EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024

EURL-PT-POP_2401-BM

FOOD

Report

PFAS

(Report Version 1.0)

26 March 2025

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Summary

Test sample	**FOOD:** Bovine Meat [2401-BM]
Analytes of interest	
Mandatory for NRLs:	**PFASs** (PFOS, PFOA, PFNA, PFHxS, Sum of PFOS, PFOA, PFNA, PFHxS)
Optional for NRLs:	**Other PFASs** (perfluoroalkylcarboxylic acids, perfluoroalkylsulfonic acids, perfluoroalkane sulfonamides)
Methods	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 March 2025 (Version 1.0)
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 ILS, test material and analytes

This proficiency test (PT) on the determination of **PCDD/Fs, PCBs, PBDEs, HBCDDs** and **PFAS** in **Bovine Meat** was organized by the EURL for halogenated POPs in Feed and Food to be performed between February and April 2024. 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 **Bovine Meat**.

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 2024. 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.

First results were discussed by representatives of European Commission, NRLs and the EURL at the EURL/NRL workshop in May 2024 in Freiburg, Germany.

1.1. Samples and coding

The test sample was prepared from contaminated food fortified with some analytes of interest using analytical standards or technical mixtures of PCDD/Fs, PCBs, PBDEs and HBCDDs.

Bovine Meat	**Sample no. 2401-BM-xxx**

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

1.2. Analytes of interest

NRLs for halogenated POPs in feed and food were requested to determine the following parameters:

- **PFASs**
  - Total perfluorooctane sulfonic acid (Total-PFOS[1]), perfluorooctanoic acid (PFOA), perfluorononanoic acid (PFNA), perfluorohexane sulfonic acid (PFHxS)
  - Sum of Total-PFOS[1], PFOA, PFNA, PFHxS

NRLs for halogenated POPs in feed and food are encouraged to determine the following additional parameters for PFASs:

- **Optional PFASs**
  - **Perfluoroalkylsulfonic acids (PFSAs):** perfluorobutanesulfonic acid (PFBS), perfluoropentanesulfonic acid (PFPeS), perfluoroheptanesulfonic acid (PFHpS), linear perfluorooctanesulfonic acid (L-PFOS), branched perfluorooctanesulfonic acids (br-PFOS), perfluorononanesulfonic acid (PFNS), perfluorodecanesulfonic acid (PFDS), perfluoroundecane sulfonic acid (PFUnDS), perfluorododecane sulfonic acid (PFDoDS), perfluorotridecane sulfonic acid (PFTrDS)
  - **Perfluoroalkylcarboxylic acids (PFCAs):** perfluorobutanoic acid (PFBA), perfluoropentanoic acid (PFPeA), perfluorohexanoic acid (PFHxA), perfluoroheptanoic acid (PFHpA), perfluorodecanoic acid (PFDA), perfluoroundecanoic acid (PFUnDA), perfluorododecanoic acid (PFDoDA), perfluorotridecanoic acid (PFTrDA), perfluorotetradecanoic acid (PFTeDA)
  - Perfluorooctane sulphonamide **(FOSA)**
  - 2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluor-3-(trifluoromethoxy)propoxy]-propionic acid **(DONA)**
  - 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoic acid **(GenX)**
  - Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate (major component of **F-53B**)
  - Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate (minor component of **F-53B**)
  - 1-Propanaminium, N,N-dimethyl-N-oxide-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide (**Capstone A**)
  - 1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide (**Capstone B**)

1.3. Methods

Any kinds of detection and quantification methods could be applied.

[1] Total-PFOS: sum of linear and branched stereoisomers, whether they are chromatographically separated or not

1.4. Coding of laboratories and confidentiality

The identity of participating laboratories will be kept confidential and will not be revealed to other participants. 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 PFAS

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,
- 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 **µg/kg wet weight (w. w.).**

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. 58 laboratories reported results for PFAS. One laboratory reported two sets of results.

Table 1: Participating laboratories

Participating laboratories	Region	No. of participants	No. of participants reporting PFAS results
National Reference Laboratories	European Union	27	20
	Other Countries	5	1
Official Laboratories	European Union	69	28
	Other European Countries	4	3
	Africa	-	-
	Americas	1	-
	Asia	-	-
	Oceania	-	-
Commercial Laboratories	European Union	18	5
	Other European Countries	2	1
	Africa	-	-
	Americas	1	-
	Asia	2	-
	Oceania	-	-
	Total	**129**	**58**

2.1. Number of reported results

Table 2: Reported results for individual PFAS substances for bovine meat (2401-BM) of all laboratories

Analyte	Abbreviation	2401-BM
Perfluorobutanoic acid	(PFBA)	37
Perfluoropentanoic acid	(PFPeA)	43
Perfluorohexanoic acid	(PFHxA)	47
Perfluoroheptanoic acid	(PFHpA)	48
Perfluorooctanoic acid	(PFOA)	59
Perfluorononanoic acid	(PFNA)	59
Perfluorodecanoic acid	(PFDA)	48
Perfluoroundecanoic acid	(PFUnDA)	48
Perfluorododecanoic acid	(PFDoDA)	47
Perfluorotridecanoic acid	(PFTrDA)	42
Perfluorotetradecanoic acid	(PFTeDA)	42
Perfluorobutanesulfonic acid	(PFBS)	45
Perfluoropentanesulfonic acid	(PFPeS)	41
Perfluorohexanesulfonic acid	(PFHxS)	58
Perfluoroheptanesulfonic acid	(PFHpS)	45
Linear Perfluorooctanesulfonic acid	(L-PFOS)	46
Perfluorononanesulfonic acid	(PFNS)	40
Perfluorodecanesulfonic acid	(PFDS)	43
Perfluoroundecanesulfonic acid	(PFUnDS)	28
Perfluorododecanesulfonic acid	(PFDoDS)	31
Perfluorotridecanesulfonic acid	(PFTrDS)	23
Perfluorooctane sulphonamide	(FOSA)	23

Analyte	Abbreviation	2401-BM
2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluor-3-(trifluoromethoxy)propoxy]-propionic acid	(DONA)	31
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoic acid	(GenX)	30
Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate	(major component of F-53B)	29
Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate	(minor component of F-53B)	28
1-Propanaminium, N,N-dimethyl-N-oxide-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide	(Capstone A)	4
1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide	(Capstone B)	5

Table 3: Reported results for PFASs sum parameters for bovine meat (2401-BM) of all laboratories

Analyte	2401-BM
Sum of branched perfluorooctanesulfonic acids (br-PFOS)	43
Sum of branched & linear perfluorooctanesulfonic acids (Total-PFOS)	56
Sum of Total-PFOS, PFOA, PFNA, PFHxS (upper bound)	54
Sum of Total-PFOS, PFOA, PFNA, PFHxS (lower bound)	58

2.2. Accreditation

Table 4: Reported accreditation according to ISO/IEC 17025 by participants for PFAS

Bovine meat	PFAS
Accreditation	42
No accreditation	16

2.3. Detection methods

Any kind of chromatographic separation and detection methods could be applied for analysis. Most of the participating laboratories applied ultra- or high-performance liquid chromatography (U/HPLC) as separation method combined with low resolution tandem mass spectrometry (MS/MS) as detection method, except two laboratories, which applied high resolution mass spectrometry (Orbitrap) as detection method.

3. Test for sufficient homogeneity

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 2401-BM were analysed in duplicate for PFCAs, PFSAs and sum parameters. The test materials showed sufficient homogeneity PFAS substances in 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 PFAS substances 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:

- PFBA, PFPeA, PFHxA, PFHpA, PFOA
- PFBS, PFPeS, PFNS, PFUnDS, PFDoDS, PFTrDS
- FOSA, DONA, GenX, major component of F-53B, minor component of F-53B, Capstone A, Capstone B

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 L-PFOS, PFNA, PFHxS and sum parameters (sum of branched and linear Perfluorooctanesulfonic acids) and sum of Total-PFOS, PFOA, PFNA, PFHxS. 42 of 58 reporting laboratories were accredited according to ISO/IEC 17025 for PFAS in food. After eliminating outliers, 35 to 41 results contributed to the calculation of the assigned values from the ISO/IEC 17025 group. No significant differences (1 - 4%) between the assigned values calculated for both data sets for PFAS were observed. For PFHxS a slightly higher deviations of 8% was observed, due to the low contamination level (Table 5).

Table 5: Comparison of assigned values for 2401-BM for all participants and participants with reported accreditation according to ISO/IEC 17025 for PFAS

Individual compounds and sum parameters	Assigned value All participants	Assigned value ISO/IEC 17025 accreditation	Deviation
	µg/kg w.w.		%
PFNA	0.315	0.327	<4
PFHxS	0.0726	0.0783	<8
Total-PFOS	0.747	0.751	<1
Sum of Total-PFOS, PFOA, PFNA, PFHxS (ub)	1.19	1.22	<3
Sum of Total-PFOS, PFOA, PFNA, PFHxS (lb)	1.14	1.15	<1

4.1. PFASs – individual substances

The assigned values for the test sample 2401-BM were calculated as consensus of participants' results for individual PFAS, taking into account the calculation criteria described above (Table 6 and 7; tabular summary see annex 1; Figure 1 and 2).

Table 6: Assigned values for Perfluoroalkylcarboxylic acids (rounded to three significant figures)

Bovine meat (2401-BM)	Assigned value PFCAs µg/kg w.w.
PFNA	0.315
PFDA	0.692
PFUnDA	0.475
PFDoDA	0.286
PFTrDA	0.177
PFTeDA	0.161

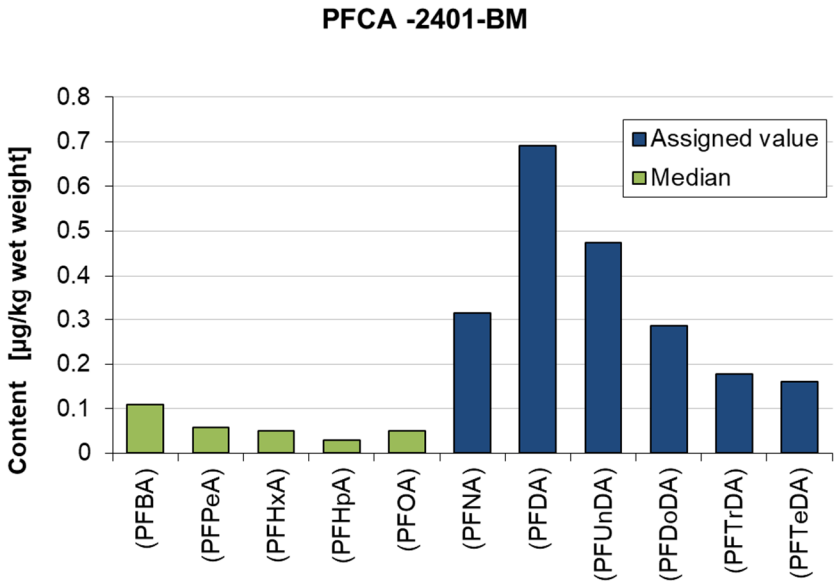

Figure 1: Assigned values (blue) and median values (green) for PFCAs individual substances for bovine meat (2401-BM) [µg/kg w.w.]

Table 7: Assigned values for Perfluoroalkylsulfonic acids (rounded to three significant figures)

Bovine meat (2401-BM)	Assigned value PFSAs µg/kg w.w.
PFHxS	0.0726
PFHpS	0.239
L-PFOS	0.536
PFDS	0.242

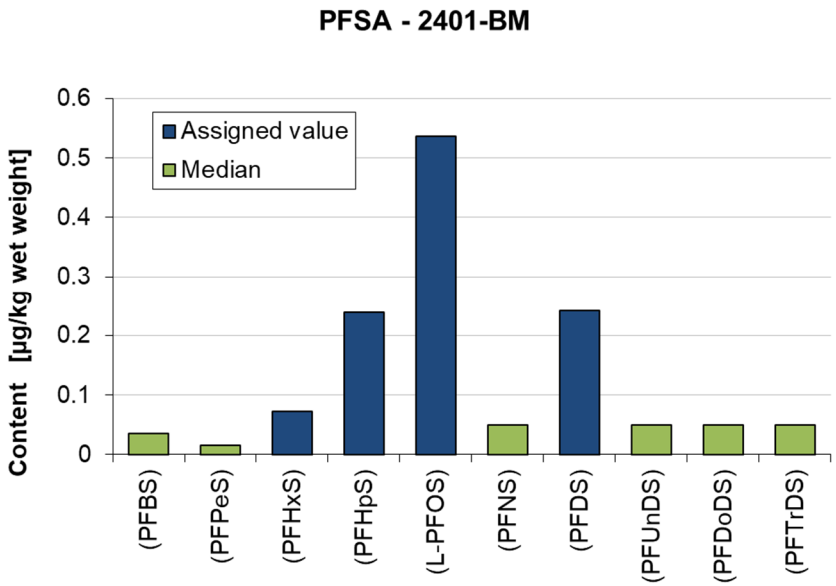

Figure 2: Assigned values (blue) and median values (green) for PFSAs individual substances for bovine meat (2401-BM) [µg/kg w.w.]

4.2. PFASs – sum parameter

The assigned values for the test sample 2401-BM were calculated as consensus of participants' results for PFAS sum parameters, taking into account the calculation criteria described above (Table 8; tabular summary see annex 1; Figure 3).

Table 8: Assigned values for sum of PFOS, PFOA, PFNA, PFHxS (rounded to three significant figures)

Bovine meat (2401-BM)	Assigned value µg/kg w.w.
Sum of branched perfluorooctanesulfonic acids (br-PFOS)	0.221
Sum of branched & linear perfluorooctanesulfonic acids (Total-PFOS)	0.747
Sum of Total-PFOS, PFOA, PFNA, PFHxS (upper bound)	1.19
Sum of Total-PFOS, PFOA, PFNA, PFHxS (lower bound)	1.14

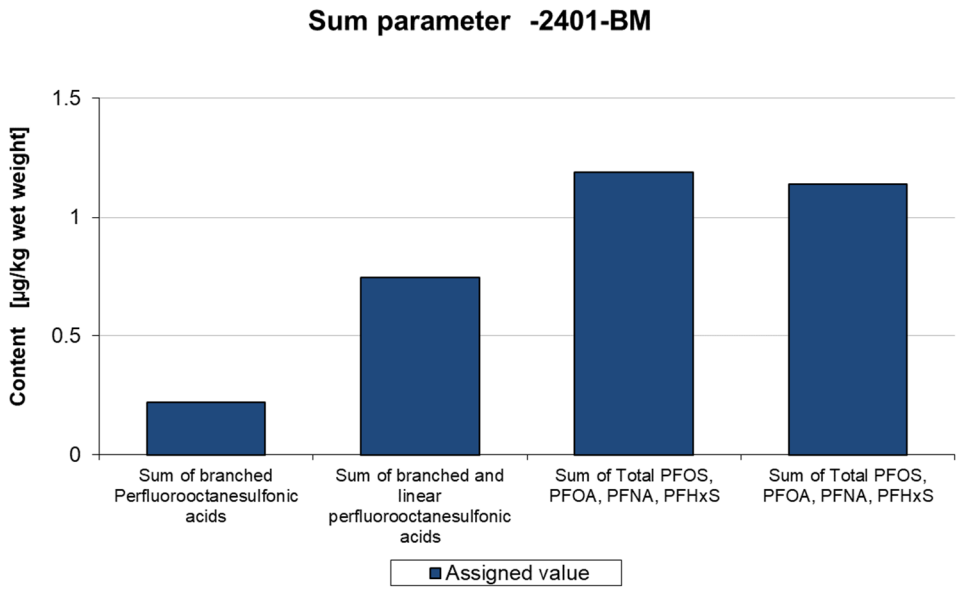

Figure 3: Assigned values (blue) for PFAS sum parameters for bovine meat (2401-BM) [µg/kg w.w.]

4.3. Comparison of the assigned value with legal limits

Maximum levels for food are defined in Commission Regulation (EC) No 2023/915 of 25 April 2023 setting maximum levels for certain contaminants in foodstuff. Maximum levels for PFAS in Foodstuffs can be found under Annex 1 section 4.2.and are summarized in Table 9. For the Bovine Meat test sample 2401-BM the assigned values for Total-PFOS, PFNA, PFHxS and sum of Total-PFOS, PFOA, PFNA, PFHxS were compared to the maximum levels and are in the range of the respective maximum levels (Figure 4).

Table 9: Maximum levels according to Commission Regulation (EC) No 2023/915 of 25 April 2023

Annex 1 Section 4.2 : Perfluoroalkyl substances 4.2.1.1 Meat of bovine animals	Unit	Maximum level
PFOS	**µg/kg**	**0.30**
PFOA	**µg/kg**	**0.80**
PFNA	**µg/kg**	**0.20**
PFHxS	**µg/kg**	**0.20**
Sum of PFOS, PFOA, PFNA and PFHxS	**µg/kg**	**1.3**

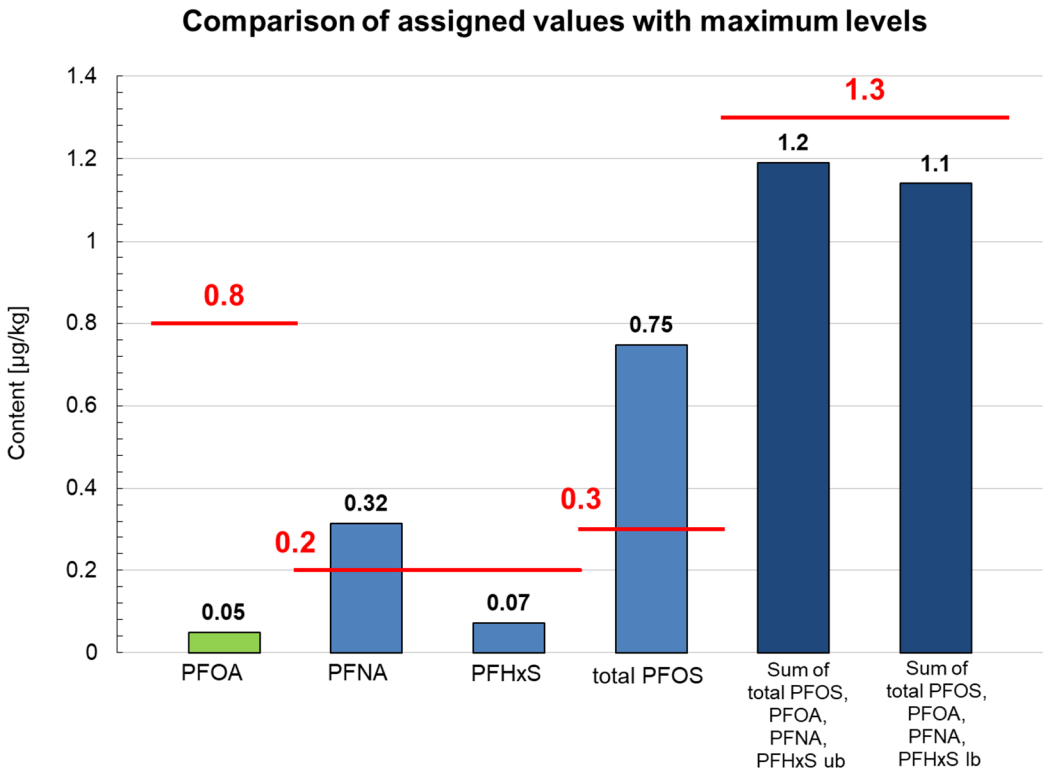

Figure 4: Comparison of the assigned values (blue bars; median values green bars) for PFOA, PFNA, PFHxS, Total-PFOS and sum of Total-PFOS, PFOA, PFNA, PFHxS (ub and lb) for Bovine Meat (2401-BM) with maximum levels (red lines)) [µg/kg w.w.]

5. Scoring of results – Z-scores

For evaluation of results, the z-scores were calculated according to the following formula:

$$z = \frac{(x - x_a)}{\sigma_{p_{rel}} * x_a}$$

x: *participant's result*
x_a: *assigned value*
σ_{prel}: *relative fitness-for-purpose-based "standard deviation for proficiency assessment"*

For individual substances and sum parameters, the standard deviation for proficiency assessment σ_{prel} is defined as 20 %.

Z-scores for individual substances and sum parameters 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. PFAS individual substances - Participants' z-scores

Z-scores for individual PFCAs and PFASs were within the range of ± 2 for 71% to 97% of all participants (Table 10 and 11; tabular summary see annex 3; Figure 5).

Table 10: Distribution of participants' z-scores for PFCAs for bovine meat (2401-BM)

Percentage of participants' results PFCAs	$\lvert z\text{-score} \rvert \leq 2$	$2 < \lvert z\text{-score} \rvert < 3$	$\lvert z\text{-score} \rvert \geq 3$
PFNA	97%	2%	2%
PFDA	93%	4%	2%
PFUnDA	93%	2%	4%
PFDoDA	95%	5%	-
PFTrDA	71%	11%	17%
PFTeDA	82%	3%	15%

Table 11: Distribution of participants' z-scores for PFSAs for bovine meat (2401-BM)

Percentage of participants' results PFSAs	|z-score| ≤ 2	2 < |z-score| < 3	|z-score| ≥ 3
PFHxS	90%	2%	8%
PFHpS	88%	10%	2%
L-PFOS	96%	4%	-
PFDS	78%	12%	10%

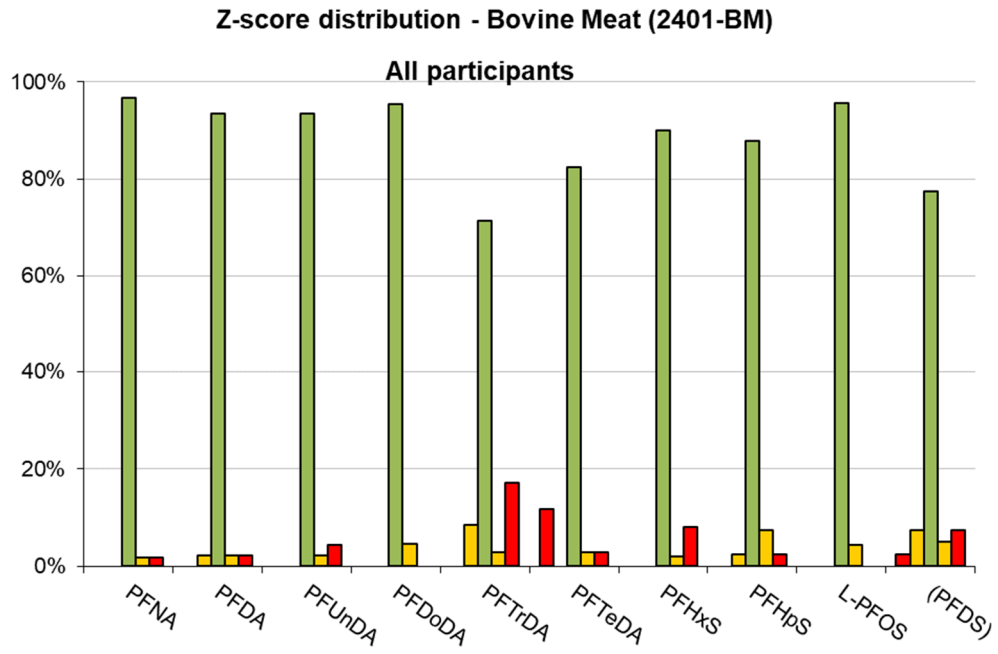

Figure 5: Distribution of participants' z-scores for individual PFCAs for bovine meat (2401-BM) [Green bars: -2 ≤ z-score ≤ 2, orange bars: -3 < z-score < -2, 2 < z-score < 3, red bars: z-score ≤ -3, z-score ≥ 3]

5.2. PFASs sum parameters - Participants' z-scores

Z-scores for sum parameters were within the range of ± 2 for 74% to 88% of all participants (Table 11; tabular summary see annex 3; Figure 6).

Table 12: Distribution of participants' z-scores for sum parameters and DONA for bovine meat (2401-BM)

Percentage of participants' results Sum parameters	|z-score| ≤ 2	2 < |z-score| < 3	|z-score| ≥ 3
Sum of branched Perfluorooctanesulfonic Acid (br-PFOS)	74%	16%	10%
Sum of branched and linear Perfluorooctanesulfonic Acid (Total-PFOS)	88%	12%	-
Sum of t-PFOS, PFOA, PFNA, PFHxS (ub)	87%	7%	6%
Sum of t-PFOS, PFOA, PFNA, PFHxS (lb)	88%	5%	7%

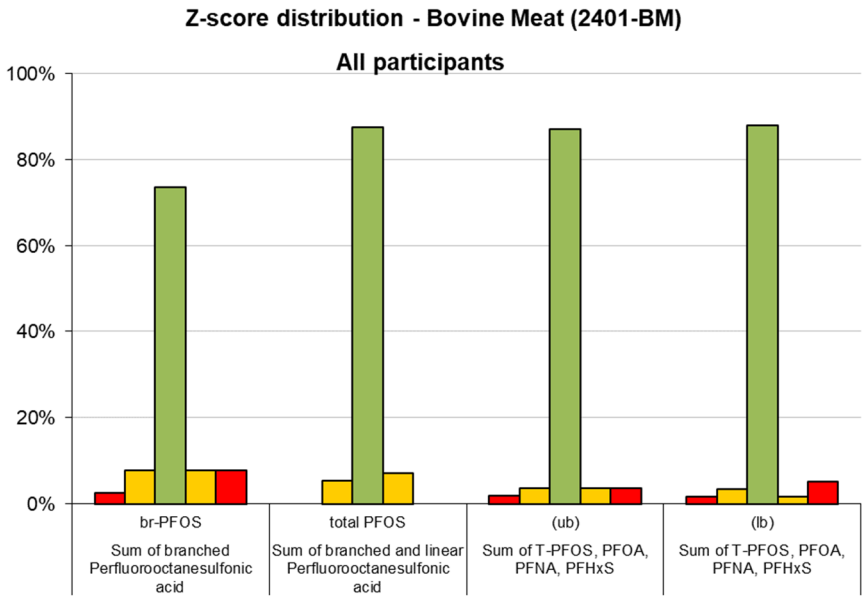

Figure 6: Distribution of participants' z-scores for individual PFSAs for bovine meat (2401-BM) [Green bars: -2 ≤ z-score ≤ 2, orange bars: -3 < z-score < -2, 2 < z-score < 3, red bars: z-score ≤ -3, z-score ≥ 3]

6. Participants' feedback

A questionnaire for feedback from participants of this EURL proficiency test was available as online survey between 23 April 2024 and 31 May 2024. 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, 10 laboratories (13 % of all PT participants) replied to this survey.

Table 13: Participating laboratories in the feedback survey

Type of laboratory	Answers
National Reference Laboratory (NRL)	5
Official Laboratory (OFL)	3
Commercial laboratory	1
Other (e.g. research and development)	1
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?	★★★★½
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:

- The amount of sample received was not enough for BIOSSAY and CONFIMATORY METHOD. We had subscribed for both participation. *EURL comment: if you need more test material please let us know before shipment (the amount of one portion of reference material can be found in the announcement) you can add this as a comment during registration*
- Very suitible matrix, would be good to investigate and see if something could be done to achieve assigned value for BDE-209. Maybe spike PT with just that to make it easier to analyze? or if it is hard to press the LOQ to the level it needs to be, maybe allow a higher LOQ? *EURL comment: BDE-209 was spiked 20-times higher than the recommended LOQ of 0.01µg/kg w.w.; unfortunately, no assigned value could be calculated*
- HBCDD: Sample was below the limit of quantification. *EURL comment: The aim was to spike HBCDD at the recommended LOQ of 0.01µg/kg w.w.; unfortunately, no assigned value could be calculated at that low level*

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).

All homogeneity and stability testing was performed under accreditation according to DIN EN ISO/IEC 17025:2018.

8. Results of participants

An overview of the PFASs results for the PT test sample Bovine Meat (2401-BM) 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.

10. Annex

Bovine Meat – 2401-BM	
1	Assigned values – PFCAs, PFSAs and sum parameters
2	Participants' results – Tables – PFCAs, PFSAs, sum parameters and other PFAS
3	Participants' z-scores – Tables – PFCAs, PFSAs, sum parameters
4	Participants' z-scores – Charts – PFCAs, PFSAs, sum parameters
5	Test for sufficient homogeneity and stability – PFCAs and PFSAs
6	Overview participants' methods – Weighed sample, internal and recovery standards and comments
7	Overview participants' methods – Extractions, clean-up and detection
8	Overview participants' methods – Measurement uncertainty and Limit of Quantification

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EURL Proficiency Test on Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]
EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food
26 March 2025

Annex 1: Assigned values of PFCAs, PFSAs and sum of PFOS, PFOA, PFNA, PFHxS

Test sample - Bovine Meat (2401-BM)

Assigned values of individual substances and sum parameters

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

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Bovine Meat 2024 [EURL-PT-POP_2401-BM]

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

Bovine Meat (2401-BM)

Perfluoroalkylcarboxylic acids (PFCAs) - Assigned values

Analyte		Result µg/kg wet weight	**Assigned value** [outliers removed]	**Robust standard deviation** [outliers removed]	**Standard uncertainty** [outliers removed]	**No. of results contributing to assigned value**	**Median** [all values]
Perfluorobutanoic acid	(PFBA)						0.110
Perfluoropentanoic acid	(PFPeA)						0.0585
Perfluorohexanoic acid	(PFHxA)						0.0500
Perfluoroheptanoic acid	(PFHpA)						0.0300
Perfluorooctanoic acid	(PFOA)						0.050
Perfluorononanoic acid	(PFNA)		0.315	0.045	0.0076	56	0.311
Perfluorodecanoic acid	(PFDA)		0.692	0.110	0.021	43	0.679
Perfluoroundecanoic acid	(PFUnDA)		0.475	0.086	0.016	43	0.4620
Perfluorododecanoic acid	(PFDoDA)		0.286	0.053	0.0099	44	0.2900
Perfluorotridecanoic acid	(PFTrDA)		0.177	0.028	0.0064	30	0.180
Perfluorotetradecanoic acid	(PFTeDA)		0.161	0.035	0.0078	32	0.157

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Bovine Meat 2024 [EURL-PT-POP_2401-BM]

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

Bovine Meat (2401-BM)

Perfluoroalkylsulfonic acids (PFSAs) - Assigned values

Analyte		Result µg/kg wet weight	**Assigned value** [outliers removed]	**Robust standard deviation** [outliers removed]	**Standard uncertainty** [outliers removed]	**No. of results contributing to assigned value**	**Median** [all values]
Perfluorobutanesulfonic acid	(PFBS)						0.0350
Perfluoropentanesulfonic acid	(PFPeS)						0.0150
Perfluorohexanesulfonic acid	(PFHxS)		0.0726	0.016	0.0030	48	0.0733
Perfluoroheptanesulfonic acid	(PFHpS)		0.239	0.051	0.010	41	0.2360
Linear Perfluorooctanesulfonic acid	(L-PFOS)		0.536	0.086	0.016	44	0.553
Sum of branched Perfluorooctanesulfonic acids	(br-PFOS)		0.221	0.054	0.012	32	0.215
Sum of branched and linear perfluorooctanesulfonic acids	(total PFOS)		0.747	0.15	0.026	52	0.772
Perfluorononanesulfonic acid	(PFNS)						0.0500
Perfluorodecanesulfonic acid	(PFDS)		0.242	0.061	0.012	38	0.2490
Perfluoroundecane sulfonic acid	(PFUnDS)						0.0500
Perfluorododecane sulfonic acid	(PFDoDS)						0.0500
Perfluorotridecane sulfonic acid	(PFTrDS)						0.0500

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Bovine Meat 2024 [EURL-PT-POP_2401-BM]

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

Bovine Meat (2401-BM)

Sum of PFOS, PFOA, PFNA, PFHxS - Assigned values

Analyte		Result µg/kg wet weight	**Assigned value** [outliers removed]	**Robust standard deviation** [outliers removed]	**Standard uncertainty** [outliers removed]	**No. of results contributing to assigned value**	**Median** [all values]
Sum of total PFOS, PFOA, PFNA, PFHxS	(ub)		1.19	0.20	0.036	47	1.19
Sum of total PFOS, PFOA, PFNA, PFHxS	(lb)		1.14	0.19	0.033	51	1.16

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Bovine Meat 2024 [EURL-PT-POP_2401-BM]

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

Bovine Meat (2401-BM)

Other PFAS - Assigned values

Analyte		Result µg/kg wet weight	**Assigned value** [outliers removed]	**Robust standard deviation** [outliers removed]	**Standard uncertainty** [outliers removed]	**No. of results contributing to assigned value**	**Median** [all values]
Perfluorooctane sulphonamide	(FOSA)						0.0500
2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluor-3-(trifluoromethoxy)propoxy]-propionic acid	(DONA)						0.0500
2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoic acid	(GenX)						0.0615
Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate	(major component of F-53B)						0.0485
Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate	(minor component of F-53B)						0.0250
1-Propanaminium, N,N-dimethyl-N-oxide-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide	(Capstone A)						0.175
1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide	(Capstone B)						0.150

EURL Proficiency Test on Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]
EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food
26 March 2025

Annex 2: Participants' results of PFCAs, PFSAs, FOSA and sum of PFOS, PFOA, PFNA, PFHxS

Test sample - Bovine Meat (2401-BM)

