-1.7	-2.2	-2.0	-2.1
45	2301-MP												
46	2301-MP		1.4	1.6	1.3	1.5			0.4	0.5	0.4	1.9	1.2
47	2301-MP		17.7	18.3	17.6	18.1			14.1	14.4	15.3	12.4	12.8
48	2301-MP		-3.4	-3.3	-3.4	-3.3			-2.7	-2.6	-1.9	-2.4	-2.7
49	2301-MP												
50	2301-MP		-1.3	-1.5	-1.3	-1.5			-0.9	0.0	0.0	-1.1	-2.3
51	2301-MP		2.7	2.9	2.6	2.8			1.8	2.1	2.7	1.8	2.4
52	2301-MP		0.5	0.6	0.4	0.6			0.3	0.2	0.3	0.7	0.8
53	2301-MP		-0.7	-0.6	-0.7	-0.5			-0.1	-0.4	-0.7	-0.6	-0.3
54	2301-MP												
55	2301-MP		-0.5	-0.4	-0.6	-0.4			-0.3	-0.4	-0.4	-0.3	-0.2
56	2301-MP		-3.2	-3.1	-3.2	-3.1			-2.3	-2.6	-2.6	-2.6	-2.2
57	2301-MP				-5.8	-6.7							
58	2301-MP		0.5	0.7	0.5	0.6			0.4	0.3	1.6	0.3	0.2
59	2301-MP												
60	2301-MP		0.4	0.5	0.3	0.5			0.5	0.0	0.3	0.6	0.3
61	2301-MP												
62	2301-MP		-0.4	-0.2	-0.4	-0.3			-0.2	-0.3	0.7	-0.5	-0.5
63	2301-MP		-0.2	-0.1	-0.2	-0.1			-0.3	-0.2	0.4	-0.5	-0.1
64	2301-MP		-0.2	-0.1	-0.3	-0.1			-0.3	0.6	-0.6	-0.3	0.0
65	2301-MP		-2.0	-1.9	-2.0	-1.9			-1.0	-1.3	-1.7	-1.3	-1.7
66	2301-MP		0.8	1.0	0.8	0.9			-0.9	1.0	1.3	1.2	0.5
67	2301-MP		0.0	0.2	0.0	0.1			0.0	0.2	0.1	1.3	-1.1
68	2301-MP		2.0	0.9	2.0	0.9			1.1	0.0	3.0	0.2	0.5
69	2301-MP		0.9	1.0	0.8	1.0			0.6	0.8	1.1	0.7	0.5
70	2301-MP		-2.9	-2.8	-2.9	-2.8			-2.9	-2.5	-0.5	-2.6	-1.7
71	2301-MP		-0.8	-0.7	-0.9	-0.7			-0.6	-0.8	-0.5	-0.5	-0.5
72	2301-MP												
73	2301-MP		1.2	1.3	1.1	1.3			1.4	1.2	0.9	1.0	0.7
74	2301-MP												

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Milk Powder (2301-MP)
Non dioxin-like PCB - Z-scores

LC	Sample	Z-score [σ_p = 15 %]	Sum Indicator PCBs reported upper bound	Sum Indicator PCBs reported lower bound	Sum Indicator PCBs calculated upper bound	Sum Indicator PCBs calculated lower bound	Z-score [σ_p = 20 %]	PCB 28	PCB 52	PCB 101	PCB 138	PCB 153	PCB 180
75	2301-MP												
76	2301-MP		-0.6	-0.5	-0.7	-0.5			0.1	-0.9	-0.4	-0.4	-0.5
77	2301-MP		0.1	0.3	0.4	-0.1			1.2	1.4	2.1	-1.0	-1.6
78	2301-MP		-0.8	-0.6	-0.8	-0.7			0.0	-0.5	-0.9	-0.6	-0.5
79	2301-MP												
80	2301-MP		0	0	0	0			0	0	0	1	0.0
81	2301-MP		0.0	0.2	0.0	0.1			0.1	-0.1	0.4	-0.4	0.0
82	2301-MP												
83	2301-MP		0.7	0.8	0.6	0.8			0.3	0.2	0.9	-1.2	-0.4
84	2301-MP		-1.0	-0.8	-1.0	-0.9			0.3	-0.4	-0.6	-1.8	-0.3
85	2301-MP		1.0	1.2	1.0	1.2			1.4	1.3	0.0	1.0	0.6
86	2301-MP		-0.3	-0.2	-0.3	-0.2			-0.2	-0.5	-0.5	-0.1	0.2
87	2301-MP												
88	2301-MP		-0.1	0.0	-0.1	0.0			0.0	0.3	-1.4	0.7	-0.2
89	2301-MP												
90	2301-MP												
91	2301-MP		0.4	-0.8	0.3	-0.8			-0.7	-0.5		-0.2	1.3
92	2301-MP		-0.3	-0.2	-0.4	-0.2			-0.4	0.1	-0.6	-0.2	-0.1
93	2301-MP												
94	2301-MP		-6.1	-6.1	10945.7	11195.8			8302.2	9339.7	7592.9	7530.8	8539.5
95	2301-MP												
96	2301-MP		3.9	4.1	3.8	4.0			3.0	3.1	2.5	2.9	3.3
97	2301-MP												
98	2301-MP		0.4	0.6	0.4	0.5			0.1	0.0	-0.5	0.8	0.8
99	2301-MP		13	14	13	13.4			11.3	12.1	11.3	8.9	7.2
100	2301-MP												
101	2301-MP		1.0	1.2	1.0	1.2			1.0	0.8	0.5	0.8	1.2
102	2301-MP												
103	2301-MP		0.4	0.0	0.4	0.0			-0.2	-0.3	0.3	0.3	0.0
104	2301-MP		-1.2	-1.2	-1.2	-1.2			-0.8	-0.9	-0.9	-0.5	-1.1
105	2301-MP		1.1	1.3	1.1	1.3			1.5	1.1	0.7	0.6	0.7
106	2301-MP		-2.1	-2.0	-2.1	-2.0			-1.4	-0.7	-1.6	-2.3	-1.3
107	2301-MP												
108	2301-MP		0.8	0.7	0.9	0.8			0.2	0.3	1.2	1.1	0.5
109	2301-MP												
110	2301-MP												
111	2301-MP		-4.7	-4.6	-4.7	-4.6			-3.4	-3.5	-3.5	-3.5	-3.4
112	2301-MP		-0.7	-1.5	-0.7	-1.4				-1.3		-2.2	4.5
113	2301-MP		-0.7	-0.6	-0.8	-0.6			-0.1	-0.9	-0.5	-0.5	-0.5
114	2301-MP		-0.4	-0.6	-0.4	-0.6			-0.3	-0.5	5.1	-3.0	-0.5
115	2301-MP		2.4	2.6	2.5	2.7			2.8	2.2	1.6	2.0	1.5
116	2301-MP		-0.4	-0.2	-0.4	-0.2			-0.2	-0.3	-0.6	0.0	-0.1
117	2301-MP												
118	2301-MP												
119	2301-MP		-3.6	-3.9	-3.6	-3.9			-2.4	-3.1	-2.3	-3.0	-3.1
120	2301-MP		-0.3	-0.2	-0.3	-0.2			-0.6	0.0	0.0	0.0	-0.2
121	2301-MP		17.0	17.6	16.9	17.4			14.7	13.4	14.6	10.0	14.2
122	2301-MP		2	-4	2	-4						-0.5	-0.7
123	2301-MP		-0.4	-0.3	-0.5	-0.3			-2.3	0.5	-0.6	-0.5	0.7
124	2301-MP		0.1	0.2	0.0	0.2			0.2	0.1	0.1	0.0	0.1
125	2301-MP												
126	2301-MP		0.3	0.5	0.3	0.4			1.8	0.0	0.5	-0.1	0.0
127	2301-MP		13	13	13	13			10.3	9.2	11.7	8.9	9.9
128	2301-MP												
129	2301-MP		0.4	0.6	0.4	0.5			-0.1	0.3	1.4	0.1	0.3
7A	2301-MP		62.4	64.0	62.1	63.7			41.2	57.5	94.3	27.5	38.5
101A	2301-MP		1.0	1.2	1.0	1.2			1.0	0.8	0.5	0.8	1.2
30*	2301-MP		-0.7	-0.6	-0.7	-0.6			0.2	-0.9	-0.5	-0.4	-0.7
56*	2301-MP		-0.5	-0.4	-0.6	-0.4			-0.3	-0.8	-0.7	-0.8	-0.1
104*	2301-MP		-1.2	-1.2	-1.2	-1.2			-0.8	-0.9	-0.9	-0.5	-1.1

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Milk Powder (2301-MP)
Bioanalytical screening methods - Bioassay-scores

LC	Sample	Bioassay-score [$\sigma_{bioassay}$ = 20 %]	PCDD/F + DL-PCB	PCDD/F	DL-PCB
1	2301-MP				
2	2301-MP				
3	2301-MP				
4	2301-MP				
5	2301-MP				
6	2301-MP				
7	2301-MP				
8	2301-MP				
9	2301-MP		-1.0		
10	2301-MP				
11	2301-MP				
12	2301-MP				
13	2301-MP				
14	2301-MP				
15	2301-MP				
16	2301-MP				
17	2301-MP				
18	2301-MP				
19	2301-MP				
20	2301-MP				
21	2301-MP				
22	2301-MP				
23	2301-MP				
24	2301-MP				
25	2301-MP				
26	2301-MP				
27	2301-MP				
28	2301-MP				
29	2301-MP				
30	2301-MP				
31	2301-MP				
32	2301-MP				
33	2301-MP				
34	2301-MP				
35	2301-MP				
36	2301-MP				
37	2301-MP				
38	2301-MP				
39	2301-MP		36.7		
40	2301-MP				
41	2301-MP				
42	2301-MP				
43	2301-MP				
44	2301-MP				
45	2301-MP				
46	2301-MP		0.4	0.0	0.9
47	2301-MP				
48	2301-MP				
49	2301-MP				
50	2301-MP				
51	2301-MP				
52	2301-MP				
53	2301-MP				
54	2301-MP				
55	2301-MP		0.8		
56	2301-MP				
57	2301-MP				
58	2301-MP		-1.9		
59	2301-MP				
60	2301-MP				
61	2301-MP				
62	2301-MP				
63	2301-MP				
64	2301-MP				
65	2301-MP				
66	2301-MP		0.8		
67	2301-MP		0.8	1.2	0.5
68	2301-MP				
69	2301-MP				
70	2301-MP				
71	2301-MP				
72	2301-MP				
73	2301-MP				
74	2301-MP		-5.0	-5.0	-5.0

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EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Bioanalytical screening methods - Bioassay-scores

LC	Sample	Bioassay-score [$\sigma_{bioassay}$ = 20 %]	PCDD/F + DL-PCB	PCDD/F	DL-PCB
75	2301-MP				
76	2301-MP				
77	2301-MP				
78	2301-MP				
79	2301-MP				
80	2301-MP				
81	2301-MP				
82	2301-MP				
83	2301-MP				
84	2301-MP				
85	2301-MP				
86	2301-MP				
87	2301-MP				
88	2301-MP				
89	2301-MP				
90	2301-MP				
91	2301-MP				
92	2301-MP				
93	2301-MP				
94	2301-MP				
95	2301-MP				
96	2301-MP				
97	2301-MP		0.6		2.7
98	2301-MP				
99	2301-MP				
100	2301-MP				
101	2301-MP				
102	2301-MP				
103	2301-MP				
104	2301-MP				
105	2301-MP				
106	2301-MP				
107	2301-MP				
108	2301-MP				
109	2301-MP				
110	2301-MP				
111	2301-MP				
112	2301-MP				
113	2301-MP				
114	2301-MP				
115	2301-MP				
116	2301-MP				
117	2301-MP				
118	2301-MP				
119	2301-MP				
120	2301-MP				
121	2301-MP				
122	2301-MP				
123	2301-MP				
124	2301-MP				
125	2301-MP				
126	2301-MP				
127	2301-MP				
128	2301-MP				
129	2301-MP				
7A	2301-MP				
97A	2301-MP		0.0		

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EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Lipid content - Z-scores

LC	Sample	Z-score [σ_p = 10 %]	Lipid content Physico-chemical methods	Lipid content Bioanalytical methods	Lipid content Mean
1	2301-MP				
2	2301-MP		-4.4		-4.4
3	2301-MP		-2.2		-2.2
4	2301-MP				
5	2301-MP		-4.4		-4.4
6	2301-MP				
7	2301-MP		-9.0		-9.0
8	2301-MP		0.4		0.4
9	2301-MP		0.1	-0.8	-0.4
10	2301-MP		-5.4		-5.4
11	2301-MP		-0.2		-0.2
12	2301-MP		-3.5		-3.5
13	2301-MP				
14	2301-MP		-0.8		-0.8
15	2301-MP		0.6		0.6
16	2301-MP		0.8		0.8
17	2301-MP		0.0		0.0
18	2301-MP		-0.3		-0.3
19	2301-MP		2.6		2.6
20	2301-MP				
21	2301-MP		-0.8		-0.8
22	2301-MP				
23	2301-MP		-8.0		-8.0
24	2301-MP				
25	2301-MP		0.1		0.1
26	2301-MP		0.7		0.7
27	2301-MP		0.6		0.6
28	2301-MP				
29	2301-MP				
30	2301-MP		-6.1		-6.1
31	2301-MP				
32	2301-MP		1.4		1.4
33	2301-MP				
34	2301-MP		0.5		0.5
35	2301-MP				
36	2301-MP				
37	2301-MP		-0.6		-0.6
38	2301-MP				
39	2301-MP			-8.3	-8.3
40	2301-MP		-1.5		-1.5
41	2301-MP		-1.4		-1.4
42	2301-MP		0.6		0.6
43	2301-MP		0.6		0.6
44	2301-MP				
45	2301-MP				
46	2301-MP		-0.3	-1.1	-0.7
47	2301-MP				
48	2301-MP		14.9		14.9
49	2301-MP				
50	2301-MP		0.5		0.5
51	2301-MP		-1.1		-1.1
52	2301-MP		1.1		1.1
53	2301-MP		0.4		0.4
54	2301-MP		0.9		0.9
55	2301-MP		-0.6	-0.6	-0.6
56	2301-MP		-8.2		-8.2
57	2301-MP		-3.1		-3.1
58	2301-MP		-0.7	-0.7	-0.7
59	2301-MP				
60	2301-MP		0.7		0.7
61	2301-MP		0.6		0.6
62	2301-MP		0.2		0.2
63	2301-MP		0.4		0.4
64	2301-MP		1.5		1.5
65	2301-MP		0.6		0.6
66	2301-MP		-0.8	-0.8	-0.8
67	2301-MP		0.8	0.8	0.8
68	2301-MP		0.3		0.3
69	2301-MP				
70	2301-MP		0.1		0.1
71	2301-MP		0.4		0.4
72	2301-MP				
73	2301-MP		0.3		0.3
74	2301-MP			-9.1	-9.1

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Lipid content - Z-scores

LC	Sample	Z-score [σ_p = 10 %]	Lipid content Physico-chemical methods	Lipid content Bioanalytical methods	Lipid content Mean
75	2301-MP				
76	2301-MP		-0.3		-0.3
77	2301-MP		0.7		0.7
78	2301-MP		0.6		0.6
79	2301-MP				
80	2301-MP		0.7		0.7
81	2301-MP				
82	2301-MP				
83	2301-MP		-0.2		-0.2
84	2301-MP		0.8		0.8
85	2301-MP		0.3		0.3
86	2301-MP		0.0		0.0
87	2301-MP				
88	2301-MP		4.5		4.5
89	2301-MP				
90	2301-MP				
91	2301-MP		0.8		0.8
92	2301-MP		-2.4		-2.4
93	2301-MP				
94	2301-MP		-4.6		-4.6
95	2301-MP				
96	2301-MP		-4.9		-4.9
97	2301-MP			2.2	2.2
98	2301-MP		-0.8		-0.8
99	2301-MP		-6.9		-6.9
100	2301-MP				
101	2301-MP		0.6		0.6
102	2301-MP		0.4		0.4
103	2301-MP		0.4		0.4
104	2301-MP		4.4		4.4
105	2301-MP				
106	2301-MP		-1.0		-1.0
107	2301-MP				
108	2301-MP		0.2		0.2
109	2301-MP				
110	2301-MP				
111	2301-MP		25.8		25.8
112	2301-MP		2.0		2.0
113	2301-MP		-2.2		-2.2
114	2301-MP		-5.0		-5.0
115	2301-MP		-1.6		-1.6
116	2301-MP		0.4		0.4
117	2301-MP				
118	2301-MP				
119	2301-MP		-3.3		-3.3
120	2301-MP		-0.3		-0.3
121	2301-MP		-7.0		-7.0
122	2301-MP		0.8		0.8
123	2301-MP		-0.2		-0.2
124	2301-MP		-0.2		-0.2
125	2301-MP				
126	2301-MP		0.5		0.5
127	2301-MP		-6.9		-6.9
128	2301-MP				
129	2301-MP		0.4		0.4
7A	2301-MP		-9.0		-9.0
97A	2301-MP			1.6	1.6
101A	2301-MP		0.6		0.6
2*	2301-MP		1.3		1.3
56*	2301-MP		0.5		0.5

EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
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03 May 2024

Annex 4: Participants' z-scores of PCDD/Fs and PCBs - Charts

Test sample - Milk Powder (2301-MP)

Z-scores of sum parameters and individual results

Calculation of z-score on basis of assigned value

$z = (x - x_a) / \sigma_p$

x_a: assigned value
x: participant's result
σ_p: fitness-for-purpose-based standard deviation for proficiency assessment

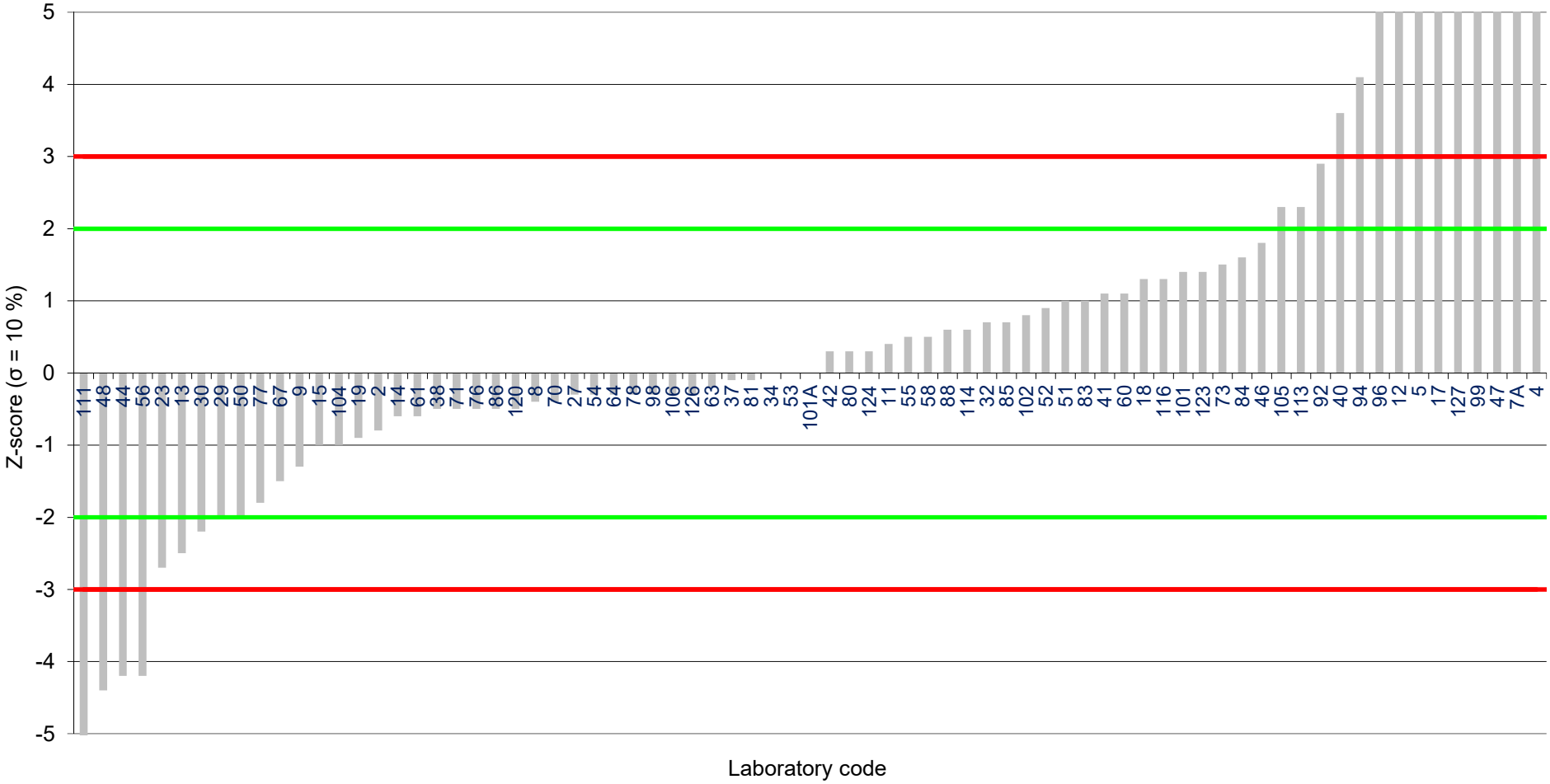
10%: WHO-PCDD/F-TEQ, WHO-PCB-TEQ and WHO-PCDD/F-PCB-TEQ
15%: Sum of six indicator PCBs (PCB 28, 52, 101, 138, 153, 180)
20%: Evaluated individual PCDD/F and PCB congeners

± 2 z-scores:
± 3 z-scores:

Milk Powder (2301-MP)

WHO-PCDD/F-PCB-TEQ upper bound (reported)

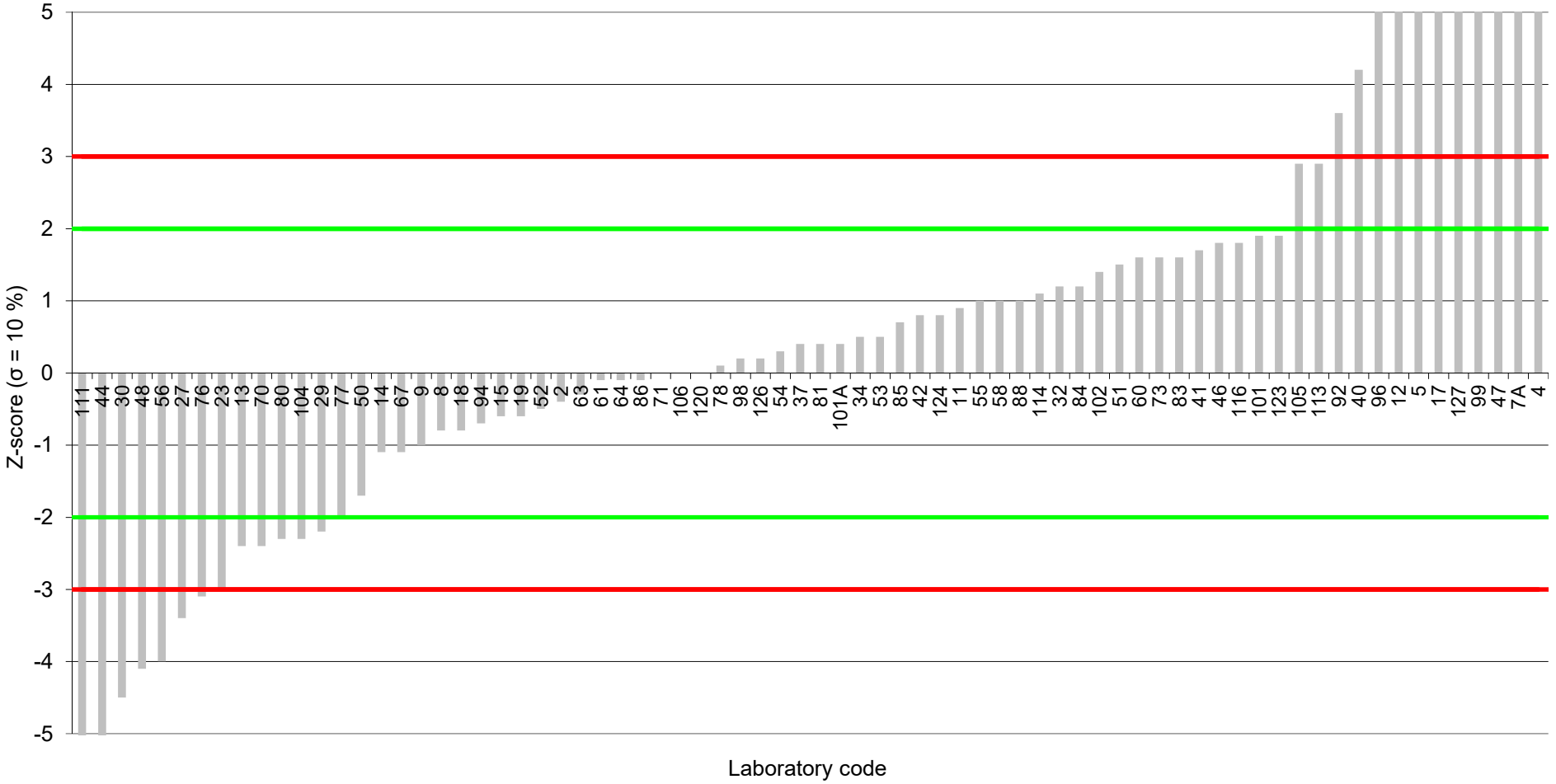
Assigned value: 2.4 pg/g fat



Milk Powder (2301-MP)

WHO-PCDD/F-PCB-TEQ lower bound (reported)

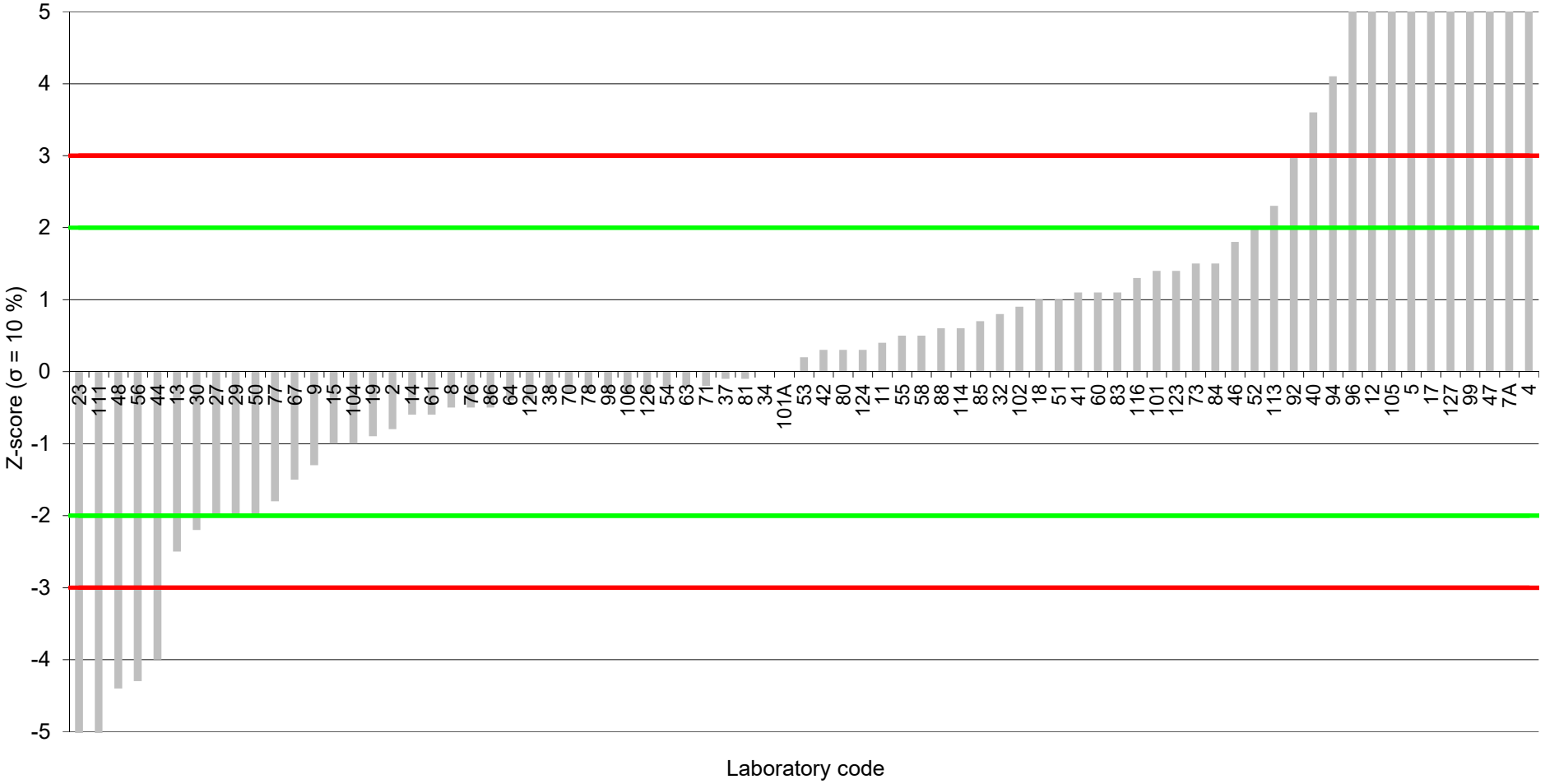
Assigned value: 2.29 pg/g fat



Milk Powder (2301-MP)

WHO-PCDD/F-PCB-TEQ upper bound (calculated)

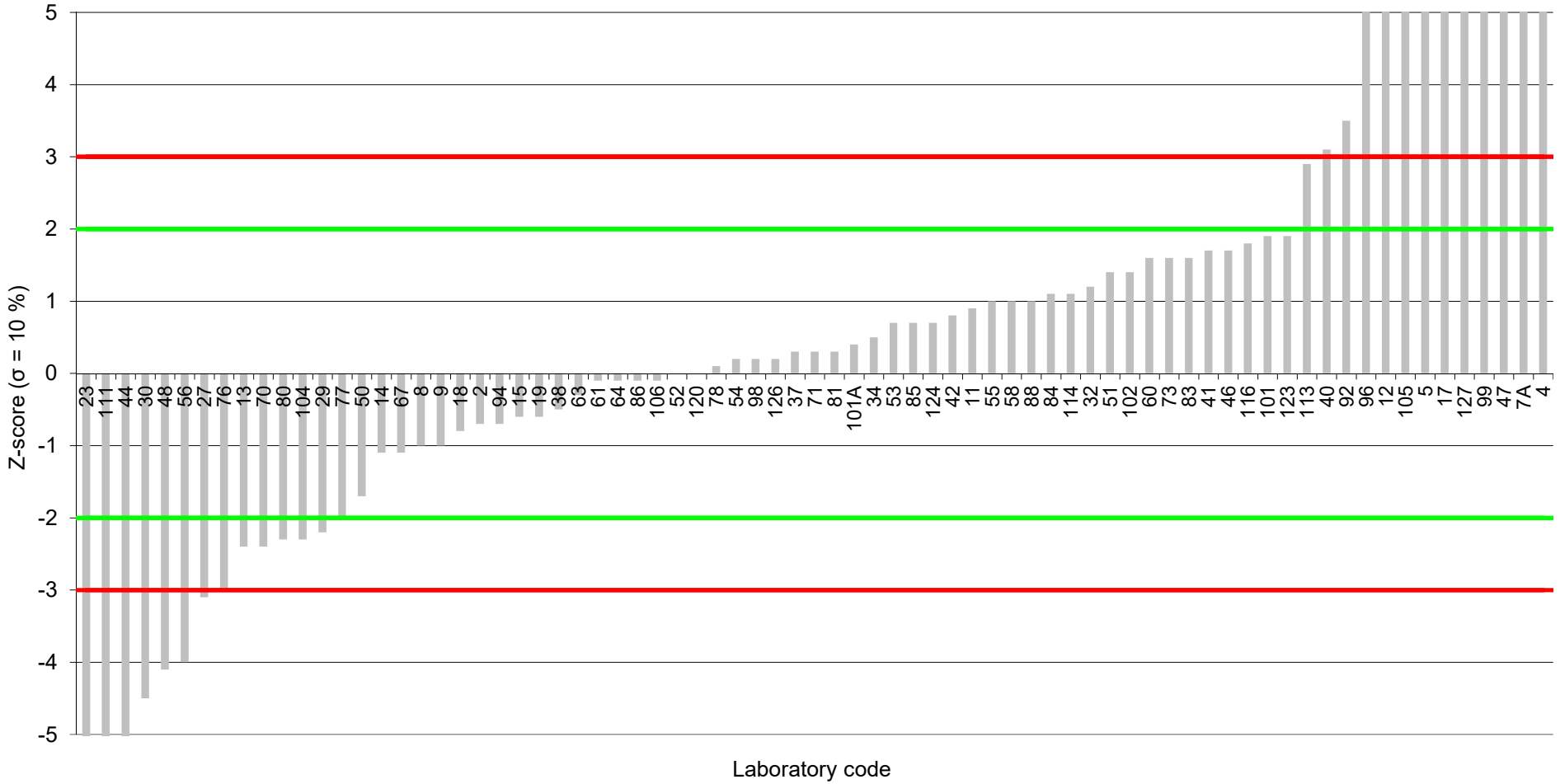
Assigned value: 2.4 pg/g fat



Milk Powder (2301-MP)

WHO-PCDD/F-PCB-TEQ lower bound (calculated)

