



EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Olive Oil 2026

EURL-PT-DPB_2601-OL

FOOD

Final Report PBDEs and HBCDDs (Report Version 1.0)

04 August 2026



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Summary

Test sample	FOOD: Olive oil [2601-OL]
Analytes of interest Mandatory for NRLs:	PBDEs (BDE-28, -47, -49, -99, -100, -153, -154, -183, -209) HBCDDs (α -HBCDD, β -HBCDD, γ -HBCDD or total HBCDD)
Methods	Any kind of method
Participants	NRLs, OFLs, other official laboratories, commercial laboratories performing the analysis of samples taken by feed business operators
Statistical evaluation	ISO 13528:2022 [1], IUPAC Protocol [2]
Final report	04 August 2026 (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 PT, test material and analytes

This proficiency test (PT) on the determination of **PCDD/Fs**, **PCBs**, **PBDEs** and **HBCDDs** in **Olive Oil** was organized by the EURL for halogenated POPs in Feed and Food to be performed between February and April 2026. The objective was to assess analytical performance of laboratories and inter-laboratory comparability of results from analyses of PCDD/Fs, PCBs, PBDEs and HBCDDs in one sample of **Olive Oil**.

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 2026. NRLs are 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 will allow the extension of the data basis for calculation of assigned values and evaluation of results.

Official laboratories and **commercial laboratories** performing the analysis of samples taken by food business operators were invited to participate in this interlaboratory study.

The evaluated results were discussed by representatives of European Commission, NRLs and the EURL at the EURL/NRL online workshop on 11 May 2026.

1.1. Samples and coding

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

Olive Oil	Sample no. 2601-OL-xxx
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Each participant received about **20 g** of the test sample in a HDPE bottle.

1.2. Analytes of interest

Participants were requested to determine the following parameters:

Polybrominated diphenyl ethers (PBDEs)

- Individual congeners: BDE-28, -47, -49, -99, -100, -153, -154, -183, -209
- Sum of 8 PBDEs (without BDE-209)
- Sum of 9 PBDEs (with BDE-209)

Hexabromocyclododecanes (HBCDDs)

- α -HBCDD, β -HBCDD, γ -HBCDD stereoisomers
- Sum of α -, β -, γ -HBCDD (using HPLC methods)
- Total HBCDD (using GC methods)

1.3. Methods

All kinds of detection and quantification methods could be applied.

1.4. Coding of laboratories and confidentiality

The identity of participating laboratories will be kept confidential.

For NRLs of EU member states, the suggested “protocol for management of underperformance in comparative testing or lack of collaboration of National Reference Laboratories (NRLs)” will be followed. The confidentiality of NRLs will be kept according to this protocol.

For OFLs of EU member states cooperating with NRL, the respective NRLs will inform the EURL for halogenated POPs about the participating OFLs and will receive the respective laboratory codes, invoices for participation fee and certificates of participation of the OFLs.

1.5. Results of PBDEs and HBCDDs

Laboratories should:

- use their own reference standards for identification and quantification,
- report results for each analyte,
- report upper and lower bound results for sum parameters,
- report the limit of quantification (LOQ), at least for each non-quantified analyte,
- report the measurement uncertainty,
- give method information

- 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 have to be reported in **µg/kg product** for PBDEs and HBCDDs

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

109 laboratories registered for this proficiency test.

Table 1: Participating laboratories

Participating laboratories	Region	No. of participants
National Reference Laboratories	European Union	27
	Other Countries	5
Official Laboratories	European Union	56
	Other Countries	4
Commercial Laboratories		15
University or Academic Research Institute		2
	Total	109

2.1. Number of reported results

Table 2: Reported results for PBDEs

Reported results (2601-OL)	All laboratories
PBDE congeners	32 – 39
Sum of 8 PBDEs (without BDE-209)	36
Sum of 9 PBDEs (with BDE-209)	29

Table 3: Reported results for HBCDDs

Reported results (2502-HY)	All laboratories
α -, β -, γ -HBCDD	20
Sum of α -, β -, γ -HBCDD	20
Total HBCDD (using GC methods)	2

2.2. Accreditation

Table 4: Reported accreditation according to ISO/IEC 17025 by participants for PBDEs and HBCDDs

Olive oil (2601-OL)	PBDEs	HBCDDs
Accreditation	27	8
No accreditation	8	11

2.3. Detection methods

The following detection methods were applied:

- GC-HRMS-, GC-MS/MS and GC-LRMS-methods for PBDEs
- GC-HRMS-, GC-LRMS-, LC-MS/MS-, LC-HRMS-methods for HBCDDs

Table 5: Overview of chromatographic separation and detection methods of PBDEs and HBCDDs

Detection methods	PBDEs	HBCDDs
GC-HRMS	20	1
GC-MS/MS	15	-
GC-LRMS	3	1
LC-MS/MS	-	15
LC-HRMS	-	2

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 2601-OL were analyzed in duplicate for PBDEs. The test for sufficient homogeneity was performed for selected sum parameters and individual congeners. The test materials showed sufficient homogeneity for this proficiency test. Homogeneity can be concluded also for HBCDDs, due to similar physico-chemical properties. The stability check of the analytes of interest applying room temperature storage was performed according to ISO 13528:2022 [1]. The test material showed sufficient stability for this proficiency test.

4. Determination of the assigned value

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

The determination of the assigned value was performed according to ISO 13528:2022 [1] by estimating the assigned value as the consensus of participants' results (using only results of physico-chemical methods). The Hampel estimator as robust analysis method was taken for calculation of assigned value after examination of the distribution of the remaining results using histogram and Kernel density estimation.

Assigned values were calculated for individual PBDE congeners, sum of 8 PBDEs (without BDE-209) and sum of 9 PBDEs (including BDE-209), for individual HBCDD diastereomers, sum of α -, β - and γ -HBCDD and total HBCDD (including limits of quantification (LOQs)), if possible. Additionally, the median of all values was 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. 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 in the range of the respective LOQ or too few results, no assigned values could be calculated for:

- BDE 28, BDE-49
- Total HBCDD (using GC-methods)

Since there are no traceable reference values available, the assigned values in this PT were calculated based on the Hampel estimator 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 PBDEs and HBCDDs. No significant differences between the assigned values calculated for both data sets were observed.

Table 6: Comparison of assigned values for all participants and participants with reported accreditation according to ISO/IEC 17025 for PBDE and HBCDD sum parameters

Sum parameters	Assigned value All participants	Assigned value ISO/IEC 17025 accreditation	Deviation
	µg/kg product		%
Sum of PBDE without BDE-209 (ub)	0.315	0.322	2
Sum of PBDE including BDE-209 (ub)	0.498	0.522	5
Sum of α -, β -, γ -HBCDD (ub)	0.328	0.313	5

4.1. PBDEs – sum parameters and individual congeners

The assigned values for the test sample 2601-OL were calculated as consensus of participants' results for individual PBDEs and sum parameters, taking into account the calculation criteria described above.

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

Olive oil (2601-OL)	Assigned value µg/kg product
Sum of PBDE without BDE-209 ub	0.315
Sum of PBDE without BDE-209 lb	0.304
Sum of PBDE including BDE-209 ub	0.498
Sum of PBDE including BDE-209 lb	0.435
BDE-28	-
BDE-47	0.0747
BDE-49	-
BDE-99	0.0927
BDE-100	0.0204
BDE-153	0.0226
BDE-154	0.0104
BDE-183	0.0830
BDE-209	0.183

PBDE congeners - 2601-OL

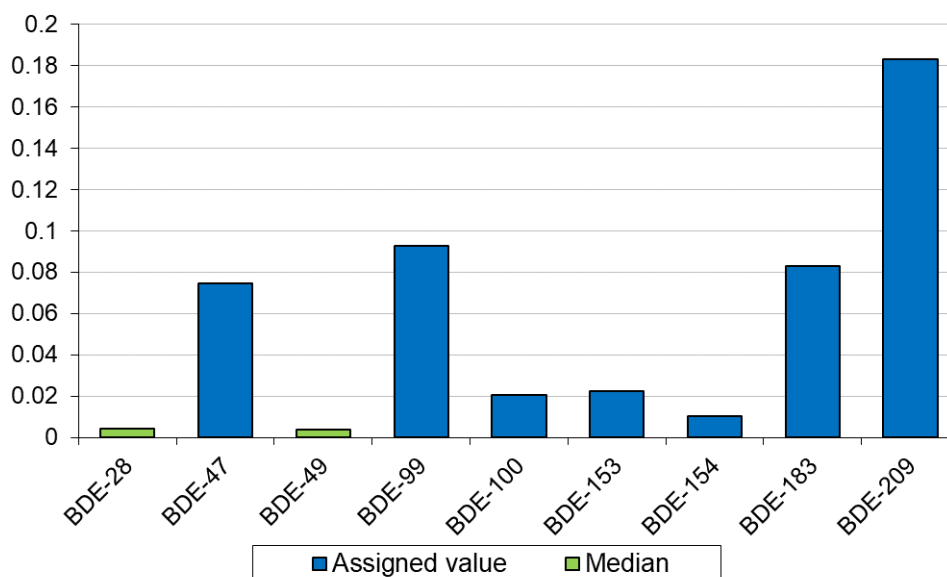


Figure 1: Assigned values (blue) and median values (green) for PBDE individual congeners for Olive oil (2601-OL) [µg/kg product]

PBDE sum parameters - 2601-OL

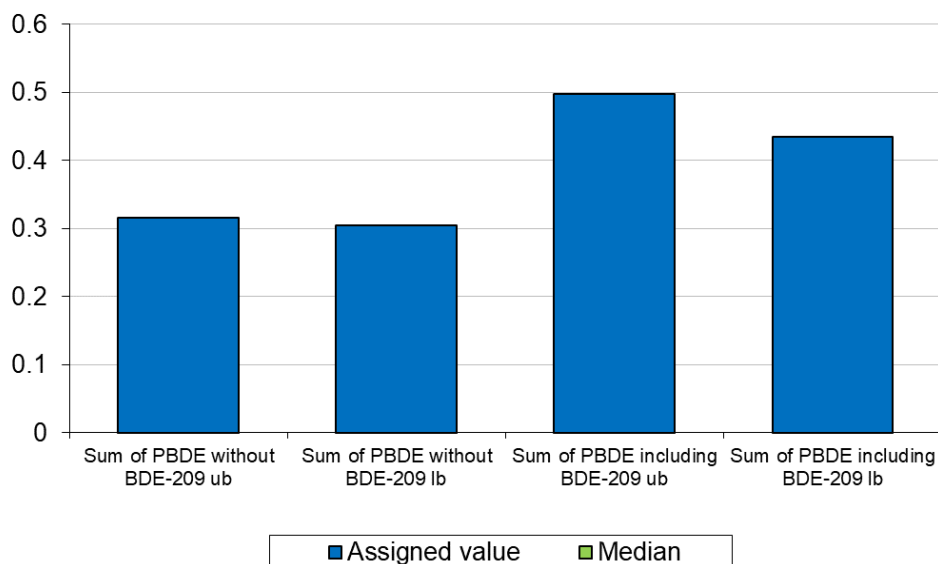


Figure 2: Assigned values (blue) for PBDE sum parameters for Olive oil (2601-OL) [µg/kg product]

4.2. HBCDDs – individual stereoisomers and sum parameter

The assigned values for the test sample 2601-OL were calculated as consensus of participants' results for individual HBCDDs and sum parameters, taking into account the calculation criteria described above.

Table 8: Assigned values for HBCDDs (rounded to three significant figures)

Olive oil (2601-OL)	Assigned value µg/kg product
Sum of α -, β -, γ -HBCDD (ub)	0.328
Sum of α -, β -, γ -HBCDD (lb)	0.323
(+/-)- α -HBCDD	0.117
(+/-)- β -HBCDD	0.102
(+/-)- γ -HBCDD	0.112
Total HBCDD	-

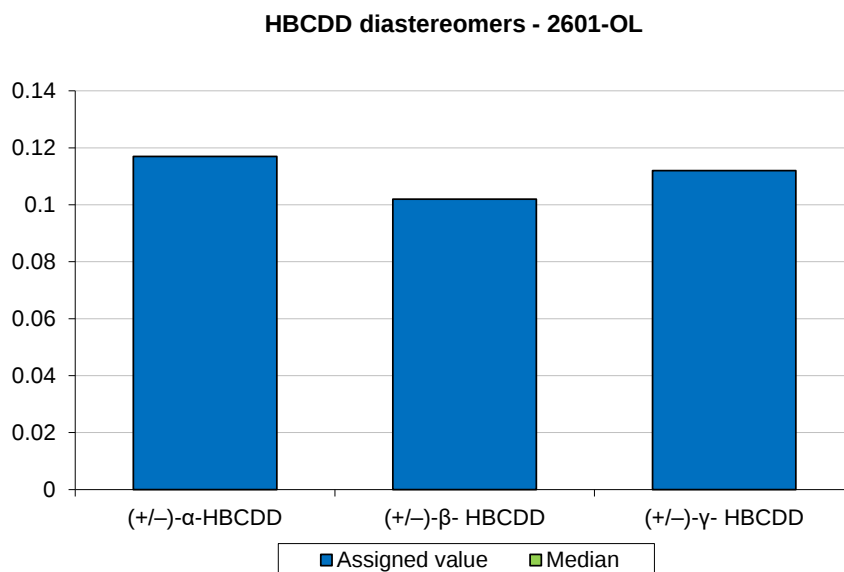


Figure 3: Assigned values (blue) and median values (green) for HBCDD individual congeners for Olive oil (2601-OL) [µg/kg product]

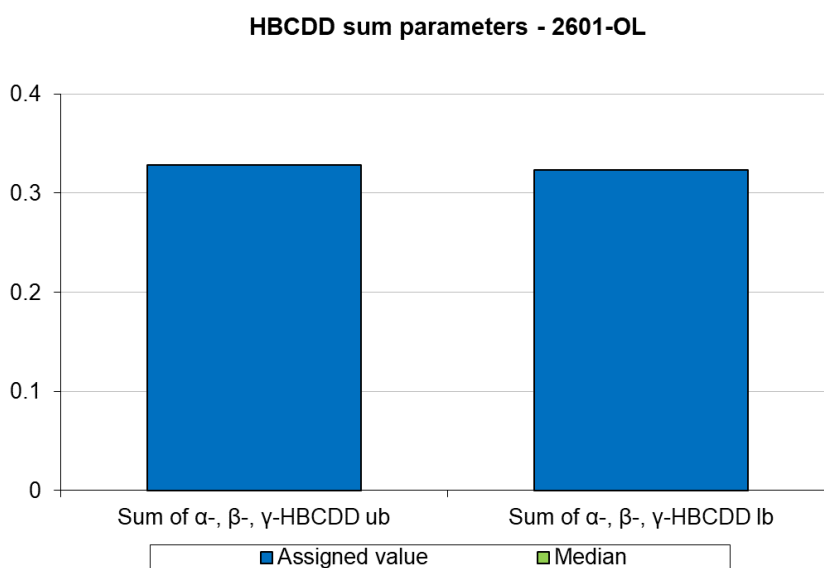


Figure 4: Assigned values (blue) and median values (green) for HBCDD sum parameters for Olive oil (2601-OL) [µg/kg product]

4.3. Comparison of assigned values with recommended LOQs

The limits of quantification are currently based on the values specified in Commission Recommendation of 3 March 2014, on the monitoring of trace levels of brominated flame retardants in food (2014/118/EU). For PBDEs the recommended LOQ value is 0.01 µg/kg w.w. for individual congeners. However, the Guidance document on analytical parameters for the determination of organobromine contaminants in food and feed [3] of the EURL/NRL network recommends a target LOQ of 0.001 µg/kg product, except for BDE-209.

For HBCDDs the recommended LOQ value is at 0.01 µg/kg product, for α-, β- and γ-stereoisomers (Table 9). For total HBCDD measured by GC-MS, the corresponding LOQ value is 0.003 µg/kg product, as cumulative response of all possible HBCDD diastereomers (Table 9).

Table 9: Analytical recommendations from “Guidance document on analytical parameters for the determination of organobromine contaminants in food and feed” [3]

Food	Limit of quantification per congener/stereoisomer µg/kg product
PBDEs	0.01 and 0.001 (all congeners except BDE-209)
HBCDDs	0.01 (sum of HBCDDs) and 0.003 (total HBCDD)

PBDEs:

For BDE-28 and BDE-49 assigned values could not be calculated. Median values for BDE-28 (0.00415 µg/kg) and BDE-49 (0.0039 µg/kg) were below the recommended LOQ of 0.01 µg/kg, but above the target LOQ of 0.001 µg/kg. BDE 49 is currently the only BDE congener from this proficiency test without its own internal ¹³C-labelled standards.

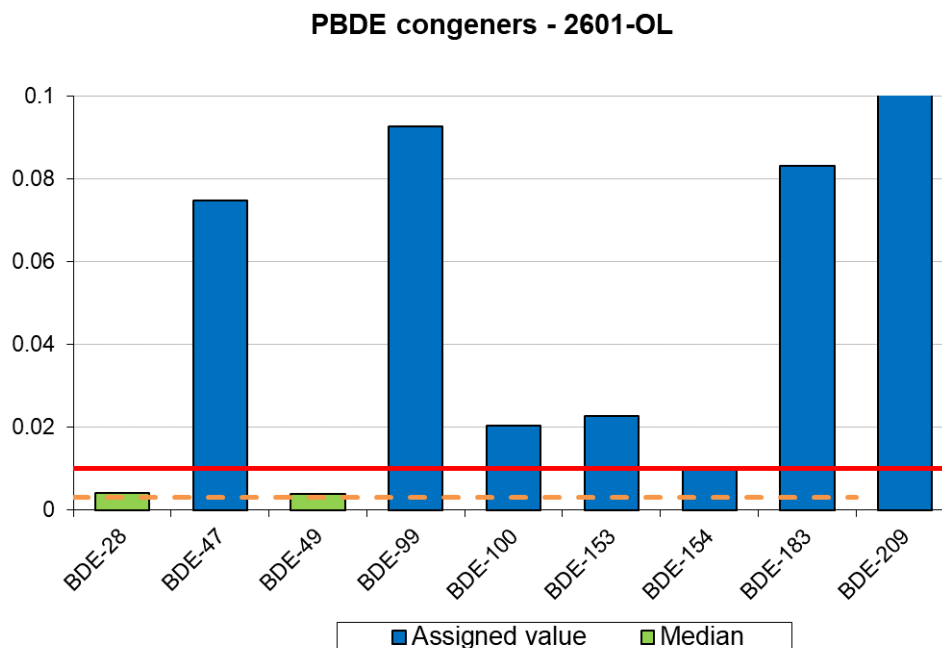


Figure 5: Comparison of assigned values for PBDE congeners with recommended LOQs (yellow line at 0.001 µg/kg product and red line at 0.01 µg/kg product) in Olive oil (2601-OL)

HBCDDs:

For alpha-, beta- and gamma-HBCDD assigned values could be calculated which are about a factor of 10 above the recommended LOQ of 0.01 µg/kg. Assigned values for all three diastereomers were in the range of 0.1 µg/kg, showing that in this concentration range participants could reliably report results for the diastereomers.

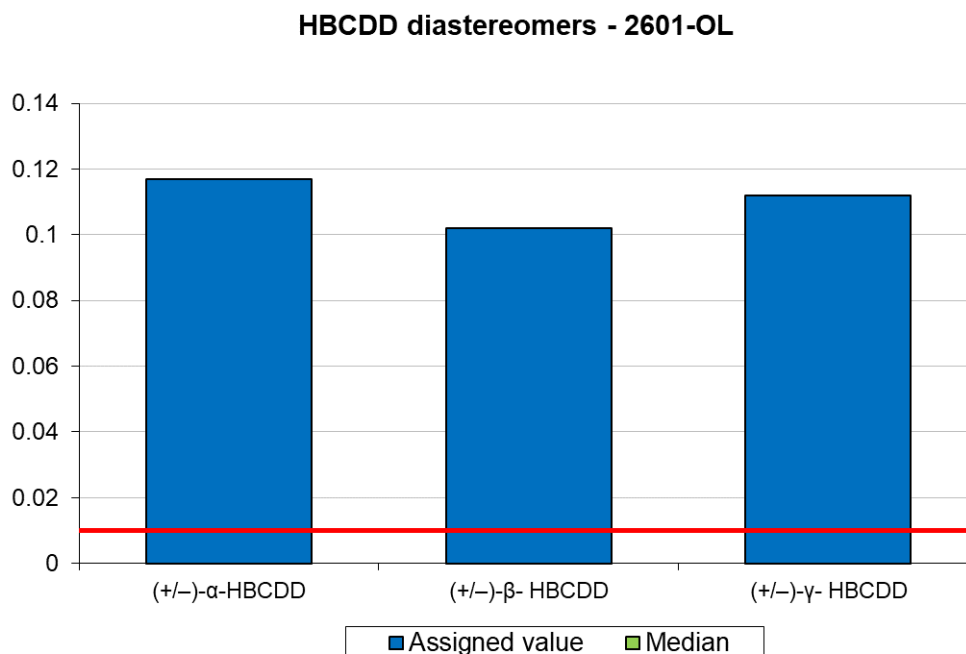


Figure 6: Comparison of assigned values for HBCDD stereoisomers with recommended LOQs (red line at 0.01 µg/kg product) in Olive Oil (2601-OL)

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

$\sigma_{p_{rel}}$: relative fitness-for-purpose-based "standard deviation for proficiency assessment"

For individual PBDE congeners, individual HBCDD diastereomers and PBDE and HBCDD sum parameters, the relative standard deviation for proficiency assessment $\sigma_{p_{rel}}$ is defined as 20 %.

Z-scores for individual congeners / substances and diastereomers are 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:

$ z\text{-score} \leq 2$	<i>satisfactory performance</i>
$2 < z\text{-score} < 3$	<i>questionable performance (warning signal)</i>
$ z\text{-score} \geq 3$	<i>unsatisfactory performance (action signal)</i>

5.1. PBDEs - Participants' z-scores

Table 10: Distribution of participants' z-scores for individual PBDE congeners for Olive oil (2601-OL)

Percentage of participants' results	$ z\text{-score} \leq 2$	$2 < z\text{-score} < 3$	$ z\text{-score} \geq 3$
BDE-28	-	-	-
BDE-47	81%	3%	16%
BDE-49	-	-	-
BDE-99	94%	0%	6%
BDE-100	91%	3%	6%-
BDE-153	97%	0%	3%
BDE-154	90%	3%	7%-
BDE-183	97%	0%	3%
BDE-209	80%	8%	12%

Table 11: Distribution of participants' z-scores for PBDE sum parameters for Olive oil (2601-OL)

Percentage of participants' results	$ z\text{-score} \leq 2$	$2 < z\text{-score} < 3$	$ z\text{-score} \geq 3$
Sum of PBDE without BDE-209 ub	87%	3%	10%
Sum of PBDE without BDE-209 lb	82%	5%	13%
Sum of PBDE including BDE-209 ub	74%	3%	22%
Sum of PBDE including BDE-209 lb	77%	10%	13%

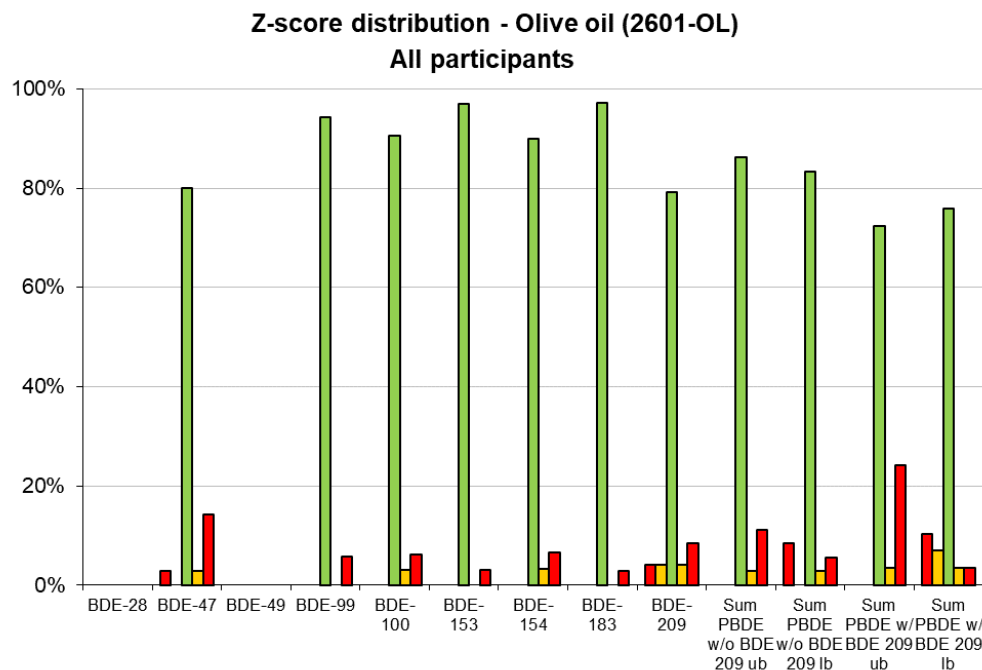


Figure 7: Distribution of participants' z-scores for PBDE congeners / sum parameters for olive oil (2601-OL) [Green bars: $-2 \leq z\text{-score} \leq 2$, orange bars: $-3 < z\text{-score} < -2$, $2 < z\text{-score} < 3$, red bars: $z\text{-score} \leq -3$, $z\text{-score} \geq 3$]

5.2. HBCDDs - Participants' z-scores

HBCDD stereoisomers undergo thermal isomerization at temperatures above 160 °C. With GC elution temperature of these compounds of normally above 160 °C a separation of HBCDD stereoisomers using GC analysis is not possible. Only one unresolved peak is obtained. Additional thermal decomposition of HBCDDs is reported for temperatures above 240 °C. Therefore, in case of applying GC-MS methods for HBCDD analysis determination of total HBCDD (as sum of all originally present HBCDD diastereomers) is possible only. Due to the low numbers of results for total HBCDD the sum of α -, β -, γ -HBCDD (using LC methods) was taken for comparison.