* 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 Bovine Meat 2024 [EURL-PT-POP_2401-BM]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bovine Meat (2401-BM)
Perfluoroalkylcarboxylic acids (PFCAs) - Results

LC	Sample	Result µg/kg wet weight	Perfluorobutanoic acid **(PFBA)**	Perfluoropentanoic acid **(PFPeA)**	Perfluorohexanoic acid **(PFHxA)**	Perfluoroheptanoic acid **(PFHpA)**	Perfluorooctanoic acid **(PFOA)**	Perfluorononanoic acid **(PFNA)**	Perfluorodecanoic acid **(PFDA)**	Perfluoroundecanoic acid **(PFUnDA)**	Perfluorododecanoic acid **(PFDoDA)**	Perfluorotridecanoic acid **(PFTrDA)**	Perfluorotetradecanoic acid **(PFTeDA)**
1	2401-BM		0.12	0.007	< 0.007	0.0026	0.0069	0.35	0.668	0.565	0.309	0.204	0.177
2	2401-BM		0.051	< 0.02	< 0.02	< 0.02	< 0.05	0.214	0.458	0.345	0.195	0.111	0.066
9	2401-BM		< 0.1	< 0.1	0.131	< 0.1	< 0.1	0.297	0.287	< 0.2	< 0.2	< 0.5	< 0.5
10	2401-BM						0.034	0.311					
14	2401-BM		< 0.406	< 0.326	< 0.137	< 0.166	< 0.196	0.308	0.983	0.635	< 1.37	< 0.206	< 0.915
17	2401-BM		< 0.1	0.11	< 0.1	< 0.1	< 0.1	0.336	0.727	0.562	0.38	0.284	0.307
18	2401-BM		< 0.01	< 0.01	< 0.01	< 0.01	0.0071	0.306	0.663	0.483	0.283	0.152	0.143
21	2401-BM		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.29	0.44	0.36	0.25	0.15	< 0.1
22	2401-BM		< 0.01	< 0.01	< 0.01	< 0.01	0.02	0.429	0.856	0.904	0.386	< 0.01	< 0.01
26	2401-BM				< 0.005	< 0.005	0.00705	0.329	0.696	0.45	0.256		
27	2401-BM			< 0.3	< 0.3	< 0.05	< 0.06	0.529	1.16	0.66			
28	2401-BM			< 0.01	0.01	0.013	0.013	0.322	0.686	0.484	0.289	0.234	0.187
33	2401-BM		< 0.01	0.0144	< 0.01	< 0.01	0.056	0.3	0.633	0.429	0.295	0.16	0.099
34	2401-BM		< 1.1	0.099	< 0.02	< 0.01	< 0.01	0.243	0.543	0.397	0.228	0.19	0.058
35	2401-BM		< 10	< 0.2	< 0.2	< 0.2	< 0.2	0.328	0.751	0.314	0.431	< 0.2	0.21
40	2401-BM						< 0.05	0.21					
42	2401-BM		< 0.0028	< 0.0028	< 0.0028	< 0.0028	0.0057	0.281	0.875	0.439	0.255	0.0894	0.0318
43	2401-BM		< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	0.3	0.62	0.44	0.26	0.17	0.12
48	2401-BM		< 0.1	0.12	< 0.01	< 0.01	0.01	0.333	0.7	0.457	0.291	0.445	0.152
49	2401-BM		< 0.1	< 0.05	< 0.03	< 0.03	< 0.03	0.31	0.64	0.45	0.25		
51	2401-BM		< 0.0298	< 0.00955	< 0.0298	< 0.00298	0.00705	0.316	0.679	0.5	0.289	0.172	0.157
53	2401-BM		< 0.2	< 0.01	< 0.01	< 0.01	0.007	0.286	0.64	0.455	0.248	0.143	0.126
56	2401-BM		< 0.4	< 0.05	< 0.2	< 0.05	< 0.2	0.328	0.754	0.518	0.32	0.162	0.199
58	2401-BM				< 0.008	< 0.013	0.0075	0.31	0.62	0.48	0.3		
60	2401-BM				< 0.005	< 0.1	0.009	0.369	0.76	0.537	0.305	0.176	0.157
65	2401-BM		< 0.1	< 0.1	< 0.1	< 0.1	< 0.01	0.317	0.705	0.51	0.29	0.187	0.149
66	2401-BM		0.167	< 0.005	< 0.005	< 0.005	0.0077	0.363	0.807	0.599	0.377	0.179	0.18
67	2401-BM		< 0.02	< 0.02	< 0.02	< 0.02	0.02	0.328	0.678	0.464	0.328	< 0.02	< 0.02
68	2401-BM		< 0.5	0.03	< 0.01	< 0.01	< 0.01	0.238	0.678	0.363	0.232	0.297	0.16
69	2401-BM		< 0.067	< 0.067	< 0.067	< 0.067	< 0.067	0.29	0.45	0.46	0.25		
70	2401-BM						< 0.1	0.29					
71	2401-BM						< 0.2	0.37					
74	2401-BM						< 0.1	0.34					
76	2401-BM		< 0.3	< 0.1	< 0.1	< 0.01	< 0.01	0.43	< 0.01	0.71	0.4	0.22	0.2
78	2401-BM		< 0.5	< 0.2	< 0.01	< 0.01	< 0.02	0.214	0.447	0.326	0.197	0.136	0.095
79	2401-BM		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.349	0.723	0.549	0.321	0.152	0.174
80	2401-BM			< 0.1	< 0.05	< 0.05	< 0.05	0.365	0.77	0.563	0.338	0.19	0.178
81	2401-BM		< 0.2	< 0.05	< 0.05	< 0.05	< 0.05	0.311	0.649	0.462	0.281	0.179	0.149
82	2401-BM						0.00632	0.305					
83	2401-BM				< 0.05	< 0.05	< 0.05	0.31	0.63	0.39	0.27		0.13
84	2401-BM		< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	0.36	0.74	0.42	0.317	0.094	0.141
85	2401-BM		< 0.56	< 0.084	< 0.084	< 0.084	< 0.084	0.286	0.617	0.439	0.266	0.183	0.151
86	2401-BM		< 10	< 0.1	< 0.05	< 0.05	< 0.05	0.45	0.9	0.76	0.45	0.3	
87	2401-BM		< 0.07	< 0.07	< 0.05	< 0.02	< 0.03	0.348	0.724	0.523	0.291	0.218	0.171
92	2401-BM						< 0.02	0.32					
93	2401-BM			< 0.2	< 0.05	< 0.025	< 0.1	0.28	0.59	0.44	0.27	0.18	0.14
96	2401-BM						< 0.05	0.391					
97	2401-BM						< 0.1	0.28					
99	2401-BM						< 0.1	0.413					
112	2401-BM						< 0.05	0.58					
113	2401-BM			< 0.1	< 0.1	< 0.1	< 0.1	0.41	0.82	0.59	0.34	0.29	0.23
114	2401-BM					< 0.05	< 0.05	0.364	0.793	0.563	0.357	0.475	< 0.25
115	2401-BM			< 0.15	< 0.03	< 0.02	< 0.02	0.334	0.729	0.492	0.316	0.172	0.131
117	2401-BM		< 0.2	< 0.2	< 0.2	< 0.2	0.38	0.22	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
118	2401-BM		< 0.25	< 0.05	< 0.05	< 0.05	< 0.05	0.38	0.83	0.62	0.36	0.28	0.21
124	2401-BM		< 0.05	< 0.01	< 0.01	< 0.01	< 0.05	0.33	0.78	0.5	0.3	0.17	0.17
3B	2401-BM						< 0.01	0.224					
59B	2401-BM		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.26	0.48	0.35	0.22	< 0.2	< 0.2
81A	2401-BM		< 0.2	< 0.05	< 0.05	< 0.05	< 0.05	0.311	0.649	0.462	0.281	0.179	0.149

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Bovine Meat (2401-BM)
Perfluoroalkylsulfonic acids (PFSAs) - Results

LC	Sample	Result µg/kg wet weight	Perfluorobutanesulfonic acid (PFBS)	Perfluoropentanesulfonic acid (PFPeS)	Perfluorohexanesulfonic acid (PFHxS)	Perfluoroheptanesulfonic acid (PFHpS)	Linear Perfluorooctanesulfonic acid (L-PFOS)	Sum of branched Perfluorooctanesulfonic acid (br-PFOS)	Sum of branched and linear Perfluorooctanesulfonic (total PFOS)	Perfluorononane- sulfonic acid (PFNS)	Perfluorodecane- sulfonic acid (PFDS)	Perfluoroundecane-sulfonic acid (PFUnDS)	Perfluorododecane-sulfonic acid (PFDoDS)	Perfluorotridecane-sulfonic acid (PFTrDS)
1	2401-BM		< 0.003	< 0.004	0.071	0.347	0.555	0.336	0.892	< 0.007	0.35	< 0.01	< 0.01	< 0.05
2	2401-BM		< 0.01	< 0.01	0.043	0.168	0.346	0.197	0.543	< 0.05	0.137	< 0.25	< 0.25	< 0.25
9	2401-BM													
10	2401-BM				0.071				0.826					
14	2401-BM		< 0.146	< 0.336	< 0.148	< 0.505	0.581	0.193	0.774	< 0.215	< 0.265	< 28.6	< 33.6	
17	2401-BM		< 0.1		0.103	0.261	0.818				0.31			
18	2401-BM		< 0.01	< 0.01	0.063	0.221	0.508	0.233	0.741	< 0.01	0.232	< 0.01	< 0.01	< 0.1
21	2401-BM		< 0.1	< 0.1	< 0.1	0.18	0.4	< 0.1	0.44	< 0.1	0.15	< 0.1	< 0.1	< 0.1
22	2401-BM		< 0.01	< 0.01	0.071	< 0.01	36.9	1.1	38	< 0.01	< 0.01		< 0.01	
26	2401-BM		< 0.001	< 0.001	0.0724	0.304	0.639	0.293	0.932	< 0.001	0.225		< 0.005	
27	2401-BM		< 0.08	< 0.09	0.116	0.385	0.843	0.329	1.17	< 0.05	0.578	< 0.05	< 0.05	
28	2401-BM		< 0.01	< 0.01	0.068	0.199	0.551	0.314	0.865	< 0.01	0.161	< 0.01	< 0.01	< 0.01
33	2401-BM		< 0.01	< 0.01	0.067	0.23	0.482	0.238	0.72	< 0.01	0.19	< 0.01	< 0.01	< 0.01
34	2401-BM		< 0.01	< 0.01	0.051	0.163	0.415	0.189	0.609	< 0.01	0.223	< 0.01	< 0.01	< 0.02
35	2401-BM		< 0.2	< 0.2	< 0.2	< 0.2	0.561	0.293	0.819	< 0.2	0.227	< 0.2	< 0.2	< 0.2
40	2401-BM				< 0.1				0.35					
42	2401-BM		< 0.0028	< 0.0028	0.0453	0.204	0.607	0.204	0.811	< 0.0028	0.142	< 0.0028	< 0.0028	< 0.0028
43	2401-BM		< 0.05	< 0.05	0.067	0.23	0.48	0.2	0.68	< 0.05	0.21	< 0.05	< 0.05	< 0.05
48	2401-BM		< 0.01	< 0.01	0.077	0.238	0.578	0.236	0.814	< 0.01	0.279	< 0.01	< 0.01	< 0.01
49	2401-BM		< 0.05	< 0.05	0.08	0.2	0.45	0.16	0.61	< 0.05	0.25			
51	2401-BM		< 0.0109	< 0.00689	0.0827	0.243	0.565	0.213	0.778	< 0.00692	0.237	< 0.015		
53	2401-BM		< 0.01	< 0.01	0.065	0.196	0.472	0.234	0.706	< 0.01	0.22		< 0.01	
56	2401-BM		< 0.05	< 0.05	0.07	0.278	0.561		1.05	< 0.2	0.278			
58	2401-BM		< 0.0015	< 0.005	0.07	0.22	0.5	0.28	0.78					
60	2401-BM		< 0.00443	< 0.00484	0.075	0.218	0.541	0.265	0.806	< 0.00484	0.242			
65	2401-BM		< 0.1	< 0.1	0.0573	0.234			0.805	< 0.1	0.292	< 0.1	< 0.1	< 0.1
66	2401-BM		< 0.005	< 0.005	0.0748	0.228	0.602	0.478	1.08	< 0.005	0.247	< 0.005	< 0.005	< 0.005
67	2401-BM		< 0.02	< 0.02	0.073	0.308	0.61	< 0.02		< 0.02	0.068	< 0.02	< 0.02	< 0.02
68	2401-BM		< 0.01	< 0.01	0.045	0.259	0.42	0.231	0.651	< 0.01	0.239	< 0.01	< 0.01	< 0.01
69	2401-BM		< 0.067	< 0.067	0.072	0.33	0.56		0.83	< 0.133	0.45	< 0.67		
70	2401-BM				0.12		0.45	< 0.1	0.54					
71	2401-BM				< 0.2				0.63					
74	2401-BM				< 0.1				0.73					
76	2401-BM		< 0.01	< 0.01	0.091	0.33	0.71	0.22	0.93	< 0.1	0.35	< 0.1	< 0.1	0.4
78	2401-BM		< 0.01	< 0.01	0.043	0.141	0.337	0.0722	0.409	< 0.01	0.161		< 0.01	
79	2401-BM		< 0.05	< 0.05	0.0824	0.258	0.554	0.285	0.853	< 0.05	0.272	< 0.05		
80	2401-BM		< 0.05		0.08		0.61	0.29	0.9		0.315			
81	2401-BM		< 0.05	< 0.05	0.069	0.249	0.475	0.216	0.691	< 0.05	0.287		< 0.05	
82	2401-BM				0.0884		< 0.003	< 0.003	0.856					
83	2401-BM				0.07	0.22	0.51	< 0.05	0.51					
84	2401-BM		< 0.01	< 0.01	0.075	0.238	0.53	0.24	0.77	< 0.01	0.19	< 0.01	< 0.01	< 0.01
85	2401-BM		< 0.075	< 0.078	0.063	0.229	0.456	0.176	0.631	< 0.081	0.264			
86	2401-BM		< 0.05	< 0.05	0.1	0.35			0.95	< 0.05	0.41	< 0.05	< 0.1	< 0.1
87	2401-BM		< 0.07	< 0.2	0.091	0.286	0.598	0.124	0.722	< 0.25	0.259		< 0.15	
92	2401-BM				0.067				0.83					
93	2401-BM		< 0.04		0.06	0.21	0.48	0.11	0.59		0.28			
96	2401-BM				0.072				0.742					
97	2401-BM				< 0.1		0.61	0.21	0.83					
99	2401-BM				0.094				1.08					
112	2401-BM				0.24		0.6	0.15	0.85					
113	2401-BM		< 0.1	< 0.1	0.12	0.36	0.67	0.12	0.79	< 0.1	0.32			
114	2401-BM				0.0735	0.33	0.454	0.156	0.61					
115	2401-BM		< 0.03		0.06		0.645		0.645		0.304			
117	2401-BM		< 0.2	< 0.2	0.34	< 0.2	0.56	0.27	0.84	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
118	2401-BM		< 0.05	< 0.05	0.083	0.3	0.6	0.42	1	< 0.05	0.35	< 0.05	< 0.05	< 0.05
124	2401-BM		< 0.01	< 0.01	0.086	0.25	0.52	0.25	0.77	< 0.01	0.25		< 0.5	
3B	2401-BM				0.0538				0.552					
59B	2401-BM		< 0.2	< 0.2	< 0.2	0.2			0.53	< 0.2	0.2	< 0.2	< 0.2	< 0.2
81A	2401-BM		< 0.05	< 0.05	0.069	0.249	0.475	0.167	0.641	< 0.05	0.287		< 0.05	

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Bovine Meat 2024 [EURL-PT-POP_2401-BM]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bovine Meat (2401-BM)
Sum of PFOS, PFOA, PFNA, PFHxS - Results

LC	Sample	Result µg/kg wet weight	Sum of total-PFOS, PFOA, PFNA, PFHxS **(ub)**	Sum of total-PFOS, PFOA, PFNA, PFHxS **(lb)**
1	2401-BM		1.32	1.32
2	2401-BM		0.85	0.8
9	2401-BM		0.297	0.397
10	2401-BM		1.24	1.24
14	2401-BM		1.43	1.08
17	2401-BM		1.27	1.27
18	2401-BM		1.12	1.12
21	2401-BM		0.93	0.73
22	2401-BM		38.5	38.5
26	2401-BM		1.34	1.34
27	2401-BM		1.82	1.82
28	2401-BM		1.27	1.27
33	2401-BM		1.14	1.14
34	2401-BM		0.913	0.903
35	2401-BM		1.31	1.31
40	2401-BM		0.56	0.56
42	2401-BM		1.14	1.14
43	2401-BM		1.1	1
48	2401-BM		1.23	1.23
49	2401-BM		1	1
51	2401-BM		1.18	1.18
53	2401-BM		1.06	1.06
56	2401-BM		1.65	1.45
58	2401-BM		1.17	1.17
60	2401-BM		1.26	1.26
65	2401-BM		1.19	1.18
66	2401-BM		1.53	1.53
67	2401-BM		1.03	1.03
68	2401-BM		0.945	0.935
69	2401-BM		1.25	1.18
70	2401-BM		1.05	0.95
71	2401-BM		1.4	1
74	2401-BM			1.08
76	2401-BM		1.5	1.5
78	2401-BM		0.685	0.665
79	2401-BM		1.33	1.28
80	2401-BM		1.4	1.35
81	2401-BM		1.12	1.07
82	2401-BM			1.26
83	2401-BM			0.89
84	2401-BM		1.22	1.21
85	2401-BM		1.07	0.981
86	2401-BM		1.55	1.5
87	2401-BM		1.19	1.16
92	2401-BM			1.2
93	2401-BM		1.03	0.93
96	2401-BM		1.26	1.21
97	2401-BM		1.3	1.1
99	2401-BM		1.64	1.59
112	2401-BM		1.72	1.67
113	2401-BM		1.4	1.3
114	2401-BM		1.1	1.05
115	2401-BM		1.05	1.05
117	2401-BM		1.8	1.8
118	2401-BM		1.51	1.46
124	2401-BM		1.2	1.2
3B	2401-BM		0.839	0.829
59B	2401-BM			
81A	2401-BM		1.07	1.02

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Bovine Meat 2024 [EURL-PT-POP_2401-BM]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bovine Meat (2401-BM)
Other PFAS - Results

LC	Sample	Result µg/kg wet weight	Perfluorooctane sulphonamide **FOSA**	2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluor-3-(trifluoromethoxy)propoxy]-propionic acid **DONA**	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoic acid **GenX**	Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate **major component of F-53B**	Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate **minor component of F-53B**	1-Propanaminium, N,N-dimethyl-N-oxide-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]a **Capstone A**	1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8- **Capstone B**
1	2401-BM		< 0.025	< 0.005	< 0.005	< 0.01	< 0.01		< 0.1
2	2401-BM		< 0.05	< 0.02	< 0.5	< 0.02	< 0.02		
9	2401-BM								
10	2401-BM								
14	2401-BM			< 0.167	< 0.384	< 0.312	< 0.442		
17	2401-BM		< 0.01						
18	2401-BM			< 0.01	< 0.01	< 0.01	< 0.01		
21	2401-BM		< 0.1	< 0.1	< 0.1				
22	2401-BM		< 0.01	< 0.01	< 0.01				
26	2401-BM		< 0.001						
27	2401-BM		< 0.1	< 0.05	< 0.1	< 0.05	< 0.05	< 1	< 0.3
28	2401-BM			< 0.01	< 0.01	< 0.01	< 0.01		
33	2401-BM			< 0.01	< 0.01	< 0.05	< 0.01		
34	2401-BM			< 0.01	< 0.03	< 0.01	< 0.01		
35	2401-BM								
40	2401-BM								
42	2401-BM			< 0.0028	< 0.0028	< 0.0028	< 0.0028		
43	2401-BM			< 0.05	< 1	< 0.05	< 0.05		
48	2401-BM			< 0.01	< 0.1	< 0.01	< 0.01		
49	2401-BM								
51	2401-BM		< 0.0205	< 0.00307	< 0.073	< 0.0138	< 0.0154		
53	2401-BM		< 0.05	< 0.2	< 0.5	< 0.2	< 0.2		
56	2401-BM			< 0.05	< 0.05	< 0.05	< 0.05		
58	2401-BM								
60	2401-BM				< 0.005				
65	2401-BM		< 0.1	< 0.1	< 0.5	< 0.1	< 0.1		
66	2401-BM			< 0.005	< 0.005	< 0.005	< 0.005		
67	2401-BM								
68	2401-BM			< 0.01	< 0.01	< 0.01	< 0.01		
69	2401-BM		< 0.133						
70	2401-BM								
71	2401-BM								
74	2401-BM								
76	2401-BM		< 0.01	< 0.1	< 0.1	< 0.01	< 0.01		
78	2401-BM								
79	2401-BM		< 0.05	< 0.05	< 0.05	< 0.05	< 0.25		
80	2401-BM		< 0.05						
81	2401-BM		< 0.05	< 0.05	< 0.1	< 0.05	< 0.05		
82	2401-BM								
83	2401-BM								
84	2401-BM		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
85	2401-BM			< 0.078		< 0.078	< 0.078		
86	2401-BM								
87	2401-BM		< 0.13					< 0.15	< 0.15
92	2401-BM								
93	2401-BM			< 0.1	< 0.025	< 0.025	< 0.025		
96	2401-BM								
97	2401-BM								
99	2401-BM								
112	2401-BM								
113	2401-BM								
114	2401-BM		< 2.5	< 2.4		< 0.047			
115	2401-BM								
117	2401-BM		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
118	2401-BM		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
124	2401-BM		< 0.01	< 0.5	< 0.5	< 0.05	< 0.05		
3B	2401-BM								
59B	2401-BM		< 0.5	< 0.2	< 0.2	< 0.2	< 0.2		
81A	2401-BM		< 0.05	< 0.05	< 0.1	< 0.05	< 0.05		

EURL Proficiency Test on Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]
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26 March 2025

Annex 3: Participants' z-scores of PFCAs, PFSAs and sum of PFOS, PFOA, PFNA, PFHxS

Test sample - Bovine Meat (2401-BM)

Z-scores of individual substances and sum parameters

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
20%: Evaluated individual substances and sum parameters

* 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 Bovine Meat 2024 [EURL-PT-POP_2401-BM]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bovine Meat (2401-BM)
Perfluoroalkylcarboxylic acids (PFCAs) - Z-scores

LC	Sample	Z-score [σ_p = 20 %]	Perfluorononanoic acid **(PFNA)**	Perfluorodecanoic acid **(PFDA)**	Perfluoroundecanoic acid **(PFUnDA)**	Perfluorododecanoic acid **(PFDoDA)**	Perfluorotridecanoic acid **(PFTrDA)**	Perfluorotetradecanoic acid **(PFTeDA)**
1	2401-BM		0.6	-0.2	0.9	0.4	0.8	0.5
2	2401-BM		-1.6	-1.7	-1.4	-1.6	-1.9	-3.0
9	2401-BM		-0.3	-2.9				
10	2401-BM		-0.1					
14	2401-BM		-0.1	2.1	1.7			
17	2401-BM		0.3	0.3	0.9	1.6	3.0	4.5
18	2401-BM		-0.1	-0.2	0.1	-0.1	-0.7	-0.6
21	2401-BM		-0.4	-1.8	-1.2	-0.6	-0.8	
22	2401-BM		1.8	1.2	4.5	1.7		
26	2401-BM		0.2	0.0	-0.3	-0.5		
27	2401-BM		3.4	3.4	1.9			
28	2401-BM		0.1	0.0	0.1	0.1	1.6	0.8
33	2401-BM		-0.2	-0.4	-0.5	0.2	-0.5	-1.9
34	2401-BM		-1.1	-1.1	-0.8	-1.0	0.4	-3.2
35	2401-BM		0.2	0.4	-1.7	2.5		1.5
40	2401-BM		-1.7					
42	2401-BM		-0.5	1.3	-0.4	-0.5	-2.5	-4.0
43	2401-BM		-0.2	-0.5	-0.4	-0.5	-0.2	-1.3
48	2401-BM		0.3	0.1	-0.2	0.1	7.6	-0.3
49	2401-BM		-0.1	-0.4	-0.3	-0.6		
51	2401-BM		0.0	-0.1	0.3	0.1	-0.1	-0.1
53	2401-BM		-0.5	-0.4	-0.2	-0.7	-1.0	-1.1
56	2401-BM		0.2	0.4	0.5	0.6	-0.4	1.2
58	2401-BM		-0.1	-0.5	0.1	0.2		
60	2401-BM		0.9	0.5	0.7	0.3	0.0	-0.1
65	2401-BM		0.0	0.1	0.4	0.1	0.3	-0.4
66	2401-BM		0.8	0.8	1.3	1.6	0.1	0.6
67	2401-BM		0.2	-0.1	-0.1	0.7		
68	2401-BM		-1.2	-0.1	-1.2	-0.9	3.4	0.0
69	2401-BM		-0.4	-1.7	-0.2	-0.6		
70	2401-BM		-0.4					
71	2401-BM		0.9					
74	2401-BM		0.4					
76	2401-BM		1.8		2.5	2.0	1.2	1.2
78	2401-BM		-1.6	-1.8	-1.6	-1.6	-1.2	-2.0
79	2401-BM		0.5	0.2	0.8	0.6	-0.7	0.4
80	2401-BM		0.8	0.6	0.9	0.9	0.4	0.5
81	2401-BM		-0.1	-0.3	-0.1	-0.1	0.1	-0.4
82	2401-BM		-0.2					
83	2401-BM		-0.1	-0.4	-0.9	-0.3		-1.0
84	2401-BM		0.7	0.3	-0.6	0.5	-2.3	-0.6
85	2401-BM		-0.5	-0.5	-0.4	-0.3	0.2	-0.3
86	2401-BM		2.1	1.5	3.0	2.9	3.5	
87	2401-BM		0.5	0.2	0.5	0.1	1.2	0.3
92	2401-BM		0.1					
93	2401-BM		-0.6	-0.7	-0.4	-0.3	0.1	-0.7
96	2401-BM		1.2					
97	2401-BM		-0.6					
99	2401-BM		1.6					
112	2401-BM		4.2					
113	2401-BM		1.5	0.9	1.2	0.9	3.2	2.1
114	2401-BM		0.8	0.7	0.9	1.2	8.4	
115	2401-BM		0.3	0.3	0.2	0.5	-0.1	-0.9
117	2401-BM		-1.5					
118	2401-BM		1.0	1.0	1.5	1.3	2.9	1.5
124	2401-BM		0.2	0.6	0.3	0.2	-0.2	0.3
3B	2401-BM		-1.4					
59B	2401-BM		-0.9	-1.5	-1.3	-1.2		
81A	2401-BM		-0.1	-0.3	-0.1	-0.1	0.1	-0.4

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

Bovine Meat (2401-BM)
Perfluoroalkylsulfonic acids (PFSAs) - Z-scores

LC	Sample	Z-score [σ_p = 20 %]	Perfluorohexanesulfonic acid **(PFHxS)**	Perfluoroheptanesulfonic acid **(PFHpS)**	Linear Perfluorooctanesulfonic acid **(L-PFOS)**	Sum of branched Perfluorooctanesulfonic acid **(br-PFOS)**	Sum of branched and linear Perfluorooctanesulfonic acid **(total PFOS)**	Perfluorodecane- sulfonic acid **(PFDS)**
1	2401-BM		-0.1	2.3	0.2	2.6	1.0	2.2
2	2401-BM		-2.0	-1.5	-1.8	-0.5	-1.4	-2.2
9	2401-BM							
10	2401-BM		-0.1				0.5	
14	2401-BM				0.4	-0.6	0.2	
17	2401-BM		2.1	0.5	2.6			1.4
18	2401-BM		-0.7	-0.4	-0.3	0.3	0.0	-0.2
21	2401-BM			-1.2	-1.3		-2.1	-1.9
22	2401-BM		-0.1		339.2	19.9	249.4	
26	2401-BM		0.0	1.4	1.0	1.6	1.2	-0.4
27	2401-BM		3.0	3.1	2.9	2.4	2.8	6.9
28	2401-BM		-0.3	-0.8	0.1	2.1	0.8	-1.7
33	2401-BM		-0.4	-0.2	-0.5	0.4	-0.2	-1.1
34	2401-BM		-1.5	-1.6	-1.1	-0.7	-0.9	-0.4
35	2401-BM				0.2	1.6	0.5	-0.3
40	2401-BM						-2.7	
42	2401-BM		-1.9	-0.7	0.7	-0.4	0.4	-2.1
43	2401-BM		-0.4	-0.2	-0.5	-0.5	-0.4	-0.7
48	2401-BM		0.3	0.0	0.4	0.3	0.4	0.8
49	2401-BM		0.5	-0.8	-0.8	-1.4	-0.9	0.2
51	2401-BM		0.7	0.1	0.3	-0.2	0.2	-0.1
53	2401-BM		-0.5	-0.9	-0.6	0.3	-0.3	-0.5
56	2401-BM		-0.2	0.8	0.2		2.0	0.7
58	2401-BM		-0.2	-0.4	-0.3	1.3	0.2	
60	2401-BM		0.2	-0.4	0.0	1.0	0.4	0.0
65	2401-BM		-1.1	-0.1			0.4	1.0
66	2401-BM		0.2	-0.2	0.6	5.8	2.2	0.1
67	2401-BM		0.0	1.4	0.7			-3.6
68	2401-BM		-1.9	0.4	-1.1	0.2	-0.6	-0.1
69	2401-BM		0.0	1.9	0.2		0.6	4.3
70	2401-BM		3.3		-0.8		-1.4	
71	2401-BM						-0.8	
74	2401-BM						-0.1	
76	2401-BM		1.3	1.9	1.6	0.0	1.2	2.2
78	2401-BM		-2.0	-2.1	-1.9	-3.4	-2.3	-1.7
79	2401-BM		0.7	0.4	0.2	1.4	0.7	0.6
80	2401-BM		0.5		0.7	1.6	1.0	1.5
81	2401-BM		-0.2	0.2	-0.6	-0.1	-0.4	0.9
82	2401-BM		1.1				0.7	
83	2401-BM		-0.2	-0.4	-0.2		-1.6	
84	2401-BM		0.2	0.0	-0.1	0.4	0.2	-1.1
85	2401-BM		-0.7	-0.2	-0.7	-1.0	-0.8	0.5
86	2401-BM		1.9	2.3			1.4	3.5
87	2401-BM		1.3	1.0	0.6	-2.2	-0.2	0.4
92	2401-BM		-0.4				0.6	
93	2401-BM		-0.9	-0.6	-0.5	-2.5	-1.1	0.8
96	2401-BM		0.0				0.0	
97	2401-BM				0.7	-0.2	0.6	
99	2401-BM		1.5				2.2	
112	2401-BM		11.5		0.6	-1.6	0.7	
113	2401-BM		3.3	2.5	1.3	-2.3	0.3	1.6
114	2401-BM		0.1	1.9	-0.8	-1.5	-0.9	
115	2401-BM		-0.9		1.0		-0.7	1.3
117	2401-BM		18.4		0.2	1.1	0.6	
118	2401-BM		0.7	1.3	0.6	4.5	1.7	2.2
124	2401-BM		0.9	0.2	-0.1	0.7	0.2	0.2
3B	2401-BM		-1.3				-1.3	
59B	2401-BM			-0.8			-1.5	-0.9
81A	2401-BM		-0.2	0.2	-0.6	-1.2	-0.7	0.9

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Bovine Meat (2401-BM)
Sum of Total PFOS, PFOA, PFNA, PFHxS - Z-scores

LC	Sample	Z-score [σ_p = 20 %]	Sum of Total PFOS, PFOA, PFNA, PFHxS **(ub)**	Sum of Total PFOS, PFOA, PFNA, PFHxS **(lb)**
1	2401-BM		0.5	0.8
2	2401-BM		-1.4	-1.5
9	2401-BM		-3.8	-3.3
10	2401-BM		0.2	0.4
14	2401-BM		1.0	-0.3
17	2401-BM		0.3	0.6
18	2401-BM		-0.3	-0.1
21	2401-BM		-1.1	-1.8
22	2401-BM		156.8	163.9
26	2401-BM		0.6	0.9
27	2401-BM		2.6	3.0
28	2401-BM		0.3	0.6
33	2401-BM		-0.2	0.0
34	2401-BM		-1.2	-1.0
35	2401-BM		0.5	0.7
40	2401-BM		-2.6	-2.5
42	2401-BM		-0.2	0.0
43	2401-BM		-0.4	-0.6
48	2401-BM		0.2	0.4
49	2401-BM		-0.8	-0.6
51	2401-BM		0.0	0.2
53	2401-BM		-0.5	-0.4
56	2401-BM		1.9	1.4
58	2401-BM		-0.1	0.1
60	2401-BM		0.3	0.5
65	2401-BM		0.0	0.2
66	2401-BM		1.4	1.7
67	2401-BM		-0.7	-0.5
68	2401-BM		-1.0	-0.9
69	2401-BM		0.3	0.2
70	2401-BM		-0.6	-0.8
71	2401-BM		0.9	-0.6
74	2401-BM			-0.3
76	2401-BM		1.3	1.6
78	2401-BM		-2.1	-2.1
79	2401-BM		0.6	0.6
80	2401-BM		0.9	0.9
81	2401-BM		-0.3	-0.3
82	2401-BM			0.5
83	2401-BM			-1.1
84	2401-BM		0.1	0.3
85	2401-BM		-0.5	-0.7
86	2401-BM		1.5	1.6
87	2401-BM		0.0	0.1
92	2401-BM			0.3
93	2401-BM		-0.7	-0.9
96	2401-BM		0.3	0.3
97	2401-BM		0.5	-0.2
99	2401-BM		1.9	2.0
112	2401-BM		2.2	2.3
113	2401-BM		0.9	0.7
114	2401-BM		-0.4	-0.4
115	2401-BM		-0.6	-0.4
117	2401-BM		2.6	2.9
118	2401-BM		1.3	1.4
124	2401-BM		0.0	0.3
3B	2401-BM		-1.5	-1.4
59B	2401-BM			
81A	2401-BM		-0.5	-0.5