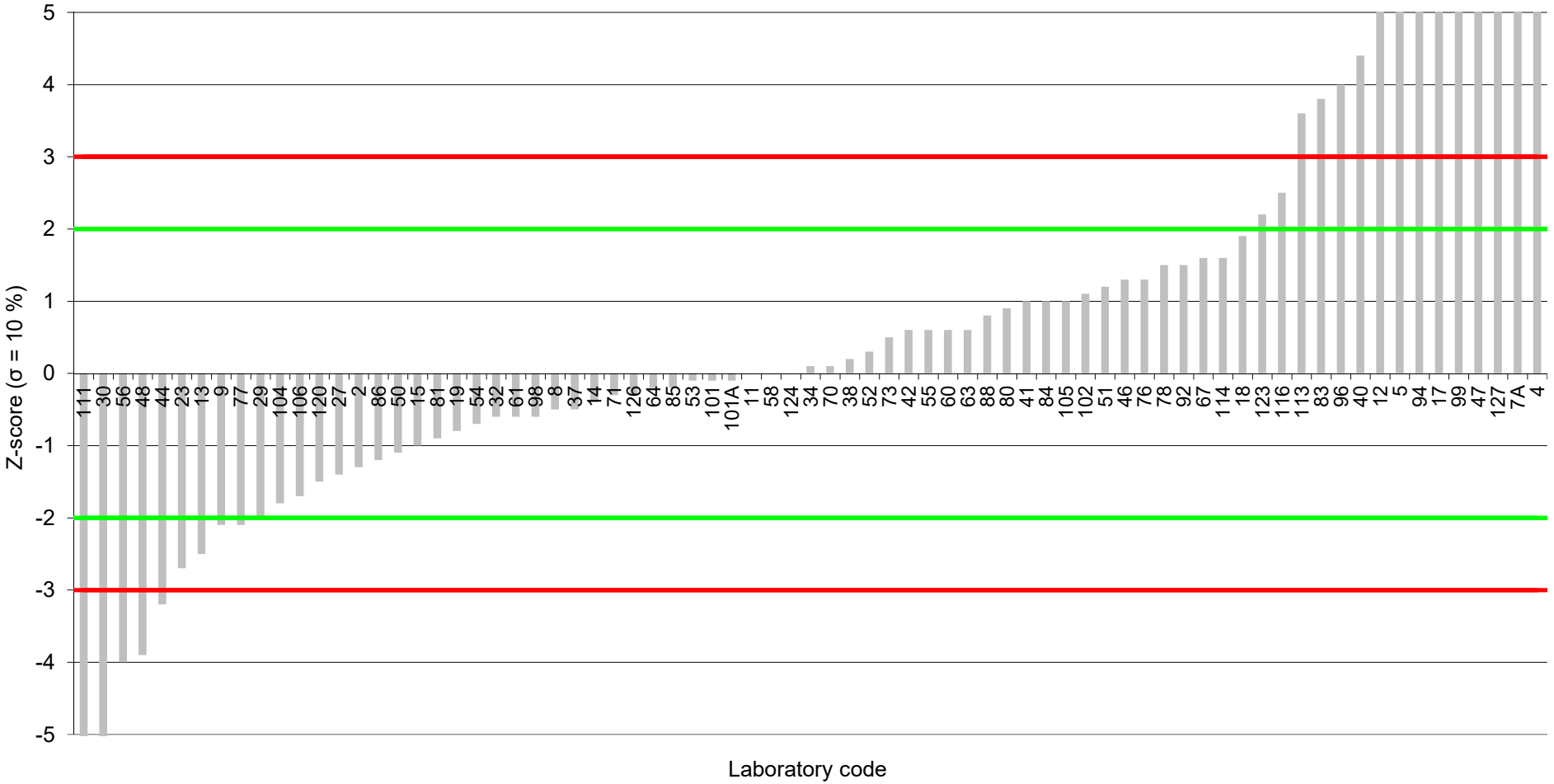
Assigned value: 2.29 pg/g fat



Milk Powder (2301-MP)

WHO-PCDD/F-TEQ upper bound (reported)

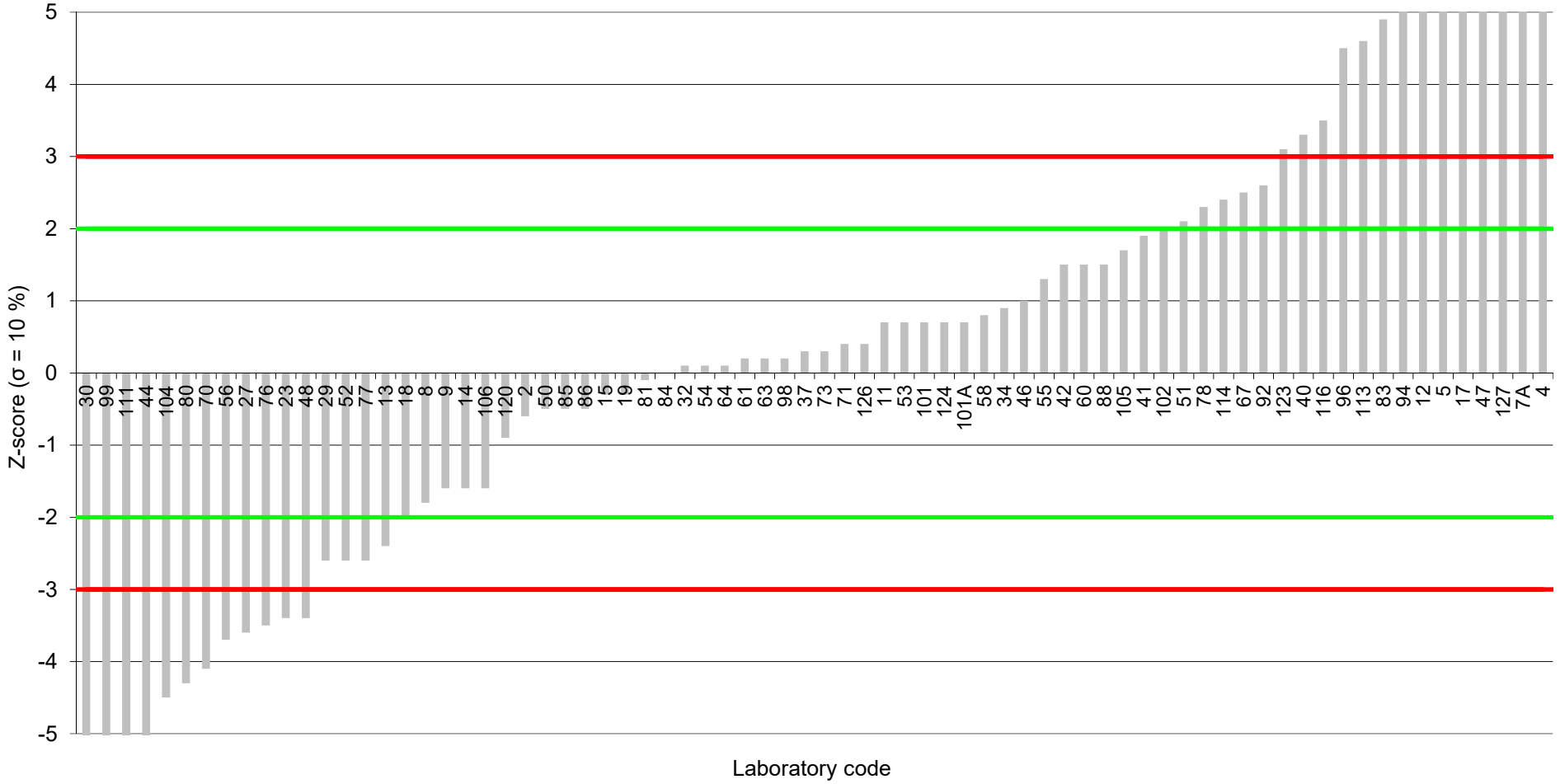
Assigned value: 1.26 pg/g fat



Milk Powder (2301-MP)

WHO-PCDD/F-TEQ lower bound (reported)

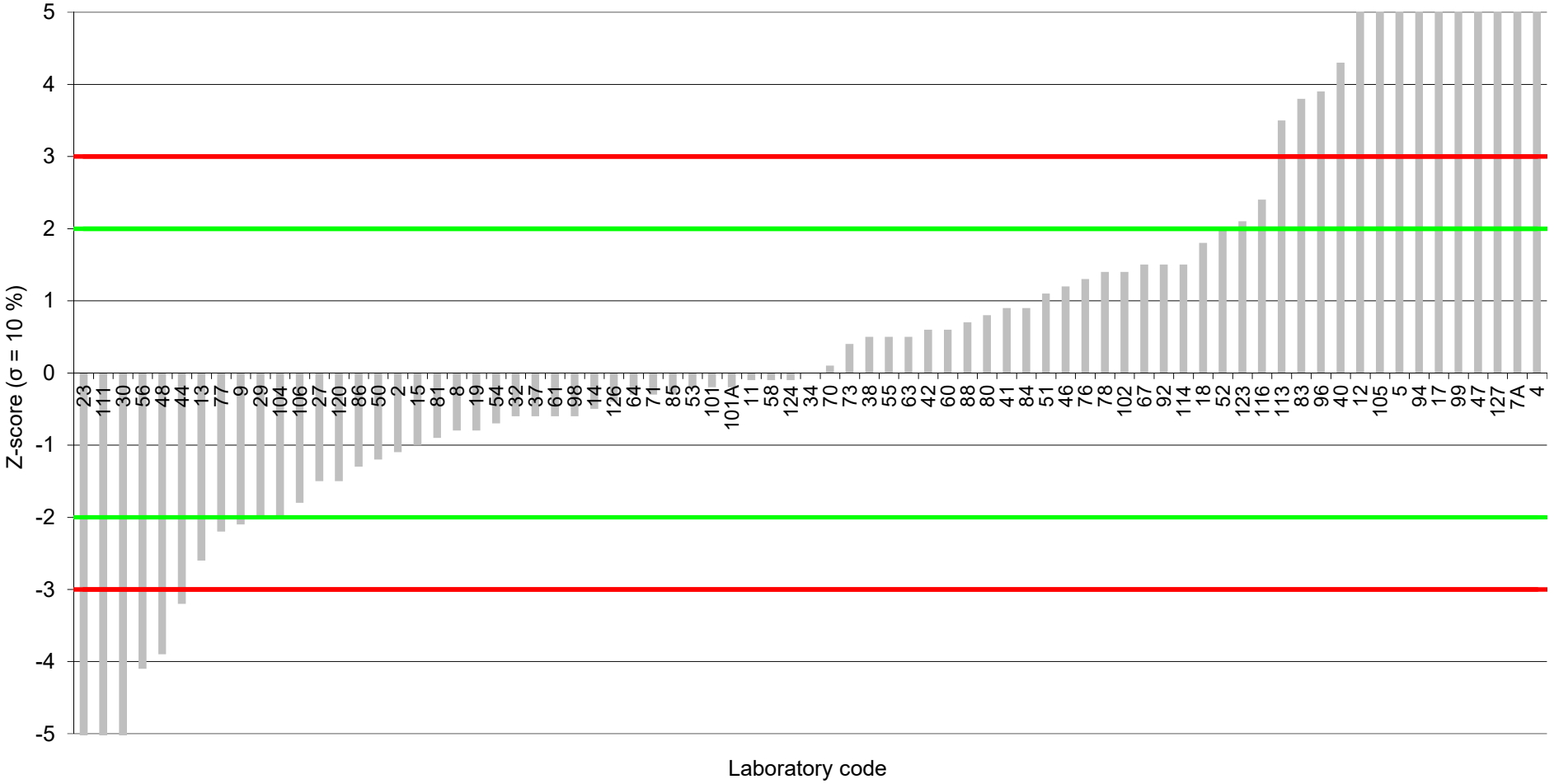
Assigned value: 1.17 pg/g fat



Milk Powder (2301-MP)

WHO-PCDD/F-TEQ upper bound (calculated)

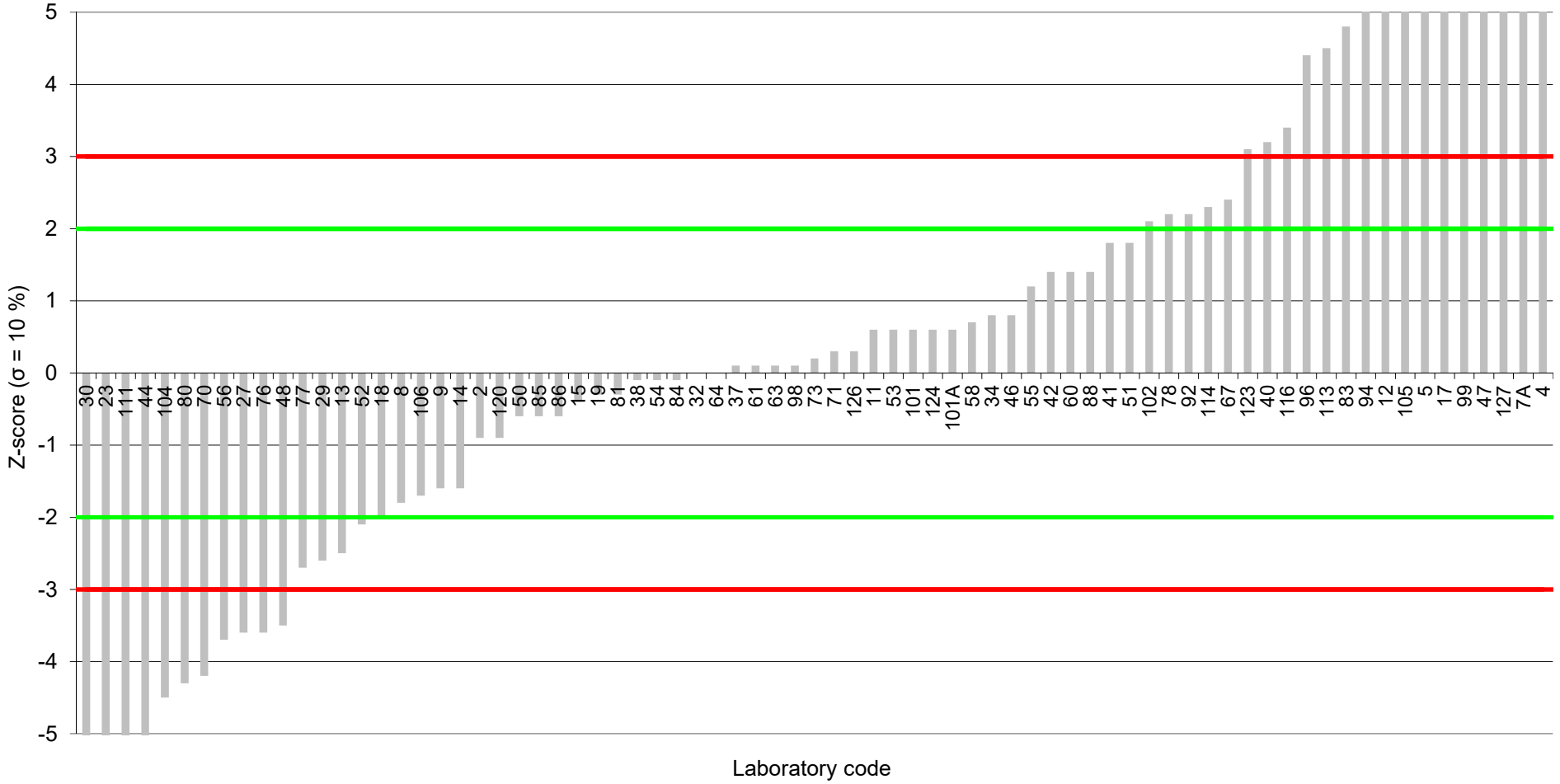
Assigned value: 1.27 pg/g fat



Milk Powder (2301-MP)

WHO-PCDD/F-TEQ lower bound (calculated)

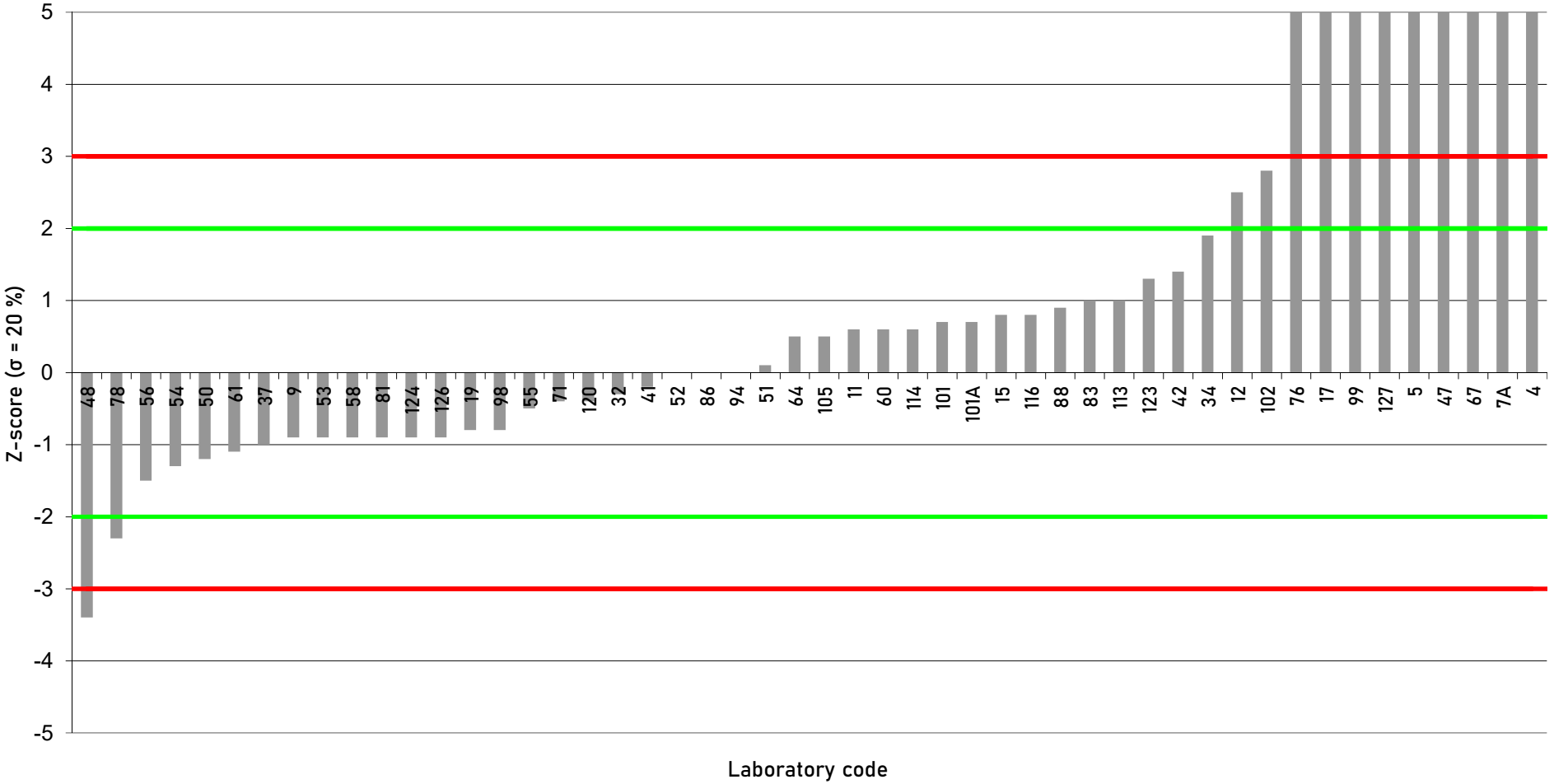
Assigned value: 1.18 pg/g fat



Milk Powder (2301-MP)

2,3,7,8-TCDD

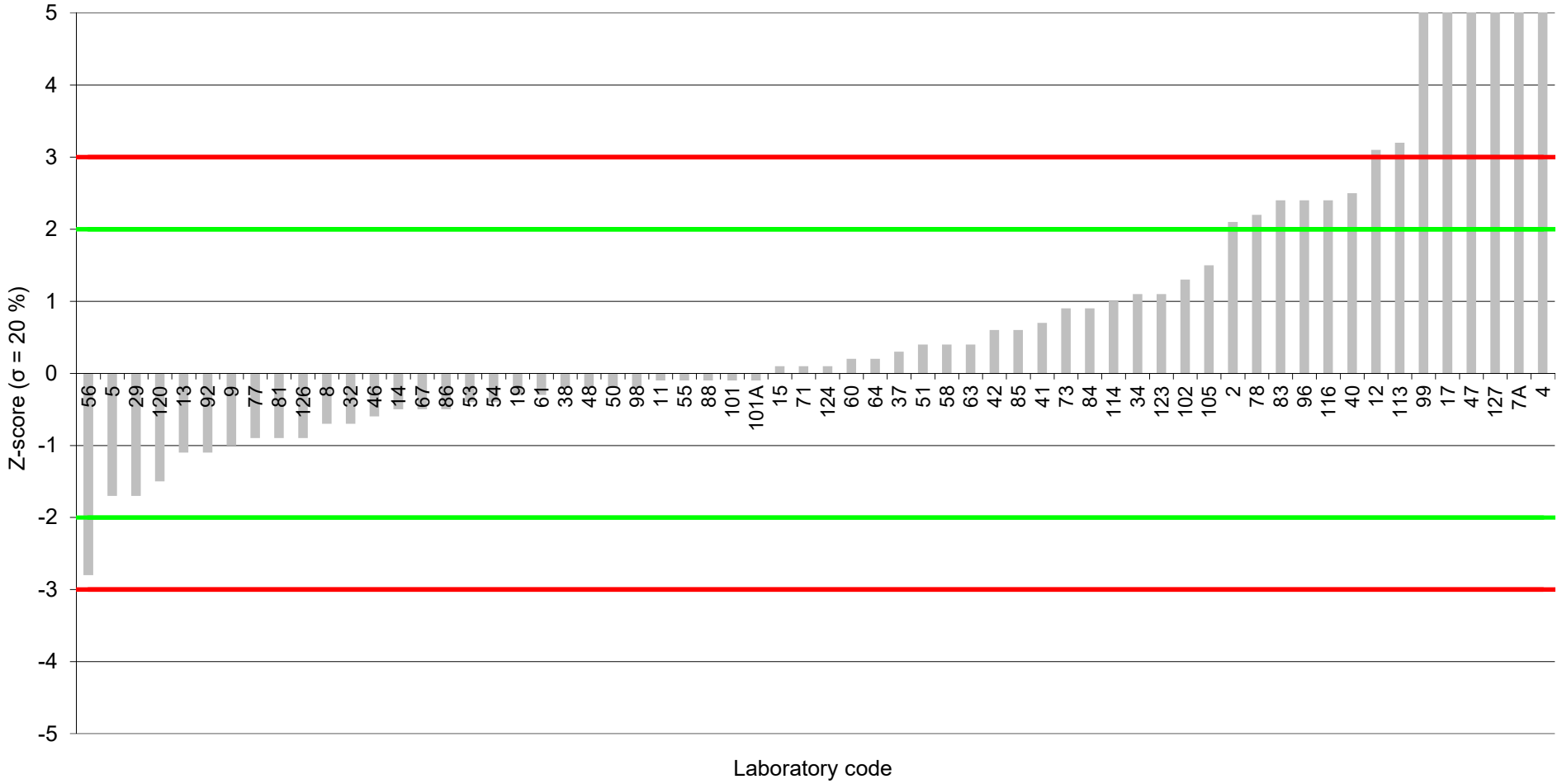
Assigned value: 0.109 pg/g fat



Milk Powder (2301-MP)

1,2,3,7,8-PeCDD

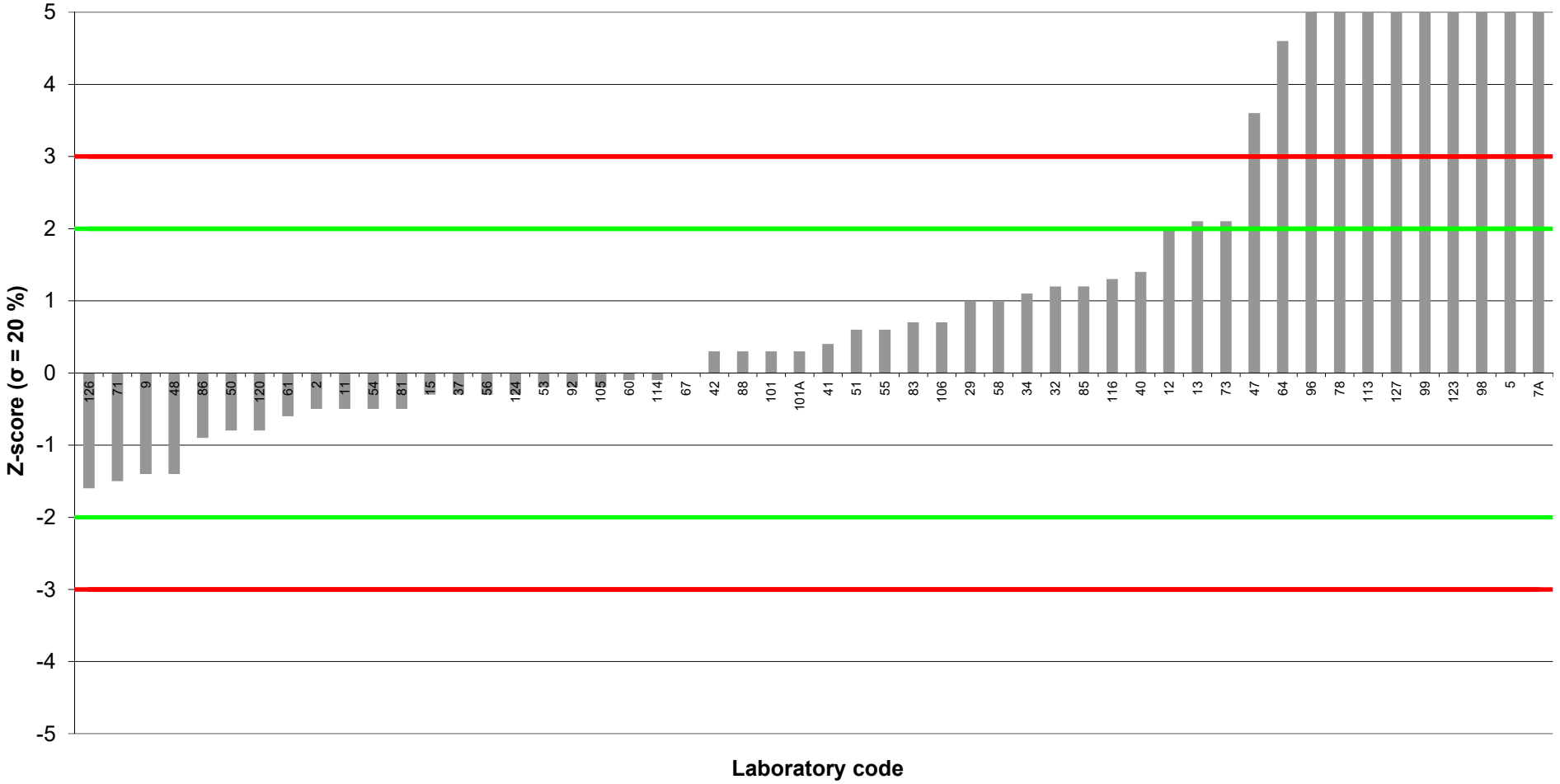
Assigned value: 0.269 pg/g fat



Milk Powder (2301-MP)

1,2,3,4,7,8-HxCDD

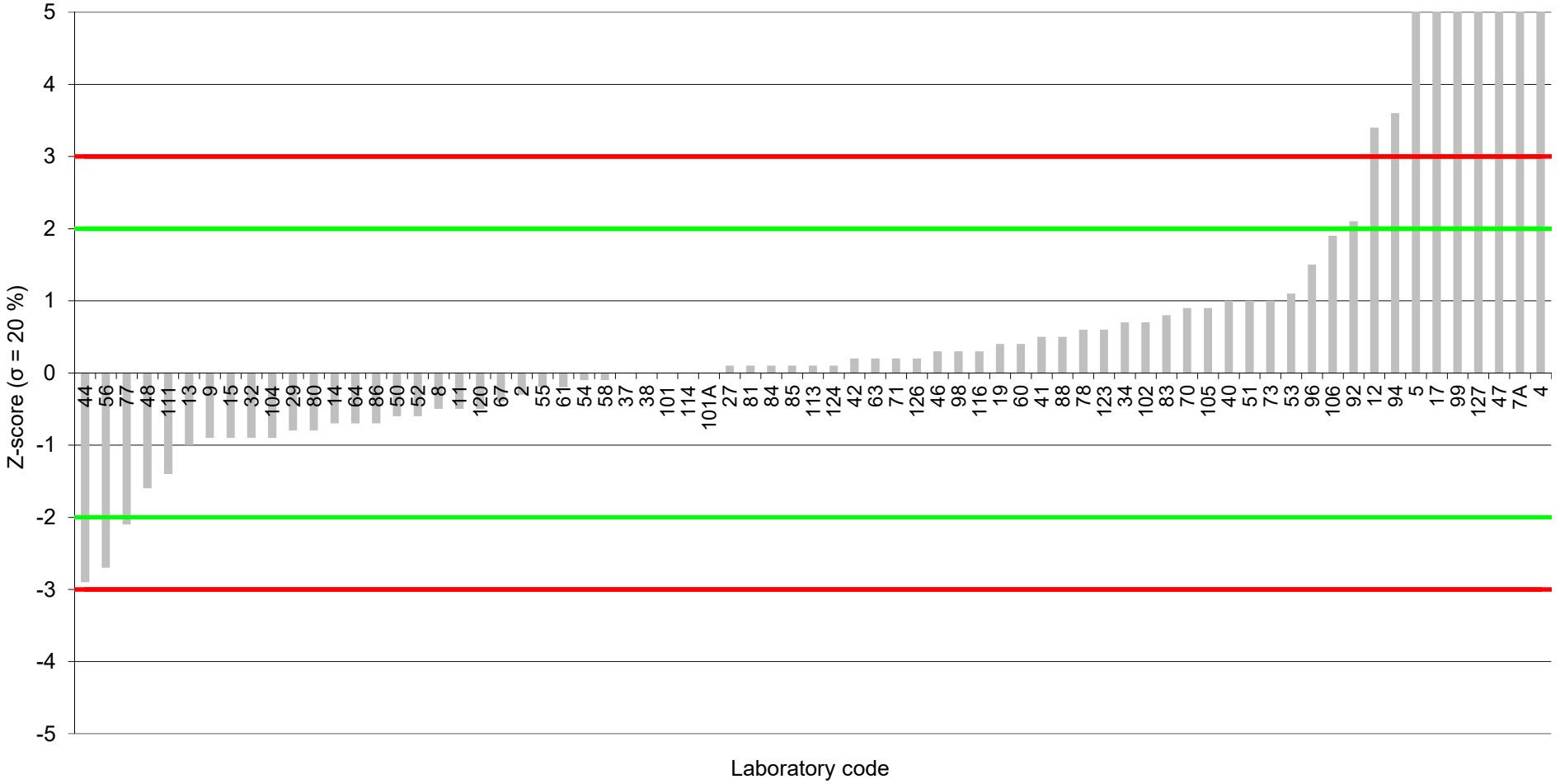
Assigned value: 0.177 pg/g fat



Milk Powder (2301-MP)

1,2,3,6,7,8-HxCDD

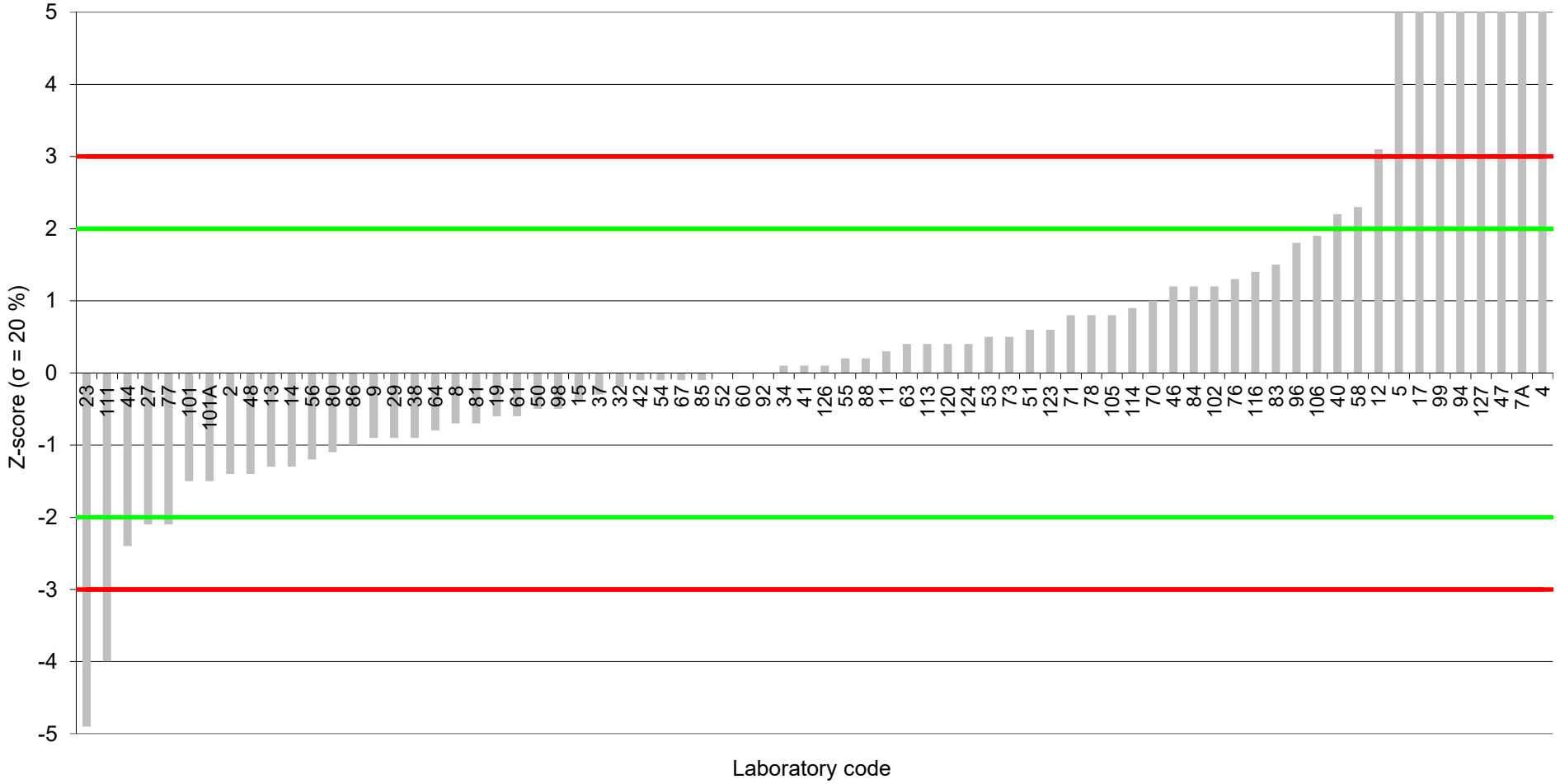
Assigned value: 0.584 pg/g fat



Milk Powder (2301-MP)