Table 12: Distribution of participants' z-scores for HBCDD for Olive oil (2601-OL)

Percentage of participants' results	$ z\text{-score} \leq 2$	$2 < z\text{-score} < 3$	$ z\text{-score} \geq 3$
(+/-)- α -HBCDD	100%	0%	0%
(+/-)- β -HBCDD	82%	18%	0%
(+/-)- γ -HBCDD	77%	23%	0%
Sum of α -, β -, γ -HBCDD (ub)	90%	0%	10%
Sum of α -, β -, γ -HBCDD (lb)	85%	0%	15%
Total HBCDD	50%	0%	50%

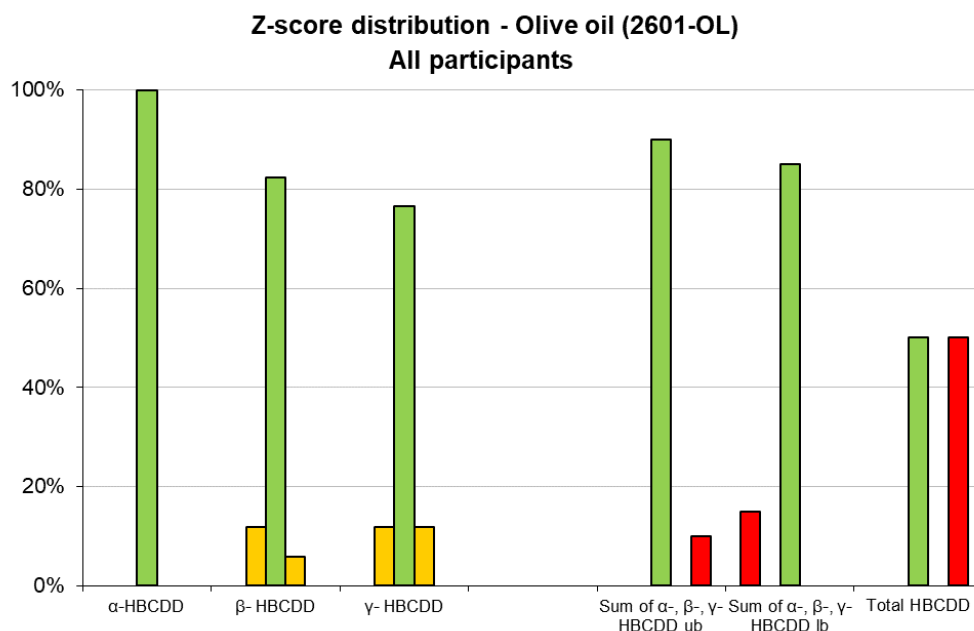


Figure 8: Distribution of participants' z-scores for HBCDD stereoisomers / sum parameters for Olive oil (2601-OL) [Green bars: $-2 \leq z\text{-score} \leq 2$, orange bars: $-3 < z\text{-score} < -2$, $2 < z\text{-score} < 3$, red bars: $z\text{-score} \leq -3$, $z\text{-score} \geq 3$]

6. Participants' feedback

A questionnaire for feedback from participants of this EURL proficiency test was available as online survey between 20 April 2026 and 15 May 2026. 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 (9 % 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)	2
Commercial laboratory	3
Other (e.g. research and development)	0

Table 14: Feedback of participants regarding organization of PT (5 stars meaning "fully", 1 star meaning "not at all")

Organization of PT	5 of 5 stars	4 of 5 stars	3 of 5 stars	2 of 5 stars	1 of 5 stars	No answer
Announcement	80%	20%				
Instructions	60%	30%	10%			
Sample shipment	80%	20%				
Reporting of results	50%	30%	20%			
Preliminary report	80%	20%				

Table 15: Feedback of participants regarding specific aspects of PT (5 stars meaning "fully", 1 star meaning "not at all")

Specific aspects of PT	5 of 5 stars	4 of 5 stars	3 of 5 stars	2 of 5 stars	1 of 5 stars	No answer
Provision of information	70%	20%	10%			
Acceptable time frame	70%	30%				
Reporting of results on PT platform	40%	30%	20%		10%	
Evaluation of preliminary results	50%	40%			10%	
Choice of matrix	50%	50%				
Level of contamination	30%	40%	10%	10%	10%	

Additional comments:

- *The congener profile should reflect real-life samples to higher extent.*
- *PCB 169 too high*
- *There are some textboxes missing in results reporting page: there is no place to note things like "below reporting limit" or "over the validation range".*
- *Worked overall well, would like to be able to use the method parameters we put in this time to use in the next PT-round (if we use the same method). Maybe one can create methods for the lab and then choose them in the exercise you participate in. Other than that, we missed a field to make comments on the different pages. For example, we would have liked to comment that we did not find an action level for the matrix, we did not just skip that question.*
- *The new PT platform is very user friendly and simplifies working with data.*
- *The new PT platform is very understandable and easy to use.*

7. Quality control

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

8. Results of participants

An overview of the PBDE and HBCDD results for the PT test sample Olive oil (2601-OL) are given in the following annexes. Laboratories are coded according to the laboratory codes sent after registration.

9. References

- [1] ISO 13528:2022, Statistical methods for use in proficiency testing by interlaboratory comparisons, International Organization for Standardization
- [2] M. Thompson, S.L.R. Ellison, R. Wood: The International Harmonized Protocol For The Proficiency Testing Of Analytical Chemistry Laboratories, Pure Appl. Chem., Vol. 78, No. 1, pp. 145-196, 2006.
- [3] EURL for halogenated POPs in feed and food (2021): Guidance Document on the Determination of Organobromine Contaminants - Analytical Parameters in food and feed, version 1.2 of 10 May 2023. Available online under <https://eurl-pops.eu/news/guidance-document-bcon-parameters/guidance-document-bcon-parameters-2>

10. Annex

Olive oil – 2601-OL	
Annex 1	Assigned values – PBDEs
Annex 2	Participants' results – Tables – PBDEs
Annex 3	Participants' z-scores – Tables – PBDEs
Annex 4	Participants' z-scores – Charts – PBDEs
Annex 5	Test for sufficient homogeneity and stability – PBDEs
Annex 6	Participants' methods – PBDEs
Annex 7	Assigned values – HBCDDs
Annex 8	Participants' results – Tables – HBCDDs
Annex 9	Participants' z-scores – Tables – HBCDDs
Annex 10	Participants' z-scores – Charts – HBCDDs
Annex 11	Participants' methods – HBCDDs

EURL for halogenated POPs in Feed and Food
c/o State Institute for Chemical and Veterinary Analysis of Food Freiburg



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EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Olive Oil 2026 [EURL-PT-DPB_2601-OL]

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

04 August 2026

Annex 1: Assigned values of PBDEs

Test sample - Olive oil (2601-OL)

Assigned values of sum parameters and individual congeners

Estimation of the assigned value as the consensus of participants' results

Assigned value = Hampel estimate



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

Olive oil (2601-OL)

PBDE - Assigned values

Analyte		Result µg/kg product	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 8 PBDE	without BDE-209 (ub)		0.315	0.0429	0.0092	34	0.313
Sum of 8 PBDE	without BDE-209 (lb)		0.304	0.0426	0.0091	34	0.300
Sum of 9 PBDE	including BDE-209 (ub)		0.498	0.129	0.030	28	0.528
Sum of 9 PBDE	including BDE-209 (lb)		0.435	0.121	0.029	28	0.459
BDE-28	2,2',4-tribromodiphenyl ether						0.00415
BDE-47	2,2',4,4'-tetrabromodiphenyl ether		0.0747	0.0152	0.0031	37	0.0761
BDE-49	2,2',4,5'-tetrabromodiphenyl ether						0.00390
BDE-99	2,2',4,4',5-pentabromodiphenyl ether		0.0927	0.0131	0.0027	37	0.0927
BDE-100	2,2',4,4',6-pentabromodiphenyl ether		0.0204	0.00360	0.00074	37	0.0200
BDE-153	2,2',4,4',5,5'-hexabromodiphenyl ether		0.0226	0.00408	0.00084	37	0.0230
BDE-154	2,2',4,4',5,6'-hexabromodiphenyl ether		0.0104	0.00242	0.00050	37	0.0109
BDE-183	2,2',3,4,4',5',6'-heptabromodiphenyl ether		0.0830	0.0116	0.0024	37	0.0851
BDE-209	2,2',3,3',4,4',5,5',6,6'-decabromodiphenyl ether		0.183	0.108	0.024	31	0.199



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

04 August 2026

Annex 2: Participants' results of PBDEs

Test sample - Olive oil (2601-OL)

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

Olive oil (2601-OL)

PBDE - Results

LC	Data set	Sample	Result µg/kg product	Sum of 8 PBDE without BDE-209 (ub)	Sum of 8 PBDE without BDE-209 (lb)	Sum of 9 PBDE including BDE-209 (ub)	Sum of 9 PBDE including BDE-209 (lb)	2,2',4- tribromodiphenyl ether BDE-28	2,2',4,4'- tetrabromodiphenyl ether BDE-47	2,2',4,5'- tetrabromodiphenyl ether BDE-49	2,2',4,4',5- pentabromodiphenyl ether BDE-99	2,2',4,4',6- pentabromodiphenyl ether BDE-100	2,2',4,4',5,5'- hexabromodiphenyl ether BDE-153	2,2',4,4',5,6'- hexabromodiphenyl ether BDE-154	2,2',3,4,4',5',6'- heptabromodiphenyl ether BDE-183	2,2',3,3',4,4',5,5',6,6'- decabromodiphenyl ether BDE-209
1	A	2601-OL		0.311	0.308	0.486	0.483	<0.003	0.0723	0.0025	0.0979	0.0215	0.02	0.011	0.0832	0.174
2		2601-OL														
3	A	2601-OL		0.307	0.298	0.534	0.524	<0.009	0.072	<0.01	0.089	0.019	0.021	0.009	0.088	0.226
4		2601-OL														
5		2601-OL														
6		2601-OL														
7	A	2601-OL		0.299	0.299	0.553	0.553	0.002	0.084	0.0032	0.0735	0.0172	0.021	0.00983	0.0878	0.254
8		2601-OL														
9	A	2601-OL		0.348	0.328	0.552	0.532	<0.01	0.0765	<0.01	0.1	0.0204	0.0215	0.0116	0.0973	0.181
10	A	2601-OL		0.249	0.249	0.393	0.393	<0.01	0.0801	<0.01	0.0818	0.0144	0.0157	<0.01	0.0574	0.144
11		2601-OL														
12	A	2601-OL		0.317	0.308	0.447	0.438	<0.0059	0.076	<0.0039	0.0898	0.194	0.0235	0.0113	0.0875	0.13
13		2601-OL														
14	A	2601-OL		0.316	0.316	0.381	0.381	0.00236	0.0798	0.00187	0.095	0.0203	0.0211	0.0109	0.0848	0.0652
15	A	2601-OL		0.287	0.287	0.438	0.438	0.002	0.07	0.003	0.088	0.02	0.02	0.01	0.078	0.15
16	A	2601-OL		0.352	0.352	0.476	0.476	0.00197	0.00843		0.114	0.0272	0.0247	0.012	0.0883	0.124
17		2601-OL														
18	A	2601-OL		0.295	0.295	0.454	0.454	0.00169	0.0713	0.00216	0.0885	0.0196	0.0221	0.0099	0.0795	0.159
19		2601-OL														
20		2601-OL														
21		2601-OL														
22		2601-OL														
23		2601-OL														
24	A	2601-OL		0.3	0.3	0.57	0.57	<0.0067	0.069	<0.0072	0.097	0.019	0.022	0.01	0.079	0.27
25		2601-OL														
26		2601-OL														
27	A	2601-OL		0.27	0.27	0.43	0.43	0.003	0.067	0.002	0.083	0.019	0.019	0.012	0.062	0.16
28	A	2601-OL		0.351	0.251	1.35	0.251	<0.01	0.0739	<0.01	0.0922	<0.02	<0.03	<0.03	0.0851	<1
29		2601-OL														
30		2601-OL														
31		2601-OL														
32	A	2601-OL		0.312	0.312	0.51	0.51	0.0011	0.075	0.002	0.094	0.02	0.021	0.0099	0.089	0.198
33		2601-OL														
34		2601-OL														
35	A	2601-OL		0.278	0.274	0.397	0.393	<0.0028	0.0663	<0.0016	0.0821	0.0162	0.0174	0.0083	0.0833	0.119
36		2601-OL														
37	A	2601-OL		0.319	0.319	4.28	4.28	0.00117	0.0845		0.0806	0.019	0.031	0.00813	0.0948	3.96
38	A	2601-OL		0.31	0.3	0.8	0.3	<0.0063	0.076	<0.0063	0.095	0.02	0.023	0.01	0.076	<0.5
39		2601-OL														
40		2601-OL														
41		2601-OL														
42	A	2601-OL		0.331	0.331	0.55	0.55	0.0027	0.0809	0.0023	0.0927	0.0242	0.0282	0.0121	0.0879	0.219
43		2601-OL														
44	A	2601-OL		0.307	0.307			0.00308	0.0747	0.00251	0.0911	0.0195	0.022	0.0113	0.0829	
45		2601-OL														
46		2601-OL														
47		2601-OL														
48		2601-OL														
49		2601-OL														
50		2601-OL														
51		2601-OL														
52		2601-OL														
53	A	2601-OL		5	0	5	0	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1
54		2601-OL														
55		2601-OL														
56	A	2601-OL		0.332	0.332	0.531	0.531	<0.002	0.08	0.0023	0.088	0.019	0.023	0.012	0.108	0.199
57		2601-OL														
58	A	2601-OL		0.661	0.611			<0.025	0.325	0.036	0.117	0.025	0.024	<0.025	0.085	
59	A	2601-OL		0.313	0.313	0.525	0.525	0.0018	0.0763		0.0989	0.023	0.0228	0.0107	0.0793	0.212
60		2601-OL														
61		2601-OL														
62		2601-OL														
63	A	2601-OL		0.31	0.3	0.48	0.48	<0.0045	0.081	<0.0025	0.081	0.021	0.023	0.01	0.087	0.17
64		2601-OL														
65		2601-OL														
66		2601-OL														
67	A	2601-OL						1.77	51.6	0.61	43.5	13.9	11.2	5.68	36.9	65.3
68	A	2601-OL		0.312	0.31	0.541	0.539	0.00173	0.0761	<0.002	0.0865	0.0197	0.0236	0.0108	0.0912	0.23
69	A	2601-OL		0.27	0.27	0.36	0.36	0.0015	0.059		0.087	0.019	0.019	0.0096	0.077	0.084

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Olive Oil 2026 [EURL-PT-DPB_2601-OL]

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

Olive oil (2601-OL)
PBDE - Results

LC	Data set	Sample	Result µg/kg product	Sum of 8 PBDE without BDE-209 (ub)	Sum of 8 PBDE without BDE-209 (lb)	Sum of 9 PBDE including BDE-209 (ub)	Sum of 9 PBDE including BDE-209 (lb)	2,2',4- tribromodiphenyl ether BDE-28	2,2',4,4'- tetrabromodiphenyl ether BDE-47	2,2',4,5'- tetrabromodiphenyl ether BDE-49	2,2',4,4',5- pentabromodiphenyl ether BDE-99	2,2',4,4',6- pentabromodiphenyl ether BDE-100	2,2',4,4',5,5'- hexabromodiphenyl ether BDE-153	2,2',4,4',5,6'- hexabromodiphenyl ether BDE-154	2,2',3,4,4',5',6'- heptabromodiphenyl ether BDE-183	2,2',3,3',4,4',5,5',6,6'- decabromodiphenyl ether BDE-209
70		2601-OL														
71		2601-OL														
72		2601-OL														
73		2601-OL														
74		2601-OL														
75	A	2601-OL		0.453	0.443			<0.005	0.136	<0.005	0.148	0.031	0.024	0.015	0.089	
76		2601-OL														
77		2601-OL														
78	A	2601-OL		0.29	0.29			0.0014	0.065	0.0016	0.092	0.02	0.02	0.0095	0.086	
79		2601-OL														
80		2601-OL														
81		2601-OL														
82		2601-OL														
83	A	2601-OL						<0.005	0.045		0.079	<0.005	0.016	0.007	0.061	0.146
84		2601-OL														
85		2601-OL														
86		2601-OL														
87		2601-OL														
88	A	2601-OL		0.352	0.254	1.33	0.254	<0.0098	0.072	<0.0098	0.0935	<0.0196	<0.0294	<0.0294	0.0881	<0.98
89		2601-OL														
90		2601-OL														
91		2601-OL														
92		2601-OL														
93	A	2601-OL		0.35	0.35			0.0028	0.111	0.0027	0.1	0.022	0.023	0.0094	0.0786	
94		2601-OL														
95		2601-OL														
96	A	2601-OL		0.359	0.359			0.00415	0.129		0.108	0.0283	0.0253	0.0124	0.0519	
97		2601-OL														
98		2601-OL														
99	A	2601-OL		0.286	0.282	0.457	0.453	<0.004	0.0653	0.004	0.0859	0.0204	0.0208	0.00861	0.0767	0.171
100		2601-OL														
101		2601-OL														
102	A	2601-OL		0.435	0.135	0.608	0.308	<0.05	0.083	<0.05	<0.05	<0.05	<0.05	<0.05	0.052	<0.25
103		2601-OL														
104	A	2601-OL		0.44	0.06	1.1	0.06	<0.015	<0.15	<0.02	<0.098	<0.039	<0.029	<0.029	0.06	<0.69
105	A	2601-OL						<0.124	<0.248	<0.248	<0.124	<0.124	<0.124	<0.124	<0.124	<2.48
106		2601-OL														
107	A	2601-OL		0.276	0.276	0.463	0.463	0.0165	0.0521	0.0132	0.0753	0.0184	0.023	<0.01	0.0695	0.187
108	A	2601-OL		0.52	0	0.77	0	<0.01	<0.13	<0.02	<0.13	<0.05	<0.04	<0.03	<0.11	<0.25
109		2601-OL														
Additional sets																
58	B	2601-OL		0.632	0.622	0.872	0.622	<0.01	0.325	0.036	0.117	0.025	0.024	0.011	0.085	<0.25
78	B	2601-OL		0.3	0.3			0.0016	0.072	0.0016	0.093	0.02	0.019	0.097	0.084	
Modification																
12*		2601-OL						<0.0059	0.076	<0.0039	0.0898	0.0194	0.0235	0.0113	0.0875	0.13
16*		2601-OL						0.00197	0.0843		0.114	0.0272	0.0247	0.012	0.0883	0.124
83*		2601-OL						<0.005	0.045		0.079	<0.02	0.016	0.007	0.061	0.146

Olive oil (2601-OL)
PBDE - Measurement uncertainty

LC	Data set	Sample		Measurement uncertainty [%]								
				BDE-28	BDE-47	BDE-49	BDE-99	BDE-100	BDE-153	BDE-154	BDE-183	BDE-209
1	A	2601-OL		25	25	25	25	25	30	25	25	50
2		2601-OL										
3	A	2601-OL		39	36	15	38	16	23	40	14	32
4		2601-OL										
5		2601-OL										
6		2601-OL										
7	A	2601-OL		28	41	34	34	27	27	28	36	40
8		2601-OL										
9	A	2601-OL		35	30	45	30	30	30	30	30	45
10	A	2601-OL										
11		2601-OL										
12	A	2601-OL			50		50	50	50	50	50	30
13		2601-OL										
14	A	2601-OL		15.3	20.3	20.3	17.5	19.4	20.2	23.8	9.68	31.4
15	A	2601-OL		20	20	20	20	20	20	20	20	20
16	A	2601-OL		16	13		12	17	19	16	21	17
17		2601-OL										
18	A	2601-OL										
19		2601-OL										
20		2601-OL										
21		2601-OL										
22		2601-OL										
23		2601-OL										
24	A	2601-OL		20	20	20	20	20	20	20	20	70
25		2601-OL										
26		2601-OL										
27	A	2601-OL										
28	A	2601-OL		30	30	30	30	30	30	30	30	30
29		2601-OL										
30		2601-OL										
31		2601-OL										
32	A	2601-OL		30	30	50	30	30	30	30	50	50
33		2601-OL										
34		2601-OL										
35	A	2601-OL		30	30	30	30	30	30	30	30	30
36		2601-OL										
37	A	2601-OL		30	30		30	30	30	30	30	30
38	A	2601-OL		30	30	60	30	30	30	30	30	30
39		2601-OL										
40		2601-OL										
41		2601-OL										
42	A	2601-OL		25	35	35	30	25	25	25	40	25
43		2601-OL										
44	A	2601-OL		30	30	30	30	30	30	30	30	
45		2601-OL										
46		2601-OL										
47		2601-OL										
48		2601-OL										
49		2601-OL										
50		2601-OL										
51		2601-OL										
52		2601-OL										
53	A	2601-OL		35	35	35	35	35	35	35	40	45
54		2601-OL										
55		2601-OL										
56	A	2601-OL		25	25	25	25	25	25	25	25	25
57		2601-OL										
58	A	2601-OL		59	42	59	42	59	59	59	59	
59	A	2601-OL		25	25		25	25	25	25	25	25
60		2601-OL										
61		2601-OL										
62		2601-OL										
63	A	2601-OL		27.9	25.5	41.8	27.5	26.8	25.1	29.9	20.9	19.6
64		2601-OL										
65		2601-OL										
66		2601-OL										
67	A	2601-OL		40	40	40	40	40	40	40	40	40
68	A	2601-OL		47	26		28	23	32	24	23	45
69	A	2601-OL										



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Olive oil (2601-OL)
PBDE - Measurement uncertainty

LC	Data set	Sample		Measurement uncertainty [%]								
				BDE-28	BDE-47	BDE-49	BDE-99	BDE-100	BDE-153	BDE-154	BDE-183	BDE-209
70		2601-OL										
71		2601-OL										
72		2601-OL										
73		2601-OL										
74		2601-OL										
75	A	2601-OL		30	30	30	30	30	30	30	30	
76		2601-OL										
77		2601-OL										
78	A	2601-OL		20	20	20	20	20	20	20	20	
79		2601-OL										
80		2601-OL										
81		2601-OL										
82		2601-OL										
83	A	2601-OL		35	25		40	40	40	40	25	40
84		2601-OL										
85		2601-OL										
86		2601-OL										
87		2601-OL										
88	A	2601-OL		30	30	30	30	30	30	30	30	30
89		2601-OL										
90		2601-OL										
91		2601-OL										
92		2601-OL										
93	A	2601-OL										
94		2601-OL										
95		2601-OL										
96	A	2601-OL		24.3	29.5		34.7	24.6	29.7	29.3	62.9	
97		2601-OL										
98		2601-OL										
99	A	2601-OL		40	40	40	40	40	40	40	40	40
100		2601-OL										
101		2601-OL										
102	A	2601-OL		45	45	45	45	45	45	45	45	45
103		2601-OL										
104	A	2601-OL		30	30	30	30	30	30	30	30	50
105	A	2601-OL										
106		2601-OL										
107	A	2601-OL										
108	A	2601-OL		30	30	30	30	30	30	30	30	30
109		2601-OL										
Additional sets												
58	B	2601-OL		59	42	59	42	59	59	59	59	59
78	B	2601-OL		20	20	20	20	20	20	20	20	
Modification												
12*		2601-OL										
16*		2601-OL										
83*		2601-OL										



EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Olive Oil 2026 [EURL-PT-DPB_2601-OL]

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

04 August 2026

Annex 3: Participants' z-scores of PBDEs - Tables

Test sample - Olive oil (2601-OL)

Z-scores of sum parameters and individual results

Calculation of z-score on basis of assigned value

$$z = (x - x_a) / x_a \cdot \sigma_{\text{prel}}$$

x_a : assigned value

x : participant's result

σ_{prel} : relative fitness-for-purpose-based relative standard deviation for proficiency assessment