EURL Proficiency Test on Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]
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Annex 4: Participants' z-scores of PFCAs, PFSAs and sum of PFOS, PFOA, PFNA, PFHxS - charts

Test sample - Bovine Meat (2401-BM)

Z-scores of individual substances and sum parameters

Calculation of z-score on basis of assigned value

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

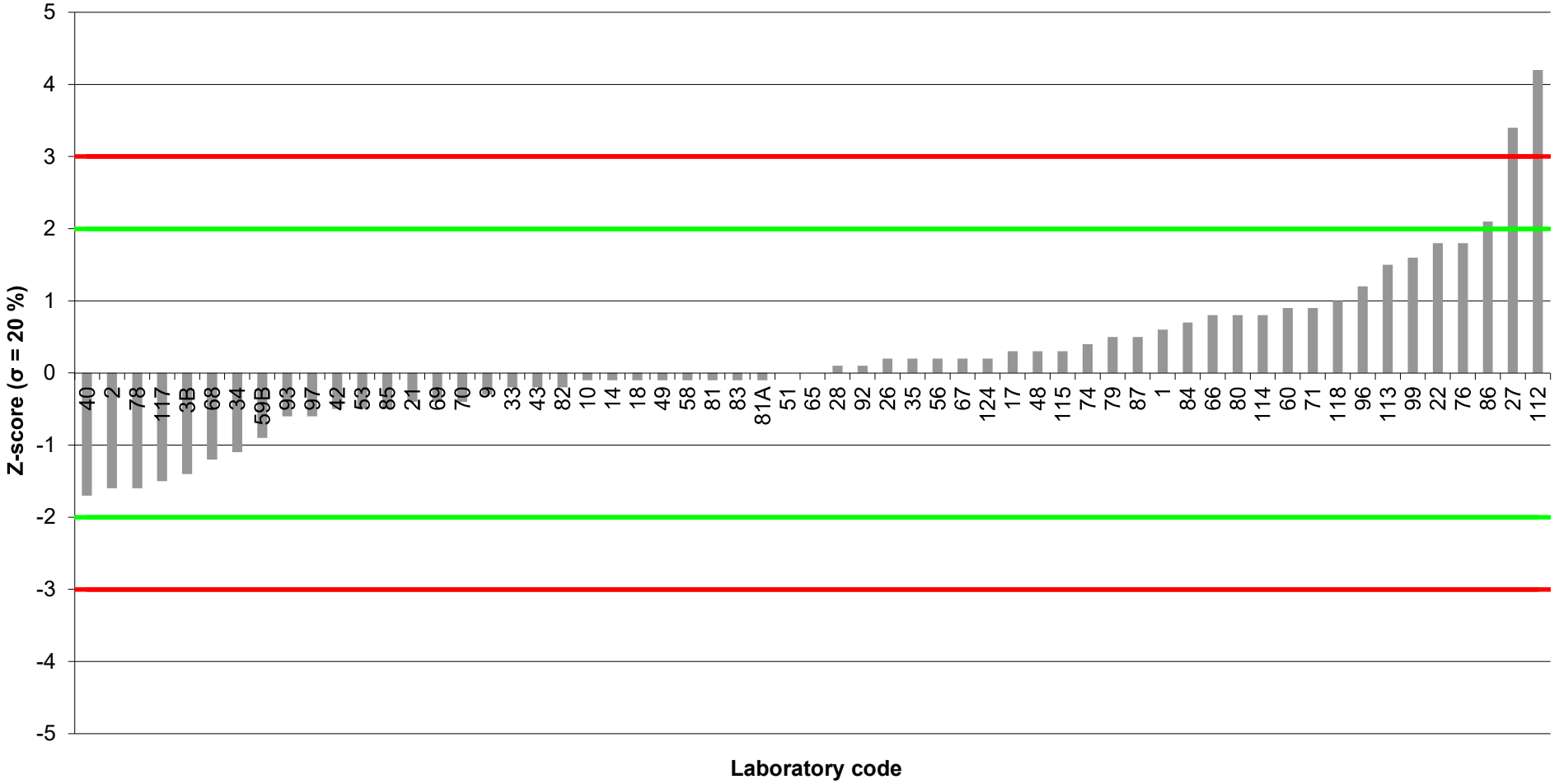
x_a: assigned value
x: participant's result
σ_p: fitness-for-purpose-based standard deviation for proficiency assessment
20%: Evaluated individual substances and sum parameters

± 2 z-scores:
± 3 z-scores:

Bovine Meat (2401-BM)

Perfluorononanoic acid

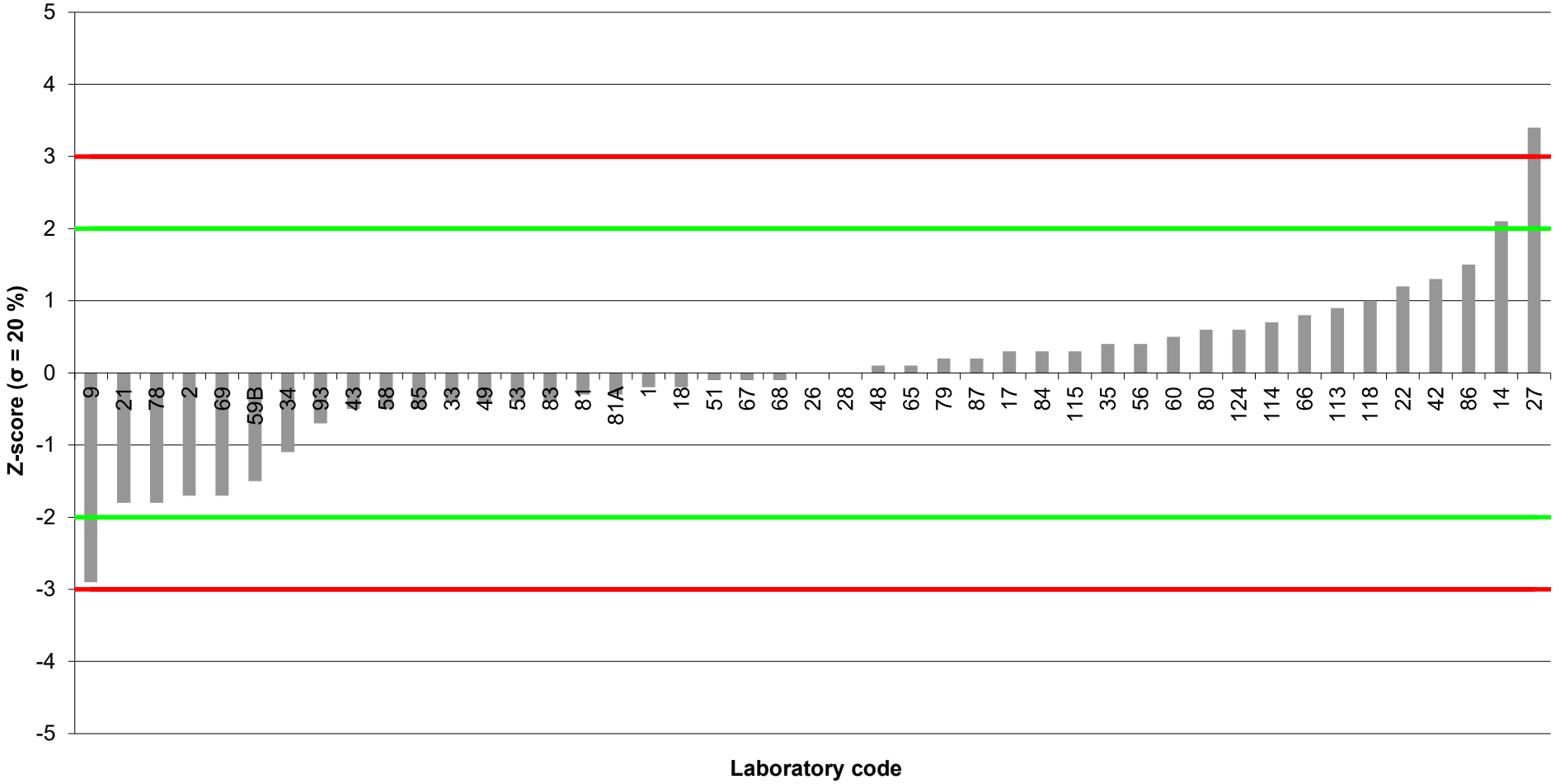
Assigned value: 0.315 µg/kg wet weight



Bovine Meat (2401-BM)

Perfluorodecanoic acid

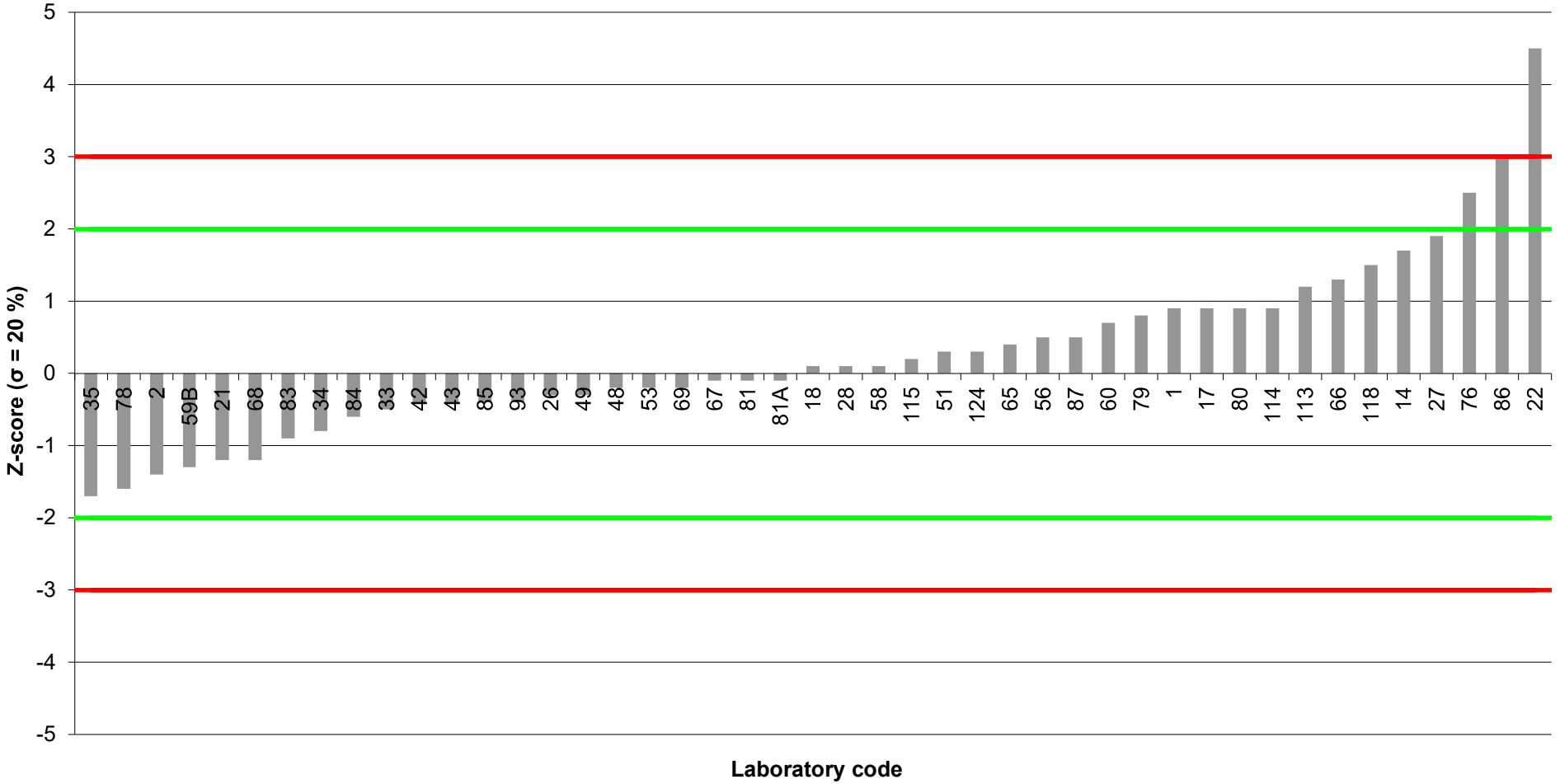
Assigned value: 0.692 µg/kg wet weight



Bovine Meat (2401-BM)

Perfluoroundecanoic acid

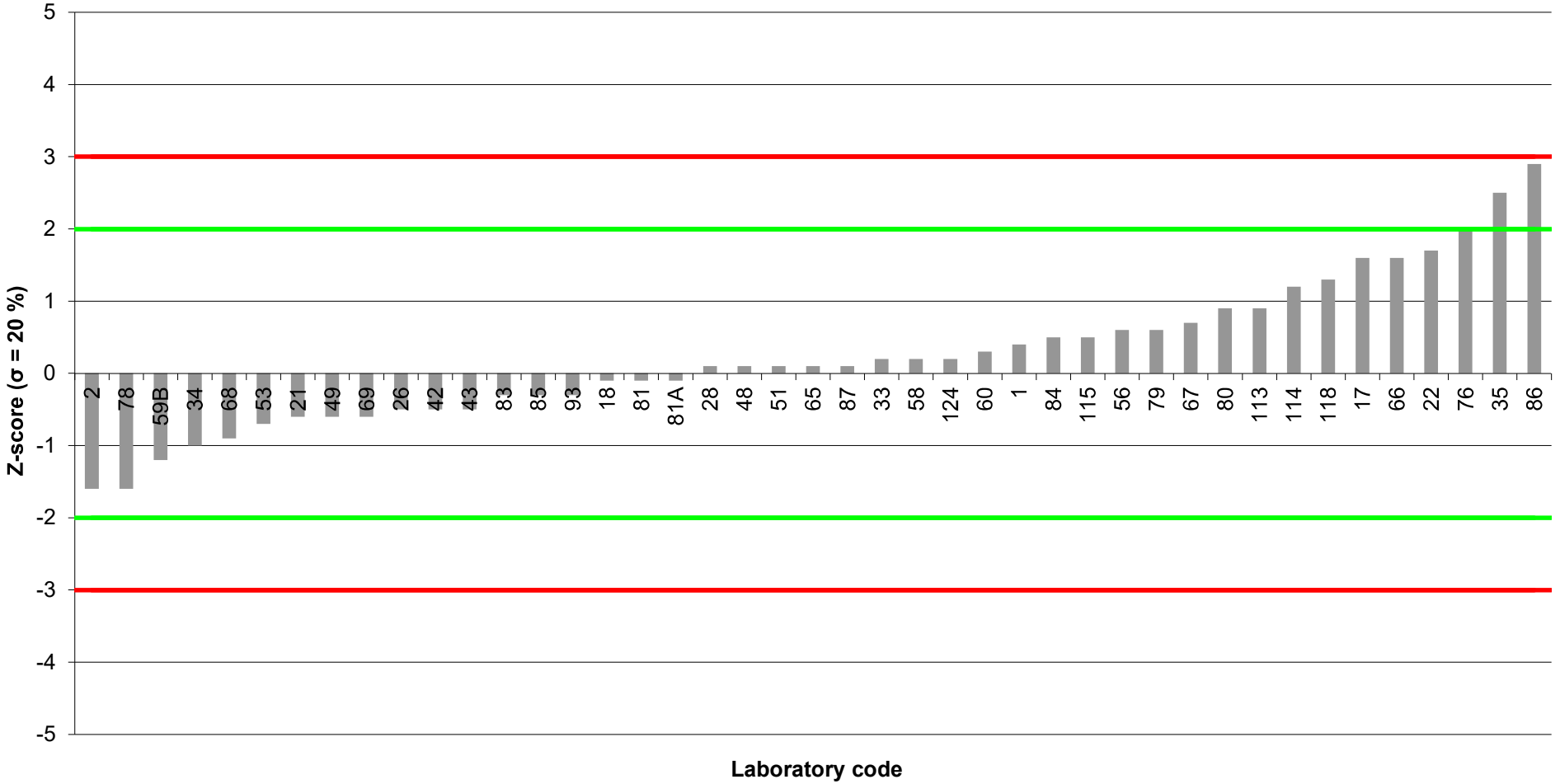
Assigned value: 0.48 µg/kg wet weight



Bovine Meat (2401-BM)

Perfluorododecanoic acid

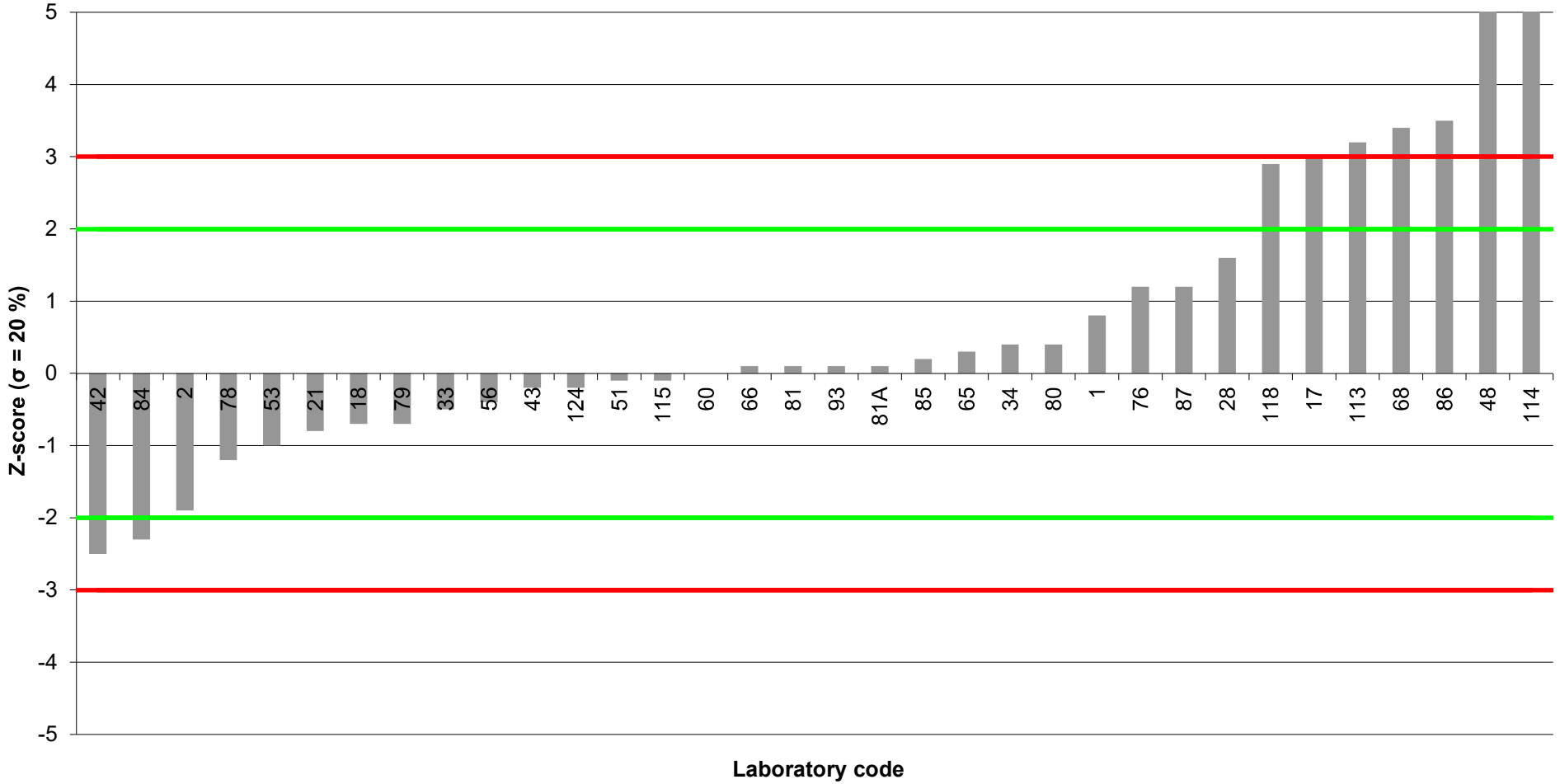
Assigned value: 0.286 µg/kg wet weight



Bovine Meat (2401-BM)

Perfluorotridecanoic acid

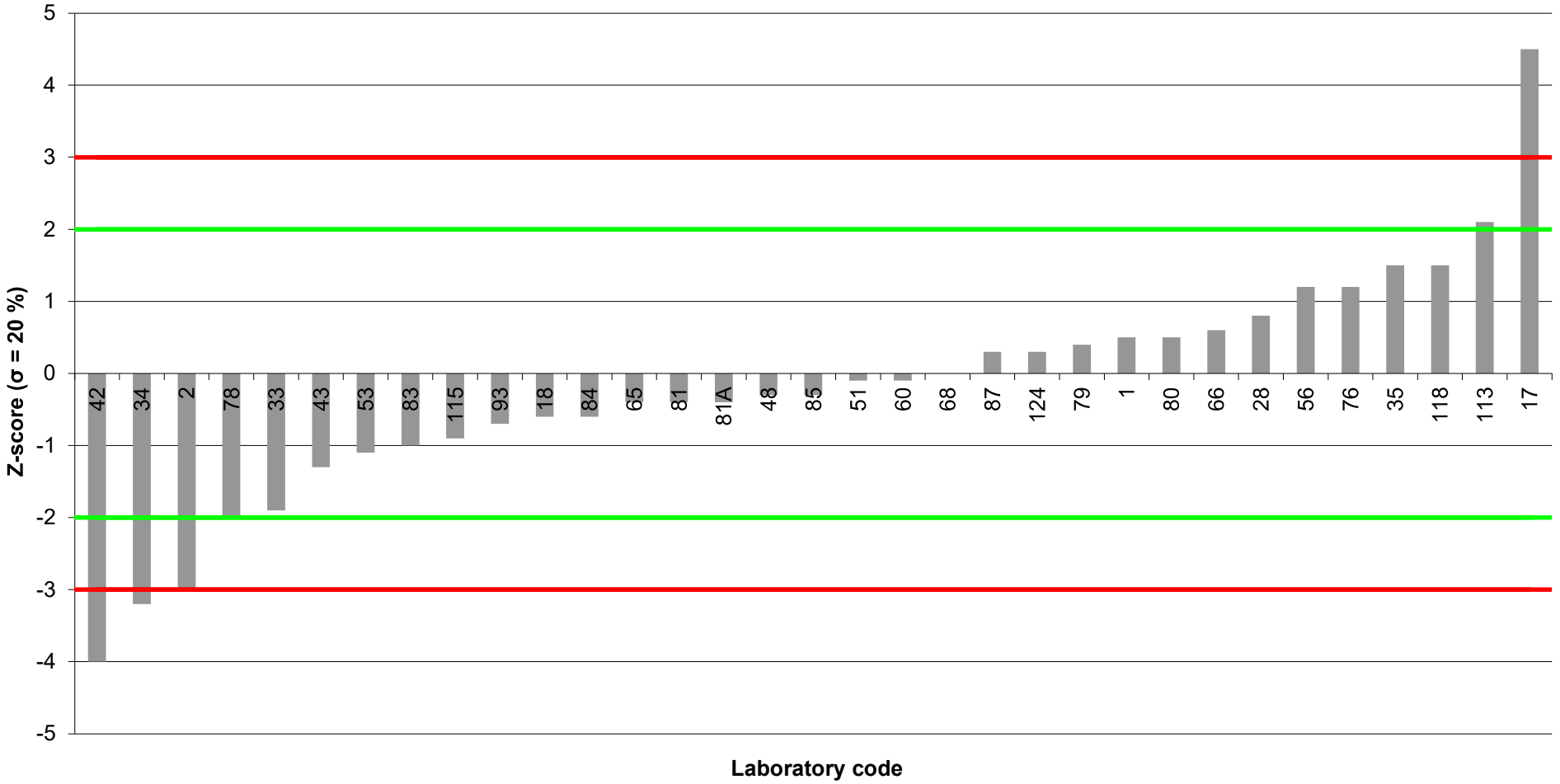
Assigned value: 0.18 µg/kg wet weight



Bovine Meat (2401-BM)

Perfluorotetradecanoic acid

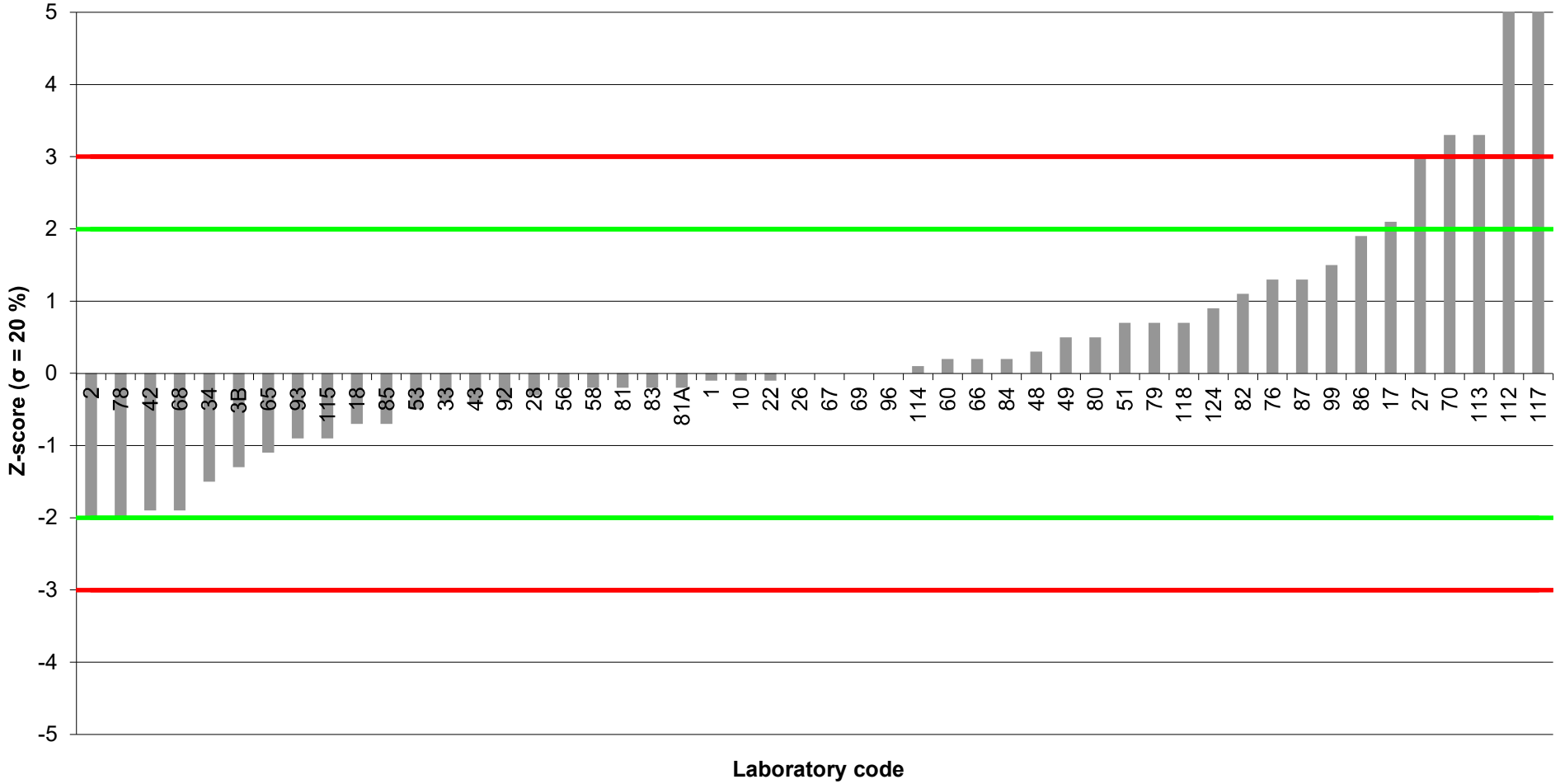
Assigned value: 0.16 µg/kg wet weight



Bovine Meat (2401-BM)

Perfluorohexanesulfonic acid

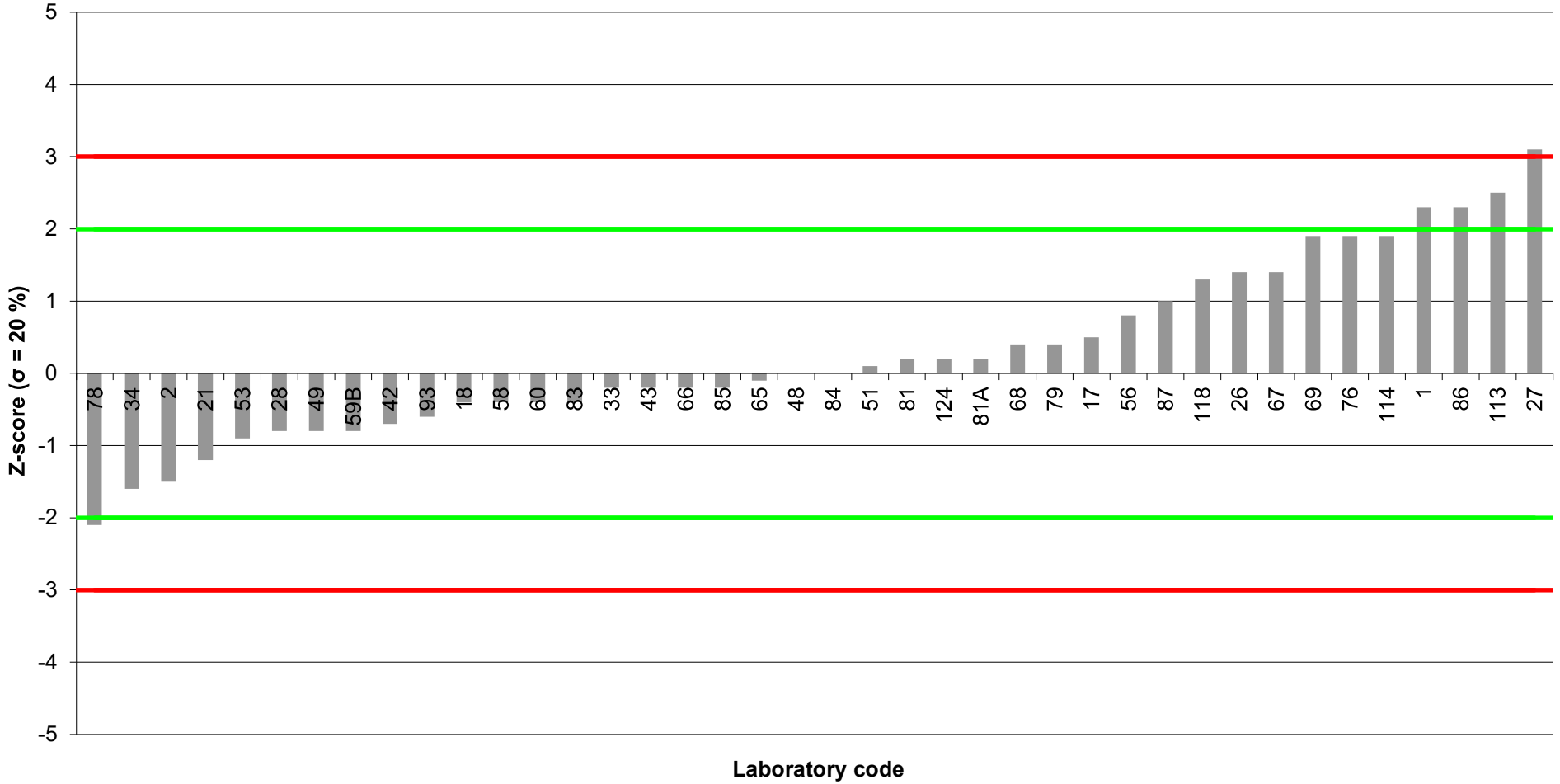
Assigned value: 0.073 µg/kg wet weight



Bovine Meat (2401-BM)