1,2,3,4,6,7,8-HpCDD

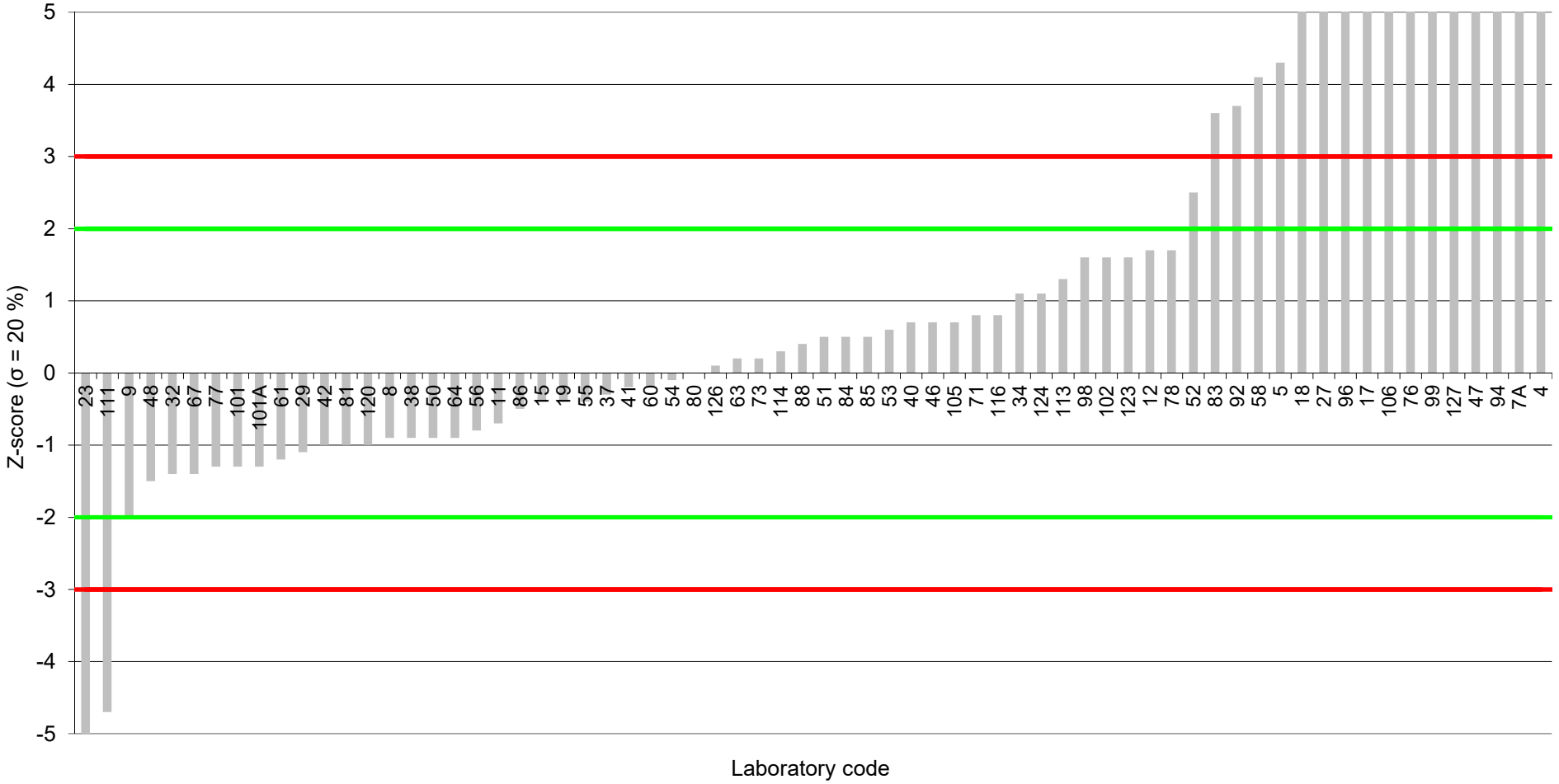
Assigned value: 1.13 pg/g fat



Milk Powder (2301-MP)

OCDD

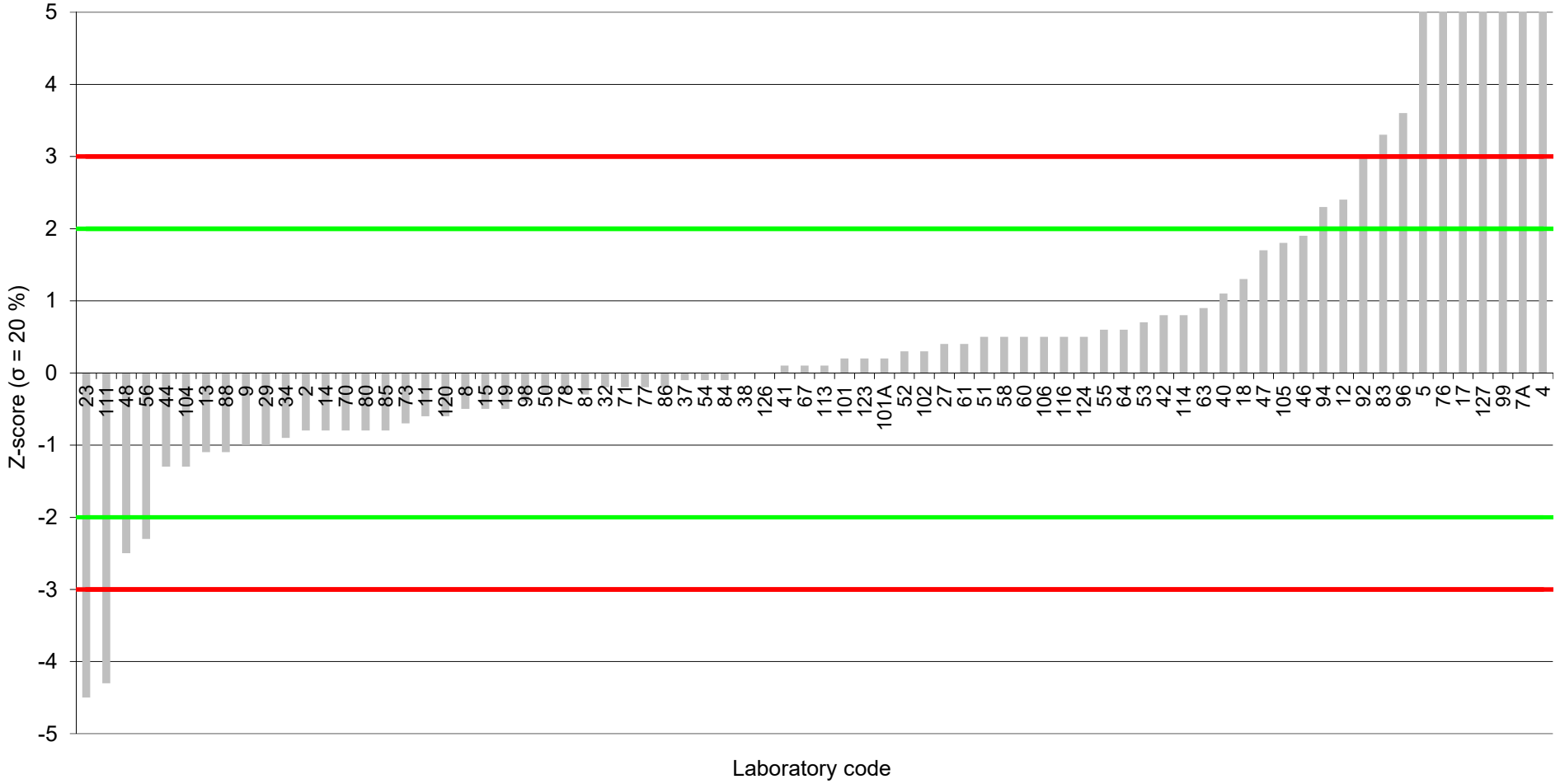
Assigned value: 1.83 pg/g fat



Milk Powder (2301-MP)

2,3,7,8-TCDF

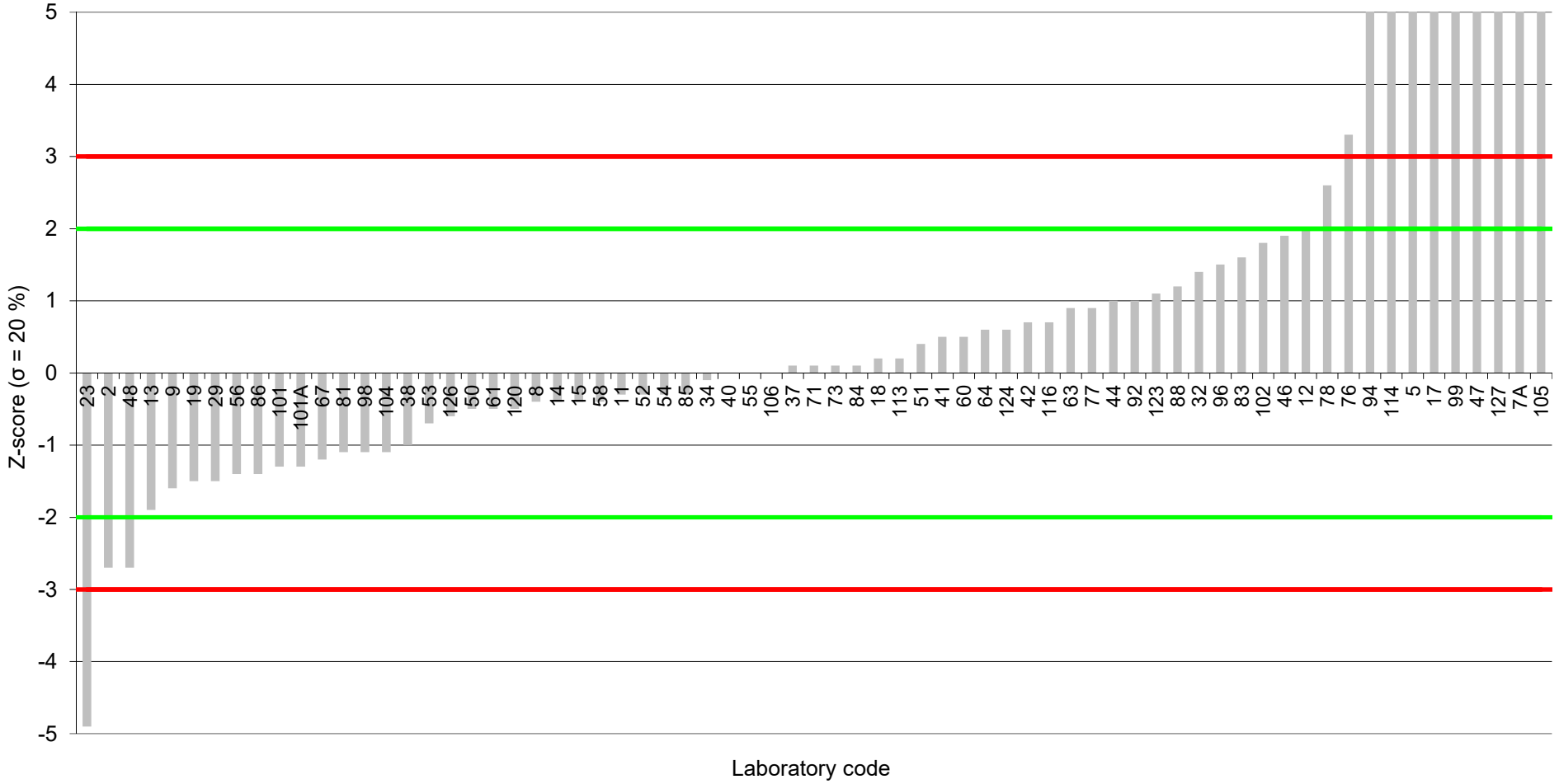
Assigned value: 1.03 pg/g fat



Milk Powder (2301-MP)

1,2,3,7,8-PeCDF

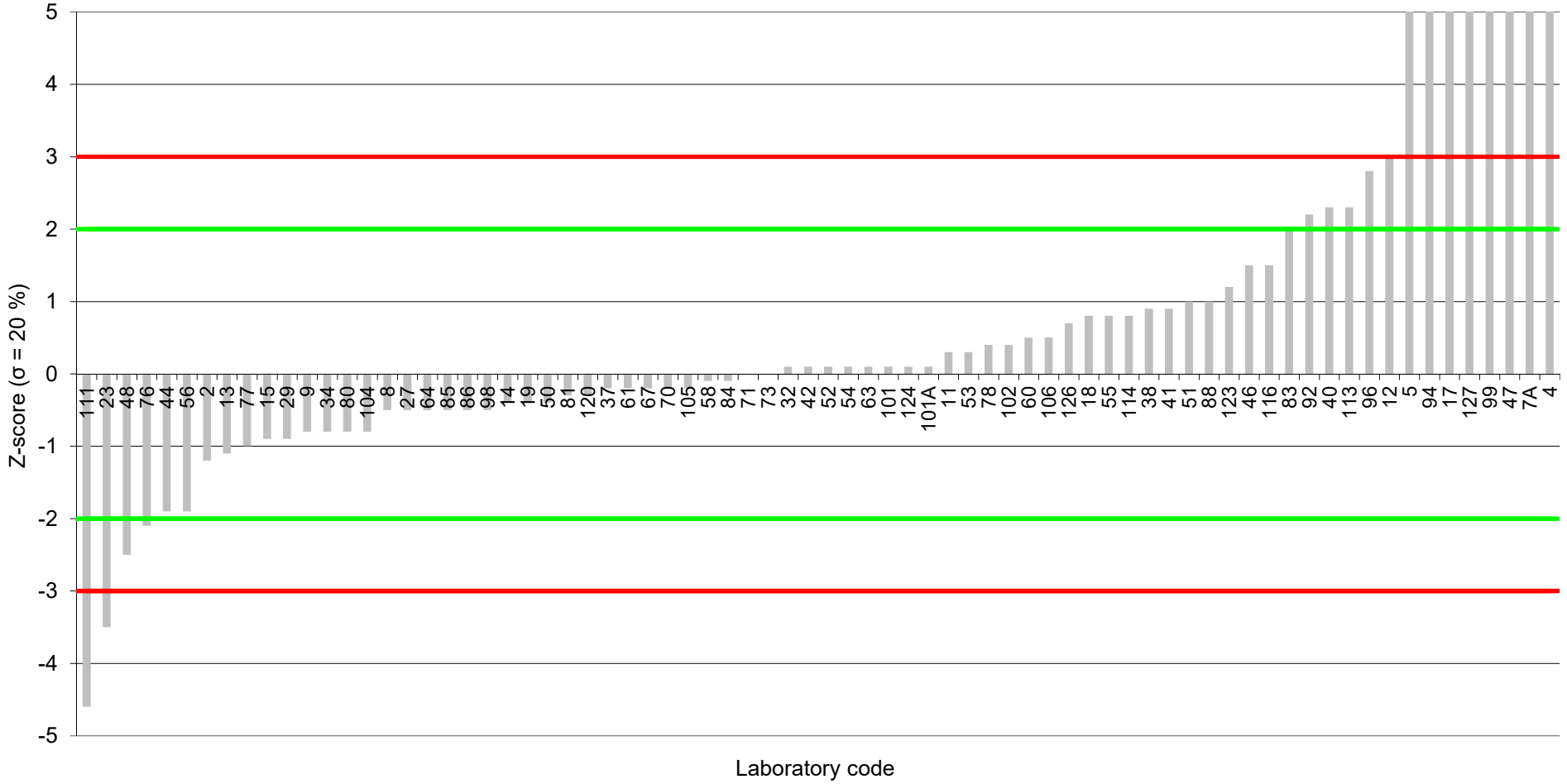
Assigned value: 0.348 pg/g fat



Milk Powder (2301-MP)

2,3,4,7,8-PeCDF

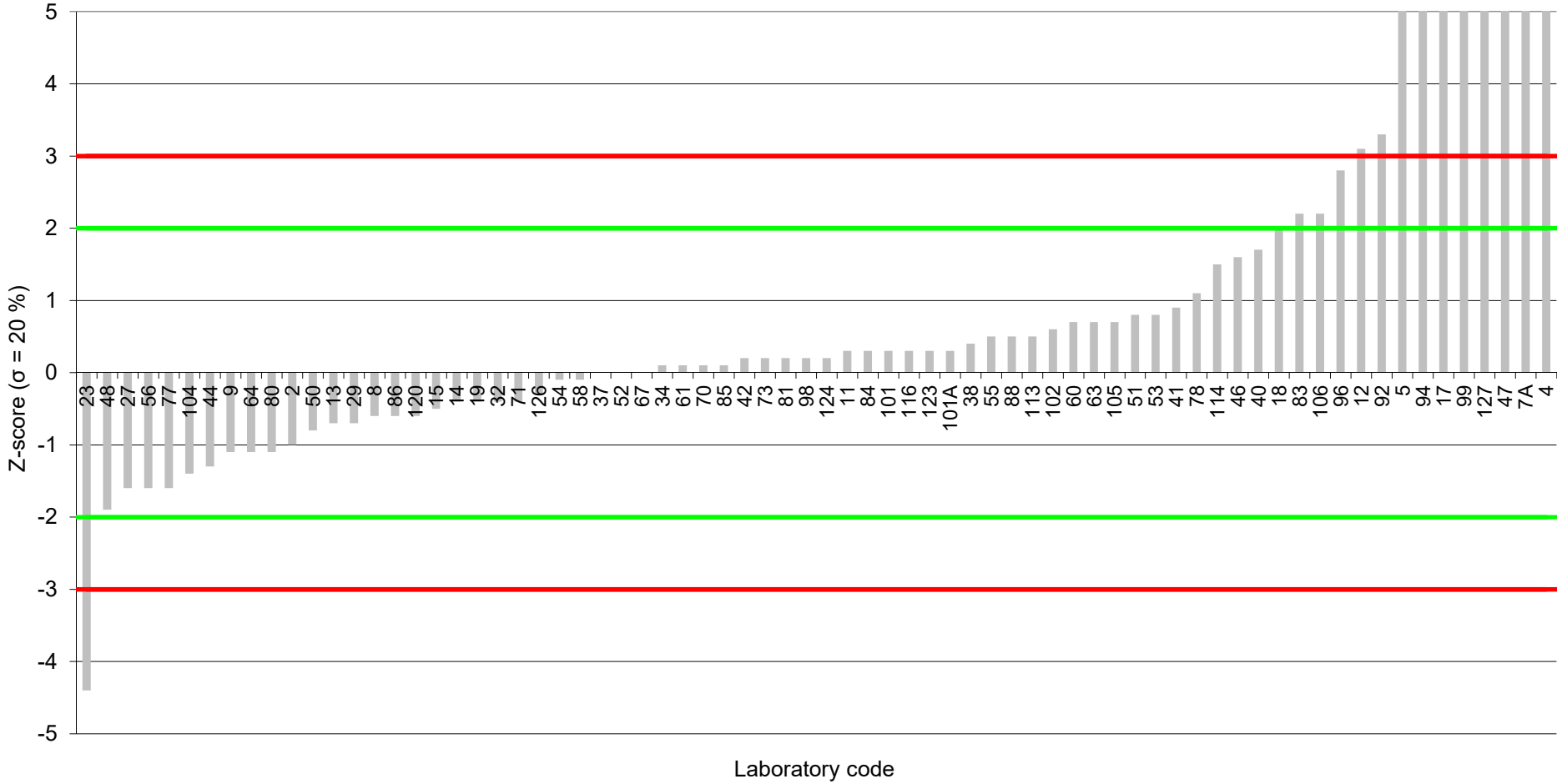
Assigned value: 1.56 pg/g fat



Milk Powder (2301-MP)

1,2,3,4,7,8-HxCDF

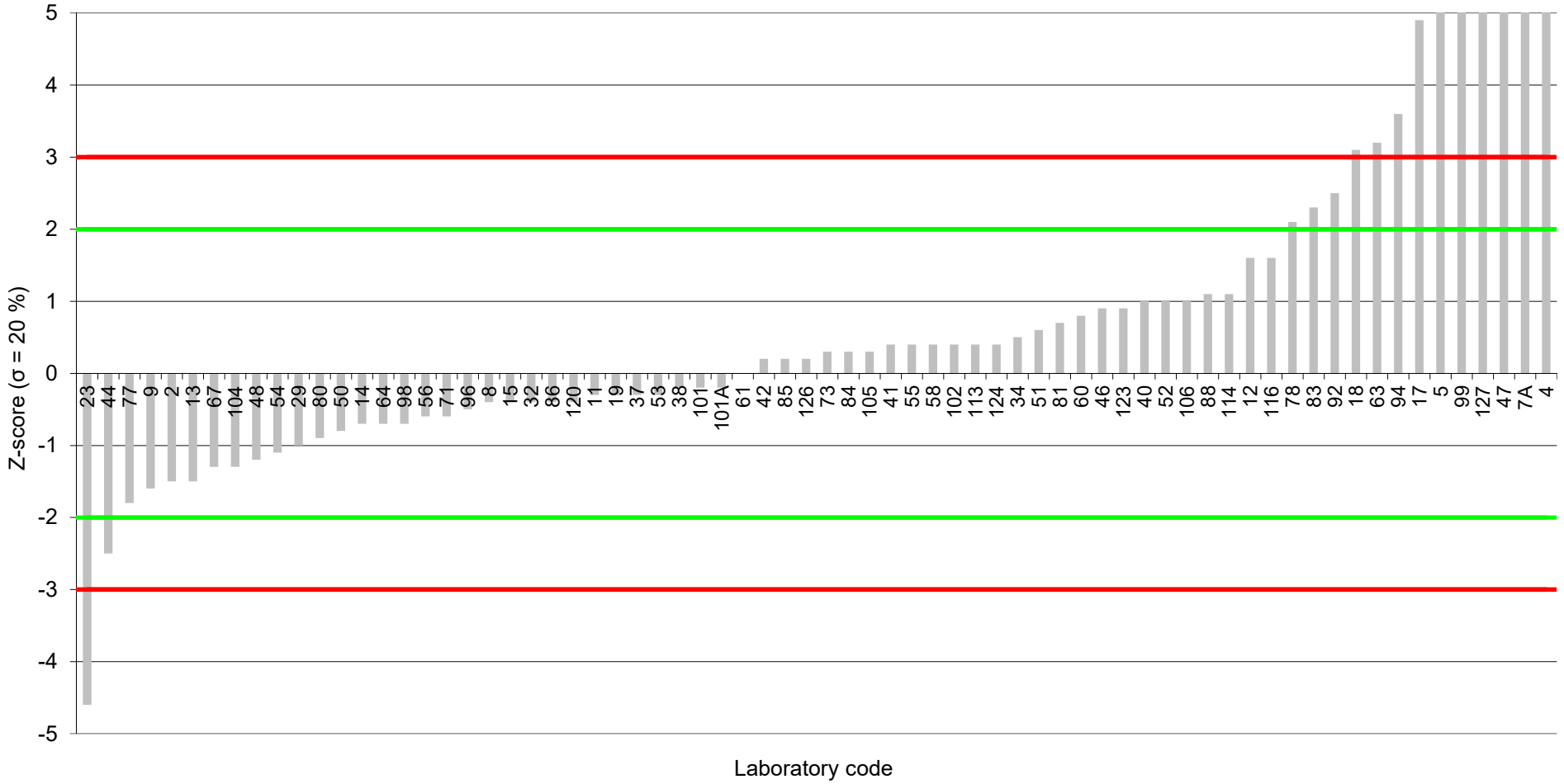
Assigned value: 0.712 pg/g fat



Milk Powder (2301-MP)

1,2,3,6,7,8-HxCDF

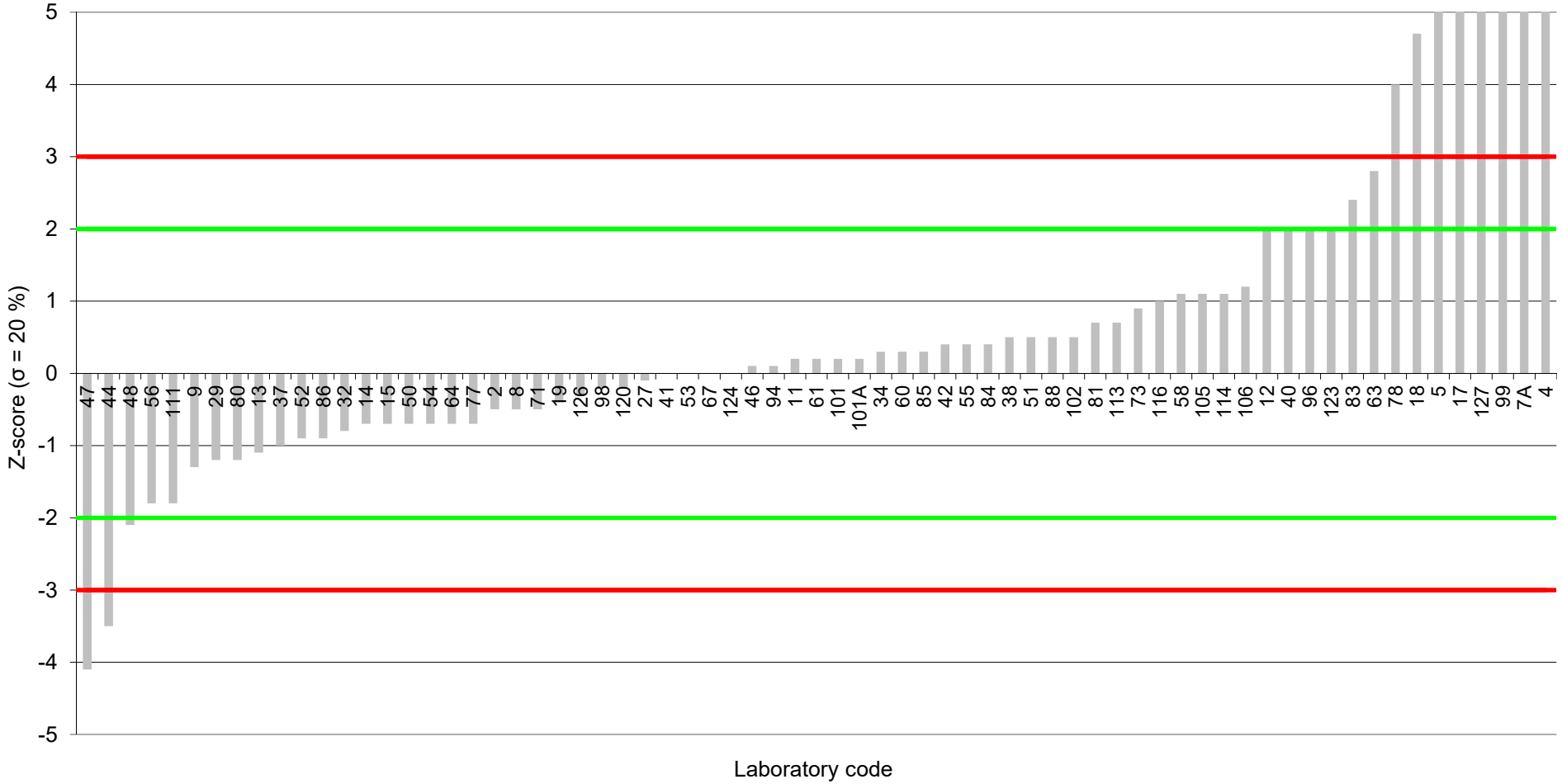
Assigned value: 0.395 pg/g fat



Milk Powder (2301-MP)

2,3,4,6,7,8-HxCDF

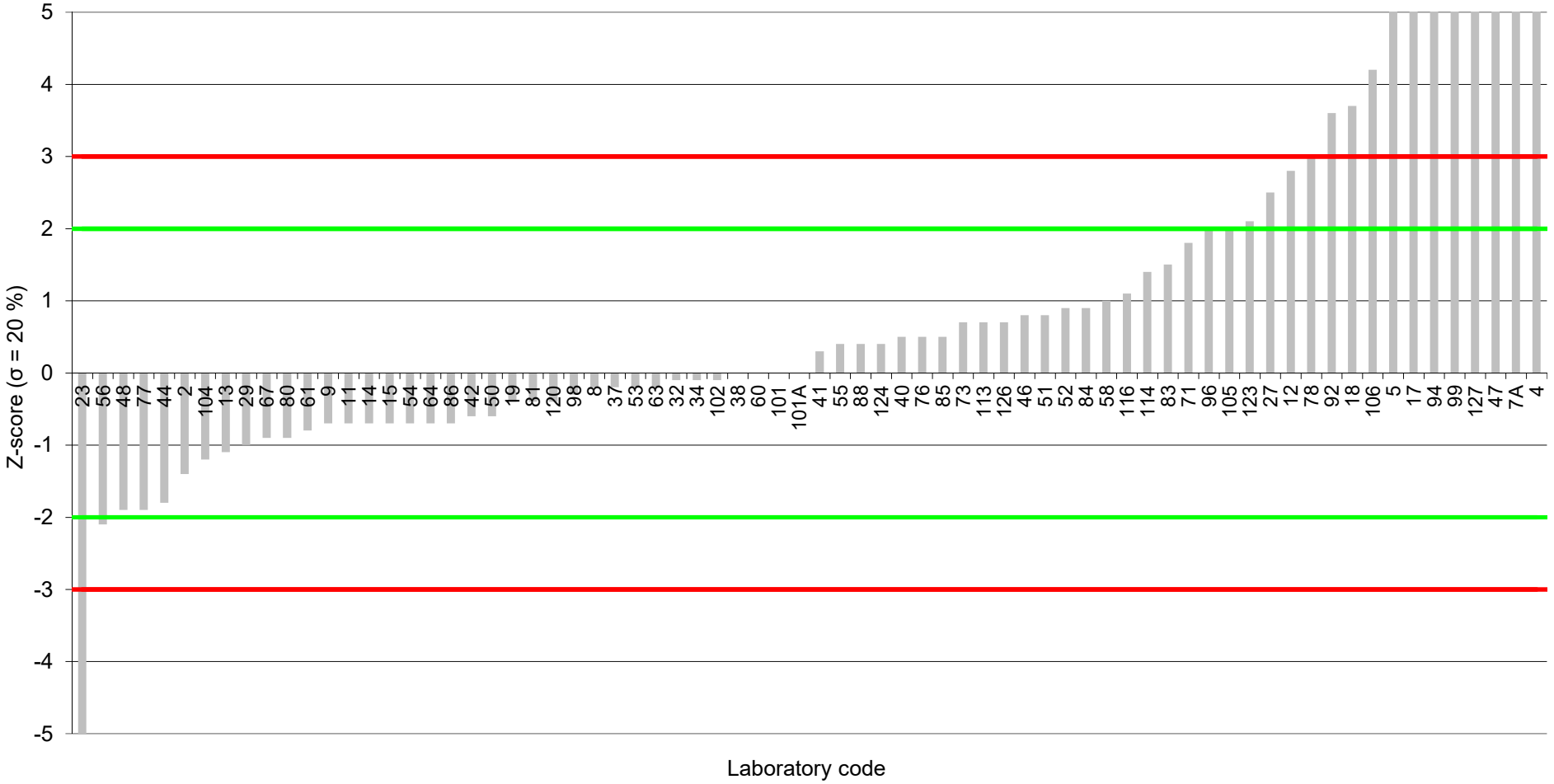
Assigned value: 0.44 pg/g fat



Milk Powder (2301-MP)

1,2,3,4,6,7,8-HpCDF

Assigned value: 0.863 pg/g fat



Milk Powder (2301-MP)

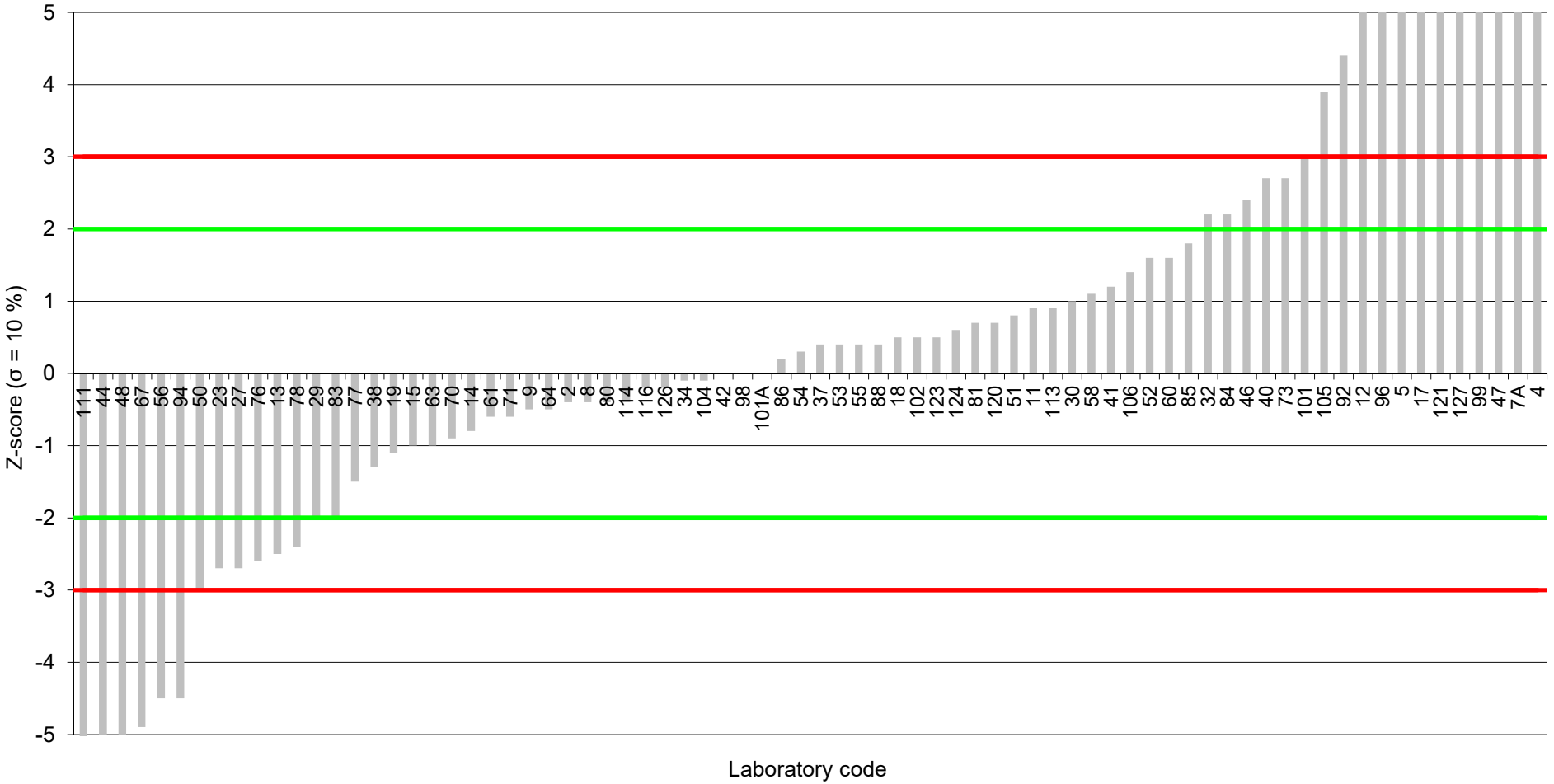
OCDF

Assigned value: 0.891 pg/g fat

Milk Powder (2301-MP)