20%: Evaluated individual PBDE congeners and sum

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

Olive oil (2601-OL)
PBDE- Z-scores

LC	Data set	Sample	Z-score [σ _p = 20 %]	Sum of 8 PBDE without BDE-209 (ub)	Sum of 8 PBDE without BDE-209 (lb)	Sum of 9 PBDE including BDE-209 (ub)	Sum of 9 PBDE including BDE-209 (lb)	Z-score [σ _p = 20 %]	2,2',4'- tribromodiphenyl ether BDE-28	2,2',4,4'- tetrabromodiphenyl ether BDE-47	2,2',4,5'- tetrabromodiphenyl ether BDE-49	2,2',4,4',5'- pentabromodiphenyl ether BDE-99	2,2',4,4',6'- pentabromodiphenyl ether BDE-100	2,2',4,4',5,5'- hexabromodiphenyl ether BDE-153	2,2',4,4',5,6'- hexabromodiphenyl ether BDE-154	2,2',3,4,4',5',6'- heptabromodiphenyl ether BDE-183	2,2',3,3',4,4',5,5',6,6'- decabromodiphenyl ether BDE-209
1	A	2601-OL		-0.1	0.1	-0.1	0.6			-0.2		0.3	0.3	-0.6	0.3	0.0	-0.2
2		2601-OL															
3	A	2601-OL		-0.1	-0.1	0.4	1.0			-0.2		-0.2	-0.3	-0.4	-0.7	0.3	1.2
4		2601-OL															
5		2601-OL															
6		2601-OL															
7	A	2601-OL		-0.3	-0.1	0.6	1.4			0.6		-1.0	-0.8	-0.4	-0.3	0.3	1.9
8		2601-OL															
9	A	2601-OL		0.5	0.4	0.5	1.1			0.1		0.4	0.0	-0.2	0.6	0.9	-0.1
10	A	2601-OL		-1.0	-0.9	-1.1	-0.5			0.4		-0.6	-1.5	-1.5		-1.5	-1.1
11		2601-OL															
12	A	2601-OL		0.0	0.1	-0.5	0.0			0.1		-0.2	42.5	0.2	0.4	0.3	-1.4
13		2601-OL															
14	A	2601-OL		0.0	0.2	-1.2	-0.6			0.3		0.1	0.0	-0.3	0.2	0.1	-3.2
15	A	2601-OL		-0.4	-0.3	-0.6	0.0			-0.3		-0.3	-0.1	-0.6	-0.2	-0.3	-0.9
16	A	2601-OL		0.6	0.8	-0.2	0.5			-4.4		1.1	1.7	0.5	0.8	0.3	-1.6
17		2601-OL															
18	A	2601-OL		-0.3	-0.1	-0.4	0.2			-0.2		-0.2	-0.2	-0.1	-0.2	-0.2	-0.7
19		2601-OL															
20		2601-OL															
21		2601-OL															
22		2601-OL															
23		2601-OL															
24	A	2601-OL		-0.2	-0.1	0.7	1.6			-0.4		0.2	-0.3	-0.1	-0.2	-0.2	2.4
25		2601-OL															
26		2601-OL															
27	A	2601-OL		-0.7	-0.6	-0.7	-0.1			-0.5		-0.5	-0.3	-0.8	0.8	-1.3	-0.6
28	A	2601-OL		0.6	-0.9	8.6	-2.1			-0.1		0.0				0.1	
29		2601-OL															
30		2601-OL															
31		2601-OL															
32	A	2601-OL		0.0	0.1	0.1	0.9			0.0		0.1	-0.1	-0.4	-0.2	0.4	0.4
33		2601-OL															
34		2601-OL															
35	A	2601-OL		-0.6	-0.5	-1.0	-0.5			-0.6		-0.6	-1.0	-1.2	-1.0	0.0	-1.7
36		2601-OL															
37	A	2601-OL		0.1	0.2	38.0	44.2			0.7		-0.7	-0.3	1.9	-1.1	0.7	103.2
38	A	2601-OL		-0.1	-0.1	3.0	-1.6			0.1		0.1	-0.1	0.1	-0.2	-0.4	
39		2601-OL															
40		2601-OL															
41		2601-OL															
42	A	2601-OL		0.3	0.4	0.5	1.3			0.4		0.0	0.9	1.2	0.8	0.3	1.0
43		2601-OL															
44	A	2601-OL		-0.1	0.0					0.0		-0.1	-0.2	-0.1	0.4	0.0	
45		2601-OL															
46		2601-OL															
47		2601-OL															
48		2601-OL															
49		2601-OL															
50		2601-OL															
51		2601-OL															
52		2601-OL															
53	A	2601-OL		74.4	-5.0	45.2	-5.0										
54		2601-OL															
55		2601-OL															
56	A	2601-OL		0.3	0.5	0.3	1.1			0.4		-0.3	-0.3	0.1	0.8	1.5	0.4
57		2601-OL															
58	A	2601-OL		5.5	5.0					16.8		1.3	1.1	0.3		0.1	
59	A	2601-OL		0.0	0.1	0.3	1.0			0.1		0.3	0.6	0.0	0.1	-0.2	0.8
60		2601-OL															
61		2601-OL															
62		2601-OL															
63	A	2601-OL		-0.1	-0.1	-0.2	0.5			0.4		-0.6	0.1	0.1	-0.2	0.2	-0.4
64		2601-OL															
65		2601-OL															
66		2601-OL															
67	A	2601-OL								3448.8		2341.3	3401.9	2472.9	2725.8	2217.9	1779.2
68	A	2601-OL		0.0	0.1	0.4	1.2			0.1		-0.3	-0.2	0.2	0.2	0.5	1.3
69	A	2601-OL		-0.7	-0.6	-1.4	-0.9			-1.1		-0.3	-0.3	-0.8	-0.4	-0.4	-2.7

Olive oil (2601-OL)
PBDE- Z-scores

LC	Data set	Sample	Z-score [σ _p = 20 %]	Sum of 8 PBDE without BDE-209 (ub)	Sum of 8 PBDE without BDE-209 (lb)	Sum of 9 PBDE including BDE-209 (ub)	Sum of 9 PBDE including BDE-209 (lb)	Z-score [σ _p = 20 %]	2,2',4'- tribromodiphenyl ether BDE-28	2,2',4,4'- tetrabromodiphenyl ether BDE-47	2,2',4,5'- tetrabromodiphenyl ether BDE-49	2,2',4,4',5'- pentabromodiphenyl ether BDE-99	2,2',4,4',6'- pentabromodiphenyl ether BDE-100	2,2',4,4',5,5'- hexabromodiphenyl ether BDE-153	2,2',4,4',5,6'- hexabromodiphenyl ether BDE-154	2,2',3,4,4',5',6'- heptabromodiphenyl ether BDE-183	2,2',3,3',4,4',5,5',6,6'- decabromodiphenyl ether BDE-209
70		2601-OL															
71		2601-OL															
72		2601-OL															
73		2601-OL															
74		2601-OL															
75	A	2601-OL		2.2	2.3					4.1		3.0	2.6	0.3	2.2	0.4	
76		2601-OL															
77		2601-OL															
78	A	2601-OL		-0.4	-0.2					-0.6		0.0	-0.1	-0.6	-0.4	0.2	
79		2601-OL															
80		2601-OL															
81		2601-OL															
82		2601-OL															
83	A	2601-OL								-2.0		-0.7		-1.5	-1.6	-1.3	-1.0
84		2601-OL															
85		2601-OL															
86		2601-OL															
87		2601-OL															
88	A	2601-OL		0.6	-0.8	8.4	-2.1			-0.2		0.0				0.3	
89		2601-OL															
90		2601-OL															
91		2601-OL															
92		2601-OL															
93	A	2601-OL		0.6	0.8					2.4		0.4	0.4	0.1	-0.5	-0.3	
94		2601-OL															
95		2601-OL															
96	A	2601-OL		0.7	0.9					3.6		0.8	1.9	0.6	1.0	-1.9	
97		2601-OL															
98		2601-OL															
99	A	2601-OL		-0.5	-0.4	-0.4	0.2			-0.6		-0.4	0.0	-0.4	-0.9	-0.4	-0.3
100		2601-OL															
101		2601-OL															
102	A	2601-OL		1.9	-2.8	1.1	-1.5			0.6						-1.9	
103		2601-OL															
104	A	2601-OL		2.0	-4.0	6.0	-4.3									-1.4	
105	A	2601-OL															
106		2601-OL															
107	A	2601-OL		-0.6	-0.5	-0.4	0.3			-1.5		-0.9	-0.5	0.1		-0.8	0.1
108	A	2601-OL		3.3	-5.0	2.7	-5.0										
109		2601-OL															
Additional sets																	
58	B	2601-OL		5.0	5.2	3.8	2.1			16.8		1.3	1.1	0.3	0.3	0.1	
78	B	2601-OL		-0.2	-0.1					-0.2		0.0	-0.1	-0.8	41.6	0.1	
Modification																	
12*		2601-OL								0.1		-0.2	-0.2	0.2	0.4	0.3	-1.4
16*		2601-OL								0.6		1.1	1.7	0.5	0.8	0.3	-1.6
83*		2601-OL								-2.0		-0.7		-1.5	-1.6	-1.3	-1.0



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Annex 4: Participants' z-scores of PBDEs - Charts

Test sample - Olive oil (2601-OL)

Z-scores of sum parameters and individual results

Calculation of z-score on basis of assigned value

$$z = (x - x_a) / x_a \cdot \sigma_{\text{prel}}$$

x_a : assigned value

x : participant's result

σ_{prel} : relative fitness-for-purpose-based relative standard deviation for proficiency assessment

20%: Evaluated individual PBDE congeners and sum

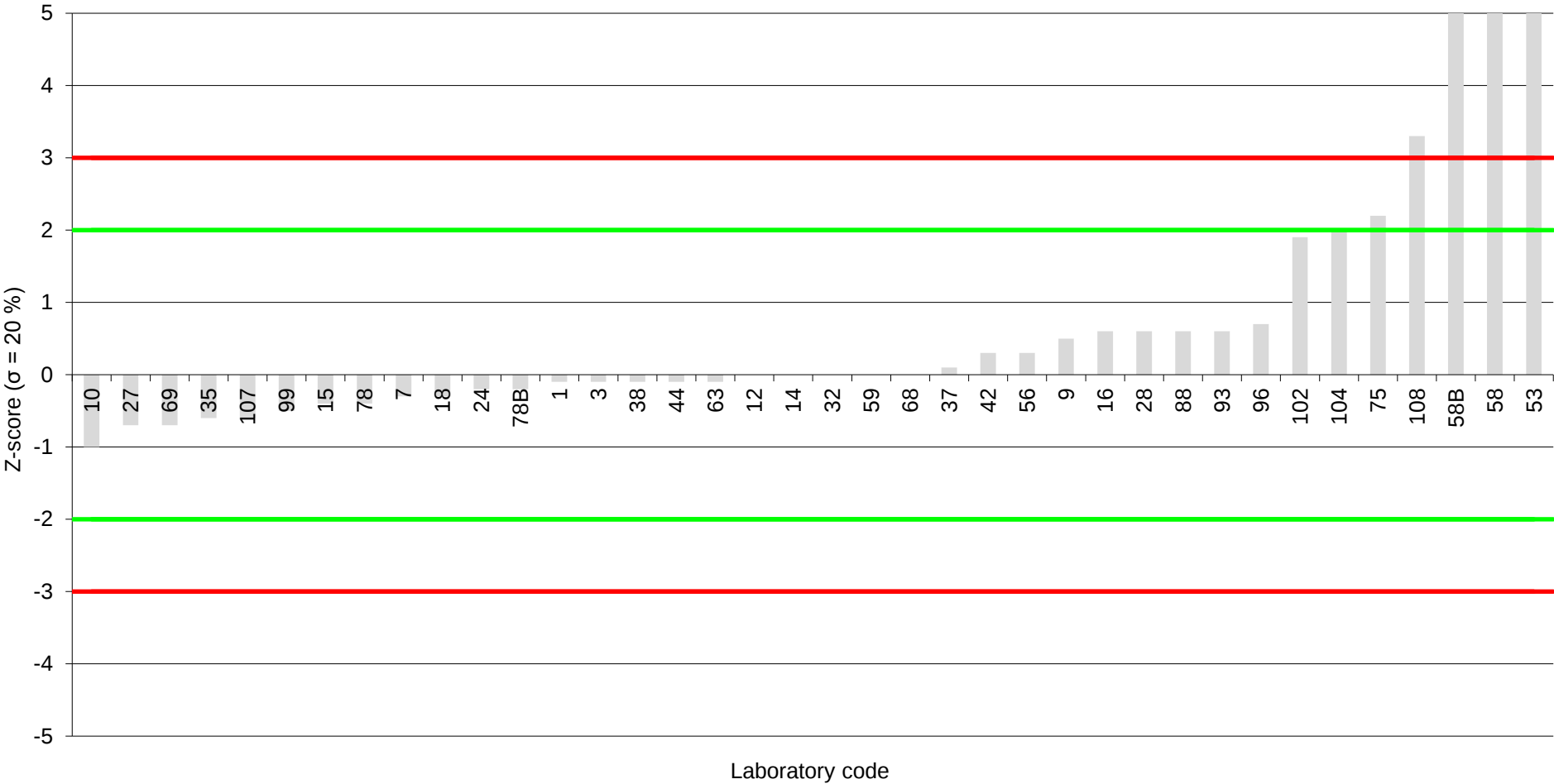
± 2 z-scores: 

± 3 z-scores: 

Olive oil (2601-OL)

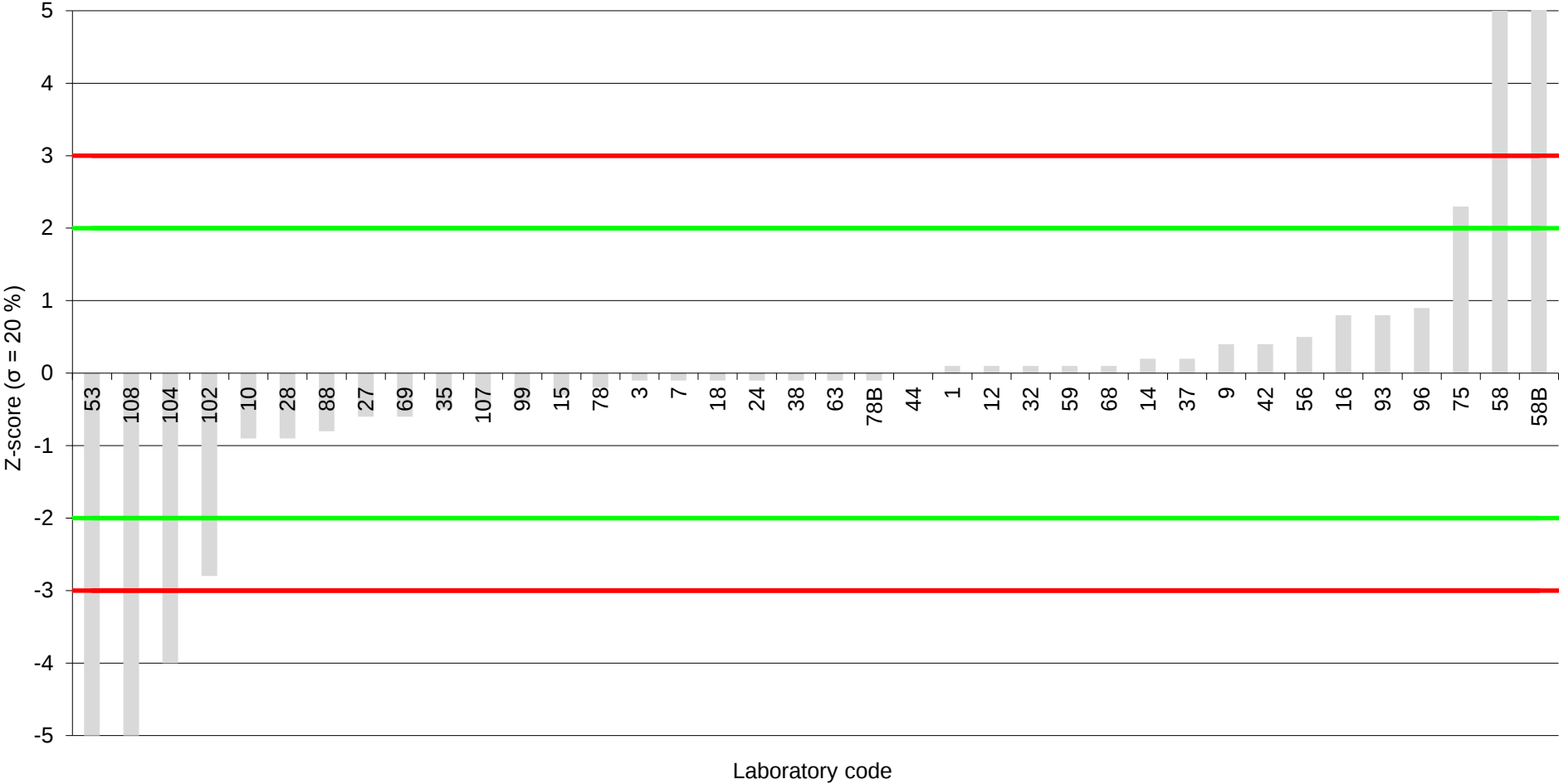
Sum of PBDE without BDE-209 ub

Assigned value: 0.315 µg/kg product



Olive oil (2601-OL)

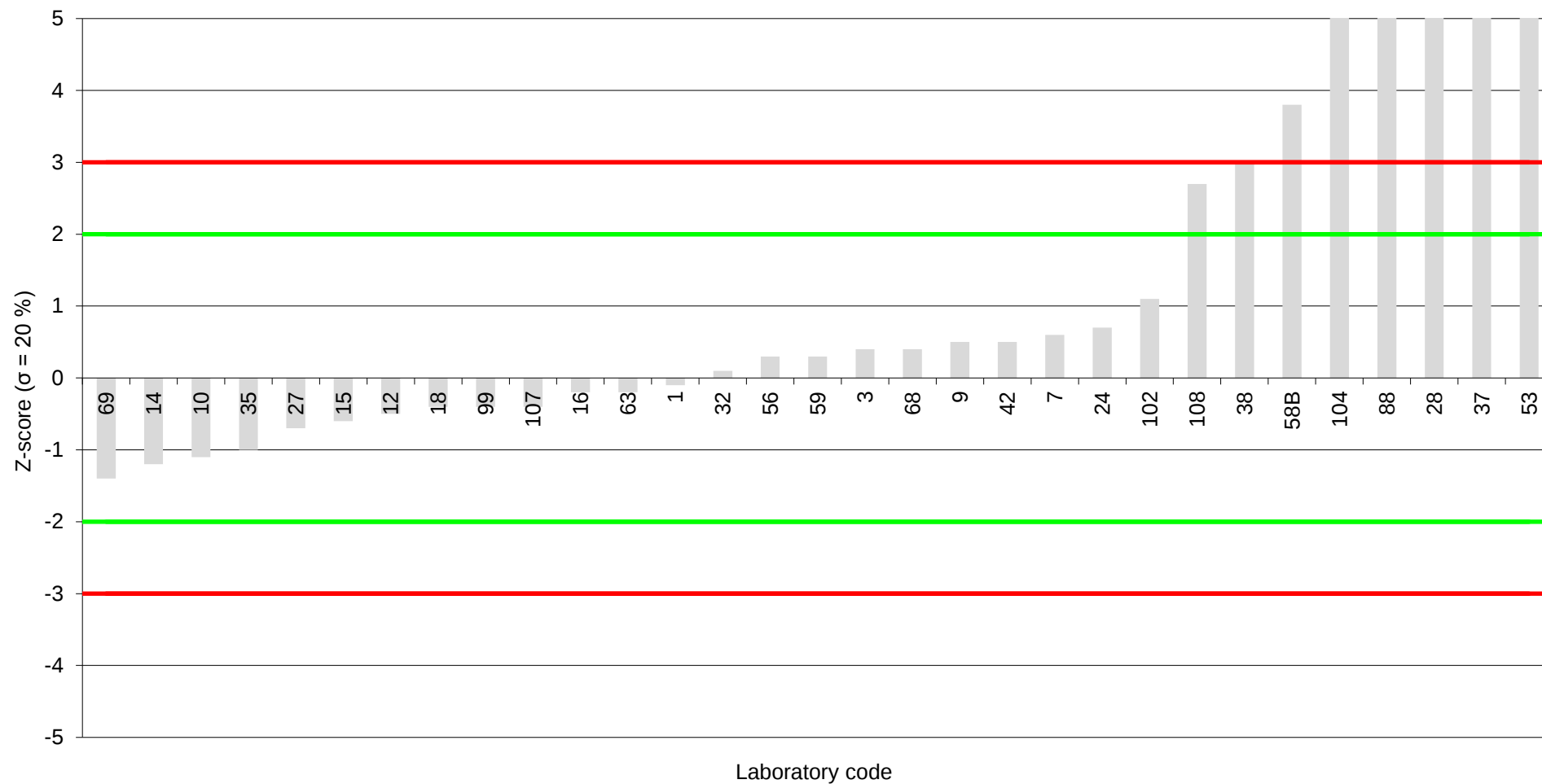
Sum of PBDE without BDE-209 lb
Assigned value: 0.304 µg/kg product



Olive oil (2601-OL)

Sum of PBDE including BDE-209 ub

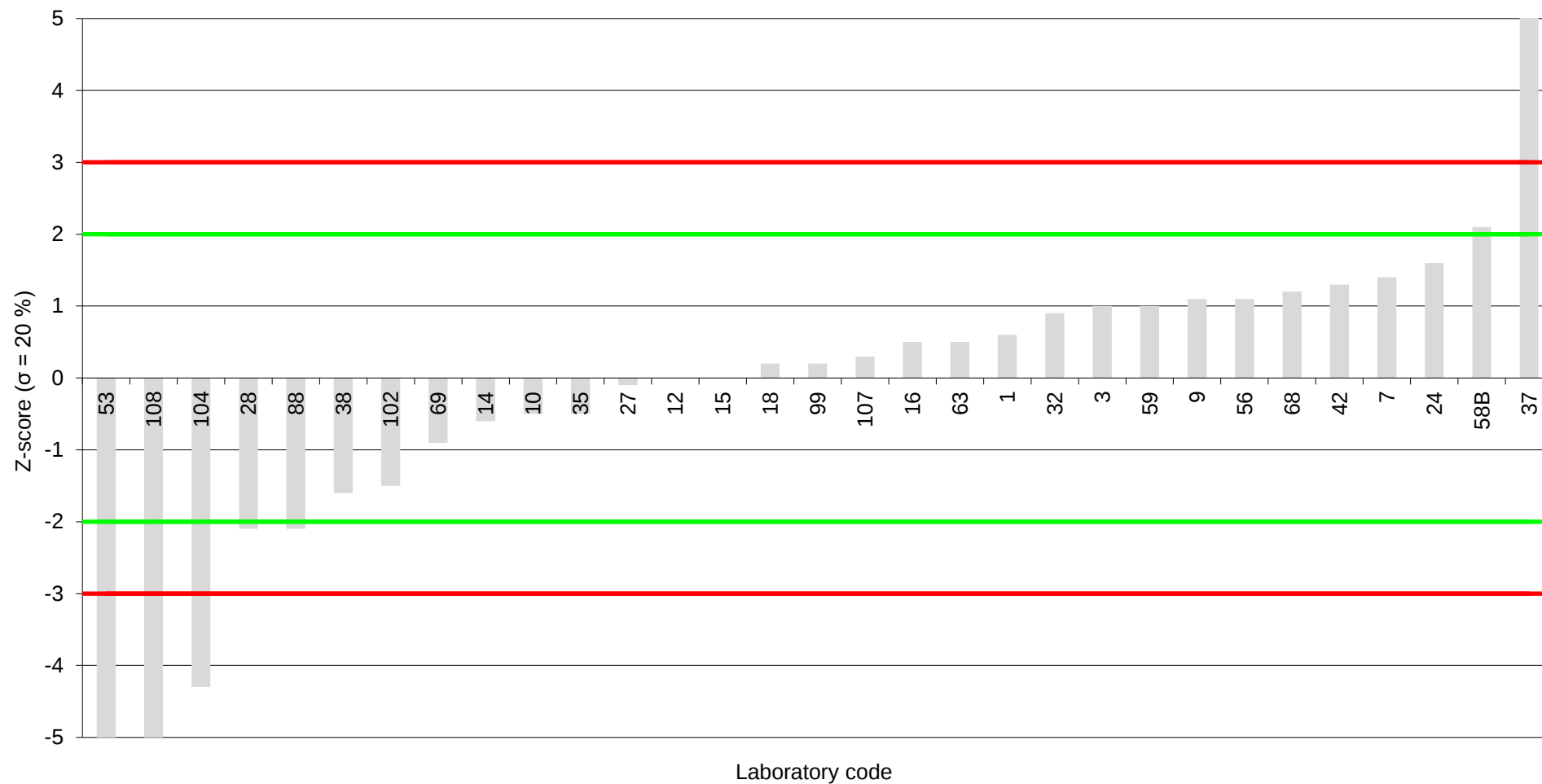
Assigned value: 0.498 µg/kg product



Olive oil (2601-OL)