Perfluoroheptanesulfonic acid

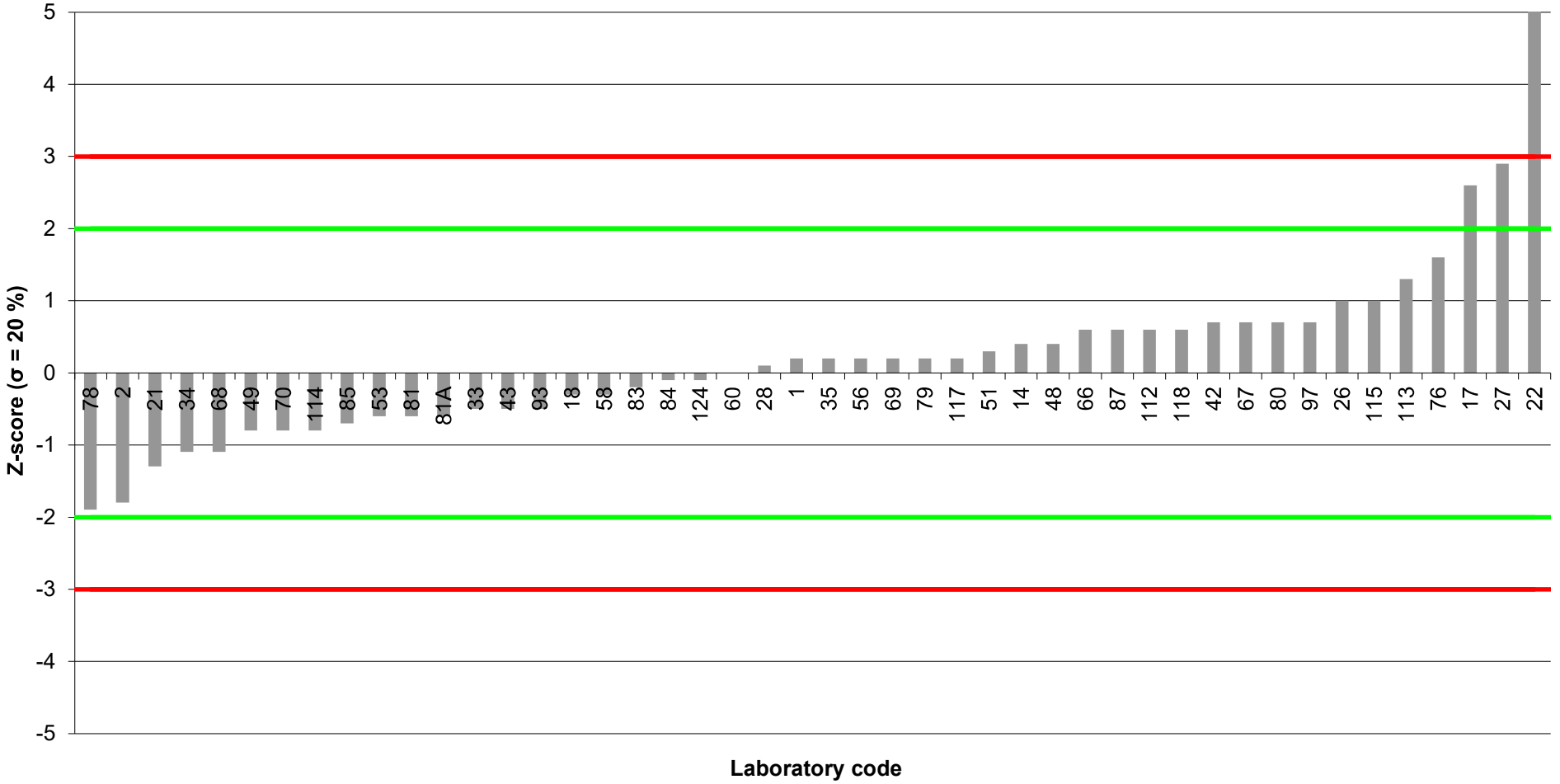
Assigned value: 0.24 µg/kg wet weight



Bovine Meat (2401-BM)

Linear Perfluorooctanesulfonic acid

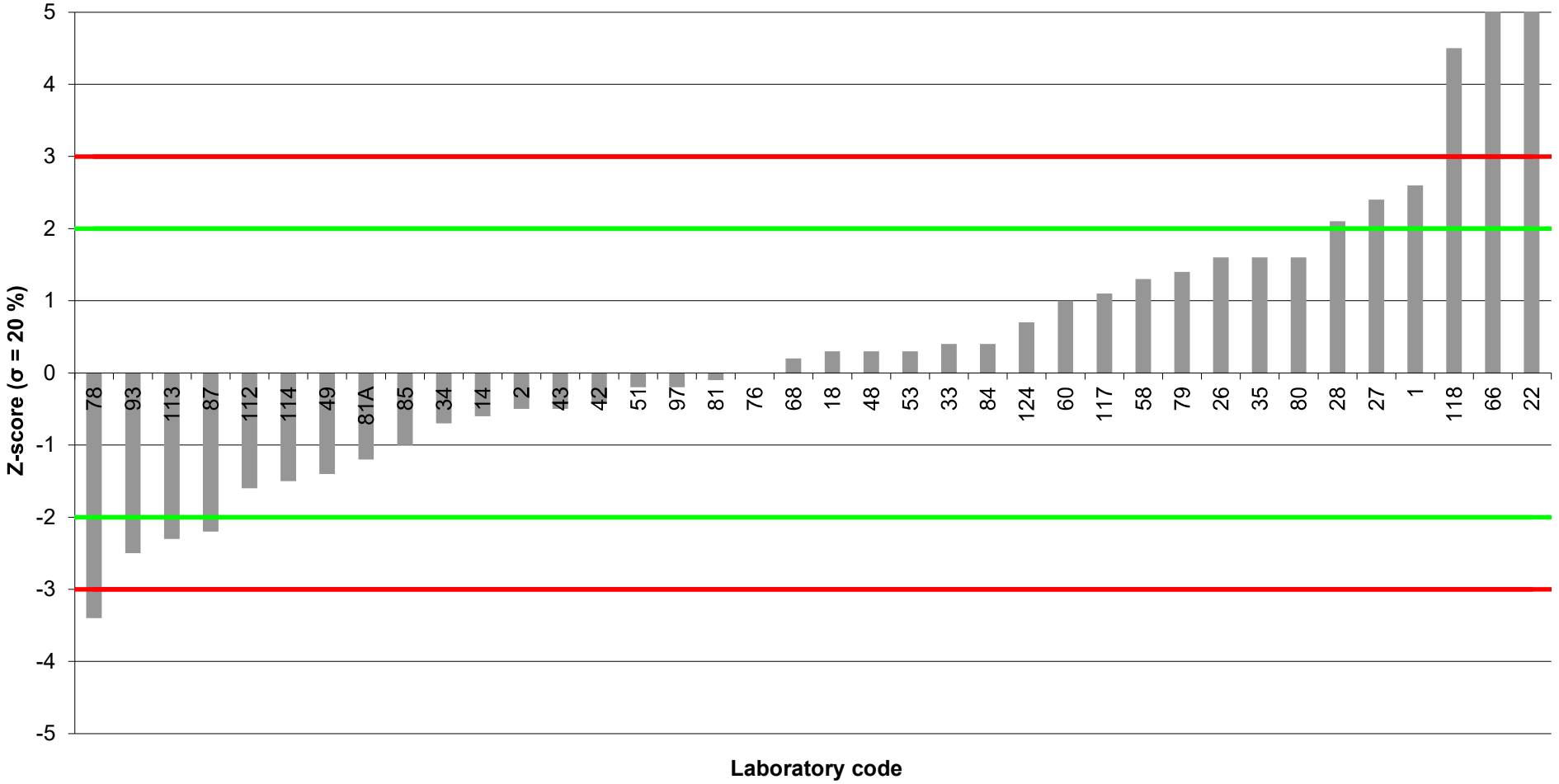
Assigned value: 0.536 µg/kg wet weight



Bovine Meat (2401-BM)

Sum of branched Perfluorooctanesulfonic acid

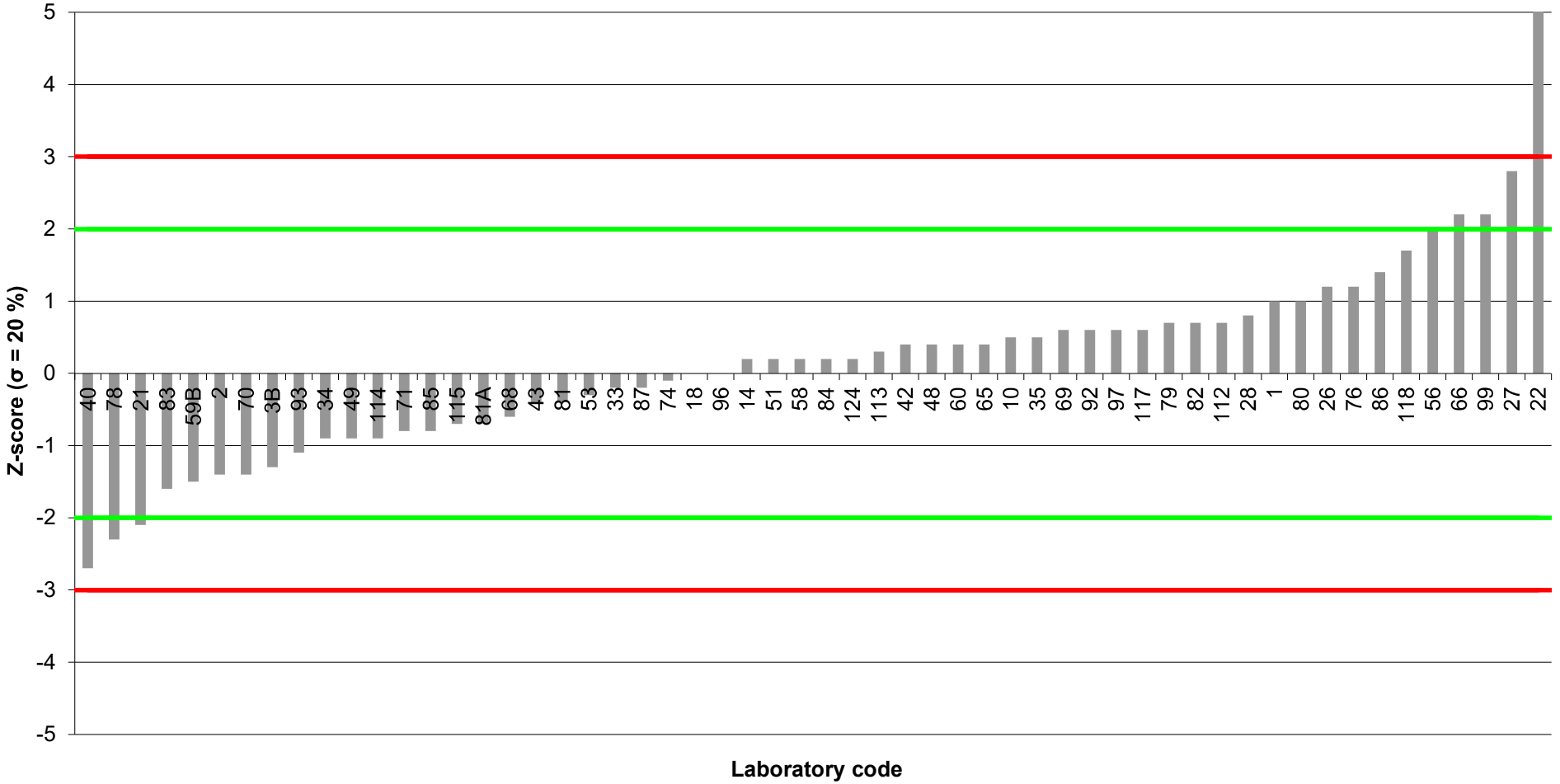
Assigned value: 0.221 µg/kg wet weight



Bovine Meat (2401-BM)

Sum of branched and linear Perfluorooctanesulfonic acid

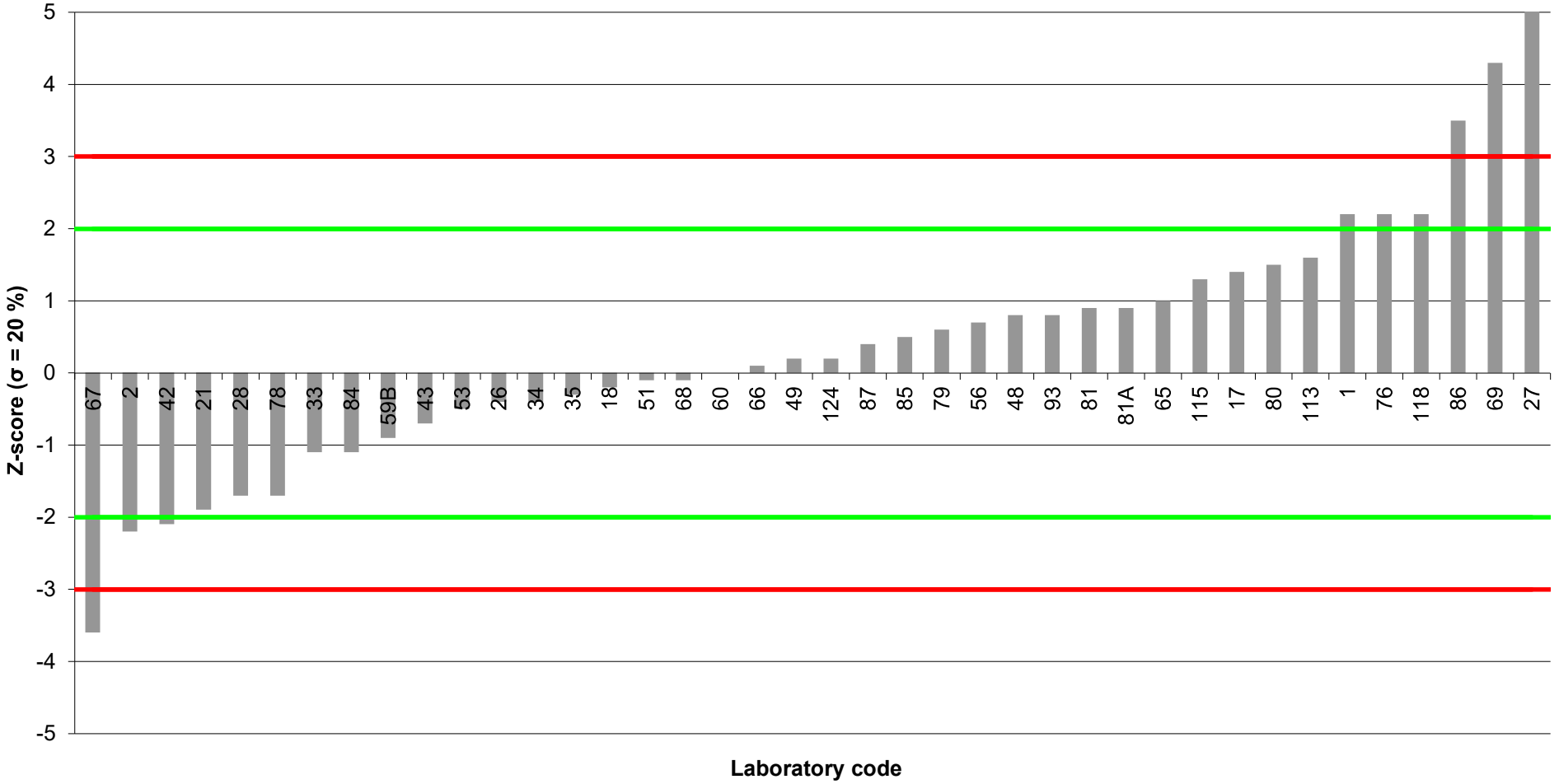
Assigned value: 0.747 µg/kg wet weight



Bovine Meat (2401-BM)

Perfluorodecanesulfonic acid

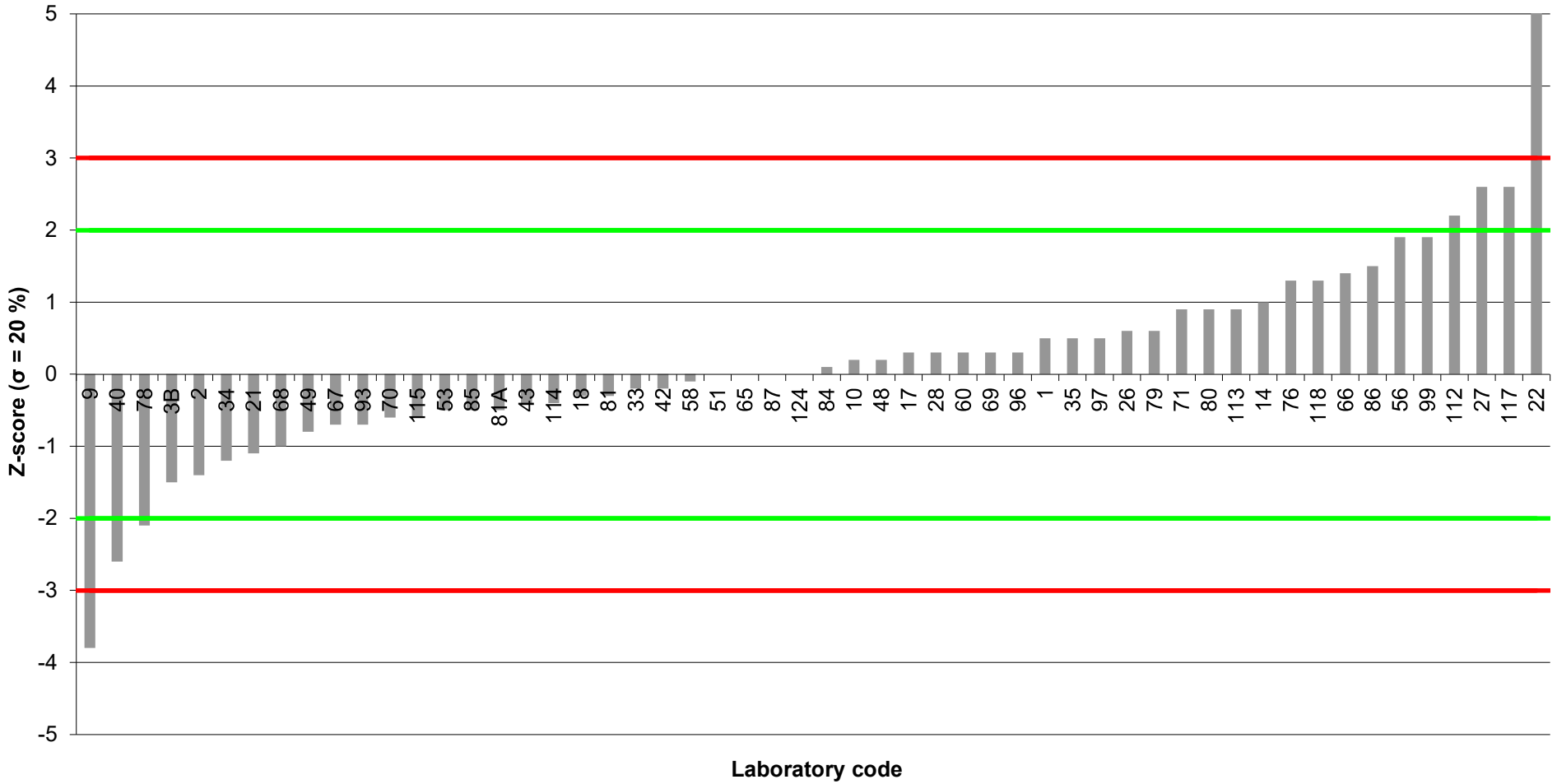
Assigned value: 0.24 µg/kg wet weight



Bovine Meat (2401-BM)

Sum of total PFOS, PFOA, PFNA, PFHxS (ub)

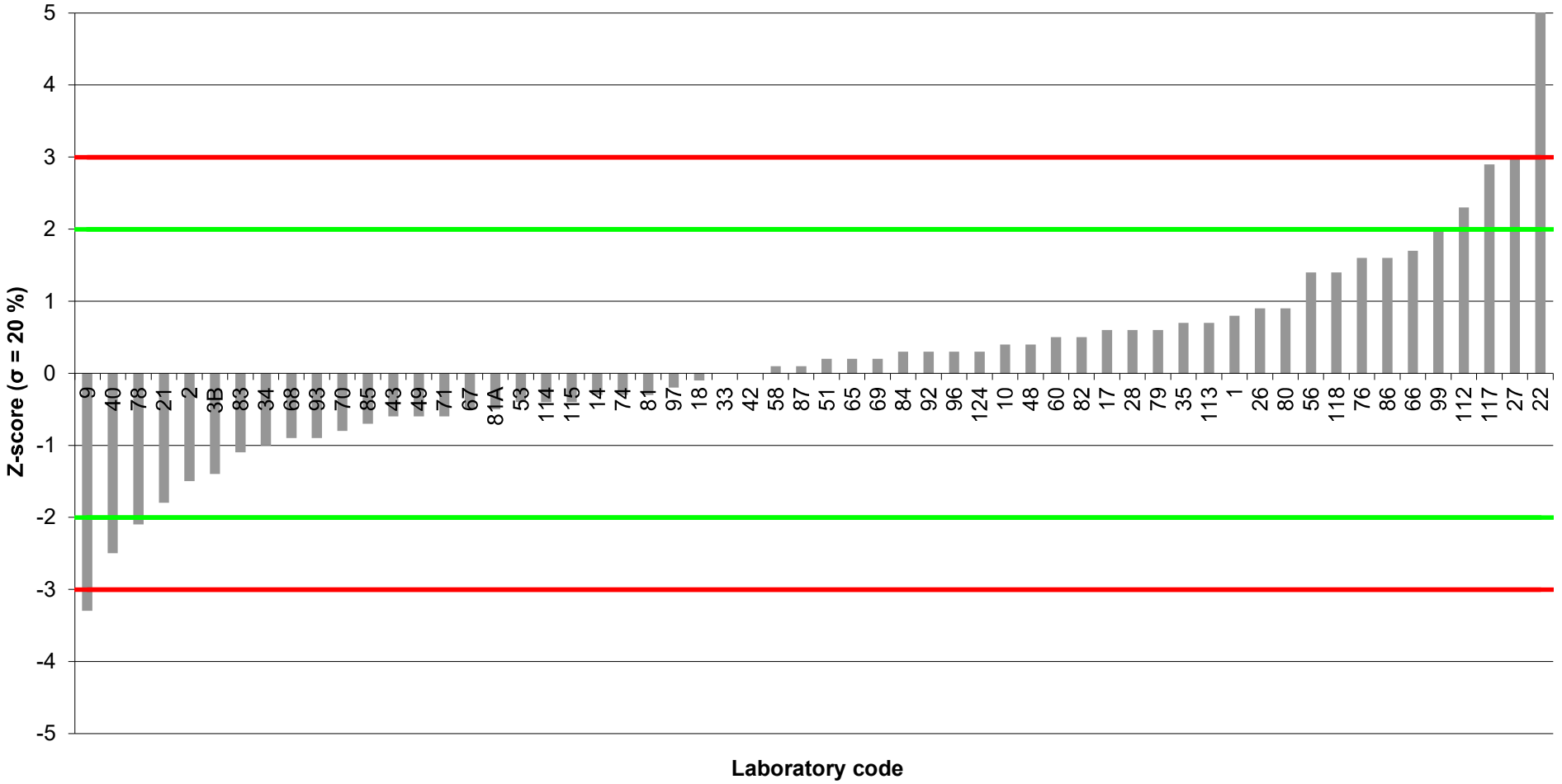
Assigned value: 1.19 µg/kg wet weight



Bovine Meat (2401-BM)

Sum of total PFOS, PFOA, PFNA, PFHxS (lb)

Assigned value: 1.14 µg/kg wet weight



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Annex 5: Test for sufficient homogeneity and stability for PFCAs, PFSAs and sum of PFOS, PFOA, PFNA, PFHxS

Test sample - Bovine Meat (2401-BM)

EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Bovine Meat 2024 [EURL-PT-POP_2401-BM]
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Bovine Meat (2401-BM)
PFCAs, PFSAs - Homogeneity test - Data

Analyte	Result µg/kg wet weight	**Mean** (n = 10, duplicate analysis)	**Median** (n = 10, duplicate analysis)	**Relative standard deviation** [%]
PFNA		0.349	0.349	10%
PFDA		0.765	0.755	11%
PFUnDA		0.531	0.532	10%
PFDoDA		0.299	0.291	11%
PFHxS		0.0649	0.0644	12%
br-PFOS		0.243	0.236	10%
L-PFOS		0.575	0.554	10%

EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFASs in Bovine Meat 2024 [EURL-PT-POP_2401-BM]
EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bovine Meat (2401-BM)
Selected compounds - Homogeneity test - Data

Sample	Replicate	Result µg/kg wet weight	L-PFOS	br-PFOS	PFDA
27	1		0.617	0.268	0.854
	2		0.550	0.235	0.737
65	1		0.537	0.235	0.665
	2		0.648	0.271	0.852
117	1		0.635	0.279	0.800
	2		0.550	0.212	0.750
129	1		0.573	0.252	0.798
	2		0.689	0.242	0.883
131	1		0.557	0.249	0.741
	2		0.498	0.211	0.760
160	1		0.511	0.226	0.603
	2		0.531	0.227	0.707
232	1		0.511	0.217	0.680
	2		0.581	0.228	0.765
254	1		0.497	0.224	0.606
	2		0.545	0.238	0.803
272	1		0.652	0.296	0.880
	2		0.544	0.222	0.744
277	1		0.679	0.280	0.919
	2		0.597	0.254	0.748
Cochran's C-test					
C			0.201	0.372	0.238
$C_{critical}$ (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 $\bar{x}$			0.575	0.243	0.765
Standard deviation of sample averages s_x			0.044	0.015	0.059
Wthin-sample standard deviation s_w			0.058	0.027	0.090
Between-sample standard deviation s_s			0.016	0.000	0.000
Standard deviation for proficiency assessment σ_{PT}			0.12	0.05	0.153
s_s / σ_{PT}			0.138	0.000	0.000
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 Bovine Meat 2024 [EURL-PT-POP_2401-BM]
EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bovine Meat (2401-BM)
Selected compounds - Stability test - Data

Sample	Replicate	Result µg/kg wet weight	**L-PFOS**
7	1		0.524
	2		0.532
82	1		0.568
	2		0.501
210	1		0.560
	2		0.562
Stability test			
General average (stability test) $\bar{y}$			0.541
General average (homogeneity test) $\bar{x}$			0.575
Standard deviation for proficiency assessment σPT			0.115
$\lvert \bar{y} - \bar{x} \rvert$			0.0338
Test for stability ($\lvert \bar{y} - \bar{x} \rvert \leq 0.3$ σPT)			passed

EURL Proficiency Test on Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]
EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food
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Annex 6: Participants' methods for PFAS - Weighed sample, internal and recovery standards and comments

Test sample - Bovine Meat (2401-BM)

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]

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

Bovine Meat (2401-BM)

Methods Perfluoroalkylcarboxylic acids (PFCAs), Perfluoroalkylsulfonic acids (PFSAs) and Other PFAS - Weighed sample and internal standards

LC	Sample	Weighed sample [g]	Use of isotope-labelled internal standards for … PFCAs (yes/no)	PFSAs (yes/no)	FOSA (yes/no)	Other internal standards	Use of recovery / injection standard(s) (yes/no)	Matrix calibration (yes/no)
1	2401-BM	5	yes	yes	yes	no	no	no
2	2401-BM	2g	yes	yes	yes		no	no
9	2401-BM	3	yes	not analysed in this case	not analysed in this case	yes, Mixture from Wellingont HIF	No	Yes
10	2401-BM	5	yes	yes			no	no
14	2401-BM	2,0g	yes	yes	yes	M2-6FTS, M2-6FTS, M2-8FTS, d3-N-MeFOSAA, d5-N-EtFOSAA, M8FOSA	yes	yes
17	2401-BM	5g	yes	yes	yes	M5PFHxA (Perfluoro-n-(1,2,3,4,6-13C5) Hexanoic acid), M3PFHxS (Sodium perfluor-1-(1,2,3-13C3)Hexane sulfonate) M8PFOA (perfluoro-n-(13C8) octanoic acid), M8PFOS (Sodium perfluoro-1-(1,2,3,4-13C4) octanesulfonate), MPFDoDA (Perfluoro-n-(1,2-13C2) dodecanoic acid)	no	no
18	2401-BM	1	yes	yes	yes		no	no
21	2401-BM	5	Yes	Yes	Yes		No	No
22	2401-BM	5	yes	yes	yes		injection standard	no
26	2401-BM	2	yes	yes	no		yes	no
27	2401-BM	5	Yes	Yes	Yes		No	No
28	2401-BM	1	yes	yes	yes		yes	no
33	2401-BM	1.03	yes	yes	yes		no	no
34	2401-BM	4g	yes	yes	yes		yes	no
35	2401-BM	1	yes	yes			no	no
40	2401-BM	3g	yes	yes	no		yes	no
42	2401-BM	1.007	Yes	Yes	Yes		No	No
43	2401-BM	5	yes : MPFAC-C-ES from Wellington Laboratories	yes : MPFAC-C-ES from Wellington Laboratories	M3HFPO-DA from Wellington Laboratories		yes : MPFAC-C-IS from Wellington Laboratories	no
48	2401-BM	2	yes	yes	yes		no	yes
49	2401-BM	2		yes	yes		yes/no	no
51	2401-BM	5	yes	yes	yes		yes	no
53	2401-BM	2	YES	YES	YES	YES; PFOSA-13C8; HFPO-DA-13C3	YES	NO
56	2401-BM	0,5 g / 1 g / 2 g	yes	yes			yes	no
58	2401-BM	4	yes	yes			yes	no
60	2401-BM	2	yes	yes	yes		no	no
65	2401-BM	5g	yes	yes	yes		yes	no
66	2401-BM	0.99	yes	yes	no		no	no
67	2401-BM	2	yes	yes	yes		no	no
68	2401-BM	3	yes	yes	yes		yes	no
69	2401-BM	5	yes	yes			no	yes
70	2401-BM	3.06	Yes	Yes			No	No
71	2401-BM	1	yes	yes			dependent on recovery, yes for <80% and >120%	no
74	2401-BM	5	yes	yes			yes	yes
76	2401-BM	2g	Yes	Yes	Yes		No	No
78	2401-BM	5	yes	yes	not analysed	none	yes	no
79	2401-BM	2	yes	yes	yes	13C8-FOSA, d3-N-MeFOSAA, d5-N-EtFOSAA, 13C2-4:2 FTS; 13C2-6:2 FTS, 13C2-8:2 FTS, 13C3-HFPO-DA	no	no
80	2401-BM	2	Yes	Yes	Yes		No	No
81	2401-BM	5	yes	yes	yes	yes (GenX, FOSA)	yes	no
82	2401-BM	1	no	no	yes	Perfluoro-n-[1,2,3,4-13C4]-octanoic acid; Perfluoro-n-[1,2,3,4,5-13C5]nonanoic acid; Sodium perfluoro-1-hexane[18O2]sulfonate; Sodium perfluoro-1-[1,2,3,4-13C4]octanesulfonate	no	no
83	2401-BM	2	Y -MPFAC-C-ES - wellington	Y -MPFAC-C-ES wellington		MPFAC-C-ES - wellington	Y- MPFAc-C-IS wellington	no
84	2401-BM	2	yes	yes (except PFDoDS)	yes (except Capstone A)		no	no (except PFDoDS and Capstone A)
85	2401-BM	0.36	yes	yes			no	yes
86	2401-BM	2	no	no	no		yes	yes
87	2401-BM	2	yes	yes	yes		yes	no
92	2401-BM	5.0	yes	yes	no	no	no	no
93	2401-BM	1.00	Yes	Yes	Yes		Yes	Yes
96	2401-BM	5.0	yes	yes	no	no	no	no
97	2401-BM	5	no	no	no		yes	yes
99	2401-BM	1	yes	yes			yes	no
112	2401-BM	2	yes	yes			no	no
113	2401-BM	2	YES	YES	NO	NO	NO	YES
114	2401-BM	2	yes	yes	yes	MPFAC-24ES from Wellington-labs (includes PFCA and PFSA and others)	no	no
115	2401-BM	1.00	yes	yes			no	no
117	2401-BM	2	yes	yes	yes	no	no	no
118	2401-BM	2	Yes (All/ Not PFTrDA)	Yes (PFBS/PFHxS/ PFOS)	Yes (if available)		No	No
124	2401-BM	2	yes	yes	yes		no	no
3B	2401-BM	5g	yes	yes	yes		yes	no
59B	2401-BM	2.0	yes	yes	yes		no	no
81A	2401-BM	5	yes	yes	yes	yes (GenX, FOSA)	yes	no

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]

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

Bovine Meat (2401-BM)