WHO-PCB-TEQ upper bound (reported)

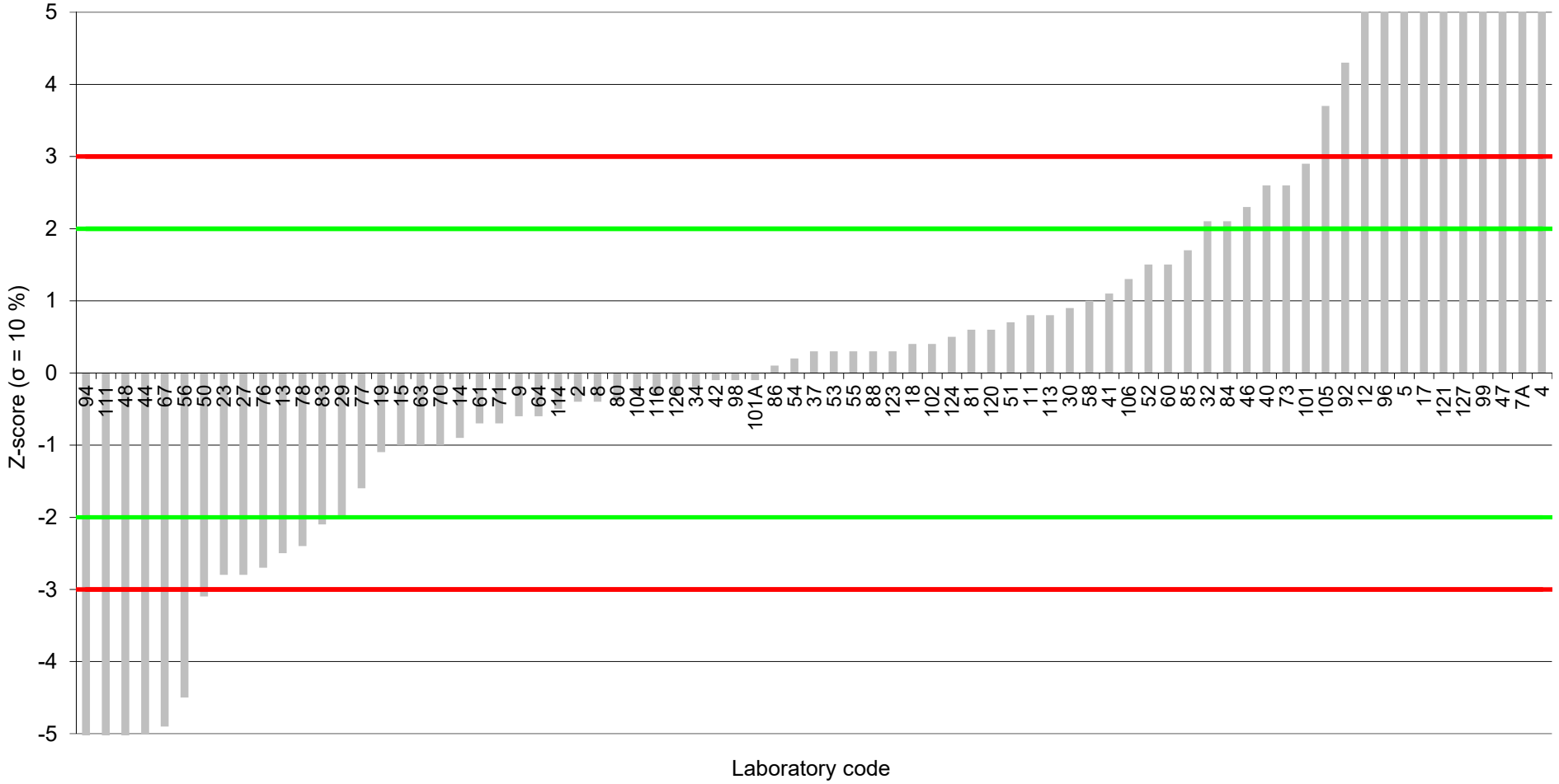
Assigned value: 1.14 pg/g fat



Milk Powder (2301-MP)

WHO-PCB-TEQ lower bound (reported)

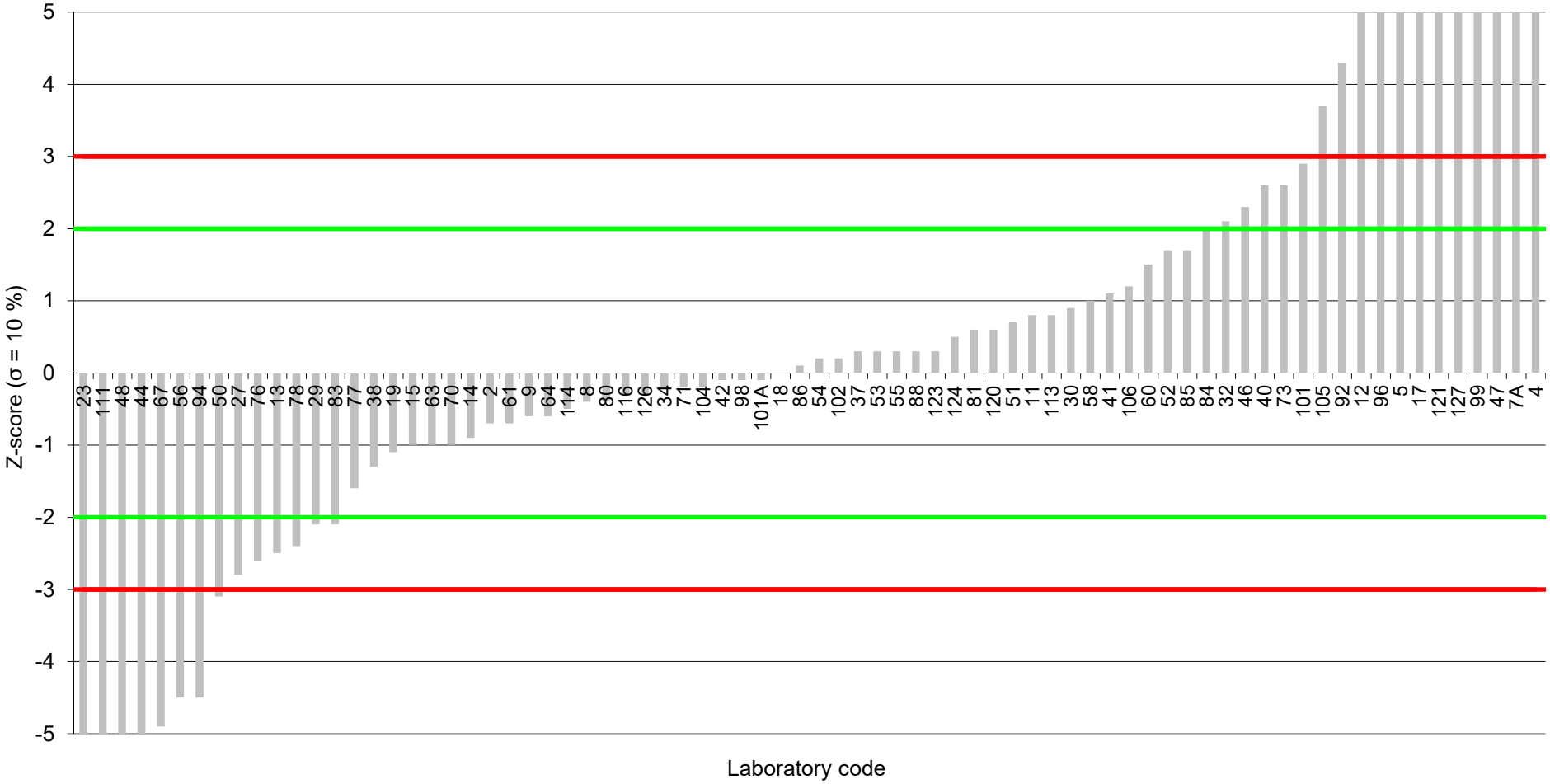
Assigned value: 1.15 pg/g fat



Milk Powder (2301-MP)

WHO-PCB-TEQ upper bound (calculated)

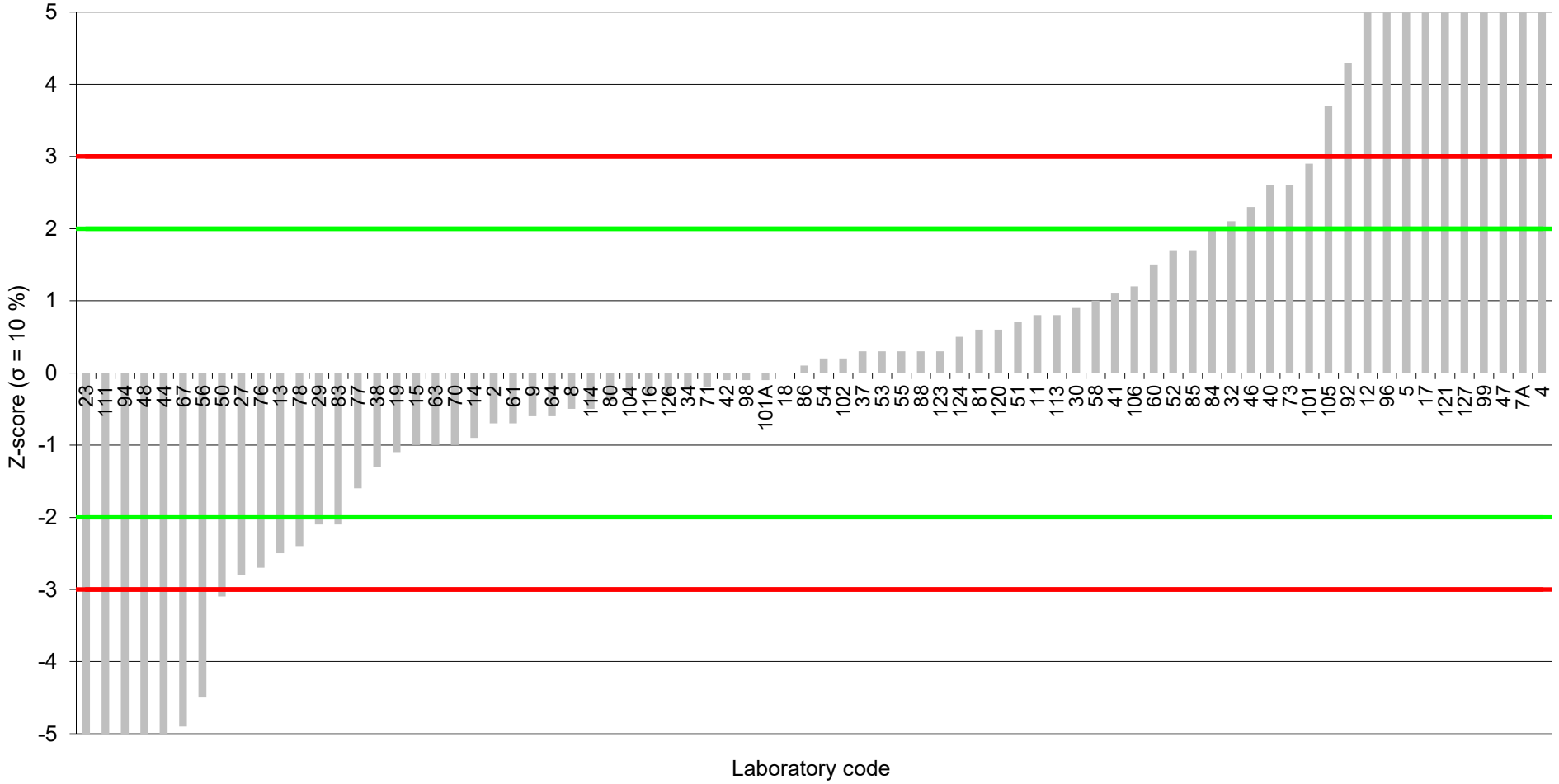
Assigned value: 1.15 pg/g fat



Milk Powder (2301-MP)

WHO-PCB-TEQ lower bound (calculated)

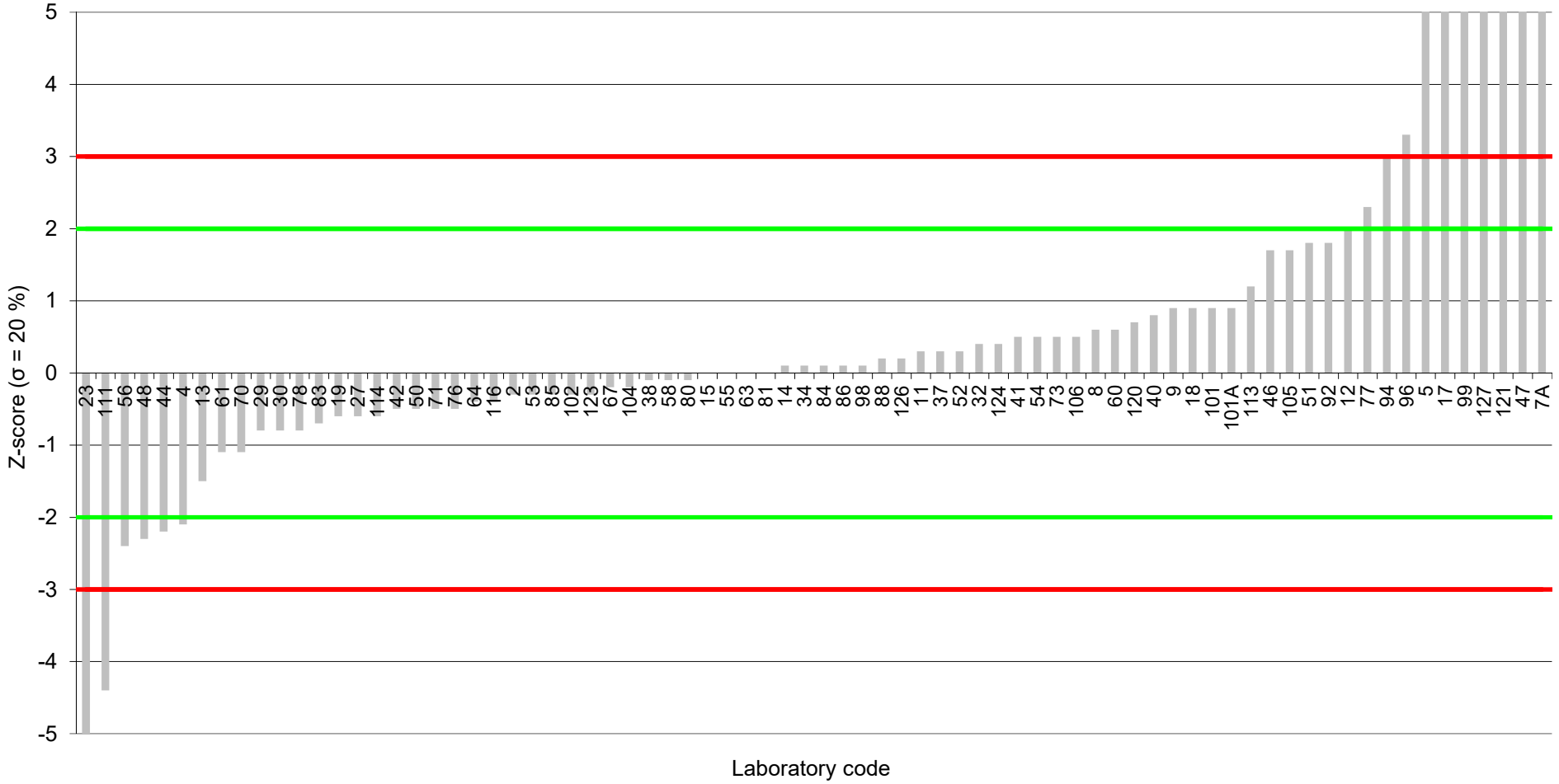
Assigned value: 1.15 pg/g fat



Milk Powder (2301-MP)

PCB 105

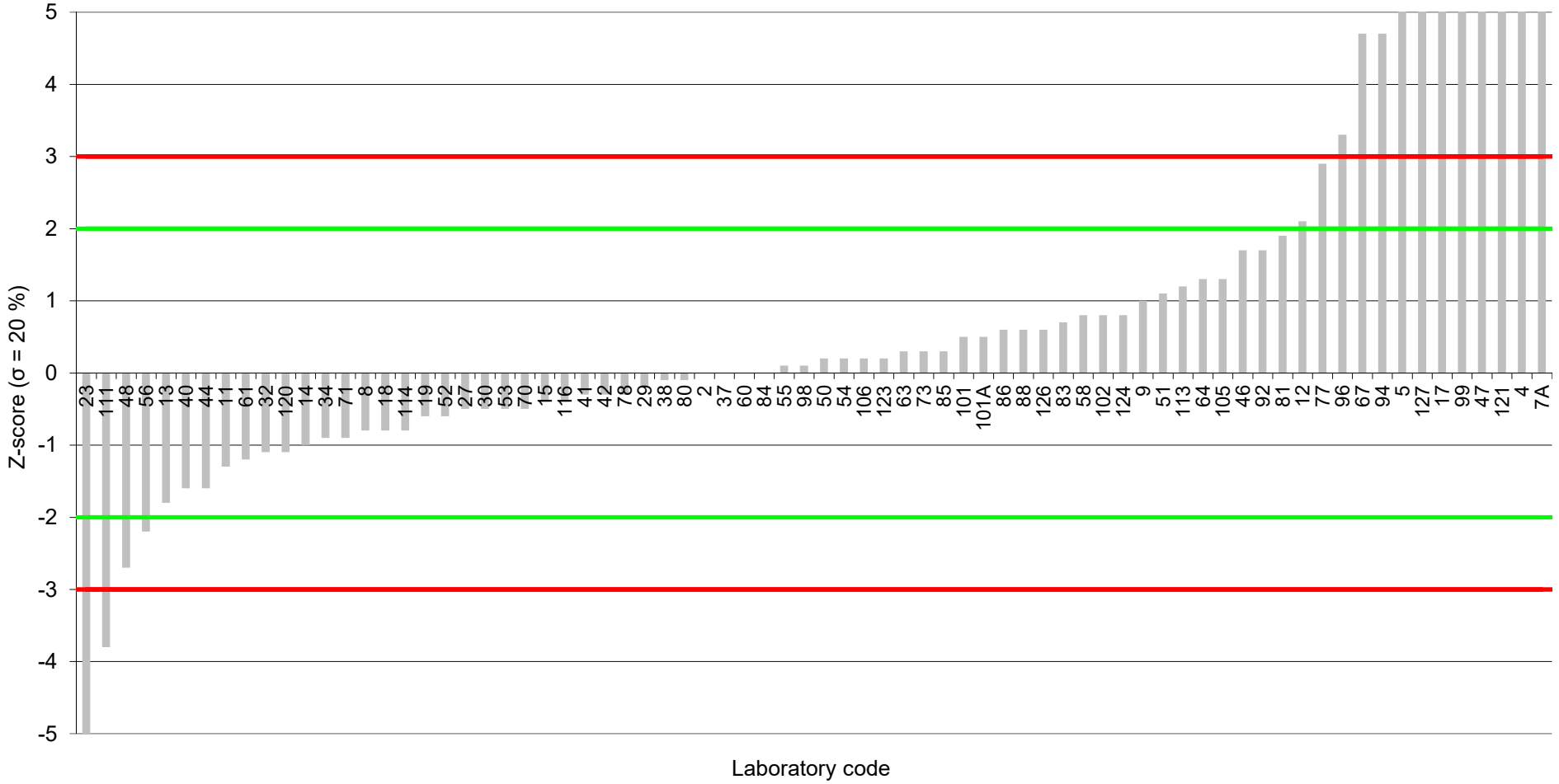
Assigned value: 1530 pg/g fat



Milk Powder (2301-MP)

PCB 114

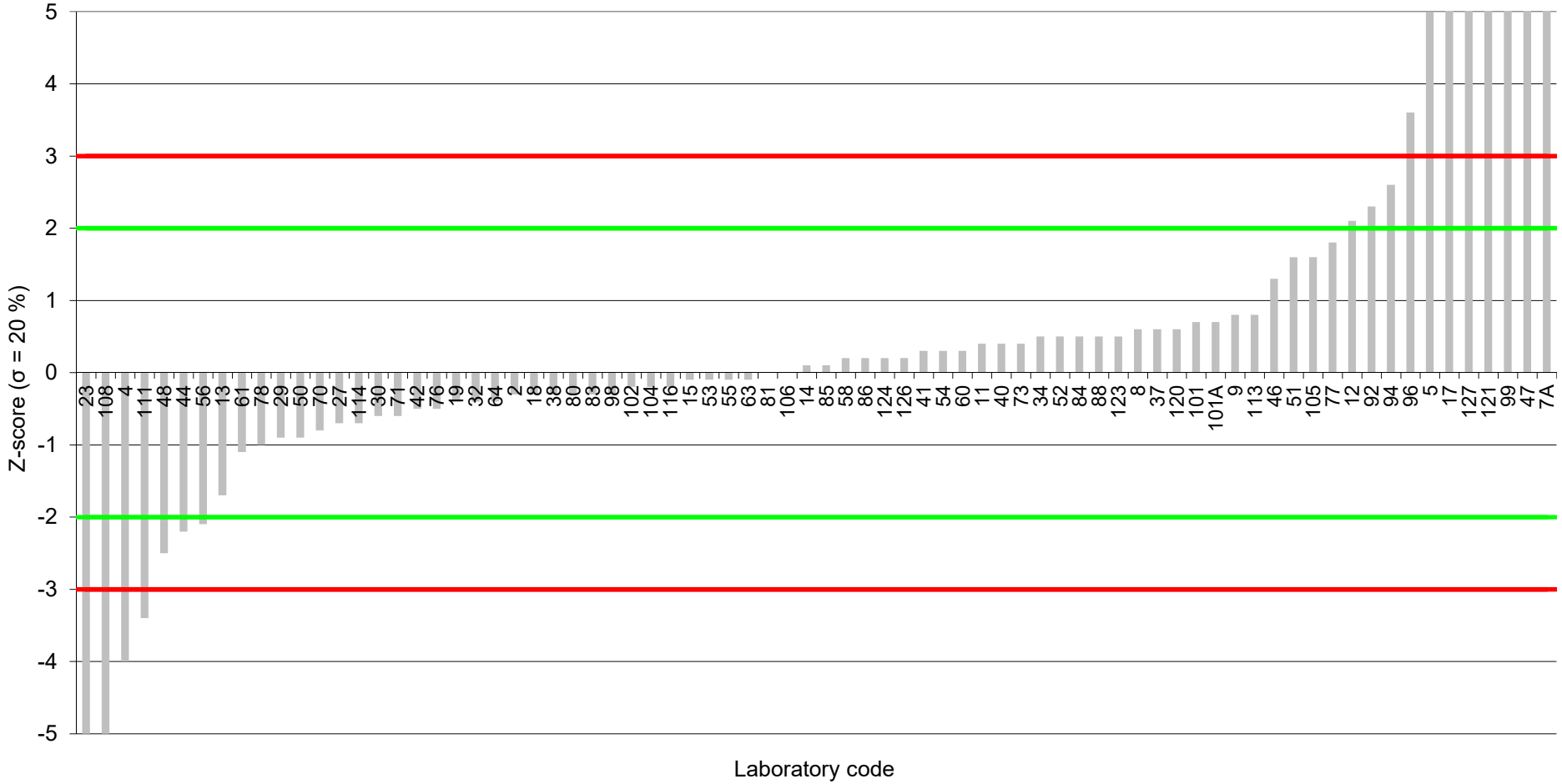
Assigned value: 101 pg/g fat



Milk Powder (2301-MP)

PCB 118

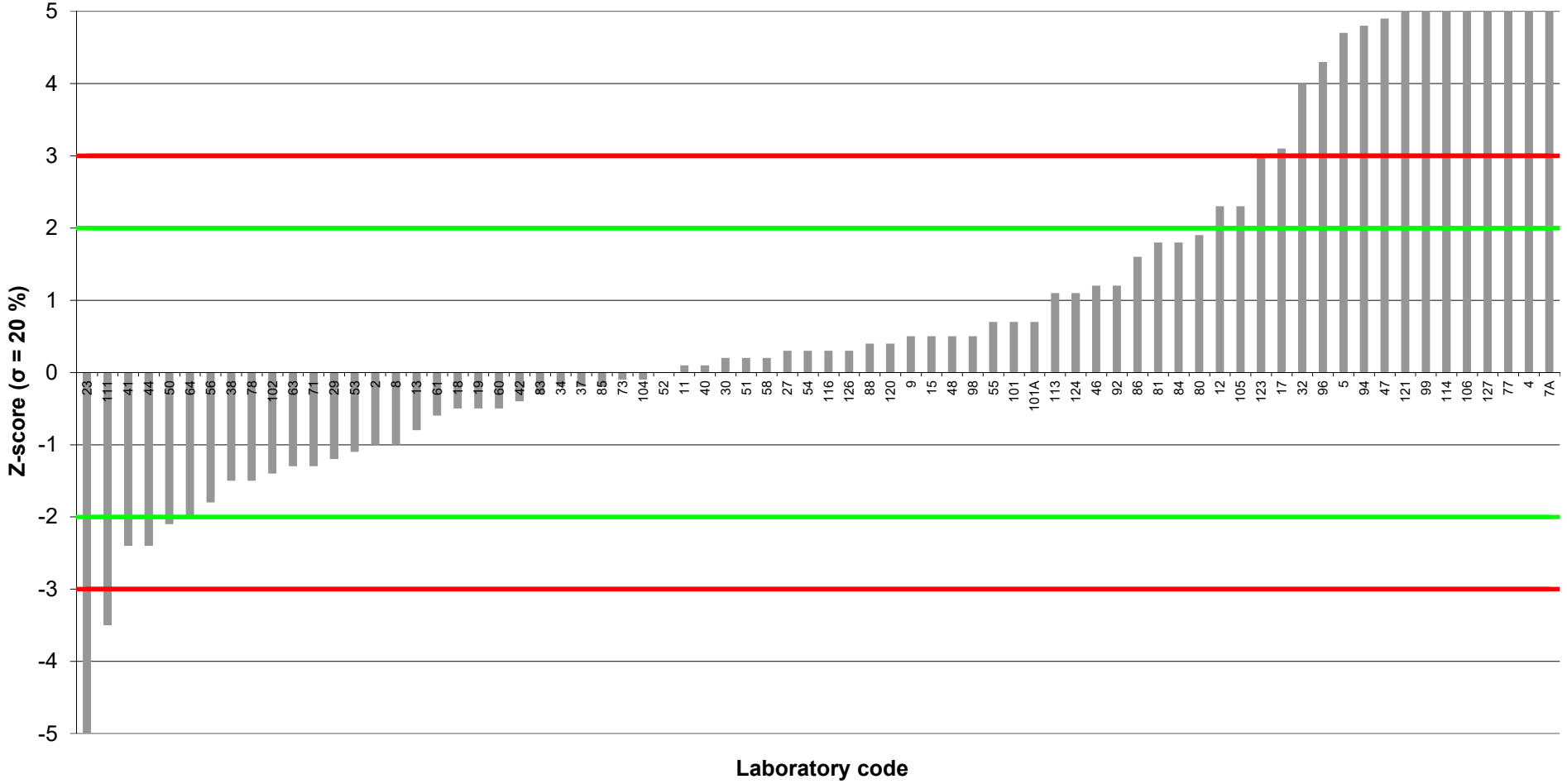
Assigned value: 3390 pg/g fat



Milk Powder (2301-MP)

PCB 123

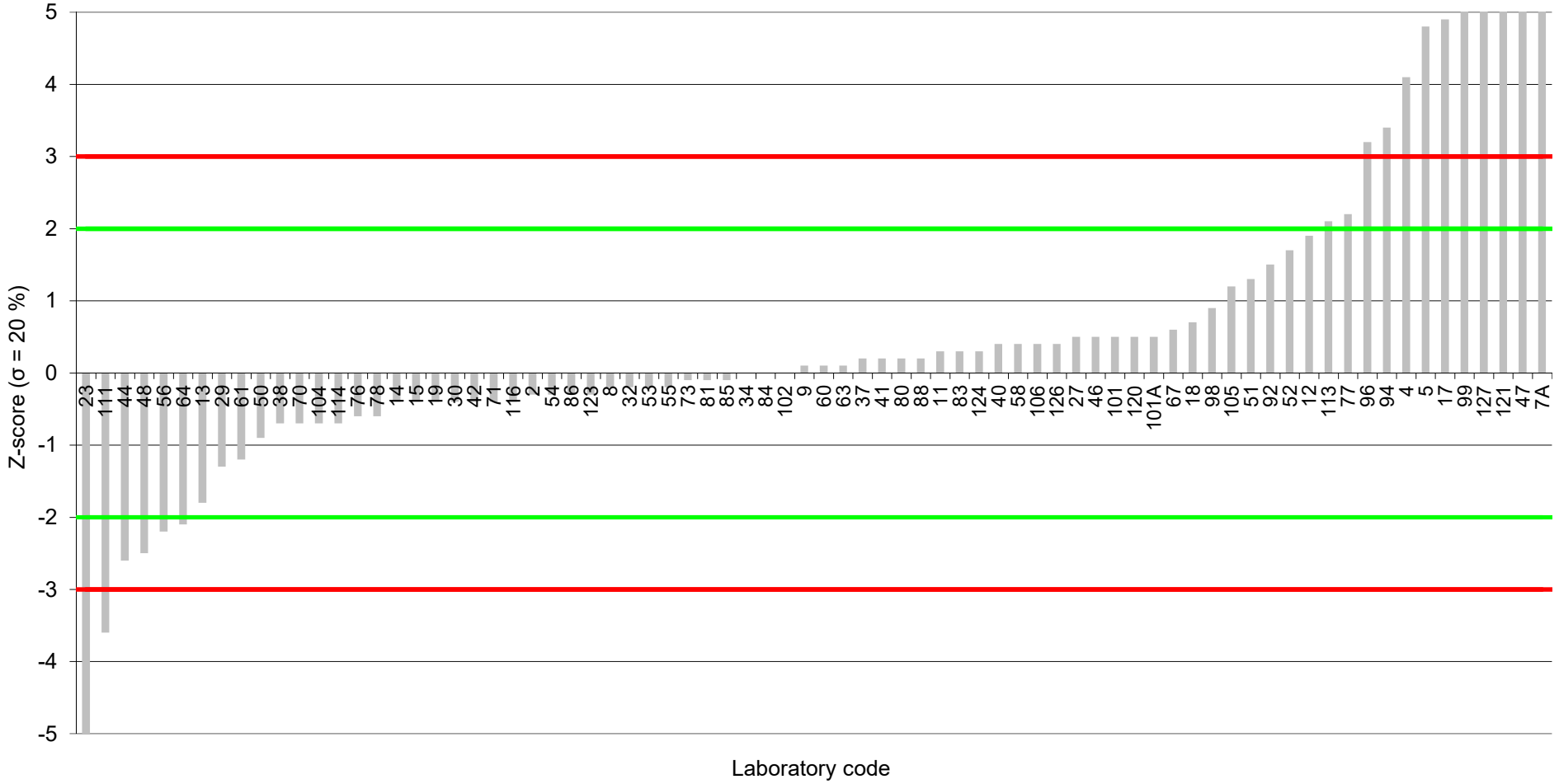
Assigned value: 58.3 pg/g fat



Milk Powder (2301-MP)

PCB 156

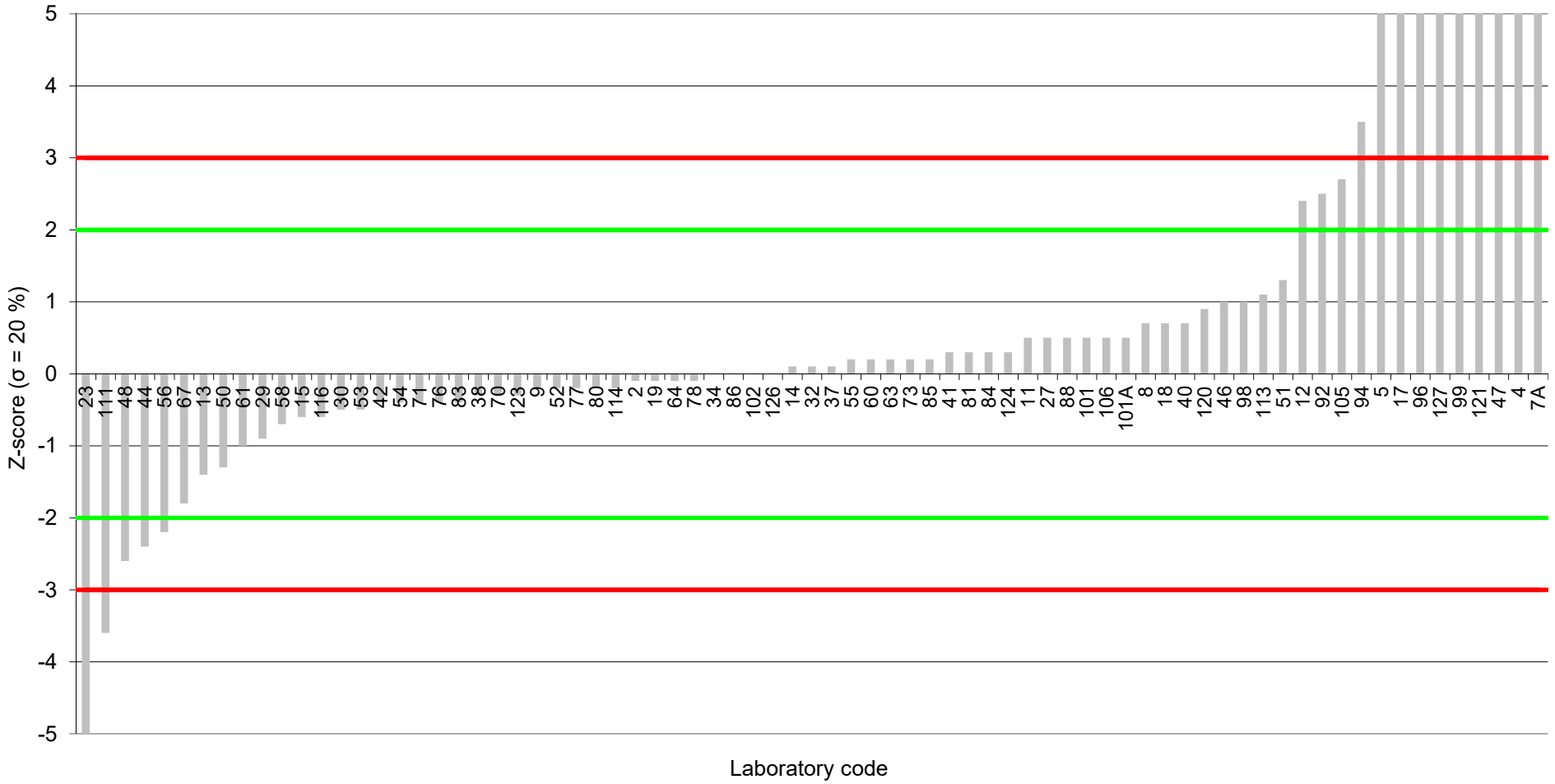
Assigned value: 445 pg/g fat



Milk Powder (2301-MP)