Sum of PBDE including BDE-209 lb

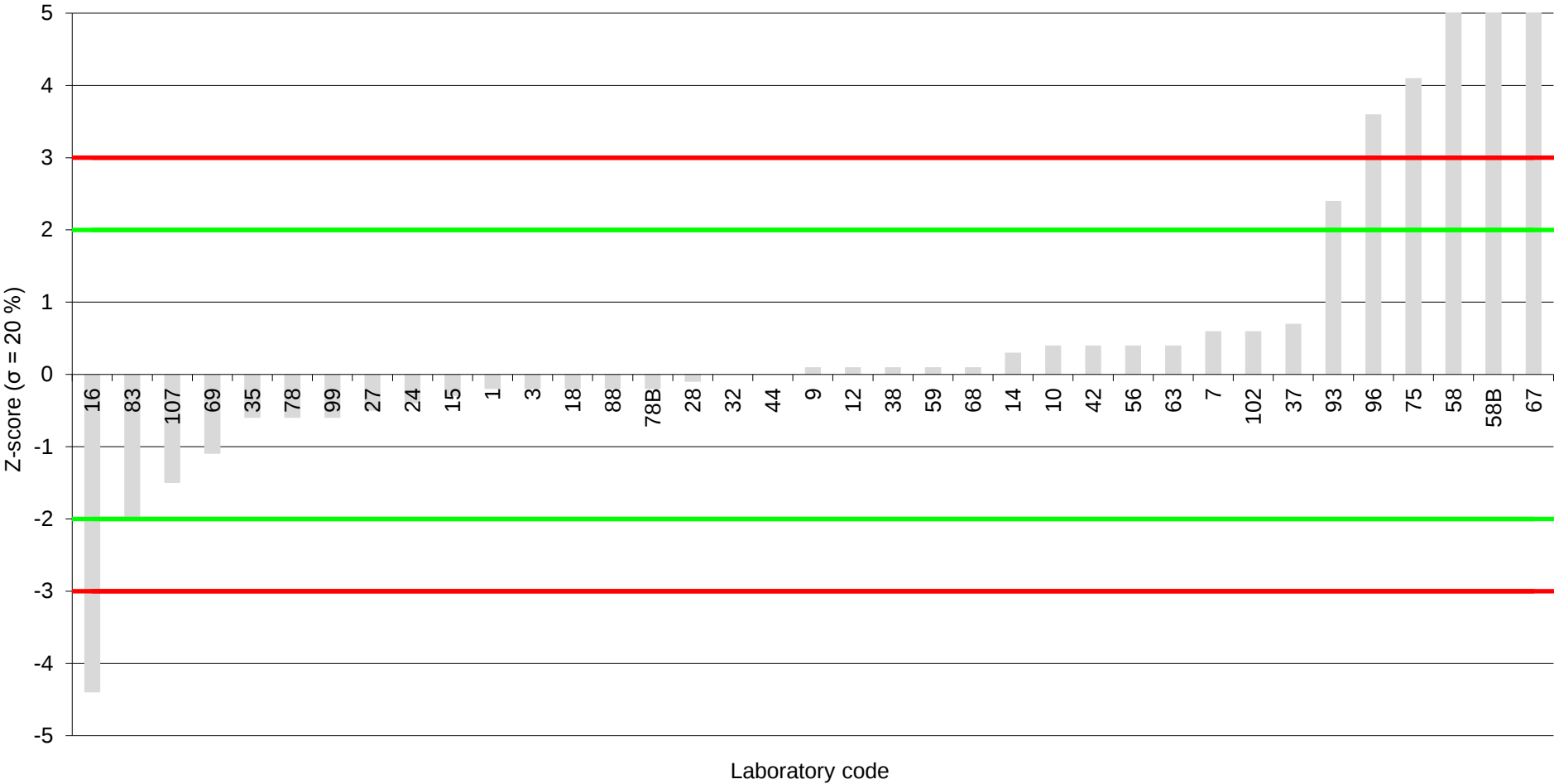
Assigned value: 0.435 µg/kg product



Olive oil (2601-OL)

BDE-47

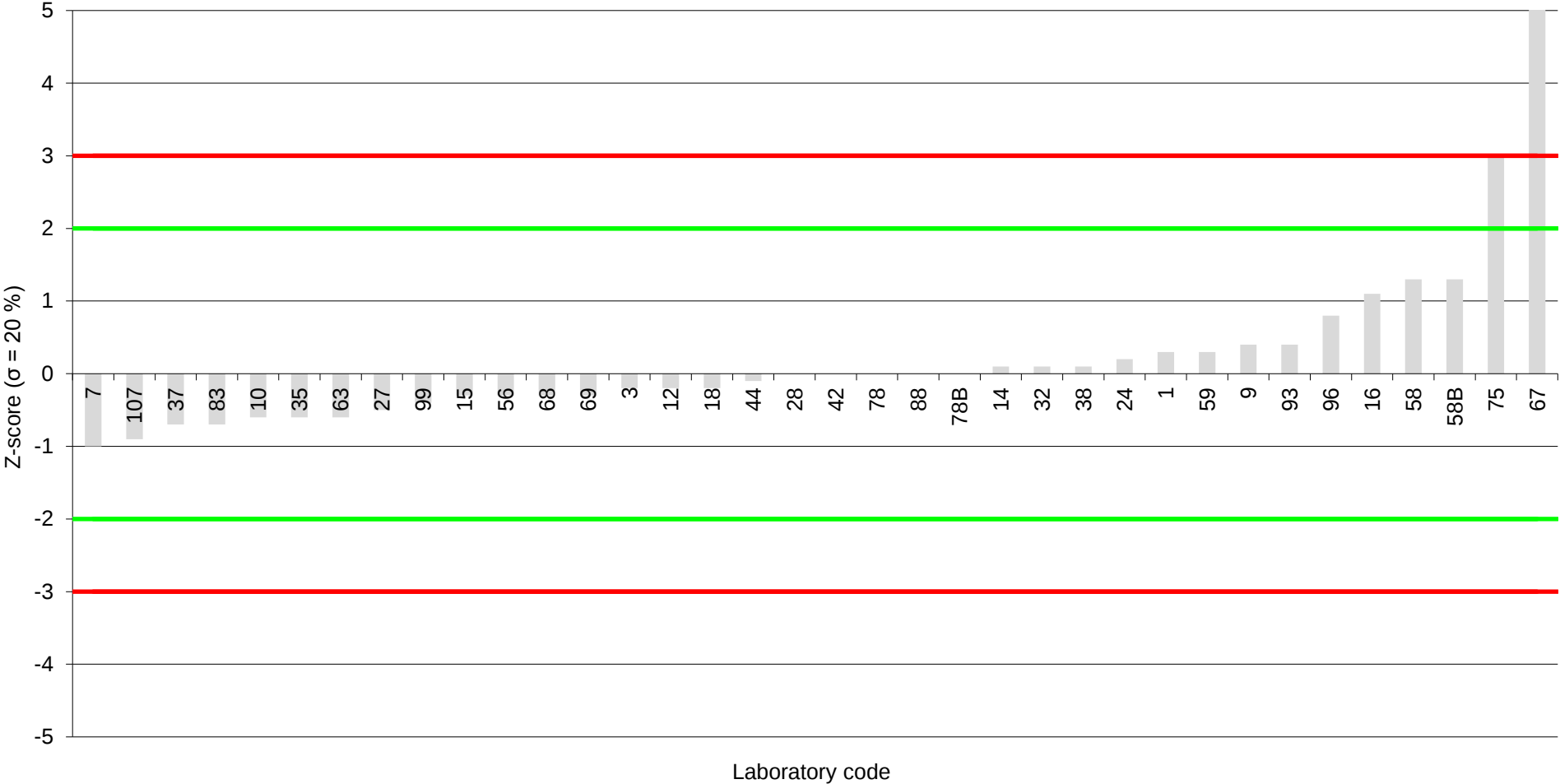
Assigned value: 0.0747 µg/kg product



Olive oil (2601-OL)

BDE-99

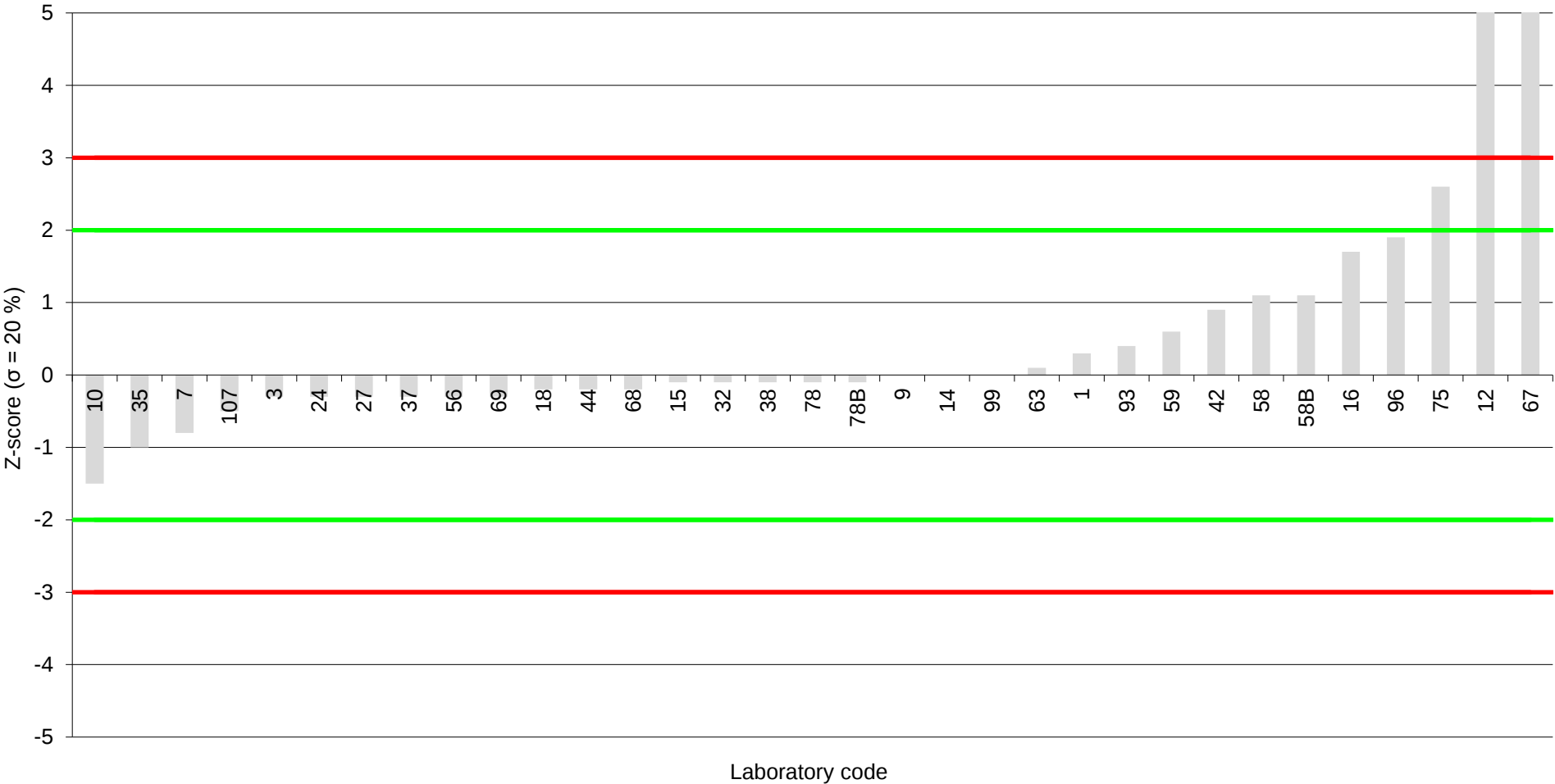
Assigned value: 0.0927 µg/kg product



Olive oil (2601-OL)

BDE-100

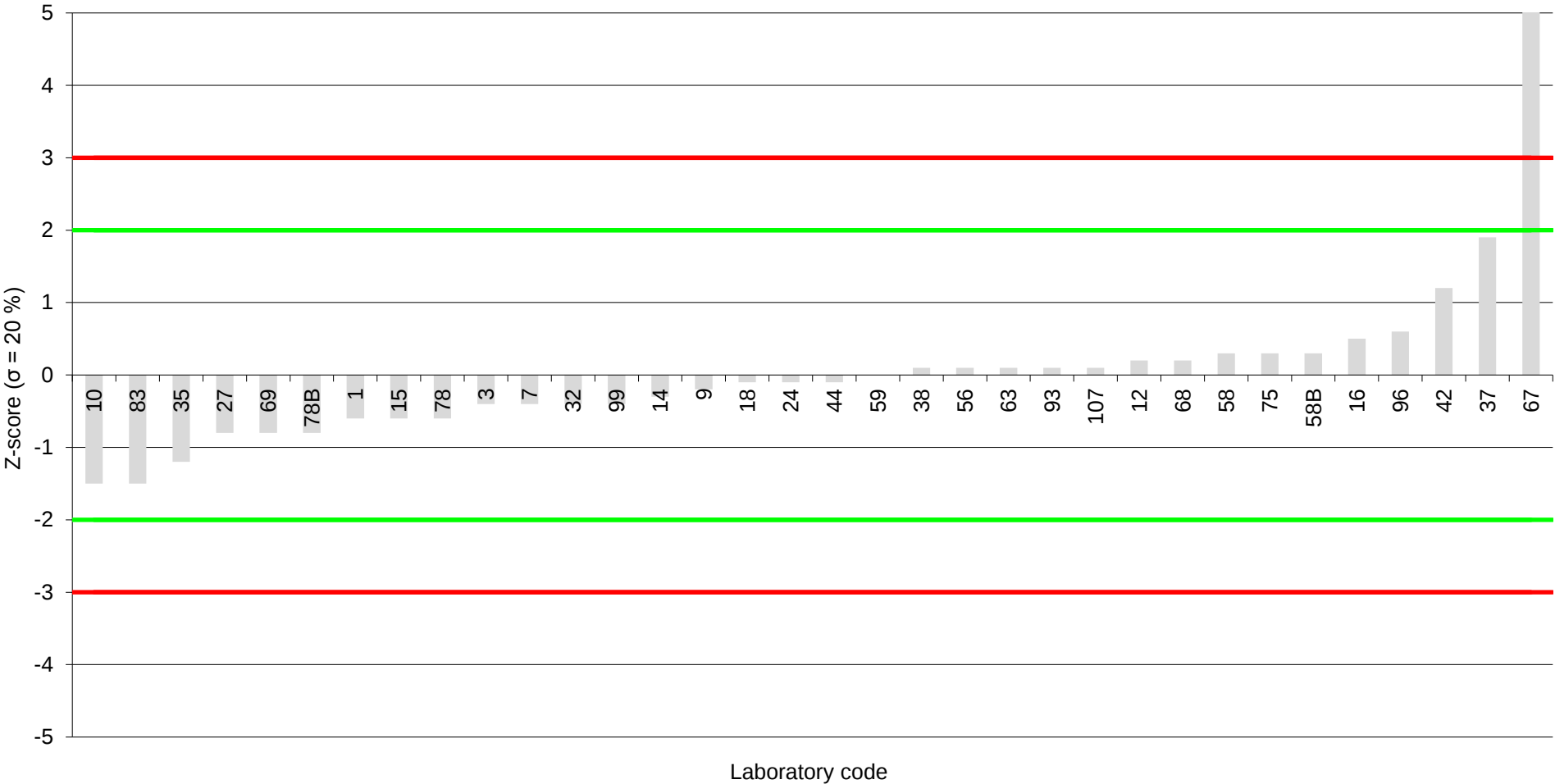
Assigned value: 0.0204 µg/kg product



Olive oil (2601-OL)

BDE-153

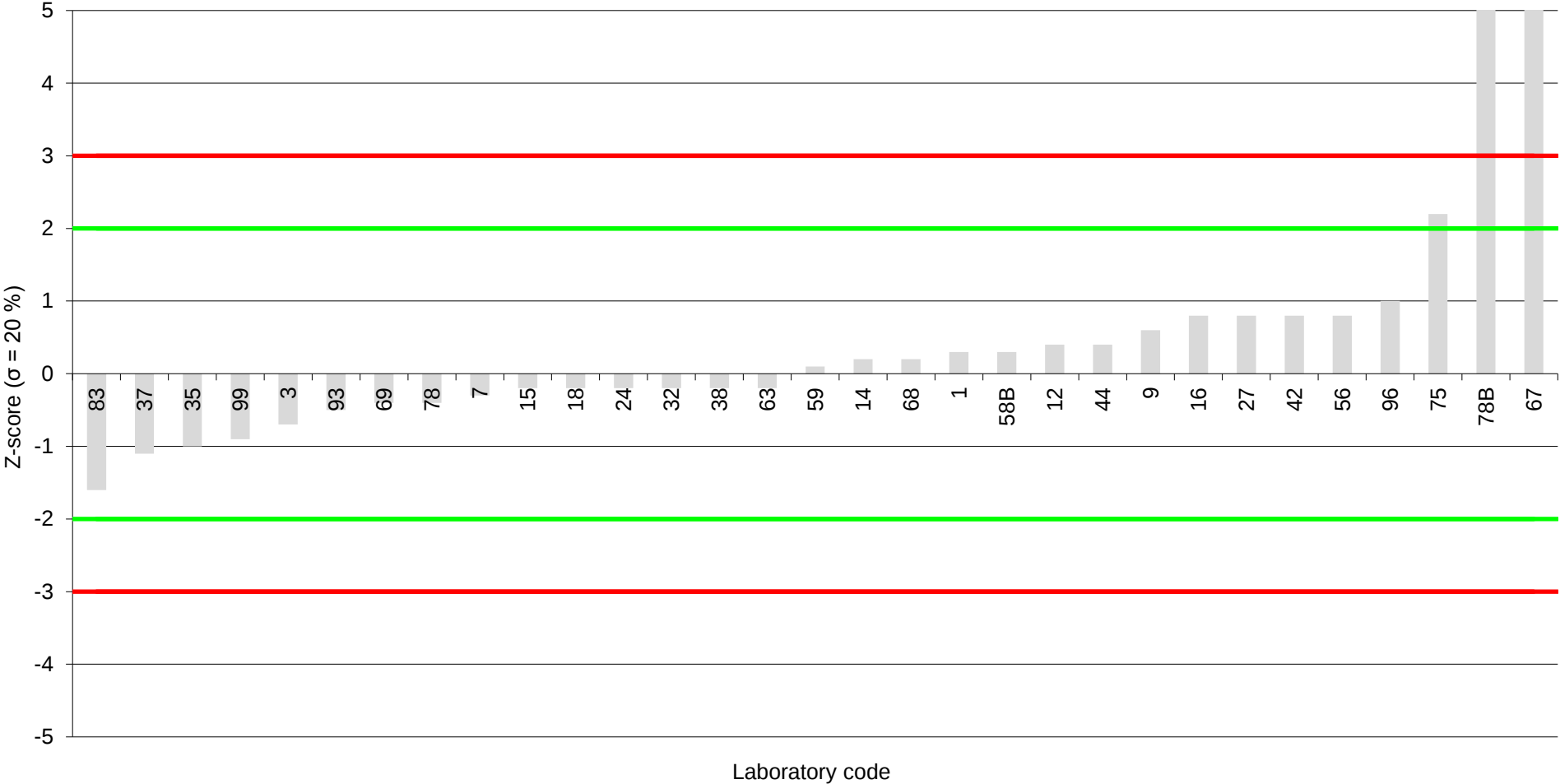
Assigned value: 0.0226 µg/kg product



Olive oil (2601-OL)

BDE-154

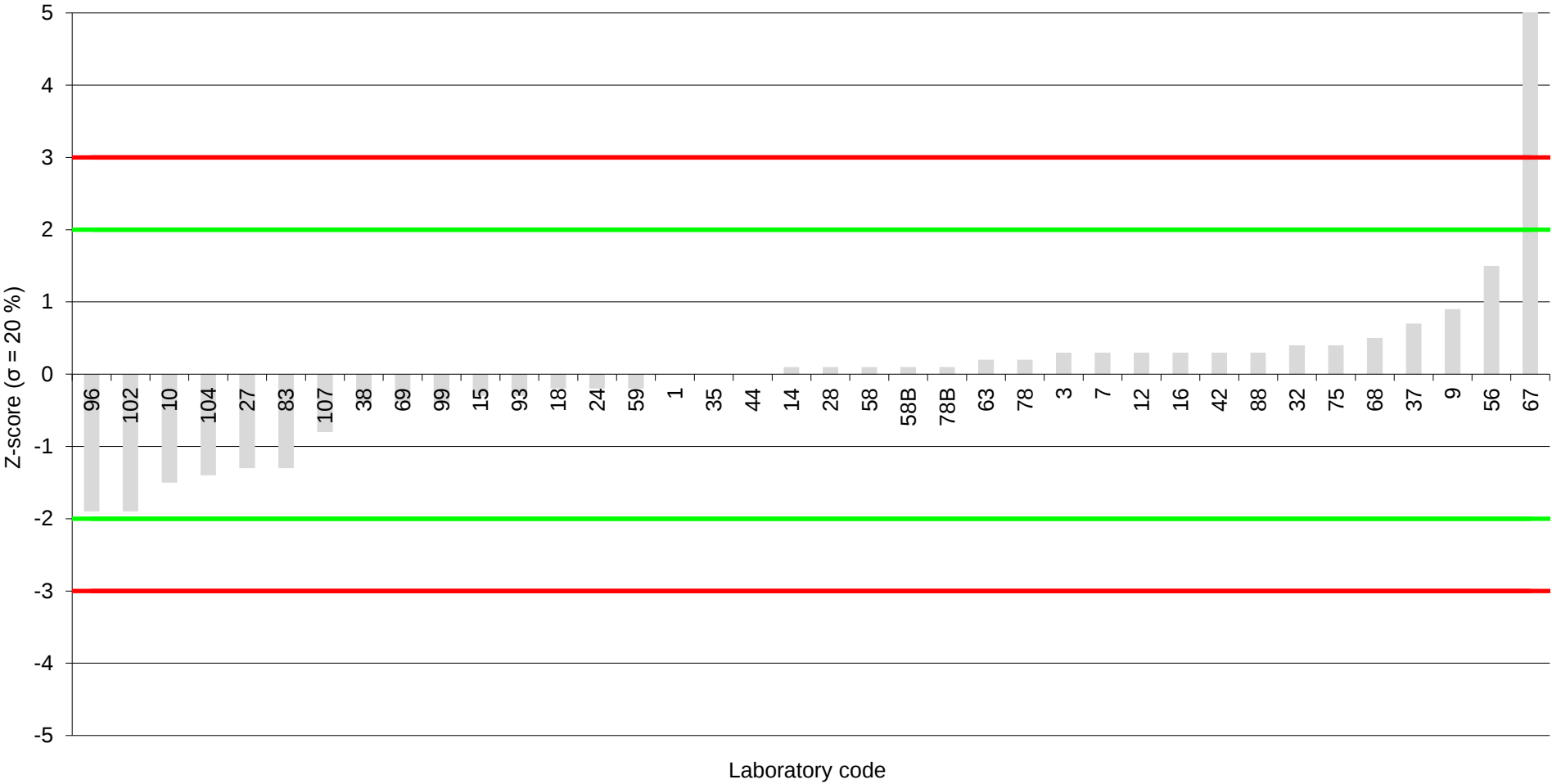
Assigned value: 0.0104 µg/kg product



Olive oil (2601-OL)

BDE-183

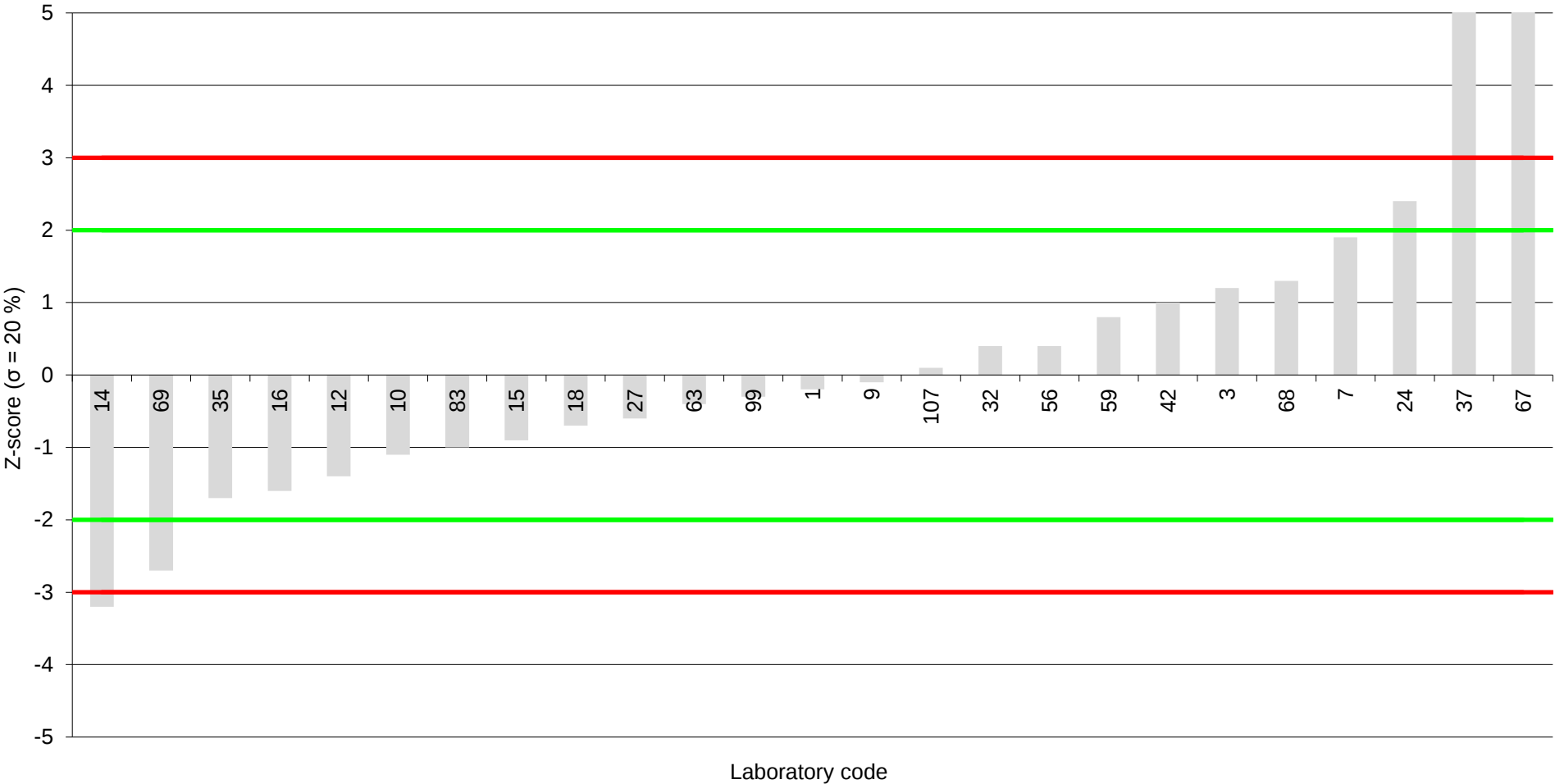
Assigned value: 0.0830 µg/kg product



Olive oil (2601-OL)