Methods Perfluoroalkylcarboxylic acids (PFCAs) - Internal Standards

LC	Sample		Perfluorobutanoic acid **(PFBA)**	Perfluoropentanoic acid **(PFPeA)**	Perfluorohexanoic acid **(PFHxA)**	Perfluoroheptanoic acid **(PFHpA)**	Perfluorooctanoic acid **(PFOA)**	Perfluorononanoic acid **(PFNA)**	Perfluorodecanoic acid **(PFDA)**	Perfluoroundecanoic acid **(PFUnDA)**	Perfluorododecanoic acid **(PFDoDA)**	Perfluorotridecanoic acid **(PFTrDA)**	Perfluorotetradecanoic acid **(PFTeDA)**
1	2401-BM		Perfluoro-n-(1,2,3,4-13C4)butansäure (MPFBA)	Perfluoro-n-(13C5)pentansäure (M5PFPeA)	Perfluoro-n-(1,2,3,4,6-13C5)hexansäure (M5PFHxA)	Perfluoro-n-[1,2,3,4-13C4]heptansäure (M4PFHpA)	Perfluoro-n-(13C8)octansäure (M8PFOA)	Perfluoro-n-(13C9)nonansäure (M9PFNA)	Perfluoro-n-(1,2,3,4,5,6-13C6)decansäure (M6PFDA)	Perfluoro-n-(1,2,3,4,5,6,7-13C7)undecansäure (M7PFUdA)	Perfluoro-n-(1,2-13C2)dodecansäure (MPFDoA)	Perfluoro-n-(1,2-13C2)dodecansäure (MPFDoA)	Perfluoro-n-(13C2)tetradecansäure (M2PFTeDA)
2	2401-BM		13C4-PFBA	13C5-PFPeA	13C5-PFHxA	M4PFHpA	13C8-PFOA	13C9-PFNA	13C6-PFDA	13C7-PFUdA	13C2-PFDoA	13C2-PFDoA	13C2-PFDoA
9	2401-BM		MPFBA	M5PFPeA	M5PFHxA	M4PFHpA	M8PFOA	M9PFNA	M6PFDA	M7PFUnDA	MPFDoA	M2PFTeDA	M2PFTeDA
10	2401-BM						13C-PFOA	13C-PFNA					
14	2401-BM		MPFBA	M5PFPeA	M5PFHxA	M5PFHpA	M8PFOA	M9PFNA	M6PFDA	M7PFUdA	MPFDoA	no IS	M2PFDeA
17	2401-BM		M5PFHxA (Perfluoro-n-(1,2,3,4,6-13C5) Hexanoic acid)	M5PFHxA (Perfluoro-n-(1,2,3,4,6-13C5) Hexanoic acid)	M5PFHxA (Perfluoro-n-(1,2,3,4,6-13C5) Hexanoic acid)	M5PFHxA (Perfluoro-n-(1,2,3,4,6-13C5) Hexanoic acid)	M8PFOA (perfluoro-n-(13C8) octanoic acid)	M8PFOA (perfluoro-n-(13C8) octanoic acid)	M8PFOA (perfluoro-n-(13C8) octanoic acid)	M8PFOA (perfluoro-n-(13C8) octanoic acid)	MPFDoDA (Perfluoro-n-(1,2-13C2) dodecanoic acid)	MPFDoDA (Perfluoro-n-(1,2-13C2) dodecanoic acid)	MPFDoDA (Perfluoro-n-(1,2-13C2) dodecanoic acid)
18	2401-BM		PFBA 13C4	PFPeA 13C3	PFHxA 13C2	PFHpA 13C4	PFOA 13C4	PFNA 13C5	PFDA 13C2	PFUnDA 13C2	PFDoDA 13C2	PFDoDA 13C2	PFDoDA 13C2
21	2401-BM		MPFBA	MPFPeA	MPFHxA	MPFHpA	MPFOA	MPFNA	MPFDA	MPFUnDA	MPFDoDa	MPFDoDa	MPFTeDA
22	2401-BM		PFBA-13C3	PFPeA-13C5	PFHxA-13C5	PFHpA--13C4	PFOA-13C8	PFNA-13C9	PFDA-13C6	PFUnDA-13C7	PFDoDA-13C2	PFTrDA-13C2	PFTeDA-13C2
26	2401-BM				mPFHxA	mPFHxA	mPFOA	mPFNA	mPFDA	mPFUdA	mPFDoA		
27	2401-BM			PFPeA-13C3	PFHxA-13C5	PFHpA-13C4	PFOA-13C	PFNA-13C5	PFDA-13C2	PFUnDA-13C2			
28	2401-BM			PFPeA13C3	PFHxA13C2	PFHpA13C4	PFOA13C4	PFNA13C5	PFDA13C2	PFUnDA13C2	PFDoDA13C2	PFTeDA13C2	PFTeDA13C2
33	2401-BM		PFBA 13C4	PFPeA 13C3	PFHxA 13C2	PFHpA 13C4	PFOA 13C4	PFNA 13C5	PFDA 13C2	PFUndA 13C2	PFDoDA 13C2	PFBS 13C3	PFBS 13C3
34	2401-BM		M13C4 PFBA	M13C3 PFPeA	M13C2 PFHxA	M13C4 PFHpA	M13C4 PFOA	M13C5 PFNA	M13C2 PFDA	M13C2 PFUnDA	M13C2 PFDoDA	M13C2 PFDoDA	M13C2 PFDoDA
35	2401-BM		PFBA-13C4	PFPeA-13C3	PFHxA-13C2	PFHpA-13C4	PFOA-13C4	PFNA-13C5	PFDA-13C2	PFDoDA-13C2	PFDoDA-13C2	PFDoDA-13C2	PFTeDA-13C2
40	2401-BM						PFOA isotope-labelled	PFNA isotope-labelled					
42	2401-BM		PFBA 13C4	PFPeA 13C3	PFHxA 13C2	PFHpA 13C7	PFOA 13C4	PFNA 13C5	PFDA 13C2	PFUnDA 13C2	PFDoDA 13C2	PFDoDA 13C2	PFDoDA 13C2
43	2401-BM		MPFBA	MPFPeA	MPFHxA	MPFHpA	MPFOA	MPFNA	MPFDA	MPFUnDA	MPFDoDA	MPFDoDA/MPFTeDA	MPFTeDA
48	2401-BM		13C4-PFBA	13C5-PFPeA	13C5-PFHxA	13C4-PFHpA	13C8-PFOA	13C9-PFNA	13C6-PFDA	13C7-PFUdA	13C2-PFDoA	13C2-PFTeDA	13C2-PFTeDA
49	2401-BM		PFBA-13C2	PFPeA-13C5	PFHxA-13C2	PFOA-13C4	PFOA-13C4	PFNA-13C5	PFDA-13C2	PFUnDA-13C2	PFDoDA-13C2		
51	2401-BM		13C-PFBA	13C-PFPeA	13C-PFHxA	13C-PFHpA	13C-PFOA	13C-PFNA	13C-PFDA	13C-PFUnDA	13C-PFDoDA	13C-Pseudo-PFTrDA	13C-PFTeDA
53	2401-BM		PFBA-13C4	PFPeA-13C5	PFHxA-13C5	PFHpA-13C4	PFOA-13C8	PFNA-13C9	PFDA-13C6	PFUnA -13C7	PFDoA -13C2	PFDoA -13C2	PFTeDA-13C2
56	2401-BM							13C9-PFNA	13C6-PFDA	13C7-PFUnDA	13C2-PFDoDA	13C2-PFDoDA	13C2-PFTeDA
58	2401-BM				Perfluoro-n-[1,2,3,4,6-13C12] hexanoic acid	Perfluoro-n-[1,2,3,4-13C12] heptanoic acid	Perfluoro-n-[1,2,3,4-13C12] octanoic acid	Perfluoro-n-[1,2,3,4,5-13C12] nonanoic acid	Perfluoro-n-[1,2-13C12] decanoic acid	Perfluoro-n-[1,2,3,4,5,6,7-113C12]undecanoic acid	Perfluoro-n-[1,2-13C12] dodecanoic acid		
60	2401-BM				13C5-PFHxA	13C4-PFHpA	13C8-PFOA	13C9-PFNA	13C6-PFDA	13C7-PFUnDA	13C2-PFDoDA	13C2-PFDoDA	13C2-PFTeDA
65	2401-BM		13C4-PFBA	13C5-PFPeA	13C2-PFHxA	13C4-PFHpA	13C8-PFOA	13C5-PFNA	13C2-PFDA	13C2-PFUnA	13C2-PFDoA	13C2-PFDoA	13C2-PFTeDA
66	2401-BM		PFBA 13C4	PFPeA 13C5	PFHxA 13C5	PFHpA 13C4	PFOA 13C8	PFNA 13C9	PFDA 13C6	PFUdA 13C7	PFDoA 13C2	PFDoA 13C2	PFTeDA 13C2
67	2401-BM		MPFAC-MXA		MPFAC-MXA		MPFAC-MXA	MPFAC-MXA	MPFAC-MXA	MPFAC-MXA	MPFAC-MXA		
68	2401-BM		13C3-PFBA	13C5-PFPeA	13C6-PFHxA	13C7-PFHpA	13C8-PFOA	13C9-PFNA	13C9-PFDA	13C9-PFUnDA	13C12-PFDoDA	13C12-PFDoDA	13C2-PFTeDA
69	2401-BM		M5PFPeA	M5PFPeA	M5PFPeA	MPFOA	MPFOA	MPFNA	M7PFUnDA	M7PFUnDA	MPFDoDA		
70	2401-BM						13C8-PFOA	13C9-PFNA					
71	2401-BM						13C8-PFOA	13C9-PFNA					
74	2401-BM						PFOA-13C4	PFNA-13C5					
76	2401-BM		13C4-PFBA	13C5-PFPeA	13C5-PFHxA	13C4-PFHpA	13C4-PFOA	13C5-PFNA	13C6-PFDA	13C7-PFUdA	13C2-PFDoA	13C2-PFDoA	13C2-PFTeDA
78	2401-BM		13C4-PFBA	13C5-PFPeA	13C5-PFHxA	13C4-PFHpA	13C8-PFOA	13C9-PFNA	13C6-PFDA	13C7-PFUnDA	13C2-PFDoDA	13C2-PFDoDA	13C2-PFTeDA
79	2401-BM		13C4-PFBA	13C5-PFPeA	13C5-PFHxA	13C4-PFHpA	13C8-PFOA	13C9-PFNA	13C6-PFDA	13C7-PFUnDA	13C2-PFDoDA	13C2-PFDoDA	13C2-PFTeDA
80	2401-BM			Perfluoro-n-[13C5]pentanoic acid (M5PFPeA)	Perfluoro-n-[1,2,3,4,6-13C5]hexanoic acid (M5PFHxA)	Perfluoro-n-[1,2,3,4-13C4]heptanoic acid (M4PFHpA)	Perfluoro-n-[13C8]octanoic acid (M8PFOA)	Perfluoro-n-[13C9]nonanoic acid (M9PFNA)	Perfluoro-n-[1,2,3,4,5,6-13C6]decanoic acid (M6PFDA)	Perfluoro-n-[1,2,3,4,5,6,7-13C7]undecanoic acid (M7PFUdA)	Perfluoro-n-[1,2-13C2]dodecanoic acid (MPFDoA)	Perfluoro-n-[1,2-13C2]dodecanoic acid (MPFDoA)	Perfluoro-n-[1,2-13C2]tetradecanoic acid M2PFTeDA
81	2401-BM		PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFDoDA	PFTeDA
82	2401-BM						Perfluoro-n-[1,2,3,4-13C4]-octanoic acid	Perfluoro-n-[1,2,3,4,5-13C5]nonanoic acid					
83	2401-BM				13C PFHxA	13C PFHpA	13C PFOA	13C PFNA	13C PFDA	13C PFUnDA	13C PFDoDA		13C PFTeDA
84	2401-BM		MPFBA	MPFPeA	MPFHxA	MPFOS	MPFOA	MPFNA	MPFDA	MPFUnDA	MPFDoDA	MPFDoDA	MPFTeDA
85	2401-BM		PFBA-13C4	PFPeA-13C5	PFHxA-13C5	PFHpA-13C2	PFOA-13C8	PFNA-13C9	PFDA-13C6	PFUnDA-13C7	PFDoDA-13C2	PFDoDA-13C2+PFTeDA-13C2	PFTeDA-13C2
86	2401-BM												
87	2401-BM		13C4-PFBA	13C5-PFPeA	13C5-PFHxA	13C4-PFHpA	13C8-PFOA	13C9-PFNA	13C6-PFDA	13C7-PFUnDA	13C2-PFDoA	13C2-PFTeA	13C2-PFTeA
92	2401-BM						13C4-PFOA	13C5-PFNA					
93	2401-BM			13C3-PFPeA	13C2-PFHxA	13C4-PFHpA	13C4-PFOA	13C5-PFNA	13C2-PFDA	13C2-PFUnDA	13C2-PFDoDA	13C-PFDoDA	13C2-PFTeDA
96	2401-BM						Perfluoro-n(13C8)octanoicacid (M8-PFOA)	Perfluoro-n(13C9)nonanoicacid (M9-PFNA)					
97	2401-BM												
99	2401-BM						13C4 - PFOA	13C9 - PFNA					
112	2401-BM												
113	2401-BM			13C5_PFPeA	13C5_PFHxA	13C4_PFHpA	13C8_PFOA	13C9-PFNA	13C2_PFDA	13C7_PFUnA	13C2_PFDoA	13C2_PFDoA	13C2_PFTeDA
114	2401-BM					PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTeDA	PFTeDA
115	2401-BM			M5PFPeA	MPFHxA	MPFOA	MPFOA	MPFNA	MPFDA	MPFUnDA	MPFDoDA	MPFDoDA	MPFDoDA
117	2401-BM		PFBA-C13	PFPeA-C13	PFHxA-C13	PFHxA-C13	PFOA-C13	PFNA-C13	PFDA-C13	PFUnDA-C13	PFDoDA-C13	PFDoDA-C13	PFTeDA-C13
118	2401-BM		PFBA_13C	PFPeA_13C	PFHxA_13C	PFHpA_13C	PFOA_13C	PFNA_13C	PFDA_13C	PFUnA_13C	PFDoA_13C	PFTeDA (13C2)	PFTeDA (13C2)
124	2401-BM		MPFBA	MPFPeA	MPFHxA	MPFHpA	MPFOA	MPFNA	MPFDA	MPFUnDa	MPFDoDA	MPFTeDA	MPFTeDA
3B	2401-BM						13C8-PFOA	13C5-PFNA					
59B	2401-BM		M3PFBA	M3PFPeA	PFHxA-13C2	M4PFHpA	PFOA-13C4	PFNA-13C5	PFDA-13C2	PFUdA-13C2	PFDoA-13C2	M2PFTeDA	M2PFTeDA
81A	2401-BM		PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFDoDA	PFTeDA

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]

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

Bovine Meat (2401-BM)

Methods Perfluoroalkylcarboxylic acids (PFCAs) - Recovery Standards

LC	Sample		Perfluorobutanoic acid **(PFBA)**	Perfluoropentanoic acid **(PFPeA)**	Perfluorohexanoic acid **(PFHxA)**	Perfluoroheptanoic acid **(PFHpA)**	Perfluorooctanoic acid **(PFOA)**	Perfluorononanoic acid **(PFNA)**	Perfluorodecanoic acid **(PFDA)**	Perfluoroundecanoic acid **(PFUnDA)**	Perfluorododecanoic acid **(PFDoDA)**	Perfluorotridecanoic acid **(PFTrDA)**	Perfluorotetradecanoic acid **(PFTeDA)**
1	2401-BM												
2	2401-BM												
9	2401-BM												
10	2401-BM						NA	NA					
14	2401-BM												
17	2401-BM		-	-	-	-	-	-	-	-	-	-	-
18	2401-BM		PFOS 13C8	PFOS 13C8	PFOS 13C8	PFOS 13C8	PFOS 13C8	PFOS 13C8	PFOS 13C8	PFOS 13C8	PFOS 13C8	PFOS 13C8	PFOS 13C8
21	2401-BM		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
22	2401-BM		PFOA-13C2	PFOA-13C2	PFOA-13C2	PFOA-13C2	PFOA-13C2	PFOA-13C2	PFDA-13C2	PFDA-13C2	PFDA-13C2	PFDA-13C2	PFDA-13C2
26	2401-BM												
27	2401-BM												
28	2401-BM			PFOS13C8	PFOS13C8	PFOS13C8	PFOS13C8	PFOS13C8	PFOS13C8	PFOS13C8	PFOS13C8	PFOS13C8	PFOS13C8
33	2401-BM												
34	2401-BM		M13C8 PFOS	M13C8 PFOS	M13C8 PFOS	M13C8 PFOS	M13C8 PFOS	M13C8 PFOS	M13C8 PFOS	M13C8 PFOS	M13C8 PFOS	M13C8 PFOS	M13C8 PFOS
35	2401-BM		none	none	none	none	none	none	none	none	none	none	none
40	2401-BM												
42	2401-BM		17.00	28.00	29.00	30	30.00	30.00	28.00	24.00	15.00	15.00	15.00
43	2401-BM		MPFBA injection	MPFBA injection	MPFBA injection	MPFBA injection	MPFOA injection	MPFOA injection	MPFDA injection	MPFDA injection	MPFDA injection	MPFDA injection	MPFDA injection
48	2401-BM		No	No	No	No	No	No	No	No	No	No	No
49	2401-BM												
51	2401-BM		R-PFBA	R-PFOA	R-PFOA	R-PFOA	R-PFOA	R-PFOA	R-PFDA	R-PFDA	R-PFDA		R-PFDA
53	2401-BM		PFOS-13C4	PFOS-13C4	PFOS-13C4	PFOS-13C4	PFOS-13C4	PFOS-13C4	PFOS-13C4	PFOS-13C4	PFOS-13C4	PFOS-13C4	PFOS-13C4
56	2401-BM							13C5-PFNA	13C2-PFDA				
58	2401-BM				Sodium perfluoro-[13C8]octanesulfonate	Sodium perfluoro-[13C8]octanesulfonate	Sodium perfluoro-[13C8]octanesulfonate	Sodium perfluoro-[13C8]octanesulfonate	Sodium perfluoro-[13C8]octanesulfonate	Sodium perfluoro-[13C8]octanesulfonate	Sodium perfluoro-[13C8]octanesulfonate		
60	2401-BM												
65	2401-BM		13C4-PFOA	13C4-PFOA	13C4-PFOA	13C4-PFOA	13C4-PFOA	13C4-PFOA	13C4-PFOA	13C4-PFOA	13C4-PFOA	13C4-PFOA	13C4-PFOA
66	2401-BM												
67	2401-BM												
68	2401-BM		13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS
69	2401-BM												
70	2401-BM												
71	2401-BM												
74	2401-BM												
76	2401-BM												
78	2401-BM		13C3-PFBA	13C3-PFBA	13C2-PFOA	13C2-PFOA	13C2-PFOA	13C2-PFOA	13C2-PFDA	13C2-PFDA	13C2-PFDA	13C2-PFDA	13C2-PFDA
79	2401-BM												
80	2401-BM												
81	2401-BM		PFBA	PFBA	PFBA	PFOA	PFOA	PFOA	PFDA	PFDA	PFDA	PFDA	PFDA
82	2401-BM												
83	2401-BM				13C PFOA	13C PFOA	13C PFOA	13C PFDA	13C PFDA	13C PFDA	13C PFDA		13C PFDA
84	2401-BM												
85	2401-BM												
86	2401-BM		PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTrDA	
87	2401-BM												
92	2401-BM												
93	2401-BM			13C8-PFOA	13C8-PFOA	13C8-PFOA	13C8-PFOA	13C8-PFOA	13C8-PFOA	13C8-PFOA	13C8-PFOA	13C8-PFOA	13C8-PFOA
96	2401-BM						none	none					
97	2401-BM												
99	2401-BM												
112	2401-BM												
113	2401-BM												
114	2401-BM												
115	2401-BM												
117	2401-BM												
118	2401-BM												
124	2401-BM												
3B	2401-BM						13C4-PFOA	13C4-PFOA					
59B	2401-BM												
81A	2401-BM		PFBA	PFBA	PFBA	PFOA	PFOA	PFOA	PFDA	PFDA	PFDA	PFDA	PFDA

Bovine Meat (2401-BM)

Methods Perfluoroalkylcarboxylic acids (PFCAs) - Comments

LC	Sample	Perfluorobutanoic acid **(PFBA)**	Perfluoropentanoic acid **(PFPeA)**	Perfluorohexanoic acid **(PFHxA)**	Perfluoroheptanoic acid **(PFHpA)**	Perfluorooctanoic acid **(PFOA)**	Perfluorononanoic acid **(PFNA)**	Perfluorodecanoic acid **(PFDA)**	Perfluoroundecanoic acid **(PFUnDA)**	Perfluorododecanoic acid **(PFDoDA)**	Perfluorotridecanoic acid **(PFTrDA)**	Perfluorotetradecanoic acid **(PFTeDA)**
1	2401-BM	only one MS/MS transition was used for identification and the result was confirmed by a second chromatographic separation (raptor C18 column)	only one MS/MS transition was used for identification (raptor C18 column)									
2	2401-BM	identified only with HRMS	identified only with HRMS									
9	2401-BM											
10	2401-BM											
14	2401-BM	<LOQ (found 0,146) one MSMS 212,8/168,8 confimed 2. LCMS run				<LOQ (found 0,011)				<LOQ (found 0,471)	<LOQ (found 0,129)	
17	2401-BM	Below our LOQ		Below our LOQ	Detected below our LOQ	Detected below our LOQ						
18	2401-BM	Only one MS/MS transition	Only one MS/MS transition									
21	2401-BM	Only 1 MRM, no confirmation	Only 1 MRM, no confirmation									
22	2401-BM		only one MS/MS transition									
26	2401-BM	not analyzed	not analyzed								not analyzed	not analyzed
27	2401-BM	Not analysed	Two MS/MS transitions							Not analysed	Not analysed	Not analysed
28	2401-BM	not analysed	MS/MS									
33	2401-BM	212,9>168,9	262,9>218,9	312,9>268,9	362,9>318,9	412,9>368,9	462,9>418,9	512,9>468,9	562,9>518,9	612,9>568,9	662,9>618,9	712,9>668,9
34	2401-BM	216,9 > 171,9 , not confirmed by HRMS	265,9 > 221,9 , not confirmed by HRMS									
35	2401-BM											
40	2401-BM					< LQ						
42	2401-BM	Only one MS/MS transition	Only one MS/MS transition									
43	2401-BM	confirmed by HRMS	confirmed by HRMS									
48	2401-BM	HRMS	HRMS									
49	2401-BM											
51	2401-BM											
53	2401-BM	Confirmed by a second chromatographic separation	Confirmed by a second chromatographic separation									
56	2401-BM											
58	2401-BM											
60	2401-BM	Not Analyzed	Not Analyzed									
65	2401-BM											
66	2401-BM											
67	2401-BM											
68	2401-BM											
69	2401-BM	quantitation and confirmation with HRMS	quantitation and confirmation with HRMS									
70	2401-BM											
71	2401-BM											
74	2401-BM											
76	2401-BM											
78	2401-BM	only one MS/MS transition was used for identification	only one MS/MS transition was used for identification									
79	2401-BM	no confirmation	no confirmation									
80	2401-BM	Not tested										
81	2401-BM	Identification and quantification were performed by HRMS	Identification and quantification were performed by HRMS									
82	2401-BM											
83	2401-BM	no conf ion	no conf ion									
84	2401-BM	A second chromatographic separation was used for identification.	A second chromatographic separation was used for identification.									
85	2401-BM	only one MS/MS transition	only one MS/MS transition									
86	2401-BM											
87	2401-BM	only one MS/MS transition	only one MS/MS transition									
92	2401-BM					< LOQ						
93	2401-BM		PFPeA 263 --> 219 transistion was used for quantitation. The qualifier "transistion" was 263 --> 263. The result is not comfirmed with a secondary analysis.									
96	2401-BM					Determination of recovery via spiking on meat	Determination of recovery via spiking on meat					
97	2401-BM											
99	2401-BM											
112	2401-BM											

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]

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

Bovine Meat (2401-BM)

Methods Perfluoroalkylcarboxylic acids (PFCAs) - Comments

LC	Sample		Perfluorobutanoic acid **(PFBA)**	Perfluoropentanoic acid **(PFPeA)**	Perfluorohexanoic acid **(PFHxA)**	Perfluoroheptanoic acid **(PFHpA)**	Perfluorooctanoic acid **(PFOA)**	Perfluorononanoic acid **(PFNA)**	Perfluorodecanoic acid **(PFDA)**	Perfluoroundecanoic acid **(PFUnDA)**	Perfluorododecanoic acid **(PFDoDA)**	Perfluorotridecanoic acid **(PFTrDA)**	Perfluorotetradecanoic acid **(PFTeDA)**
113	2401-BM												
114	2401-BM											Not yet validated and therefore no LOQ or MU	
115	2401-BM												
117	2401-BM		1 MS/MS transition	1 MS/MS transition									
118	2401-BM		Only one MS/MS transition	Only one MS/MS transition									
124	2401-BM												
3B	2401-BM												
59B	2401-BM		result <0,20	result <0,20	result <0,20	result <0,20	result <0,20					result <0,20	result <0,20
81A	2401-BM		Identification and quantification were performed by HRMS	Identification and quantification were performed by HRMS									

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]

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

Bovine Meat (2401-BM)

Methods Perfluoroalkylsulfonic acids (PFSAs) - Internal Standards

LC	Sample		Perfluorobutanesulfonic acid **(PFBS)**	Perfluoropentanesulfonic acid **(PFPeS)**	Perfluorohexanesulfonic acid **(PFHxS)**	Perfluoroheptanesulfonic acid **(PFHpS)**	Linear Perfluorooctanesulfonic acid **(L-PFOS)**	Sum of branched PFOS acids **(br-PFOS)**	Total-Perfluorooctanesulfonic acids **(total PFOS)**	Perfluorononanesulfonic acid **(PFNS)**	Perfluorodecanesulfonic acid **(PFDS)**	Perfluoroundecane- sulfonic acid **(PFUnDS)**	Perfluorododecane- sulfonic acid **(PFDoDS)**	Perfluorotridecane- sulfonic acid **(PFTrDS)**
1	2401-BM		Perfluoro-1-(2,3,4-13C3)butansulfonsäure (Na.salz) (M3PFBS)	Perfluoro-n-(1,2,3,4,6-13C5)hexansäure (M5PFHxA)	Perfluoro-1-(2,3,4-13C3)hexansulfonsäure (Na.salz) (M3PFHxS)	Perfluoro-n-(13C8)octansäure (M8PFOA)	Perfluoro-n-(13C8)octansulfonsäure (Natriumsalz) (M8PFOS)	Perfluoro-n-(13C8)octansulfonsäure (Natriumsalz) (M8PFOS)	Perfluoro-n-(13C8)octansulfonsäure (Natriumsalz) (M8PFOS)	Perfluoro-n-(1,2,3,4,5,6-13C6)decansäure (M6PFDA)	Perfluoro-n-(1,2-13C2)dodecansäure (MPFDoA)	Perfluoro-n-(1,2-13C2)dodecansäure (MPFDoA)	Perfluoro-n-(13C2)tetradecansäure (M2PFTeDA)	Perfluoro-n-(13C2)tetradecansäure (M2PFTeDA)
2	2401-BM		13C3-PFBS	13C3-PFHxS	13C3-PFHxS	13C3-PFHxS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS
9	2401-BM													
10	2401-BM				13C-PFHxS				13C-PFOS					
14	2401-BM		M3PFBS	M2-4:2FTS	M3PFHxS	M8PFOA	M8PFOS	M8PFOS		M8PFOS	M8PFOS	MPFDoA	M8PFOS	MPFDoA
17	2401-BM		M3PFHxS (Sodium perfluor-1-(1,2,3-13C3)Hexane sulfonate)		M3PFHxS (Sodium perfluor-1-(1,2,3-13C3)Hexane sulfonate)	M3PFHxS (Sodium perfluor-1-(1,2,3-13C3)Hexane sulfonate)	M8PFOS (Sodium perfluoro-1-(1,2,3,4-13C4) octanesulfonate)				M8PFOA (perfluoro-n-(13C8) octanoic acid)			
18	2401-BM		PFBS 13C3	PFHxS 18O2	PFHxS 18O2	PFHxS 18O2	PFOS 13C4	PFOS 13C4	PFOS 13C4	PFUnDA 13C2	PFUnDA 13C2	PFUnDA 13C2	PFUnDA 13C2	PFUnDA 13C2
21	2401-BM		MPFBS	MPFHxS	MPFHxS	MPFHxS	MPFOS	MPFOS	MPFOS	MPFOS	MPFOS	MPFOS	MPFOS	MPFOS
22	2401-BM		PFBS-13C3	PHHxS-13C3	PFHxS-13C3	PFOS-13C8	PFOS-13C8	PFOS-13C8	PFOS-13C8	PFOS-13C8	PFOS-13C8		PFOS-13C8	
26	2401-BM		mPFHxS	mPFHxS	mPFHxS	mPFHxS	mPFOS	mPFOS	mPFOS	mPFOS	mPFOS		mPFOS	
27	2401-BM		PFBS-13C3	PFBS-13C3	PFHxS-18O2	PFHxS-18O2	PFOS-13C8 (linear)	PFOS-13C8 (linear)		PFOS-13C8 (linear)	PFOS-13C8 (linear)	PFOS-13C8 (linear)	PFOS-13C8 (linear)	PFOS-13C8 (linear)
28	2401-BM		PFBS13C3	PFBS13C3	PFHxS18O2	PFHxS18O2	PFOS13C4	PFOS13C4	PFOS13C4	PFDA13C2	PFDA13C2	PFUnDA13C2	PFTeDA13C2	PFTeDA13C2
33	2401-BM		PFBS 13C3	PFHxS 18O2	PFHxS 18O2	PFOS 13C4	PFOS 13C4	PFOS 13C4	PFOS 13C4	PFOS 13C4	PFOS 13C4	PFOS 13C4	PFOS 13C4	PFOS 13C4
34	2401-BM		M13C3 PFBS	M13C3 PFBS	M18O2 PFHxS	M18O2 PFHxS	M13C4 PFOS	M13C4 PFOS	M13C4 PFOS	M13C2 PFUnDA	M13C2 PFUnDA	M13C2 PFUnDA	M13C2 PFUnDA	M13C2 PFUnDA
35	2401-BM		PFBS-13C3	PFBS-13C3	PFHxS-18O2	PFHxS-18O2	PFOS-13C4	PFOS-13C4	PFOS-13C4	PFOS-13C8	PFOS-13C8			
40	2401-BM				PFHxS isotope-labelled				PFOS isotope-labelled					
42	2401-BM		PFBS 13C4	PFHxA 13C2	PFHxS 18O2	PFHxS 18O2	PFOS 13C4	PFOS 13C4	PFOS 13C4	PFUnDA 13C2	PFUnDA 13C2	PFUnDA 13C2	PFUnDA 13C2	PFUnDA 13C2
43	2401-BM		MPFBS	MPFHxS	MPFHxS	MPFHxS	MPFOS	MPFOS	MPFOS	MPFHxS	MPFHxS	MPFHxS	MPFHxS	MPFHxS
48	2401-BM		13C3-L-PFBS	13C3-L-PFHxS	13C3-L-PFHxS	13C3-L-PFHxS	13C8-L-PFOS	13C8-L-PFOS	13C8-L-PFOS	13C6-PFDA	13C7-PFUdA	13C2-PFTeDA	13C7-PFUdA	13C2-PFTeDA
49	2401-BM				PFHxS-18O2	PFOS-13C4	PFOS-13C4	PFOS-13C4			PFOS-13C4			
51	2401-BM		13C-PFBS	13C-PFBS	13C-PFHxS	13C-PFOS m/z 80	13C-PFOS m/z 80	13C-PFOS m/z 80 and m/z 99		13C-PFOS m/z 80	13C-PFOS m/z 80	13C-PFUnDA		
53	2401-BM		PFBS-13C3	PFHxS-13C3	PFHxS-13C3	PFHxS-13C3	PFOS-13C8	PFOS-13C8		PFOS-13C8	PFDA-13C6		PFDoA -13C2	
56	2401-BM				13C3-PFHxS	13C8-PFOS	13C8-PFOS		13C8-PFOS		13C8-PFOS			
58	2401-BM		sodium perfluoro-1-[2,3,4-13C12] butanesulfonate	sodium perfluoro-1-hexane[18O2]sulfonate	sodium perfluoro-1-hexane[18O2]sulfonate	sodium perfluoro-1-hexane[18O2]sulfonate	Sodium perfluoro-1-[1,2,3,4-13C12] octanesulfonate.	Sodium perfluoro-1-[1,2,3,4-13C12] octanesulfonate.	Sodium perfluoro-1-[1,2,3,4-13C12] octanesulfonate.					
60	2401-BM		13C3-PFBS	13C3-PFHxS	13C3-PFHxS	13C3-PFHxS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS
65	2401-BM		13C3-PFBS	13C3-PFBS	18O2-PFHxS	18O2-PFHxS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C8-PFOA	13C2-PFUnA	13C2-PFDoA	13C2-PFDoA	13C2-PFTeDA
66	2401-BM		PFBS 13C3	PFHxA 13C5	PFHxS 13C3	PFOA 13C8	PFOS 13C8	PFOS 13C8	PFOS 13C8	PFDA 13C6	PFUdA 13C7	PFDoA 13C2	PFTeDA 13C2	PFTeDA 13C2
67	2401-BM				MPFAC-MXA		MPFAC-MXA							
68	2401-BM		13C4-PFBS	13C4-PFBS	13C6-PFHxS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS
69	2401-BM		M3PFHxS	M3PFHxS	M3PFHxS	M3PFHxS	MPFOS		MPFOS	M7PFUnDA	M7PFUnDA	MPFDoDA		
70	2401-BM				13C3-PFHxS		13C8-PFOS	13C8-PFOS						
71	2401-BM				13C6-PFHxS				13C8-PFOS					
74	2401-BM				PFHxS-13C3				PFOS-13C4					
76	2401-BM		13C3-PFBS	13C3-PFBS	18O2-PFHxS	18O2-PFHxS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C2-PFDoA
78	2401-BM		13C3-PFBS	13C3-PFHxS	13C3-PFHxS	13C3-PFHxS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS		13C8-PFOS	
79	2401-BM		13C3-PFBS	13C3-PFHxS	13C3-PFHxS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C3-PFHxS		
80	2401-BM		Sodium perfluoro-1-[2,3,4-13C3]butanesulfonate M3PFBS		Sodium perfluoro-1-[1,2,3-13C3]hexanesulfonate M3PFHxS		Sodium perfluoro-1-[13C8]octanesulfonate M8PFOS	Sodium perfluoro-1-[13C8]octanesulfonate M8PFOS			Sodium perfluoro-1-[13C8]octanesulfonate M8PFOS			
81	2401-BM		PFBS	PFBS	PFHxS	PFHxS	PFOS		PFOS	PFOS	PFOS		PFOS	
82	2401-BM				Sodium perfluoro-1-hexane[18O2]sulfonate		Sodium perfluoro-1-[1,2,3,4-13C4]octanesulfonate	Sodium perfluoro-1-[1,2,3,4-13C4]octanesulfonate	Sodium perfluoro-1-[1,2,3,4-13C4]octanesulfonate					
83	2401-BM				13C PFOS	13C PFOS	13C PFOS	13C PFOS						
84	2401-BM		MPFHxS	MPFOS	MPFHxS	MPFHxS	MPFOS	MPFOS	MPFOS	MPFHxS	MPFHxS	MPFHxS		MPFTeDA
85	2401-BM		PFBS-13C3	PFHxS-13C3	PFHxS-13C3	PFOS-13C8	PFOS-13C8	PFOS-13C8		PFOS-13C8	PFOS-13C8			
86	2401-BM													
87	2401-BM		13C3-PFBS	13C3-PFHxS	13C3-PFHxS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C8-PFOS	13C7-PFUnDA	13C7-PFUnDA		13C2-PFTeA	
92	2401-BM				18O2-PFHxS				13C4-PFOS					
93	2401-BM		13C3-PFBS		18O2-PFHxS	18O2-PFHxS	13C4-PFOS	13C4-PFOS	13C4-PFOS		13C2-PFDoDA			
96	2401-BM				Perfluoro-1[1,2,3-(13C3)]hexansulfonat				Perfluoro(13C8)octansulfonat					
97	2401-BM													
99	2401-BM				13C3 - PFHxS				13C4 - PFOS					
112	2401-BM													
113	2401-BM		13C3_PFBS	13C3_PFHxS	13C3_PFHxS	13C3_PFHxS	13C8_PFOS	13C8_PFOS	13C8_PFOS	13C8_PFOS	13C2_PFDA			
114	2401-BM				L-PFHxS	PFNA	L-PFOS	L-PFOS	L-PFOS					
115	2401-BM		MPFBS		MPFHxS		MPFOS		MPFOS		MPFOS			
117	2401-BM		PFHxS-C13	PFHxS-C13	PFHxS-C13	PFHxS-C13	PFOS-C13	PFOS-C13	PFOS-C13	PFOS-C13	PFOS-C13	PFOS-C13	PFOS-C13	PFOS-C13
118	2401-BM		PFBS_13C		PFHxS_13C		PFOS_13C		PFOS_13C					PFTeDA (13C2)
124	2401-BM		MPFBS	MPFHxS	MPFHxS	MPFHxS	MPFOS	MPFOS		MPFHxS	MPFOS		MPFDoDA	
3B	2401-BM				18O2-PFHxS				13C4-PFOS					
59B	2401-BM		M3PFBS	M3PFBS	PFHxS-18O2	PFHxS-18O2			PFOS ISTD	PFOS ISTD	PFOS ISTD	PFOS ISTD	PFOS ISTD	PFOS ISTD
81A	2401-BM		PFBS	PFBS	PFHxS	PFHxS	PFOS		PFOS	PFOS	PFOS		PFOS	

