Australian Government
Department of Industry, Science and Resources

National Measurement Institute

# Proficiency Test Final Report AQA 24-14 PFAS in Biota and Food

February 2025

## ACKNOWLEDGMENTS

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I would like to thank the management and staff of the participating laboratories for supporting the study. It is only through widespread participation that we can provide an effective service to laboratories.

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NATA WORLD RECOGNISED ACCREDITATION Accredited for compliance with ISO/IEC 17043

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## SUMMARY

AQA 24-14 PFAS in Biota and Food commenced in July 2024. Twenty-one laboratories registered to participate, and 20 participants submitted results by the due date.

The sample set consisted of a spiked prawn sample (Sample S1), a spiked carrot sample (Sample S2) and a spiked milk powder sample (Sample S3). The per- and polyfluoroalkyl substances (PFAS) analytes assessed in this study were: PFBS, PFPeS, PFHxS (total and linear), PFHpS, PFOS (total and linear), PFNS, PFDS, PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFNA, PFDA, PFUdA, PFDoA, PFTrDA, PFTeDA, PFOSA, MeFOSA, EtFOSA, MeFOSAA, EtFOSAA, EtFOSE, 6:2FTS, 10:2FTS, 5:3FTCA, GenX, ADONA, 9Cl-PF3ONS and 11Cl-PF3OUdS.

Of 1222 possible results, 951 (78%) were numeric results. One hundred were a 'less than' value (< *x*) or Not Reported (NR), and 171 results were Not Tested (NT).

The assigned values for all scored analytes were the robust averages of participants' results, and associated uncertainties were estimated from the robust standard deviations.

**Traceability**: The consensus of participants' results is not traceable to any external reference, so although expressed in SI units, metrological traceability has not been established.

The outcomes of the study were assessed against the aims as follows:

- *Assess the ability of participants to correctly identify PFAS in biota and food matrices.*

Laboratory **7** reported numeric results for all 72 scored analytes across all matrices.

Eleven participants (Laboratories **2**, **3**, **4**, **5**, **9**, **12**, **13**, **14**, **17**, **19** and **21**) did not report numeric results for analytes that they tested for and were spiked into the samples (total of 68 results).

Six participants reported analytes that were not spiked into the samples (total of 18 results).

- *Compare the performances of participants and assess their accuracy in the measurement of PFAS in biota and food matrices.*

Of 915 *z*-scores, 809 (88%) returned $|z| \leq 2.0$, indicating an acceptable performance.

Of 909 $E_n$-scores, 640 (70%) returned $|E_n| < 1.0$, indicating agreement of the participant's result with the assigned value within their respective expanded uncertainties.

Laboratory **7** returned acceptable *z*-scores and $E_n$-scores for all 72 scored analytes.

- *Evaluate participants' test methods for PFAS in biota and food analysis.*

Participants used a wide variety of methods for extraction and analysis. Most participants did not base their methodology on a standard method. Results were generally compatible.

Most participants used the same analysis procedure across all three matrices (prawn, carrot and milk powder) with only minor differences, e.g. sample mass used for analysis, or volume of reagent added for pre-treatment.

- *Develop the practical application of traceability and measurement uncertainty.*

Of 951 numeric results reported for analytes of interest in this study, 896 (94%) were reported with an associated expanded measurement uncertainty.

Although it is a requirement of ISO/IEC 17025 that laboratories have procedures to estimate the uncertainty, several laboratories are still reporting potentially unrealistically small or large relative uncertainties for routine PFAS analysis. The magnitude of the reported measurement

uncertainties for spiked analytes in this study was within the range 0.35% to 143% of the reported value.

- *Compare the performance of participants with their past performance.*

NMIA has been conducting PFAS in biota and food proficiency testing (PT) studies since 2016.

The proportion of total possible results being reported by participants as numeric results has remained fairly consistent, even with the significantly increased number of PFAS analytes over the last few studies, indicating that participants have the capacity to analyse a wide range of PFAS, including novel analytes, at relevant mass fractions.

AQA 16-06 included 6 analytes, and 92% of scored results returned an acceptable *z*-score. The present study AQA 24-14 included 78 analytes, and 88% of scored results returned an acceptable *z*-score.

- *Produce materials that can be used in method validation and as control samples*.

The test samples of this PT study are homogeneous and are well characterised. Surplus samples are available for purchase from NMIA and can be used for quality control and method validation purposes.

# 1 INTRODUCTION

## 1.1 NMIA Proficiency Testing Program

The National Measurement Institute, Australia (NMIA) is responsible for Australia's national measurement infrastructure, providing a range of services including a chemical proficiency testing program.

Proficiency testing (PT) is the 'evaluation of participant performance against pre-established criteria by means of interlaboratory comparison'.[1] NMIA PT studies target chemical testing in areas of high public significance such as trade, environment, law enforcement and food safety. NMIA offers studies in:

- pesticide residues in soil, water, fruit, vegetables and herbs;
- petroleum hydrocarbons and phenols in soil and water;
- per- and polyfluoroalkyl substances (PFAS) in soil, biosolid, water, biota and food;
- inorganic analytes in soil, water, filters, food and pharmaceuticals;
- controlled drug assay, drugs in wipes and clandestine laboratory; and
- allergens in food.

## 1.2 Study Aims

The aims of the study were to:

- assess the ability of participants to correctly identify PFAS in biota and food matrices.
- compare the performances of participants and assess their accuracy in the measurement of PFAS in biota and food matrices;
- evaluate participants' test methods for PFAS in biota and food analysis;
- develop the practical application of traceability and measurement uncertainty;
- compare the performance of participants with their past performance; and
- produce materials that can be used in method validation and as control samples.

The choice of test method was left to the participating laboratories.

## 1.3 Study Conduct

The conduct of NMIA proficiency tests is described in the NMIA Study Protocol for Proficiency Testing.[2] The statistical methods used are described in the NMIA Chemical Proficiency Testing Statistical Manual.[3] These documents have been prepared with reference to ISO/IEC 17043,[1] and The International Harmonized Protocol for the Proficiency Testing of Analytical Chemistry Laboratories.[4]

NMIA is accredited by the National Association of Testing Authorities, Australia (NATA) to ISO/IEC 17043:2023 as a provider of proficiency testing schemes. This study falls within the scope of NMIA's accreditation.

## 2 STUDY INFORMATION

### 2.1 Study Timetable

The timetable of the study was:

| | |
|---|---|
| Invitations sent | 1/07/2024 |
| Samples sent | 26/08/2024 |
| Results due | 14/10/2024 |
| Interim Report | 16/10/2024 |
| Preliminary Report | 17/10/2024 |

### 2.2 Participation and Laboratory Code

Twenty-one laboratories registered to participate in this study. All participants were assigned a confidential laboratory code number for this study. Twenty participants submitted results by the results due date.

### 2.3 Selection of PFAS Analytes and Test Material Preparation

Participants were provided with a list of potential PFAS analytes that were spiked into the study's samples, as presented in Table 1.

Table 1 Potential Spiked PFAS Analytes

| | | | |
|---|---|---|---|
| PFBS | PFHxA | PFOSA | GenX |
| PFPeS | PFHpA | MeFOSA | ADONA |
| PFHxS | PFOA | EtFOSA | PFEESA |
| PFHpS | PFNA | MeFOSAA | PFMPA |
| PFOS | PFDA | EtFOSAA | PFMBA |
| PFNS | PFUdA | MeFOSE | NFDHA |
| PFDS | PFDoA | EtFOSE | 9Cl-PF3ONS |
| PFUdS | PFTrDA | 4:2FTS | 11Cl-PF3OUdS |
| PFDoS | PFTeDA | 6:2FTS | 3:3FTCA |
| PFTrDS | PFHxDA | 8:2FTS | 5:3FTCA |
| PFBA | PFODA | 10:2FTS | 7:3FTCA |
| PFPeA | FOUEA | 8:2diPAP | |

Consideration was given to USEPA Method 1633 (applicable to aqueous, solid, biosolids and tissue samples) when selecting PFAS analytes and their spiked values for this study.[5]

Samples S1 and S3 were prepared in June 2024. Sample S2 was prepared in August 2022, as part of previous NMIA PT study AQA 22-14.[6] Care was taken to avoid any PFAS contamination during sample preparation. The prepared samples were:

- Sample S1: Prawn paste (5 g portions) spiked with 29 different PFAS analytes.
- Sample S2: Carrot puree (30 g portions) spiked with 22 different PFAS analytes.
- Sample S3: Milk powder (20 g portions) spiked with 27 different PFAS analytes.

Details of spiked analytes and values are presented in Table 2. Further sample preparation details can be found in Appendix 1.

Table 2 Spiked Values of Test Samples

| Analyte | Sample S1 Prawn (µg/kg) | Sample S2 Carrot (µg/kg) | Sample S3 Milk Powder (µg/kg) |
|---|---|---|---|
| PFBS | 1.34 | 0.891 | 1.32 |
| PFPeS | Not Spiked | 7.47 | 0.708 |
| PFHxS | 1.89 | 6.61 | 0.664 |
| PFHxS (linear) | 1.89 | 6.61 | 0.664 |
| PFHpS | 1.44 | 3.00 | 0.668 |
| PFOS | 2.78 | 2.12 | 0.277 |
| PFOS (linear) | 2.19 | 2.12 | 0.218 |
| PFNS | 9.65 | 1.72 | 0.954 |
| PFDS | 6.77 | 6.80 | 0.958 |
| PFBA | 5.34 | 1.19 | 3.28 |
| PFPeA | 1.50 | 2.20 | 1.48 |
| PFHxA | 4.02 | 7.45 | 0.996 |
| PFHpA | 4.99 | 1.50 | 0.997 |
| PFOA | 2.00 | 1.20 | 0.695 |
| PFNA | 0.998 | 2.31 | 0.499 |
| PFDA | 1.18 | 9.47 | 0.803 |
| PFUdA | 1.21 | Not Spiked | 1.01 |
| PFDoA | Not Spiked | Not Spiked | 1.10 |
| PFTrDA | 7.98 | Not Spiked | 1.19 |
| PFTeDA | 1.80 | Not Spiked | 1.49 |
| PFOSA | 2.99 | 4.95 | Not Spiked |
| MeFOSA | 7.98 | 4.99 | Not Spiked |
| EtFOSA | 7.98 | 3.99 | Not Spiked |
| MeFOSAA | 7.98 | Not Spiked | 1.99 |
| EtFOSAA | Not Spiked | Not Spiked | 1.99 |
| EtFOSE | 7.98 | Not Spiked | Not Spiked |
| 6:2FTS | 9.53 | 1.89 | Not Spiked |
| 10:2FTS | Not Spiked | Not Spiked | 1.92 |
| 5:3FTCA | 24.8 | Not Spiked | Not Spiked |
| GenX | 10.1 | 11.1 | 0.994 |
| ADONA | 9.47 | 14.0 | 0.936 |
| 9Cl-PF3ONS | 23.2 | Not Spiked | 0.926 |
| 11Cl-PF3OUdS | 23.4 | Not Spiked | 0.936 |

## 2.4 Homogeneity and Stability of Test Materials

The process used to prepare, store and dispatch Sample S1 has been demonstrated in previous NMIA PFAS in biota and food PT studies to produce sufficiently homogeneous and stable

samples. Sample S2 has been demonstrated previously in AQA 22-14 to be sufficiently homogeneous and stable.[6]

As Sample S3 was a new matrix type introduced in this study, homogeneity and stability testing was conducted for this sample. The samples were demonstrated to be sufficiently homogeneous and stable for the evaluation of participants' performance in this study.

The stability of all three samples was also assessed by comparing the results returned by participants with the spiked values. Assigned values for scored analytes were within 73% to 108%, 73% to 111% and 70% to 95% of the spiked values for Samples S1, S2 and S3 respectively. These values are similar to those observed in previous NMIA PFAS in biota and food PT studies, and provides support for the stability of these analytes.

Further details on the homogeneity and stability assessment are given in Appendix 2.

### 2.5 Test Material Storage and Dispatch

After preparation, the test materials were dispensed into sample tubes, labelled and shrink-wrapped. Prior to sample dispatch, the samples were stored at -20 °C.

Samples were packed into insulated polystyrene foam boxes with cooler bricks and sent by courier on 26 August 2024.

The following items were packaged with the samples:

- a covering letter which included a description of the test samples and instructions for participants; and
- a form for participants to confirm the receipt and condition of the samples.

An Excel spreadsheet for the electronic reporting of results was emailed to all participants.

### 2.6 Instructions to Participants

Participants were instructed as follows:

- Quantitatively analyse the samples for PFAS, using your routine test method and report results in units of µg/kg on as received basis for all samples.
- Thaw out the Samples S1 and S2 and mix it thoroughly before subsampling.
- Keep the milk powder sample COVERED to avoid moisture absorption.
- If analyses cannot be commenced on the day of receipt, please STORE THE SAMPLES FROZEN.
- Report results using the electronic results sheet emailed to you.
- For each analyte report a single result expressed as if reporting to a client (i.e. corrected for recovery or not, according to your standard procedure, but state if results are corrected on the result sheet). This figure will be used in all statistical analysis in the study report. Report results in units of µg/kg on an as received basis for all samples.
- For each analyte report the associated expanded measurement uncertainty as µg/kg (e.g. 0.50 ± 0.02 µg/kg), if determined.
- No limit of reporting has been set for this study. Report results as you would to a client, applying the limit of reporting of the method used for analysis.
- Report any listed analyte not tested as NT.

- Please complete the method details and report the basis of your uncertainty estimates as required by the results sheet.
- If determined, report your internal standard percentage recovery. This will be presented in the report for information only.
- Return the completed results sheet by email (proficiency@measurement.gov.au) by 30 September 2024.

The results due date was later to 14 October 2024 for all participants.

### 2.7 Interim Report and Preliminary Report

An Interim Report was emailed to all participants on 16 October 2024.

A Preliminary Report was emailed to all participants on 17 October 2024. This report included a summary of the results reported by participants, assigned values, performance coefficients of variation (PCVs), *z*-scores and $E_n$-scores for each analyte in this study.

No data from the Preliminary Report has been changed in this Final Report.

## 3 PARTICIPANT LABORATORY INFORMATION

### 3.1 Participants' Test Methods

Participants were requested to provide information about their methodology. Responses are presented in Appendix 4.

### 3.2 Basis of Participants' Measurement Uncertainty Estimates

Participants were requested to provide information about their basis of measurement uncertainty (MU). Responses are presented in Table 3. Responses may be modified so that the participant cannot be identified.