BDE-209

Assigned value: 0.183 µg/kg product





EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Olive Oil 2026 [EURL-PT-DPB_2601-OL]

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Annex 5: Test for sufficient homogeneity and stability for PBDEs

Test sample - Olive oil (2601-OL)



EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Olive Oil 2026 [EURL-PT-DPB_2601-OL]

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

Olive Oil (2601-OL)

PBDE - Homogeneity test - Data

Analyte	Result µg/kg product	Mean (n = 10, duplicate analysis)	Median (n = 10, duplicate analysis)	Relative standard deviation [%]
Sum of PBDE without BDE-209 ub		0.261	0.260	2%
Sum of PBDE including BDE-209 ub		0.418	0.417	2%
BDE-28		0.00161	0.00160	4%
BDE-47		0.0633	0.0630	2%
BDE-49		0.00225	0.00225	6%
BDE-99		0.0829	0.0826	3%
BDE-100		0.0178	0.0177	2%
BDE-153		0.0189	0.0188	3%
BDE-154		0.0118	0.0118	2%
BDE-183		0.0621	0.0619	3%
BDE-209		0.157	0.158	3%



EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Olive Oil 2026 [EURL-PT-DPB_2601-OL]

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

Olive Oil (2601-OL)

Selected PBDE congeners - Homogeneity test - Data

Sample	Replicate	Result µg/kg product	BDE-99
35	1		0.0807
	2		0.0852
39	1		0.0834
	2		0.0798
56	1		0.0833
	2		0.0869
57	1		0.0845
	2		0.0873
110	1		0.0833
	2		0.0843
114	1		0.0860
	2		0.0799
141	1		0.0820
	2		0.0819
145	1		0.0835
	2		0.0824
163	1		0.0808
	2		0.0808
169	1		0.0812
	2		0.0819
Cochran's C-test			
C			0.402
C _{critical} (α = 0.05, m = 2, n = 10)			0.602
C _{critical} (α = 0.01, m = 2, n = 10)			0.718
C < C _{critical}			yes
Outliers			no evidence for analytical outliers
Homogeneity test			
General average $\bar{x}$			0.083
Standard deviation of sample averages s_x			0.0016
Within-sample standard deviation s_w			0.0022
Between-sample standard deviation s_s			0.0005
Standard deviation for proficiency assessment σ_{PT}			0.0166
s_s / σ_{PT}			0.000
Test for homogeneity ($s_s \leq 0.3 \sigma_{PT}$)			passed



EURL Proficiency Test on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Olive Oil 2026 [EURL-PT-DPB_2601-OL]

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

Olive Oil (2601-OL)

Selected congeners - Stability test - Data

Sample	Replicate	Result µg/kg wet weight	BDE-99
35	1		0.085
	2		0.080
110	1		0.079
	2		0.082
141	1		0.077
	2		0.079
Stability test			
General average (stability test) $\bar{y}$			0.080
General average (homogeneity test) $\bar{x}$			0.083
Standard deviation for proficiency assessment σ_{PT}			0.0166
$ \bar{y} - \bar{x} $			0.00274
Test for stability ($ \bar{y} - \bar{x} \leq 0.3 \sigma_{PT}$)			passed



EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Olive Oil 2026 [EURL-PT-DPB_2601-OL]

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

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Annex 6: Participants' methods for PBDEs

Test sample - Olive oil (2601-OL)

LC	Data set	Sample	Accreditation according to ISO/IEC 17025	Weighed sample [g]	Use of isotope-labelled internal standards for PBDE congeners (yes/no)	Other internal standards	PBDE
1	A	2601-OL	no	1.017	yes		
2		2601-OL					
3	A	2601-OL	yes	3	yes		no
4		2601-OL					
5		2601-OL					
6		2601-OL					
7	A	2601-OL	yes	5.0	yes		
8		2601-OL					
9	A	2601-OL	yes	10	yes		
10	A	2601-OL	no	4	yes		
11		2601-OL					
12	A	2601-OL	yes	5	yes		
13		2601-OL					
14	A	2601-OL	yes	5	yes		
15	A	2601-OL					
16	A	2601-OL	yes	6	yes		
17		2601-OL					
18	A	2601-OL	yes	2.5	yes		
19		2601-OL					
20		2601-OL					
21		2601-OL					
22		2601-OL					
23		2601-OL					
24	A	2601-OL	yes	1	yes		
25		2601-OL					
26		2601-OL					
27	A	2601-OL	yes	2.0	yes		
28	A	2601-OL	yes	1	yes		
29		2601-OL					
30		2601-OL					
31		2601-OL					
32	A	2601-OL					
33		2601-OL					
34		2601-OL					
35	A	2601-OL	yes	2	yes		
36		2601-OL					
37	A	2601-OL		2.8	yes		
38	A	2601-OL	yes	8	yes		
39		2601-OL					
40		2601-OL					
41		2601-OL					
42	A	2601-OL	yes	2.5	yes		
43		2601-OL					
44	A	2601-OL	yes	5	yes		
45		2601-OL					
46		2601-OL					
47		2601-OL					
48		2601-OL					
49		2601-OL					
50		2601-OL					
51		2601-OL					
52		2601-OL					
53	A	2601-OL					
54		2601-OL					
55		2601-OL					
56	A	2601-OL	yes	4	yes		
57		2601-OL					
58	A	2601-OL	yes	1	yes		
59	A	2601-OL	yes	2	yes		
60		2601-OL					
61		2601-OL					
62		2601-OL					
63	A	2601-OL	yes	4	yes		
64		2601-OL					
65		2601-OL					
66		2601-OL					
67	A	2601-OL	no	3.882	yes		
68	A	2601-OL	no	2	yes		
69	A	2601-OL	yes		yes		
70		2601-OL					
71		2601-OL					
72		2601-OL					

LC	Data set	Sample	Accreditation according to ISO/IEC 17025	Weighed sample [g]	Use of isotope-labelled internal standards for PBDE congeners (yes/no)	Other internal standards PBDE
73		2601-OL				
74		2601-OL				
75	A	2601-OL	yes	0.5	yes	
76		2601-OL				
77		2601-OL				
78	A	2601-OL	yes	6.00	yes	N/A
79		2601-OL				
80		2601-OL				
81		2601-OL				
82		2601-OL				
83	A	2601-OL	no	0.5	yes	
84		2601-OL				
85		2601-OL				
86		2601-OL				
87		2601-OL				
88	A	2601-OL	yes	1	yes	
89		2601-OL				
90		2601-OL				
91		2601-OL				
92		2601-OL				
93	A	2601-OL	no	7.76	yes	
94		2601-OL				
95		2601-OL				
96	A	2601-OL	yes	3.01	yes	
97		2601-OL				
98		2601-OL				
99	A	2601-OL	yes	1.2	yes	
100		2601-OL				
101		2601-OL				
102	A	2601-OL	yes	1	yes	BDE-37, BDE-77, 13C12-BDE-209
103		2601-OL				
104	A	2601-OL	yes	1.021	yes	
105	A	2601-OL	no	1.0085	yes	
106		2601-OL				
107	A	2601-OL	no	4.01	yes	
108	A	2601-OL	yes	5	yes	
109		2601-OL				
Additional Sets						
58	B	2601-OL				
78	B	2601-OL		6.10	yes	N/A

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Olive oil (2601-OL)
 Methods PBDEs - Internal and recovery standards

LC	Data set	Sample	BDE 28 Internal standard	BDE 47 Internal standard	BDE 49 Internal standard	BDE 99 Internal standard	BDE 100 Internal standard	BDE 153 Internal standard	BDE 154 Internal standard	BDE 183 Internal standard	BDE 209 Internal standard	BDE 28 Recovery standard	BDE 47 Recovery standard	BDE 49 Recovery standard	BDE 99 Recovery standard	BDE 100 Recovery standard	BDE 153 Recovery standard	BDE 154 Recovery standard	BDE 183 Recovery standard	BDE 209 Recovery standard
1	A	2601-OL	13C BDE 28	13C BDE 47	13C BDE 47	13C BDE 99	13C BDE 100	13C BDE 153	13C BDE 154	13C BDE 183	13C BDE 209	13C BDE126	13C BDE126	13C BDE126	13C BDE126	13C BDE126	13C BDE126	13C BDE126	13C BDE126	13C BDE126
2		2601-OL																		
3	A	2601-OL	13C-BDE-28	13C-BDE-47	13C-BDE-47	13C-BDE-99	13C-BDE-100	13C-BDE-153	13C-BDE-154	13C-BDE-183	13C-BDE-209	13C-BDE-139	13C-BDE-139	13C-BDE-139	13C-BDE-139	13C-BDE-139	13C-BDE-139	13C-BDE-139	13C-BDE-139	13C-BDE-139
4		2601-OL																		
5		2601-OL																		
6		2601-OL																		
7	A	2601-OL	BDE-28	BDE-47	BDE-47	BDE-99	BDE-100	BDE-153	BDE-154	BDE-183	BDE-209	BDE-79	BDE-79	BDE-79	BDE-79	BDE-79	BDE-138	BDE-138	BDE-138	BDE-206
8		2601-OL																		
9	A	2601-OL	13C	13C	13CBDE47	13C	13C	13C	13C	13C	13C	13CBDE139	13CBDE139	13CBDE139	13CBDE139	13CBDE139	13CBDE139	13CBDE139	13CBDE139	13CBDE139
10	A	2601-OL																		
11		2601-OL																		
12	A	2601-OL	13C-BDE28	13C-BDE47	13C-BDE47	13C-BDE99	13C-BDE100	13C-BDE153	13C-BDE154	13C-BDE183	13C-BDE209	13C-BDE118	13C-BDE118	13C-BDE118	13C-BDE118	13C-BDE118	13C-BDE118	13C-BDE118	13C-BDE118	13C-BDE208
13		2601-OL																		
14	A	2601-OL	BDE-28	BDE-47	BDE-47	BDE-99	BDE-100	BDE-153	BDE-154	BDE-183	BDE-209	PCB-188	PCB-188	PCB-188	PCB-188	PCB-188	PCB-188	PCB-188	PCB-188	PCB-188
15	A	2601-OL	13C12-BDE-28	13C12-BDE-47	13C12-BDE-47	13C12-BDE-99	13C12-BDE-100	13C12-BDE-153	13C12-BDE-154	13C12-BDE-183	13C12-BDE-209	13C12-BDE-139	13C12-BDE-139	13C12-BDE-139	13C12-BDE-139	13C12-BDE-139	13C12-BDE-139	13C12-BDE-139	13C12-BDE-139	13C12-BDE-139
16	A	2601-OL	13C BDE 28	13C BDE 47		13C BDE 99	13C BDE 100	13C BDE 153	13C BDE 154	13C BDE 183	13C BDE 209	13C BDE 77	13C BDE 77		13C BDE 77	13C BDE 77	13C BDE 138	13C BDE 138	13C BDE 138	13C BDE 138
17		2601-OL																		
18	A	2601-OL	13C BDE-28	13C BDE-47	13C BDE-47	13C BDE-99	13C BDE-100	13C BDE-153	13C BDE-154	13C BDE-183	13C BDE-209	13C BDE-77	13C BDE-77	13C BDE-77	13C BDE-77	13C BDE-77	13C BDE-138	13C BDE-138	13C BDE-138	
19		2601-OL																		
20		2601-OL																		
21		2601-OL																		
22		2601-OL																		
23		2601-OL																		
24	A	2601-OL	13C12-BDE-28	13C12-BDE-47	13C12-BDE-47	13C12-BDE-99	13C12-BDE-100	13C12-BDE-153	13C12-BDE-154	13C12-BDE-183	13C12-BDE-209	13C12-BDE-118	13C12-BDE-118	13C12-BDE-118	13C12-BDE-118	13C12-BDE-118	13C12-BDE-118	13C12-BDE-118	13C12-BDE-118	13C12-BDE-118
25		2601-OL																		
26		2601-OL																		
27	A	2601-OL	13C-BDE-28	13C-BDE-47	13C-BDE-47	13C-BDE-99	13C-BDE-100	13C-BDE-153	13C-BDE-154	13C-BDE-183	13C-BDE-209	13C-BDE-79	13C-BDE-79	13C-BDE-79	13C-BDE-139	13C-BDE-139	13C-BDE-139	13C-BDE-139	13C-BDE-180	13C-BDE-206
28	A	2601-OL	13C-TriBDE28	13C-TetraBDE47	13C-TetraBDE47	13C-PentaBDE99	13C-PentaBDE99	13C-HexaBDE153	13C-HexaBDE153	13C-HeptaBDE183	13C-DecaBDE209	13C-HexaBDE138	13C-HexaBDE138	13C-HexaBDE138	13C-HexaBDE138	13C-HexaBDE138	13C-HexaBDE138	13C-HexaBDE138	13C-HexaBDE138	13C-HexaBDE138
29		2601-OL																		
30		2601-OL																		
31		2601-OL																		
32	A	2601-OL	13C-BDE-28	13C-BDE-47	13C-BDE-47	13C-BDE-99	13C-BDE-100	13C-BDE-153	13C-BDE-154	13C-BDE-183	13C-BDE-209	13C-BDE-139	13C-BDE-139	13C-BDE-139	13C-BDE-139	13C-BDE-139	13C-BDE-139	13C-BDE-139	13C-BDE-139	13C-BDE-206
33		2601-OL																		
34		2601-OL																		
35	A	2601-OL	13C12-MBDE 28	13C12-MBDE 47	13C12-MBDE 47	13C12-MBDE 99	13C12-MBDE 100	13C12-MBDE 153	13C12-MBDE 154	13C12-MBDE 183	13C12-MBDE 209	13C12-MBDE 77	13C12-MBDE 77	13C12-MBDE 77	13C12-MBDE 77	13C12-MBDE 77	13C12-MBDE 139	13C12-MBDE 139	13C12-MBDE 77	13C12-MBDE 205
36		2601-OL																		
37	A	2601-OL	C13-BDE-28	C13-BDE-47		C13-BDE-99	C13-BDE-100	C13-BDE-153	C13-BDE-154	C13-BDE-183	C13-BDE-209	C13-BDE-139	C13-BDE-139		C13-BDE-139	C13-BDE-139	C13-BDE-139	C13-BDE-139	C13-BDE-139	C13-BDE-139
38	A	2601-OL	13C-BDE-28	13C-BDE-47	13C-BDE-47	13C-BDE-99	13C-BDE-100	13C-BDE-153	13C-BDE-154	13C-BDE-183	13C-BDE-209	13C-BDE-77	13C-BDE-77	13C-BDE-77	13C-BDE-126	13C-BDE-126	13C-BDE-126	13C-BDE-126	13C-BDE-126	13C-BDE-207
39		2601-OL																		
40		2601-OL																		
41		2601-OL																		
42	A	2601-OL	BDE-28 13C12	BDE-47 13C12	BDE-47 13C12	BDE-99 13C12	BDE-100 13C12	BDE-47 13C12	BDE-154 13C12	BDE-183 13C12	BDE-209 13C12									
43		2601-OL																		
44	A	2601-OL	13C12-BDE 28	13C12-BDE 47	13C12-BDE 47	13C12-BDE 99	13C12-BDE 100	13C12-BDE 153	13C12-BDE 154	13C12-BDE 183	-	13C12-PCB 52	13C12-PCB 52	13C12-PCB 52	13C12-PCB 138	13C12-PCB 138	13C12-PCB 138	13C12-PCB 138	13C12-PCB 138	-
45		2601-OL																		
46		2601-OL																		
47		2601-OL																		
48		2601-OL																		
49		2601-OL																		
50		2601-OL																		
51		2601-OL																		
52		2601-OL																		
53	A	2601-OL				BDE -99 C13					BDE -209 C13									
54		2601-OL																		
55		2601-OL																		
56	A	2601-OL	BDE-28	BDE-47	BDE-47	BDE-99	BDE-100	BDE-153	BDE-154	BDE-183	BDE-209									
57		2601-OL																		
58	A	2601-OL	BDE-28-13C12	BDE-47-13C12	BDE-47-13C12	BDE-99-13C12	BDE-100-13C12	BDE-153-13C12	BDE-154-13C12	BDE-183-13C12		BDE-77-13C12	BDE-77-13C12	BDE-77-13C12	BDE-77-13C12	BDE-77-13C12	BDE-138-13C12	BDE-138-13C12	BDE-138-13C12	
59	A	2601-OL	BDE-28L	BDE-47L		BDE-99L	BDE-100L	BDE-153L	BDE-154L	BDE-183L	BDE-209L	BDE-139L	BDE-139L		BDE-139L	BDE-139L	BDE-139L	BDE-139L	BDE-139L	BDE-139L
60		2601-OL																		
61		2601-OL																		
62		2601-OL																		
63	A	2601-OL	13C BDE28	13C BDE47	13C BDE47	13C BDE99	13C BDE100	13C BDE153	13C BDE154	13C BDE183	13C BDE209	13C BDE77	13C BDE77	13C BDE77	13C BDE77	13C BDE77	13C BDE 138	13C BDE 138	13C BDE 138	13C BDE 138
64		2601-OL																		
65		2601-OL																		
66		2601-OL																		
67	A	2601-OL	13C BDE-28	13C BDE-47	13C BDE-47	13C BDE-99	13C BDE-100	13C BDE-153	13C BDE-154	13C BDE-183	13C BDE-209	13C BDE-79	13C BDE-79	13C BDE-79	13C BDE-138	13C BDE-138	13C BDE-138	13C BDE-138	13C BDE-206	13C BDE-206
68	A	2601-OL	MBDE-28	MBDE-47	MBDE-47	MBDE-099	MBDE-100	MBDE-153	MBDE-154	MBDE-183	MBDE-209	MBDE-79	MBDE-79	MBDE-79	MBDE-139	MBDE-139	MBDE-139	MBDE-139	MBDE-139	MBDE-206
69	A	2601-OL	13C BDE-28	13C BDE-47		13C BDE-99	13C BDE-100	13C BDE-153	13C BDE-154	13C BDE-183	13C BDE-209									
70		2601-OL																		
71		2601-OL																		
72		2601-OL																		

LC	Data set	Sample	BDE 28 Internal standard	BDE 47 Internal standard	BDE 49 Internal standard	BDE 99 Internal standard	BDE 100 Internal standard	BDE 153 Internal standard	BDE 154 Internal standard	BDE 183 Internal standard	BDE 209 Internal standard	BDE 28 Recovery standard	BDE 47 Recovery standard	BDE 49 Recovery standard	BDE 99 Recovery standard	BDE 100 Recovery standard	BDE 153 Recovery standard	BDE 154 Recovery standard	BDE 183 Recovery standard	BDE 209 Recovery standard
73		2601-OL																		
74		2601-OL																		
75	A	2601-OL	13C-BDE-28	13C-BDE-47	13C-BDE-47	13C-BDE-99	13C-BDE-99	13C-BDE-153	13C-BDE-154	13C-BDE-183		13C-PCB-80	13C-PCB-80	13C-PCB-80	13C-PCB-80	13C-PCB-80	13C-PCB-80	13C-PCB-80	13C-PCB-80	
76		2601-OL																		
77		2601-OL																		
78	A	2601-OL	C13-BDE-28	C13-BDE-47	C13-BDE-49	C13-BDE-99	C13-BDE-100	C13-BDE-153	C13-BDE-154	C13-BDE-183		C13-BDE-79	C13-BDE-79	C13-BDE-79	C13-BDE-79	C13-BDE-79	C13-BDE-139	C13-BDE-139	C13-BDE-180	
79		2601-OL																		
80		2601-OL																		
81		2601-OL																		
82		2601-OL																		
83	A	2601-OL	13C-BDE155	13C-BDE155		13C-BDE155	13C-BDE155	13C-BDE155	13C-BDE155	13C-BDE155	13C-BDE209									
84		2601-OL																		
85		2601-OL																		
86		2601-OL																		
87		2601-OL																		
88	A	2601-OL	13C-TriBDE28	13C-TetraBDE47	13C-TetraBDE47	13C-PentaBDE99	13C-PentaBDE99	13C-HexaBDE153	13C-HexaBDE153	13C-HeptaBDE183	13C-DecaBDE209	13C-HexaBDE138	13C-HexaBDE138	13C-HexaBDE138	13C-HexaBDE138	13C-HexaBDE138	13C-HexaBDE138	13C-HexaBDE138	13C-HexaBDE138	13C-HexaBDE138
89		2601-OL																		
90		2601-OL																		
91		2601-OL																		
92		2601-OL																		
93	A	2601-OL	BDE-28	BDE-47	BDE-47	BDE-99	BDE-100	BDE-153	BDE-154	BDE-183		BDE-77	BDE-77	BDE-77	BDE-77	BDE-77	BDE-138	BDE-138	BDE-138	
94		2601-OL																		
95		2601-OL																		
96	A	2601-OL	13C-BDE-28	13C-BDE-47		13C-BDE-99	13C-BDE-100	13C-BDE-153	13C-BDE-154	13C-BDE-183		13C-BDE-77	13C-BDE-77		13C-BDE-77	13C-BDE-77	13C-BDE-77	13C-BDE-77	13C-BDE-77	
97		2601-OL																		
98		2601-OL																		
99	A	2601-OL	BDE-28L	BDE-47L	BDE-47L	BDE-99L	BDE-100L	BDE-153L	BDE-154L	BDE-183L	BDE-209L									
100		2601-OL																		
101		2601-OL																		
102	A	2601-OL	BDE-37	BDE-77	BDE-77	BDE-77	BDE-77	BDE-77	BDE-77	BDE-77	13C12-BDE-209	/	/	/	/	/	/	/	/	/
103		2601-OL																		
104	A	2601-OL	13C12 PBDE-28	13C12 PBDE-47	13C12 PBDE-47	13C12 PBDE-99	13C12 PBDE-100	13C12 PBDE-153	13C12 PBDE-154	13C12 PBDE-183	13C12 PBDE-209	13C12 PBDE-77	13C12 PBDE-77	13C12 PBDE-77	13C12 PBDE-77	13C12 PBDE-77	13C12 PBDE-77	13C12 PBDE-77	13C12 PBDE-77	4'-F-BDE-208
105	A	2601-OL	13C-BDE-28	13C-BDE-47	13C-BDE-47	13C-BDE-99	13C-BDE-100	13C-BDE-153	13C-BDE-154	13C-BDE-183	13C-BDE-209	13C-BDE-79	13C-BDE-79	13C-BDE-79	13C-BDE-138	13C-BDE-138	13C-BDE-138	13C-BDE-138	13C-BDE-138	13C-BDE-206
106		2601-OL																		
107	A	2601-OL	13C_BDE28	13C_BDE47	13C_BDE47	13C_BDE99	13C_BDE100	13C_BDE153	13C_BDE154	13C_BDE183	13C_BDE209	13C_BDE79	13C_BDE79	13C_BDE79	13C_BDE138	13C_BDE138	13C_BDE138	13C_BDE138	13C_BDE138	13C_BDE206
108	A	2601-OL	BDE-28	BDE-47	BDE-47	BDE-99	BDE-100	BDE-153	BDE-154	BDE-183	BDE- 209	BDE-138	BDE-138	BDE-138	BDE-138	BDE-138	BDE-138	BDE-138	BDE-138	BDE-138
109		2601-OL																		
Additional Sets																				
58	B	2601-OL	BDE-28-13C12	BDE-47-13C12	BDE-47-13C12	BDE-99-13C12	BDE-100-13C12	BDE-153-13C12	BDE-154-13C12	BDE-183-13C12	BDE-209-13C12	BDE-77-13C12	BDE-77-13C12	BDE-77-13C12	BDE-77-13C12	BDE-77-13C12	BDE-138-13C12	BDE-138-13C12	BDE-138-13C12	BDE-138-13C12
78	B	2601-OL	C13-BDE-28	C13-BDE-47	C13-BDE-49	C13-BDE-99	C13-BDE-100	C13-BDE-153	C13-BDE-154	C13-BDE-183		C13-BDE-79	C13-BDE-79	C13-BDE-79	C13-BDE-79	C13-BDE-79	C13-BDE-139	C13-BDE-139	C13-BDE-180	