PCB 157

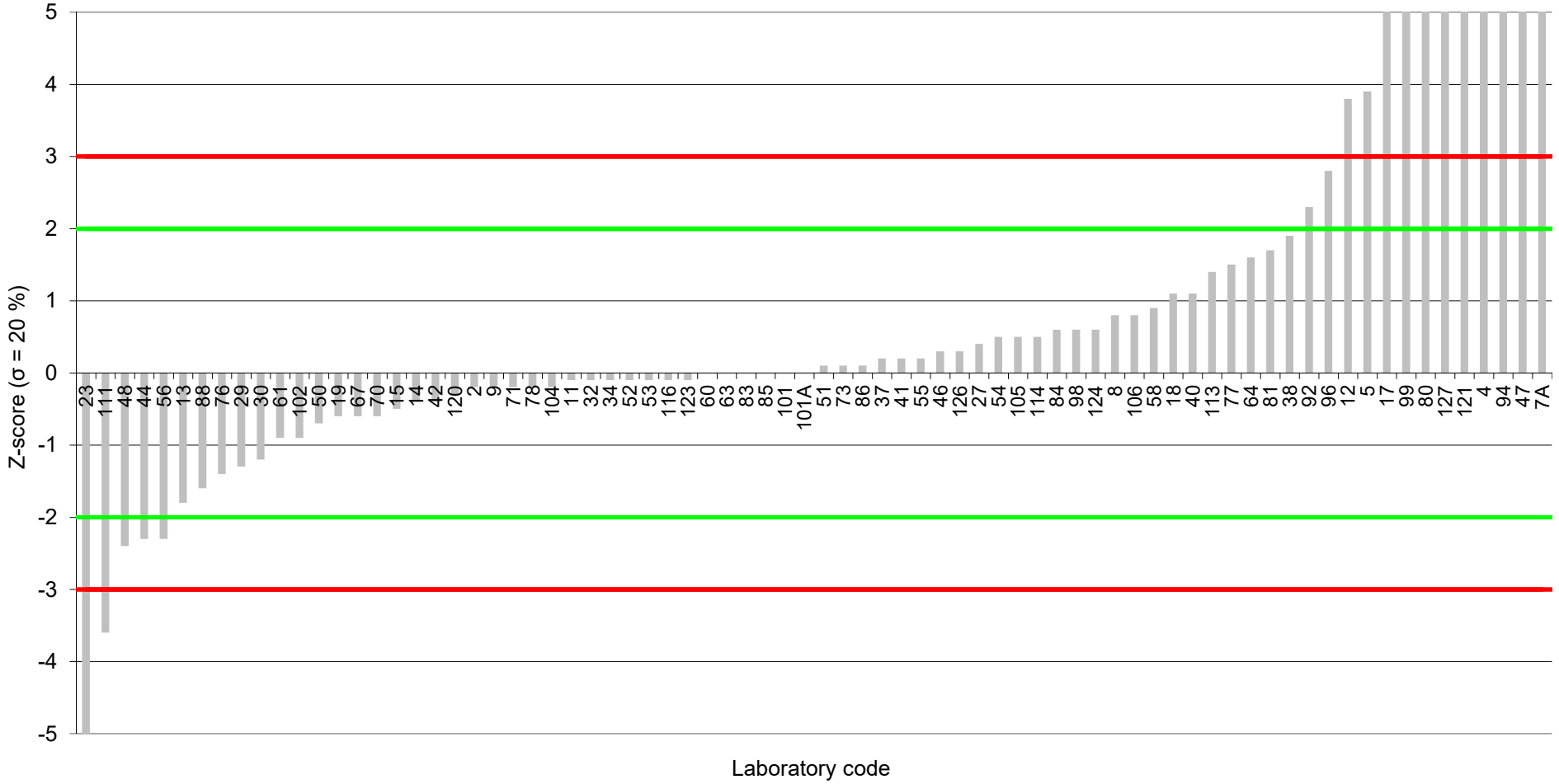
Assigned value: 96 pg/g fat



Milk Powder (2301-MP)

PCB 167

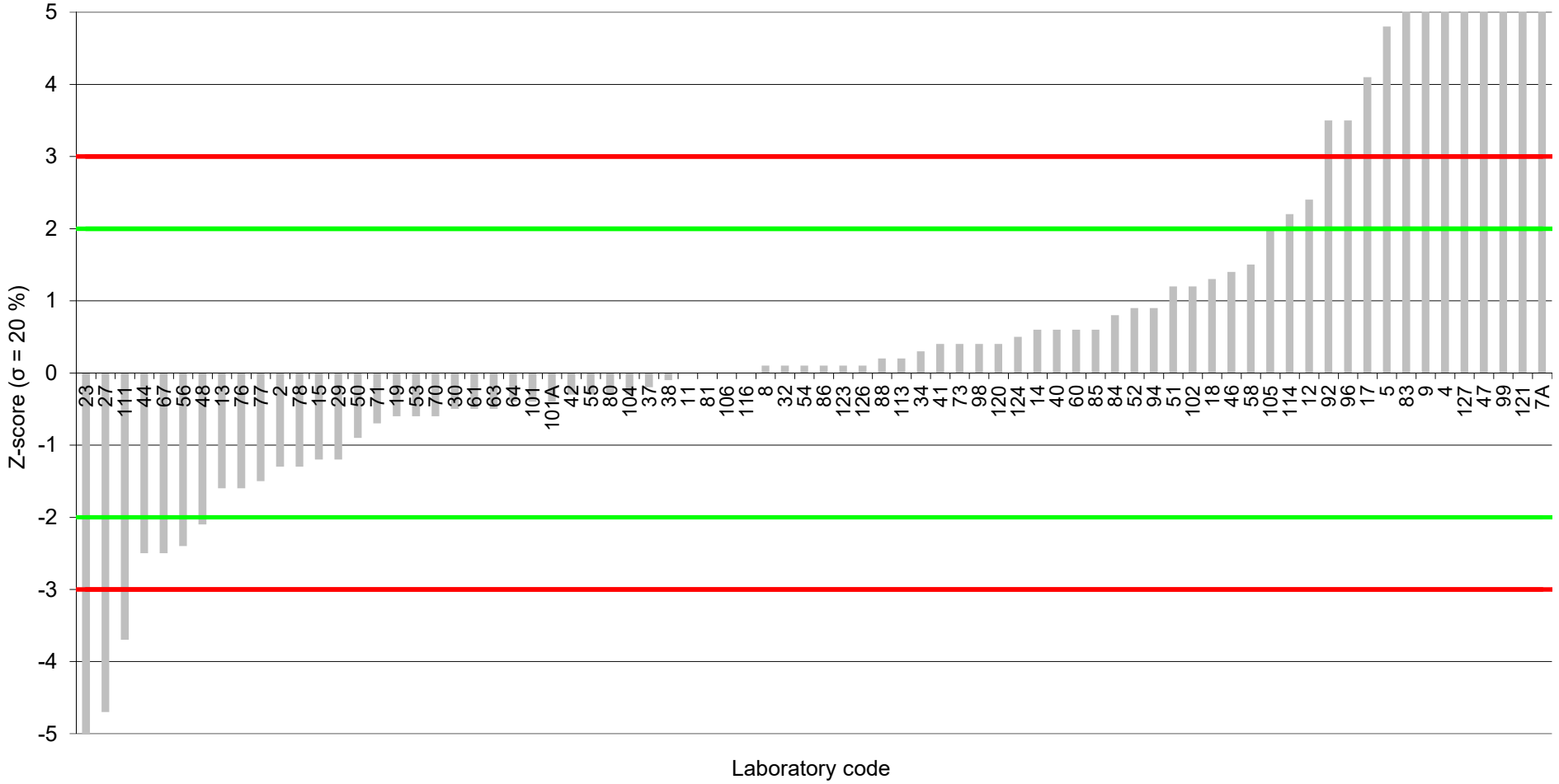
Assigned value: 147 pg/g fat



Milk Powder (2301-MP)

PCB 77

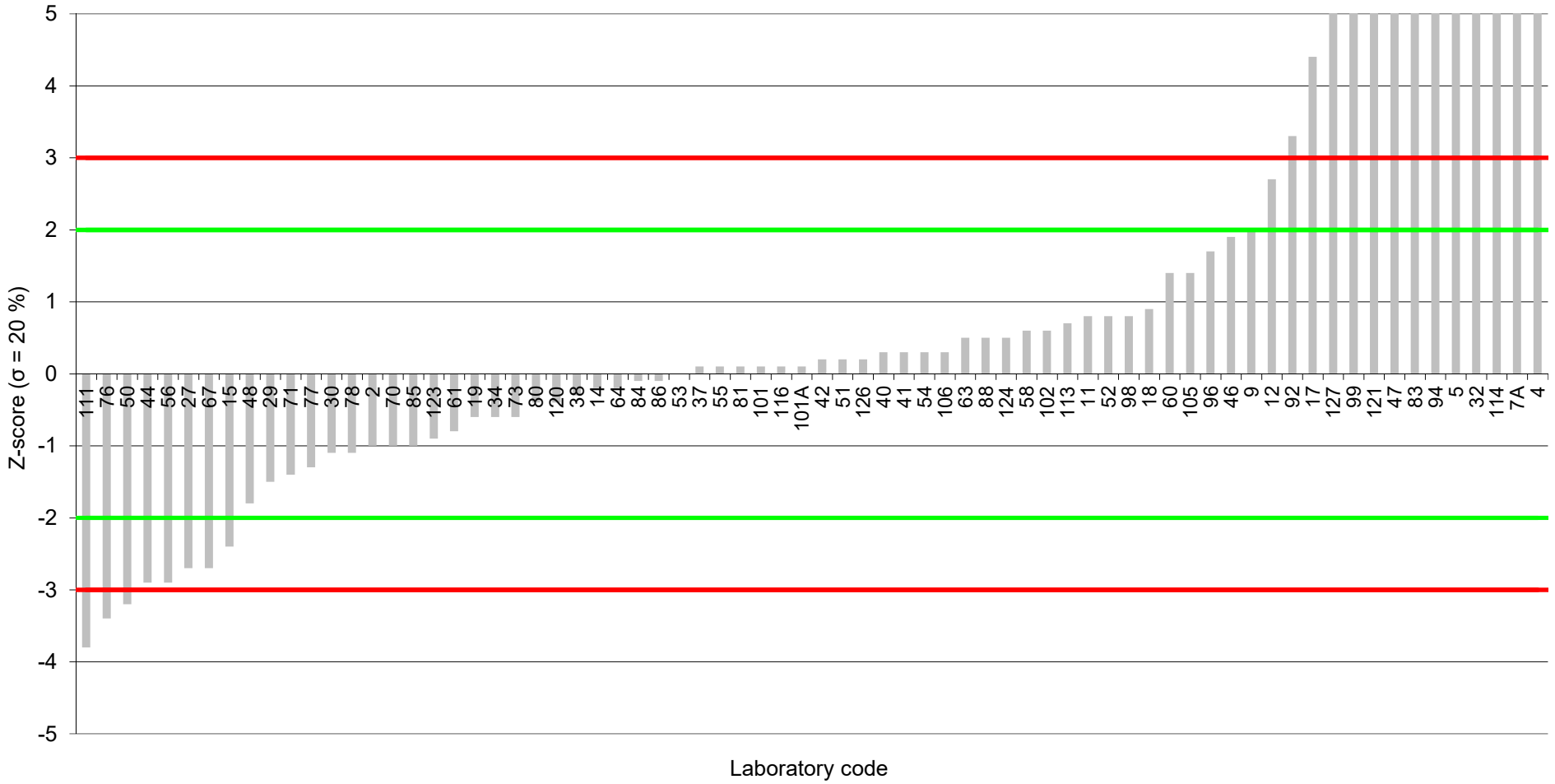
Assigned value: 48.4 pg/g fat



Milk Powder (2301-MP)

PCB 81

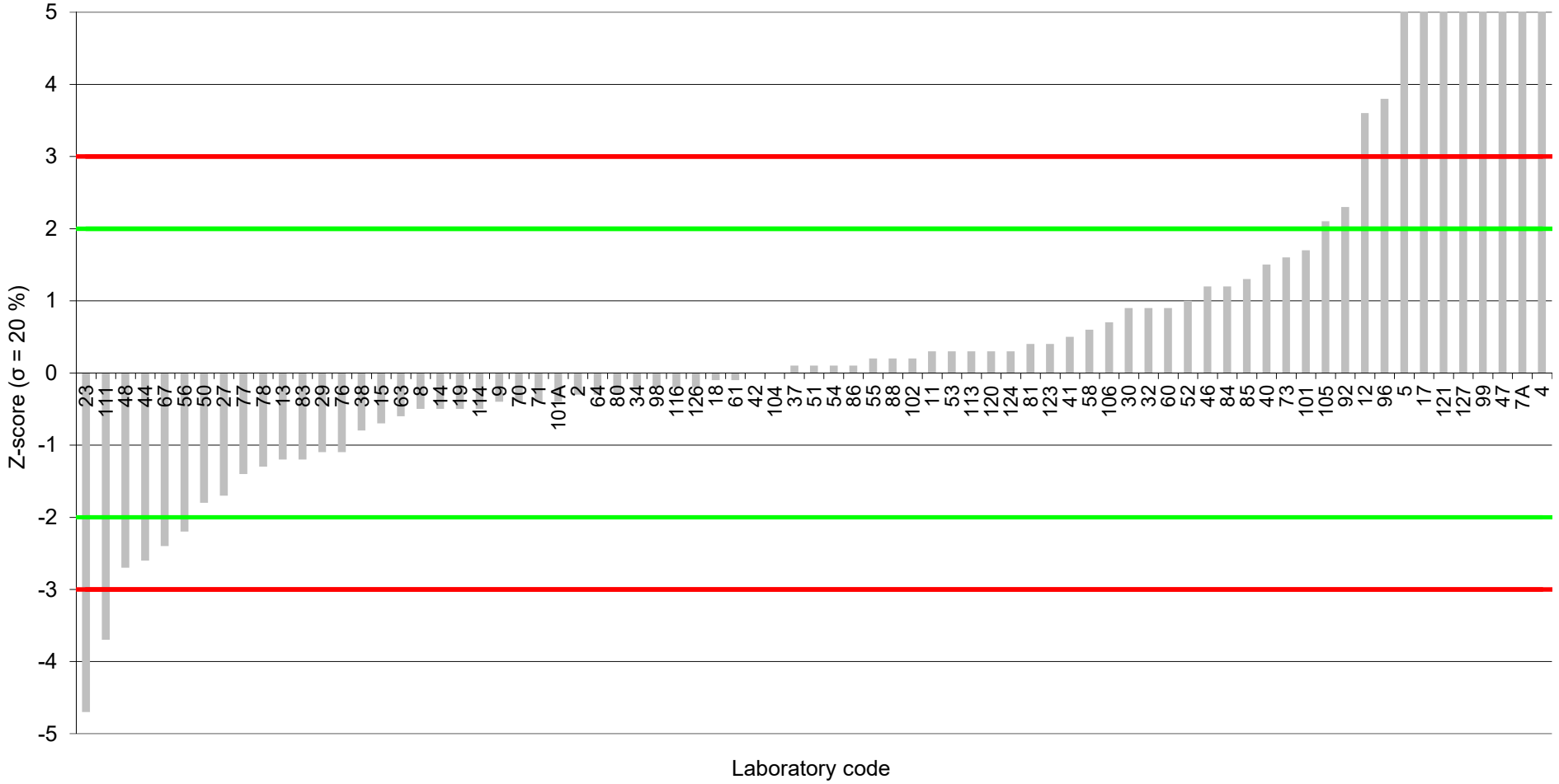
Assigned value: 5.51 pg/g fat



Milk Powder (2301-MP)

PCB 126

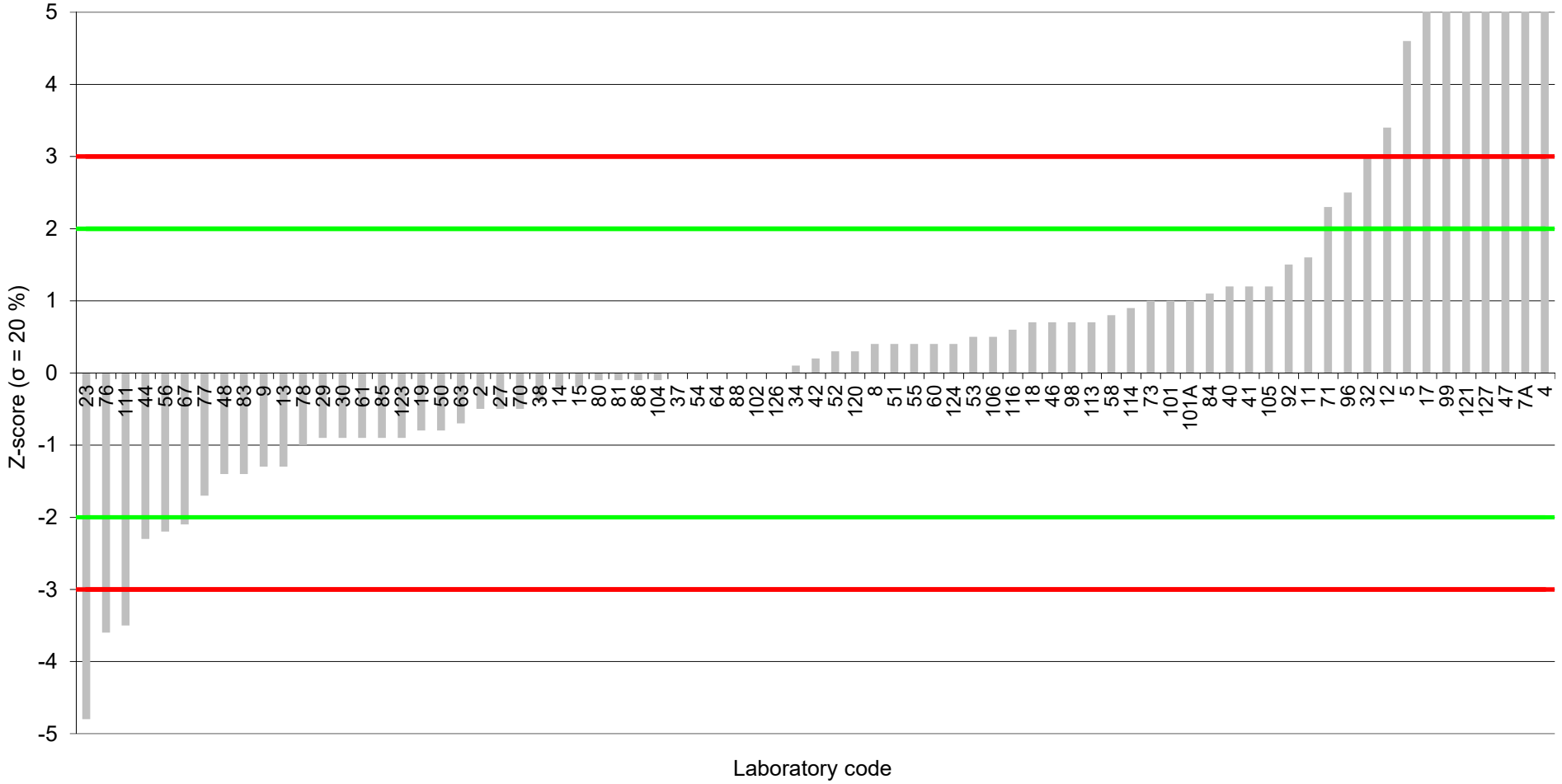
Assigned value: 8.28 pg/g fat



Milk Powder (2301-MP)

PCB 169

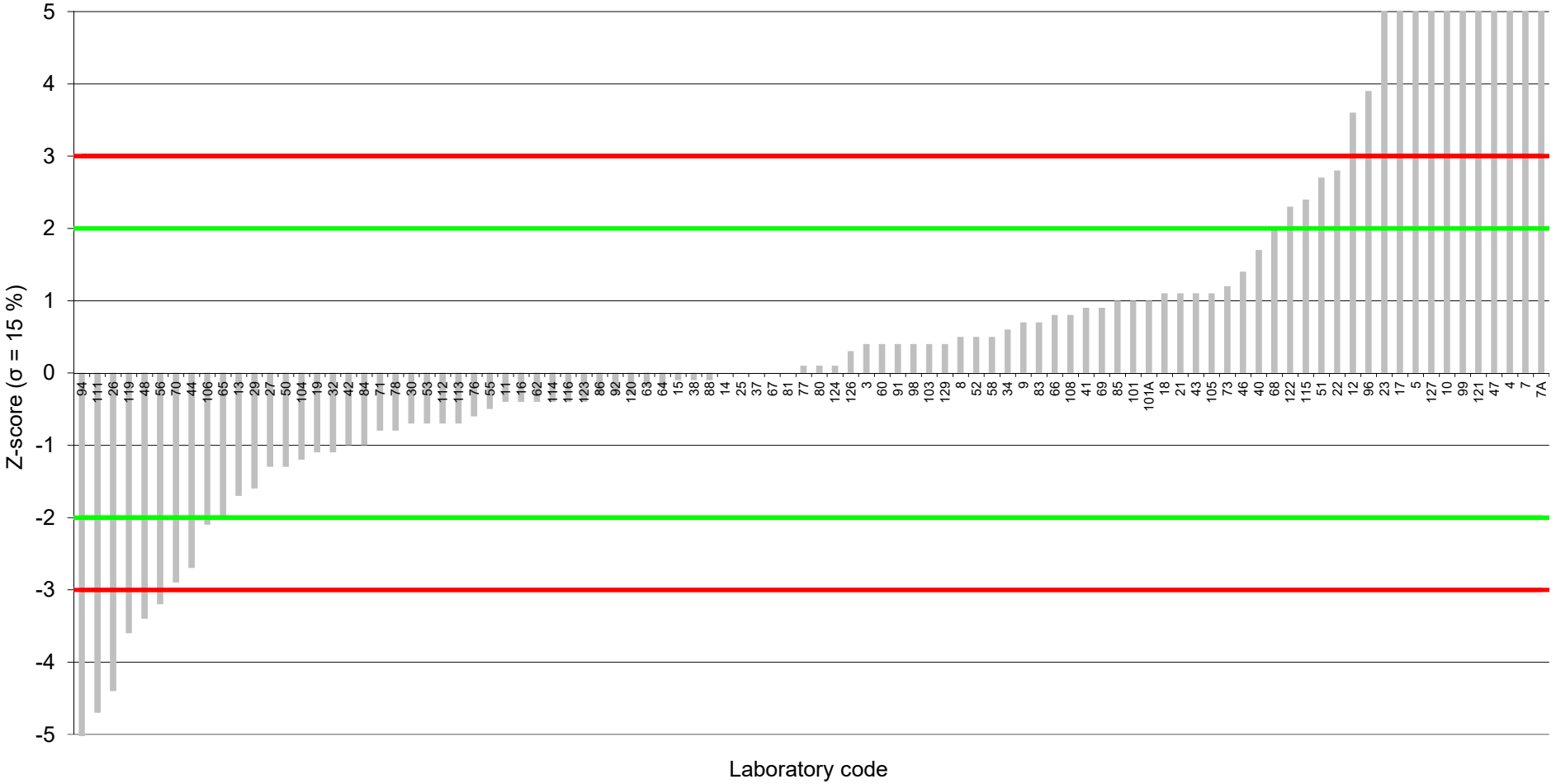
Assigned value: 4.56 pg/g fat



Milk Powder (2301-MP)

Sum of 6 NDL-PCBs upper bound (reported)

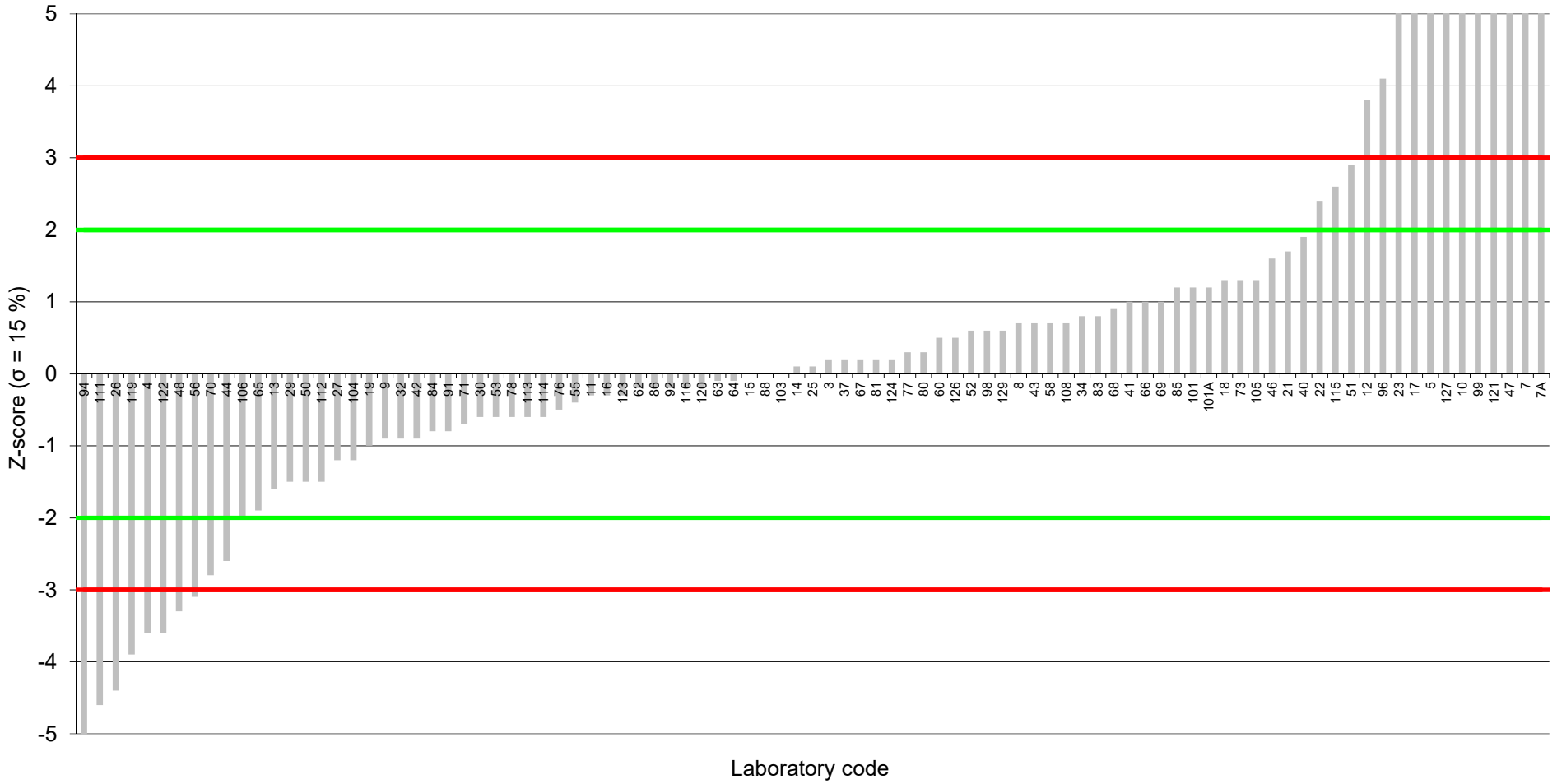
Assigned value: 22.3 ng/g fat



Milk Powder (2301-MP)

Sum of 6 NDL-PCBs lower bound (reported)

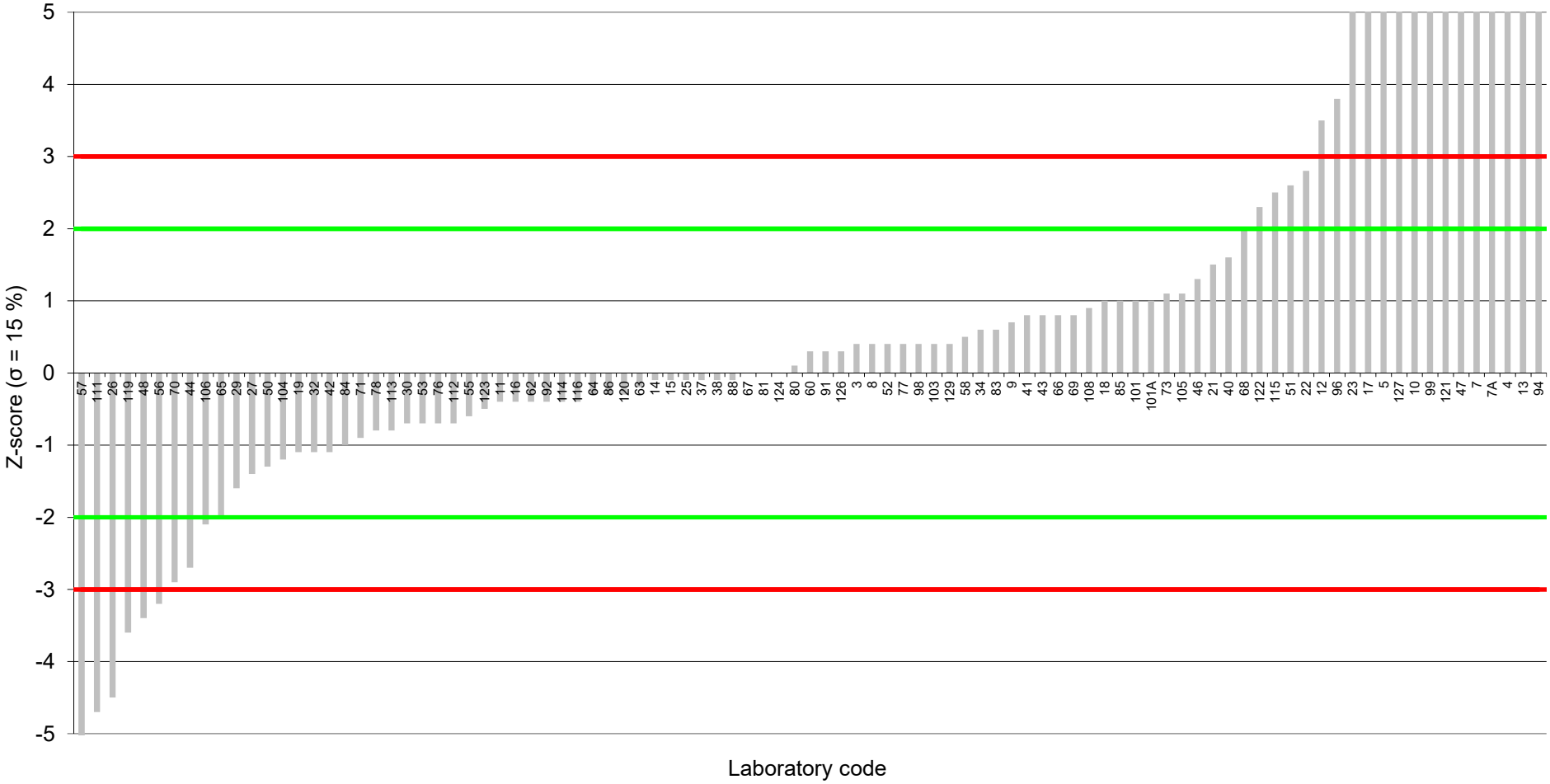
Assigned value: 21.8 ng/g fat



Milk Powder (2301-MP)

Sum of 6 NDL-PCBs upper bound (calculated)

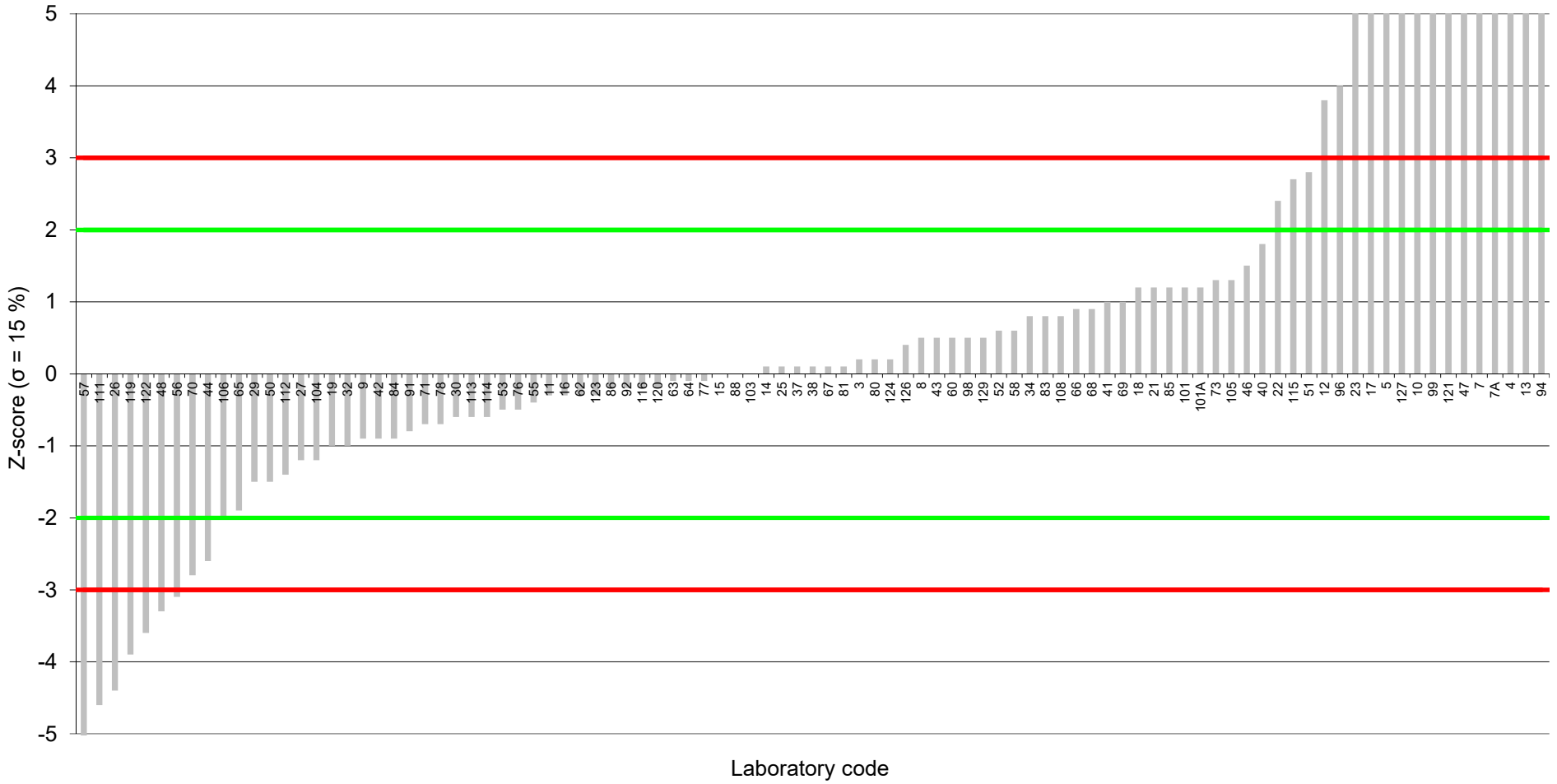
Assigned value: 22.4 ng/g fat



Milk Powder (2301-MP)