Table 3 Basis of Participants' Uncertainty Estimate

| Lab. Code | Approach to Estimating MU | Information Sources for MU Estimation* | | Guide Document for Estimating MU |
|---|---|---|---|---|
| | | Precision | Method Bias | |
| 1 | Top Down - precision and estimates of the method and laboratory bias<br>Coverage factor not reported | Control samples - SS | Recoveries of SS | NATA - Estimating and reporting MU of chemical test results |
| 2 | Top Down - precision and estimates of the method and laboratory bias<br>k = 2 | Control samples<br>Duplicate analysis<br>Instrument calibration | Instrument calibration<br>Recoveries of SS<br>Standard purity | ISO/GUM |
| 3 | Top Down - precision and estimates of the method and laboratory bias<br>Coverage factor not reported | Control samples - RM<br>Duplicate analysis | | Eurachem/CITAC Guide |
| 4 | Standard deviation of replicate analyses multiplied by 2 or 3<br>k = 2 | Control samples - SS<br>Duplicate analysis | Recoveries of SS | Eurachem/CITAC Guide |
| 5 | Top Down - precision and estimates of the method and laboratory bias<br>k = 2 | Control samples<br>Duplicate analysis | CRM<br>Standard purity | ISO/GUM |
| 6 | Standard deviation of replicate analyses multiplied by 2 or 3<br>k = 2 | Standard deviation from PT studies only | | ASTM E2254-13 |
| 7 | Top Down - precision and estimates of the method and laboratory bias<br>k = 2 | Control samples - CRM<br>Duplicate analysis<br>Instrument calibration | CRM<br>Laboratory bias from PT studies<br>Recoveries of SS | NMI Uncertainty Course |
| 8 | Standard deviation of replicate analyses multiplied by 2 or 3<br>Uncertainty calculated as 3 x SD of replicates<br>Coverage factor not reported | Control samples - SS<br>Duplicate analysis<br>Instrument calibration | Recoveries of SS | Eurachem/CITAC Guide |
| 9 | Top Down - precision and estimates of the method and laboratory bias<br>k = 2 | Control samples - CRM<br>Duplicate analysis<br>Instrument calibration | CRM<br>Recoveries of SS<br>Standard purity | Eurachem/CITAC Guide |

| Lab. Code | Approach to Estimating MU | Information Sources for MU Estimation* | | Guide Document for Estimating MU |
|---|---|---|---|---|
| | | Precision | Method Bias | |
| 10 | Standard deviation of replicate analyses multiplied by 2 or 3<br>k = 2 | Control samples - SS | Recoveries of SS | ISO/GUM |
| 12 | Top Down - precision and estimates of the method and laboratory bias<br>k = 2 | Control samples - RM<br>Duplicate analysis | CRM<br>Laboratory bias from PT studies<br>Recoveries of SS | Nordtest Report TR537 |
| 13 | Top Down - precision and estimates of the method and laboratory bias<br>Coverage factor not reported | Duplicate analysis<br>Instrument calibration | Instrument calibration<br>Recoveries of SS | ISO/GUM |
| 14 | Standard deviation of replicate analyses multiplied by 2 or 3<br>Measurement Uncertainty (U) estimated from the standard deviation (u) of replicate recovery samples using the expression U = 2 x u.<br>k = 2 | Control samples - SS | | Statistics and Chemometrics for Analytical Chemistry, Miller and Miller, 5th Edition |
| 15 | Standard deviation of replicate analyses multiplied by 2 or 3<br>Coverage factor not reported | Control samples - SS<br>Duplicate analysis<br>Instrument calibration | Instrument calibration<br>Recoveries of SS<br>Standard purity | Standard deviation |
| 16 | Bottom Up (ISO/GUM, fish bone/cause and effect diagram)<br>k = 2 | Duplicate analysis | Instrument calibration<br>Standard purity | ISO/GUM |
| 17 | Top Down - precision and estimates of the method and laboratory bias<br>Coverage factor not reported | Control samples - SS<br>Duplicate analysis<br>Instrument calibration | Instrument calibration<br>Laboratory bias from PT studies<br>Recoveries of SS<br>Standard purity | |
| 18 | Top Down - precision and estimates of the method and laboratory bias<br>k = 2 | Control samples - SS | Recoveries of SS | Other guide document |
| 19 | Standard deviation of triplicate measurements<br>Coverage factor not reported | Standard deviation from PT studies only | | |
| 20 | Standard deviation of replicate analyses multiplied by 2 or 3<br>Coverage factor not reported | Duplicate analysis | Recoveries of SS | Nordtest Report TR537 |
| 21 | Standard deviation of triplicate measurements<br>Coverage factor not reported | Standard deviation from PT studies only | | |
| | | Control samples - RM<br>Duplicate analysis | | |

* SS = Spiked Samples, RM = Reference Material, CRM = Certified Reference Material

### 3.3 Participants' Comments

Participants were invited to make comments on the samples, this PT study, or suggestions for future studies. Such feedback may be useful in improving future studies. Participants' comments are presented in Table 4. Responses may be modified so that the participant cannot be identified.

Table 4 Participants' Comments

| Lab. Code | Sample | Participant's Comments |
|---|---|---|
| 18 | S2 | PFHxS and PFOS always reported Total. PFDoS found traces below reporting limits. |
| 21 | S2 | Did not perform on carrot. |

# 4 PRESENTATION OF RESULTS AND STATISTICAL ANALYSIS

## 4.1 Results Summary

Participant results are presented in Tables 5 to 82, with summary statistics: robust average, median, mean, number of numeric results (N), maximum (Max), minimum (Min), robust standard deviation (Robust SD) and robust coefficient of variation (Robust CV), as well as other estimates of analyte mass fraction. Bar charts of results and performance scores are presented in Figures 2 to 79. An example chart with interpretation guide is shown in Figure 1.

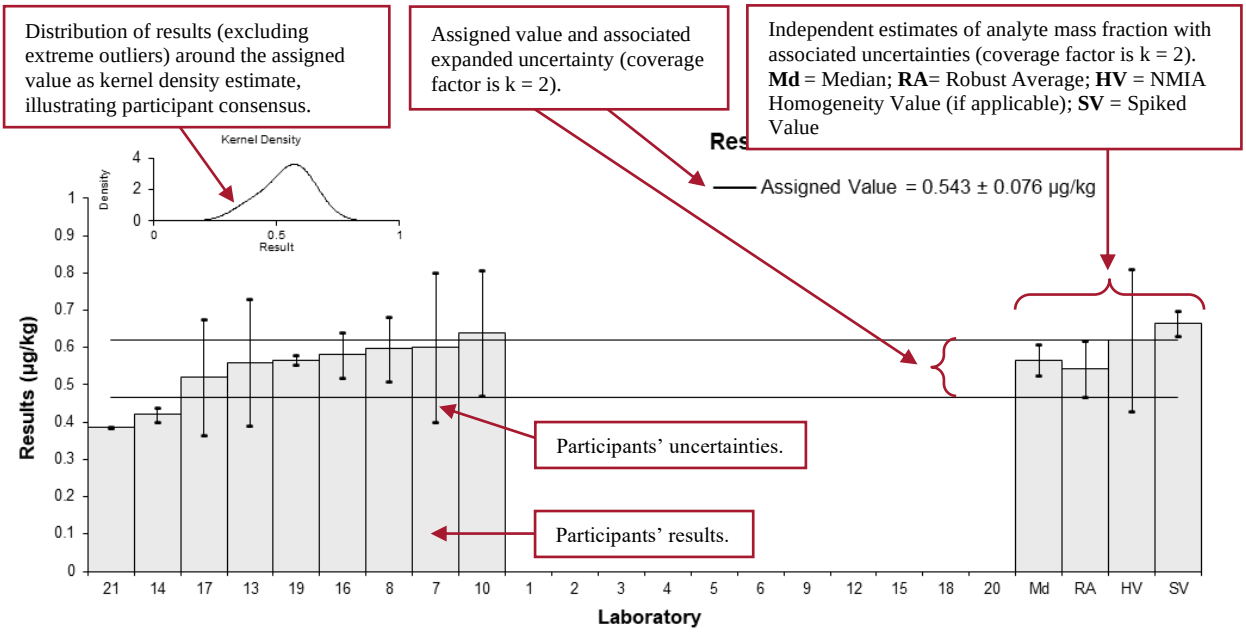



Figure 1 Guide to Presentation of Results

## 4.2 Outliers, Extreme Outliers and Other Excluded Results

Outliers were results less than 50% and greater than 150% of the robust average, and these were removed before the calculation of the assigned value, if applicable.[3,4] Extreme outliers were obvious blunders e.g. results reported with incorrect units, or for a different analyte or sample, and such results were removed for the calculation of all summary statistics.[3,4]

The results from Laboratories **13** and **17** in Sample S1 were consistently lower than the spiked value. To avoid unfair scoring, these results were excluded from robust average calculations as they would bias low the assigned value; they were also excluded from the calculation of all summary statistics.

## 4.3 Assigned Value

The assigned value is defined as the 'value attributed to a particular property or characteristic of a proficiency testing item'.[1] In this PT study, the property is the mass fraction of the analyte in the sample. Assigned values were the robust averages of participants' results, and the expanded uncertainties were estimated from the associated robust SDs (Appendix 3).

## 4.4 Robust Average and Robust Between-Laboratory Coefficient of Variation

The robust averages and expanded MUs, and robust CVs (a measure of the variability of participants' results) were calculated using the procedure described in ISO 13528.[7]

## 4.5 Performance Coefficient of Variation (PCV)

The PCV is a fixed measure of the between-laboratory variation that in the judgement of the study coordinator would be expected from participants given the levels of analytes present. The PCV is not the CV of participants' results; it is set by the study coordinator and is based

on the mass fraction of the analytes and experience from previous studies, and is supported by mathematical models such as the Thompson-Horwitz equation.[8] By setting a fixed and realistic value for the PCV, a participant's performance does not depend on the performance of other participants and can be compared from study to study.

### 4.6 Target Standard Deviation for Proficiency Assessment

The target standard deviation for proficiency assessment (σ) is the product of the assigned value ($X$) and the PCV, as presented in Equation 1.

$$\sigma = X \times PCV \qquad \textit{Equation 1}$$

### 4.7 z-Score

For each participant's result, a *z*-score is calculated according to Equation 2.

$$z = \frac{(\chi - X)}{\sigma} \qquad \textit{Equation 2}$$

where:

$z$ is *z*-score

$\chi$ is a participant's result

$X$ is the assigned value

$\sigma$ is the target standard deviation for proficiency assessment from Equation 1

For the absolute value of a *z*-score:

- $|z| \leq 2.0$ is acceptable;
- $2.0 < |z| < 3.0$ is questionable; and
- $|z| \geq 3.0$ is unacceptable.

To account for potential low bias in consensus values due to inefficient methodologies, *z*-scores may be adjusted for a 'maximum acceptable result' (see also Section 6.3).

### 4.8 $E_n$-Score

The $E_n$-score is complementary to the *z*-score in assessment of laboratory performance. $E_n$-score includes measurement uncertainty and is calculated according to Equation 3.

$$E_n = \frac{(\chi - X)}{\sqrt{U_\chi{}^2 + U_X{}^2}} \qquad \textit{Equation 3}$$

where:

$E_n$ is $E_n$-score

$\chi$ is a participant's result

$X$ is the assigned value

$U_\chi$ is the expanded uncertainty of the participant's result

$U_X$ is the expanded uncertainty of the assigned value

For the absolute value of an $E_n$-score:

- $|E_n| < 1.0$ is acceptable;
- $|E_n| \geq 1.0$ is unacceptable.

### 4.9 Traceability and Measurement Uncertainty

Laboratories accredited to ISO/IEC 17025 must establish and demonstrate the traceability and measurement uncertainty associated with their test results.[9]

Guidelines for quantifying uncertainty in analytical measurement are described in the Eurachem/CITAC Guide.[10]

## 5 TABLES AND FIGURES

Table 5

**Sample Details**

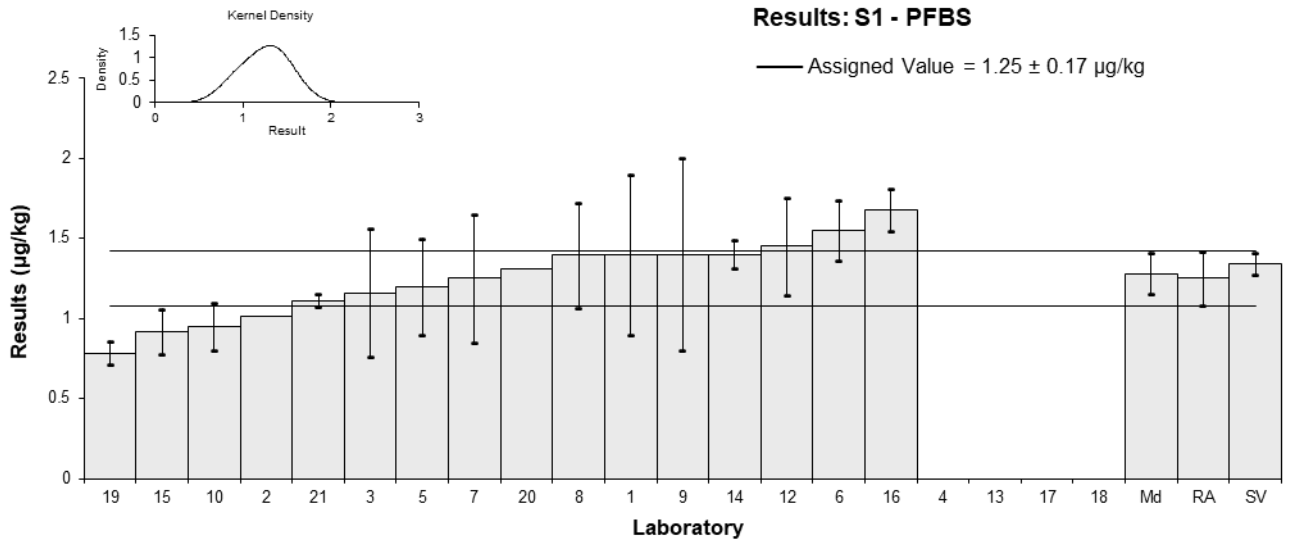
| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | PFBS |
| **Unit** | µg/kg |

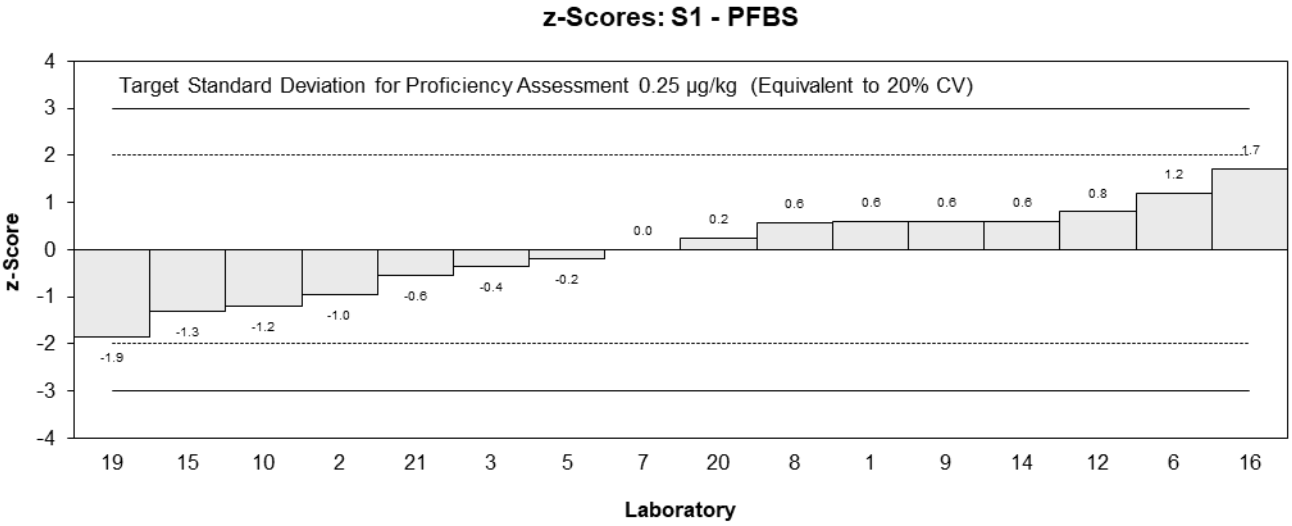
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 1.4 | 0.5 | 90 | 0.60 | 0.28 |
| **2** | 1.012807 | NR | 82 | -0.95 | -1.40 |
| **3** | 1.16 | 0.4 | 58 | -0.36 | -0.21 |
| **4** | < 1 | NR | NR | | |
| **5** | 1.2 | 0.3 | 90 | -0.20 | -0.15 |
| **6** | 1.55 | 0.19 | NR | 1.20 | 1.18 |
| **7** | 1.25 | 0.4 | 83 | 0.00 | 0.00 |
| **8** | 1.396 | 0.328 | 96 | 0.58 | 0.40 |
| **9** | 1.4 | 0.6 | 81 | 0.60 | 0.24 |
| **10** | 0.949 | 0.147 | 115.1 | -1.20 | -1.34 |
| **12** | 1.45 | 0.301 | 95.0 | 0.80 | 0.58 |
| **13** | <0.5 | NR | 117 | | |
| **14** | 1.4 | 0.09 | 98 | 0.60 | 0.78 |
| **15** | 0.92 | 0.14 | 82.1 | -1.32 | -1.50 |
| **16** | 1.68 | 0.13 | NR | 1.72 | 2.01 |
| **17** | <0.5 | NR | NR | | |
| **18** | NS | NS | NS | | |
| **19** | 0.785 | 0.074 | 92 | -1.86 | -2.51 |
| **20** | 1.31 | NR | NR | 0.24 | 0.35 |
| **21** | 1.11 | 0.04 | 105 | -0.56 | -0.80 |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 1.25 | 0.17 |
| **Spike Value** | 1.34 | 0.07 |
| **Robust Average** | 1.25 | 0.17 |
| **Median** | 1.28 | 0.13 |
| **Mean** | 1.25 | |
| **N** | 16 | |
| **Max** | 1.68 | |
| **Min** | 0.785 | |
| **Robust SD** | 0.27 | |
| **Robust CV** | 21% | |


Kernel Density
Density
Result
Results: S1 - PFBS
Assigned Value = 1.25 ± 0.17 µg/kg
Results (µg/kg)
19 15 10 2 21 3 5 7 20 8 1 9 14 12 6 16 4 13 17 18 Md RA SV
Laboratory


z-Scores: S1 - PFBS
Target Standard Deviation for Proficiency Assessment 0.25 µg/kg (Equivalent to 20% CV)
z-Score
-1.9 -1.3 -1.2 -1.0 -0.6 -0.4 -0.2 0.0 0.2 0.6 0.6 0.6 0.6 0.8 1.2 1.7
19 15 10 2 21 3 5 7 20 8 1 9 14 12 6 16
Laboratory