LC	Data set	Sample	Extraction					
			Sample preparation/pre-treatment	Extraction technique	Extraction solvent	Extraction time [h]	Extraction temperature [°C]	Extraction pressure [MPa]
1	A	2601-OL		No extraction applied, the sample is just dissolved in hexane/acetone 13:2				
2		2601-OL						
3	A	2601-OL		High-fat food products – plant and animal fats and oils – are naturally homogeneous and do not require extraction or sample preparation. We perform a sodium sulfate filtration to determine the fat content.				
4		2601-OL						
5		2601-OL						
6		2601-OL						
7	A	2601-OL						
8		2601-OL						
9	A	2601-OL		saponification and LLE	hexane	1	room	room
10	A	2601-OL						
11		2601-OL						
12	A	2601-OL		Column extraction				
13		2601-OL						
14	A	2601-OL	homogenization	Column extraction	n-hexane	1	room temp.	atm. pressure
15	A	2601-OL						
16	A	2601-OL		no extraction				
17		2601-OL						
18	A	2601-OL						
19		2601-OL						
20		2601-OL						
21		2601-OL						
22		2601-OL						
23		2601-OL						
24	A	2601-OL						
25		2601-OL						
26		2601-OL						
27	A	2601-OL		no extraction needed				
28	A	2601-OL	None	Cold extraction				
29		2601-OL						
30		2601-OL						
31		2601-OL						
32	A	2601-OL						
33		2601-OL						
34		2601-OL						
35	A	2601-OL						
36		2601-OL						
37	A	2601-OL		Pressurized liquid extraction	pentane/acetone 88/12	0,5	80	1500
38	A	2601-OL						
39		2601-OL						
40		2601-OL						
41		2601-OL						
42	A	2601-OL		no extraction				
43		2601-OL						
44	A	2601-OL	thorough homogenization	no extraction				
45		2601-OL						
46		2601-OL						
47		2601-OL						
48		2601-OL						
49		2601-OL						
50		2601-OL						
51		2601-OL						
52		2601-OL						
53	A	2601-OL						
54		2601-OL						
55		2601-OL						
56	A	2601-OL						
57		2601-OL						
58	A	2601-OL						
59	A	2601-OL	none	none				
60		2601-OL						
61		2601-OL						
62		2601-OL						
63	A	2601-OL		None				
64		2601-OL						
65		2601-OL						
66		2601-OL						
67	A	2601-OL		Column extraction				
68	A	2601-OL	none	none				
69	A	2601-OL						
70		2601-OL						
71		2601-OL						
72		2601-OL						



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Olive oil (2601-OL)
Methods PBDEs - Extraction

LC	Data set	Sample	Extraction					
			Sample preparation/pre-treatment	Extraction technique	Extraction solvent	Extraction time [h]	Extraction temperature [°C]	Extraction pressure [MPa]
73	A	2601-OL						
74		2601-OL						
75		2601-OL						
76		2601-OL						
77	A	2601-OL						
78		2601-OL	None	Diluted in Hexane	Hexane			
79		2601-OL						
80		2601-OL						
81	A	2601-OL						
82		2601-OL						
83		2601-OL	no	Liquid-liquid extraction	hexan/diethylether			
84		2601-OL						
85	A	2601-OL						
86		2601-OL						
87		2601-OL						
88		2601-OL		Cold extraction				
89	A	2601-OL						
90		2601-OL						
91		2601-OL						
92		2601-OL						
93	A	2601-OL						
94		2601-OL						
95		2601-OL						
96		2601-OL	Vortex mix	Automated acid hydrolysis with abbreviated Soxhlet - Hydrotherm™/ Soxtherm™	2 M Sulfuric Acid - Hydrotherm, Hexane - Soxtherm	6	100 - Hydrotherm, 140 - Soxtherm	
97	A	2601-OL						
98		2601-OL						
99		2601-OL	Homogenisation	DigiPREP thermoreactor	Hydrochloric acid/Ethanol (8/2)	0.5	80	Atmospheric pressure
100		2601-OL						
101	A	2601-OL						
102		2601-OL	Dissolution in hexane	Adsorption chromatography on silica , Column extraction	/	/	/	/
103		2601-OL						
104		2601-OL		Pressurized liquid extraction	hexane	2 cycles a 5 min	100	10
105	A	2601-OL						
106		2601-OL						
107		2601-OL		Soxhlet	DCM: hexane=1:1	24	80	0.101325
108		2601-OL		L-L	hexane	0.5	25	-
109	Additional Sets	2601-OL						
58		B	2601-OL					
78		B	2601-OL	None	Diluted in Hexane	Hexane		

LC	Data set	Sample	Clean-up								Final volume [µl]: PBDE
			Gelchromatography	Silica/sulfuric acid column	Florisil column	Alumina column	Carbon column	Fully automated system	Semi-automated system	Other columns / clean-up method	
1	A	2601-OL	no	no	no	no	no	DexTech	no	DexTech column for PBDE: Silica/Silica+ acid/Silica basic	2500
2		2601-OL									
3	A	2601-OL	no	yes	yes	yes	no		no		50
4		2601-OL									
5		2601-OL									
6		2601-OL									
7	A	2601-OL	no	no	no	no	no	PowerPrep	no	liquid-liquid partitioning process with sulphuric acid	40
8		2601-OL									
9	A	2601-OL	yes	yes	no	no	yes		no		20
10	A	2601-OL	no	no	no	no	no	Miura	no		50
11		2601-OL									
12	A	2601-OL	no	yes	no	yes	yes		no		500
13		2601-OL									
14	A	2601-OL	no	no	no	no	no	PowerPrep	no	Removal of waxes in PCB fraction after PowerPrep: Supelclean Sulfoxide Glass SPE 6g/20ml column	20
15	A	2601-OL									
16	A	2601-OL	no	yes	no	no	yes		no		50
17		2601-OL									
18	A	2601-OL	no	no	no	no	no	Miura	no		20
19		2601-OL									
20		2601-OL									
21		2601-OL									
22		2601-OL									
23		2601-OL									
24	A	2601-OL	no	yes	no	yes	yes	Miura	no	Silica/AgNO3	100
25		2601-OL									
26		2601-OL									
27	A	2601-OL	no	no	no	no	no	DexTech	no		
28	A	2601-OL	no	yes	no	no	no		no		100
29		2601-OL									
30		2601-OL									
31		2601-OL									
32	A	2601-OL									
33		2601-OL									
34		2601-OL									
35	A	2601-OL	no	no	no	no	no	DexTech	no		400
36		2601-OL									
37	A	2601-OL	no	yes	no	yes	yes		no	Silver nitrate column	1000
38	A	2601-OL	no	yes	no	yes	no		no	acidic treatment	50
39		2601-OL									
40		2601-OL									
41		2601-OL									
42	A	2601-OL	no	yes	no	yes	no	DexTech	no		50
43		2601-OL									
44	A	2601-OL	no	yes	no	yes	yes		no	basic silica, silver nitrate silica	50
45		2601-OL									
46		2601-OL									
47		2601-OL									
48		2601-OL									
49		2601-OL									
50		2601-OL									
51		2601-OL									
52		2601-OL									
53	A	2601-OL									
54		2601-OL									
55		2601-OL									
56	A	2601-OL	no	no	no	no	no	DexTech	yes		50
57		2601-OL									
58	A	2601-OL	yes	yes	no	no	no		no		250
59	A	2601-OL	no	no	no	no	no	DexTech	no		30
60		2601-OL									
61		2601-OL									
62		2601-OL									
63	A	2601-OL	no	no	no	no	no	DexTech	no		100
64		2601-OL									
65		2601-OL									
66		2601-OL									
67	A	2601-OL	no	yes	no	no	no		no		30
68	A	2601-OL	no	no	no	no	no	Miura	no		50
69	A	2601-OL	no	no	no	no	no	PowerPrep	no		30
70		2601-OL									
71		2601-OL									
72		2601-OL									



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Olive oil (2601-OL)
Methods PBDEs - Clean-up

LC	Data set	Sample	Clean-up							Other columns / clean-up method	Final volume [µl]: PBDE
			Gelchromatography	Silica/sulfuric acid column	Florisil column	Alumina column	Carbon column	Fully automated system	Semi-automated system		
73		2601-OL									
74		2601-OL									
75	A	2601-OL	no	yes	no	yes	no		no		50
76		2601-OL									
77		2601-OL									
78	A	2601-OL	no	no	no	no	no	PowerPrep	no	Acidified Silica - Alumina	100
79		2601-OL									
80		2601-OL									
81		2601-OL									
82		2601-OL									
83	A	2601-OL	no	no	no	no	no		no	Sulfuric acid treatment before clean-up on silica column	200
84		2601-OL									
85		2601-OL									
86		2601-OL									
87		2601-OL									
88	A	2601-OL	no	yes	no	no	no		no		100
89		2601-OL									
90		2601-OL									
91		2601-OL									
92		2601-OL									
93	A	2601-OL	no	yes	no	no	no		no	basic set of "power-prep system" columns	40
94		2601-OL									
95		2601-OL									
96	A	2601-OL	no	no	no	no	no	Miura	no		12
97		2601-OL									
98		2601-OL									
99	A	2601-OL	no	yes	no	no	no		no	Liquid/liquid partition with hexane	50
100		2601-OL									
101		2601-OL									
102	A	2601-OL	no	yes	no	no	no		no	Deactivated silica	500
103		2601-OL									
104	A	2601-OL	no	yes	no	yes	yes	Miura	no	silver nitrate column	60
105	A	2601-OL	no	yes	no	yes	no		no		25
106		2601-OL									
107	A	2601-OL	no	yes	no	no	yes		no		20
108	A	2601-OL	no	yes	no	no	no		no		250
109		2601-OL									
Additional Sets											
58	B	2601-OL									
78	B	2601-OL	no	no	no	no	no	PowerPrep	no	Acidified Silica - Alumina	100

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Olive oil (2601-OL)
Methods PBDEs - Detection, LOQ, measurement uncertainty

LC	Data set	Sample	Chromatographic separation and detection method			Detector	Limit of quantification	Measurement uncertainty
			GC injection	Injected volume [µl]	GC separation: Stationary phase		Determination of LOQ	Estimation
1	A	2601-OL	PTV	100	CL-Pesticides	HRMS	By our processing software: TargetQuan	according NEN-7779
2		2601-OL						
3	A	2601-OL	PTV	1.5	RTX-1614 , DB-5-MS	HRMS	calculated from validation and verified with a blank sample	validation
4		2601-OL						
5		2601-OL						
6		2601-OL						
7	A	2601-OL	PTV	2	Rtx-1614 15m x 0.25mm x 0.1µm	HRMS	The LOQs were estimated using the approach "Congener-based LOQs from S/N Calculations". This methodology is reported in the Guidance Document on the Estimation of LOD and LOQ for Measurements in the Field of Contaminants in Feed and Food.	The MU was estimated using the "semi-empirical approach" based on the ISO Guide to the expression of Uncertainty in Measurement applied to analytical chemistry by EURACHEM/CITAC. This approach is reported in the Guidance Document on Measurement Uncertainty for Laboratories performing PCDD/F and PCB Analysis using Isotope Dilution Mass Spectrometry
8		2601-OL						
9	A	2601-OL	PTV	5	Zebron semivolatiles	MS/MS	lowest validated level (fortification experiments)	taking into account reproducibility within lab and trueness with fortification experiments
10	A	2601-OL	Splitless	1		MS/MS		
11		2601-OL						
12	A	2601-OL	Splitless	5		MS/MS		
13		2601-OL						
14	A	2601-OL	Splitless	2	DB-5ht	HRMS	LOQ = 3 x LOD, LOD evaluated as 3 times of noise	Expanded U: Ue = k x Uc (k = 2). MU of type A is evaluated using internal RM. U of type B (includes i.a. uncertainty of weighing, volume measurements, etc.), Uc = combined uncertainty is summed uncertainty of type A and B according the law of propagation of measurement uncertainty.
15	A	2601-OL						
16	A	2601-OL	Splitless	2	RTX-1614	MS/MS	concentration responding to 9:1 s/n ratio in respective samples	expanded uncertainty from replicates of reference material
17		2601-OL						
18	A	2601-OL	Splitless	2	DB5MS	HRMS	S/N < 3	GUM METHOD
19		2601-OL						
20		2601-OL						
21		2601-OL						
22		2601-OL						
23		2601-OL						
24	A	2601-OL	PTV	1	ZB-Semivolatile	MS/MS	Mean of Blank	multiple analysis of reference material
25		2601-OL						
26		2601-OL						
27	A	2601-OL	Splitless	1	Rtx 1614, 15 m x 0.25 mm, 0.1 µm	MS/MS	S/N	According to "Combine MU calculation V1.1" document
28	A	2601-OL	Splitless	2		MS/MS	2 times higher than blanks and S/N ratio over 10	Proficiency testing and spiked samples
29		2601-OL						
30		2601-OL						
31		2601-OL						
32	A	2601-OL						
33		2601-OL						
34		2601-OL						
35	A	2601-OL	Splitless	2	Rtx-1614, 30m	HRMS	Estimation of Congener-based LOQs from S/N Calculations (Software-based S/N Calculations)	validation data
36		2601-OL						
37	A	2601-OL	PTV	2	DB5-MS	HRMS	Calculated by TargetQuan	30% used for all congeners
38	A	2601-OL	Splitless	2.0	DB-5HT	HRMS	The LOQ was determined with fortified matrixes.	The measurement uncertainty was calculated according to NF ISO 11352.
39		2601-OL						
40		2601-OL						
41		2601-OL						
42	A	2601-OL	PTV	5	5% diphenyl 95% dimethyl polysiloxane	MS/MS	Estimation by sampleand standard	by method validation
43		2601-OL						
44	A	2601-OL	pulsed splitless	2	DB-5MS (60m x 0,25mm x 0,10 µm)	HRMS	estimated from procedural blanks	based on validation - calculation from RSD and bias
45		2601-OL						
46		2601-OL						
47		2601-OL						
48		2601-OL						
49		2601-OL						
50		2601-OL						
51		2601-OL						
52		2601-OL						
53	A	2601-OL						
54		2601-OL						
55		2601-OL						
56	A	2601-OL	PTV	2	TG-PDBE 15 m Thermo	HRMS	from calibration data according DIN 32645	multiple measurement of a reference material
57		2601-OL						
58	A	2601-OL	PTV	5	DB5-HT 15m x 0.25mm x 0.1um	MS/MS	LOQs estimated via spiked matrix samples: BDE-47 0.100 ng/g ; BDE-100 0.030 ng/g ; BDE 99 0.040 ng/g; BDE 209 0.25 ng/g; other BDE 0.025 ng/g	NORDTEST
59	A	2601-OL	PTV	1	Rtx-1614	HRMS	LOQ of each individual congener is determined by TargetQuan and has the factors 3 for noise and 2 for sigma.	MU is calculated from the standard deviation of the repetition in the laboratory and that of the interlaboratory comparison and is valid for relevant contents.
60		2601-OL						
61		2601-OL						
62		2601-OL						
63	A	2601-OL	PTV	4	RTX-1614 15m	HRMS	Highest between S/N and procedural blanks approaches	According to the EURL guide for dioxins
64		2601-OL						
65		2601-OL						
66		2601-OL						

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Olive oil (2601-OL)
Methods PBDEs - Detection, LOQ, measurement uncertainty

LC	Data set	Sample	Chromatographic separation and detection method			Detector	Limit of quantification Determination of LOQ	Measurement uncertainty Estimation
			GC injection	Injected volume [µl]	GC separation: Stationary phase			
67	A	2601-OL	Splitless	1	Rtx-1614	MS/MS	lowest validated level	top down approach
68	A	2601-OL	Splitless, large volume	4	Rtx 1614 15 m, 0.25 mm ID, 0.10 µm	MS/MS		
69	A	2601-OL	PTV	1	DB-5HT	HRMS		
70		2601-OL						
71		2601-OL						
72		2601-OL						
73		2601-OL						
74		2601-OL						
75	A	2601-OL	Splitless	1.5	DB-5MS	HRMS		
76		2601-OL						
77		2601-OL						
78	A	2601-OL	PTV	1	DB5	HRMS	3:1 - Signal to noise ratio	Top-Down approach (Validation & QC data)
79		2601-OL						
80		2601-OL						
81		2601-OL						
82		2601-OL						
83	A	2601-OL	PTV	6	DB5MS 30 m	LRMS	10 times the standard deviation of the blanksample	the square root of the sum (bias and standard deviation included)
84		2601-OL						
85		2601-OL						
86		2601-OL						
87		2601-OL						
88	A	2601-OL	Splitless	2		MS/MS	2 times higher than blanks and S/N ratio over 10	Proficiency testing and spiked samples
89		2601-OL						
90		2601-OL						
91		2601-OL						
92		2601-OL						
93	A	2601-OL	Splitless	1	DB-5MS (30 m, 0.25 mm id, 0,25 mm film)	HRMS	LOQs were calculated using the "Quandesk" software	
94		2601-OL						
95		2601-OL						
96	A	2601-OL	Splitless	1.5	Guard column 5m, SGE BPX-PCB Polycarborane-Siloxane 10 m GC column, J&W DB-17ms 10 m GC column	LRMS	If low signal < 10:1, used batch blank EMPC.	based on 1 year of spike data results => the uncertainty interval / median to determine percentage
97		2601-OL						
98		2601-OL						
99	A	2601-OL	pulsed splitless	2	TG-PBDE, 15 m x 0,25 mm, 0,10 µm (Thermo Scientific)	MS/MS	0.004 ng/g for BDE-28/47/49/99/100; 0.008 ng/g for PBDE-153/154/183; 0.1 ng/g for BDE-209 (LOQ calculated by ISO 11843-2/DIN 32645)	The considered uncertainty components are: precision of the method, systematic effects on mass and volume measurements, recovery, chromatographic response factor and concentration of reference materials
100		2601-OL						
101		2601-OL						
102	A	2601-OL	PTV, /	8	DB-XLB	LRMS	LOQs were determined as the lowest calibration point where S/N > 10 (quantification m/z) and S/N > 3 (confirmation m/z).	Expanded uncertainty was calculated using coverage factor k = 2 corresponding to a coverage probability of approximately 95%. Uncertainty was calculated and stated according to the documents ILAC G17:01(2021) and Kvalimetrie 11 (issued as EURACHEM/CITAC 4).
103		2601-OL						
104	A	2601-OL	Splitless	2	TRACE-GOLD TG-PBDE	MS/MS	Based on determination of blanks during validation. Set numbers divided by sample weight.	RSD (%) was based on multiple analysis on known material during validation, then 2 x RSD(%) + 5.
105	A	2601-OL	Splitless	1	RTX-1614	HRMS		
106		2601-OL						
107	A	2601-OL	Splitless	1	(5% Phenyl)-methyl polysiloxane	HRMS	10 times of signal/noise ratio	
108	A	2601-OL	Splitless	2	Rxi 5Sil MS	HRMS, MS/MS	based on blank	according to validation data, 30% for congeners, 20% for summation parameters
109		2601-OL						
Additional Sets								
58	B	2601-OL						
78	B	2601-OL	PTV	1	DB5	HRMS	3:1 - Signal to noise ratio	Top-Down approach (Validation & QC data)



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Annex 7: Assigned values of HBCDDs

Test sample - Olive oil (2601-OL)

Assigned values of sum parameters and individual congeners

Estimation of the assigned value as the consensus of participants' results

Assigned value = Hampel estimate



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Olive oil (2601-OL)
 HBCDD - Assigned values

Analyte	Result µg/kg product	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 α-, β-, γ-HBCDD (ub)		0.328	0.0480	0.014	19	0.312
Sum of α-, β-, γ-HBCDD (lb)		0.323	0.0734	0.021	19	0.310
(+/-)-α-HBCDD (1,2,5,6,9,10-hexabromo-(1R,2R,5S,6R,9R,10S)-rel-cyclododecane)		0.117	0.0218	0.0063	19	0.118
(+/-)-β- HBCDD (1,2,5,6,9,10-hexabromo-(1R,2S,5R,6R,9R,10S)-rel-cyclododecane)		0.102	0.0239	0.0068	19	0.0985
(+/-)-γ- HBCDD (1,2,5,6,9,10-hexabromo-(1R,2R,5R,6S,9S,10R)-rel-cyclododecane)		0.112	0.0213	0.0061	19	0.113
Total HBCDD (using GC-methods)						



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Annex 8: Participants' results of HBCDDs

Test sample - Olive oil (2601-OL)

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

Olive oil (2601-OL)
HBCDD - Results

LC	Data set	Sample	Result µg/kg product	Sum of α-, β-, γ-HBCDD (ub)	Sum of α-, β-, γ-HBCDD (lb)	(+/-)-α-HBCDD 1,2,5,6,9,10-hexabromo-(1R,2R,5S,6R,9R,10S)- rel-cyclododecane	(+/-)-β- HBCDD 1,2,5,6,9,10-hexabromo-(1R,2S,5R,6R,9R,10S)- rel-cyclododecane	(+/-)-γ- HBCDD 1,2,5,6,9,10-hexabromo-(1R,2R,5R,6S,9S,10R)- rel-cyclododecane	Total HBCDD (using GC-methods)
1	A	2601-OL		0.311	0.311	0.11	0.088	0.113	
2		2601-OL							
3	A	2601-OL		0.31	0.31	0.094	0.11	0.11	
4		2601-OL							
5		2601-OL							
6		2601-OL							
7	A	2601-OL		0.295	0.295	0.103	0.0953	0.0969	
8		2601-OL							
9	A	2601-OL		0.413	0.413	0.15	0.0985	0.164	
10		2601-OL							
11		2601-OL							
12	A	2601-OL		0.6	0	<0.2	<0.2	<0.2	
13		2601-OL							
14	A	2601-OL							78.2
15	A	2601-OL		0.41	0.41	0.14	0.14	0.13	
16	A	2601-OL		0.391	0.391	0.118	0.154	0.119	
17		2601-OL							
18	A	2601-OL		0.312	0.312	0.115	0.0833	0.114	
19		2601-OL							
20		2601-OL							
21		2601-OL							
22		2601-OL							
23		2601-OL							
24		2601-OL							
25		2601-OL							
26		2601-OL							
27	A	2601-OL		0.28	0.28	0.093	0.086	0.096	
28	A	2601-OL		0.292	0.292	0.102	0.0888	0.101	
29		2601-OL							
30		2601-OL							
31	A	2601-OL		1	0	<0.4	<0.2	<0.4	
32	A	2601-OL		0.318	0.318	0.122	0.089	0.108	
33		2601-OL							
34		2601-OL							
35		2601-OL							
36		2601-OL							
37		2601-OL							
38		2601-OL							
39		2601-OL							
40		2601-OL							
41		2601-OL							
42		2601-OL							
43		2601-OL							
44	A	2601-OL		0.36	0.36	0.132	0.112	0.116	
45		2601-OL							
46		2601-OL							
47		2601-OL							
48		2601-OL							
49		2601-OL							
50		2601-OL							
51		2601-OL							
52	A	2601-OL		0.35	0.35	0.13	0.11	0.12	
53		2601-OL							
54		2601-OL							
55		2601-OL							
56		2601-OL							
57		2601-OL							
58	A	2601-OL		0.216	0.216	0.118	0.046	0.052	
59		2601-OL							
60		2601-OL							
61		2601-OL							
62		2601-OL							
63		2601-OL							

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

Olive oil (2601-OL)

HBCDD - Results

LC	Data set	Sample	Result µg/kg product	Sum of α-, β-, γ-HBCDD (ub)	Sum of α-, β-, γ-HBCDD (lb)	(+/-)-α-HBCDD 1,2,5,6,9,10-hexabromo-(1R,2R,5S,6R,9R,10S)- rel-cyclododecane	(+/-)-β- HBCDD 1,2,5,6,9,10-hexabromo-(1R,2S,5R,6R,9R,10S)- rel-cyclododecane	(+/-)-γ- HBCDD 1,2,5,6,9,10-hexabromo-(1R,2R,5R,6S,9S,10R)- rel-cyclododecane	Total HBCDD (using GC-methods)
64		2601-OL							
65		2601-OL							
66	A	2601-OL		0.3	0.1	0.1	<0.1	<0.1	
67		2601-OL							
68	A	2601-OL		0.307	0.307	0.108	0.095	0.104	
69		2601-OL							
70		2601-OL							
71		2601-OL							
72		2601-OL							
73		2601-OL							
74		2601-OL							
75		2601-OL							
76		2601-OL							
77		2601-OL							
78		2601-OL							
79		2601-OL							
80		2601-OL							
81		2601-OL							
82		2601-OL							
83	A	2601-OL							0.267
84		2601-OL							
85		2601-OL							
86		2601-OL							
87		2601-OL							
88	A	2601-OL		0.3	0.3	0.106	0.091	0.104	
89		2601-OL							
90		2601-OL							
91		2601-OL							
92		2601-OL							
93		2601-OL							
94		2601-OL							
95		2601-OL							
96		2601-OL							
97		2601-OL							
98		2601-OL							
99		2601-OL							
100		2601-OL							
101		2601-OL							
102		2601-OL							
103		2601-OL							
104		2601-OL							
105	A	2601-OL		0.428	0.428	0.127	0.132	0.169	
106		2601-OL							
107		2601-OL							
108		2601-OL							
109		2601-OL							
Additional sets									
58	B	2601-OL		0.265	0.265	0.145	0.056	0.064	