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]

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

Bovine Meat (2401-BM)

Methods Perfluoroalkylsulfonic acids (PFSAs) - Recovery Standards

LC	Sample		Perfluorobutanesulfonic acid (PFBS)	Perfluoropentanesulfonic acid (PFPeS)	Perfluorohexanesulfonic acid (PFHxS)	Perfluoroheptanesulfonic acid (PFHpS)	Linear Perfluorooctanesulfonic acid (L-PFOS)	Sum of branched PFOS acids (br-PFOS)	Total-Perfluorooctanesulfonic acids (total PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecanesulfonic acid (PFDS)	Perfluoroundecane- sulfonic acid (PFUnDS)	Perfluorododecane- sulfonic acid (PFDoDS)	Perfluorotridecane- sulfonic acid (PFTrDS)
1	2401-BM													
2	2401-BM													
9	2401-BM													
10	2401-BM				NA				NA					
14	2401-BM													
17	2401-BM													
18	2401-BM		PFOS 13C8	PFOS 13C8	PFOS 13C8	PFOS 13C8	PFOS 13C8	PFOS 13C8	PFOS 13C8	PFOS 13C8	PFOS 13C8	PFOS 13C8	PFOS 13C8	PFOS 13C8
21	2401-BM													
22	2401-BM		PFOS-13C3	PFOS-13C3	PFOS-13C3	PFOS-13C3	PFOS-13C3	PFOS-13C3	PFOS-13C3	PFOS-13C3	PFOS-13C3		PFOS-13C3	
26	2401-BM													
27	2401-BM													
28	2401-BM		PFOS13C8	PFOS13C8	PFOS13C8	PFOS13C8	PFOS13C8	PFOS13C8	PFOS13C8	PFOS13C8	PFOS13C8	PFOS13C8	PFOS13C8	PFOS13C8
33	2401-BM													
34	2401-BM		M13C8 PFOS	M13C8 PFOS	M13C8 PFOS	M13C8 PFOS	M13C8 PFOS	M13C8 PFOS	M13C8 PFOS	M13C8 PFOS	M13C8 PFOS	M13C8 PFOS	M13C8 PFOS	M13C8 PFOS
35	2401-BM		none	none	none	none	none	none	none	none	none	none	none	none
40	2401-BM													
42	2401-BM		32.00	29.00	31.00	31	28.00	28.00	28.00	24.00	24.00	24.00	24.00	24.00
43	2401-BM		MPFBA injection	MPFBA injection	MPFBA injection	MPFBA injection	MPFOS injection	MPFOS injection	MPFOS injection	MPFBA injection	MPFBA injection	MPFBA injection	MPFBA injection	MPFBA injection
48	2401-BM		No	No	No	No	No	No	No	No	No	No	No	No
49	2401-BM													
51	2401-BM		R-PFOS	R-PFOS	R-PFOS	R-PFOS	R-PFOS			R-PFOS	R-PFOS	R-PFDA		
53	2401-BM		PFOS-13C4	PFOS-13C4	PFOS-13C4	PFOS-13C4	PFOS-13C4	PFOS-13C4		PFOS-13C4	PFOS-13C4		PFOS-13C4	
56	2401-BM				18O2-PFHxS	18O2-PFHxS	13C4-PFOS		13C4-PFOS		13C4-PFOS			
58	2401-BM		Sodium perfluoro-[13C8]octanesulfonate	Sodium perfluoro-[13C8]octanesulfonate	Sodium perfluoro-[13C8]octanesulfonate	Sodium perfluoro-[13C8]octanesulfonate	Sodium perfluoro-[13C8]octanesulfonate	Sodium perfluoro-[13C8]octanesulfonate	Sodium perfluoro-[13C8]octanesulfonate					
60	2401-BM													
65	2401-BM		13C4-PFOA	13C4-PFOA	13C4-PFOA	13C4-PFOA	13C4-PFOA	13C4-PFOA	13C4-PFOA	13C4-PFOA	13C4-PFOA	13C4-PFOA	13C4-PFOA	13C4-PFOA
66	2401-BM													
67	2401-BM													
68	2401-BM		13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS
69	2401-BM													
70	2401-BM													
71	2401-BM													
74	2401-BM													
76	2401-BM													
78	2401-BM		13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS		13C4-PFOS	
79	2401-BM													
80	2401-BM													
81	2401-BM		PFOS	PFOS	PFOS	PFOS	PFOS		PFOS	PFOS	PFOS		PFOS	
82	2401-BM													
83	2401-BM				13C PFOS	13C PFOS	13C PFOS	13C PFOS						
84	2401-BM													
85	2401-BM													
86	2401-BM		PFBS	PFPeS	PFHxS	PFHpS			PFOS	PFNS	PFDS	PFUnDS	PFDoDS	PFTrDS
87	2401-BM													
92	2401-BM													
93	2401-BM		13C8-PFOA		13C8-PFOA	13C8-PFOA	13C8-PFOS	13C8-PFOS	13C8-PFOS		13C8-PFOA			
96	2401-BM				none				none					
97	2401-BM													
99	2401-BM													
112	2401-BM													
113	2401-BM													
114	2401-BM													
115	2401-BM													
117	2401-BM													
118	2401-BM													
124	2401-BM													
3B	2401-BM				13C4-PFOA				13C4-PFOA					
59B	2401-BM													
81A	2401-BM		PFOS	PFOS	PFOS	PFOS	PFOS		PFOS	PFOS	PFOS		PFOS	

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bovine Meat (2401-BM)
Methods Perfluoroalkylsulfonic acids (PFSAs) - Comments

LC	Sample		Perfluorobutanesulfonic acid **(PFBS)**	Perfluoropentanesulfonic acid **(PFPeS)**	Perfluorohexanesulfonic acid **(PFHxS)**	Perfluoroheptanesulfonic acid **(PFHpS)**	Linear Perfluorooctanesulfonic acid **(L-PFOS)**	Sum of branched PFOS acids **(br-PFOS)**	Total-Perfluorooctanesulfonic acids **(total PFOS)**	Perfluorononanesulfonic acid **(PFNS)**	Perfluorodecanesulfonic acid **(PFDS)**	Perfluoroundecane-sulfonic acid **(PFUnDS)**	Perfluorododecane-sulfonic acid **(PFDoDS)**	Perfluorotridecane- sulfonic acid **(PFTrDS)**
1	2401-BM							L-PFOS was used to quantify br-PFOS; transition m/z 499/80						
2	2401-BM				only L-PFHxS was detected			br-PFOSK was used to quantify br-PFOS						
9	2401-BM													
10	2401-BM													
14	2401-BM				<LOQ (found 0,073)	<LOQ (found 0,278)					<LOQ (found 0,196)			
17	2401-BM		Below our LOQ	not part of our scope				not part of our scope		not part of our scope		not part of our scope	not part of our scope	not part of our scope
18	2401-BM							cf comments - Method PFAS						
21	2401-BM							L-PFOS; 499>99	L-PFOS; 499>99					
22	2401-BM							same MS transition of linear PFOS	498,9>80,1 498,9>99,1			not analized		not analized
26	2401-BM							br-PFOSK, 498,9>169	br-PFOSK, 498,9>169			not analyzed		not analyzed
27	2401-BM							br-PFOSK, same transition as for L-PFOS	br-PFOSK, same transition as for L-PFOS					Not analysed
28	2401-BM							499>80.0	499>99.1					
33	2401-BM		298,9>80	348,9>80	398,9>80	448,9>80	498,9>80	498,9>80	498,9>80	548,9>80	598,9>80	648,9>80	698,9>80	748,9>80
34	2401-BM							Average of Quantifier (498,9 > 80) and Qualifier (498,9 > 99) values, determinated with L-PFOS calibration ("Av L" approach from the Comparative Study on the Determination of linear, branched, and total PFOS) in Pork Liver 2023 linear, branched, and total PFOS						
35	2401-BM													
40	2401-BM				< LQ									
42	2401-BM							L-PFOS used ; mean of 499 > 80 and 499 > 99 quantification						
43	2401-BM							subtraction of L PFOS from Total PFOS	L-PFOS, parent ion (HRMS)					
48	2401-BM							L-PFOS	L-PFOS					
49	2401-BM													
51	2401-BM							average m/z 80 and m/z 99	m/z 80 L-PFOS + average m/z 80 and m/z 99 br-PFOS				quantification not possible	quantification not possible
53	2401-BM							L-PFOS; transition: 499>80	L-PFOS; transition: 499>80					
56	2401-BM								L-PFOS, 499>80					
58	2401-BM													
60	2401-BM						L-PFOS/ Mean of mass transitons 99 and 80	Difference of Linear and Total PFOS	L-PFOS/ Mean of mass transitons 99 and 80			Only qualitativ	Only qualitativ	Only qualitativ
65	2401-BM													
66	2401-BM								499>80					
67	2401-BM													
68	2401-BM													
69	2401-BM							L-PFOS (HRMS)	L-PFOS (HRMS)					
70	2401-BM													
71	2401-BM													
74	2401-BM													
76	2401-BM													
78	2401-BM							L-PFOS was used to quantify (498,9>99)	separated			not analyzed		not analyzed
79	2401-BM						L-PFOS standard; 499->80	L-PFOS standard; 499->80	L-PFOS standard; 499->80					
80	2401-BM			Not tested		Not tested		Quan by L-PFOS standards, MRM 499>80.		Not tested		Not tested	Not tested	Not tested
81	2401-BM						A 5-point calibration curve was built-up using linear-PFOS and labelled linear-PFOS. The calculated RF was applied to quantify linear-PFOS in the sample.	branched-PFOS was calculated as difference between total-PFOS and linear-PFOS	A 5-point calibration curve was built-up using a mixture of linear and branched compounds for native PFOS and labelled linear-PFOS as internal standard. The calculated RF was applied to quantify total-PFOS in the sample.					
82	2401-BM													
83	2401-BM							Br quantified off br standard. IR failed so analyte couldn't be reported						
84	2401-BM							Reference standard: L-PFOS; mass transitions: m/z 499 > 80	Reference standard: L-PFOS; mass transitions: m/z 499 > 80					
85	2401-BM				linear isomer			br-PFOS and 499>80 (with 499>99: br-PFOS content 0.157)	br-PFOS and 499>80 (with 499>99: total PFOS content 0.606)					
86	2401-BM													
87	2401-BM							499,0 -> 99.1	499,0 -> 99.1					
92	2401-BM								Reference standard: L-PFOS; MS/MS transitions: m/z 499>80					
93	2401-BM							Branched PFOS was quantifeid on L-PFOS . For quantification 499 --> 99 transistion was used	Yes, the stereoisomers are chromatographically sapareted from L-PFOS.					

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]

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

Bovine Meat (2401-BM)

Methods Perfluoroalkylsulfonic acids (PFSAs) - Comments

LC	Sample		Perfluorobutanesulfonic acid **(PFBS)**	Perfluoropentanesulfonic acid **(PFPeS)**	Perfluorohexanesulfonic acid **(PFHxS)**	Perfluoroheptanesulfonic acid **(PFHpS)**	Linear Perfluorooctanesulfonic acid **(L-PFOS)**	Sum of branched PFOS acids **(br-PFOS)**	Total-Perfluorooctanesulfonic acids **(total PFOS)**	Perfluorononanesulfonic acid **(PFNS)**	Perfluorodecanesulfonic acid **(PFDS)**	Perfluoroundecane-sulfonic acid **(PFUnDS)**	Perfluorododecane-sulfonic acid **(PFDoDS)**	Perfluorotridecane- sulfonic acid **(PFTrDS)**
96	2401-BM				Determination of recovery via spiking on meat				Determination of recovery via spiking on meat, only calibration solution with a mix of branched and linear PFOS available					
97	2401-BM				<LOQ (0.056 µg/kg)		estimated linear content from technical grade standard 499.0 / 79.9	estimated branched content from technical grade standard 499.0 / 79.9	technical grade standard 499.0 / 79.9					
99	2401-BM				commonly used LOQ - 0.1 - in this case tried to use lower									
112	2401-BM							L-PFOS						
113	2401-BM							br-PFOS = (Total-PFOS) - (L-PFOS)	Transition used for quantification: 499 > 99					
114	2401-BM							L-PFOS was used for quantification, transition used for quantification 499,161>168,851	L-PFOS was used for quantification, transition 499,161>168,851 was used to quantify L-PFOS and B-PFOS separately					
115	2401-BM								We have a response for the branched but cannot quantify it					
117	2401-BM							L-PFOS , 499-80						
118	2401-BM						Linear Peak (Cal L-PFOS) MS/MS 499->80	Difference (Total-Linear)	All Peaks (Cal L-PFOS) MS/MS 499->80					
124	2401-BM							L-PFOS 499->80						
3B 59B	2401-BM 2401-BM		result <0,20	result <0,20	result <0,20					result <0,20		result <0,20	result <0,20	result <0,20
81A	2401-BM						A 5-point calibration curve was built-up using linear-PFOS and labelled linear-PFOS. The calculated RF was applied to quantify linear-PFOS in the sample.	branched-PFOS was calculated as difference between total-PFOS and linear-PFOS	A 5-point calibration curve was built-up using linear-PFOS and labelled linear-PFOS. The calculated RF was applied to quantify total-PFOS in the sample.					

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]

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

Bovine Meat (2401-BM)

Methods Sum of PFOS, PFOA, PFNA, PFHxS - Comments

LC	Sample		Sum of total-PFOS, PFOA, PFNA, PFHxS **(ub)**	Sum of total-PFOS, PFOA, PFNA, PFHxS **(lb)**
1	2401-BM			
2	2401-BM			
9	2401-BM		Just reported for carboxylic acids	Just reported for carboxylic acids
10	2401-BM			
14	2401-BM			
17	2401-BM			
18	2401-BM			
21	2401-BM			
22	2401-BM			
26	2401-BM			
27	2401-BM			
28	2401-BM			
33	2401-BM			
34	2401-BM			
35	2401-BM			
40	2401-BM			
42	2401-BM			
43	2401-BM			
48	2401-BM			
49	2401-BM			
51	2401-BM			
53	2401-BM		There should be an error because in the overview of results sheet the reported number seem to be thousand	
56	2401-BM		PFOA LOQ 0,2 µg/kg	
58	2401-BM			
60	2401-BM			
65	2401-BM			
66	2401-BM			
67	2401-BM			
68	2401-BM			
69	2401-BM			
70	2401-BM			
71	2401-BM			
74	2401-BM			Reg (EU) 2023/915
76	2401-BM			
78	2401-BM			
79	2401-BM			
80	2401-BM			
81	2401-BM			
82	2401-BM			
83	2401-BM			No % MU. Abs. MU = 0.21
84	2401-BM			
85	2401-BM			
86	2401-BM			
87	2401-BM			
92	2401-BM			MU% calculated from absolute MU (0,23 µg/kg)
93	2401-BM			
96	2401-BM			
97	2401-BM			
99	2401-BM			
112	2401-BM			
113	2401-BM			
114	2401-BM			
115	2401-BM		Total PFOS is only linear PFOS	Total PFOS is only linear PFOS
117	2401-BM			
118	2401-BM			
124	2401-BM			
3B	2401-BM			
59B	2401-BM			
81A	2401-BM			

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bovine Meat (2401-BM)
Methods Other PFAS - Internal Standards

LC	Sample		Perfluorooctane sulphonamide **FOSA**	2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluor-3-(trifluoromethoxy)propoxy]-propionic acid **DONA**	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoic acid **GenX**	Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate **(major component of F-53B)**	Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate **(minor component of F-53B)**	1-Propanaminium, N,N-dimethyl-N-oxide-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide **Capstone A**	1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide **Capstone B**
1	2401-BM		Perfluoro-n-(13C8)octansulfonamid (M8FOSA)	Perfluoro-4,8-dioxa-3H-nonansäure-13C2-Carboxyl Ammoniumsalz	2,3,3,3-Tetrafluoro-2(1,1,2,2,3,3,3-heptafluoropropoxy)-13C3-prppanoic acid (M3HFPO- DA)	Perfluoro-n-(13C8)octansulfonsäure (Natriumsalz) (M8PFOS)	Perfluoro-n-(1,2-13C2)dodecansäure (MPFDoA)		Perfluoro-1-(2,3,4-13C3)hexansulfonsäure (Na.salz) (M3PFHxS)
2	2401-BM		13C6-PFDA	13C4-PFHpA	13C3-HFPO-DA(GEN X)	13C8-PFOS	13C2-PFDoA		
9	2401-BM								
10	2401-BM								
14	2401-BM			M4PFHpA	M2-4:FTS	M9PFNA	M7PFUDA		
17	2401-BM		M8PFOA (perfluoro-n-(13C8) octanoic acid)						
18	2401-BM			GenX 13C3	GenX 13C3	PFUnDA 13C2	PFUnDA 13C2		
21	2401-BM		MPFOSA	MHFPO-DA	MHFPO-DA				
22	2401-BM		13C8-FOSA	13C3-GenX	13C3-GenX				
26	2401-BM		mPFOS						
27	2401-BM		FOSA-13C8	PFHxA-13C5	GenX-13C3	PFHxS-18O2	PFOS-13C8 (linear)	PFPeA-13C3	PFPeA-13C3
28	2401-BM			GenX13C3	GenX13C3	PFNA13C5	PFDA13C2		
33	2401-BM			GenX 13C3	GenX 13C3	GenX 13C3	GenX 13C3		
34	2401-BM			M13C3 GenX	M13C3 GenX	M13C2 PFUnDA	M13C2 PFUnDA		
35	2401-BM								
40	2401-BM								
42	2401-BM			GenX 13C3	GenX 13C3	PFUnDA 13C2	PFUnDA 13C2		
43	2401-BM			MPFOA	M3HFPO-DA	MPFHxS	MPFHxS		
48	2401-BM			13C5-PFHxA	13C3-M3HFPO-DA	13C7-PFUdA	13C7-PFUdA		
49	2401-BM								
51	2401-BM		13C-PFOSA	13C-PFHpA	13C-GenX	13C-PFOS m/z 80	13C-PFOS m/z 80		
53	2401-BM		PFOSA-13C8		HFPO-DA-13C3				
56	2401-BM								
58	2401-BM								
60	2401-BM			13C3-HFPO-DA	13C3-HFPO-DA				
65	2401-BM		13C8-PFOSA	13C4-PFHPA	13C3-HFPODA	13C4-PFOS	13C2-PFDoA		
66	2401-BM								
67	2401-BM								
68	2401-BM			13C3-GenX	13C3-GenX	13C3-GenX	13C3-GenX		
69	2401-BM		M8PFOSA						
70	2401-BM								
71	2401-BM								
74	2401-BM								
76	2401-BM		13C8-FOSA	13C4-PFHpA	13C3-HFPO-DA	13C8-PFOS	13C8-PFOS		
78	2401-BM								
79	2401-BM		13C8-FOSA	13C4-PFHpA	13C3-HFPO-DA	13C8-PFOS	13C8-PFOS		
80	2401-BM		Perfluoro-1-[13C8]octanesulfonamide						
81	2401-BM		FOSA	PFHpA	GenX	PFOS	PFOS		
82	2401-BM								
83	2401-BM								
84	2401-BM		MFOSA	MPFHxS	MGENX	MPFHxS	MPFHxS		MPFHxS
85	2401-BM			PFHpA-13C2		PFOS-13C8	PFOS-13C8		
86	2401-BM								
87	2401-BM		13C8-FOSA						
92	2401-BM								
93	2401-BM			13C4-PFHpA	13C3-GenX	13C2-PFUndA	13C2-PFDoA		
96	2401-BM								
97	2401-BM								
99	2401-BM								
112	2401-BM								
113	2401-BM								
114	2401-BM								
115	2401-BM								
117	2401-BM		PFOSA-C13	GEN-X-C13	GEN-X-C13	PFOS-C13	PFOS-C13	PFOS-C13	PFOS-C13
118	2401-BM		FOSA (13C8)		13C3 GenX (HFPO-DA)				
124	2401-BM		MFOSA	MPFOA	MPFOS	MPFOS	MPFOS		
3B	2401-BM								
59B	2401-BM		PFOS ISTD	M3HFPO-DA	M4PFHpA	PFOS ISTD	PFOS ISTD		
81A	2401-BM		FOSA	PFHpA	GenX	PFOS	PFOS		

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]

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

Bovine Meat (2401-BM)

Methods Other PFAS - Recovery Standards

LC	Sample		Perfluorooctane sulphonamide **FOSA**	2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluor-3-(trifluoromethoxy)propoxy]-propionic acid **DONA**	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoic acid **GenX**	Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate **(major component of F-53B)**	Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate **(minor component of F-53B)**	1-Propanaminium, N,N-dimethyl-N-oxide-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide **Capstone A**	1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide **Capstone B**
1	2401-BM								
2	2401-BM								
9	2401-BM								
10	2401-BM								
14	2401-BM								
17	2401-BM		-	-	-	-	-	-	-
18	2401-BM			PFOS 13C8	PFOS 13C8	PFOS 13C8	PFOS 13C8		
21	2401-BM								
22	2401-BM		13C4-PFOS	13C4-PFOS	13C4-PFOS				
26	2401-BM								
27	2401-BM								
28	2401-BM								
33	2401-BM								
34	2401-BM			M13C8 PFOS	M13C8 PFOS	M13C8 PFOS	M13C8 PFOS		
35	2401-BM								
40	2401-BM								
42	2401-BM			27.00	27.00	24.00	24.00		
43	2401-BM			MPFOA inj	MPFOA inj	MPFBA inj	MPFBA inj		
48	2401-BM			NO	NO	NO	NO		
49	2401-BM								
51	2401-BM		R-PFOA	R-PFOA	R-PFOA	R-PFOS	R-PFOS		
53	2401-BM		PFOS-13C4	PFOS-13C4	PFOS-13C4	PFOS-13C4	PFOS-13C4		
56	2401-BM								
58	2401-BM								
60	2401-BM								
65	2401-BM		13C4-PFOA	13C4-PFOA	13C4-PFOA	13C4-PFOA	13C4-PFOA		
66	2401-BM								
67	2401-BM								
68	2401-BM		13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS	13C4-PFOS
69	2401-BM								
70	2401-BM								
71	2401-BM								
74	2401-BM								
76	2401-BM								
78	2401-BM								
79	2401-BM								
80	2401-BM								
81	2401-BM		PFOS	PFOA	PFOA	PFOS	PFOS		
82	2401-BM								
83	2401-BM								
84	2401-BM								
85	2401-BM								
86	2401-BM								
87	2401-BM								
92	2401-BM								
93	2401-BM			13C8-PFOA	13C8-PFOA	13C8-PFOA	13C8-PFOA		
96	2401-BM								
97	2401-BM								
99	2401-BM								
112	2401-BM								
113	2401-BM								
114	2401-BM								
115	2401-BM								
117	2401-BM								
118	2401-BM								
124	2401-BM								
3B	2401-BM								
59B	2401-BM								
81A	2401-BM		PFOS	PFOA	PFOA	PFOS	PFOS		

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]

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

Bovine Meat (2401-BM)

Methods Other PFAS - Comments

LC	Sample		Perfluorooctane sulphonamide **FOSA**	2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluor-3-(trifluoromethoxy)propoxy]-propionic acid **DONA**	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoic acid **GenX**	Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate **(major component of F-53B)**	Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate **(minor component of F-53B)**	1-Propanaminium, N,N-dimethyl-N-oxide-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide **Capstone A**	1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide **Capstone B**
1	2401-BM							not analyzed	
2	2401-BM								
9	2401-BM								
10	2401-BM								
14	2401-BM								
17	2401-BM		Below our LOQ	not part of our scope	not part of our scope	not part of our scope	not part of our scope	not part of our scope	not part of our scope
18	2401-BM								
21	2401-BM								
22	2401-BM					not analized	not analized	not analized	not analized
26	2401-BM			not analyzed	not analyzed	not analyzed	not analyzed	not analyzed	not analyzed
27	2401-BM								
28	2401-BM		not analysed					not analysed	not analysed
33	2401-BM			376,8>84,8	284,9>168,9	530,9>350,8	630,9>450,7		
34	2401-BM		Not determinated					Not determinated	Not determinated
35	2401-BM								
40	2401-BM								
42	2401-BM								
43	2401-BM								
48	2401-BM								
49	2401-BM								
51	2401-BM							quantification not possible	quantification not possible
53	2401-BM								
56	2401-BM								
58	2401-BM								
60	2401-BM		Not Analyzed	Only qualitativ		Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
65	2401-BM								
66	2401-BM								
67	2401-BM								
68	2401-BM								
69	2401-BM								
70	2401-BM								
71	2401-BM								
74	2401-BM								
76	2401-BM							Has not been analyzed.	Has not been analyzed.
78	2401-BM		not analyzed	not analyzed	not analyzed	not analyzed	not analyzed	not analyzed	not analyzed
79	2401-BM							not in the meassuring method	not in the meassuring method
80	2401-BM								
81	2401-BM								
82	2401-BM								
83	2401-BM								
84	2401-BM								
85	2401-BM			expanded MU		expanded MU	expanded MU		
86	2401-BM								
87	2401-BM								
92	2401-BM								
93	2401-BM								
96	2401-BM								
97	2401-BM								
99	2401-BM								
112	2401-BM								
113	2401-BM								
114	2401-BM								
115	2401-BM								
117	2401-BM								
118	2401-BM								
124	2401-BM								
3B	2401-BM								
59B	2401-BM		result <0,50	result <0,20	result <0,20	result <0,20	result <0,20		
81A	2401-BM								

EURL Proficiency Test on Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]
EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food
26 March 2025

Annex 7: Participants' methods for PFAS - Extraction, clean-up and detection

Test sample - Bovine Meat (2401-BM)

Bovine Meat (2401-BM)
Methods Perfluoroalkylcarboxylic acids (PFCAs), Perfluoroalkylsulfonic acids (PFSAs) and Other PFAS - Pre-treatment and extraction