Sum of 6 NDL-PCBs lower bound (calculated)

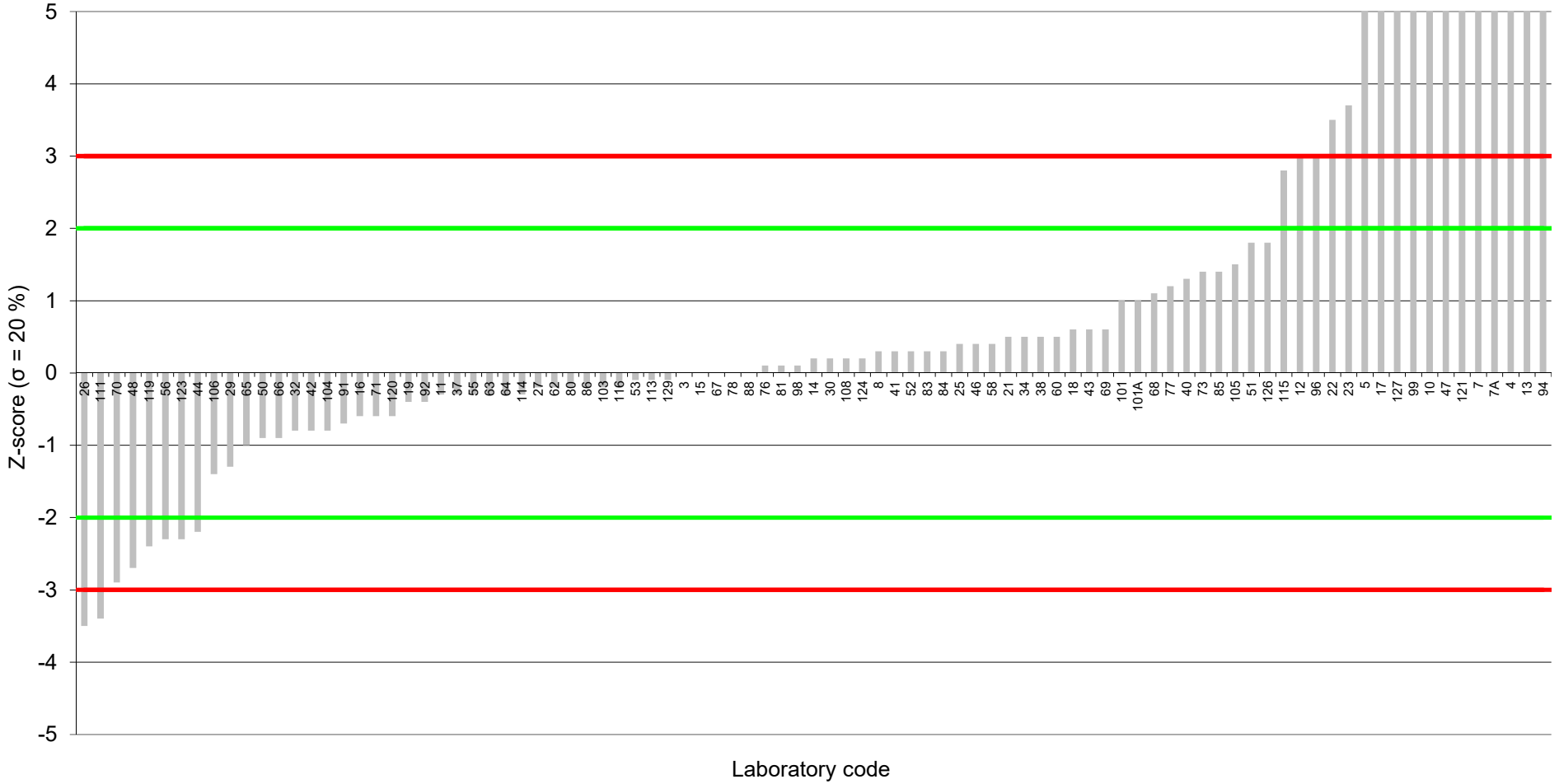
Assigned value: 21.9 ng/g fat



Milk Powder (2301-MP)

PCB 52

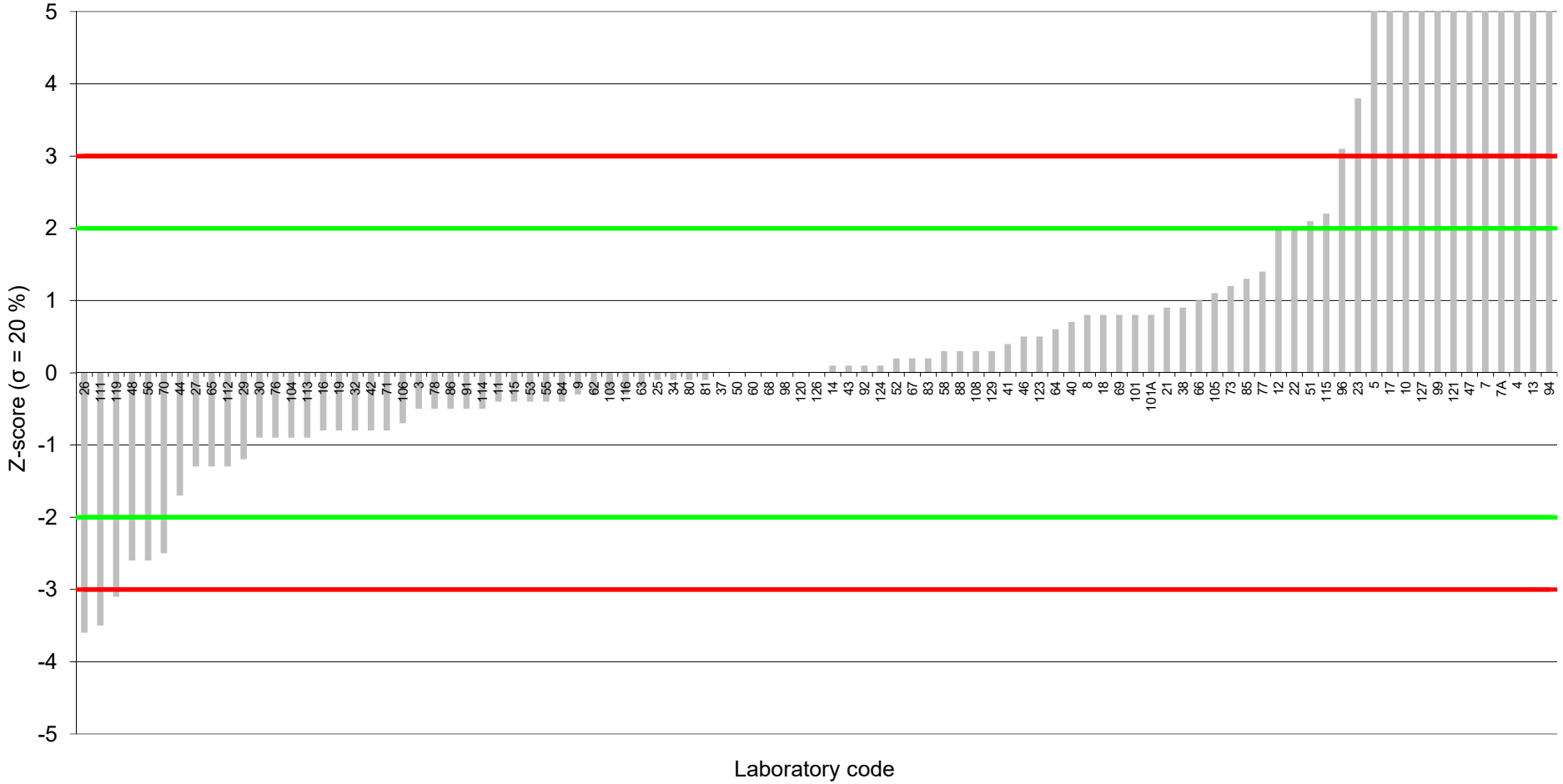
Assigned value: 3.19 ng/g fat



Milk Powder (2301-MP)

PCB 101

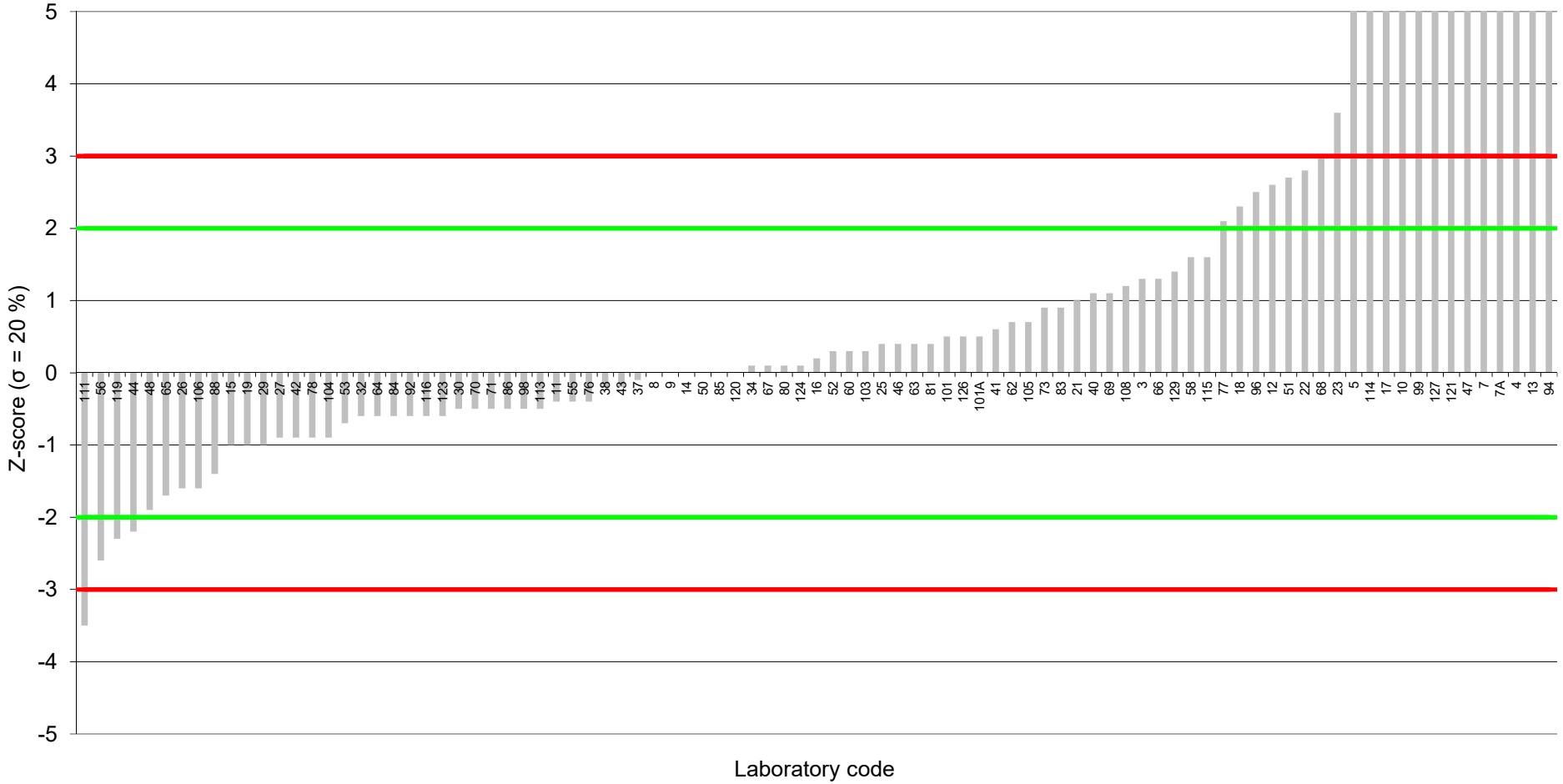
Assigned value: 4.12 ng/g fat



Milk Powder (2301-MP)

PCB 138

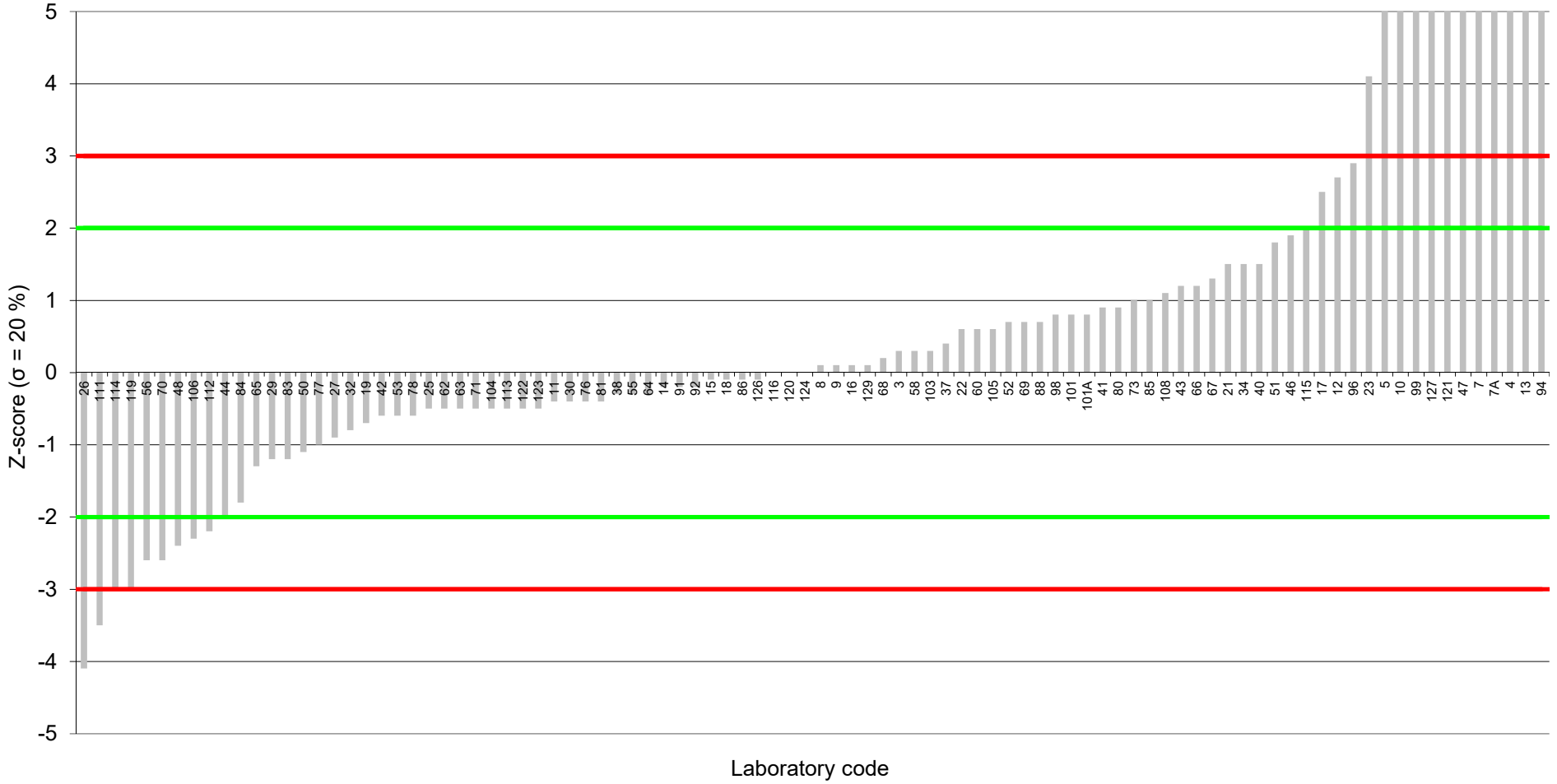
Assigned value: 2.81 ng/g fat



Milk Powder (2301-MP)

PCB 153

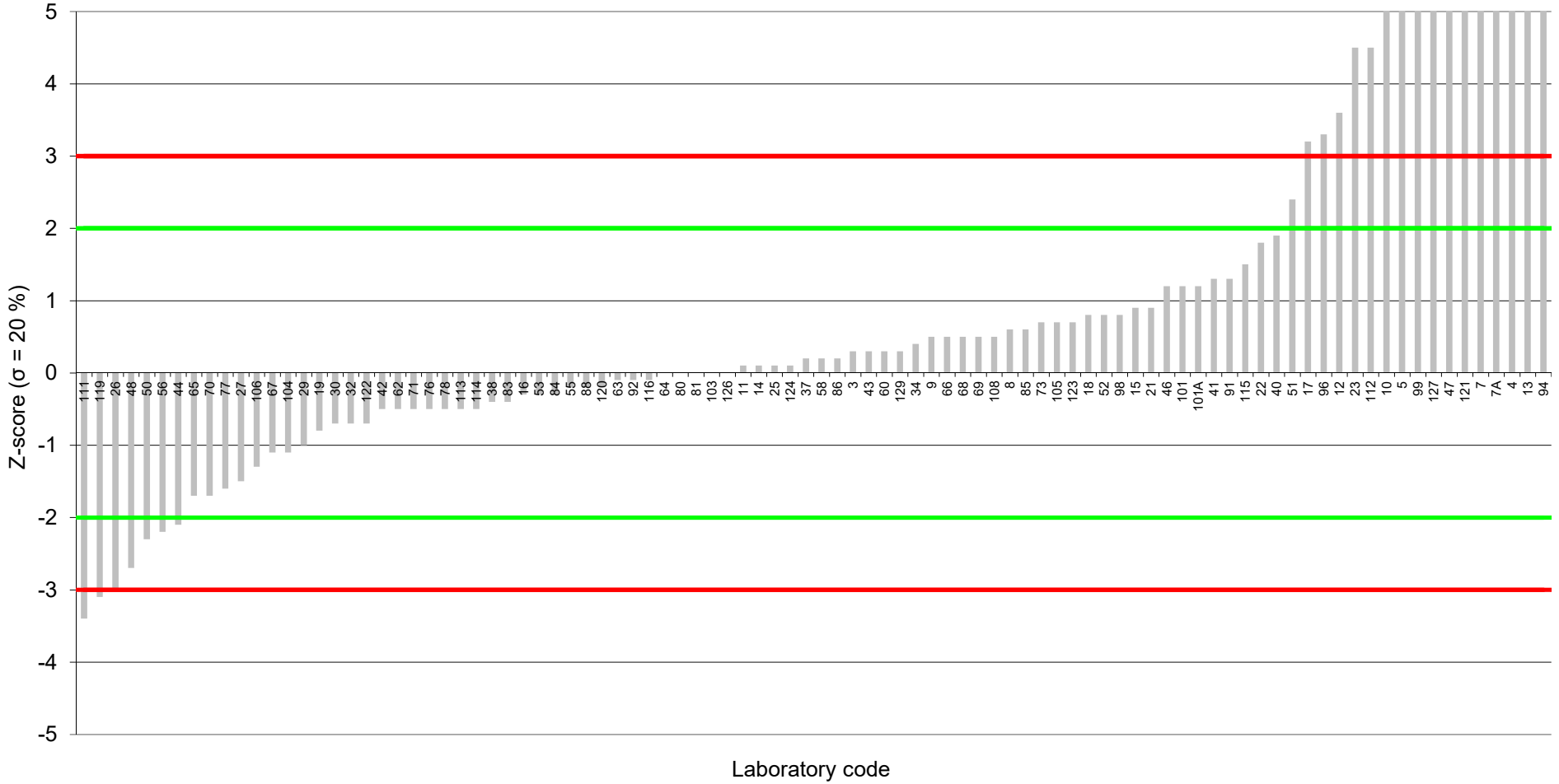
Assigned value: 5.58 ng/g fat



Milk Powder (2301-MP)

PCB 180

Assigned value: 5.84 ng/g fat



EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food
03 May 2024

Annex 5: Scoring system for PCDD/Fs and PCBs

Test sample - Milk Powder (2301-MP)

Positive scoring system

The "positive scoring system" gives one assessment for the PT sample covering all relevant PCDD/F and PCB sum parameters and congeners.
The criteria are applicable for sum parameter concentrations in the range (about 0.5 to 4 times) of the level of interest.

The total score for the positive scoring system is calculated according to the following general principles:

- Calculation of z-scores for sum parameters and evaluated individual congeners
- Calculation of the positive scores according to the following table:

Positive scoring system	I z-score I ≤ 2	2 < I z-score I < 3	I z-score I ≥ 3
Individual congeners	Positive score	Positive score	Positive score
Contribution to sum parameter* > 10 %	12	6	0
Contribution to sum parameter* 3 – 10 %	8	4	0
Contribution to sum parameter* < 3 %	6	3	0
Not evaluated congeners	0	0	0

*separately for the respective sum parameters WHO-PCDD/F-TEQ, WHO-PCB-TEQ and the sum of six indicator PCBs

- Calculation of maximum achievable scores (I z-score I ≤ 2) for PCDD/F and DL-PCB and indicator PCB congeners separately:
  Maximum score = Σmax. score(> 10 %) + Σmax. score(3-10 %) + Σmax. score(< 3 %)
- Calculation of the participant's scores for PCDD/F and DL-PCB and indicator PCB congeners separately:
  Participant's score = Σscore(> 10 %) + Σscore(3-10 %) + Σscore(< 3 %)
- Calculation of achieved scoring percentage for each participant:
  Participant's scoring percentage = Participant's score / Maximum score • 100

Criteria for successful participation:

Sum parameters:	≤ 1 parameter with Iz-scoreI > 2, no parameter with Iz-scoreI ≥ 3
PCDD/F congeners:	≥ 75 % of maximum score
DL-PCB congeners:	≥ 75 % of maximum score
Indicator PCB congeners:	≥ 75 % of maximum score
Difference between reported and calculated results for sum parameters	≤ 10 %

Successful participation for PCDD/Fs and PCBs, if all above mentioned criteria for the reported analytes are met.

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Summary Scoring system

LC	Sample	Scoring system	WHO-PCDD/F-PCB-TEQ z-score	WHO-PCDD/F-TEQ z-score	WHO-PCB-TEQ z-score	Sum Indicator PCBs z-score	Sum Parameters (≤ 1 parameter with Iz-scorel ≥ 2, no parameter with Iz-scorel ≥ 3)	PCDD/F congeners (≥ 75 % of max. score)	DL-PCB congeners (≥ 75 % of max. score)	NDL-PCB congeners (≥ 75 % of max. score)	Calculation of sum parameters (deviation ≤ 10 %)	Evaluation	Successful participation	Reason for not successful participation				
														Sum parameters	PCDD/F congeners	DL-PCB congeners	NDL-PCB congeners	Calculation sum param.
1	2301-MP																	
2	2301-MP		-0.8	-1.3	-0.4		Passed	90%	100%		yes		**yes**					
3	2301-MP					0.4	Passed			100%	yes		**yes**					
4	2301-MP		2765.0	5275.7	5832.1	23.2	Failed	0%	5%	0%	no		**no**	x	x	x	x	x
5	2301-MP		9.5	8.8	10.3	7.2	Failed	11%	0%	0%	yes		**no**	x	x	x	x	
6	2301-MP																	
7	2301-MP					57.0	Failed			0%	yes		**no**	x			x	
8	2301-MP		-0.4	-0.5	-0.4	0.5	Passed	100%	100%	100%	yes		**yes**					
9	2301-MP		-1.3	-2.1	-0.5	0.7	Passed	100%	93%	100%	yes		**yes**					
10	2301-MP					12.8	Failed			0%	yes		**no**	x			x	
11	2301-MP		0.4	0.0	0.9	-0.4	Passed	100%	100%	100%	yes		**yes**					
12	2301-MP		6.1	5.5	6.8	3.6	Failed	50%	40%	50%	yes		**no**	x	x	x	x	
13	2301-MP		-2.5	-2.5	-2.5	-1.7	Failed	97%	100%	0%	no		**no**	x			x	x
14	2301-MP		-0.6	-0.4	-0.8	0.0	Passed	100%	100%	100%	yes		**yes**					
15	2301-MP		-1.0	-1.0	-1.0	-0.1	Passed	100%	96%	100%	yes		**yes**					
16	2301-MP					-0.4	Passed			100%	yes		**yes**					
17	2301-MP		12.7	14.5	10.7	5.8	Failed	3%	0%	10%	yes		**no**	x	x	x	x	
18	2301-MP		1.3	1.9	0.5	1.1	Passed	50%	100%	90%	yes		**no**		x			
19	2301-MP		-0.9	-0.8	-1.1	-1.1	Passed	100%	100%	100%	yes		**yes**					
20	2301-MP																	
21	2301-MP					1.1	Passed			100%	yes		**yes**					
22	2301-MP					2.8	Passed			70%	yes		**no**				x	
23	2301-MP		-2.7	-2.7	-2.7	5.4	Failed	0%	0%	0%	no		**no**	x	x	x	x	x
24	2301-MP																	
25	2301-MP					0.0	Passed			100%	yes		**yes**					
26	2301-MP					-4.4	Failed			30%	yes		**no**	x			x	
27	2301-MP		-0.3	-1.4	-2.7	-1.3	Passed	74%	89%	100%	no		**no**		x			x
28	2301-MP																	
29	2301-MP		-2.0	-2.0	-2.0	-1.6	Passed	100%	100%	100%	yes		**yes**					
30	2301-MP		-2.2	-5.1	1.0	-0.7	Failed	100%	100%	100%	yes		**no**	x				
31	2301-MP																	
32	2301-MP		0.7	-0.6	2.2	-1.1	Passed	100%	78%	100%	yes		**yes**					
33	2301-MP																	
34	2301-MP		0.0	0.1	-0.1	0.6	Passed	100%	100%	100%	yes		**yes**					
35	2301-MP																	
36	2301-MP																	
37	2301-MP		-0.1	-0.5	0.4	0.0	Passed	100%	100%	100%	yes		**yes**					
38	2301-MP		-0.5	0.2	-1.3	-0.1	Passed	100%	100%	100%	yes		**yes**					
39	2301-MP																	
40	2301-MP		3.6	4.4	2.7	1.7	Failed	85%	100%	100%	yes		**no**	x				
41	2301-MP		1.1	1.0	1.2	0.9	Passed	100%	96%	100%	yes		**yes**					
42	2301-MP		0.3	0.6	0.0	-1.0	Passed	100%	100%	100%	yes		**yes**					
43	2301-MP					1.1	Passed			100%	yes		**yes**					
44	2301-MP		-4.2	-3.2	-5.0	-2.7	Failed	73%	54%	70%	yes		**no**	x	x	x	x	
45	2301-MP																	
46	2301-MP		1.8	1.3	2.4	1.4	Passed	100%	100%	100%	yes		**yes**					
47	2301-MP		23.8	19.7	28.3	17.7	Failed	7%	0%	0%	yes		**no**	x	x	x	x	
48	2301-MP		-4.4	-3.9	-5.0	-3.4	Failed	74%	65%	60%	yes		**no**	x	x	x	x	
49	2301-MP																	
50	2301-MP		-2.0	-1.1	-3.0	-1.3	Passed	100%	89%	90%	yes		**yes**					
51	2301-MP		1.0	1.2	0.8	2.7	Passed	100%	100%	70%	yes		**no**				x	
52	2301-MP		0.9	0.3	1.6	0.5	Passed	97%	100%	100%	no		**no**					x
53	2301-MP		0.0	-0.1	0.4	-0.7	Passed	100%	100%	100%	yes		**yes**					
54	2301-MP		-0.3	-0.7	0.3		Passed	100%	100%		yes		**yes**					
55	2301-MP		0.5	0.6	0.4	-0.5	Passed	100%	100%	100%	yes		**yes**					
56	2301-MP		-4.2	-4.0	-4.5	-3.2	Failed	79%	54%	50%	yes		**no**	x		x	x	
57	2301-MP																	
58	2301-MP		0.5	0.0	1.1	0.5	Passed	92%	100%	100%	yes		**yes**					
59	2301-MP																	
60	2301-MP		1.1	0.6	1.6	0.4	Passed	100%	100%	100%	yes		**yes**					
61	2301-MP		-0.6	-0.6	-0.6		Passed	100%	100%		yes		**yes**					
62	2301-MP					-0.4	Passed			100%	yes		**yes**					
63	2301-MP		-0.2	0.6	-1.0	-0.2	Passed	87%	100%	100%	yes		**yes**					
64	2301-MP		-0.3	-0.2	-0.5	-0.2	Passed	94%	96%	100%	yes		**yes**					
65	2301-MP					-2.0	Passed			100%	yes		**yes**					
66	2301-MP					0.8	Passed			100%	yes		**yes**					
67	2301-MP		-1.5	1.6	-4.9	0.0	Failed	93%	65%	100%	yes		**no**	x		x		
68	2301-MP					2.0	Passed			90%	yes		**yes**					

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Milk Powder (2301-MP)
Summary Scoring system

LC	Sample	Scoring system	WHO-PCDD/F-PCB-TEQ z-score	WHO-PCDD/F-TEQ z-score	WHO-PCB-TEQ z-score	Sum Indicator PCBs z-score	Sum Parameters (≤ 1 parameter with Iz-scorel ≥ 2, no parameter with Iz-scorel ≥ 3)	PCDD/F congeners (≥ 75 % of max. score)	DL-PCB congeners (≥ 75 % of max. score)	NDL-PCB congeners (≥ 75 % of max. score)	Calculation of sum parameters (deviation ≤ 10 %)	Evaluation	Successful participation	Reason for not successful participation				
														Sum parameters	PCDD/F congeners	DL-PCB congeners	NDL-PCB congeners	Calculation sum param.
69	2301-MP					0.9	Passed			100%	yes		**yes**					
70	2301-MP		-0.4	0.1	-0.9	-2.9	Passed	100%	100%	70%	yes		**no**				**x**	
71	2301-MP		-0.5	-0.3	-0.6	-0.8	Passed	100%	93%	100%	yes		**yes**					
72	2301-MP																	
73	2301-MP		1.5	0.5	2.7	1.2	Passed	91%	100%	100%	yes		**yes**					
74	2301-MP																	
75	2301-MP																	
76	2301-MP		-0.5	1.3	-2.6	-0.6	Passed	41%	74%	100%	yes		**no**		**x**	**x**		
77	2301-MP		-1.8	-2.1	-1.5	0.1	Passed	93%	80%	90%	yes		**yes**					
78	2301-MP		-0.3	1.5	-2.4	-0.8	Passed	66%	100%	100%	yes		**no**		**x**			
79	2301-MP																	
80	2301-MP		0.3	0.9	-0.4	0.1	Passed	100%	93%	100%	yes		**yes**					
81	2301-MP		-0.1	-0.9	0.7	0.0	Passed	100%	100%	100%	yes		**yes**					
82	2301-MP																	
83	2301-MP		1.0	3.8	-2.0	0.7	Failed	70%	85%	100%	yes		**no**	**x**	**x**			
84	2301-MP		1.6	1.0	2.2	-1.0	Passed	100%	100%	100%	yes		**yes**					
85	2301-MP		0.7	-0.2	1.8	1.0	Passed	94%	100%	100%	yes		**yes**					
86	2301-MP		-0.5	-1.2	0.2	-0.3	Passed	100%	100%	100%	yes		**yes**					
87	2301-MP																	
88	2301-MP		0.6	0.8	0.4	-0.1	Passed	100%	100%	100%	yes		**yes**					
89	2301-MP																	
90	2301-MP																	
91	2301-MP					0.4	Passed			100%	yes		**yes**					
92	2301-MP		2.9	1.5	4.4	-0.3	Failed	52%	66%	100%	yes		**no**	**x**	**x**	**x**		
93	2301-MP																	
94	2301-MP		4.1	11.8	-4.5	-6.1	Failed	22%	24%	0%	no		**no**	**x**	**x**	**x**	**x**	**x**
95	2301-MP																	
96	2301-MP		5.5	4.0	7.2	3.9	Failed	64%	18%	30%	yes		**no**	**x**	**x**	**x**	**x**	
97	2301-MP																	
98	2301-MP		-0.3	-0.6	0.0	0.4	Passed	94%	100%	100%	yes		**yes**					
99	2301-MP		21.2	19.5	23.2	13.1	Failed	0%	0%	0%	no		**no**	**x**	**x**	**x**	**x**	**x**
100	2301-MP										yes							
101	2301-MP		1.4	-0.1	3.0	1.0	Passed	100%	100%	100%	yes		**yes**					
102	2301-MP		0.8	1.1	0.5		Passed	96%	100%		yes		**yes**					
103	2301-MP					0.4	Passed			100%	yes		**yes**					
104	2301-MP		-1.0	-1.8	-0.1	-1.2	Passed	100%	100%	100%	yes		**yes**					
105	2301-MP		2.3	1.0	3.9	1.1	Failed	94%	85%	100%	no		**no**	**x**				**x**
106	2301-MP		-0.3	-1.7	1.4	-2.1	Passed	78%	93%	90%	yes		**yes**					
107	2301-MP										yes							
108	2301-MP					0.8	Passed		0%	100%	yes		**no**			**x**		
109	2301-MP										yes							
110	2301-MP										yes							
111	2301-MP		-6.9	-6.6	-7.3	-4.7	Failed	30%	0%	0%	no		**no**	**x**	**x**	**x**	**x**	**x**
112	2301-MP					-0.7	Passed			50%	yes		**no**				**x**	
113	2301-MP		2.3	3.6	0.9	-0.7	Failed	78%	96%	100%	yes		**no**	**x**				
114	2301-MP		0.6	1.6	-0.4	-0.4	Passed	94%	82%	70%	yes		**no**				**x**	
115	2301-MP					2.4	Passed			80%	yes		**yes**					
116	2301-MP		1.3	2.5	-0.2	-0.4	Passed	94%	100%	100%	yes		**yes**					
117	2301-MP										yes							
118	2301-MP										yes							
119	2301-MP					-3.6	Failed			30%	yes		**no**	**x**			**x**	
120	2301-MP		-0.5	-1.5	0.7	-0.3	Passed	100%	100%	100%	yes		**yes**					
121	2301-MP				18.5	17	Failed		0%	0%	yes		**no**	**x**		**x**	**x**	
122	2301-MP					2.3	Passed			100%	yes		**yes**					
123	2301-MP		1.4	2.2	0.5	-0.4	Passed	92%	96%	90%	yes		**yes**					
124	2301-MP		0.3	0	0.6	0.1	Passed	100%	100%	100%	yes		**yes**					
125	2301-MP										yes							
126	2301-MP		-0.3	-0.3	-0.2	0.3	Passed	100%	100%	100%	yes		**yes**					
127	2301-MP		20.5	21	20.1	12.7	Failed	0%	0%	0%	yes		**no**	**x**	**x**	**x**	**x**	
128	2301-MP										yes							
129	2301-MP					0.4	Passed			100%	yes		**yes**					
7A	2301-MP		65.8	64	68.2	62.4	Failed	0%	0%	0%	yes		**no**	**x**	**x**	**x**	**x**	
101A	2301-MP		0	-0.1	0	1	Passed	100%	100%	100%	yes		**yes**					