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Annex 9: Participants' z-scores of HBCDDs - Tables

Test sample - Olive oil (2601-OL)

Z-scores of sum parameters and individual results

Calculation of z-score on basis of assigned value

$$z = (x - x_a) / x_a \cdot \sigma_{\text{prel}}$$

x_a : assigned value

x : participant's result

σ_{prel} : relative fitness-for-purpose-based relative standard deviation for proficiency assessment

20%: Evaluated individual HBCDD diastereomers and sum

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



EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Olive Oil 2026 [EURL-PT-DPB_2601-OL]

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

Olive oil (2601-OL)

HBCDD - Z-scores

LC	Data set	Sample	Z-score [σ _p = 20 %]	Sum of α-, β-, γ-HBCDD (ub)	Sum of α-, β-, γ-HBCDD (lb)	(+/-)-α-HBCDD 1,2,5,6,9,10-hexabromo-(1R,2R,5S,6R,9R,10S)- rel-cyclododecane	(+/-)-β- HBCDD 1,2,5,6,9,10-hexabromo-(1R,2S,5R,6R,9R,10S)- rel-cyclododecane	(+/-)-γ- HBCDD 1,2,5,6,9,10-hexabromo-(1R,2R,5R,6S,9S,10R)- rel-cyclododecane	Total HBCDD* (using GC-methods)
1	A	2601-OL		-0.3	-0.2	-0.3	-0.7	0.0	
2		2601-OL							
3	A	2601-OL		-0.3	-0.2	-1.0	0.4	-0.1	
4		2601-OL							
5		2601-OL							
6		2601-OL							
7	A	2601-OL		-0.5	-0.4	-0.6	-0.3	-0.7	
8		2601-OL							
9	A	2601-OL		1.3	1.4	1.4	-0.2	2.3	
10		2601-OL							
11		2601-OL							
12	A	2601-OL		4.1	-5.0				
13		2601-OL							
14	A	2601-OL							1187.1
15	A	2601-OL		1.3	1.3	1.0	1.9	0.8	
16	A	2601-OL		1.0	1.1	0.0	2.5	0.3	
17		2601-OL							
18	A	2601-OL		-0.2	-0.2	-0.1	-0.9	0.1	
19		2601-OL							
20		2601-OL							
21		2601-OL							
22		2601-OL							
23		2601-OL							
24		2601-OL							
25		2601-OL							
26		2601-OL							
27	A	2601-OL		-0.7	-0.7	-1.0	-0.8	-0.7	
28	A	2601-OL		-0.5	-0.5	-0.6	-0.6	-0.5	
29		2601-OL							
30		2601-OL							
31	A	2601-OL		10.2	-5.0				
32	A	2601-OL		-0.2	-0.1	0.2	-0.6	-0.2	
33		2601-OL							
34		2601-OL							
35		2601-OL							
36		2601-OL							
37		2601-OL							
38		2601-OL							
39		2601-OL							
40		2601-OL							
41		2601-OL							
42		2601-OL							
43		2601-OL							
44	A	2601-OL		0.5	0.6	0.6	0.5	0.2	
45		2601-OL							
46		2601-OL							
47		2601-OL							
48		2601-OL							
49		2601-OL							
50		2601-OL							
51		2601-OL							
52	A	2601-OL		0.3	0.4	0.6	0.4	0.4	
53		2601-OL							
54		2601-OL							
55		2601-OL							
56		2601-OL							
57		2601-OL							
58	A	2601-OL		-1.7	-1.7	0.0	-2.7	-2.7	
59		2601-OL							
60		2601-OL							
61		2601-OL							
62		2601-OL							
63		2601-OL							

Olive oil (2601-OL)
HBCDD - Z-scores

LC	Data set	Sample	Z-score [σ _p = 20 %]	Sum of α-, β-, γ-HBCDD (ub)	Sum of α-, β-, γ-HBCDD (lb)	(+/-)-α-HBCDD 1,2,5,6,9,10-hexabromo-(1R,2R,5S,6R,9R,10S)- rel-cyclododecane	(+/-)-β- HBCDD 1,2,5,6,9,10-hexabromo-(1R,2S,5R,6R,9R,10S)- rel-cyclododecane	(+/-)-γ- HBCDD 1,2,5,6,9,10-hexabromo-(1R,2R,5R,6S,9S,10R)- rel-cyclododecane	Total HBCDD* (using GC-methods)
64		2601-OL							
65		2601-OL							
66	A	2601-OL		-0.4	-3.5	-0.7			
67		2601-OL							
68	A	2601-OL		-0.3	-0.2	-0.4	-0.3	-0.4	
69		2601-OL							
70		2601-OL							
71		2601-OL							
72		2601-OL							
73		2601-OL							
74		2601-OL							
75		2601-OL							
76		2601-OL							
77		2601-OL							
78		2601-OL							
79		2601-OL							
80		2601-OL							
81		2601-OL							
82		2601-OL							
83	A	2601-OL							-0.9
84		2601-OL							
85		2601-OL							
86		2601-OL							
87		2601-OL							
88	A	2601-OL		-0.4	-0.4	-0.5	-0.5	-0.4	
89		2601-OL							
90		2601-OL							
91		2601-OL							
92		2601-OL							
93		2601-OL							
94		2601-OL							
95		2601-OL							
96		2601-OL							
97		2601-OL							
98		2601-OL							
99		2601-OL							
100		2601-OL							
101		2601-OL							
102		2601-OL							
103		2601-OL							
104		2601-OL							
105	A	2601-OL		1.5	1.6	0.4	1.5	2.5	
106		2601-OL							
107		2601-OL							
108		2601-OL							
109		2601-OL							
Addit		2601-OL							
58	B	2601-OL		-1.0	-0.9	1.2	-2.3	-2.1	

* Z-scores for information only; calculation based on assigned value for sum of α-, β-, γ-HBCDD (ub)



EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Olive Oil 2026 [EURL-PT-DPB_2601-OL]

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

04 August 2026

Annex 10: Participants' z-scores of HBCDDs - Charts

Test sample - Olive oil (2601-OL)

Z-scores of sum parameters and individual results

Calculation of z-score on basis of assigned value

$$z = (x - x_a) / x_a \cdot \sigma_{\text{prel}}$$

x_a : assigned value

x : participant's result

σ_{prel} : relative fitness-for-purpose-based relative standard deviation for proficiency assessment

20%: Evaluated individual HBCDD diastereomers and sum

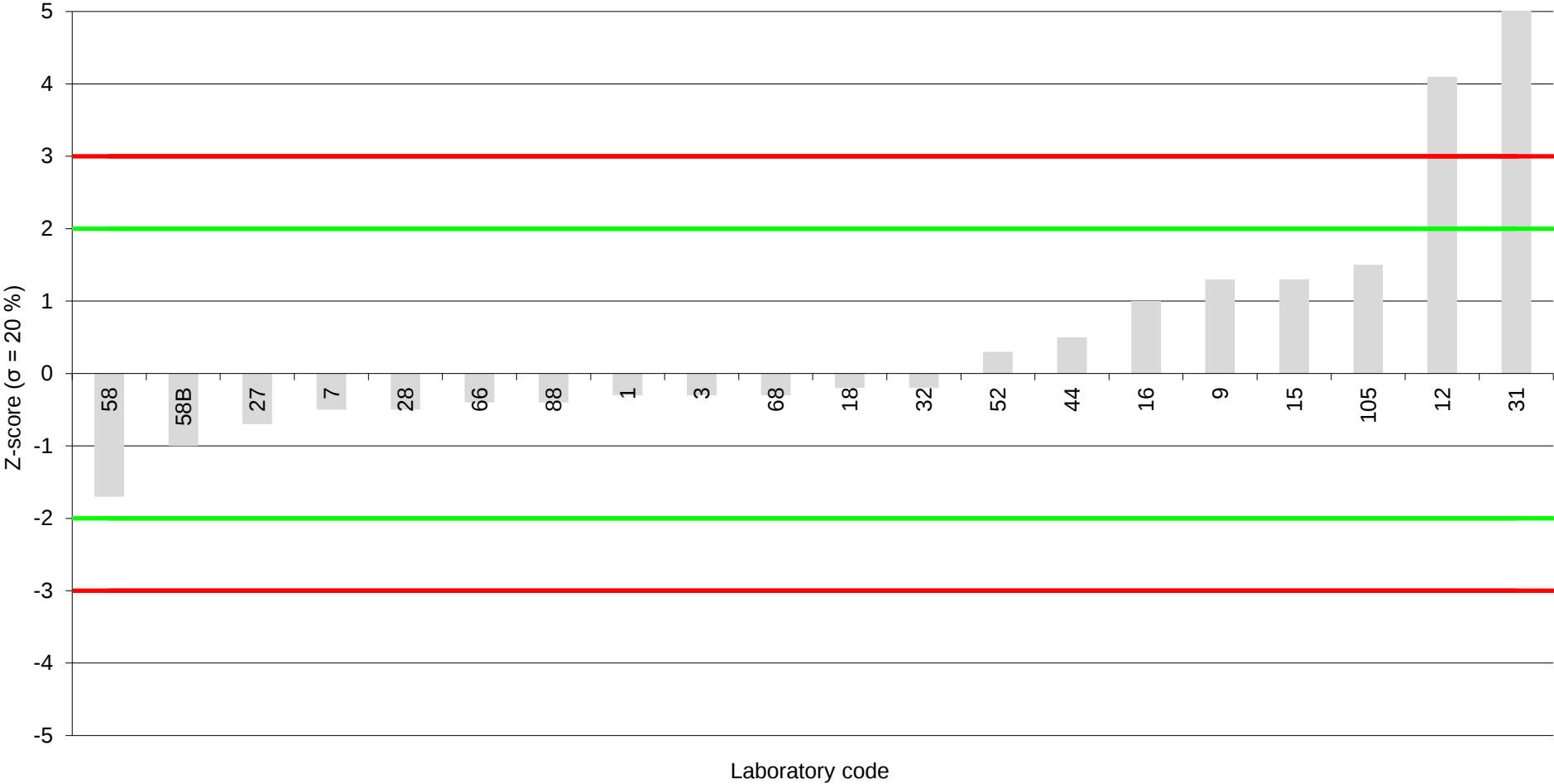
± 2 z-scores: 

± 3 z-scores: 

Olive oil (2601-OL)

Sum of α -, β -, γ -HBCDD ub

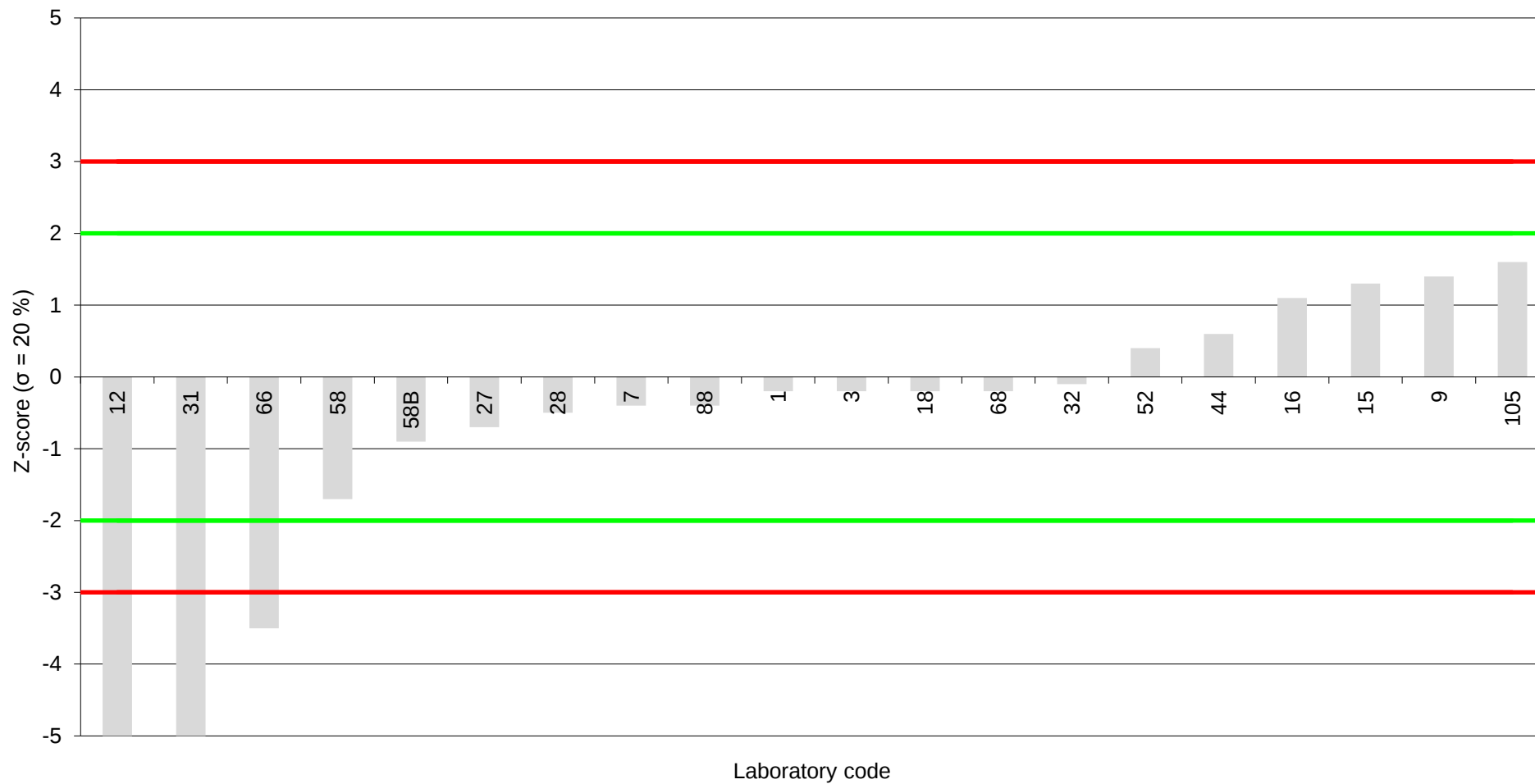
Assigned value: 0.328 $\mu\text{g/kg}$ product



Olive oil (2601-OL)

Sum of α -, β -, γ -HBCDD lb

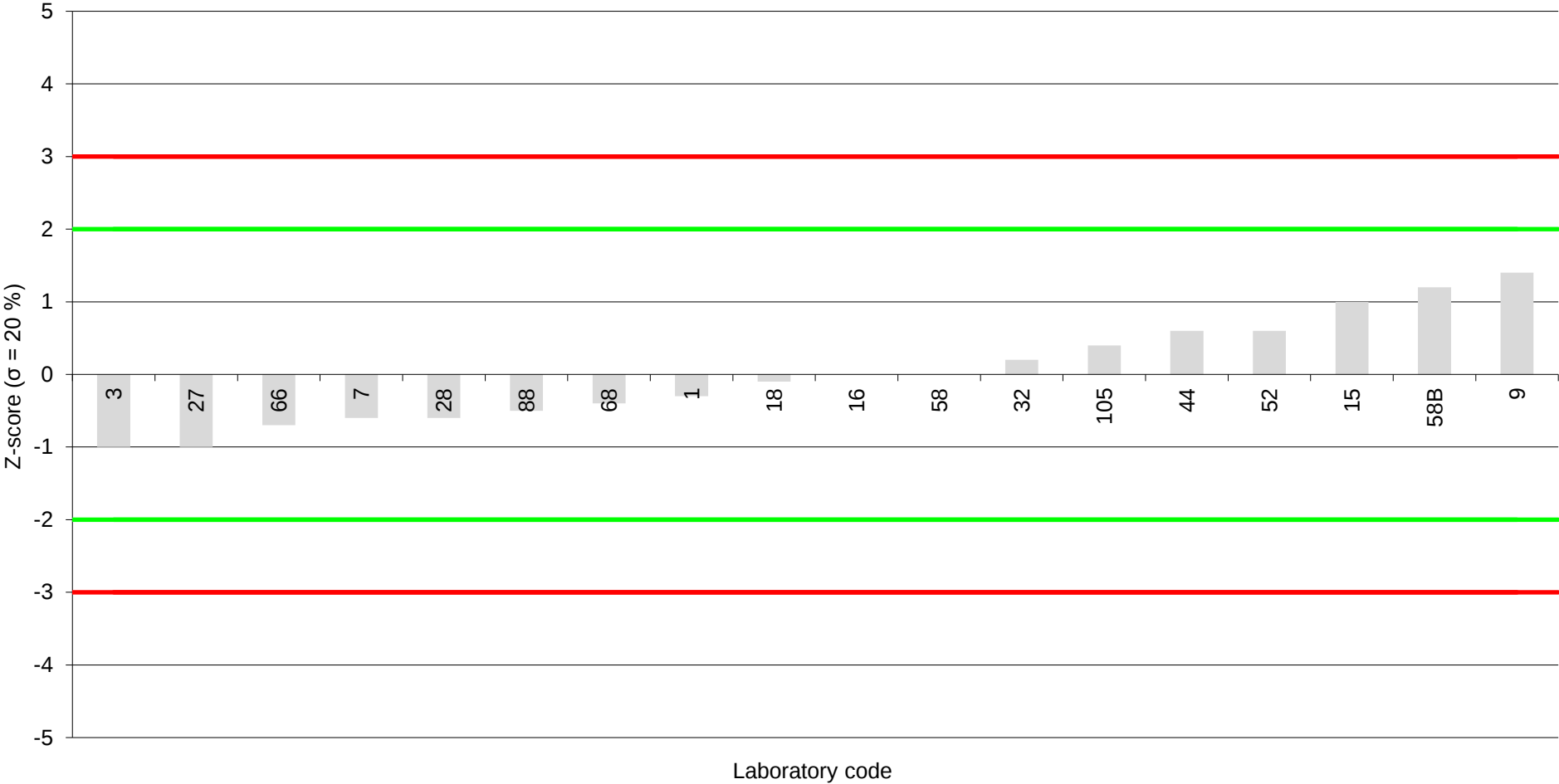
Assigned value: 0.323 $\mu\text{g/kg}$ product



Olive oil (2601-OL)

(+/-)- α -HBCDD

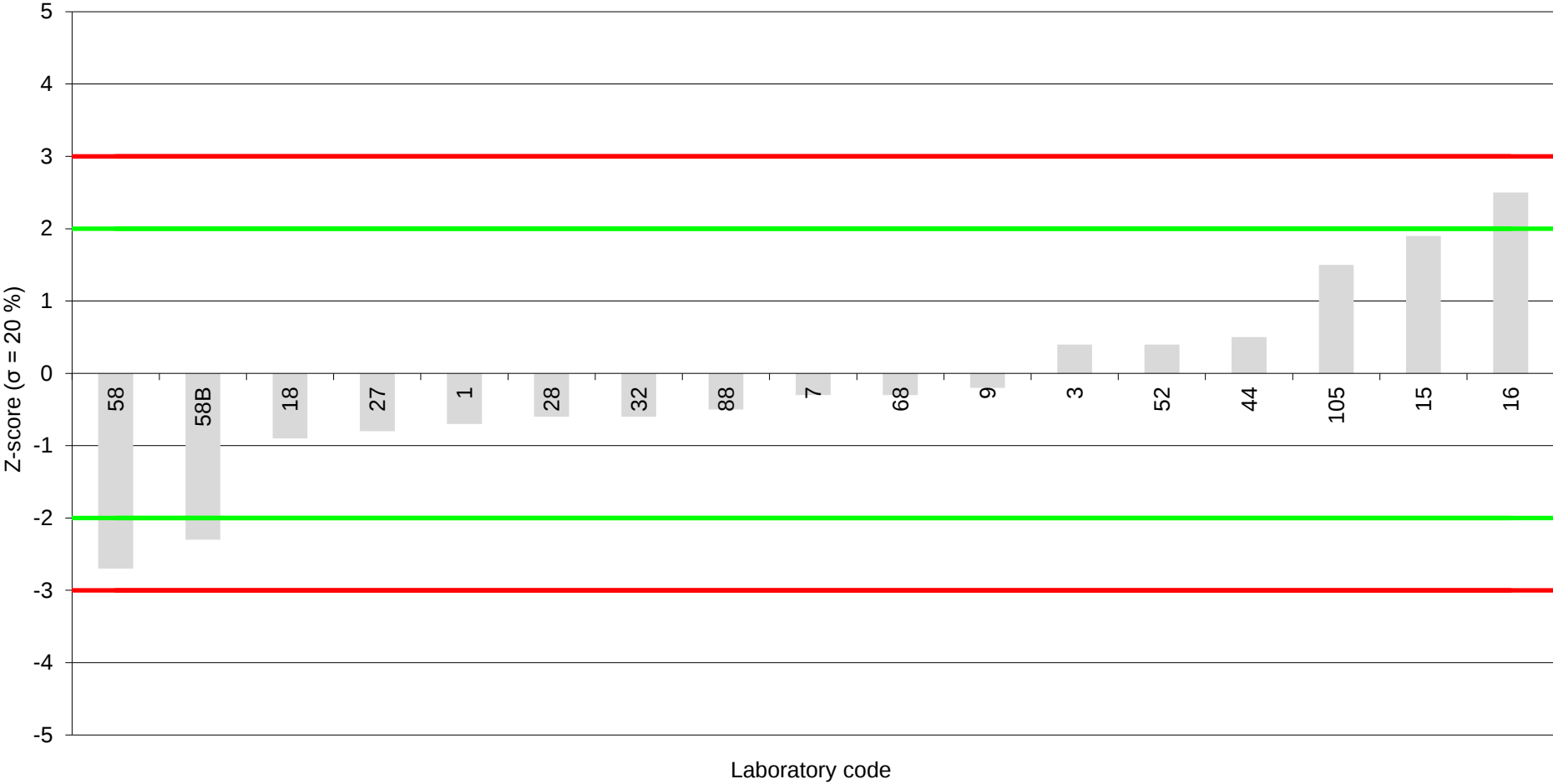
Assigned value: 0.117 $\mu\text{g/kg}$ product



Olive oil (2601-OL)

(+/-)-β-HBCDD

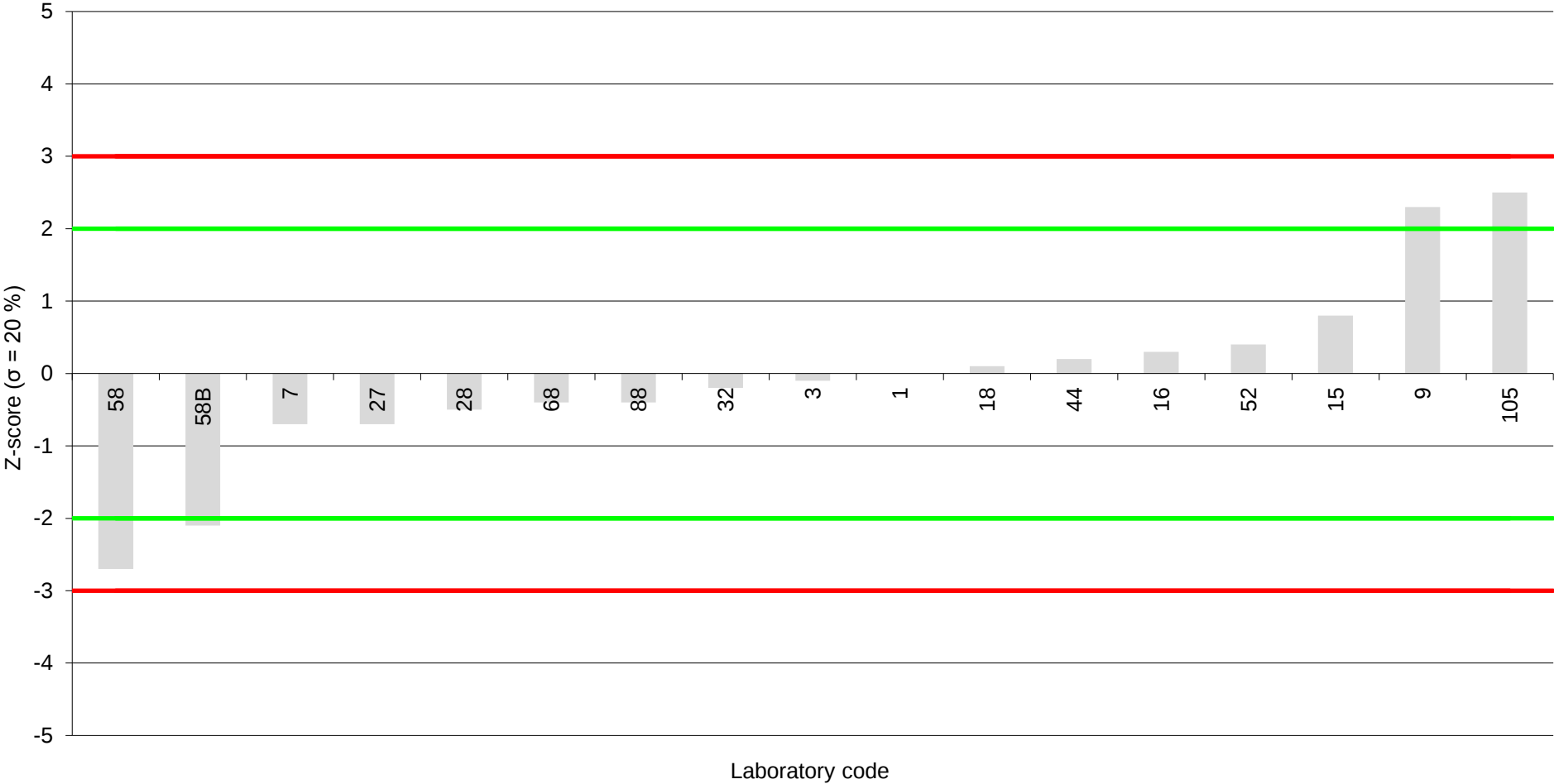
Assigned value: 0.102 µg/kg product



Olive oil (2601-OL)