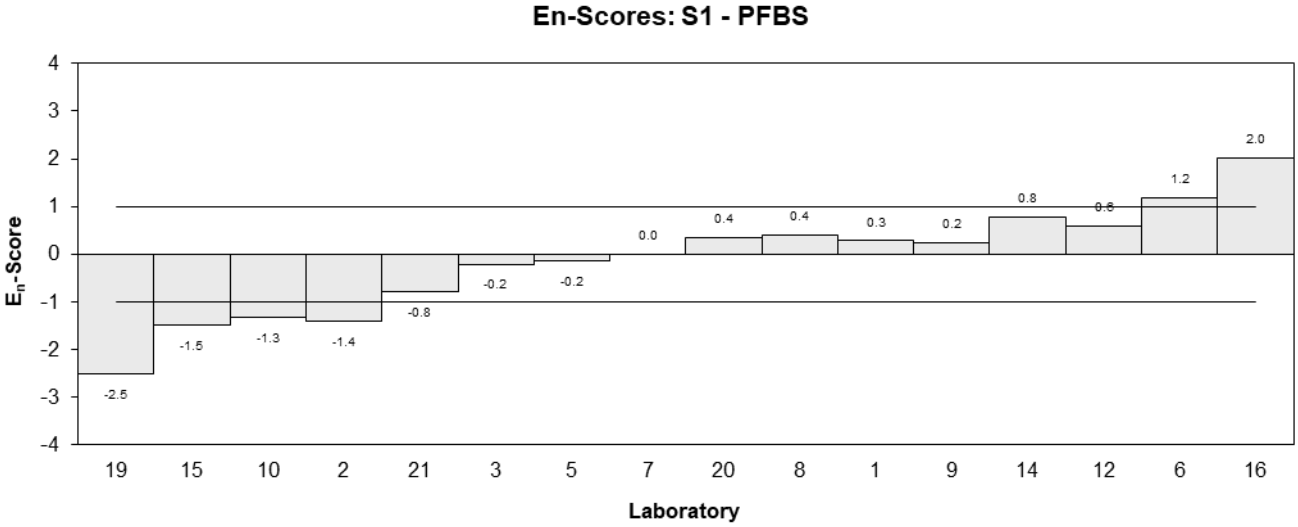

En-Scores: S1 - PFBS
En-Score
-2.5 -1.5 -1.3 -1.4 -0.8 -0.2 -0.2 0.0 0.4 0.4 0.3 0.2 0.8 0.6 1.2 2.0
19 15 10 2 21 3 5 7 20 8 1 9 14 12 6 16
Laboratory

Figure 2

Table 6

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | PFHxS |
| **Unit** | µg/kg |

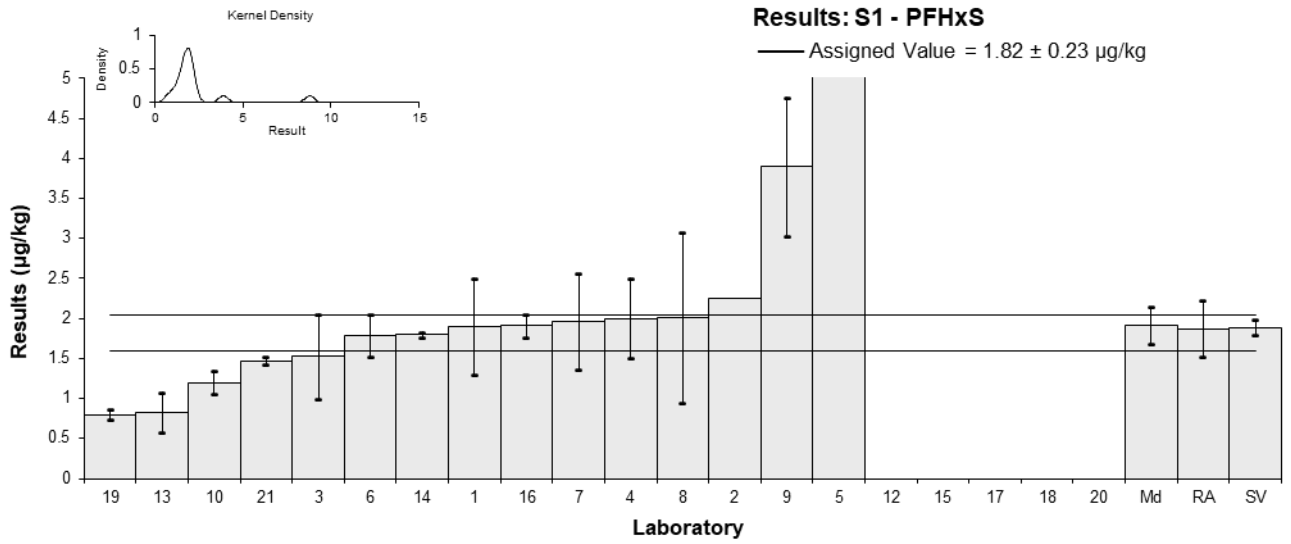
**Participant Results**

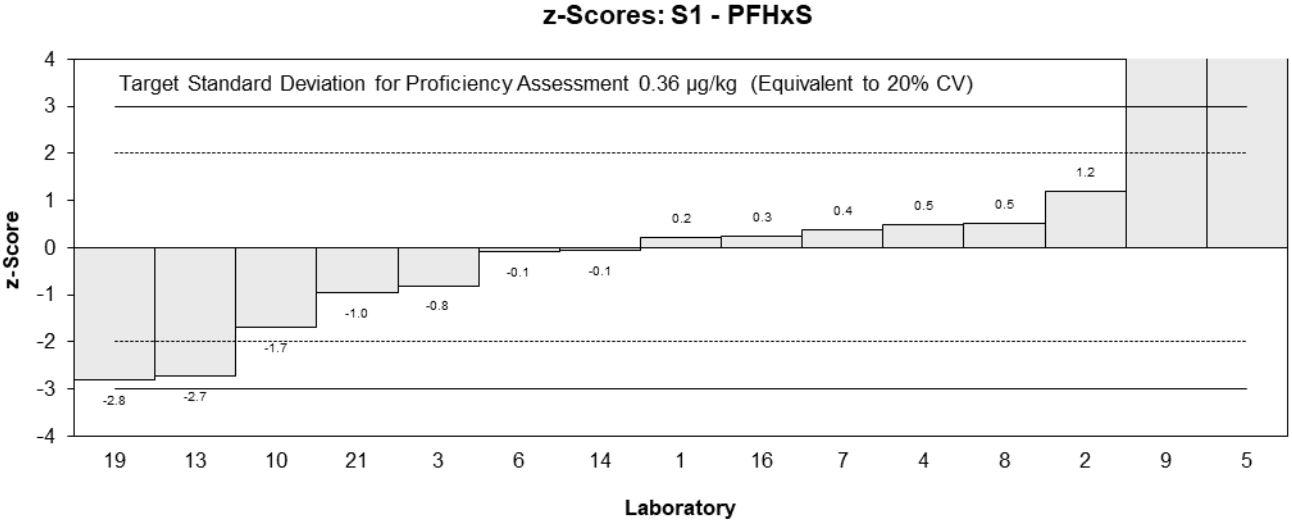
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 1.9 | 0.6 | 107 | 0.22 | 0.12 |
| **2** | 2.257456 | NR | 93 | 1.20 | 1.90 |
| **3** | 1.526 | 0.53 | 66 | -0.81 | -0.51 |
| **4** | 2 | 0.5 | NR | 0.49 | 0.33 |
| **5*** | 8.8 | 2.1 | 41 | 19.18 | 3.30 |
| **6** | 1.79 | 0.26 | NR | -0.08 | -0.09 |
| **7** | 1.96 | 0.6 | 79 | 0.38 | 0.22 |
| **8** | 2.011 | 1.061 | 101 | 0.52 | 0.18 |
| **9*** | 3.9 | 0.865 | 78 | 5.71 | 2.32 |
| **10** | 1.2 | 0.148 | NR | -1.70 | -2.27 |
| **12** | NT | NT | NT | | |
| **13**** | 0.83 | 0.25 | 80 | -2.72 | -2.91 |
| **14** | 1.8 | 0.03 | 99 | -0.05 | -0.09 |
| **15** | NT | NT | NT | | |
| **16** | 1.91 | 0.14 | NR | 0.25 | 0.33 |
| **17** | <0.5 | NR | NR | | |
| **18** | NS | NS | NS | | |
| **19*** | 0.798 | 0.063 | 97 | -2.81 | -4.29 |
| **20** | NT | NT | NT | | |
| **21** | 1.47 | 0.05 | 103 | -0.96 | -1.49 |

* Outlier, ** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 1.82 | 0.23 |
| **Spike Value** | 1.89 | 0.09 |
| **Robust Average** | 1.87 | 0.35 |
| **Median** | 1.91 | 0.23 |
| **Mean** | 2.4 | |
| **N** | 14 | |
| **Max** | 8.8 | |
| **Min** | 0.798 | |
| **Robust SD** | 0.53 | |
| **Robust CV** | 28% | |


Kernel Density
Density
Result
Results: S1 - PFHxS
Assigned Value = 1.82 ± 0.23 µg/kg
Results (µg/kg)
Laboratory
19 13 10 21 3 6 14 1 16 7 4 8 2 9 5 12 15 17 18 20 Md RA SV


z-Scores: S1 - PFHxS
Target Standard Deviation for Proficiency Assessment 0.36 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
19 13 10 21 3 6 14 1 16 7 4 8 2 9 5
-2.8 -2.7 -1.7 -1.0 -0.8 -0.1 -0.1 0.2 0.3 0.4 0.5 0.5 1.2

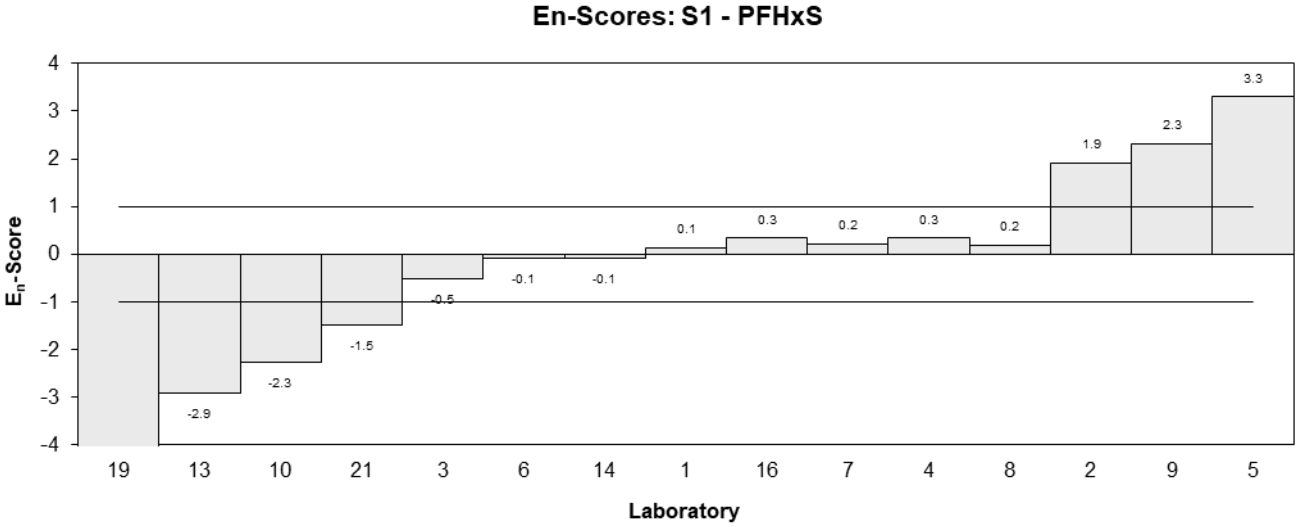

En-Scores: S1 - PFHxS
En-Score
Laboratory
19 13 10 21 3 6 14 1 16 7 4 8 2 9 5
-2.9 -2.3 -1.5 -0.5 -0.1 -0.1 0.1 0.3 0.2 0.3 0.2 1.9 2.3 3.3

Figure 3

Table 7

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | PFHxS (linear) |
| **Unit** | µg/kg |

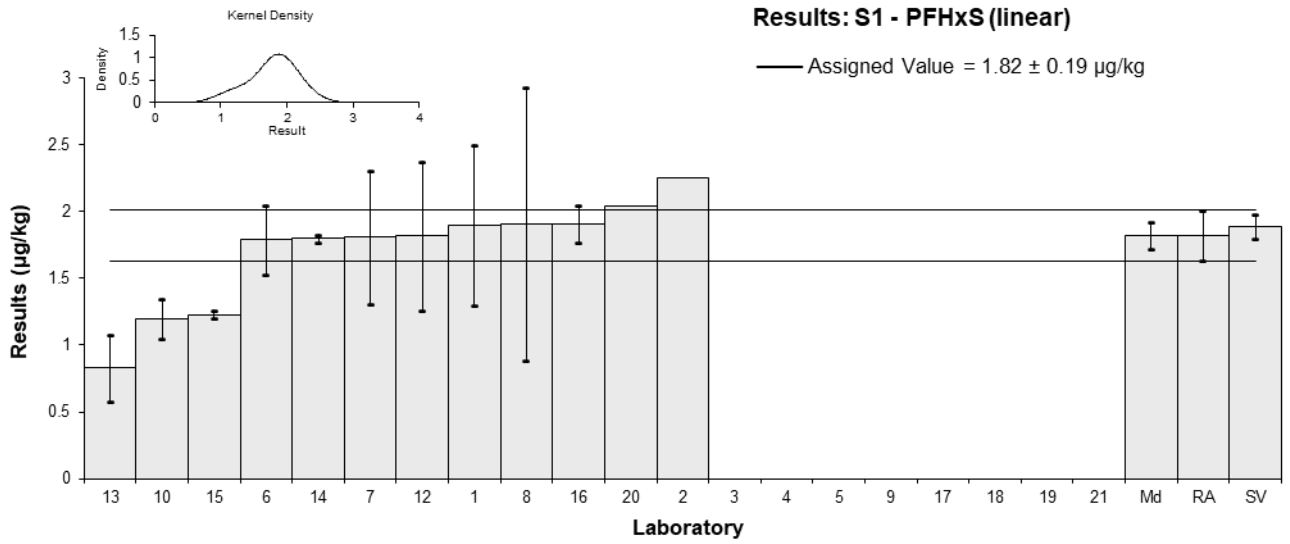
**Participant Results**

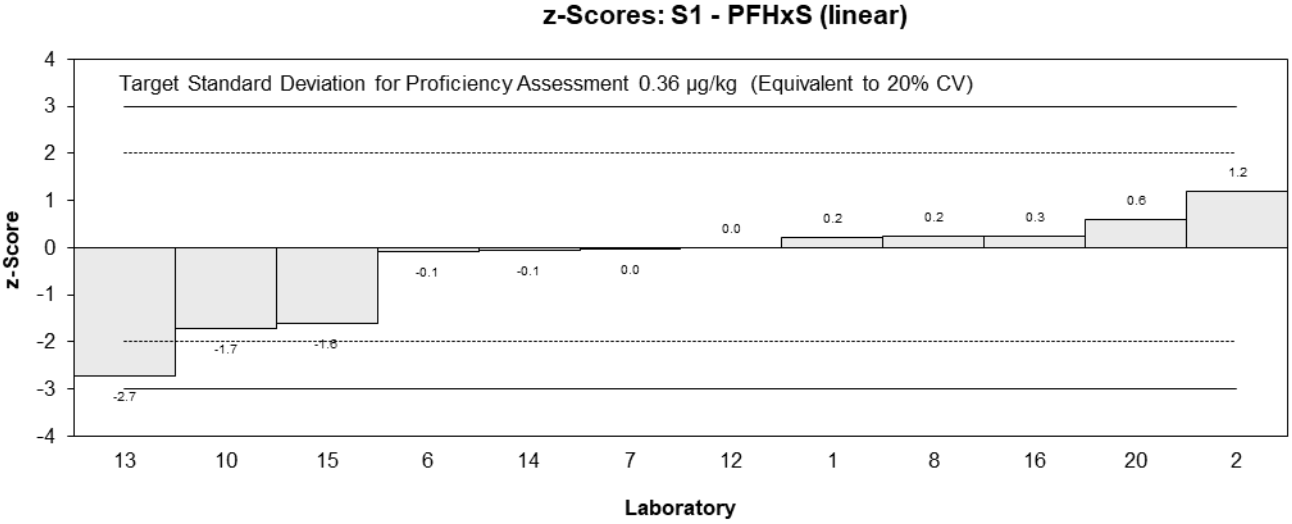
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 1.9 | 0.6 | 107 | 0.22 | 0.13 |
| **2** | 2.257456 | NR | 93 | 1.20 | 2.30 |
| **3** | NT | NT | NT | | |
| **4** | NT | NT | NT | | |
| **5** | NT | NT | NT | | |
| **6** | 1.79 | 0.26 | NR | -0.08 | -0.09 |
| **7** | 1.81 | 0.5 | NR | -0.03 | -0.02 |
| **8** | 1.908 | 1.027 | 101 | 0.24 | 0.08 |
| **9** | NR | NR | NR | | |
| **10** | 1.199 | 0.148 | 123.3 | -1.71 | -2.58 |
| **12** | 1.82 | 0.556 | 95.0 | 0.00 | 0.00 |
| **13**** | 0.83 | 0.25 | 80 | -2.72 | -3.15 |
| **14** | 1.8 | 0.03 | 99 | -0.05 | -0.10 |
| **15** | 1.23 | 0.03 | 77.7 | -1.62 | -3.07 |
| **16** | 1.91 | 0.14 | NR | 0.25 | 0.38 |
| **17** | NT | NT | NT | | |
| **18** | NS | NS | NS | | |
| **19** | NR | NR | NR | | |
| **20** | 2.04 | NR | NR | 0.60 | 1.16 |
| **21** | NR | NR | NR | | |

** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 1.82 | 0.19 |
| **Spike Value** | 1.89 | 0.09 |
| **Robust Average** | 1.82 | 0.19 |
| **Median** | 1.82 | 0.10 |
| **Mean** | 1.79 | |
| **N** | 11 | |
| **Max** | 2.257456 | |
| **Min** | 1.199 | |
| **Robust SD** | 0.26 | |
| **Robust CV** | 14% | |


Results: S1 - PFHxS (linear)
Assigned Value = 1.82 ± 0.19 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
13 10 15 6 14 7 12 1 8 16 20 2 3 4 5 9 17 18 19 21 Md RA SV
Laboratory


z-Scores: S1 - PFHxS (linear)
Target Standard Deviation for Proficiency Assessment 0.36 µg/kg (Equivalent to 20% CV)
z-Score
-2.7 -1.7 -1.6 -0.1 -0.1 0.0 0.0 0.2 0.2 0.3 0.6 1.2
13 10 15 6 14 7 12 1 8 16 20 2
Laboratory

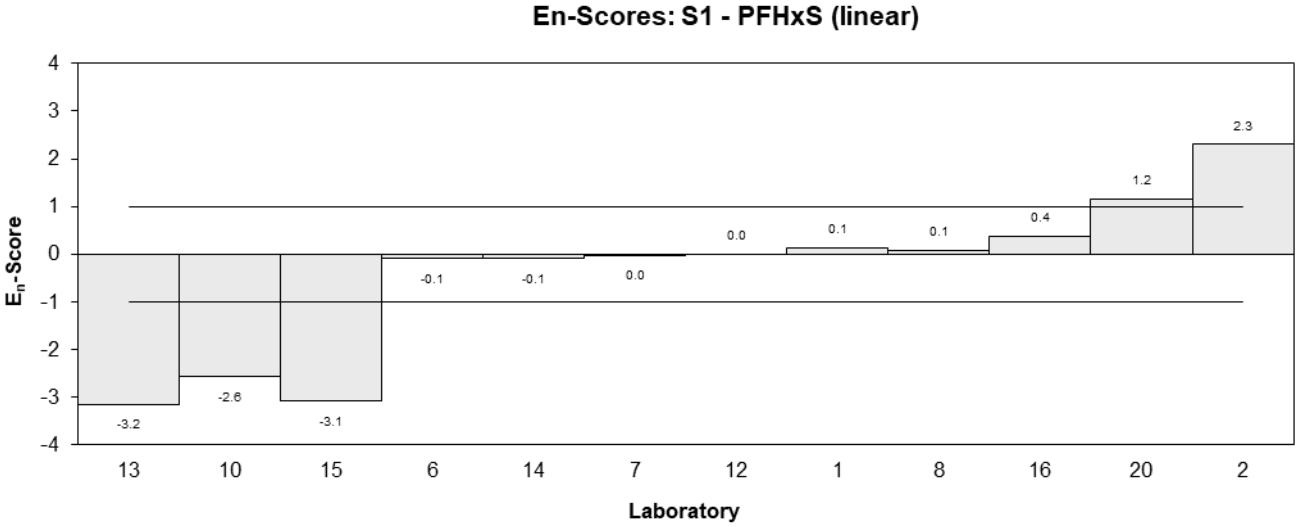

En-Scores: S1 - PFHxS (linear)
En-Score
-3.2 -2.6 -3.1 -0.1 -0.1 0.0 0.0 0.1 0.1 0.4 1.2 2.3
13 10 15 6 14 7 12 1 8 16 20 2
Laboratory

Figure 4

Table 8

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | PFHpS |
| **Unit** | µg/kg |

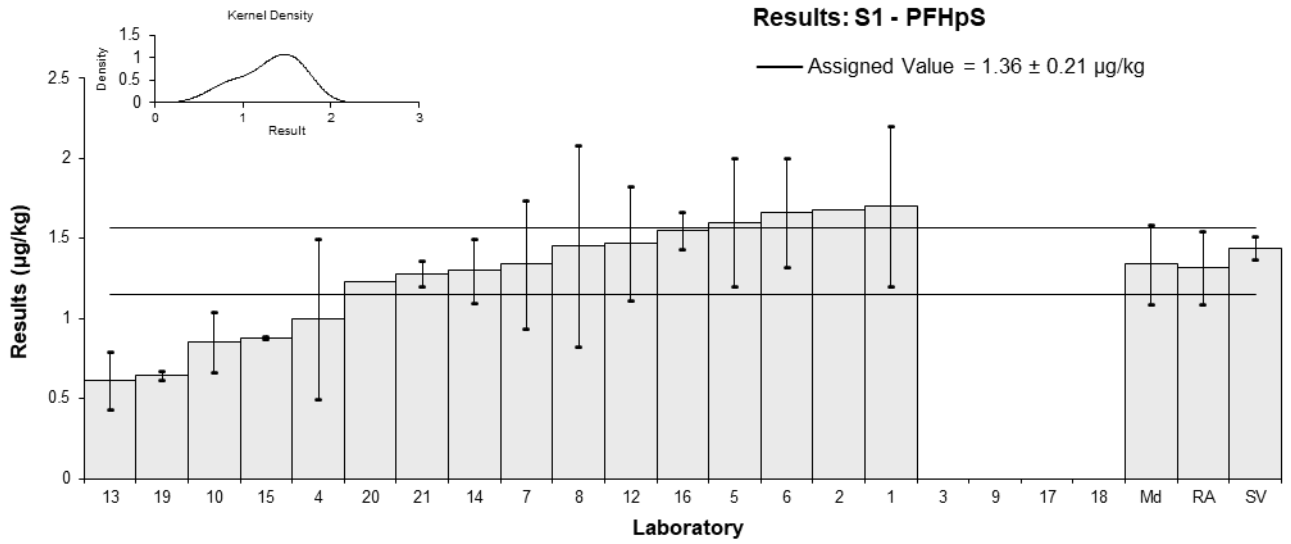
**Participant Results**

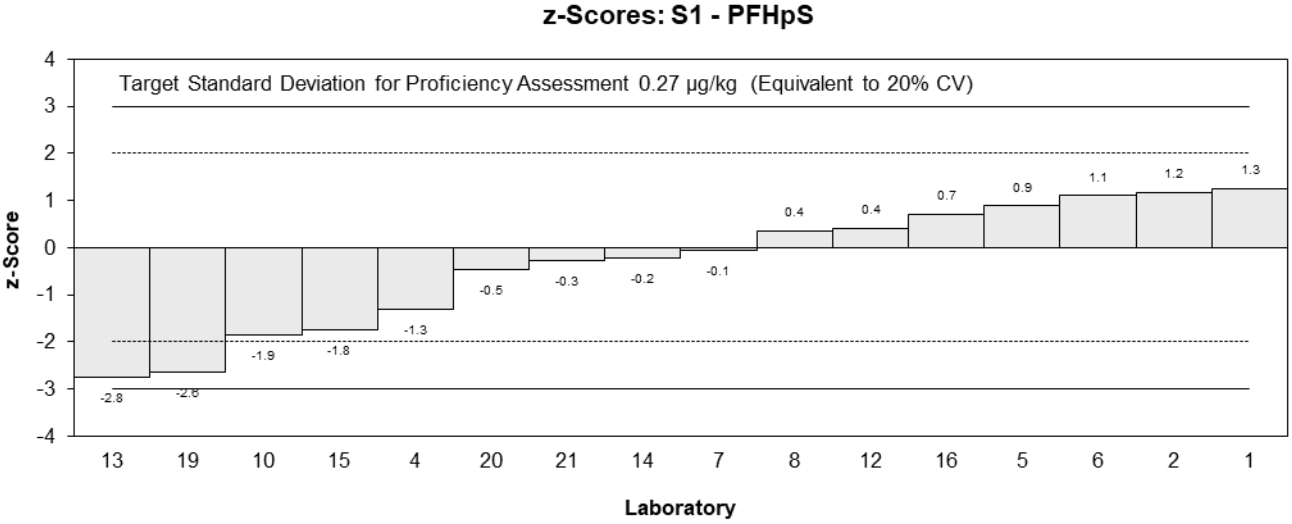
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 1.7 | 0.5 | 103 | 1.25 | 0.63 |
| **2** | 1.675445 | NR | NR | 1.16 | 1.50 |
| **3** | <1 | NR | 70 | | |
| **4** | 1 | 0.5 | NR | -1.32 | -0.66 |
| **5** | 1.6 | 0.4 | NR | 0.88 | 0.53 |
| **6** | 1.66 | 0.34 | NR | 1.10 | 0.75 |
| **7** | 1.34 | 0.4 | NR | -0.07 | -0.04 |
| **8** | 1.454 | 0.627 | 101 | 0.35 | 0.14 |
| **9** | NR | NR | NR | | |
| **10** | 0.855 | 0.19 | NR | -1.86 | -1.78 |
| **12** | 1.47 | 0.355 | 95.0 | 0.40 | 0.27 |
| **13**** | 0.61 | 0.18 | 80 | -2.76 | -2.71 |
| **14** | 1.3 | 0.2 | 99 | -0.22 | -0.21 |
| **15** | 0.88 | 0.01 | 77.7 | -1.76 | -2.28 |
| **16** | 1.55 | 0.12 | NR | 0.70 | 0.79 |
| **17** | <0.5 | NR | NR | | |
| **18** | NS | NS | NS | | |
| **19*** | 0.642 | 0.027 | 97 | -2.64 | -3.39 |
| **20** | 1.23 | NR | NR | -0.48 | -0.62 |
| **21** | 1.28 | 0.08 | 103 | -0.29 | -0.36 |

* Outlier, ** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 1.36 | 0.21 |
| **Spike Value** | 1.44 | 0.07 |
| **Robust Average** | 1.32 | 0.23 |
| **Median** | 1.34 | 0.25 |
| **Mean** | 1.31 | |
| **N** | 15 | |
| **Max** | 1.7 | |
| **Min** | 0.642 | |
| **Robust SD** | 0.35 | |
| **Robust CV** | 27% | |


Kernel Density
Density
Result
Results: S1 - PFHpS
Assigned Value = 1.36 ± 0.21 µg/kg
Results (µg/kg)
13 19 10 15 4 20 21 14 7 8 12 16 5 6 2 1 3 9 17 18 Md RA SV
Laboratory


z-Scores: S1 - PFHpS
Target Standard Deviation for Proficiency Assessment 0.27 µg/kg (Equivalent to 20% CV)
z-Score
-2.8 -2.6 -1.9 -1.8 -1.3 -0.5 -0.3 -0.2 -0.1 0.4 0.4 0.7 0.9 1.1 1.2 1.3
13 19 10 15 4 20 21 14 7 8 12 16 5 6 2 1
Laboratory

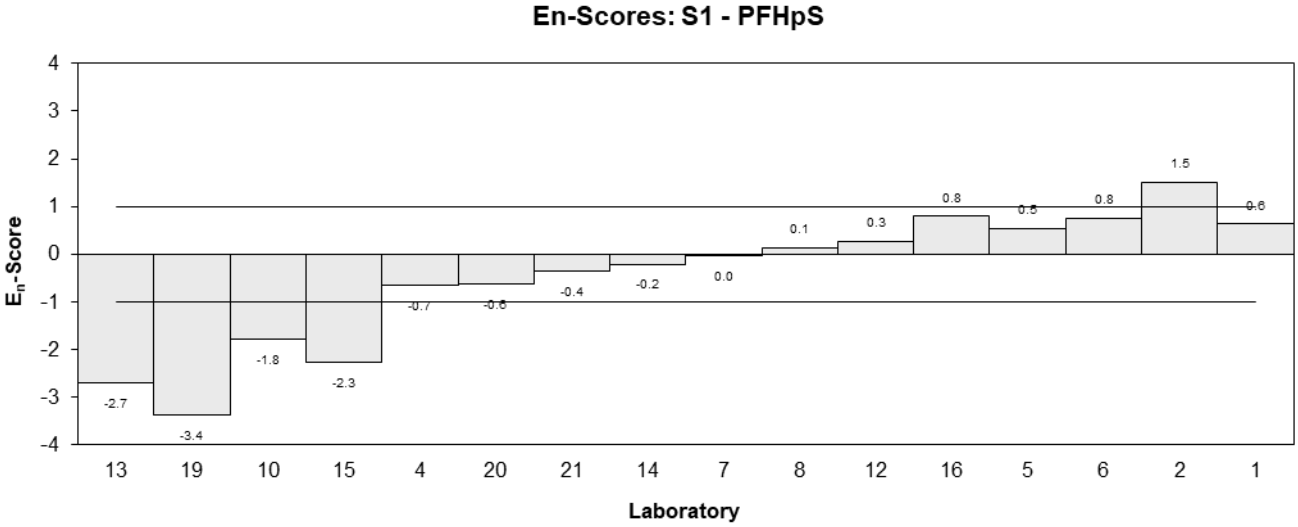

En-Scores: S1 - PFHpS
En-Score
-2.7 -3.4 -1.8 -2.3 -0.7 -0.6 -0.4 -0.2 0.0 0.1 0.3 0.8 0.5 0.8 1.5 0.6
13 19 10 15 4 20 21 14 7 8 12 16 5 6 2 1
Laboratory

Figure 5

Table 9

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | PFOS |
| **Unit** | µg/kg |