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Annex 6: Test for sufficient homogeneity and stability for PCDD/Fs and PCBs

Test sample - Milk Powder (2301-MP)

EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
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Milk Powder (2301-MP)
Sum parameters - Homogeneity test - Data

Analyte	Result pg/g fat	**Mean** (n = 10, duplicate analysis)	**Median** (n = 10, duplicate analysis)	**Relative standard deviation** [%]
WHO-PCDD/F-PCB-TEQ upper bound		2.44	2.41	9%
WHO-PCDD/F-PCB-TEQ middle bound		2.44	2.41	9%
WHO-PCDD/F-PCB-TEQ lower bound		2.44	2.41	9%

EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
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Milk Powder (2301-MP)
PCDD/F - Homogeneity test - Data

Analyte	Result pg/g fat	**Mean** (n = 10, duplicate analysis)	**Median** (n = 10, duplicate analysis)	**Relative standard deviation** [%]
WHO-PCDD/F-TEQ upper bound		1.32	1.29	6%
WHO-PCDD/F-TEQ middle bound		1.31	1.29	7%
WHO-PCDD/F-TEQ lower bound		1.31	1.29	7%
2,3,7,8-TCDD		0.116	0.115	16%
1,2,3,7,8-PeCDD		0.264	0.267	12%
1,2,3,4,7,8-HxCDD		0.198	0.208	20%
1,2,3,6,7,8-HxCDD		0.679	0.677	7%
1,2,3,7,8,9-HxCDD		0.184	0.188	15%
1,2,3,4,6,7,8-HpCDD		1.26	1.28	9%
1,2,3,4,6,7,8,9-OCDD		1.92	1.92	10%
2,3,7,8-TCDF		1.20	1.19	8%
1,2,3,7,8-PeCDF		0.374	0.382	12%
2,3,4,7,8-PeCDF		1.76	1.77	6%
1,2,3,4,7,8-HxCDF		0.756	0.767	8%
1,2,3,6,7,8-HxCDF		0.384	0.384	7%
2,3,4,6,7,8-HxCDF		0.459	0.453	9%
1,2,3,7,8,9-HxCDF		<0.02		
1,2,3,4,6,7,8-HpCDF		0.785	0.779	7%
1,2,3,4,7,8,9-HpCDF		<0.014		
1,2,3,4,6,7,8,9-OCDF		0.909	0.899	9%

EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
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Milk Powder (2301-MP)
DL-PCB - Homogeneity test - Data

Analyte	Result pg/g fat	**Mean** (n = 10, duplicate analysis)	**Median** (n = 10, duplicate analysis)	**Relative standard deviation** [%]
WHO-PCB-TEQ upper bound		1.14	1.13	15%
WHO-PCB-TEQ middle bound		1.13	1.13	16%
WHO-PCB-TEQ lower bound		1.14	1.13	15%
PCB 105		1580	1590	7%
PCB 114		96.2	94.6	16%
PCB 118		3470	3430	6%
PCB 123		52.0	53.4	23%
PCB 156		409	406	11%
PCB 157		92.3	93.9	28%
PCB 167		127	131	24%
PCB 189		21.1	20.4	9%
PCB 77		45.0	45.2	7%
PCB 81		5.56	5.66	11%
PCB 126		8.52	8.52	19%
PCB 169		4.26	4.53	17%

EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
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Milk Powder (2301-MP)
NDL-PCB - Homogeneity test - Data

Analyte	Result ng/g fat	**Mean** (n = 10, duplicate analysis)	**Median** (n = 10, duplicate analysis)	**Relative standard deviation** [%]
Sum Indicator PCBs upper bound		21.3	21.6	4%
Sum Indicator PCBs middle bound		21.3	21.6	4%
Sum Indicator PCBs lower bound		21.3	21.6	4%
PCB 28		0.333	0.329	13%
PCB 52		3.38	3.28	7%
PCB 101		4.03	4.01	9%
PCB 138		2.61	2.60	5%
PCB 153		5.17	5.22	6%
PCB 180		5.76	5.77	8%

EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
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Milk Powder (2301-MP)
Selected congeners - Homogeneity test - Data

Sample	Replicate	Result pg/g fat	WHO-PCDD/F-TEQ ub	PCB 105	2,3,4,7,8-PeCDF
13	1		1.28	1554	1.61
	2		1.28	1638	1.69
22	1		1.30	1520	1.81
	2		1.25	1476	
55	1		1.38	1623	1.87
	2		1.28	1522	1.61
77	1		1.35	1627	1.74
	2		1.44	1438	1.92
102	1		1.38	1672	1.80
	2		1.42	1703	1.90
128	1		1.31	1569	1.80
	2		1.27	1796	1.81
141	1		1.14	1548	1.74
	2		1.28	1335	1.66
177	1		1.28	1681	1.62
	2		1.35	1620	1.86
179	1		1.46	1715	1.85
	2		1.37	1593	1.88
180	1		1.27	1586	1.64
	2		1.28	1486	1.73
Cochran's C-test					
C			0.371	0.285	0.306
$C_{critical}$ (α = 0.05, m = 2, n = 10)			0.602	0.602	0.602
$C_{critical}$ (α = 0.01, m = 2, n = 10)			0.718	0.718	0.718
$C < C_{critical}$			yes	yes	yes
Outliers			no evidence for analytical outliers	no evidence for analytical outliers	no evidence for analytical outliers
Homogeneity test					
General average $\bar{x}$			1.32	1585	1.76
Standard deviation of sample averages s_x			0.066	83.5	0.075
Wthin-sample standard deviation s_w			0.054	95.2	0.106
Between-sample standard deviation s_s			0.054	49.4	0.000
Standard deviation for proficiency assessment σ_{PT}			0.264	317	0.352
s_s / σ_{PT}			0.21	0.16	0.0
Test for homogeneity ($s_s \leq 0.3\ \sigma_{PT}$)			passed	passed	passed

EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP
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Milk Powder (2301-MP)
Selected congeners - Stability test - Data

Sample	Replicate	Result pg/g fat	WHO-PCDD/F-TEQ ub	2,3,4,7,8-PeCDF
18	1		1.31	1.76
	2		1.23	1.61
110	1		1.30	1.78
	2		1.24	
202	1		1.29	1.79
	2		1.31	1.78
Stability test				
General average (stability test) $\bar{y}$			1.28	1.74
General average (homogeneity test) $\bar{x}$			1.32	1.76
Standard deviation for proficiency assessment σPT			0.26	0.35
$\lvert \bar{y} - \bar{x} \rvert$			0.04	0.01
Test for stability ($\lvert \bar{y} - \bar{x} \rvert \leq 0.3$ σPT)			passed	passed

EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
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Annex 7: Participants' methods for PCDD/Fs and PCBs

Test sample - Milk Powder (2301-MP)

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]

EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)

Physico-chemical Methods PCDD/Fs and PCBs - Internal standards

LC	Sample	Weighed sample [g]	Use of isotope-labelled internal standards for all relevant …			Other internal standards		
			PCDD/F congeners (yes/no)	DL-PCB congeners (yes/no)	NDL-PCB congeners (yes/no)	PCDD/Fs	DL-PCBs	NDL-PCBs
1	2301-MP							
2	2301-MP	50.01	Yes (15)	Yes (12)	No	Yes - 1,2,3,4-TCDD / 1,2,3,7,8,9 HxCDD	Yes - PCB 70 / 111 / 138 / 170	No
3	2301-MP	0.4	no	no	Yes			PCB-111 (injection standard)
4	2301-MP	10	yes			yes		
5	2301-MP	60.11	YES	YES	YES			
6	2301-MP							
7	2301-MP	20						
8	2301-MP	25.0	yes	yes	yes	13C-12378-TCDF and 13C-1234689-HpCDF (Recovery standards), 13C-1234-TCDD (Clean-Up standard)	PCB 111 and PCB 170 (Recovery standards)	PCB 70 and PCB 111 (Recovery standards)
9	2301-MP	20	yes	yes	yes			
10	2301-MP	1.2			yes			3,3',4,4',5-Pentachlorobiphényl 13C12
11	2301-MP	20.0	yes	yes	yes			
12	2301-MP	18.00	yes	yes	yes	all 13C-: CB70, CB111, CB138, CB178, 1378-TCDD, 12478-PeCDD, 123468-HxCDD, 1234679-HpCDD	moPCBs: all 13C-: CB60, CB70, CB111, CB127, CB159, CB170 (for noPCBs see PCDD/Fs)	all 13C-: CB60, CB70, CB111, CB127, CB159, CB170
13	2301-MP							
14	2301-MP	10.6	yes	yes	yes	recovery standards	recovery standards	recovery standards
15	2301-MP	18.4	yes	yes	yes			
16	2301-MP	10			yes			C13-PCB-178
17	2301-MP	1.01	yes	yes	yes			
18	2301-MP	23.3	yes	yes	yes			
19	2301-MP	8.1	yes	yes	yes			
20	2301-MP							
21	2301-MP	10			no			PCB112 , PCB143
22	2301-MP							
23	2301-MP	20.058	yes	yes	yes			
24	2301-MP							
25	2301-MP	2.5	/	/	no	/	/	PCB 65, PCB 166
26	2301-MP	10			no			PCB 209
27	2301-MP	30	Yes	Yes	Yes	Recovery standards: 13C-1,2,3,4-TCDD; 13C-1,9-HxCDD	Recovery standards: 13C-PCB-101, 13C-PCB-138	
28	2301-MP							
29	2301-MP	4	yes	yes	yes			
30	2301-MP	2	yes	yes	yes			
31	2301-MP							
32	2301-MP	3.377	Yes	Yes	Yes			
33	2301-MP							
34	2301-MP	43	yes	yes	yes			
35	2301-MP							
36	2301-MP							
37	2301-MP	45	yes	yes	yes			
38	2301-MP	50	Yes	Yes	Yes			
39	2301-MP							
40	2301-MP	5.45	yes	yes	yes			
41	2301-MP	8.0	Yes	Yes	Yes	-	-	-
42	2301-MP	45	yes	yes	yes			
43	2301-MP	20			no			epsilon-HCH, PCB 167
44	2301-MP		YES	YES	YES	1,2,3,4-Tetrachlorodibenzo-p-dioxin (13C6,99%) / 1,2,3,4,6,9-Hexachlorodibenzofuran (13C12, 98,7%)	1,2,3,4-Tetrachlorodibenzo-p-dioxin (13C6,99%) / 1,2,3,4,6,9-Hexachlorodibenzofuran (13C12, 98,7%)	2,2',3,3',4,4',5-Heptachlorobiphenyl (PCB170, 13C12,99%)
45	2301-MP							
46	2301-MP	15	yes	yes	yes	1,2,3,4-TCDD	PCB 111	PCB 111
47	2301-MP							
48	2301-MP	17	yes	yes	yes			
49	2301-MP							
50	2301-MP	50	yes	yes	yes			
51	2301-MP	21.2	yes	yes	yes	-	-	-
52	2301-MP	10	yes	yes	yes			
53	2301-MP	15.0	yes	yes	yes			
54	2301-MP	30.00	yes	yes		13C-1,2,3,4-Cl4DD, 13C- 1,2,3,4,6-Cl5DF, 13C -1,2,3,4,6,9-Cl6DF, 13C-1,2,3,4,6,8,9-Cl7DF		
55	2301-MP	2.5	yes	yes	yes			
56	2301-MP	20	yes	yes	yes			
57	2301-MP	0.5						
58	2301-MP	10	yes	yes	yes			
59	2301-MP							
60	2301-MP	90	yes	yes	yes			
61	2301-MP	30.00	yes	yes				
62	2301-MP	5			yes			
63	2301-MP	10	yes (except 1,2,3,7,8,9-HxCDD and 1,2,3,4,6,7,8,9-OCDF)	yes	no			TCMX, PCB-209, trans-nonachlor
64	2301-MP	10	yes	yes	yes			
65	2301-MP	30			yes			
66	2301-MP	1.0			no			
67	2301-MP	3	yes	yes	yes			
68	2301-MP	10	no	no	no			PCB 29, PCB 194, PCB 206
69	2301-MP							
70	2301-MP	4.665	yes	yes	no			
71	2301-MP	30	yes	yes	yes			
72	2301-MP							
73	2301-MP	10	yes	yes	yes			
74	2301-MP							

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]

EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)

Physico-chemical Methods PCDD/Fs and PCBs - Internal standards

LC	Sample	Weighed sample [g]	Use of isotope-labelled internal standards for all relevant …			Other internal standards		
			PCDD/F congeners (yes/no)	DL-PCB congeners (yes/no)	NDL-PCB congeners (yes/no)	PCDD/Fs	DL-PCBs	NDL-PCBs
75	2301-MP							
76	2301-MP	5	yes	yes	yes			
77	2301-MP		Yes	Yes	Yes			
78	2301-MP	50	yes	yes	yes			
79	2301-MP							
80	2301-MP	30	yes	yes	yes			
81	2301-MP		yes	no	no			
82	2301-MP							
83	2301-MP	34.86	No (were used 15 labelled congeners)	Yes	Yes			
84	2301-MP	30	YES	YES	YES			
85	2301-MP	10	yes	yes	yes			
86	2301-MP	10.57	yes	yes	yes	no	no	no
87	2301-MP							
88	2301-MP	18.17	yes	yes	yes			
89	2301-MP							
90	2301-MP							
91	2301-MP	3			no			
92	2301-MP	1.1	yes	yes	yes			
93	2301-MP							
94	2301-MP	60.12	yes	yes	yes			
95	2301-MP							
96	2301-MP	3	yes	yes	yes			
97	2301-MP							
98	2301-MP	30	yes	yes	yes			
99	2301-MP	20.2	yes	yes	yes	1,2,3,4-TCDD	1,2,3,4-TCDD	PCB159
100	2301-MP							
101	2301-MP	20	yes	yes	yes			
102	2301-MP	20.0	yes	yes		1,2,3,4-TCDD, isotope-labelled	PCB 80, isotope-labelled	
103	2301-MP	5			yes			
104	2301-MP	25.0	yes	yes	yes			
105	2301-MP	3	Yes	Yes	Yes			
106	2301-MP	30	yes	yes	yes			
107	2301-MP							
108	2301-MP	3		Yes	Yes			
109	2301-MP							
110	2301-MP							
111	2301-MP	16	YES	YES	YES			
112	2301-MP	2						PCB 209 (Instrument Internal Standard)
113	2301-MP	21	Y	Y	Y	1234-TCDD; 123789-HxCDD	PCB 101; PCB 138; PCB 194	PCB 123
114	2301-MP	20	yes	yes	no			PCB-155 and PCB-54
115	2301-MP	3			YES			SYRINGE STANDARD PCB-155-13C12
116	2301-MP	41	yes	yes	yes			
117	2301-MP							
118	2301-MP							
119	2301-MP	5			yes			
120	2301-MP	15	YES	YES	YES			
121	2301-MP	10	YES	YES	YES			
122	2301-MP	12			yes			
123	2301-MP	8	Yes	Yes	Yes			
124	2301-MP	50	yes	yes	yes			
125	2301-MP							
126	2301-MP	15	yes	yes	yes			
127	2301-MP	3	yes	yes	yes	ISS. Well EPA1613-ISS	ISS. Well P48-RS	ISS. Well P48-RS
128	2301-MP							
129	2301-MP	5			no			
7A	2301-MP	20	yes	yes	yes	1234-TCDD	1234-TCDD	1234-TCDD
97A	2301-MP							
101A	2301-MP	20	yes	yes	yes			

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EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Physico-chemical Methods PCDD/Fs and PCBs - Extraction

LC	Sample	Extraction Sample preparation/pre-treatment	Extraction technique	Extraction solvent	Extraction time [h]	Extraction temperature [ºC]	Extraction pressure [MPa]
1	2301-MP						
2	2301-MP	None	Hydrochloric acid digestion	3:1 (v/v) Hexane: Dichloromethane	12h	ambient	ambient
3	2301-MP	no	Separatory funnel, evaporation Kudern-Danish	hexane/acetone 50/50 (v/v)	0,017	ambiente	ambiente
4	2301-MP	yes		hexano/acetona/ciclohexano/tolueno (1/5/5)	1	55	45
5	2301-MP	NA	iquid-liquid extraction	acetone/hexane (1:1)	1	25	
6	2301-MP						
7	2301-MP		Cold extraction	Petroleum ether / acetone (2/1)	2	22	
8	2301-MP	Add hydromatrix and mix	ASE	DCM/methanol (2/1 v/v)	0.5	100	10.3
9	2301-MP	Milk reconstitution in MilliQ water with Ultraturrax	Liquid-Liquid	Röse-Gottlieb protocol			
10	2301-MP	homogenisation	sample mixed with sand and Na2SO4(50/50)	aceton/hexan(1/2)	1	rt	ap
11	2301-MP	reconstitution with water	liquid-liquid partitioning process	ethanol/diethylether/petroleum ether (1/2/2)			
12	2301-MP	Dissolved in MilliQ water and heated	Liquid-liquid extraction	dipotassium oxalate, ethanol, diethyl ether, n-pentan	-	-	-
13	2301-MP						
14	2301-MP	dissolving in water	L-L	diethylether-hexane		room temp	ambient
15	2301-MP	None	Cold Extraction	Hexane, Diethyl Ether, Ethanol.	-	room temperature	-
16	2301-MP	/	cold extraction	methanol + hexane		room temperature	atmospheric pressure
17	2301-MP	Drying by Steamroom	solid/liquid extraction	Hexane/IPA (60/40) + Toluène/Acétone (70/30)	/	/	/
18	2301-MP	solved with hot water and lyophilized; LLE of Toluene 3x with water after Soxhlet, drying with Na2SO4 before further sample preparation	Soxhlet	Toluene/Ethanol 30/70	40		
19	2301-MP	homogenisation, denaturation	cold extraction	toluol/ethanol (1/1)		room temperature	ambient
20	2301-MP						
21	2301-MP	drying	soxhlet	hexaan	3	69°C	
22	2301-MP						
23	2301-MP	no	soxhlet	hexane / toluene…			
24	2301-MP						
25	2301-MP	/	Modified QuEChERS	ethyl-acetate	5 min	ambient	/
26	2301-MP			ethyl acetate/cyclohexane 1/1	24	21	
27	2301-MP	Reconstitution of test ssample in hot water with addition of ammonia	Liquid-liquid extraction	diethyl ether and petroleum ether			
28	2301-MP						
29	2301-MP		liquid	butanone/ethylacetate (1/1)	1	ambient	ambient
30	2301-MP	NA	liq/liq dairy extraction	ethanol / ammonia / diethyl ether / n-pentane	1 hour	ambient	ambient
31	2301-MP						
32	2301-MP		Soxhlet	Toluene/Ethanol (1/1)	16		
33	2301-MP						
34	2301-MP	Homogenisation	Soxhlet	Toluene /ethanol 50 / 50	24	120	atm
35	2301-MP						
36	2301-MP						
37	2301-MP		Twisselman	Toluene / Ethanol (30/70)	6		
38	2301-MP			solvent mixture			
39	2301-MP						
40	2301-MP	/	Liquide/Liquide	Ethanol/Diéthyléther/Hexane	/	/	/
41	2301-MP	-	Manuel Ext liq/liq after protein precipitation	Pentane	-	-	-
42	2301-MP	Säureaufschluss	Soxhlet	Cyclohexene/DCM	17		
43	2301-MP	none	liquid-liquid extraction	Methanol/diethyl ether/ Petroleum ether/water (100/100/100/90)	2 x 0.03 h; (2 min.)	20°C (room temperature)	
44	2301-MP	N/A	MANUAL			AMBIENT	N/A
45	2301-MP						
46	2301-MP		ASE	dichloromethane/hexane/methanol (25/60/15)	0,3	100	10
47	2301-MP						
48	2301-MP	-	Twisselmann	iso-Propanol:Toluol (25:75)	8h	82°C	atm
49	2301-MP						
50	2301-MP	hydrolysis	soxhlet	toluene	4	120	
51	2301-MP	-	liquid liquid extraction	hexane / diethyl ether / 2-Propanol (2 / 1 / 2)	-	20	-
52	2301-MP	no	Soxhlet	toluol	16h		
53	2301-MP		Twisselmann	Ethanol/ Toluol (70/30, v/v), tert-butyl-methyl-ether	6	boiling point	
54	2301-MP		Soxhlet	toluene/iso-propanol (23/77)	overnight	boiling	
55	2301-MP	redissolve the powder in water to regain milk (1:10)	LLE; Ultra turrax	Acetone + PE	2 min	room temperature	
56	2301-MP		ASE	Hexane/Acetone (80/20)	1	125	10
57	2301-MP		Rybolizing	Hexane/Acetone (2:1)	1 min	20	1 bar
58	2301-MP	reconstitution with water	LLE mit oxalic acid /Petroleum ehter/n-pentane				
59	2301-MP						
60	2301-MP	resolved in water	liquid/liquid	Diethylether/Hexane (1/1)		room temperature	ambient pressure
61	2301-MP	freeze drying	twisselman	Ethanol/Toluol (7/3)	8	boiling point	
62	2301-MP	none	Quechers	ACN 1% Acetic acid		Room Temp	
63	2301-MP	thorough homogenization, powder reconstitution with MQ water (1:9), acid hydrolysis (sodium oxalate,ethanol)	(ultrasonic bath, agitate), L-L cold extraction (2 fold)	diethylether, n-hexane	2	20	0.1
64	2301-MP	no	ASE	Toluene:Cyclohexane	40min	130oC	1500
65	2301-MP	freeze drying	twisselman	Ethanol/Toluol (7/3)	8	boiling point	
66	2301-MP	homogenisation	shaking	DEE		ambient	normal
67	2301-MP		cold	MeOH/hexane	10 minutes	ambient	
68	2301-MP	Reconstitution (15g milk powder/ 90ml MQ water: 105g liquid milk)	Ultra turax	Ethyl Acetate	0.02	room temperature	
69	2301-MP						
70	2301-MP		ASE	Hexane	1	100	10,3
71	2301-MP	homogenisation	Soxhlet	Toluene	16 h		
72	2301-MP						
73	2301-MP	NO	ASE	TOLUENE	N. 3 Static	130	10
74	2301-MP						
75	2301-MP						
76	2301-MP		Shaking on robot	Water/Ethyl acetate 1:1	0,25	40	10
77	2301-MP	-	Soxhlet	Hexane/DCM (70/30)	18	Boiling	
78	2301-MP	drying	Soxhlet	hexane:DCM (1:1)	8	boiling point of solvent mixture	normal
79	2301-MP						
80	2301-MP	original	ASE	1. Extraktion Aceton / 2. Extraktion Petrolether/Aceton (90/10)	1	90	10

Milk Powder (2301-MP)
Physico-chemical Methods PCDD/Fs and PCBs - Extraction

LC	Sample	Extraction					
		Sample preparation/pre-treatment	Extraction technique	Extraction solvent	Extraction time [h]	Extraction temperature [ºC]	Extraction pressure [MPa]
81	2301-MP		Röse Gottlieb			70	
82	2301-MP						
83	2301-MP	the sample of milk powder was reconstituted with water	Liquid-Liquid partition	1) add Ethanol/amonia -turrax 5 min, 2) add Diethyl Ether turrax 5 min, 3) add Petroleum Ether turrax 5 min			
84	2301-MP		SOXHLET	PCDD/F & DL-PCB TOLUENE/ETHANOL (3/7); NDL-PCB HEXANE/DCM (1/1)	24H		
85	2301-MP	NO	ASE	TOLUENE	N. 3 Static	130	10
86	2301-MP		ASE	n-hexane/dichloromethane/methanol (5/2/1)	5 min	80	
87	2301-MP						
88	2301-MP	no	ASE	Toluen:Ethanol (90:10)	1	100	10,342
89	2301-MP						
90	2301-MP						
91	2301-MP						
92	2301-MP	drying	Twisselmann	Hex/DCM	4h	60	0,01
93	2301-MP						
94	2301-MP		microwave	1:1 Methylene Chloride:Hexane	1 hour	100	NA
95	2301-MP						
96	2301-MP	drying	PLE	Tolune/Acetone (70/30)			
97	2301-MP						
98	2301-MP	Homogenisation	ASE, LLE	ASE: hexane : 2-propanol (3:2, v/v), LLE: ethanol : DEE : n-hexane (10 : 4 : 6, v/v/v), n-hexane	ASE: 30 min/sample, LLE: 30 min/sample	ASE: 120°C, LLE: ambient temperature	ASE: 10MPa, LLE: atmospheric pressure
99	2301-MP	homogenated	Inhouse extraction method	Cyclohexane / IPA / salt water	0,1	room temperature	atmospheric
100	2301-MP						
101	2301-MP	mixing	PSE	DCM:n-hexane:MeOH (45:45:10)	3 cycles per 2 minutes	65°C	10 MPa
102	2301-MP	homogenizing	Soxhlet	Ethanol/Toluol 7:3	8	boiling temperature	
103	2301-MP		ASE	n-Hexan/Dichlormethan/Methanol (5/2/1)		80	10
104	2301-MP	-	Soxhlet	toluene-acetic acid 95:5	20h	boiling point of solvent mixture	-
105	2301-MP	no	ASE	Hexane/DCM/Methanol (5:2:1)	20	80	10
106	2301-MP	sample reconstitution	liquid liquid breakdown	Ethanol 100% - ethyl ether 100% - petroleum ether 100 %	-	25°C	Atmospheric
107	2301-MP						
108	2301-MP	reconstitution	liquid-liquid	TBME/Hexane (1/1)	0,25	Ambient	Ambient
109	2301-MP						
110	2301-MP						
111	2301-MP	LIOFILIZZAZIONE	ASE	ESANO-ACETONE 4:1	0,30	125 °C	
112	2301-MP	Basic Proteins Hydrolysis	Metodo Rose-Gottlieb	Solvent mixture: Diethyl ether/petroleum Ether 1/1			
113	2301-MP	DRYNG	ASE	n-ESANO/ACETONE (4/1)	0:45 h	110 (°C)	11,7 (MPa)
114	2301-MP	freeze-drying	ASE	n-hexane:dichloromethane	0.75	100	10 aprox
115	2301-MP		ASE	ACETONE:HEXANE 1:1	1/3	100	10,34
116	2301-MP		L-L extraction	Ethanol/Hexane/diethyl ether (300ml, 125ml, 85ml)			
117	2301-MP						
118	2301-MP						
119	2301-MP	Drying	Automated extraction system BUCHI	petroleum ether; 2-propanol	1 h	100 °C	100 bar
120	2301-MP		ASE	TOLUENE	0.5	135.00	1500.00
121	2301-MP		ASE	HEXANE/ACETONE 50/50	0.33	100	10.13
122	2301-MP	none	Online-Cool-Extraction	Water/Acetone/Hexane/NaCl = 1/2/1/0,5 (v/v/v/m)	16	ambient	ambient
123	2301-MP	No	ASE	Toluene	45 minutes	135	
124	2301-MP		ASE	hexane:aceton 80:20	30 min	120	10
125	2301-MP						
126	2301-MP	no	Büchi Speed Extractor	Ethanol/Toluene 70/30	2 x 0,1	100	10
127	2301-MP		Soxhlet	toluene	8	-	-
128	2301-MP						
129	2301-MP		Soxhlet	Ethyl acetate/Cyclohexane	6		
7A	2301-MP		Cold extraction	Cyclohexane/dichlormetane (1/1)	app. 3 h	room temperature	
97A	2301-MP						
101A	2301-MP	mixing	PSE	DCM:n-hexane:MeOH (45:45:10)	3 cycles per 2 minutes	65°C	10 MPa

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EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)

Physico-chemical Methods PCDD/Fs and PCBs - Clean-up

		Clean-up									
LC	Sample	Gelchromatography	Silica/sulfuric acid column	Florisil column	Alumina column	Carbon column	Others	Final volume [µl]: PCDD/F	Final volume [µl]: DL-PCB (non-ortho-PCBs)	Final volume [µl]: DL-PCB (mono-ortho-PCBs)	Final volume [µl]: Indicator PCBs
1	2301-MP										
2	2301-MP	No	yes	No	Yes	Yes	None	10	10	30	N/A
3	2301-MP	no	no	no	no	no	Silica with sulfuric acid				1000
4	2301-MP	YES	YES	YES	YES	YES		15	15	15	15
5	2301-MP		YES		YES	YES		20	20	20	20
6	2301-MP										
7	2301-MP	no	no	yes							1500
8	2301-MP	no	no	yes	no	no	Silica/sulfuric acid/sodium hydroxide column	100	100	100	100
9	2301-MP	no	yes	no	yes	yes		9	9	100	100
10	2301-MP	no	yes	no	no	no					100ul
11	2301-MP	no	yes	no	yes	yes		20	20	20	20
12	2301-MP	no	yes	no	yes	yes	Silver nitrate column	250 µl	250 µl	100 µl	100 µl
13	2301-MP										
14	2301-MP	no	yes	no	yes	yes	no	15	15	500	500
15	2301-MP	no	yes	yes	yes	no		10	50	50	50
16	2301-MP	no	yes	no	yes	no	no	/	/	/	250 µl
17	2301-MP	no	yes	no	yes	yes	no	25	25	125	125
18	2301-MP	no	yes	no	yes	yes	Silica/AgNO3	50	50	100	100
19	2301-MP	no	yes	no	yes	yes	AgNO3 (MIURA)	20	20	20	20
20	2301-MP										
21	2301-MP	no	yes	no	yes	no	no				1000
22	2301-MP										
23	2301-MP	no	no	yes	yes	yes					
24	2301-MP										
25	2301-MP	no	yes	no	no	no	/	/	/	/	500
26	2301-MP	yes									250
27	2301-MP	Yes	Yes	Yes	No	Yes	Sufuric acid treatment of the final extract	10	50	50	200
28	2301-MP										
29	2301-MP	no	yes	no	yes	yes		20	100	100	100
30	2301-MP	no	yes	no	yes	yes		30	30	30	30
31	2301-MP										
32	2301-MP	No	Yes	No	Yes	No	/	10	500	500	500
33	2301-MP										
34	2301-MP	no	yes	no	yes	yes		25	100	100	100
35	2301-MP										
36	2301-MP										
37	2301-MP	no	yes	no	yes	yes	acidic treatment	25	25	25	25
38	2301-MP		yes		yes	yes					
39	2301-MP										
40	2301-MP	no	yes	no	yes	yes		10	20	50	50
41	2301-MP	No	Yes	Yes	No	Yes		10.00	10.00	50.00	50.00
42	2301-MP	no	yes	no	yes	no		50	50	100	100
43	2301-MP	yes	yes	no	no	no	none				1000 µl
44	2301-MP	NO	YES	NO	YES	YES		20	20	20	200
45	2301-MP										
46	2301-MP	no	yes	yes	no	yes		10	20	50	50
47	2301-MP										
48	2301-MP	no	yes	no	yes	yes	silica/AgNO3	50	50	50	50
49	2301-MP										
50	2301-MP	no	yes	no	yes	yes		120000	90000	90000	5000
51	2301-MP	no	yes	no	yes	no	no	10	50	50	50
52	2301-MP	no	yes	no	yes	yes	no	20 µl	20 µl	100 µl	100 µl
53	2301-MP	no	yes	no	yes	yes	no	20	25	500	500
54	2301-MP	no	yes (Dextech)	no	yes (Dextech)	yes (Dextech)		10	10	80	
55	2301-MP	no	yes	no	yes	yes	no	500	500	500	500
56	2301-MP	no	yes	yes	yes	yes		20	20	20	20
57	2301-MP	yes	no	no	no	no	no				1 ml
58	2301-MP	no	yes	no	yes	yes		25	25	100	100
59	2301-MP										
60	2301-MP	no	yes	no	yes	yes	no	20	20	200	200
61	2301-MP	no	yes	no	yes	yes	no	30	30	400	
62	2301-MP						d-SPE: PSA, C18, MgSO4				300
63	2301-MP	yes	yes	no	yes	yes	basic silica, silver nitrate silica	20	20	30	1000
64	2301-MP		yes	yes		yes		10	40	500	500
65	2301-MP	no	yes	no	yes	yes	no				400
66	2301-MP		yes								500
67	2301-MP	Miura									
68	2301-MP	yes	yes	no	no	no					1000
69	2301-MP										
70	2301-MP	no	yes	no	yes	yes	no	20	20	500	500
71	2301-MP	no	yes	yes	yes	no		20	100	100	100
72	2301-MP										
73	2301-MP	N	Y	N	Y	Y	NA	10	20	20	20
74	2301-MP										
75	2301-MP										
76	2301-MP	no	yes	no	yes	yes	Silver nitrate column	20	20	1000	1000
77	2301-MP	No	Yes	No	Yes	Yes	-	50	50	50	50
78	2301-MP	yes	yes	no	no	yes		10	20	20	20
79	2301-MP										
80	2301-MP	yes	yes	no	no	yes		16	16	22	1000

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Milk Powder (2301-MP)