(+/-)- γ -HBCDD

Assigned value: 0.112 $\mu\text{g/kg}$ product





EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Olive Oil 2026 [EURL-PT-DPB_2601-OL]

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

04 August 2026

Annex 11: Participants' methods for HBCDDs

Test sample - Olive oil (2601-OL)

LC	Data set	Sample	Accreditation according to ISO/IEC 17025	Weighed sample [g]	Use of isotope-labelled internal standards HBCDD diastereomers (yes/no)	Other internal standards HBCDD
1	A	2601-OL	no	1	yes	
2		2601-OL				
3	A	2601-OL	no	3	yes	
4		2601-OL				
5		2601-OL				
6		2601-OL				
7	A	2601-OL	no	5.0	yes	
8		2601-OL				
9	A	2601-OL	no	2.5	yes	
10		2601-OL				
11		2601-OL				
12	A	2601-OL	no	5	yes	
13		2601-OL				
14	A	2601-OL	no	5	yes	
15		2601-OL				
16	A	2601-OL	yes	3	yes	
17		2601-OL				
18	A	2601-OL	yes	2.5	yes	
19		2601-OL				
20		2601-OL				
21		2601-OL				
22		2601-OL				
23		2601-OL				
24		2601-OL				
25		2601-OL				
26		2601-OL				
27	A	2601-OL	yes	2.0	yes	
28	A	2601-OL	yes	1		
29		2601-OL				
30		2601-OL				
31	A	2601-OL	no	1.0	yes	
32		2601-OL				
33		2601-OL				
34		2601-OL				
35		2601-OL				
36		2601-OL				
37		2601-OL				
38		2601-OL				
39		2601-OL				
40		2601-OL				
41		2601-OL				
42		2601-OL				
43		2601-OL				
44	A	2601-OL	yes	1	yes	
45		2601-OL				
46		2601-OL				
47		2601-OL				
48		2601-OL				
49		2601-OL				
50		2601-OL				
51		2601-OL				
52	A	2601-OL	yes	3	yes	
53		2601-OL				
54		2601-OL				
55		2601-OL				
56		2601-OL				
57		2601-OL				
58	A	2601-OL	yes	1	yes	
59		2601-OL				
60		2601-OL				
61		2601-OL				
62		2601-OL				
63		2601-OL				
64		2601-OL				
65		2601-OL				
66	A	2601-OL	no	0.6	yes	
67		2601-OL				
68	A	2601-OL	no	10	yes	recovery standard: deuterated HBCDDs
69		2601-OL				
70		2601-OL				
71		2601-OL				
72		2601-OL				

Olive oil (2601-OL)
Methods HBCDDs - Accreditation, weighed sample, standards

LC	Data set	Sample	Accreditation according to ISO/IEC 17025	Weighed sample [g]	Use of isotope-labelled internal standards HBCDD diastereomers (yes/no)	Other internal standards HBCDD
73		2601-OL				
74		2601-OL				
75		2601-OL				
76		2601-OL				
77		2601-OL				
78		2601-OL				
79		2601-OL				
80		2601-OL				
81		2601-OL				
82		2601-OL				
83	A	2601-OL	no	0.5	no	13C-BDE155
84		2601-OL				
85		2601-OL				
86		2601-OL				
87		2601-OL				
88	A	2601-OL	yes	1		
89		2601-OL				
90		2601-OL				
91		2601-OL				
92		2601-OL				
93		2601-OL				
94		2601-OL				
95		2601-OL				
96		2601-OL				
97		2601-OL				
98		2601-OL				
99		2601-OL				
100		2601-OL				
101		2601-OL				
102		2601-OL				
103		2601-OL				
104		2601-OL				
105	A	2601-OL	no	9.92	yes	
106		2601-OL				
107		2601-OL				
108		2601-OL				
109		2601-OL				
Additional Sets						
58	B	2601-OL				

LC	Data set	Sample	Total HBCDD Internal standard	(+/-)- α -HBCDD Internal standard	(+/-)- β - HBCDD Internal standard	(+/-)- γ - HBCDD Internal standard	Total HBCDD Recovery standard	(+/-)- α -HBCDD Recovery standard	(+/-)- β - HBCDD Recovery standard	(+/-)- γ - HBCDD Recovery standard
1	A	2601-OL		13C- α -HBCD	13C-B-HBCD	13C-j-HBCD		-	-	-
2		2601-OL								
3	A	2601-OL		13C α HBCCDD	13C β HBCCDD	13C γ HBCCDD		d18-racbeta-1,2,5,6,9,10 - Hexabromocyklododecane	d18-racbeta-1,2,5,6,9,10 - Hexabromocyklododecane	d18-racbeta-1,2,5,6,9,10 - Hexabromocyklododecane
4		2601-OL								
5		2601-OL								
6		2601-OL								
7	A	2601-OL		α -HBCDD	β -HBCDD	γ -HBCDD		D18- β -HBCDD	D18- β -HBCDD	D18- β -HBCDD
8		2601-OL								
9	A	2601-OL		13C α fa	13C β eta	13C γ ama		dbhbcbdd	dbhbcbdd	dbhbcbdd
10		2601-OL								
11		2601-OL								
12	A	2601-OL		13C- α -HBCDD	13C- β -HBCDD	13C- γ -HBCDD				
13		2601-OL								
14	A	2601-OL	HBCDD							
15		2601-OL		13C12- α -HBCDD	13C12- β -HBCDD	13C12- γ -HBCDD		NA	NA	NA
16	A	2601-OL		13C α HBCCDD	13C γ HBCCDD	13C γ HBCCDD				
17		2601-OL								
18	A	2601-OL		13C- α -HBCDD	13C- β -HBCDD	13C- γ -HBCDD		d18- β -HBCDD	d18- β -HBCDD	d18- β -HBCDD
19		2601-OL								
20		2601-OL								
21		2601-OL								
22		2601-OL								
23		2601-OL								
24		2601-OL								
25		2601-OL								
26		2601-OL								
27	A	2601-OL		13C α -HBCDD	13C β -HBCDD	13C γ -HBCDD		2H- β -HBCDD	2H- β -HBCDD	2H- β -HBCDD
28	A	2601-OL		13C12- α HBCCD	13C12- β HBCCD	13C12- γ HBCCD		d18- β HBCCD	d18- β HBCCD	d18- β HBCCD
29		2601-OL								
30		2601-OL								
31	A	2601-OL		α HBCCDD (13C)	β HBCCDD (13C)	γ HBCCDD (13C)			D18- β HBCCDD	
32		2601-OL		13C α HBCCDD	13C β HBCCDD	13C γ HBCCDD				
33		2601-OL								
34		2601-OL								
35		2601-OL								
36		2601-OL								
37		2601-OL								
38		2601-OL								
39		2601-OL								
40		2601-OL								
41		2601-OL								
42		2601-OL								
43		2601-OL								
44	A	2601-OL		α -HBCDD (13C12)	β -HBCDD (13C12)	γ -HBCDD (13C12)				
45		2601-OL								
46		2601-OL								
47		2601-OL								
48		2601-OL								
49		2601-OL								
50		2601-OL								
51		2601-OL								
52	A	2601-OL								
53		2601-OL								
54		2601-OL								
55		2601-OL								
56		2601-OL								
57		2601-OL								
58	A	2601-OL		α -HBCDD -13C12	γ -HBCDD-13C12	γ -HBCDD-13C12		β -HBCDD -13C12	β -HBCDD -13C12	β -HBCDD -13C12
59		2601-OL								
60		2601-OL								
61		2601-OL								
62		2601-OL								
63		2601-OL								
64		2601-OL								
65		2601-OL								
66	A	2601-OL		C13 α HBCCD	C13 α HBCCD	C13 α HBCCD				
67		2601-OL								
68	A	2601-OL		13C12- α HBCCDD	13C12- β HBCCDD	13C12- γ HBCCDD		α HBCCDD-d18	β HBCCDD-d18	γ HBCCDD-d18
69		2601-OL								
70		2601-OL								
71		2601-OL								
72		2601-OL								

LC	Data set	Sample	Total HBCDD Internal standard	(+/-)- α -HBCDD Internal standard	(+/-)- β - HBCDD Internal standard	(+/-)- γ - HBCDD Internal standard	Total HBCDD Recovery standard	(+/-)- α -HBCDD Recovery standard	(+/-)- β - HBCDD Recovery standard	(+/-)- γ - HBCDD Recovery standard
73		2601-OL								
74		2601-OL								
75		2601-OL								
76		2601-OL								
77		2601-OL								
78		2601-OL								
79		2601-OL								
80		2601-OL								
81		2601-OL								
82		2601-OL								
83	A	2601-OL	13C-BDE155							
84		2601-OL								
85		2601-OL								
86		2601-OL								
87		2601-OL								
88	A	2601-OL		13C12-alphaHBCD	13C12-betaHBCD	13C12-gammaHBCD		d18-beta-HBCD	d18-beta-HBCD	d18-beta-HBCD
89		2601-OL								
90		2601-OL								
91		2601-OL								
92		2601-OL								
93		2601-OL								
94		2601-OL								
95		2601-OL								
96		2601-OL								
97		2601-OL								
98		2601-OL								
99		2601-OL								
100		2601-OL								
101		2601-OL								
102		2601-OL								
103		2601-OL								
104		2601-OL								
105	A	2601-OL		13C-aHBCD	13C-bHBCD	13C-gHBCD		29%	18%	25%
106		2601-OL								
107		2601-OL								
108		2601-OL								
109		2601-OL								
Additional Sets										
58	B	2601-OL		α -HBCDD -13C12	γ -HBCDD-13C12	γ -HBCDD-13C12		β -HBCDD -13C12	β -HBCDD -13C12	β -HBCDD -13C12

LC	Data set	Sample	Extraction						
			Sample preparation/pre-treatment	Extraction technique	Extraction solvent	Extraction time [h]	Extraction temperature [°C]	Extraction pressure [MPa]	
1	A	2601-OL	none	none					
2		2601-OL							
3	A	2601-OL							
4		2601-OL							
5		2601-OL							
6		2601-OL							
7	A	2601-OL							
8		2601-OL							
9	A	2601-OL		direct clean up on multilayer silica column and elutioon with DCM:hex 1:1					
10		2601-OL							
11		2601-OL							
12	A	2601-OL		Column extraction					
13		2601-OL							
14	A	2601-OL							
15		2601-OL	homogenization	Column extraction	after elution of PCDD/Fs, PCBs, the silica/H2SO4 column was eluted: 10% DCM/n-hexane and DCM:n-hexane (1:1, v/v)	0,5	room temp.	atm. pressure	
16	A	2601-OL							
17		2601-OL							
18	A	2601-OL							
19		2601-OL							
20		2601-OL							
21		2601-OL							
22		2601-OL							
23		2601-OL		no extraction					
24		2601-OL							
25		2601-OL							
26		2601-OL							
27	A	2601-OL							
28	A	2601-OL							
29		2601-OL							
30		2601-OL							
31	A	2601-OL		Mechanical shaking	Hexane/Dichloromethane (50/50)	0.33	20	Ambiant	
32		2601-OL							
33		2601-OL							
34		2601-OL							
35		2601-OL							
36		2601-OL							
37		2601-OL							
38		2601-OL							
39		2601-OL		no extraction needed QuECHERS					
40		2601-OL							
41		2601-OL							
42		2601-OL							
43		2601-OL							
44	A	2601-OL							
45		2601-OL							
46		2601-OL							
47		2601-OL		Cold extraction	dichlormethane:acetone 2:1	1.5	ambient	0.1	
48		2601-OL							
49		2601-OL							
50		2601-OL							
51		2601-OL							
52	A	2601-OL							
53		2601-OL							
54		2601-OL							
55		2601-OL		Dissolved in hexane	Hexane 100%	N/A	N/A	N/A	
56		2601-OL							
57		2601-OL							
58	A	2601-OL							
59		2601-OL							
60		2601-OL							
61		2601-OL							
62		2601-OL							
63		2601-OL		Dissolve in 2 mL hexane; Destruction with 10 mL conc. sulfuricacid; Extraction with 10 mL water; LC-MS/MS	Hexane/water (2/10)	appr. 1 min	Rt	-	
64		2601-OL							
65		2601-OL							
66	A	2601-OL							
67		2601-OL							
68	A	2601-OL	mixing with natriumsulfate	Column extraction, Cold extraction	DCM/Hexan 1/1	1-2 h	20	ambient	
69		2601-OL							
70		2601-OL							
71		2601-OL							
72		2601-OL							

Olive oil (2601-OL)
Methods HBCDDs - Extraction

LC	Data set	Sample	Extraction					
			Sample preparation/pre-treatment	Extraction technique	Extraction solvent	Extraction time [h]	Extraction temperature [°C]	Extraction pressure [MPa]
73		2601-OL						
74		2601-OL						
75		2601-OL						
76		2601-OL						
77		2601-OL						
78		2601-OL						
79		2601-OL						
80		2601-OL						
81		2601-OL						
82		2601-OL						
83	A	2601-OL	no	Liquid-liquid extraction	n-hexane/diethylether			
84		2601-OL						
85		2601-OL						
86		2601-OL						
87		2601-OL						
88	A	2601-OL		QuECHERS				
89		2601-OL						
90		2601-OL						
91		2601-OL						
92		2601-OL						
93		2601-OL						
94		2601-OL						
95		2601-OL						
96		2601-OL						
97		2601-OL						
98		2601-OL						
99		2601-OL						
100		2601-OL						
101		2601-OL						
102		2601-OL						
103		2601-OL						
104		2601-OL						
105	A	2601-OL		Soxhlet	Hexane:dichloromethane 50:50			
106		2601-OL						
107		2601-OL						
108		2601-OL						
109		2601-OL						
Additional Sets								
58	B	2601-OL						

LC	Data set	Sample	Clean-up											Final volume [µl]: HBCDD
			Gelchromatography	Silica/sulfuric acid column	Florisil column	Alumina column	Carbon column	Fully automated system	Semi-automated system	Solid Phase Extraction	Dispersive Solid Phase Extraction	Other columns / clean-up method (please specify)	Any additional information (e.g. SPE column, dSPE)	
1	A	2601-OL	no	yes	no	no	no		no	no	no			
2		2601-OL												
3	A	2601-OL	no	yes	no	no	no		no	no	no			
4		2601-OL												
5		2601-OL												
6		2601-OL												
7	A	2601-OL	no	no	no	no	no	PowerPrep	no	no	no	acid hydrolysis with sulphuric acid		40
8		2601-OL												
9	A	2601-OL	yes	yes	no	no	yes		no	no	no			200
10		2601-OL												
11		2601-OL												
12	A	2601-OL	no	yes	no	yes	yes		no	no	no			100
13		2601-OL												
14	A	2601-OL	no	no	no	no	no		no	no	no	no clean-up		20
15		2601-OL												
16	A	2601-OL	no	yes	no	no	no		no	no	no			50
17		2601-OL												
18	A	2601-OL	no	yes	no	no	no		no	no	no	liquid/liquid extraction		20
19		2601-OL												
20		2601-OL												
21		2601-OL												
22		2601-OL												
23		2601-OL												
24		2601-OL												
25		2601-OL												
26		2601-OL												
27	A	2601-OL	no	yes	yes	no	no		no	no	no			100
28		2601-OL	no	yes	no	no	no		no	no	no			1000
29		2601-OL												
30		2601-OL												
31	A	2601-OL	no	yes	no	no	no		no	no	no			200
32		2601-OL												
33		2601-OL												
34		2601-OL												
35		2601-OL												
36		2601-OL												
37		2601-OL												
38		2601-OL												
39		2601-OL												
40		2601-OL												
41		2601-OL												
42		2601-OL												
43		2601-OL												
44	A	2601-OL	yes	no	no	no	no		no	no	no	silica columns		500
45		2601-OL												
46		2601-OL												
47		2601-OL												
48		2601-OL												
49		2601-OL												
50		2601-OL												
51		2601-OL												
52	A	2601-OL	no	yes	yes	no	no		no	no	no			100
53		2601-OL												
54		2601-OL												
55		2601-OL												
56		2601-OL												
57		2601-OL												
58	A	2601-OL	yes	yes	no	no	no		no	no	no			250
59		2601-OL												
60		2601-OL												
61		2601-OL												
62		2601-OL												
63		2601-OL												
64		2601-OL												
65		2601-OL												
66	A	2601-OL	no	no	no	no	no		no	no	no			200
67		2601-OL												
68	A	2601-OL	no	yes	no	no	no		no	no	no			400
69		2601-OL												
70		2601-OL												
71		2601-OL												
72		2601-OL												

Olive oil (2601-OL)
Methods HBCDDs - Clean-up

LC	Data set	Sample	Clean-up											Final volume [µl]: HBCDD
			Gelchromatography	Silica/sulfuric acid column	Florisil column	Alumina column	Carbon column	Fully automated system	Semi-automated system	Solid Phase Extraction	Dispersive Solid Phase Extraction	Other columns / clean-up method (please specify)	Any additional information (e.g. SPE column, dSPE)	
73		2601-OL												
74		2601-OL												
75		2601-OL												
76		2601-OL												
77		2601-OL												
78		2601-OL												
79		2601-OL												
80		2601-OL												
81		2601-OL												
82		2601-OL												
83	A	2601-OL	no	no	no	no	no		no	no	no	Sulfuric acid treatment and silica column		200
84		2601-OL												
85		2601-OL												
86		2601-OL												
87		2601-OL												
88	A	2601-OL	no	yes	no	no	no		no	no	no			1000
89		2601-OL												
90		2601-OL												
91		2601-OL												
92		2601-OL												
93		2601-OL												
94		2601-OL												
95		2601-OL												
96		2601-OL												
97		2601-OL												
98		2601-OL												
99		2601-OL												
100		2601-OL												
101		2601-OL												
102		2601-OL												
103		2601-OL												
104		2601-OL												
105	A	2601-OL	no	yes	no	no	no		no	no	no			1000
106		2601-OL												
107		2601-OL												
108		2601-OL												
109		2601-OL												
Additional Sets														
58	B	2601-OL												

EURL Proficiency Study on the Determination of PCDD/Fs, PCBs, PBDEs and HBCDDs in Olive Oil 2026 [EURL-PT-DPB_2601-OL]
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Olive oil (2601-OL)
Methods HBCDDs - Detection, LOQ, measurement uncertainty

LC	Data set	Sample	Chromatographic separation and detection method			Chromatographic separation: Stationary phase	Detector	Limit of quantification	Measurement uncertainty
			Chromatographic separation	Injection	Injected volume [µl]			Determination of LOQ	Estimation
1	A	2601-OL	LC		10		MS/MS	by validation on samples with low spikes	according NEN-7779
2		2601-OL							
3	A	2601-OL	LC		10	Hypersil Gold C18, 100x2,1mm, 1,9µm	MS/MS	LOD and LOQ were estimated based on analysis of 10 blank spiked samples	MU were estimated based on precision and truenes from fortyfication experiment
4		2601-OL							
5		2601-OL							
6		2601-OL							
7	A	2601-OL	LC		5	BEH C18 (50 mm x 2.1 mm; 1.7 µm)	HRMS	The LOQ was estimated following the "Calibration Standards" approach. This methodology is reported in the Guidance Document on the Estimation of LOD and LOQ for Measurements in the Field of Contaminants in Feed and Food.	The MU was estimated using the Top-Down approach reported in the Guidance Document on Measurement Uncertainty for Laboratories performing PCDD/F and PCB Analysis using Isotope Dilution Mass Spectrometry
8		2601-OL							
9	A	2601-OL	LC		70	Luna PHP	MS/MS	lowest validated level (fortification experiments)	
10		2601-OL							
11		2601-OL							
12	A	2601-OL	LC	Direct	5	C18	MS/MS	The lowest point of calibration standard, and comparison of IS in the oil sample and calibration samples	Estimated based on other matrix
13		2601-OL							
14	A	2601-OL	GC	splitless	2	DB-5ht	HRMS	LOQ = 3 x LOD, LOD evaluated as 3 times of noise	Expanded U: Ue = k x Uc (k = 2). MU of type A is evaluated using internal RM. U of type B (includes i.a. uncertainty of weighing, volume measurements, etc.), Uc = combined uncertainty is summed uncertainty of type A and B according the law of propagation of measurement uncertainty.
15		2601-OL							
16	A	2601-OL	LC	LC	5	C-18	MS/MS	concentration responding to 9:1 s/n ratio in calibration solutions	expanded uncertainty from replicates of reference material
17		2601-OL							
18	A	2601-OL	LC		3	Hypersil Gold	MS/MS	S/N=10	GUM METHOD
19		2601-OL							
20		2601-OL							
21		2601-OL							
22		2601-OL							
23		2601-OL							
24		2601-OL							
25		2601-OL							
26		2601-OL							
27	A	2601-OL	LC	ESI	4		MS/MS	lowest point of calibration with S/N > 10	According to "Combine MU calculation V1.1" document
28	A	2601-OL							
29		2601-OL					MS/MS	2 times higher then Blanks and S/N over 10	Profficiency testings and spiked samples
30		2601-OL							
31	A	2601-OL	LC	UPLC	2	Eclipse Plus C18, 2.1 x 100mm	MS/MS	Lowest point of validation	40 % - This is the uncertainty measurement we use for accredited food samples. We are not accredited for oil matrices.
32		2601-OL							
33		2601-OL							
34		2601-OL							
35		2601-OL							
36		2601-OL							
37		2601-OL							
38		2601-OL							
39		2601-OL							
40		2601-OL							
41		2601-OL							
42		2601-OL							
43		2601-OL							
44	A	2601-OL	LC		10	C18	MS/MS	0.05	from RSD and bias
45		2601-OL							
46		2601-OL							
47		2601-OL							
48		2601-OL							
49		2601-OL							
50		2601-OL							
51		2601-OL							
52	A	2601-OL	LC		10		HRMS		
53		2601-OL							
54		2601-OL							
55		2601-OL							
56		2601-OL							
57		2601-OL							
58	A	2601-OL	LC		20	Kinetex XB-C18 2.6 mm 100A - 100 x 2.10 mm	MS/MS	LOQs estimated via spiked matrix samples: 0.100 ng/g	NORDTEST
59		2601-OL							
60		2601-OL							
61		2601-OL							
62		2601-OL							
63		2601-OL							
64		2601-OL							
65		2601-OL							

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

Olive oil (2601-OL)
Methods HBCDDs - Detection, LOQ, measurement uncertainty

LC	Data set	Sample	Chromatographic separation and detection method				Detector	Limit of quantification Determination of LOQ	Measurement uncertainty Estimation
			Chromatographic separation	Injection	Injected volume [µl]	Chromatographic separation: Stationary phase			
66	A	2601-OL	LC	Direct	5	C18	MS/MS, LRMS	Replicate analysis of a reference sample with appr. 0,8 µg/kg. LOQ calculated as 10 times signal to noise	Calculated from triplicate analysis of the PT sample
67		2601-OL							
68	A	2601-OL	LC		18	C18	MS/MS	ten point equidistant calibration in Matrix at the expected LOQ using DIN 32645 (LOQ = 0,01 µg/kg)	
69		2601-OL							
70		2601-OL							
71		2601-OL							
72		2601-OL							
73		2601-OL							
74		2601-OL							
75		2601-OL							
76		2601-OL							
77		2601-OL							
78		2601-OL							
79		2601-OL							
80		2601-OL							
81		2601-OL							
82		2601-OL							
83	A	2601-OL	GC	PTV	6	DB5MS 30 m	LRMS	10 times the standard deviation of the blanksample	the square root of the sum (bias and standard deviation included)
84		2601-OL							
85		2601-OL							
86		2601-OL							
87		2601-OL							
88	A	2601-OL	LC		10		MS/MS	2 times higher than Blanks and S/N over 10	profficiency testings and spiked samples
89		2601-OL							
90		2601-OL							
91		2601-OL							
92		2601-OL							
93		2601-OL							
94		2601-OL							
95		2601-OL							
96		2601-OL							
97		2601-OL							
98		2601-OL							
99		2601-OL							
100		2601-OL							
101		2601-OL							
102		2601-OL							
103		2601-OL							
104		2601-OL							
105	A	2601-OL	LC		10	C18	MS/MS	0.05 µg/kg	30%
106		2601-OL							
107		2601-OL							
108		2601-OL							
109		2601-OL							
Additional Sets									
58	B	2601-OL							