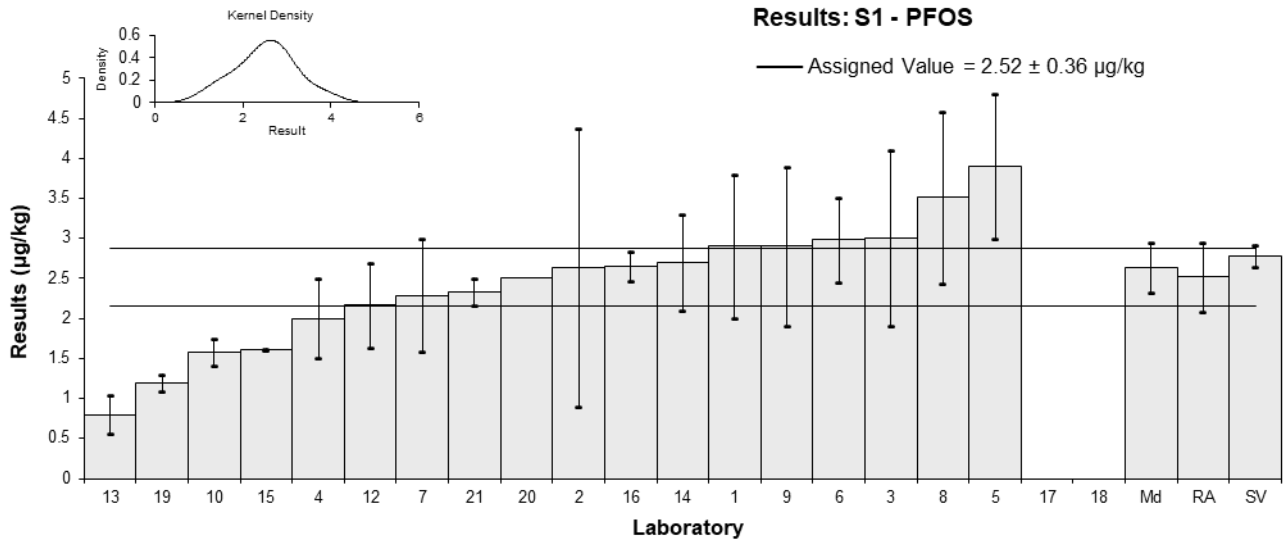
**Participant Results**

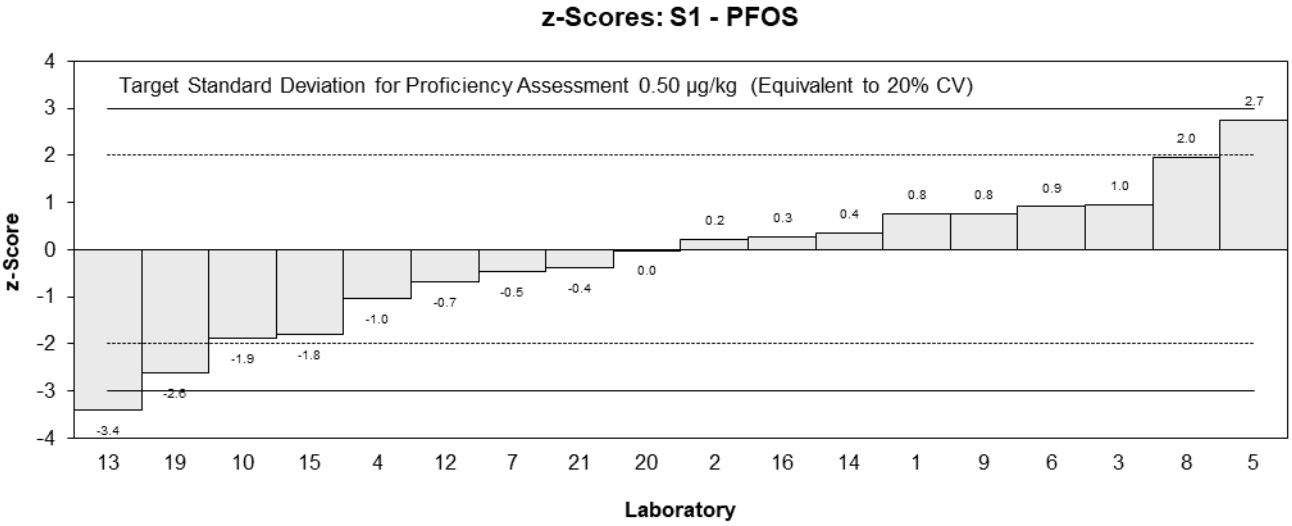
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 2.9 | 0.9 | 103 | 0.75 | 0.39 |
| **2** | 2.631234 | 1.7366 | 95 | 0.22 | 0.06 |
| **3** | 3.002 | 1.1 | 70 | 0.96 | 0.42 |
| **4** | 2 | 0.5 | NR | -1.03 | -0.84 |
| **5*** | 3.9 | 0.9 | 31 | 2.74 | 1.42 |
| **6** | 2.98 | 0.53 | NR | 0.91 | 0.72 |
| **7** | 2.29 | 0.7 | 74 | -0.46 | -0.29 |
| **8** | 3.509 | 1.074 | 91 | 1.96 | 0.87 |
| **9** | 2.9 | 0.988 | 83 | 0.75 | 0.36 |
| **10** | 1.572 | 0.169 | NR | -1.88 | -2.38 |
| **12** | 2.17 | 0.529 | 92.5 | -0.69 | -0.55 |
| **13**** | 0.80 | 0.24 | 76 | -3.41 | -3.98 |
| **14** | 2.7 | 0.6 | 93 | 0.36 | 0.26 |
| **15** | 1.61 | 0.01 | 100.1 | -1.81 | -2.53 |
| **16** | 2.65 | 0.19 | NR | 0.26 | 0.32 |
| **17** | <0.5 | NR | NR | | |
| **18** | NS | NS | NS | | |
| **19*** | 1.196 | 0.108 | 88 | -2.63 | -3.52 |
| **20** | 2.51 | NR | NR | -0.02 | -0.03 |
| **21** | 2.33 | 0.17 | 104 | -0.38 | -0.48 |

* Outlier, ** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 2.52 | 0.36 |
| **Spike Value** | 2.78 | 0.14 |
| **Robust Average** | 2.52 | 0.43 |
| **Median** | 2.63 | 0.31 |
| **Mean** | 2.52 | |
| **N** | 17 | |
| **Max** | 3.9 | |
| **Min** | 1.196 | |
| **Robust SD** | 0.71 | |
| **Robust CV** | 28% | |


Results: S1 - PFOS
Assigned Value = 2.52 ± 0.36 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
13 19 10 15 4 12 7 21 20 2 16 14 1 9 6 3 8 5 17 18 Md RA SV


z-Scores: S1 - PFOS
Target Standard Deviation for Proficiency Assessment 0.50 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
13 19 10 15 4 12 7 21 20 2 16 14 1 9 6 3 8 5
-3.4 -2.6 -1.9 -1.8 -1.0 -0.7 -0.5 -0.4 0.0 0.2 0.3 0.4 0.8 0.8 0.9 1.0 2.0 2.7

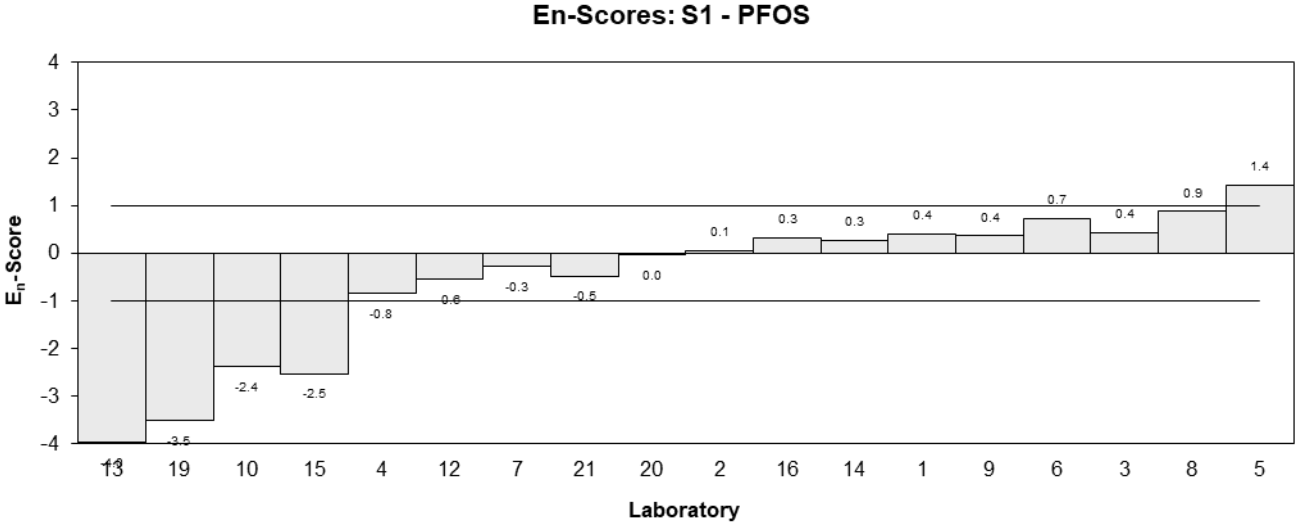

En-Scores: S1 - PFOS
En-Score
Laboratory
13 19 10 15 4 12 7 21 20 2 16 14 1 9 6 3 8 5
-3.5 -2.4 -2.5 -0.8 -0.6 -0.3 -0.5 0.0 0.1 0.3 0.3 0.4 0.4 0.7 0.4 0.9 1.4

Figure 6

Table 10

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | PFOS (linear) |
| **Unit** | µg/kg |

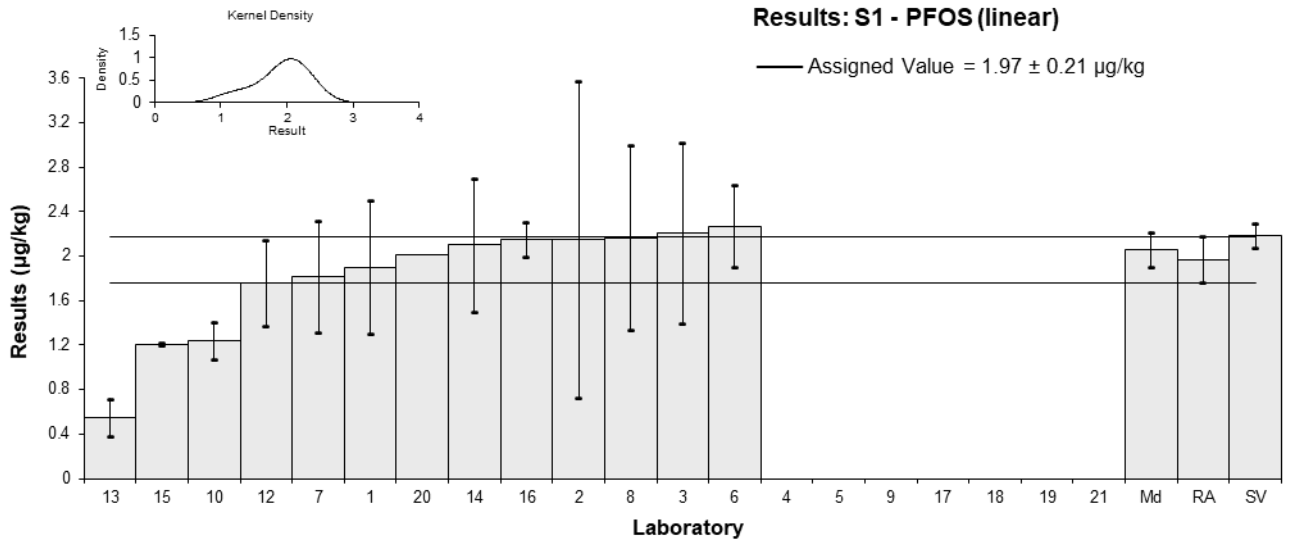
**Participant Results**

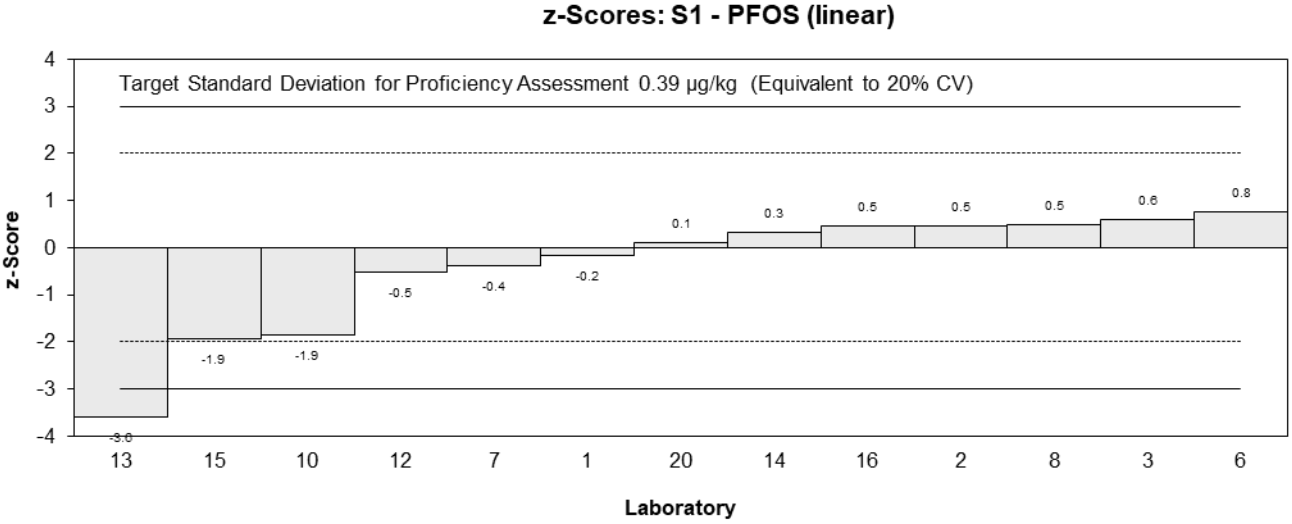
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 1.9 | 0.6 | 103 | -0.18 | -0.11 |
| **2** | 2.150748 | 1.4194 | 95 | 0.46 | 0.13 |
| **3** | 2.208 | 0.81 | 70 | 0.60 | 0.28 |
| **4** | NT | NT | NT | | |
| **5** | NT | NT | NT | | |
| **6** | 2.27 | 0.37 | NR | 0.76 | 0.71 |
| **7** | 1.82 | 0.5 | NR | -0.38 | -0.28 |
| **8** | 2.165 | 0.83 | 91 | 0.49 | 0.23 |
| **9** | NR | NR | NR | | |
| **10** | 1.24 | 0.169 | 110.5 | -1.85 | -2.71 |
| **12** | 1.76 | 0.385 | 92.5 | -0.53 | -0.48 |
| **13**** | 0.55 | 0.17 | 76 | -3.60 | -5.26 |
| **14** | 2.1 | 0.6 | 93 | 0.33 | 0.20 |
| **15** | 1.21 | 0.01 | 100.1 | -1.93 | -3.61 |
| **16** | 2.15 | 0.16 | NR | 0.46 | 0.68 |
| **17** | NT | NT | NT | | |
| **18** | NS | NS | NS | | |
| **19** | NR | NR | NR | | |
| **20** | 2.01 | NR | NR | 0.10 | 0.19 |
| **21** | NR | NR | NR | | |

** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 1.97 | 0.21 |
| **Spike Value** | 2.19 | 0.11 |
| **Robust Average** | 1.97 | 0.21 |
| **Median** | 2.06 | 0.16 |
| **Mean** | 1.92 | |
| **N** | 12 | |
| **Max** | 2.27 | |
| **Min** | 1.21 | |
| **Robust SD** | 0.29 | |
| **Robust CV** | 15% | |


Kernel Density
Density
Result
Results: S1 - PFOS (linear)
Assigned Value = 1.97 ± 0.21 µg/kg
Results (µg/kg)
Laboratory
13 15 10 12 7 1 20 14 16 2 8 3 6 4 5 9 17 18 19 21 Md RA SV


z-Scores: S1 - PFOS (linear)
Target Standard Deviation for Proficiency Assessment 0.39 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
13 15 10 12 7 1 20 14 16 2 8 3 6
-3.6 -1.9 -1.9 -0.5 -0.4 -0.2 0.1 0.3 0.5 0.5 0.5 0.6 0.8

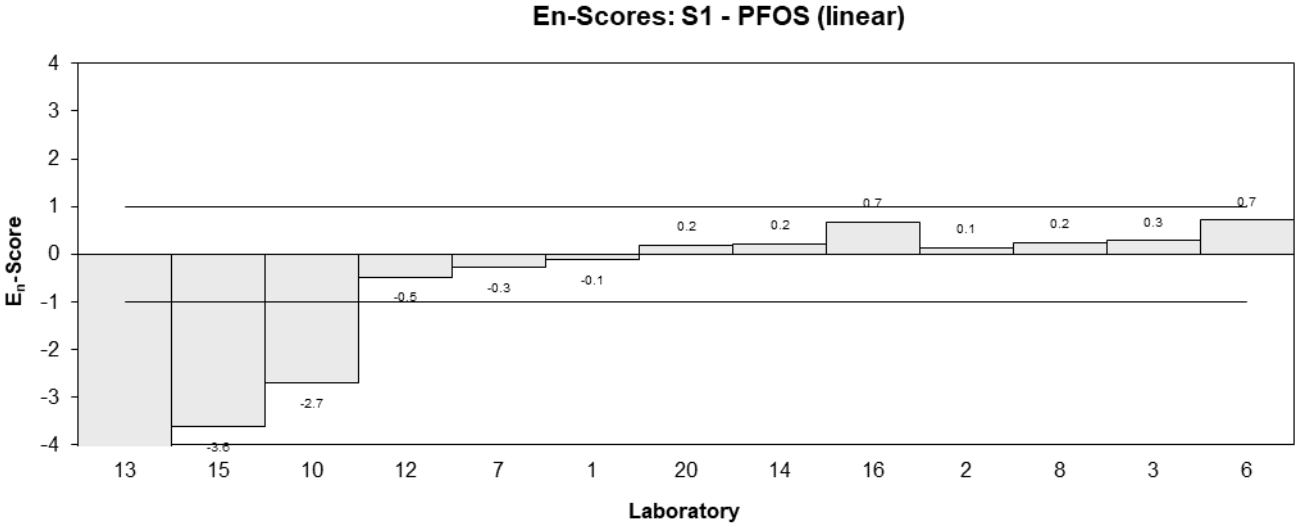

En-Scores: S1 - PFOS (linear)
En-Score
Laboratory
13 15 10 12 7 1 20 14 16 2 8 3 6
-3.6 -2.7 -0.5 -0.3 -0.1 0.2 0.2 0.7 0.1 0.2 0.3 0.7

Figure 7

Table 11

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | PFNS |
| **Unit** | µg/kg |