LC	Sample		Pre-treatment and extraction					
1	2401-BM		Pre-treatment: -		Extraction method: extraction according to a modified version of the QuEChERs method:	5g sample, addition of 10 ml water and 10 ml ACN , ultrasonic extraction, and shaking after addition of Citrat-Extraction-Tube (CET) for QuEChERs, centrifugation, SPE-clean up of the supernatant		
2	2401-BM		Weigh 2g of sample in 50 mL falcon.	Add internal standard (EPA-533ES from Wellington)	Add 10ml di H2O, 10mL ACN and 150 µL formic acid	Manual stirring for 1minute; Add salts for extraction (6gr MgSO4+1,5gr NaCl)	Manual stirring for 2 minutes	
9	2401-BM		1) 3 g of sample, spiking with 10 ul of IS mixture - extraction with 10 ml methanol 10 mM NaOH, 2h, in an orbital digestor at 120 rpm after homogenization	2) centrifugation for 10 min at 4000 rpm	3) supernatant evaporated till 1 ml			
10	2401-BM		Extraction with NaOH methanolic solution					
14	2401-BM		2,0g Sample, add 10mL ACN, add QuEChERS MIX, vortex, zentrifuge					
17	2401-BM		Weigh 5 ± 0.01 grams of the sample into a 50 ml centrifuge tube, add 100 µl of Internal Standard.	Add 10 ml Acetonitrile with 5% Formic acid, Add 15 ml HPLC-Water for dry samples, Shake the collomix for 2 minutes.	Add 6.5 grams of QuECheRS salt, Shake in the collomix for 4 minutes.Centrifuge at 10000 rpm for 4 minutes			
18	2401-BM		Pre-treatment includes a grinding, freeze-drying and supplementation step.	Extraction involves the use of a methanol solution containing potassium hydroxide.				
21	2401-BM		Sample intake 5 g	add 5 ml H2O	shake	add 10 ml ACN	add 150 µl Formic acid; shake	
22	2401-BM		extraction with NaOH 0,05M in methanol					
26	2401-BM		shake with solvent					
27	2401-BM		Simultaneous homogeneisation and QuEChERs extraction :	weighed samples, NaCl/MgSO4, water and acetonitrile are agitated in a PP tube containing stainless steel	beads to desintegrate the sample matrix and achieve PFAS extraction.			
28	2401-BM		lyophilisation de l'échantillon	extraction solide/liquide avec methanol hydroxide de potassium				
33	2401-BM		pre-treatment: lyophilization - Extraction solid/ liquid	extraction: Purification on SPE Chromabond PFAS	Purification on SPE ENVI Carb			
34	2401-BM		Sample is dry	1g of dry sample is extracted with 15 ml MeOH/KOH 0,01M during 16 hours	Evaporate 5ml of supernatant until 1ml, dilute with 4ml of water			
35	2401-BM		Adding ISTD	Adding 20 mL methanol	Shaking for 15 min	Extract for 60 min with ultra sonic	Centrifugate for 15 min	
40	2401-BM		Ion paring extraction in water + Na2CO3 + tetrabutylammionium and Methyl tert-butyl ether (MTBE)					
42	2401-BM		Drying sample	Extraction with methanolic solution containing potassium hydroxide				
43	2401-BM		5g matrix weighed after homogenisation	Isotope-labelled internal standards spiked	Quechers extraction using Water, Acetonitrile, NaCl and MgSO4 salts.	After centrifugation, organic phase is taken for clean-up steps.		
48	2401-BM		Two exctractions with acetonitrile					
49	2401-BM		ultrasonic extraction using acetonitrile					
51	2401-BM		# addition of 10 mL dest. water to 5 g	# extraction with 10 mL ACN and 60 µL HCl (6 MOL), shaking (20 min) and ultrasonication (20 min)	# addtion of 4 g Mg2SO4 and 1 g NaCl # 15 min centrifugation, transfer of organic layer to 15 mL tube	# evaporation to 1 mL using nitrogen (50 °C), add 1 mL ACN # addition of 8 mL 25mM NH4Ac buffer (pH = 6)	# centrifugation and transfer to SPE cartridge	
53	2401-BM		DOUBLE EXTRACTION WITH ACETONITRILE					
56	2401-BM		Sample + 10 mL H2O + 10 mL ACN	60 min ultrasonic extraction (shaking by hand every 15 min)	Cooling down to room temp	Addition of 4 g MgSO4, 1 g NaCl, 250 mg carbon	Shaking by hand rapidly; Centrifugation	
58	2401-BM		Freeze drying.	Extraction using 10 ml of methanol/potassium hydroxide for 17 hours.				
60	2401-BM		solid liquid extraction with 20 mL 0.1 % NH3 in acetonitrile					
65	2401-BM		Quechers-Extraction					
66	2401-BM		Méthanol + KOH					
67	2401-BM		SL extraction					
68	2401-BM							
69	2401-BM		QuEChERS extaction					
70	2401-BM		Sample was extracted with acetonitrile in an ultrasonic bath					
71	2401-BM		extraction with acetonitrile/water,	addition of magnesium sulfate and sodium acetate,	shaking, centrifugation			
74	2401-BM		hydrolysis and solvent extraction					
76	2401-BM		Modified QuEChERS. The sample is extracted two times with acetonitrile, MgSO4 and NaCl is added.					
78	2401-BM		Addition of acetonitrile, shake (5 min); Treatment in ultrasound bath (5 min)	Addition of 1ml NaOH (1 M), shake (15 min); Treatment in ultrasound bath (15 min)	Addition of 0,5 g NaCl for phase separation, shake (5 min); Treatment in ultrasound bath (5 min), Centrifugation (3800 U/min, 7°C, 5 min)	Transfer supernatant to another centrifuge tube - second extraction step (10 ml) Acetonitril, shake (15 min); Treatment in ultrasound bath (15 min), Centrifugation (3800 U/min, 7°C, 5 min)	Addition of formic acid to adjust a pH value of 5-6.5	
79	2401-BM		2 g sample is mixed with ISTD and extracted twice with 5 mL acetonitrile					
80	2401-BM		Extraction with Acetonitrile					
81	2401-BM		Addition of 10 mL water and 10 mL acetonitrile. Sample was shaken for 15 min.	QuEChERS extraction packet was added to the extract and shaken again.				
82	2401-BM		Shake the sample and internal standard vigorously with Millipore water and acetonitrile 15 ml.	Then add 1.5 g sodium chloride, shake for 3 minutes, refrigerate for 2 hours at -18°C and centrifuge.				
83	2401-BM		Addition of internal std	Alkaline digestion	Ext in Acetonitrile - shake and sonicate x 2			
84	2401-BM		No pre-treatments.	Addition of internal standards.	Extraction: shaking with water/acetonitrile at room temperature.			
85	2401-BM		Extracted with acetonitrile					
86	2401-BM		Homogenisation	Extraction with methanol (+0.025% ammonia)				
87	2401-BM		Extraction with methanol					
92	2401-BM		Sample spiked with internal standards	Extraction: shaking with water/acetonitrile/formic acid				
93	2401-BM		Extraction with 10 mL MeOH and formic acid	Vortex, head-over-head, centrifugation	Dilution with MQ			
96	2401-BM		5 g PT-Material + isotope-labelled internal standard	Extraction with 0,1 % ammonia in acetonitrile (mixing, shaking for two hours, centrifugation, remove supernatant)				
97	2401-BM		to 5g of sample 5ml water was added	ILIS, 10ml ACN was added and shaken	salt mix I (4g MgSO4, 1g NaCl, 0.5g Na2H citrate, 1g Na3 citrate) was added	shaken, centrifugated		
99	2401-BM		1 g of sample	addition of internal standards + standard addition	extraction with water : acetonitrile 1:1 (10 + 10 ml)	vortex, shaking, vortex, shaking head over head		
112	2401-BM		ACN 5ml	2 - extractions with ultrasonic and centrufuge at 4000rpm				
113	2401-BM		sample was weighted in a 50 ml tube. 10 ml of CH3CN and 2 ml of H2O were added	samples were shaked for 10 minutes by ultrasonic bath, then 0.5g of NaCl and 2g di MgSO4 were added for	QuEChERS extraction.			
114	2401-BM		Sample were homogenized upon arrival and put in freezer (-20 C) until extraction.	2 g sample was weighed in, in a plastic tube and spiked with 50 µL of internalstandard (c = 0,001 µg/mL).	Double extraction with 2 x 5 mL of acetonitrile. Vigorusly shaking 5 min. Ultrasonic bath 15 min. Centrifugation.	Supernatant was transfered to a new plastic tube (the same) after each extraction.		
115	2401-BM		Duplicate extraction with 5 mL acetonitrile	Sonification, 15 min	Centrifugation			
117	2401-BM			homogenization	extraction			
118	2401-BM		Extraction with 2x 5mL ACN, 15 Min. Ultrasonic, centrifuge, collect both extracts					
124	2401-BM		10 ml acetonitrile					
3B	2401-BM		Quechers-Extraction					
59B	2401-BM		extraction: 2x 5 ml acetonitrile, 10 min. ultrasonic bath, centrifugation 5 min./ 5000 rpm					
81A	2401-BM		Addition of 10 mL water and 10 mL acetonitrile. Sample was shaken for 15 min.	QuEChERS extraction packet was added to the extract and shaken again.				

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bovine Meat (2401-BM)
Methods Perfluoroalkylcarboxylic acids (PFCAs), Perfluoroalkylsulfonic acids (PFSAs) and Other PFAS - Clean-up

LC	Sample		**Clean-up**				
1	2401-BM		purification of the extracts using a mixed-mode weak anion-exchange sorbent combined with GCB SPE- tube (Strata PFAS) (WAX/GCB); 200 mg / 50 mg in a 6 mL Tube)	SPE: condition: 4 ml 0,3% NH4OH/MeOH, 6 ml water - load: sample (8ml extract diluted with about 22 ml water (30 ml final volume))	wash: 2x 4 ml water - elute: 8 ml 0,3% NH4OH/MeOH	solvent evaporation to 100 µl water - addition of 100 µl ACN/MeOH-mix (10/90)	sample measured in ACN-MeOH-H2O mix
2	2401-BM		Transfer 7mL in dSPE for purification (900mg MgSO4,150mg PSA, 50mg C18)	Manual stirring for 2 minutes	Strata PFAS (WAX-GCB)	elution using 4mL 0.3%NH3 in MeOH	evaporation to dryness under nitrogen stream (55°C) add H2O/MeOH 60/40+ 0.1% acetic acid, final volume 800 µL
9	2401-BM		4) reconsitution in 50 ml miliQ water	5) SPE with Oasis WAX 3cc	6) Elution with 5 ml MeOH (10% NH4OH)	7) Evaporation till 200 ul aprox under nitrogen current	8) Transfer to a LC-vial with inserto and further evaporation till dryness 9) reconstitutton in 100 ul of MeOH: water (1:9)
10	2401-BM		extract dilution with water; concentration and clean-up using WAX column				
14	2401-BM		pass the upper ACN phase trough a 250mgGCB SPE Cartriche	evaporate the ACN by nitrogenstream at 60°C to <0,5mL	reconstitiution of sample with 3ml 2,5% acetic acid - SPE with Strata W-AX 100mg/3mL	elution 2 times with 2mL 1% NH3 / MeOH - evaporate MeOH eluate by nitrogenstream at 60°C	reconstitiution of sample with 0,50 ml 0,05%FA in Water/Methanol 1:1 - (all in plastic tubes)
17	2401-BM		Add 7 ml of the extract to the dSPE tube (GCB, PSA, magnesiumsulfaat)	Shake in the Collomix for 2 minutes.Centrifuge at 4500 rpm for 6 minutes.	Evaporate 3 ml of the extract to 0.3 ml at 55 degrees Celsius.	Shake the extract in the vortex for 2 minutes, Transfer the sample to the vial.	
18	2401-BM		Clean-up on 2 SPE cartridges: CHROMABOND PFAS and ENVI-Carb	CHROMABOND : - Column Conditioning: Prepare column with methanol/NH4OH, methanol, and water.	- Column Washing: Rinse column with ammonium acetate and methanol.- Sample Application: Apply sample onto cartridge and pass through column.	ENVI-Carb : - Column Conditioning: Prepare column with methanol.	- Sample Application: Apply sample onto cartridge and pass through column. - Column Washing: Rinse column with glacial acetic acid and methanol.
21	2401-BM		add AOAC QuEchers	shake	centrifuge	Transfer 5 ml to 15 ml dSPE tube	shake, centrifuge, dilute 1:1 with H2O
22	2401-BM		SPE Oasis-WAX 200mg	sample in water pH<6	washing with water, methanol	elution with methanol 5% ammonia	evaporated on water bath at 50°C with nitrogen
26	2401-BM		zentrifugate	SPE Cleanup			
27	2401-BM		The extract is cleaned-up using carbon/diamino/MgSO4 mixture.				
28	2401-BM		purification sur SPE Chromabond PFAS	purification sur SPE ENVI carb			
33	2401-BM		RBS				
34	2401-BM		first purification on cartbridge SPE Chromabond PFAS	second purification on cartbridge SPE Envi carb 500mg			
35	2401-BM		Clean up with Strata X SPE	Elution wit 0.1 % NH4OH in methanol	Adding 5 µL glycerol to eluate	evaporate t dryness	reconstitute in LC Eluents (90/10)
40	2401-BM		WAX SPE clean up				
42	2401-BM		2 purifications on SPE column				
43	2401-BM		Purification on SPE Carbon S	Evaporation to 10 ml	Mix with water and pH adapted to 3	Purification on SPE Agilent polymeric weak anion exchange 500mg	Evaporation to 0,1 ml, recovery standards added and MeOH added for total volume of 0,5ml Injection in Polypropelyne vial
48	2401-BM		Weak anionic exchange (WAX) SPE plus graphitized carbon black (Envicarb)				
49	2401-BM		degreasing using n-hexane	dispersive SPE using activated carbon			
51	2401-BM		# SPE (Strata X-AW, 200 mg)	# GCB 250 mg	# elution using 3 x 3 mL 1% ammonia in methanol	# evaporation to dryness under nitrogen stream (50 °C)	# addition of recovery standard and MeOH/ 1% formic acid; final volume of 500 µL # freeze over night and syringe filtration (PES 0,2 µm)
53	2401-BM		SPE CLEAN-UP WITH STRATA X-AW 200 mg - dSPE-Envicarb 80mg				
56	2401-BM		SPE using Oasis WAX 6 cc, 150 mg Sorbent, 30 µm particle size	Conditioning with 4 mL 0.1% NH3 in MeOH, 4 mL MeOH, 4 mL 25 mM CH3COONH4 in H2O (pH 4 using acetic acid)	6 mL extract + 4 mL H2O	Washing with 4 mL H2O, 4 mL Acetone/ACN (50/50), 4 mL MeOH - Elution with 2x 1.5 mL 0.1% NH3 in MeOH	Keeper (ethylene glycole, 50 µL) was used during evaporation - Reconstitution with MeOH/H2O (50/50)
58	2401-BM		Solid phase extractions (SPE) cartridge Oasis WAX (150 mg, 6 ml) (Waters Corp., USA) and	ENVI Carb Solid Phase (500 mg, 6 mL) (Supelco, USA) were used.			
60	2401-BM		automated solid-phase extraction with a SPE with a combination	of Strata-GCB (250 mg Bottom) and Strata-X-AW (100 mg Bottom)			
65	2401-BM		SPE Cleanup				
66	2401-BM		SPE Chromabond PFAS	SPE Envicarb			
67	2401-BM		Quechers				
68	2401-BM						
69	2401-BM		QuEChERS clean-up				
70	2401-BM		dSPE with C18 and envicarb				
71	2401-BM		none				
74	2401-BM		PSA				
76	2401-BM		After MgSO4 and NaCl is added, clean-up by using fluorisil and ENVI-carb, centrifugated,	supernatant transfered, evaporated and reconstituted in methanol before injection on the	instrument.		
78	2401-BM		Freezing out fats and non-polar components (-20°C)	Addition of 250 mg ENVI-Carb	online SPE (WAX weak anion exchange)		
79	2401-BM		Add dSPE mixture (2.0 g MgSO4, 0.5 g NaCl, 0.01 g C18, 0.10 g ENVI-Carb) to the combined extract	and shake vigorously.	Centrifuge, transfer supernatant into a new tube and evaporate to dryness under N2 at 40°C.	Dissolve the residue in 500 µL eluent (300 µL methanol and 200 µL milliQ water).	Centrifuge using Spin-X or filter through a PET syringe filter.
80	2401-BM		Dispersiv SPE, addition of MgSO4, NaCl, C18 dSPE and ENVI-carb dSPE.	Evaporation and disolution in 75% Methanol.			
81	2401-BM		8 mL of the extract was purified using the dispersive solid-phase extraction (dSPE) method (dSPE Q-sep QuEChERS; 15 mL).	After manually shaking for one minute and centrifugation,	4 mL of the purified extract was evaporated to dryness under a nitrogen stream and	dissolved in the recovery standard solution.	
82	2401-BM		The extract is mixed with SPE sorbent, shaken and centrifuged.				
83	2401-BM		2D SPE - OASIS WAX + STRATA GCB via ASPEC	Evaporation and reconsitution	Addition of recovery std.		
84	2401-BM		Clean up with quechers salts and degreasing by freezing.				
85	2401-BM		Cleaned with Envicarb				
86	2401-BM		Centrifugation	SPE (Oasis WAX, 150 mg) incl. washing step			
87	2401-BM		Clean up with Strata X-AW				
92	2401-BM		Add QuEChERS salts (4g MgSO4 + 1g NaCl)	Shake at room temprature	Centrifuge 10 minutes at 3500 rpm	Evaporate to dryness under nitrogen stream (50 °C)	Reconstitution of sample with 0,5 mL 0,5% FA in water/methanol 1:1
93	2401-BM		SPE (Strata-X-AW, 200mg/6ml, 33um, Phenomenex)	Condition with MeOH and 0.04M HCl in MQ	Sample was loaded on SPE cartridge	Washing with 25mM sodium acetate buffer and 0.04M HCl in MeOH	Elution with 2% NH4OH in ACN - Sample was evaported and reconstuted to a fixed volume
96	2401-BM		Automated SPE:	Clean-up with ENVI-Carb	Clean-up with STRATA-X AW	Concentration the solution in a stream of nitrogen	
97	2401-BM		frozen out with liquid N2, centrifugated	6ml of ACN phase was added to salt mix III (0.9g MgSO4, 0.15g d-SPE)	shaken and centrifugated	filled in ALS-Vials for chromatrography	
99	2401-BM		addition of 4 g MgSO4 + 1 g NaCl - quick shaking + then head over head shaking for 5 mins	Centrifugation (4000 rpm, 10 min)	5 ml of acetonitrile layer transferred to new 15 ml centrifuge test-tube; addition of 150 mg MgSO4 + 50 mg PSA - shaking, vortex	Centrifugation (4000 rpm, 10 min); 2.5 ml of supernatant transferred to the new 15 ml centrifuge test-tube; addition of 12 ml water	vakuum SPE - Strata X-AW 200 mg 33 um Polymeric Weak Anion; 4 ml placed to nitrogen concentrator (60°C, ca 2-3h) till one drop remain - dissolved in 500 ul of MeOH - vortex - centrifugation - transfer to vials
112	2401-BM		dSPE				
113	2401-BM		Subsequently, 5 ml of the surnatant were trasferred in a 15 ml tube containing 0.1 g of dispersive C18	and 0.1 g of graphitized carbon. Finally 4 ml of extract was evaporated to dryness under a stream of nitrogen.	The extracts were diluited in 0.2 ml of ammonium acetate 2 mM and Methanol (80:20).		
114	2401-BM		0,1 g Graphitized carbon black, 0,1 g C18, 2 g MgSO4, 0,5 g NaCl added to the extract.	Vigorusly shaking 1 min. Centrifugation.	Transfer supernatant to new plastic tube. Evaporate over a stream of nitrogen at 40C.	Redissolve in 0,5 mL of 50% methanol/H2O. Filter through cellulose acetate spin filter (centrifugation).	Transfer filtrate to plastic vial with plastic cap for LC-MS/MS analysis.
115	2401-BM		Freezing of sample	Dispersive SPE (MgSO4, NaCl, C18, ENVI-carb)			
117	2401-BM			Quechers			
118	2401-BM		2.7g Dispersive SPE (MgSO4/ NaCl/ C18/ Envicarb), shaking, centrifuge,	Concentrate upper layer to dryness with N2 (40°C)	Solve wirh 1200µL MeOH and 800µL Water. Microfiltration 0.45µm		
124	2401-BM		d-SPE C18 and ENVI-carb				
3B	2401-BM		SPE Cleanup				
59B	2401-BM		extract cleaning: 2 g MgSO4, 0.5g NaCl, 0.1 g C 18, 0.1 g activated carbon, centrifugation 5 min./ 5000 rpm	evaporation to dryness: N2, 45°C	dissolv. in 250 ul of MeOH, vortex, 10 min. ultrasonic bath, centrifugation 5 min./ 15000 rpm		
81A	2401-BM		8 mL of the extract was purified using the dispersive solid-phase extraction (dSPE) method (dSPE Q-sep QuEChERS; 15 mL).	After manually shaking for one minute and centrifugation,	4 mL of the purified extract was evaporated to dryness under a nitrogen stream and	dissolved in the recovery standard solution.	

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Bovine Meat (2401-BM)
Methods Perfluoroalkylcarboxylic acids (PFCAs), Perfluoroalkylsulfonic acids (PFSAs) and Other PFAS - Chromatographic separation and detection

LC	Sample	Chromatographic separation and detection					
1	2401-BM	LC-MS/MS, reversed phase, column: Gemini 3µ C18 110Å, 100 x 2.0 , MRM measurement,	mobile phase 1: 95 % water + 5% ACN + 5mM ammonium acetate	mobile phase 2: 40 % MeOH + 60 % ACN + 5mM ammonium acetate			
2	2401-BM	UHPLC-HRMS Orbitrap Q-Exactive	Column Hypersil gold aQ (100 x 2.1mm, 1.9 µm)	initial mobile phases: 40%MeOH and 60% H2O and CH3CCONH4 20mM	Flow 0,3 mL/min	Injection volume 10 µL	Full scan 150-750 m/z
9	2401-BM	Column: Hypersil GOLD	Flow: 0.5 ml/min	Gradient: water (20 mM AcNH4) and methanol (20mM AcNH4)	ESI: negative	MS Analyser: Qexactive Orbitrap, working in full scan at 70000 resolution and data dependent scan for PFAss	
10	2401-BM	HPLC C18-phase, Orbitrap-MS detection in PRM mode					
14	2401-BM	Luna Omega 3µ PS 150x2.1mm 00F-4756	Agilent_PFAS_Delay_Phase	Pump A: 0.05g NH4AC+AcOH 5%MeOH / Pump C: ACN / Pump D: MeoH	Gradient	Detection : Sciex Qtrap 6500+ MRM neg	
17	2401-BM	Determination for PFAS in Meat by means of the Liquid Chromatography Mas Spectrometry (LC-MSMS).	Analytical Column: ZORBAX Eclipse Plus C18 RRHD (50mm 2.1mm 1.8µm)	Agilent UPLC 1290 infinity II, Agilent MS 6470 Triple Quad			
18	2401-BM	UPLC ACQUITY PREMIER chromatographic system (Waters)	Column: Acquity Premier HSST3 1.8µm VanGuard FIT 2.1X100 mm	Trap column: Atlantis Premier BEH C18 AX 5 µm 2.1X100 mm	Tandem Mass Spectrometry on Xevo TQ Absolute in negative electrospray ionization mode (ESI-)	Water and methanol mobile phases buffered with 2mM ammonium acetate	
21	2401-BM	Chromatographic column: Acquity UPLC BEH C18 1.7 µm; 2.1x100mm Column	Detection: MS/MS with quantifier and qualifier (except PFBA and PFPeA) for the native compounds				
22	2401-BM	HPLC-MS/MS, column BEH C18 100x2,1mm*1,7um,	mobile phase water/methanol with ammonium acetate				
26	2401-BM	Gradient-methode	Eulents: Methanol, Water	BEH C18	negative Mode		
27	2401-BM	Samples are separated on a PolarC18 column (Phenomemex), then analysed in negative ESI MRM mode	on a Sciex 7500 QTrap.				
28	2401-BM	LC-MS/MS xevo TQXS waters unispray négatif	colonne de piegeage isolator	colonne HSST3 2.1*100mm	10 µl injectés	run 16 min	
33	2401-BM	UPLC Agilent Infinity II / MS Agilent 6470 B	infinityLab PFC Delay column 4,6 x 30 mm	Column: ZORBAX Eclipse Plus C18 Rapid Resolution HD 2,1 x 100 mm 1,8 - Micron		mobile phase chromatography : MeOH	H2O/AcONH4 0,02 M ; Ionosation: ESI-
34	2401-BM	Hypersil Gold (100 x 2,1 mm) 1,9 µm	LC-(ESI-)-MS/MS - Agilent 6495C				
35	2401-BM	Use of autosampler programm	Use of delay column between pump an autosampler (C18, XBridge, 50 x 2.1 mm, 3,5 µm)	Eluent A: 2 mM ammoniumacetat and 5% acetonitril; Eluent B: acetonitril/methanol (60/40, v/v)	Flow: 0.25 mL/min; Column temperature: 50°C; Injection volume: 20 µL	Column: C18, XBridge, 150 x 2.1 mm, 3,5 µm	Gradient: 0 min: 70%A, 9 min: 25% A, 12 min: 5% A, 15 min: 2% A, 19,5 min: 2% A, 20,5 min: 90% A, 24 min: 90% A
40	2401-BM	C18 HPLC column separation and ESI-MS/MS detection					
42	2401-BM	LC-MS/MS					
43	2401-BM	Injection on Orbitrap, ESI-	Mobile phase A : Water - acetate ammonium 20 mM/Methanol 96/4 v/v	Mobile phase B : Methanol/ Water - acetate ammonium 20 mM 96/4 v/v	Run time : 13 minutes	Column : Acquity UPLC BEH C18 1,7 µm	
48	2401-BM	Reverse phase separation using XB column (100 x 2.1 mm, 3 µm-Phenomenex).	Mobile phases: water and MeOH both containing 5 mM of ammonium acetate	Acquisition: LC-Q-Orbitrap system using Full/SIM Scan mode (ESI-) and dd-MS2			
49	2401-BM	seperation on reversed phase C18	detection in multiple reaction monitoring mode (ESI neg)				
51	2401-BM	Agilent InfinityLab Poroshell 120 2.7 µm column, EC-C18, 2,1 x 150 mm	Delay column: Agilent InfinityLab Poroshell 120 EC-C18, 3,0 x 50 mm, 2,7 µm LC-Säule	mobile phase A: 2 mmol/L ammonium acetate + 0,1 % acetic acid; mobile phase B: methanol/acetonitrile 60:40 v %	Flow: 0,25 mL/min	0-0,5 min: 20% B; 0,5-2 min to 55% B, 2-10 min to 80% B, 10-13 min to 98% B hold until 17,5 min, 17,5-18,5 min to 20% B	Injection volume: 10 µL; MS/MS: 6495 B; resolution: unit to unit
53	2401-BM	CHROMATOGRAPHIC COLUMN: Phenomenex luna omega PS, C18,1.6 um (100 x 2.1 mm)	INJECTION MODE: PARTIAL LOOOP	INJECTION VOLUME: 20 microL	MOBILE PHASE: A) ACN; B) AMMONIUM ACETATE 2mM in H2O	FLOW: gradient from 0.1- 0.20 mL/min	DETECTION: LC-MS/MS; SOURCE: ESI
56	2401-BM	HPLC-MS/MS (Dynamic MRM, ESI- with an Agilent 6470 mass spec)	Waters xBridge BEH C18 2.5 µm 2.1 x 150 mm using an Agilent UHPLC	Channel A: 100 % Water with 2 mM CH3COONH4	Channel B: 40 % ACN/60 % MeOH	2 min 90 % Channel A; 9 min 15 % Channel A; 12 min 2 % Channel A; 15 min 2 % Channel A	15.1 min 90 % Channel A; 20 min 90 % Channel A
58	2401-BM	Mobile phases:20 mM ammonium acetate aqueous solution and methanol	Flow rate was 0.6 mL/min, and the injection volume of 10 µL.	Gemini C18 chromatographic column (3 µm, 50 x 2,0 mm).	Detection:LC-MS/MS using a Sciex 7500 system operated in the negative electrospray ionization		
60	2401-BM	LC-MS/MS	Analytical column: Acquity UPLC BEH C18, 150 x 3.0 mm, 2.7 µm	Trap column: InfinityLab PFC Delay Column 4.6 x 30 mm	HPLC gradient (Mobile phase A 2 mM ammonium acetate in water, 5 % acetonitrile,	mobile phase B: acetonitrile/ methanol 60/40 v/v)	Detection Triple quadrupole (ESI negative) ; dynamic multiple reaction monitoring
65	2401-BM	Measurement: HPLC	Injection method: standard	Injection volume (µl): 5	Stationary phase: C18-Phase	Detector: MS/MS	Scan mode: MRM
66	2401-BM	LCMSMS					
67	2401-BM	Luna Omega polar C-18	MS/MS				
68	2401-BM						
69	2401-BM	UPLC-HRMS (Q-Exactive)	Columna Agilent Poroshell 120 EC-C18 (150 x 3 mm, 2.7 µm)	Mobil phase A: 5mM amonic acetate	Mobil phase B: Methanol		
70	2401-BM	Sample extracts were analyzed by LC-MS/MS with ESI operating in negative mode. HPLC equiped with a C18 column was coupled to triple quadrupole.					
71	2401-BM	chromatographic column: Phenomenex Luna Omega PS C18 100 Å, 3 µm, 3 x 100 mm	Eluent A: 20mmol/L ammonium acetate solution	Eluent B: methanol	gradient elution	MS: PFOA: 412.6 > 368.8, 168.8; PFOS: 498.8 > 98.9, 168.9	MS: PFNA: 462.7 > 418.9, 218.9; PFHxS: 398.7 > 79.8, 98.8
74	2401-BM	LC-MSMS					
76	2401-BM	Gradient with MS/MS detection	Ammoniumacetate as buffer, methanol as the organic mobile phase.	8 min separation on column going from 100% MilliQ to 95 % methanol and back.			
78	2401-BM	LC-MS/MS	Eluent A 0,1% formic acid in water	Eluent B 0,25% NH3 and 0,05% formic acid in methanol	Pre-column and column Poroshell EC-C18	Delay-Column PFC Delay Column	
79	2401-BM	Agilent INFINITY II HPLC-System	Delay-Column ZORBAX Eclipse Plus C18, 4.6 × 30 mm, 3.5 µm	Column ACQUITY Premier BEH C18, 2.1 × 100 mm, 1,7 µm	Eluent A: 10 mM Ammoniumacetate / Acetonitrile (90:10, v/v); Eluent B: Methanol / Acetonitrile (60:40, v/v)	Gradient: 0 (90:10) -> 0.01 (60:40) -> 10 (25:75) -> 15 (5:95) -> 16 (5:95) -> 16.1 (90:10) -> 20 (90:10); Column temperature: 40 °C , flow rate: 0.3 mL/min, injection volume: 10 µL, sampler temperature: 10 °C;	Triple Quad 6495C with Agilent Jet Stream Source; dMRM-Method, Total MRMs = 92; Min/Max Dwell = 30.59 ms/398.00 ms
80	2401-BM	Detection LC-MS/MS, neg. Mode, MRM.	Waters Acquity UPLC BEH C18	Second chromatography system: Waters Acquity UPLC HSS T3			
81	2401-BM	Chromatographic column: Luna Omega PS C18 (1,6 um 2,1x 100 mm)	Mobile phase: (A) Water 10 mM of ammonium acetate (B) Methanol:Acetonitrile (1:1)	LC-HRMS (ESI-)			
82	2401-BM	Chromatographic separation using liquid chromatography. Detection by mass spectrometer.					
83	2401-BM	The detection/confirmation is done by LCMSMS in MRM detection mode	The concentration of each analyte is calculated using the isotope dilution technique	The percent recoveries of the isotope dilution analogues are calculated using the integrated peak areas of the recovery standards	Quantitation is performed using a solvent curve & a stored calibration may be used	LC - ACQUITY UPLC I-Class with PFC kit; Column - ACQUITY CSH Phenyl hexyl 1.7µm, 2.1 x 100 mm	Injection vol 30 µL; MPA - 95:5 Water: methanol + 2mM ammonium acetate, MPB - Methanol + 2 mM ammonium acetate; MS - Xevo TQ-XS, ESI -
84	2401-BM	Column C18 UPLC, 100 x 2.1 mm 1.6 µm (Waters)	Mobile phase: methanol /ammonium acetate	Injection volume: 5 µL	Flow rate 0.25 mL/min	Mass detector: triple quadrupole (SCIEX QTrap 7500)	
85	2401-BM	LC-MS/MS					
86	2401-BM	UHPLC with Water (20 mmol Ammonium formate)/Acetonitrile as mobile phase	Detection with HRMS				
87	2401-BM	Separation on C18-reversed-phase with the usage of a binary solvent gradient	Detection: MS/MS (dynamic MRM)				
92	2401-BM	LC-MS/MS	Analytical column: Kinetex C18 2,1 mm x 100 mm x 1,7 µm	Isolator column: Waters isolator kolom C18 2,1 mm x 50 mm x 3,5 µm	Gradient elution: mobile phase (A) 2mM ammonium acetate in water/methanol 98:2; (B) Acetonitrile	Injection 10 µL	
93	2401-BM	LC-MS/MS	Column: Luna Omega 1.6µ PS C18 100 A (100 x 21 mm)	Isolator column: Gemini 3µm C18 110A (50 x 3 mm)	Mobile phase A: 20 mM ammonium acetate in MQ	Mobile phase B: ACN	
96	2401-BM	LC-MS/MS	column: Poroshell 120 EC-C18 (3,0 x 150 mm, particle size: 2,7 µm)	precolumn: Poroshell 120 EC-C18 (3,0 x 50 mm, 2,7 µm)	detection: MRM (multiple reaction monitoring)		
97	2401-BM	LC: Agilent Technologies 1290 Infinity	MS: Sciex QTRAP 6500+	MRM-Mode	chromatographic column: EC 100/2 Nucleodur PFAS, 3µm; delay column: EC 50/2 Nucleodur PFAS Delay, 5µm	solvent A: 5mM NH4OAc in H2O; solvent B: 5mM NH4OAc in MeOH; gradient: 60:40 (v:v, A:B) to 5:95 (v:v, A:B) in 4 minutes	4µl injection volume, 7.5 min total run, 45°C column temperature
99	2401-BM	delay column: HALO PFAS Delay (50 x 3.0 mm, 2.7 um, 160 A)	analytical column: Atlantis T3 (30 x 2.1 mm, 3 um)	MP: A - 2 mM Ammonium Acetate in MeOH	MP: B - 2 mM Ammonium Acetate in water	injection of 10 ul; temperature of column: 30 °C; gradient elution	LC-MS/MS detection (MRM) - 2 transitions; ESI negative
112	2401-BM	LC/MS/MS Shimadzu, negative mode	C18 - column				
113	2401-BM	The LC-MS/MS chromatographic conditions were optimized on a Exion LC system from AB SCIEX.	Analytes were separeted on a reverse phase column: Luna Omega PS C18 (100× 2.1mm,1.6 µm)	Mobile Phases: A- Ammonium Acetate 2mM B- Acetonitrile	A triple quadrupole mass spectrometer QTRAP 6500 from AB SCIEX was used for analytes detection.		
114	2401-BM	Analytical Column: Waters ACQUITY Premier BEH Shield RP18 Column, 1.7 µm, 2.1 x 100 mm	Pre-column: Acquity HSS T3, 2,1x50mm, 1,8 µm; Isolator column: 2,1x50mm	Mobile phase A: H2O + 10 mM ammonium acetate; Mobile Phase B: Methanol/acetonitrile 70/30 + 10 mM ammonium acetate.	Instrument: Waters Xevo TQ-XS using ESI in negative ion mode (ESI-)	Gradient: Start 60/40 A/B. Ramp up to 70% B in 10 min. From 70 - 90% B in 5 min and keep at 90% for 2 minutes. From 90 - 00%B in 2 min followed by re-equilibration back to 60/40 A/B in 1 min.	Flow: 0,3 ml/min; injection volume: 10µl; Desolvation temp: 450 C; Deslovation gas 1000 L/hr; Cone: 150 L/hr; Nebuliser: 5 bar.
115	2401-BM	HPLC-column (retention): Luna Omega Polar C18 (1.6 µm, 100*2.1 mm)	HPLC-column (analytical): Acquity CSH C18 (1.7 µm, 100*2.1 mm)	Gradient with Methanol and Ammoniumacetate (2 mM)	MS/MS detection		
117	2401-BM		LCMSMS				

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Bovine Meat (2401-BM)
Methods Perfluoroalkylcarboxylic acids (PFCAs), Perfluoroalkylsulfonic acids (PFSAs) and Other PFAS - Chromatographic separation and detection