Physico-chemical Methods PCDD/Fs and PCBs - Clean-up

		Clean-up									
LC	Sample	Gelchromatography	Silica/sulfuric acid column	Florisil column	Alumina column	Carbon column	Others	Final volume [µl]: PCDD/F	Final volume [µl]: DL-PCB (non-ortho-PCBs)	Final volume [µl]: DL-PCB (mono-ortho-PCBs)	Final volume [µl]: Indicator PCBs
81	2301-MP	no	yes	no	yes	yes					
82	2301-MP										
83	2301-MP	no	yes	no			basic set of "power-prep system" columns	20	40	40	40
84	2301-MP	NO	YES	YES	YES	YES	NO	10	10	10	50
85	2301-MP	N	Y	N	Y	Y	NA	10	20	20	20
86	2301-MP	no	yes	yes	yes	yes	no	15	15	25	25
87	2301-MP										
88	2301-MP	no	yes	no	yes	yes		10	10	200	200
89	2301-MP										
90	2301-MP										
91	2301-MP			yes							5000
92	2301-MP	no	yes	yes	yes	yes		50	50	100	100
93	2301-MP										
94	2301-MP	yes	yes	no	yes	no		20	20	20	20
95	2301-MP										
96	2301-MP	No	Yes	Yes	No	Yes		12	12	50	50
97	2301-MP										
98	2301-MP	no	yes	yes	yes	yes	PowerPrep FMS columns (basic-neutral silica, alumina, carbon)	10	10	20	20
99	2301-MP	no	yes	no	yes	yes	no	20	20	20	20
100	2301-MP										
101	2301-MP	no	yes	no	no	yes	no	15	30	30	40
102	2301-MP	yes	yes	no	yes	yes		30	30	30	
103	2301-MP	yes	no	no	no	no	Silica column				1000
104	2301-MP	no	yes	yes	no	no	reverse extraction using dimethylsuphoxide	25	25	250	250
105	2301-MP	no	yes	no	yes	yes		50	50	1000	1000
106	2301-MP	no	yes	no	yes	yes	no	20	20	80	80
107	2301-MP										
108	2301-MP	Yes	No	No	No	No	styrene divinylbenzene				50
109	2301-MP										
110	2301-MP										
111	2301-MP		YES		YES	YES		25	50	50	50
112	2301-MP						Hexane/acetone 70/30 + Sulfuric acid 90% + SPE Bond Elut PCB (Varian - Silica gel + SCX)(hexane)				0,5 ml of PCB 209 (100 ng/ml) (isooctane solvent)
113	2301-MP	N	Y	Y	Y	Y	NT EXTRELUT	10	10	20	50
114	2301-MP	no	yes	no	yes	yes		20	50	50	500
115	2301-MP	NO	YES	NO	NO	NO	SPE SILICA COLUMN 1g/6mL				250
116	2301-MP	GPC column (only for indicatorPCB)	yes	no	no	yes	no	15	15	15	75
117	2301-MP										
118	2301-MP										
119	2301-MP	YES	NO	NO	NO	NO	NO				200 ul
120	2301-MP	no	yes	no	yes	yes		10.00	80.00	80.00	80.00
121	2301-MP	NO	YES	YES	NO	YES	NO	30	non-ortho DL-PCBs are in the PCDD/F fraction	100	Indicator PCBs are in mono-ortho DL-PCB fraction
122	2301-MP	yes	no	no	no	no	Silica, deact. with 3,5% H2O, Eluat 24 mL n-Hexane/Toluene = 3/7 (v/v)				200
123	2301-MP	No	Yes	Yes	Yes	Yes		10	20	20	20
124	2301-MP	no	yes	yes	yes	no					
125	2301-MP										
126	2301-MP	no	yes	no	yes	yes		30	30	30	30
127	2301-MP	no	yes		yes	yes		10	15	20	20
128	2301-MP										
129	2301-MP	yes	no	no	no	no	no				1,0
7A	2301-MP		yes	yes		yes		10	100	100	100
97A	2301-MP										
101A	2301-MP	no	yes	no	no	yes	no	15	30	30	40

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Physico-chemical Methods PCDD/Fs and PCBs - Detection

		PCDD/F				Dioxin-like PCB (non-ortho-PCB)				Dioxin-like PCB (mono-ortho-PCB)				Indicator PCB			
LC	Sample	GC injection	Injected volume [µl]	GC separation: Stationary phase	Detector	GC injection	Injected volume [µl]	GC separation: Stationary phase	Detector	GC injection	Injected volume [µl]	GC separation: Stationary phase	Detector	GC injection	Injected volume [µl]	GC separation: Stationary phase	Detector
1	2301-MP																
2	2301-MP	Splitless	1	5%-Phenyl-Arylene-95% DimethylPolysiloxane (ZB5-MS)	Thermo DFS HRMS	Splitless	1	5%-Phenyl-Arylene-95% DimethylPolysiloxane (ZB5-MS)	Thermo DFS HRMS	Splitless	1	5%-Phenyl-Arylene-95% DimethylPolysiloxane (ZB5-MS)	Thermo DFS HRMS	N/A	N/A	N/A	N/A
3	2301-MP													Splitless	1	Rxi-XLB	LRMS: GCMSMS
4	2301-MP	PTV	5	HP	MS/MS	PTV	5	HP	MS/MS	PTV	5	HP	MS/MS	PTV	5	HP	MS/MS
5	2301-MP	SPLITLESS	2		HRMS	SPLITLESS	2		HRMS								
6	2301-MP																
7	2301-MP													split ratio 7,0	1	Rxi®-5SIL MS w/Integra-Guard®	ECD
8	2301-MP	PTV	20 (routine), confirmation: 15	Agilent J7W DB5 40m x 0.18mm x 0.18µm (routine), Restek RTX-Dioxin2, 40m x 0.18mm x 0.18µm (confirmation)	LRMS	PTV	20 (routine), 10 (confirmation)	SGE Fast PCB HT-8 10m x 0.1mm x 0.10µm (routine), Agilent J7W DB5 40m x 0.18mm x 0.18µm (confirmation)	LRMS	PTV	20 (routine), 10 (confirmation)	SGE Fast PCB HT-8 10m x 0.1mm x 0.10µm (routine), Agilent J7W DB5 40m x 0.18mm x 0.18µm (confirmation)	LRMS	PTV	20 (routine), 10 (confirmation)	SGE Fast PCB HT-8 10m x 0.1mm x 0.10µm (routine), Agilent J7W DB5 40m x 0.18mm x 0.18µm (confirmation)	LRMS
9	2301-MP	PTV	5	VF5-MS 50x0.2x0.33	HRMS	PTV	5	VF5-MS 50x0.2x0.33	HRMS	Splitless	2	HT8 25x0.22x0.25	HRMS	Splitless	2	HT8 25x0.22x0.25	HRMS
10	2301-MP													splitless	1	8% phenyl	GC-MSMS
11	2301-MP	splitless	1	ZB-5MS Plus 60m X 0.25mm X 0.1µm	HRMS	splitless	1	HT8-PCB 60m x0,25mm x 0,25µm	HRMS	splitless	1	HT8-PCB 60m x0,25mm x 0,25µm	HRMS	splitless	1	HT8-PCB 60m x0,25mm x 0,25µm	HRMS
12	2301-MP	PTV	100 µl	Rtx-Dioxin2	HRMS	PTV	100 µl	Rtx-Dioxin2	HRMS	PTV	5 µl	Rtx-Dioxin2	HRMS	Splitless	1 µl	Ht8	HRMS
13	2301-MP																
14	2301-MP	splitless	5	(5%-phenyl)-methylpolysiloxane	MSMS	splitless	5	(5%-phenyl)-methylpolysiloxane	MSMS	splitless	5	(5%-phenyl)-methylpolysiloxane	MSMS	splitless	5	(5%-phenyl)-methylpolysiloxane	MSMS
15	2301-MP	Splitless	1	VF-Xms	LRMS	Splitless	1	Rxi 5Sil MS	LRMS	Splitless	1	Rxi 5Sil MS	LRMS	Splitless	1	Rxi 5Sil MS	LRMS
16	2301-MP	/	/	/	/	/	/	/	/	/	/	/	/	splitless	1 µl	XLB	LR-MS
17	2301-MP	Splitless	2	DB5	APGC	Splitless	1	DB5	APGC	Splitless	1	DB5	APGC	Splitless	1	DB5	APGC
18	2301-MP	PTV	8, 5	DBDIOXIN, DB-5	HRMS	PTV	8, 5	DBDIOXIN, DB-5	HRMS	PTV	2	DBDIOXIN, DB-5	HRMS	PTV	2	DBDIOXIN, DB-5	HRMS
19	2301-MP	PTV Large Volume	5	DB-5MS	HRMS	PTV Large Volume	5	DB-5MS	HRMS	splitless	1	HT8-PCB	HRMS	splitless	1	HT8-PCB	HRMS
20	2301-MP																
21	2301-MP													split	1	ID-HT8	LRMS
22	2301-MP																
23	2301-MP				GC-MS/MS				GC-MS/MS				GC-MS/MS				GC-MS/MS
24	2301-MP																
25	2301-MP													PTV Solvent Vent	8	HP-5MS	MS/MS
26	2301-MP													splitless	2	VF-5ms; 5% phenyl 95% methyl polisiloxane	MS/MS
27	2301-MP	Splitless	1	ZB-5MS Plus 60 x 0.25 x 0.25	Autospec Premier HRMS	Splitless	1	ZB-5MS 60 x 0.25 x 0.25	Autospec Premier HRMS	Splitless	1	ZB-5MS 60 x 0.25 x 0.25	Autospec Premier HRMS	PTV	2	ZB-50 30 x 0.25 x 0.25	ThermoScientific TSQ Quantum XLS Ultra GC-MS/MS
28	2301-MP																
29	2301-MP	PTV	4	DB5-MS	MSMS	PTV	4	DB5-MS	MSMS	PTV	4	DB5-MS	MSMS	PTV	4	DB5-MS	MSMS
30	2301-MP	splitless	1.6	DB5	HRMS	splitless	1.6	DB5	HRMS	splitless	1.6	DB5	HRMS	splitless	1.6	DB5	HRMS
31	2301-MP																
32	2301-MP	Splitless	2	DB5MS	HRMS	Splitless	1	DB5MS	HRMS	Splitless	1	DB5MS	HRMS	Splitless	1	DB5MS	HRMS
33	2301-MP																
34	2301-MP	splitless	1	DB5MS	APGC-MSMS	splitless	1	DB5MS	APGC-MSMS	splitless	1	DB5MS	APGC-MSMS	splitless	1	DB5MS	APGC-MSMS
35	2301-MP																
36	2301-MP																
37	2301-MP	splitless	1.8	DB-5MS	HRMS (Autospec Ultima Waters)	splitless	1.8	DB-5MS	HRMS (Autospec Ultima Waters)	splitless	1.0	HT8-PCB	HRMS (Autospec Ultima Waters)	splitless	1.0	HT8-PCB	HRMS (Autospec Ultima Waters)
38	2301-MP	PTV			GC-MSMS	PTV			GC-MSMS	PTV			GC-MSMS	PTV			GC-MSMS
39	2301-MP																
40	2301-MP	splitless	2	DB-5MS	HRMS	splitless	2	DB-5MS	HRMS	splitless	2	HT8-PCB	HRMS	splitless	2	HT8-PCB	HRMS
41	2301-MP	Splitless	2	RTX-PCB 40m	HRMS	Splitless	2	RTX-PCB 40m	HRMS	Splitless	2	RTX-PCB 40m	HRMS	Splitless	2	RTX-PCB 40m	HRMS
42	2301-MP	L-PTV	25	DB-5-MS 60m,0,25mm, 0,25µm,	HRMS	L-PTV	25	DB-5-MS 60m,0,25mm, 0,25µm,	HRMS	L-PTV	10	HT-8 60m, 0,25mm	HRMS	L-PTV	10	HT-8 60m, 0,25mm	HRMS
43	2301-MP													PTV, split ratio 1:100	1	DB-XLB; proprietary phase	GC-MS/MS (Triple quadrupol)
44	2301-MP	PTV	2.5	5% Diphenyl / 95% Dimethylpolysiloxan	LRMS	PTV	2.5	5% Diphenyl / 95% Dimethylpolysiloxan	LRMS	PTV	2.5	5% Diphenyl / 95% Dimethylpolysiloxan	LRMS	PTV	1	5% Diphenyl / 95% Dimethylpolysiloxan	LRMS
45	2301-MP																
46	2301-MP	PTV splitless	2	DB-5MS	HRMS	PTV splitless	1	DB-5MS	HRMS	PTV splitless	1	DB-5MS	HRMS	PTV splitless	1	DB-5MS	HRMS
47	2301-MP																
48	2301-MP	PTV	2	DB 5 ms	HRMS	PTV	2	DB 5 ms	HRMS	PTV	1	XLB	HRMS	PTV	1	XLB	HRMS
49	2301-MP																
50	2301-MP	splitless	2	5% phenyl-95% dimethyl polysiloxane	GCMSMS TQ	splitless	2	5% phenyl-95% dimethyl polysiloxane	GCMSMS TQ	splitless	2	5% phenyl-95% dimethyl polysiloxane	GCMSMS TQ	split/splitless	3	5% polysilarylene-95%polydimethylsiloxane	GCMSMS TQ
51	2301-MP	splitless	5	VFX ms 60m	HRMS	splitless	2	VFX ms 60m	HRMS								
52	2301-MP	PTV	3	DB5-MS/ RTX Dioxin	HRMS - Thermo DFS	PTV	3	DB5-MS	HRMS - Thermo DFS	PTV	2	HT8 PCB	LRMS - Thermo TSQ 8000evo	PTV	2	HT8 PCB	LRMS - Thermo TSQ 8000evo
53	2301-MP	PTV	5	DB5-MS	HRMS	PTV	5	DB5-MS	HRMS	SSL	1	HT8-PCB	HRMS	SSL	1	HT8-PCB	HRMS
54	2301-MP	splitless	1,5	Thermo TR-Dioxin (5% diphenyl - 95% polysilphenylene siloxane)	HRMS	splitless	1,5	Thermo TR-Dioxin (5% diphenyl - 95% polysilphenylene siloxane)	HRMS	splitless	1,5	Thermo TR-Dioxin (5% diphenyl - 95% polysilphenylene siloxane)	HRMS				
55	2301-MP	PTV	100	DB-5MS	HRMS	PTV	100	DB-5MS	HRMS	PTV	2	DB-5MS	HRMS	PTV	2	DB-5MS	HRMS
56	2301-MP	splitless	1	DB5	HRMS	splitless	1	DB5	HRMS	splitless	1	DB5	HRMS	splitless	1	DB5	HRMS
57	2301-MP													KAS-PTV splitless	1	HP- 5MS UI, 2 x 15 m x 0,25 mm x 0,25 µm, 5 % Phenyl-Methyl-Polysiloxan	MSMS
58	2301-MP	splitless	2	DB5-MS	HRMS	splitless	2	DB5-MS	HRMS	splitless	2	HT-8	HRMS	splitless	2	HT-8	HRMS
59	2301-MP																
60	2301-MP	MMI	5	Vf-Xms	MSMS	MMI	5	Vf-Xms	MSMS	MMI	2	HT8	MSMS	MMI	2	HT8	MSMS
61	2301-MP	PTV	5	DB5	HRMS (DFS)	PTV	5	DB5	HRMS (DFS)	PTV	2	DB5	HRMS (DFS)				
62	2301-MP													Splitless	1	(5%-phenyl)-methylpolysiloxane	QqQ
63	2301-MP	splitless	2-3	DB-5MS	HRMS (R>10000)	splitless	1	DB-5MS	HRMS (R>10000)	splitless	1	DB-5MS	HRMS (R>10000)	splitless	1	HT-8	µECD
64	2301-MP	splitless	2	TR - Dioxin, 60m	HRMS	splitless	2	TR - Dioxin, 60m	HRMS	splitless	2	TR - Dioxin, 60m	HRMS	splitless	2	TR - Dioxin, 60m	HRMS
65	2301-MP													PTV	2	DB5	HRMS (DFS)
66	2301-MP													splitless	2	crosslinked 5% PH ME Siloxane	ECD
67	2301-MP	spltls	2	db 5 ms	MSMS	spltls	2	db 5 ms	MSMS	splitless	1	HT-8	MSMS				
68	2301-MP													PTV	1	TraceGOLD™ TG-5 SilMS	MS/MS
69	2301-MP																
70	2301-MP	MMI	5	5% fenil-metilpolisiloxane	GC-MS TQ	MMI	5	5% fenil-metilpolisiloxane	GC-MS TQ	MMI	1	5% fenil-metilpolisiloxane	GC-MS TQ	MMI	1	5% fenil-metilpolisiloxane	GC-MS TQ
71	2301-MP	PTV	2	60m DB-5 MS, 0,25mm, 0,25µm	HRMS	splitless	1	60m DB-5 MS, 0,25mm, 0,25µm	HRMS	splitless	1	60m DB-5 MS, 0,25mm, 0,25µm	HRMS	splitless	1	60m DB-5 MS, 0,25mm, 0,25µm	HRMS
72	2301-MP																

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Milk Powder 2023 [EURL-PT-POP_2301-MP]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Milk Powder (2301-MP)
Physico-chemical Methods PCDD/Fs and PCBs - Detection

		PCDD/F				Dioxin-like PCB (non-ortho-PCB)				Dioxin-like PCB (mono-ortho-PCB)				Indicator PCB			
LC	Sample	GC injection	Injected volume [µl]	GC separation: Stationary phase	Detector	GC injection	Injected volume [µl]	GC separation: Stationary phase	Detector	GC injection	Injected volume [µl]	GC separation: Stationary phase	Detector	GC injection	Injected volume [µl]	GC separation: Stationary phase	Detector
73	2301-MP	splitless	2,5	DB 5MS	MSMS	splitless	1	DB 5MS	MSMS	splitless	1	DB 5MS	MSMS				
74	2301-MP																
75	2301-MP																
76	2301-MP	splitless	2	DB5-MS	HRMS	splitless	2	DB5-MS	HRMS	PTV	1	HT8	HRMS	PTV	1	HT8	HRMS
77	2301-MP	Splitless	1	DB-5 MS	HRMS, DFS	Splitless	1	DB-5 MS	HRMS, DFS	Splitless	1	DB-5 MS	HRMS, DFS	Splitless	1	DB-5 MS	HRMS, DFS
78	2301-MP	cold splitless	1	DB-5MS UI	MS/MS (EI)	cold splitless	1	DB-5MS UI	MS/MS (EI)	cold splitless	1	DB-5MS UI	MS/MS (EI)	cold splitless	1	DB-5MS (UI)	MS/MS (EI)
79	2301-MP																
80	2301-MP	splittless	1,2	db-xlb 30mx0,18mmx0,18µm	HRMS	splittless	1,2	db-xlb 30mx0,18mmx0,18µm	HRMS	splittless	1,2	db-xlb 30mx0,18mmx0,18µm	HRMS	splittless	1,2	db-xlb 30mx0,18mmx0,18µm	HRMS
81	2301-MP	PTV	20		GC-MS-MS	PTV	20		GC-MS-MS	PTV	20		GC-MS-MS	PTV	20		GC-MS-MS
82	2301-MP																
83	2301-MP	Splitless	2	DB-5MS (60 m, 0.25 mm id, 0,25 mm film)	HRMS (Mat-95 XP)	Splitless	1	DB-5MS (60 m, 0.25 mm id, 0,25 mm film)	HRMS (Mat-95 XP)	Splitless	1	DB-5MS (60 m, 0.25 mm id, 0,25 mm film)	HRMS (Mat-95 XP)	Splitless	1	DB-5MS (60 m, 0.25 mm id, 0,25 mm film)	HRMS (Mat-95 XP)
84	2301-MP	SPLITLESS	2	DB5MS	HRMS	SPLITLESS	1	DB5MS	HRMS	SPLITLESS	1	DB5MS	HRMS	SPLITLESS	1	DBXLB	HRMS
85	2301-MP	SPLITLESS	2	DB 5MS	HRMS	SPLITLESS	1	DB 5MS	HRMS								
86	2301-MP	splitless	2,0	60 m DB-5 MS capillary column	HRMS	splitless	2,0	60 m DB-5 MS capillary column	HRMS	splitless	2,0	60 m DB-5 MS capillary column	HRMS	splitless	1,0	60 m HT8 capillary column	GCMSMS
87	2301-MP																
88	2301-MP	splitless	2	%5 phenyl %95 polydimethylsiloxane	HRMS	splitless	2	%5 phenyl %95 polydimethylsiloxane	HRMS	splitless	2	%5 phenyl %95 polydimethylsiloxane	HRMS	splitless	2	%5 phenyl %95 polydimethylsiloxane	HRMS
89	2301-MP																
90	2301-MP																
91	2301-MP													splitless	1,0	dimethylpolysiloxane	ECD
92	2301-MP	PTV	7	DB 5MS	HRMS	PTV	7	DB 5MS	HRMS	PTV	7	DB 5MS	HRMS	PTV	7	DB 5MS	HRMS
93	2301-MP																
94	2301-MP	splitless	1	ZB-Dioxin	HRMS	splitless	1	ZB-Dioxin	HRMS	splitless	1	ZB-Dioxin	HRMS	splitless	1	ZB-Dioxin	HRMS
95	2301-MP																
96	2301-MP	Splitless	2	DB5MS	HRMS	Splitless	2	DB5MS	HRMS	Splitless	1	HT8PCB	HRMS	Splitless	1	HT8PCB	HRMS
97	2301-MP																
98	2301-MP	splitless	3	Rtx-Dioxin2 (60m x 0,25mm x 0,25um)	HRMS	splitless	3	Rtx-Dioxin2 (60m x 0,25mm x 0,25um)	HRMS	splitless	2	Rtx-Dioxin2 (60m x 0,25mm x 0,25um), HT8 (60m x 0,25mm x 0,25um)	HRMS	splitless	2	Rtx-Dioxin2 (60m x 0,25mm x 0,25um), HT8 (60m x 0,25mm x 0,25um)	HRMS
99	2301-MP	PTV	5	Column: Agilent VF-5ms 60m x 0,25mm x 0,25µm	HRMS	PTV	5	Column: Agilent VF-5ms 60m x 0,25mm x 0,25µm	HRMS	PTV	5	Column: Agilent VF-5ms 60m x 0,25mm x 0,25µm	HRMS	PTV	5	Column: Agilent VF-5ms 60m x 0,25mm x 0,25µm	HRMS
100	2301-MP																
101	2301-MP	pulsed splitless	3	vfx-ms	HRMS	pulsed splitless	3	HT8	HRMS	pulsed splitless	3	HT8	HRMS	pulsed splitless	2	HT8	HRMS
102	2301-MP	splitless	2	DB-5MS UI	HRMS	splitless	1	DB-5MS UI	HRMS	splitless	1	DB-5MS UI	HRMS				
103	2301-MP													PTV	1	DB-XLB	MS/MS
104	2301-MP	splitless	4	Rxi-5 Sil MS	MS/MS (triple quadrupole)	splitless	4	Rxi-5 Sil MS	MS/MS (triple quadrupole)	splitless	4	Rxi-5 Sil MS	MS/MS (triple quadrupole)	splitless	4	Rxi-5 Sil MS	MS/MS (triple quadrupole)
105	2301-MP	PTV	5	DB-5ms	HRMS	PTV	5	DB-5ms	HRMS								
106	2301-MP	PTV	2	5% Polysilarylene - 95% Polydimethilsyloxane (Zebron-dioxins)	HRMS	PTV	2	5% Polysilarylene - 95% Polydimethilsyloxane (Zebron-dioxins)	HRMS	PTV	2	low polarity si-arylene column (Zebron-XLB)	HRMS	PTV	2	low polarity si-arylene column (Zebron-XLB)	HRMS
107	2301-MP																
108	2301-MP													splitless	1	DB-XLB	MS/MS (QqQ)
109	2301-MP																
110	2301-MP																
111	2301-MP	PTV	6	DB5-MS	LRMS	PTV	2	DB5-MS	LRMS	PTV	2	DB5-MS	LMRS	PTV	2	DB5-MS	LMRS
112	2301-MP													Split/splitless	1	5 % diphenyl 95 % dimethylsiloxane (30m, 0,25 mm, 0,25 um)	GC/ECD
113	2301-MP	SPLITLESS	1	5% PHENYL	HRMS	SPLITLESS	1	5% PHENYL	HRMS	SPLITLESS	1	8% PHENYL	HRMS	SPLITLESS	1	8% PHENYL	HRMS
114	2301-MP	splitless	2	TG-Dioxin	HRMS	splitless	1	TG-Dioxin	HRMS	splitless	1	TG-Dioxin	HRMS	PTV	2	DB-XLB	GC-MS/MS
115	2301-MP													SPLITLESS	1	HT8 SGE	GC-MS TRIPLE QUAD
116	2301-MP	Splitless	2	Rtx-5MS, BPX-DXN	HRMS	Splitless	2	Rtx-5MS, HT8-PCB	HRMS	Splitless	2	Rtx-5MS, HT8-PCB	HRMS	Splitless	2	Rtx-5MS, HT8-PCB	HRMS
117	2301-MP																
118	2301-MP																
119	2301-MP													PTV	1 ul	DB5 MS UI	LRMS
120	2301-MP	Splitless	1	5% Phenyl (equiv) polysilphenylene-siloxane	HRMS	Splitless	1.0	TR-PCB 8 MS	HRMS	Splitless	1.0	TR-PCB 8 MS	HRMS	Splitless	1.0	TR-PCB 8 MS	HRMS
121	2301-MP					Splitless	1	5% DiPhenyl 95% Dimethyl Polysiloxane	LRMS/MS	PTV	1	5% DiPhenyl 95% Dimethyl Polysiloxane	HRMS	PTV	1	8% Phenyl (equiv) Policarborane-siloxane Phase	LRMS/MS
122	2301-MP													PTV splitless	1	HP-5MS UI (30mx0,25mmx0,25µm)	GC-MS/MS LRMS
123	2301-MP	Splitless	1	DB5MS	HRMS	Splitless	1	DB5MS	HRMS	Splitless	1	DB5MS	HRMS	Splitless	1	DB5MS	HRMS
124	2301-MP	PTV	5	SLB	HRMS	PTV	3	HT-8	HRMS	PTV	3	HT-8	HRMS	PTV	3	HT-8	HRMS
125	2301-MP																
126	2301-MP	PTV	2	Rtx-Dioxin2	HRMS	PTV	2	Rtx-Dioxin2	HRMS	PTV	1	SGE-HT8-PCB	HRMS	PTV	1	SGE-HT8-PCB	HRMS
127	2301-MP	splitless	2	DB-5MS	HRMS	splitless	2	DB-XLB	HRMS	splitless	2	DB-XLB	HRMS	splitless	2	DB-XLB	HRMS
128	2301-MP																
129	2301-MP													splitless	1	HP 5 MS	MS/MS
7A	2301-MP	splitless	2	DB-5 MS	HRMS	splitless	1	DB-5 MS	HRMS	splitless	1	DB-5 MS	HRMS	splitless	1	DB-5 MS	HRMS
97A	2301-MP																
101A	2301-MP	pulsed splitless	3	vfx-ms	HRMS	pulsed splitless	3	HT8	HRMS	pulsed splitless	3	HT8	HRMS	pulsed splitless	2	HT8	HRMS

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Milk Powder (2301-MP)
Bioanalytical screening methods PCDD/Fs and PCBs - Clean-up and Separation

LC	Sample	**Weighed sample** [g]	**Extraction** Sample preparation/pre-treatment	Extraction technique	Extraction solvent	Extraction time [h]	Extraction temperature [ºC]	Extraction pressure [Mpa]
9		25		Liquid/solid extraction	water/isopropanol/ethanol/hexane/diethylether; 20/20/20/38,8/1,2	2	ambient	ambient
39		0.12	drying	liquid-liquid extraction	Isopropanol and 3% diethyl ether	2min 3times	room tempetature	-
46		25	-	shaking	n-hexane:dichloromethane:methanol 5:2:1 v:v:v	3x 2 min	-	-
55		2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
58		10	reconstitution with water	LLE mit oxalic acid /Petroleum ehter/n-pentane				
66		1.84	evaporation, homogenisation	shaking	water, isopropanol, n-Hexan 1:1:2	2 hours	ambient	normal
67		2		cold shaking	MeOH/hexane	10 minutes	ambient	
74		5.01	Homogenization	soxhlet	Hexane	2	25	0,1
97		10	1. Soaking sample with mixture of acetone and water 2. Drying with Na2SO4	Column	n-hexane/acetone 2:1	2	18-22 (room ambient temperature)	-
97A		5.6	1. Soaking sample with mixture of acetone and water 2. Drying with Na2SO4	Column	n-hexane/acetone 2:1	2	18-22 (room ambient temperature)	-

		Clean-up (PCDD/Fs and PCBs)						**Clean-up (Separate analysis of PCDD/Fs and PCBs)**			
LC	Sample	Silica/sulfuric acid column	Alumina column	Florisil column	Carbon/celite column	Others	Separate analysis of PCDD/Fs and DL-PCBs	Alumina column	Florisil column	Carbon/celite column	Others
9		yes	no	no	no		no				
39		yes	no	no	no	no	no	no	no	no	no
46		yes	no	no	yes	no	yes	no	no	yes	no
55		yes	no	no	no	overnight pretreatment with sulphuric acid, then extracted with Hexane/Diethylether (97/3%)	no	n.a.	n.a.	n.a.	no separate analysis only PCDD/Fs + DL-PCBs (+ other AhR-agonist that ends up in final extract)
58		yes	no	no	no		no				
66		yes	no	no	no		no				
67		yes			yes		yes			yes	
74		Yes	No	No	Xcarb		Yes	no	no	Xcarb	
97		yes	no	yes	no		yes	no	yes	no	
97A		yes	no	no	no		no	no	no	no	

Milk Powder (2301-MP)

Bioanalytical screening methods PCDD/Fs and PCBs - Cell bioassay

LC	Sample	Name, type and provider of cell line	Method validated according to EU Regulation	Sample replicates on microtiter plate	Type of calibrators	Type of calibration function	Curve fitting method	Procedure blank correction	Recovery correction	Type of recovery reference sample(s)	Matrix of recovery reference sample(s)	Level(s) of recovery reference sample(s)		
												PCDD/F + DL-PCB	PCDD/F	DL-PCB
9	2301-MP	H4IIE, BDS	no	triplicates	TCDD	curve model	hill equation	no	no	spiked	beef fat	2 pg BEQ/g		
39	2301-MP	DR-EcoScreen	no	duplicates	TCDD	no use	logistic 4-parameter	yes	no	no	no	-	-	-
46	2301-MP	H1L6.1c3, XDS Inc.	yes	duplicates	TCDD, PCB 126	4-PL	SSR	yes	yes	spiked, GC/HRMS confirmed	milk fat	5,78	2,78	3
55	2301-MP	rat H4IIE (Wageningen University, now BDS)	yes	triplicates	reference samples milk fat	exponential fit	no	yes, automatically	yes, automatically	reference samples	milk fat	0.59/1.01/2.07/3.07/6.19 pg TEQ/g		
58	2301-MP	rat Hepatoma Typs H4L 1.1 c4 (University of California, Davis)	yes	triplicates	TCDD	curve model	WSSR regression	yes	yes	QC sample GC-HRMS confirmed	compound feed	80		
66	2301-MP	H4IIE hepatoma cells Gud.luc.	yes	triplicates	TCDD	linear model from 0 - 3,0 pM 0,8% DMSO	SSR	yes	yes	certified from BDS Holand		yes-BRM06 from BDS Holand		
67	2301-MP	mouse snixoid	yes	duplicate										
74	2301-MP	H1L6.1c3, mouse hepatoma, provided by Xenobiotic Detection System	yes	triplicates	We use the three calibrators TCDD, PCB126, and reference samples	curve model	by least squares estimates with the 4 parameter Hill Equation	no	no	GC/HRMS confirmed	milk powder		70	60
97	2301-MP	H4IIE, rat hepatome wild type, from Helmholtz-Zentrum Neuherberg/Germany	yes	triplicates	TCDD	S-Curve, 4-Parameter-Fit	WSSR	yes	yes	EURL PT sample: 13-02-MIA	milk	3,9 pg/g fat	2,1 pg/g fat	1,8 pg/g fat
97A	2301-MP	H4IIE, rat hepatome wild type, from Helmholtz-Zentrum Neuherberg/Germany	yes	triplicates	TCDD	S-Curve, 4-Parameter-Fit	SSR	yes	yes	GC/HRMS confirmed	milk	1,6 pg/g fat	0,4 pg/g fat	1,2 pg/g fat

LC	Sample	Bioassay cut-off value(s) calculated from				Other approach to bioassay cut-off value(s)
		matrix-matched calibration experiments (spiking) during initial validation	multiple analysis (n>6) of a sample contaminated at the GC/MS DL	multiple analysis (n>6) of a sample contaminated at 2/3 level of interest	matrix-matched calibration experiments (confirmed samples) during re-evaluation	
9	2301-MP	no	no	no	no	
39	2301-MP	yes	no	no	no	no
46	2301-MP	yes	no	no	no	3/4 AL was assumed as the cut-off level for AL.
55	2301-MP	no	no	no	no	using bioassay cut-off 2/3 ML for PCDD/Fs = 1.35 pg BEQ/g
58	2301-MP	no	yes	no	no	
66	2301-MP					2/3 of ML
67	2301-MP					
74	2301-MP	Yes	no	no	yes	no
97	2301-MP	yes for sum; no for seperate analysis of PCDD/Fs & dl PCBs in milk	no	no	yes, considering PCDD/Fs + dl PCB in milk/milk fat	2/3 of AL/ML
97A	2301-MP	yes	no	no	yes	

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Milk Powder (2301-MP)

Physico-chemical Methods PCDD/Fs and PCBs - Additional Information

LC	Sample		Additional information Physical-chemical methods		Additional information Bioanalytical methods
2	2301-MP		J&W DB-Dioxin column [44% methyl- 28% phenyl-20% cyanopropylpolysiloxane + 8% carbowax] used for confirmation of certain congeners.		
41	2301-MP		Automatic purification MIURA		
44	2301-MP		The amount of sample received does'nt match with the amount we usually use to analyze this kind of matrix.	It was not possible to extract 4 grams of fat, the recquired amount to perform the analysis.	
54	2301-MP		Cleaning of the extracted raw fat with tert butyl methyl ether by dissolving of the raw fat extract (after extraction) and allow to stand overnight. Next step is filtration and	afterwards the determination of the lipid content.	
60	2301-MP		The result for PCB156 was generated using DB-XLB gc column.		
76	2301-MP		For the first extraction step, we are using a QUECHERS-robot for the shaking and phase separation step		
83	2301-MP		Process for the acreditation of PCB-indicators still running		
112	2301-MP		Metodo Rose-Gottlieb for fat extraction		
114	2301-MP		Indicator PCBs:	Extraction: SLE (n-hexane) ; Clean-up: acid treatment + SPE (silica)	
55	2301-MP				no separate analysis only Total BEQ: PCDD/Fs + DL-PCBs (+ other AhR- agonist that ends up in final extract) this method is used as a screening assay, samples classified as suspect are subsequently analyse by GCHRMS analysis