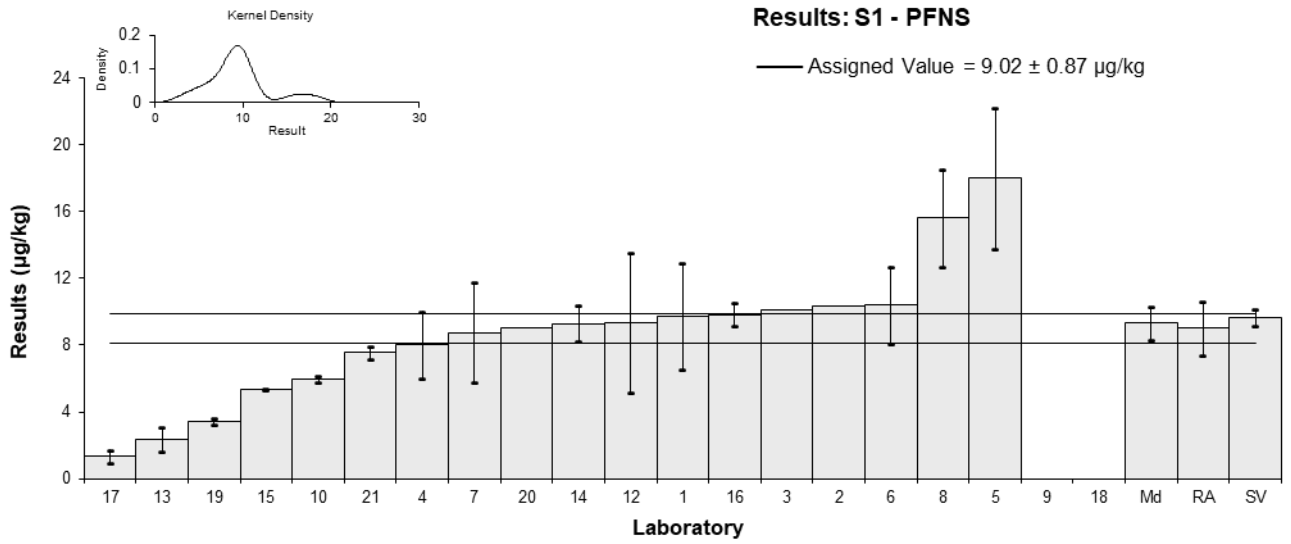
**Participant Results**

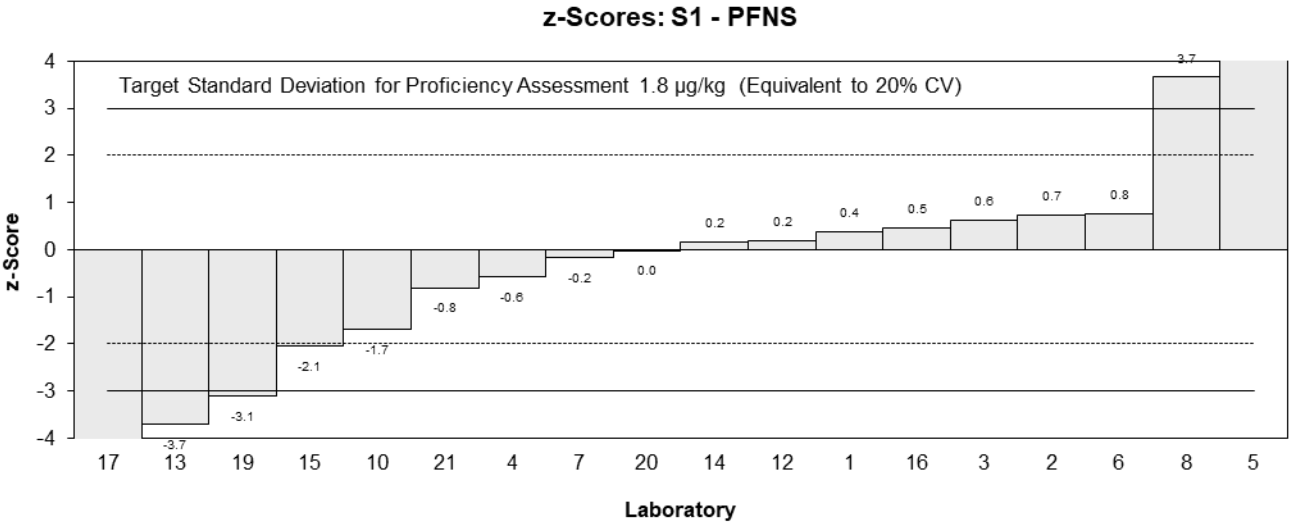
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 9.7 | 3.2 | 103 | 0.38 | 0.21 |
| **2** | 10.350991 | NR | NR | 0.74 | 1.53 |
| **3** | 10.14 | NR | 70 | 0.62 | 1.29 |
| **4** | 8 | 2 | NR | -0.57 | -0.47 |
| **5*** | 18 | 4.2 | NR | 4.98 | 2.09 |
| **6** | 10.40 | 2.32 | NR | 0.76 | 0.56 |
| **7** | 8.74 | 3.0 | NR | -0.16 | -0.09 |
| **8*** | 15.63 | 2.922 | 91 | 3.66 | 2.17 |
| **9** | NR | NR | NR | | |
| **10** | 5.954 | 0.183 | NR | -1.70 | -3.45 |
| **12** | 9.34 | 4.19 | 92.5 | 0.18 | 0.07 |
| **13**** | 2.35 | 0.71 | 76 | -3.70 | -5.94 |
| **14** | 9.3 | 1.1 | 93 | 0.16 | 0.20 |
| **15** | 5.33 | 0.02 | 100.1 | -2.05 | -4.24 |
| **16** | 9.84 | 0.7 | NR | 0.45 | 0.73 |
| **17**** | 1.31 | 0.391836734 | 98 | -4.27 | -8.08 |
| **18** | NS | NS | NS | | |
| **19*** | 3.435 | 0.175 | 88 | -3.10 | -6.29 |
| **20** | 9.01 | NR | NR | -0.01 | -0.01 |
| **21** | 7.55 | 0.37 | 104 | -0.81 | -1.55 |

* Outlier, ** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 9.02 | 0.87 |
| **Spike Value** | 9.65 | 0.48 |
| **Robust Average** | 9.0 | 1.6 |
| **Median** | 9.32 | 0.98 |
| **Mean** | 9.4 | |
| **N** | 16 | |
| **Max** | 18 | |
| **Min** | 3.435 | |
| **Robust SD** | 2.6 | |
| **Robust CV** | 28% | |


Kernel Density
Density
Result
Results: S1 - PFNS
Assigned Value = 9.02 ± 0.87 µg/kg
Results (µg/kg)
Laboratory
17 13 19 15 10 21 4 7 20 14 12 1 16 3 2 6 8 5 9 18 Md RA SV


z-Scores: S1 - PFNS
Target Standard Deviation for Proficiency Assessment 1.8 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
17 13 19 15 10 21 4 7 20 14 12 1 16 3 2 6 8 5
-3.7 -3.1 -2.1 -1.7 -0.8 -0.6 -0.2 0.0 0.2 0.2 0.4 0.5 0.6 0.7 0.8 3.7

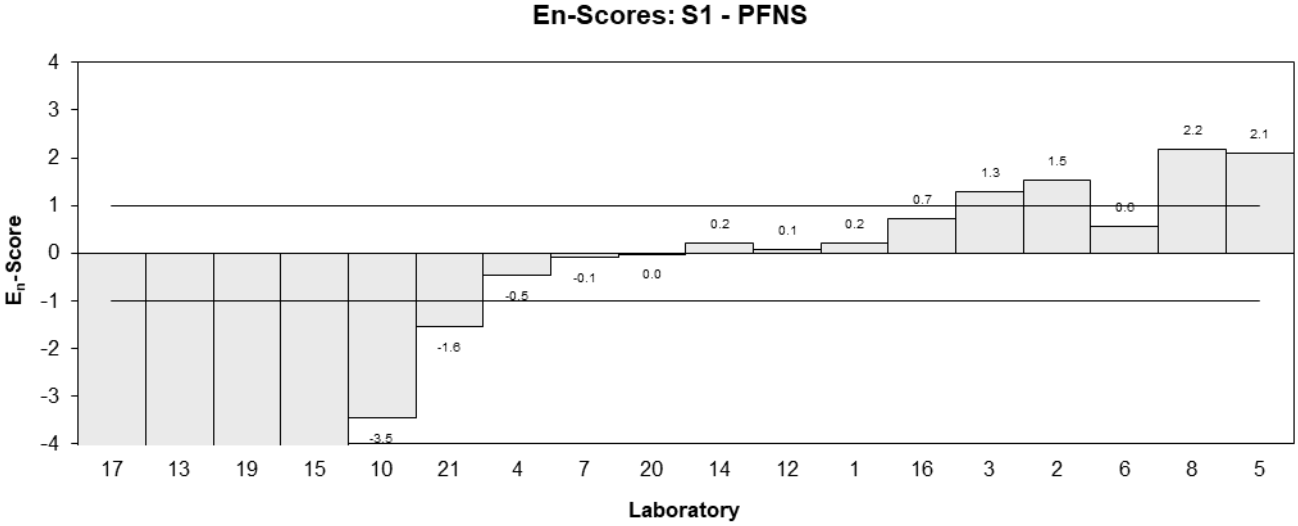

En-Scores: S1 - PFNS
En-Score
Laboratory
17 13 19 15 10 21 4 7 20 14 12 1 16 3 2 6 8 5
-3.5 -1.6 -0.5 -0.1 0.0 0.2 0.1 0.2 0.7 1.3 1.5 0.6 2.2 2.1

Figure 8

Table 12

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | PFDS |
| **Unit** | µg/kg |

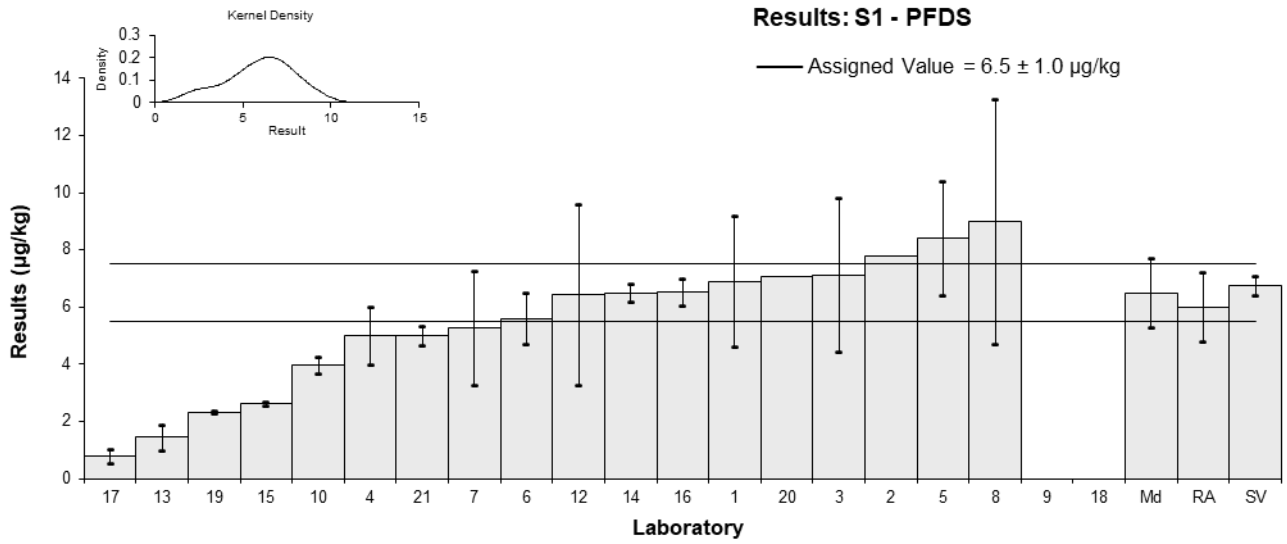
**Participant Results**

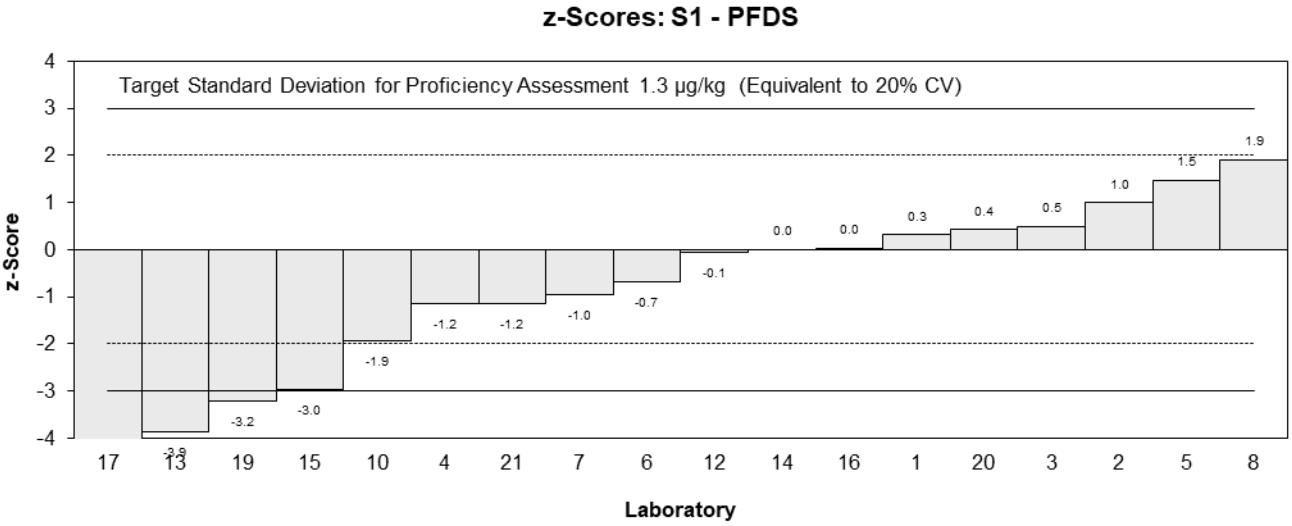
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 6.9 | 2.3 | 103 | 0.31 | 0.16 |
| **2** | 7.79047 | NR | NR | 0.99 | 1.29 |
| **3** | 7.12 | 2.7 | 70 | 0.48 | 0.22 |
| **4** | 5 | 1 | NR | -1.15 | -1.06 |
| **5** | 8.4 | 2 | NR | 1.46 | 0.85 |
| **6** | 5.60 | 0.90 | NR | -0.69 | -0.67 |
| **7** | 5.26 | 2.0 | NR | -0.95 | -0.55 |
| **8** | 8.984 | 4.285 | 91 | 1.91 | 0.56 |
| **9** | NR | NR | NR | | |
| **10** | 3.977 | 0.295 | NR | -1.94 | -2.42 |
| **12** | 6.43 | 3.17 | 92.5 | -0.05 | -0.02 |
| **13**** | 1.45 | 0.44 | 76 | -3.88 | -4.62 |
| **14** | 6.5 | 0.3 | 93 | 0.00 | 0.00 |
| **15*** | 2.62 | 0.07 | 100.1 | -2.98 | -3.87 |
| **16** | 6.54 | 0.47 | NR | 0.03 | 0.04 |
| **17**** | 0.78 | 0.233766233 | 77 | -4.40 | -5.57 |
| **18** | NS | NS | NS | | |
| **19*** | 2.332 | 0.062 | 88 | -3.21 | -4.16 |
| **20** | 7.05 | NR | NR | 0.42 | 0.55 |
| **21** | 5.01 | 0.33 | 104 | -1.15 | -1.41 |

* Outlier, ** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 6.5 | 1.0 |
| **Spike Value** | 6.77 | 0.34 |
| **Robust Average** | 6.0 | 1.2 |
| **Median** | 6.5 | 1.2 |
| **Mean** | 5.97 | |
| **N** | 16 | |
| **Max** | 8.984 | |
| **Min** | 2.332 | |
| **Robust SD** | 2.0 | |
| **Robust CV** | 33% | |


Kernel Density
Density
Result
Results: S1 - PFDS
Assigned Value = 6.5 ± 1.0 µg/kg
Results (µg/kg)
17 13 19 15 10 4 21 7 6 12 14 16 1 20 3 2 5 8 9 18 Md RA SV
Laboratory


z-Scores: S1 - PFDS
Target Standard Deviation for Proficiency Assessment 1.3 µg/kg (Equivalent to 20% CV)
z-Score
17 13 19 15 10 4 21 7 6 12 14 16 1 20 3 2 5 8
Laboratory