LC	Sample	**Chromatographic separation and detection**					
118	2401-BM	Eluent A: 2mM NH4Acetat in H2O/ MeOH 95/5	Eluent B: 2mM NH4Acetat in MeOH/ACN 50/50	Analytical Column: Waters BEH C18/ Isolator Column	40°C column oven temperature		
124	2401-BM	LC-MS/MS reversed phase chromatography					
3B	2401-BM	Measurement: HPLC	Injection method: standard	Injection volume (µl): 5	Stationary phase: C18-Phase	Detector: MS/MS	Scan mode: MRM
59B	2401-BM	A: 5mM NH4Ac in water, B: MeoH, column: Poroshell 120 EC-C18, delay column: Poroshell 120 EC-C18	MS: TSQ Endura triple quadrupole, MRM, only one ion transition for: PFBA, PFPeA, 9Cl-PF3ONS and	11Cl-PF3OUdS			
81A	2401-BM	Chromatographic column: Luna Omega PS C18 (1,6 um 2,1x 100 mm)	Mobile phase: (A) Water 10 mM of ammonium acetate (B) Methanol:Acetonitrile (1:1)	LC-HRMS (ESI-)			

EURL Proficiency Test on Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]
EURL for Halogenated Persistent Organic Pollutants (POPs) in Feed and Food
26 March 2025

Annex 8: Participants' methods for PFAS - Measurement uncertainty and Limit of Quantification

Test sample - Bovine Meat (2401-BM)

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]

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

Bovine Meat (2401-BM)

Methods Perfluoroalkylcarboxylic acids (PFCAs), Perfluoroalkylsulfonic acids (PFSAs) and Other PFAS - LOQ determination, measurement uncertainty calculation and additional information

LC	Sample		Limit of quantification (LOQ) approach	Measurement Uncertainty (MU) approach	Additional Information
1	2401-BM		estimation of LOQ based on DIN 32645 and a spiked sample		
2	2401-BM		estimated from fortified QC samples; S/N=10 of qualifier ion	Expanded uncertainty (U) multiplying by a factor k=2 for 95% confidence level	
9	2401-BM				
10	2401-BM				
14	2401-BM				
17	2401-BM		LOQ was determined according to NEN 7777:2011 & SANTE/11312/2021, by measuring 10 duplicates; of blank material spiked at the LOD (limit of detection)	Measurement uncertainty was determined according to NEN 7777:2011 & SANTE/11312/2021,by measuring 10 duplicates of blank material spiked at 0.1 ug/kg and then calculated using the reproducibility, repeatability and the bias.	
18	2401-BM		LOQ was determined on spiked samples of beef	uncertainty from Reference Laboratory validation	Quantification of Branched PFOS : e,g L-PFOS used to quantify, using the average of quantification with 498,9 > 80,2 and quantification with 498,9 > 99,1
21	2401-BM		Method validation and lowest calibration point	Method validation	
22	2401-BM				
26	2401-BM				
27	2401-BM		LOQ were determined by the accuracy profiles approach.	Measurement uncertainty were determined by the accuracy profiles approach.	The method was validated for eggs and fish, but not for meat.
28	2401-BM				
33	2401-BM		First point of calibration	Actually not calculated on our laboratory	Method reference used: LABERCA/PFAS-tma.1.03
34	2401-BM		blank value *3 or S/n=10		
35	2401-BM				
40	2401-BM				
42	2401-BM				
43	2401-BM		lowest validated level	U= k*u= 2x sqr(CVrw^2 + biais^2)	
48	2401-BM		According to EURL "Guidance Document on Analytical Parameters for the Determination of Per- and Polyfluoroalkyl Substances (PFAS) in Food and Feed" v.1.2, 11 May 2022	According to Horwitz-Thompson equation	
49	2401-BM				
51	2401-BM		The LOQ was estimated using a S/N of 3 for the less intensive mrm transition.	top-down approach as discribed in the "Guidance document on measurment uncertainty for laboratories performing PCDD/F and PCB analysis" Sum parameter: U = square root of sum of squares of MU of individual PFAS	Interfering substance for br-PFOS (m/z 80) and PFHpS. The eluent had to be changed to 5 mmol/L ammonium acetate in water (A) and 5 mmol/L ammonium acetate in methanol (B).
53	2401-BM		Spiked samples at the LOQ	From validation data including reproducibility and trueness contributions	
56	2401-BM		According to Guidance Document	Es gelten die extrapolierten Analysenspielräume des VDLUFA	
58	2401-BM		LOD and LOQ were estimated based on analysis of 10 blank spiked samples	MU were estimated based on precision and truenes from fortyfication experiment	
60	2401-BM		Spiking Experiments according to the Guidance Document	According to the Guidance Document	
65	2401-BM				
66	2401-BM				
67	2401-BM				
68	2401-BM				
69	2401-BM				

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]
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Bovine Meat (2401-BM)
Methods Perfluoroalkylcarboxylic acids (PFCAs), Perfluoroalkylsulfonic acids (PFSAs) and Other PFAS - LOQ determination, measurement uncertainty calculation and additional information

LC	Sample	Limit of quantification (LOQ) approach	Measurement Uncertainty (MU) approach	Additional Information
70	2401-BM	LOQ was determined as the lowest succesfully validated level		
71	2401-BM			
74	2401-BM			
76	2401-BM			
78	2401-BM			PFUnDS, PFTrDS, DONA, Genx, minor and major compound of F-53B, Capstone A and B and FOSA were not analyzed
79	2401-BM			
80	2401-BM	Lowest validated level where criteria for identification, trueness and precision are met.	Combined measurement uncertainty Uc including bias and intermediere reproducibility x k (k=2); Bias calculated from PT and RSD from validation.	
81	2401-BM	The LOQ was estimated as the lowest concentration of the sample fortified with acceptable precision and trueness, by applying the complete analytical method and identification criteria	The expanded measurement uncertainties were obtained using a top-down approach as reported in the “Guidance document on measurement uncertainty for laboratories performing PCDD/F and PCB analysis using isotope dilution mass spectrometry – 2017”. For the MU of the sum of four PFASs the RSS approach was used.	
82	2401-BM			
83	2401-BM	LVL		If any additional details are required on method please contact hannah.smith@statelab.ie
84	2401-BM	By spiking samples at LOQ concentration level.	By combining the contributions from: the precision of the method, the systematic effects on mass and volume measurements, the recovery factor of each compound compared with the recovery of the respective internal reference material, the chromatographic response factor and the concentration of reference materials,	
85	2401-BM	For the LOQ determination, the lowest validated level approach was used	The expanded measurement uncertainty U was calculated using a coverage factor of 2 (U=2u). The calculation of the combined standard measurement uncertainty ‘u’ (as an absolute value) of the sum parameter is calculated as the square root of the sum of squares of the individual (abs. values of); combined uncertainties. Relative U for sum parameter was calcuated U(rel) = U(abs)/Content.	
86	2401-BM			
87	2401-BM		Nordtest	Sample no.: 2401-BM-15
92	2401-BM			
93	2401-BM	lowest validated level method according to guidelines	validation - calculation based on accuracy, reproducibility	
96	2401-BM	According Guidance Document, Annex Table 7	Estimation of MU: Determination of precision from validation data and spiking materials; Determination of trueness from validation data, spiking materials and a PT result; q3	
97	2401-BM	during validation of PFAS in muscle	during validation of PFAS in muscle square root of square sum of average of bias, standard deviation of bias and relative standard deviation of recovery	
99	2401-BM			
112	2401-BM			
113	2401-BM	The lowest concentration of the analyte that satisfied method validation parameters (precision and trueness)		
114	2401-BM	According to EURL-POPs guidance document.	From recovery experiminets during validation (relative standard deviation (RSD))	30 %acetonitrile was used in mobilephase B to chromatographically remove TDCA interference from PFOS (499 > 79). We use a PEEK tubing and isolator column to decrease contamination of PFAS from the
115	2401-BM	6 times standarddeviation for egg samples spiked on a low concentration level (0,05 ng/g)	Intralaboratory reproducibility and bias combined	
117	2401-BM	validation by spikings on LOQ level	spiking experiments	
118	2401-BM	precision and accuracy of LOQ level fit the criteria of PFAS Guidance Document V.1.2, different matrices	precision and recovery data of two batches n = 3 at the same concentrations (4 different concentrations) on two different days	
124	2401-BM	lowest validated level	According EURL Guidance Document PFAS	
3B	2401-BM			
59B	2401-BM			
81A	2401-BM	The LOQ was estimated as the lowest concentration of the sample fortified with acceptable precision and trueness, by applying the complete analytical method and identification criteria	The expanded measurement uncertainties were obtained using a top-down approach as reported in the “Guidance document on measurement uncertainty for laboratories performing PCDD/F and PCB analysis using isotope dilution mass spectrometry – 2017”. For the MU of the sum of four PFASs the RSS approach was used.	

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]

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

Bovine Meat (2401-BM)

Methods Perfluoroalkylcarboxylic acids (PFCAs) - Measurement Uncertainty [%]

LC	Sample		Perfluorobutanoic acid **(PFBA)**	Perfluoropentanoic acid **(PFPeA)**	Perfluorohexanoic acid **(PFHxA)**	Perfluoroheptanoic acid **(PFHpA)**	Perfluorooctanoic acid **(PFOA)**	Perfluorononanoic acid **(PFNA)**	Perfluorodecanoic acid **(PFDA)**	Perfluoroun- decanoic acid **(PFUnDA)**	Perfluorodo- decanoic acid **(PFDoDA)**	Perfluorotri- decanoic acid **(PFTrDA)**	Perfluorotetra- decanoic acid **(PFTeDA)**
1	2401-BM												
2	2401-BM		13	13	13	12	11	10	11	12	16	21	
9	2401-BM												
10	2401-BM						25	25					
14	2401-BM												
17	2401-BM		34.7	24.4	29	20.9	20.3	37.1	29.8	26.7	30.1	26.6	37.6
18	2401-BM						40	40					
21	2401-BM		30	30	30	30	30	30	30	30	30	30	30
22	2401-BM												
26	2401-BM				40	40	40	40	40	40	40		
27	2401-BM			20	25	30	20	30	35	35			
28	2401-BM			40	40	40	40	40	40	40	40	40	40
33	2401-BM												
34	2401-BM						18	12					
35	2401-BM		50	50	50	50	50	50	50	50	50	50	50
40	2401-BM						47	34					
42	2401-BM		30	30	30	30	30	30	30	30	30	30	30
43	2401-BM		30	30	30	30	30	30	30	30	30	30	30
48	2401-BM		44	44	44	44	44	44	44	44	44	44	44
49	2401-BM		45	45	20	20	25	20	25	45	45		
51	2401-BM						22	16	21	24	20	58	21
53	2401-BM		42	42	42	42	42	32	32	32	32	32	32
56	2401-BM							88	88	88	88	88	88
58	2401-BM				10	15	17	12	18	19	22		
60	2401-BM				30	30	25	25	30	30	30	30	30
65	2401-BM		30	30	30	30	30	30	30	30	30	30	30
66	2401-BM												
67	2401-BM		20	20	20	20	20	20	20	20	20	20	20
68	2401-BM		30	25	25	25	25	25	25	25	25	25	25
69	2401-BM												
70	2401-BM						10	10					
71	2401-BM						44	44					
74	2401-BM						50	50					
76	2401-BM		37	37	37	37	37	37	37	37	37	37	37
78	2401-BM						30	30					
79	2401-BM		20	20	20	20	20	20	20	20	20	50	20
80	2401-BM						30	34					
81	2401-BM		45	30	31	48	27	43	29	27	39	27	32
82	2401-BM						30	30					
83	2401-BM				35	35	35	35	50	35	35		50
84	2401-BM		45	45	45	45	45	45	45	45	45	45	45
85	2401-BM		60	40	40	40	40	40	40	40	40	40	40
86	2401-BM		44	44	44	44	44	44	44	44	44	44	
87	2401-BM		20	20	20	20	20	20	20	20	20	35	35
92	2401-BM						29	29					
93	2401-BM			14	23	18	17	15	12	16	28	43	18
96	2401-BM						40	40					
97	2401-BM						44	34					
99	2401-BM						18	25					
112	2401-BM						50	50					
113	2401-BM												
114	2401-BM					24	7	7	7	18	17		33
115	2401-BM						10	12	8	10	20	7	7
117	2401-BM		21	13	14	13	14	14	14	16	14	21	23
118	2401-BM							13.6	10.5	11.4	9.6	15.1	11.6
124	2401-BM		30	35	40	20	20	35	40	20	25	45	25
3B	2401-BM						30	30					
59B	2401-BM												
81A	2401-BM		45	30	31	48	27	43	29	27	39	27	32

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

Bovine Meat (2401-BM)

Methods Perfluoroalkylcarboxylic acids (PFCAs) - Limit of detection (LOQ) in µg/kg wet weight

LC	Sample		Perfluorobutanoic acid **(PFBA)**	Perfluoropentanoic acid **(PFPeA)**	Perfluorohexanoic acid **(PFHxA)**	Perfluoroheptanoic acid **(PFHpA)**	Perfluorooctanoic acid **(PFOA)**	Perfluorononanoic acid **(PFNA)**	Perfluorodecanoic acid **(PFDA)**	Perfluoroun- decanoic acid **(PFUnDA)**	Perfluorodo- decanoic acid **(PFDoDA)**	Perfluorotri- decanoic acid **(PFTrDA)**	Perfluorotetra- decanoic acid **(PFTeDA)**
1	2401-BM				0.007								
2	2401-BM		0.05	0.02	0.02	0.02	0.05	0.02	0.01	0.02	0.05	0.05	0.05
9	2401-BM		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.5	0.5
10	2401-BM						0.01	0.01					
14	2401-BM		0.406	0.326	0.137	0.166	0.196	0.14	0.222	0.552	1.37	0.206	0.915
17	2401-BM		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
18	2401-BM		0.01	0.01	0.01	0.01							
21	2401-BM		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
22	2401-BM		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
26	2401-BM				0.005	0.005	0.001	0.001	0.001	0.001	0.001		
27	2401-BM			0.3	0.3	0.05	0.06	0.1	0.1	0.08			
28	2401-BM			0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
33	2401-BM		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
34	2401-BM		1.1		0.02	0.01	0.01						
35	2401-BM		10	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
40	2401-BM						0.05	0.05					
42	2401-BM		0.0028	0.0028	0.0028	0.0028	0.0028	0.0028	0.0028	0.0028	0.0028	0.0028	0.0028
43	2401-BM		0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
48	2401-BM		0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
49	2401-BM		0.1	0.05	0.03	0.03	0.03	0.04	0.02	0.05	0.05		
51	2401-BM		0.0298	0.00955	0.0298	0.00298							
53	2401-BM		0.2	0.01	0.01	0.01							
56	2401-BM		0.4	0.05	0.2	0.05	0.2						
58	2401-BM				0.008	0.013	0.0016	0.01	0.014	0.013	0.011		
60	2401-BM				0.005	0.1	0.005	0.005	0.005	0.005	0.005	0.1	0.05
65	2401-BM		0.1	0.1	0.1	0.1	0.01	0.005	0.1	0.1	0.1	0.1	0.1
66	2401-BM			0.005	0.005	0.005							
67	2401-BM		0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
68	2401-BM		0.5	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
69	2401-BM		0.067	0.067	0.067	0.067	0.067	0.067	0.133	0.133	0.133		
70	2401-BM						0.1	0.1					
71	2401-BM						0.2	0.2					
74	2401-BM						0.1	0.1					
76	2401-BM		0.3	0.1	0.1	0.01	0.01	0.005	0.01	0.01	0.01	0.01	0.01
78	2401-BM		0.5	0.2	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
79	2401-BM		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
80	2401-BM			0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.05
81	2401-BM		0.2	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
82	2401-BM						0.003	0.003					
83	2401-BM				0.05	0.05	0.05	0.05	0.05	0.05	0.05		0.05
84	2401-BM		0.5	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
85	2401-BM		0.56	0.084	0.084	0.084	0.084						
86	2401-BM		10	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	
87	2401-BM		0.07	0.07	0.05	0.02	0.03	0.03	0.06	0.06	0.06	0.1	0.1
92	2401-BM						0.02	0.02					
93	2401-BM			0.2	0.05	0.025	0.1	0.05	0.025	0.025	0.025	0.025	0.1
96	2401-BM						0.05	0.05					
97	2401-BM						0.1	0.1					
99	2401-BM						0.1	0.1					
112	2401-BM						0.05						
113	2401-BM			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
114	2401-BM					0.05	0.05	0.05	0.05	0.25	0.05		0.25
115	2401-BM			0.15	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.04
117	2401-BM		0.20	0.20	0.20	0.2	0.20	0.2	0.2	0.2	0.2	0.2	0.2
118	2401-BM		0.25	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
124	2401-BM		0.05	0.01	0.01	0.01	0.05	0.01	0.01	0.05	0.05	0.1	0.05
3B	2401-BM						0.01	0.005					
59B	2401-BM		0.20	0.20	0.20	0.2	0.20	0.2	0.2	0.2	0.2	0.2	0.2
81A	2401-BM		0.20	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05

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

Bovine Meat (2401-BM)

Methods Perfluoroalkylsulfonic acids (PFSAs) - Measurement Uncertainty [%]

LC	Sample		Perfluorobutane- sulfonic acid (PFBS)	Perfluoropentane- sulfonic acid (PFPeS)	Perfluorohexane- sulfonic acid (PFHxS)	Perfluoroheptane- sulfonic acid (PFHpS)	Linear Perfluorooctane- sulfonic acid (L-PFOS)	Sum of branched Perfluorooctane- sulfonic acids (br-PFOS)	Total-Perfluorooctane- sulfonic acids (total PFOS)	Perfluorononane- sulfonic acid (PFNS)	Perfluorodecane- sulfonic acid (PFDS)	Perfluoroundecane- sulfonic acid (PFUnDS)	Perfluorododecane- sulfonic acid (PFDoDS)	Perfluorotridecane- sulfonic acid (PFTrDS)
1	2401-BM													
2	2401-BM		17	13	11	14	11	14	11	13	17			
9	2401-BM													
10	2401-BM				25				25					
14	2401-BM													
17	2401-BM		25.4		31.3	23.4	35.7				26			
18	2401-BM				40		40		40					
21	2401-BM		30	30	30	30	30			30	30	30	30	30
22	2401-BM													
26	2401-BM													
27	2401-BM		20	25	20	30	25	30		30	35	30	30	
28	2401-BM		40	40	40	40	40	40	40	40	40	40	40	40
33	2401-BM													
34	2401-BM				18				19					
35	2401-BM		50	50	50	50	50	50	50	50	50	50	50	50
40	2401-BM				44				24					
42	2401-BM		30	30	30	30	30	30	30	30	30	30	30	30
43	2401-BM		30	30	30	30	30	30	30	30	45	45	60	60
48	2401-BM		44	44	44	44	44	44	44	44	44	44	44	44
49	2401-BM				30	45	40	50			45			
51	2401-BM				23.25469796	69.76403881	18.29946187	35.01435308			37.2			
53	2401-BM		42	42	32	32	32	32		42	32		42	
56	2401-BM				88	88	88		88		88			
58	2401-BM		16	32	23	23	21	21	29					
60	2401-BM		30	30	25	30	25		30	30	30			
65	2401-BM		30	30	30	30	30	30	30	30	30	30	30	30
66	2401-BM													
67	2401-BM		20	20	20	20	20	20		20	20	20	20	20
68	2401-BM		25	25	25	25	25	25	25	25	25	25	25	25
69	2401-BM													
70	2401-BM				10		10							
71	2401-BM				44				44					
74	2401-BM				50				50					
76	2401-BM		37	37	37	37	37	37	37	37	37	37	37	37
78	2401-BM				30				30					
79	2401-BM		20	35	20	35	20	20	20	35	35	20		
80	2401-BM				35		27	27						
81	2401-BM		29	32	33	33	27		26	26	31		45	
82	2401-BM				30		30	30	30					
83	2401-BM				35	35	35	35						
84	2401-BM		45	45	45	45	45	45	45	45	45	45	45	45
85	2401-BM		40	50	40	50	40	40	31	40	50			
86	2401-BM		44	44	44	44			44	44	44	44	44	44
87	2401-BM		20	20	20	20	20	20	20	40	40		40	
92	2401-BM				27				27					
93	2401-BM		9		17	18	21	21	21		32			
96	2401-BM				40				40					
97	2401-BM				30		42	42	42					
99	2401-BM				15				16					
112	2401-BM				50		50	50	50					
113	2401-BM													
114	2401-BM				16.00	30	16.00	18.00	24					
115	2401-BM				21.00		10.00		10		14			
117	2401-BM		17.00	15.00	16.00	14	16.00	16.00	16	14	17	50	24	50
118	2401-BM				15.90	11.1	12.00		12		9.6			
124	2401-BM		20.00	35.00	25.00	35	25.00	25.00		40	40		40	
3B	2401-BM				30.00				30					
59B	2401-BM													
81A	2401-BM		29.00	32.00	33.00	33	27.00		26	26	31		45	

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]

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

Bovine Meat (2401-BM)

Methods Perfluoroalkylsulfonic acids (PFSAs) - Limit of detection (LOQ) in µg/kg wet weight

LC	Sample		Perfluorobutane- sulfonic acid (PFBS)	Perfluoropentane- sulfonic acid (PFPeS)	Perfluorohexane- sulfonic acid (PFHxS)	Perfluoroheptane- sulfonic acid (PFHpS)	Linear Perfluorooctane- sulfonic acid (L-PFOS)	Sum of branched Perfluorooctane- sulfonic acids (br-PFOS)	Total-Perfluorooctane- sulfonic acids (total PFOS)	Perfluorononane- sulfonic acid (PFNS)	Perfluorodecane- sulfonic acid (PFDS)	Perfluoroundecane- sulfonic acid (PFUnDS)	Perfluorododecane- sulfonic acid (PFDoDS)	Perfluorotridecane- sulfonic acid (PFTrDS)
1	2401-BM		0.003	0.004						0.007		0.01	0.01	0.05
2	2401-BM		0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.05	0.05	0.25	0.25	0.25
9	2401-BM													
10	2401-BM				0.01				0.01					
14	2401-BM		0.146	0.336	0.148	0.505	0.213	0.064		0.215	0.265	28.6	33.6	
17	2401-BM		0.1		0.1	0.1	0.1				0.1			
18	2401-BM		0.01	0.01						0.01		0.01	0.01	0.1
21	2401-BM		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
22	2401-BM		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		0.01	
26	2401-BM		0.001	0.001	0.001	0.001			0.001	0.001	0.001		0.005	
27	2401-BM		0.08	0.09	0.07	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05	
28	2401-BM		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
33	2401-BM		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
34	2401-BM		0.01	0.01						0.01		0.01	0.01	0.02
35	2401-BM		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
40	2401-BM				0.1				0.1					
42	2401-BM		0.0028	0.0028	0.0028	0.0028	0.0028	0.0028	0.0056	0.0028	0.0028	0.0028	0.0028	0.0028
43	2401-BM		0.05	0.05	0.05	0.05	0.05		0.05	0.05	0.05	0.05	0.05	0.05
48	2401-BM		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
49	2401-BM		0.05	0.05	0.05	0.05	0.05	0.05		0.05	0.1			
51	2401-BM		0.0109	0.00689						0.00692		0.015		
53	2401-BM		0.01	0.01						0.01			0.01	
56	2401-BM		0.05	0.05						0.2				
58	2401-BM		0.0015	0.005	0.005	0.003	0.009	0.009	0.009					
60	2401-BM		0.00443	0.00484	0.00473	0.095	0.00478		0.00478	0.00484	0.1			
65	2401-BM		0.1	0.1	0.01	0.1			0.01	0.1	0.1	0.1	0.1	0.1
66	2401-BM		0.005	0.005						0.005		0.005	0.005	0.005
67	2401-BM		0.02	0.02	0.02	0.02	0.02	0.02		0.02	0.02	0.02	0.02	0.02
68	2401-BM		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
69	2401-BM		0.067	0.067	0.067	0.067	0.067		0.067	0.133	0.133	0.67		
70	2401-BM				0.1		0.1	0.1						
71	2401-BM				0.2				0.2					
74	2401-BM				0.1				0.1					
76	2401-BM		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.01
78	2401-BM		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		0.01	
79	2401-BM		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
80	2401-BM		0.05		0.05		0.05	0.05	0.05		0.05			
81	2401-BM		0.05	0.05	0.05	0.05	0.05		0.05	0.05	0.05		0.05	
82	2401-BM				0.003		0.003	0.003	0.003					
83	2401-BM				0.05	0.05	0.03	0.05						
84	2401-BM		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
85	2401-BM		0.075	0.078						0.081				
86	2401-BM		0.05	0.05	0.05	0.05			0.05	0.05	0.05	0.05	0.1	0.1
87	2401-BM		0.07	0.2	0.02	0.09	0.02	0.02	0.02	0.25	0.05		0.15	
92	2401-BM				0.02				0.02					
93	2401-BM		0.04		0.025	0.025	0.025	0.025	0.025		0.025			
96	2401-BM				0.05				0.05					
97	2401-BM				0.1		0.1	0.1	0.1					
99	2401-BM				0.08				0.1					
112	2401-BM													
113	2401-BM		0.1	0.1	0.1	0.1	0.1			0.1	0.1			
114	2401-BM				0.046	0.048	0.037	0.049	0.049					
115	2401-BM		0.03		0.04		0.03		0.03		0.05			
117	2401-BM		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
118	2401-BM		0.05	0.05	0.05	0.05			0.05	0.05	0.05	0.05	0.05	0.05
124	2401-BM		0.01	0.01	0.01	0.01	0.05	0.05		0.01	0.01		0.5	
3B	2401-BM				0.01				0.01					
59B	2401-BM		0.2	0.2	0.2	0.2			0.2	0.2	0.2	0.2	0.2	0.2
81A	2401-BM		0.05	0.05	0.05	0.05	0.05		0.05	0.05	0.05		0.05	

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]

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

Bovine Meat (2401-BM)

Methods Sum of PFOS, PFOA, PFNA, PFHxS - Measurement Uncertainty [%]

LC	Sample		Sum of total-PFOS, PFOA, PFNA, PFHxS **(ub)**	Sum of total-PFOS, PFOA, PFNA, PFHxS **(lb)**
1	2401-BM			
2	2401-BM			
9	2401-BM			
10	2401-BM		20	20
14	2401-BM			
17	2401-BM			
18	2401-BM		40	40
21	2401-BM		30	30
22	2401-BM			
26	2401-BM		40	40
27	2401-BM		30	30
28	2401-BM		40	40
33	2401-BM			
34	2401-BM		19	19
35	2401-BM		50	50
40	2401-BM		50	50
42	2401-BM		30	30
43	2401-BM		20	21
48	2401-BM		31.5	31.5
49	2401-BM			
51	2401-BM		12	12
53	2401-BM		18	18
56	2401-BM		88	88
58	2401-BM		37	37
60	2401-BM		25	25
65	2401-BM		30	30
66	2401-BM			
67	2401-BM		20	20
68	2401-BM		25	25
69	2401-BM			
70	2401-BM		10	10
71	2401-BM		44	44
74	2401-BM			50
76	2401-BM		37	37
78	2401-BM		50	50
79	2401-BM		40	40
80	2401-BM			
81	2401-BM		20	21
82	2401-BM			
83	2401-BM			
84	2401-BM		32	32
85	2401-BM		22	23
86	2401-BM		44	44
87	2401-BM		25	25
92	2401-BM			19
93	2401-BM		11	12
96	2401-BM		40	40
97	2401-BM		27.9	32.6
99	2401-BM		38	38
112	2401-BM		50	50
113	2401-BM			
114	2401-BM		58.00	54.00
115	2401-BM		11.00	11.00
117	2401-BM		50.00	50.00
118	2401-BM			
124	2401-BM		19.00	19.00
3B	2401-BM		30.00	30.00
59B	2401-BM			
81A	2401-BM		20.00	21.00

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bovine Meat (2401-BM)
Methods Other PFAS - Limit of detection (LOQ) in µg/kg wet weight

LC	Sample		Perfluorooctane sulphonamide **FOSA**	2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluor-3-(trifluoromethoxy)propoxy]-propionic acid **DONA**	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoic acid **GenX**	Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate **(major component of F-53B)**	Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate **(minor component of F-53B)**	1-Propanaminium, N,N-dimethyl-N-oxide-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide **Capstone A**	1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide **Capstone B**
1	2401-BM		0.03	0.01	0.01	0.01	0.01		0.10
2	2401-BM		0.05	0.02	0.50	0.02	0.02		
9	2401-BM								
10	2401-BM								
14	2401-BM			0.17	0.38	0.31	0.44		
17	2401-BM		0.01						
18	2401-BM			0.01	0.01	0.01	0.01		
21	2401-BM		0.10	0.10	0.10				
22	2401-BM		0.01	0.01	0.01				
26	2401-BM		0.00						
27	2401-BM		0.10	0.05	0.10	0.05	0.05	1.00	0.30
28	2401-BM			0.01	0.01	0.01	0.01		
33	2401-BM			0.01	0.01	0.05	0.01		
34	2401-BM			0.01	0.03	0.01	0.01		
35	2401-BM								
40	2401-BM								
42	2401-BM			0.00	0.00	0.00	0.00		
43	2401-BM			0.05	1.00	0.05	0.05		
48	2401-BM			0.01	0.10	0.01	0.01		
49	2401-BM								
51	2401-BM		0.02	0.00	0.07	0.01	0.02		
53	2401-BM		0.05	0.20	0.50	0.20	0.20		
56	2401-BM			0.05	0.05	0.05	0.05		
58	2401-BM								
60	2401-BM				0.01				
65	2401-BM		0.10	0.10	0.50	0.10	0.10		
66	2401-BM			0.01	0.01	0.01	0.01		
67	2401-BM								
68	2401-BM			0.01	0.01	0.01	0.01		
69	2401-BM		0.13						
70	2401-BM								
71	2401-BM								
74	2401-BM								
76	2401-BM		0.01	0.10	0.10	0.01	0.01		
78	2401-BM								
79	2401-BM		0.05	0.05	0.05	0.05	0.25		
80	2401-BM		0.05						
81	2401-BM		0.05	0.05	0.10	0.05	0.05		
82	2401-BM								
83	2401-BM								
84	2401-BM		0.01	0.01	0.01	0.01	0.01	0.01	0.01
85	2401-BM			0.08		0.08	0.08		
86	2401-BM								
87	2401-BM		0.13					0.15	0.15
92	2401-BM								
93	2401-BM			0.10	0.03	0.03	0.03		
96	2401-BM								
97	2401-BM								
99	2401-BM								
112	2401-BM								
113	2401-BM								
114	2401-BM		2.50	2.40		0.05			
115	2401-BM								
117	2401-BM		0.20	0.20	0.2	0.20	0.20	0.20	0.20
118	2401-BM		0.05	0.05	0.05	0.05	0.05		
124	2401-BM		0.01	0.50	0.5	0.05	0.05		
3B	2401-BM								
59B	2401-BM		0.50	0.20	0.2	0.20	0.20		
81A	2401-BM		0.05	0.05	0.1	0.05	0.05		

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs, HBCDDs and PFAS in Bovine Meat 2024 [EURL-PT-POP_2401-BM]
EURL for halogenated Persistent Organic Pollutants (POPs) in Feed and Food

Bovine Meat (2401-BM)
Methods Other PFAS - Measurement Uncertainty MU [%]

LC	Sample		Perfluorooctane sulphonamide **FOSA**	2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluor-3-(trifluoromethoxy)propoxy]-propionic acid **DONA**	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)-propanoic acid **GenX**	Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate **(major component of F-53B)**	Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate **(minor component of F-53B)**	1-Propanaminium, N,N-dimethyl-N-oxide-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide **Capstone A**	1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide **Capstone B**
1	2401-BM								
2	2401-BM		21	13		13	21		
9	2401-BM								
10	2401-BM								
14	2401-BM								
17	2401-BM		18.2						
18	2401-BM								
21	2401-BM		30	30	30				
22	2401-BM								
26	2401-BM		40						
27	2401-BM		35	20	25	25	30	45	30
28	2401-BM								
33	2401-BM								
34	2401-BM								
35	2401-BM								
40	2401-BM								
42	2401-BM			30	30	30	30		
43	2401-BM			30	30	30	30		
48	2401-BM			44	44	44	44		
49	2401-BM								
51	2401-BM								
53	2401-BM		44	44	44	44	44		
56	2401-BM								
58	2401-BM								
60	2401-BM								
65	2401-BM		30	30	30	30	30		
66	2401-BM								
67	2401-BM								
68	2401-BM			30	30	30	30		
69	2401-BM								
70	2401-BM								
71	2401-BM								
74	2401-BM								
76	2401-BM								
78	2401-BM								
79	2401-BM		20	25	20	40	50		
80	2401-BM								
81	2401-BM								
82	2401-BM								
83	2401-BM								
84	2401-BM		45	45	45	45	45	45	45
85	2401-BM			40		40	40		
86	2401-BM								
87	2401-BM		20					30	30
92	2401-BM								
93	2401-BM			20	12	41	49		
96	2401-BM								
97	2401-BM								
99	2401-BM								
112	2401-BM								
113	2401-BM								
114	2401-BM		17	9		20			
115	2401-BM								
117	2401-BM		15	50	50	50	32	50	50
118	2401-BM								
124	2401-BM		40	25	35	30	30		
3B	2401-BM								
59B	2401-BM								
81A	2401-BM								