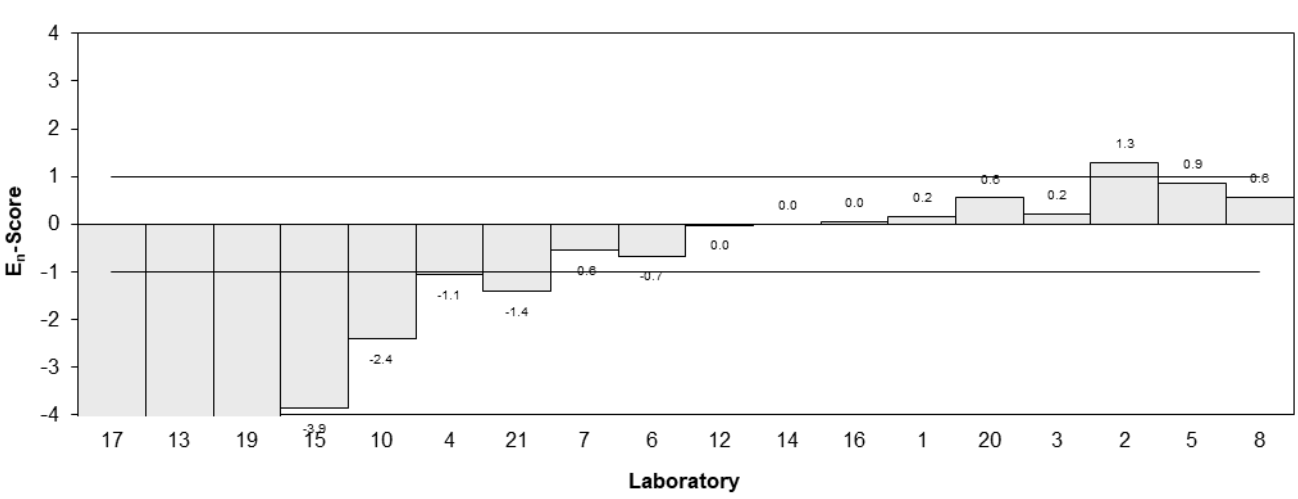

En-Scores: S1 - PFDS
En-Score
17 13 19 15 10 4 21 7 6 12 14 16 1 20 3 2 5 8
Laboratory

Figure 9

Table 13

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | PFBA |
| **Unit** | µg/kg |

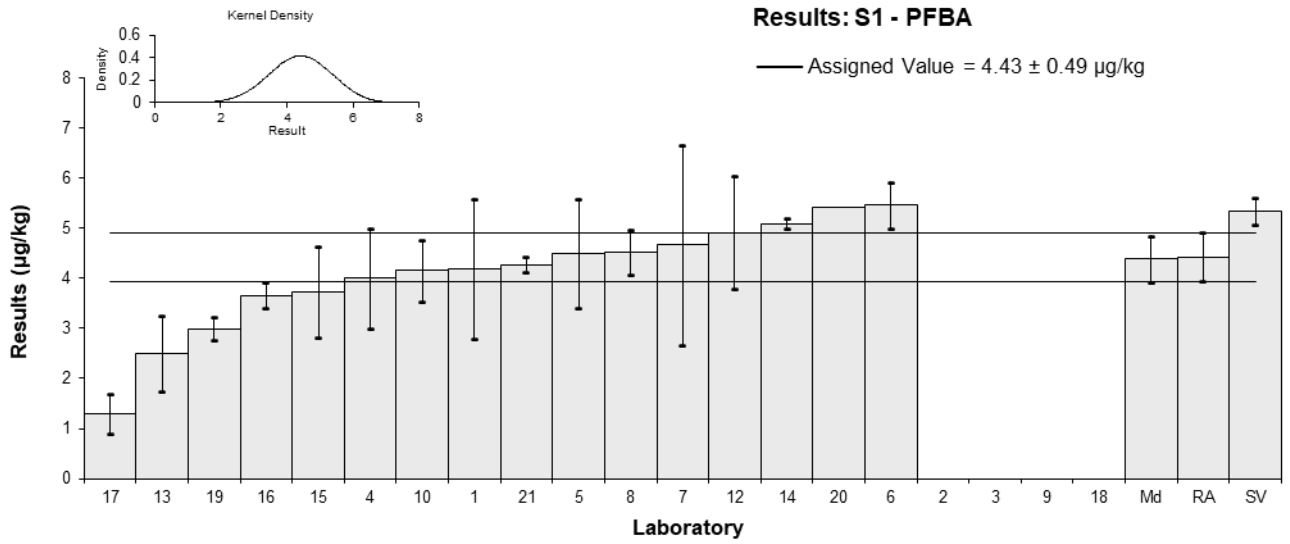
**Participant Results**

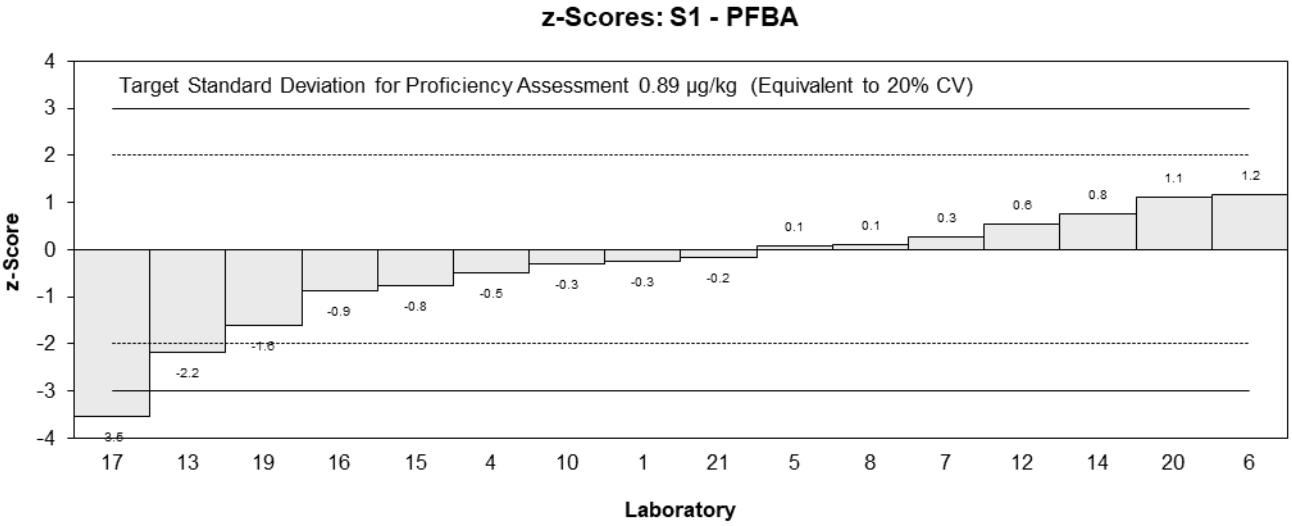
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 4.2 | 1.4 | 102 | -0.26 | -0.16 |
| **2** | <0.1 | NR | 106 | | |
| **3** | <5 | NR | 42 | | |
| **4** | 4 | 1 | NR | -0.49 | -0.39 |
| **5** | 4.5 | 1.1 | 103 | 0.08 | 0.06 |
| **6** | 5.47 | 0.46 | NR | 1.17 | 1.55 |
| **7** | 4.67 | 2.0 | 82 | 0.27 | 0.12 |
| **8** | 4.523 | 0.452 | 89 | 0.10 | 0.14 |
| **9** | NR | NR | NR | | |
| **10** | 4.154 | 0.613 | 101.5 | -0.31 | -0.35 |
| **12** | 4.92 | 1.13 | 77.9 | 0.55 | 0.40 |
| **13**** | 2.5 | 0.75 | 48 | -2.18 | -2.15 |
| **14** | 5.1 | 0.1 | 104 | 0.76 | 1.34 |
| **15** | 3.74 | 0.91 | 81.8 | -0.78 | -0.67 |
| **16** | 3.66 | 0.26 | NR | -0.87 | -1.39 |
| **17**** | 1.297 | 0.3891 | 116 | -3.54 | -5.01 |
| **18** | NS | NS | NS | | |
| **19** | 2.993 | 0.234 | 86 | -1.62 | -2.65 |
| **20** | 5.41 | NR | NR | 1.11 | 2.00 |
| **21** | 4.28 | 0.15 | 90 | -0.17 | -0.29 |

** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 4.43 | 0.49 |
| **Spike Value** | 5.34 | 0.27 |
| **Robust Average** | 4.43 | 0.49 |
| **Median** | 4.39 | 0.46 |
| **Mean** | 4.40 | |
| **N** | 14 | |
| **Max** | 5.47 | |
| **Min** | 2.993 | |
| **Robust SD** | 0.73 | |
| **Robust CV** | 17% | |


Kernel Density
Density
Result
Results: S1 - PFBA
Assigned Value = 4.43 ± 0.49 µg/kg
Results (µg/kg)
17 13 19 16 15 4 10 1 21 5 8 7 12 14 20 6 2 3 9 18 Md RA SV
Laboratory


z-Scores: S1 - PFBA
Target Standard Deviation for Proficiency Assessment 0.89 µg/kg (Equivalent to 20% CV)
z-Score
-3.5 -2.2 -1.6 -0.9 -0.8 -0.5 -0.3 -0.3 -0.2 0.1 0.1 0.3 0.6 0.8 1.1 1.2
17 13 19 16 15 4 10 1 21 5 8 7 12 14 20 6
Laboratory

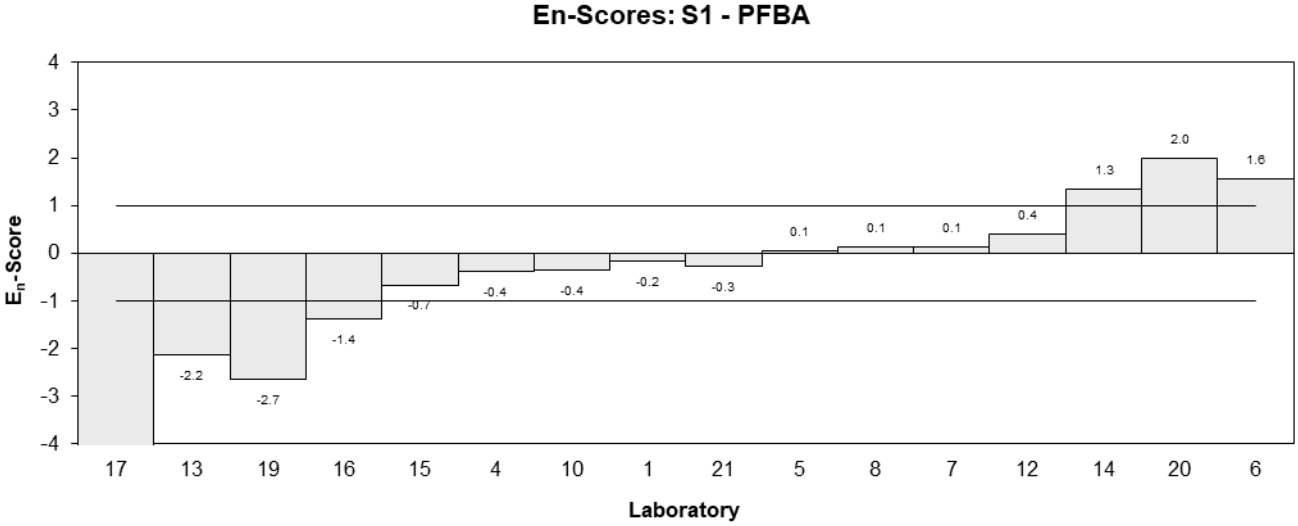

En-Scores: S1 - PFBA
En-Score
-2.2 -2.7 -1.4 -0.7 -0.4 -0.4 -0.2 -0.3 0.1 0.1 0.1 0.4 1.3 2.0 1.6
17 13 19 16 15 4 10 1 21 5 8 7 12 14 20 6
Laboratory

Figure 10

Table 14

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | PFPeA |
| **Unit** | µg/kg |

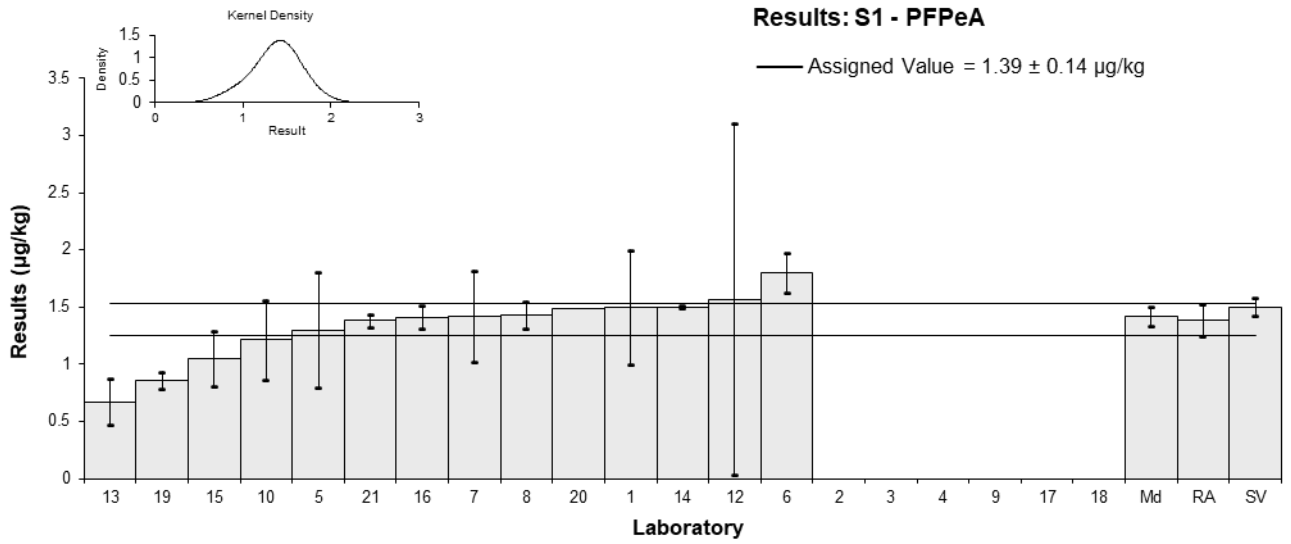
**Participant Results**

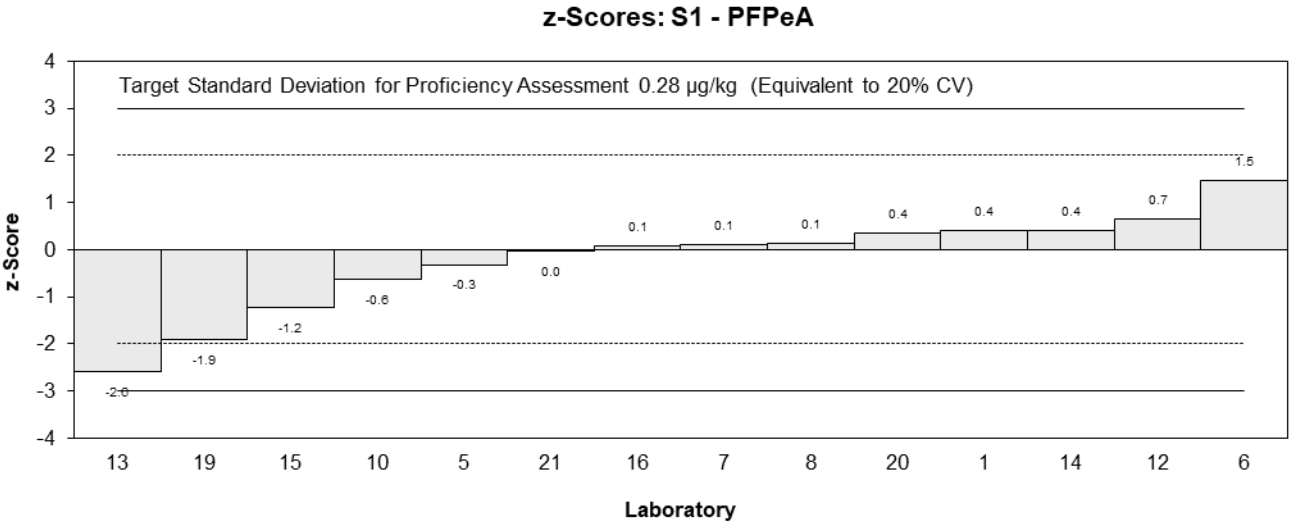
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 1.5 | 0.5 | 106 | 0.40 | 0.21 |
| **2** | <0.1 | NR | 136 | | |
| **3** | <2 | NR | 72 | | |
| **4** | < 1 | NR | NR | | |
| **5** | 1.3 | 0.5 | 90 | -0.32 | -0.17 |
| **6** | 1.80 | 0.17 | NR | 1.47 | 1.86 |
| **7** | 1.42 | 0.4 | 81 | 0.11 | 0.07 |
| **8** | 1.428 | 0.12 | 93 | 0.14 | 0.21 |
| **9** | NR | NR | NR | | |
| **10** | 1.213 | 0.35 | 106.6 | -0.64 | -0.47 |
| **12** | 1.57 | 1.54 | 99.8 | 0.65 | 0.12 |
| **13**** | 0.67 | 0.20 | 54 | -2.59 | -2.95 |
| **14** | 1.5 | 0.01 | 108 | 0.40 | 0.78 |
| **15** | 1.05 | 0.24 | 87.9 | -1.22 | -1.22 |
| **16** | 1.41 | 0.1 | NR | 0.07 | 0.12 |
| **17** | <0.5 | NR | NR | | |
| **18** | NS | NS | NS | | |
| **19** | 0.863 | 0.073 | 89 | -1.90 | -3.34 |
| **20** | 1.49 | NR | NR | 0.36 | 0.71 |
| **21** | 1.38 | 0.06 | 78 | -0.04 | -0.07 |

** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 1.39 | 0.14 |
| **Spike Value** | 1.50 | 0.08 |
| **Robust Average** | 1.39 | 0.14 |
| **Median** | 1.42 | 0.08 |
| **Mean** | 1.38 | |
| **N** | 13 | |
| **Max** | 1.8 | |
| **Min** | 0.863 | |
| **Robust SD** | 0.20 | |
| **Robust CV** | 15% | |


Kernel Density
Density
Result
Results: S1 - PFPeA
Assigned Value = 1.39 ± 0.14 µg/kg
Results (µg/kg)
13 19 15 10 5 21 16 7 8 20 1 14 12 6 2 3 4 9 17 18 Md RA SV
Laboratory


z-Scores: S1 - PFPeA
Target Standard Deviation for Proficiency Assessment 0.28 µg/kg (Equivalent to 20% CV)
z-Score
-2.6 -1.9 -1.2 -0.6 -0.3 0.0 0.1 0.1 0.1 0.4 0.4 0.4 0.7 1.5
13 19 15 10 5 21 16 7 8 20 1 14 12 6
Laboratory

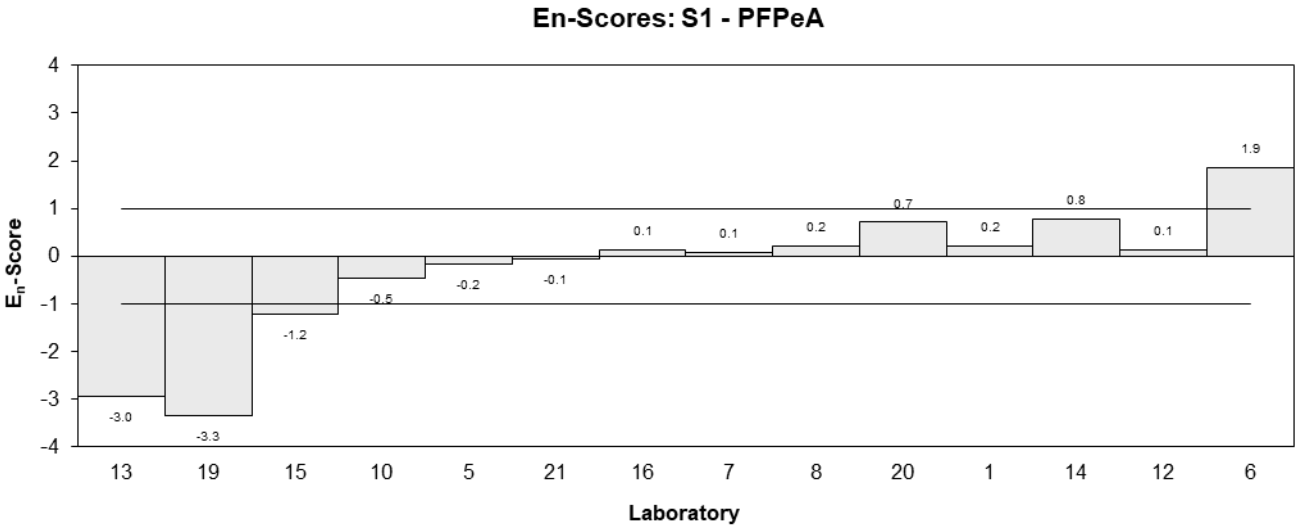

En-Scores: S1 - PFPeA
En-Score
-3.0 -3.3 -1.2 -0.5 -0.2 -0.1 0.1 0.1 0.2 0.7 0.2 0.8 0.1 1.9
13 19 15 10 5 21 16 7 8 20 1 14 12 6
Laboratory

Figure 11

Table 15

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | PFHxA |
| **Unit** | µg/kg |

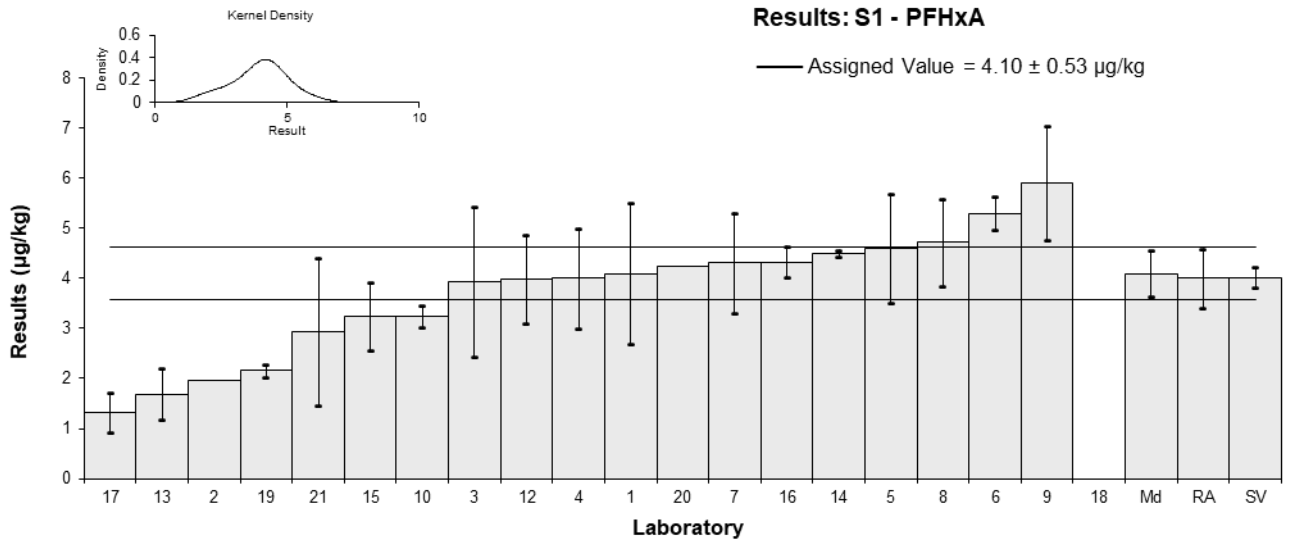
**Participant Results**

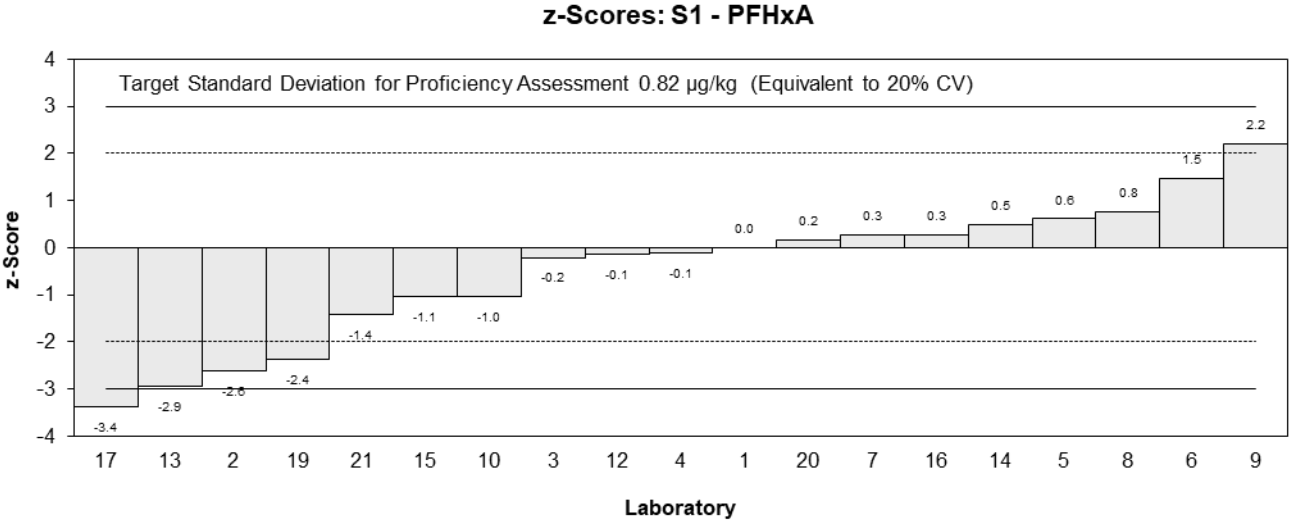
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 4.1 | 1.4 | 100 | 0.00 | 0.00 |
| **2*** | 1.955149 | NR | 128 | -2.62 | -4.05 |
| **3** | 3.928 | 1.5 | 75 | -0.21 | -0.11 |
| **4** | 4 | 1 | NR | -0.12 | -0.09 |
| **5** | 4.6 | 1.1 | 91 | 0.61 | 0.41 |
| **6** | 5.30 | 0.33 | NR | 1.46 | 1.92 |
| **7** | 4.31 | 1.0 | 83 | 0.26 | 0.19 |
| **8** | 4.719 | 0.872 | 95 | 0.75 | 0.61 |
| **9** | 5.9 | 1.144 | 53 | 2.20 | 1.43 |
| **10** | 3.244 | 0.208 | 110.9 | -1.04 | -1.50 |
| **12** | 3.99 | 0.889 | 100.7 | -0.13 | -0.11 |
| **13**** | 1.69 | 0.51 | 55 | -2.94 | -3.28 |
| **14** | 4.5 | 0.07 | 105 | 0.49 | 0.75 |
| **15** | 3.24 | 0.68 | 82.6 | -1.05 | -1.00 |
| **16** | 4.33 | 0.31 | NR | 0.28 | 0.37 |
| **17**** | 1.32 | 0.394897959 | 98 | -3.39 | -4.21 |
| **18** | NS | NS | NS | | |
| **19** | 2.154 | 0.12 | 88 | -2.37 | -3.58 |
| **20** | 4.24 | NR | NR | 0.17 | 0.26 |
| **21** | 2.94 | 1.48 | 94 | -1.41 | -0.74 |

* Outlier, ** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 4.10 | 0.53 |
| **Spike Value** | 4.02 | 0.20 |
| **Robust Average** | 4.00 | 0.59 |
| **Median** | 4.10 | 0.45 |
| **Mean** | 3.97 | |
| **N** | 17 | |
| **Max** | 5.9 | |
| **Min** | 1.955149 | |
| **Robust SD** | 0.97 | |
| **Robust CV** | 24% | |


Kernel Density
Density
Result
Results: S1 - PFHxA
Assigned Value = 4.10 ± 0.53 µg/kg
Results (µg/kg)
17 13 2 19 21 15 10 3 12 4 1 20 7 16 14 5 8 6 9 18 Md RA SV
Laboratory


z-Scores: S1 - PFHxA
Target Standard Deviation for Proficiency Assessment 0.82 µg/kg (Equivalent to 20% CV)
z-Score
-3.4 -2.9 -2.6 -2.4 -1.4 -1.1 -1.0 -0.2 -0.1 -0.1 0.0 0.2 0.3 0.3 0.5 0.6 0.8 1.5 2.2
17 13 2 19 21 15 10 3 12 4 1 20 7 16 14 5 8 6 9
Laboratory

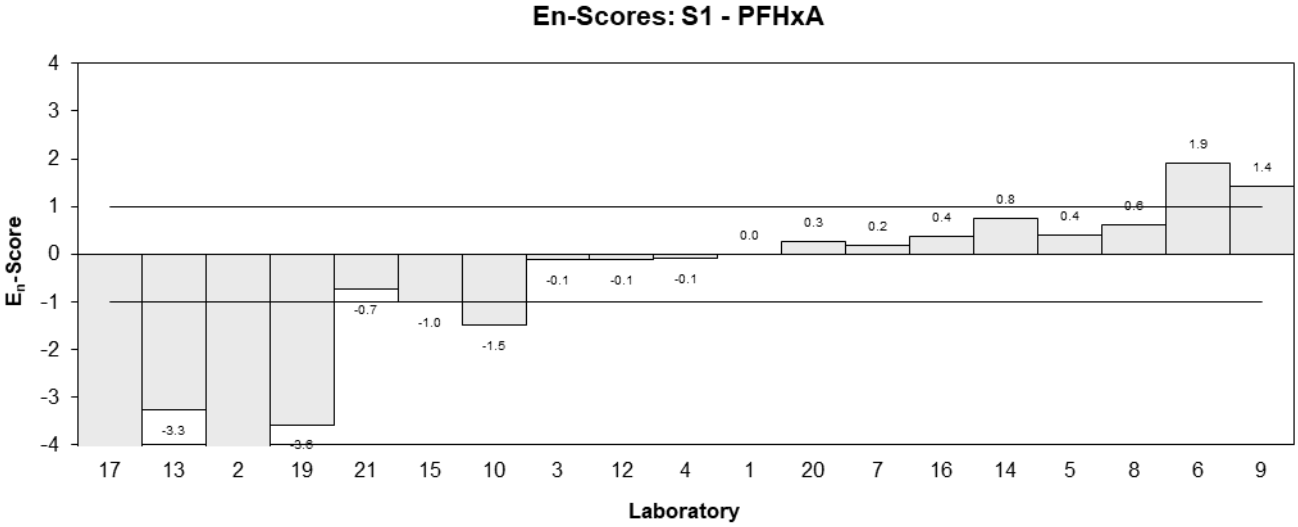

En-Scores: S1 - PFHxA
En-Score
-3.3 -3.6 -0.7 -1.0 -1.5 -0.1 -0.1 -0.1 0.0 0.3 0.2 0.4 0.8 0.4 0.6 1.9 1.4
17 13 2 19 21 15 10 3 12 4 1 20 7 16 14 5 8 6 9
Laboratory

Figure 12

Table 16

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | PFHpA |
| **Unit** | µg/kg |

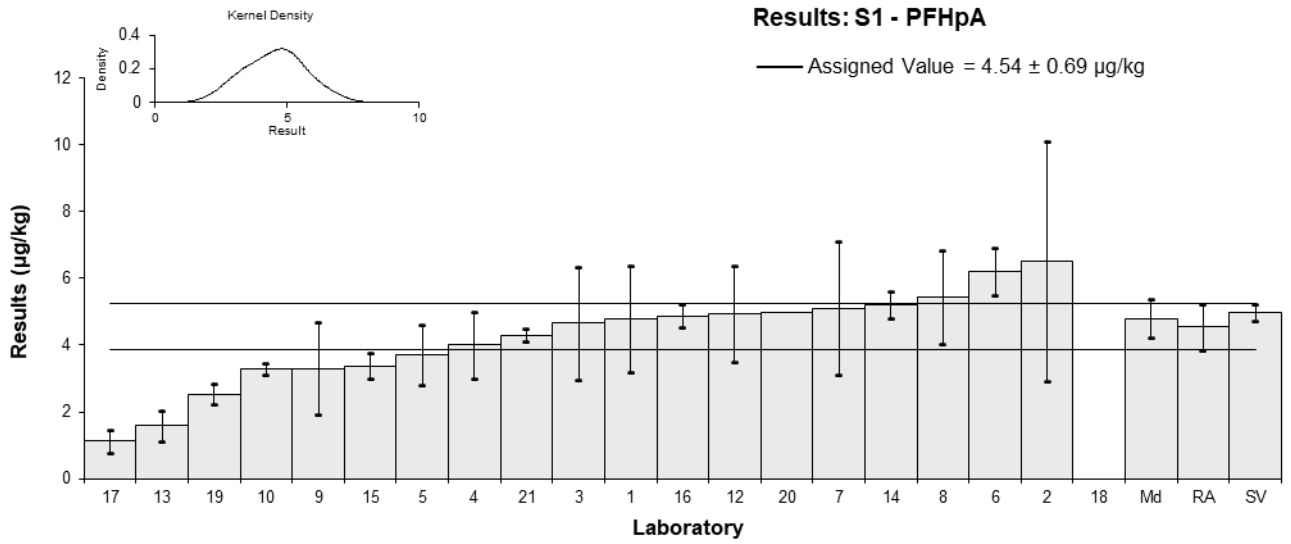
**Participant Results**

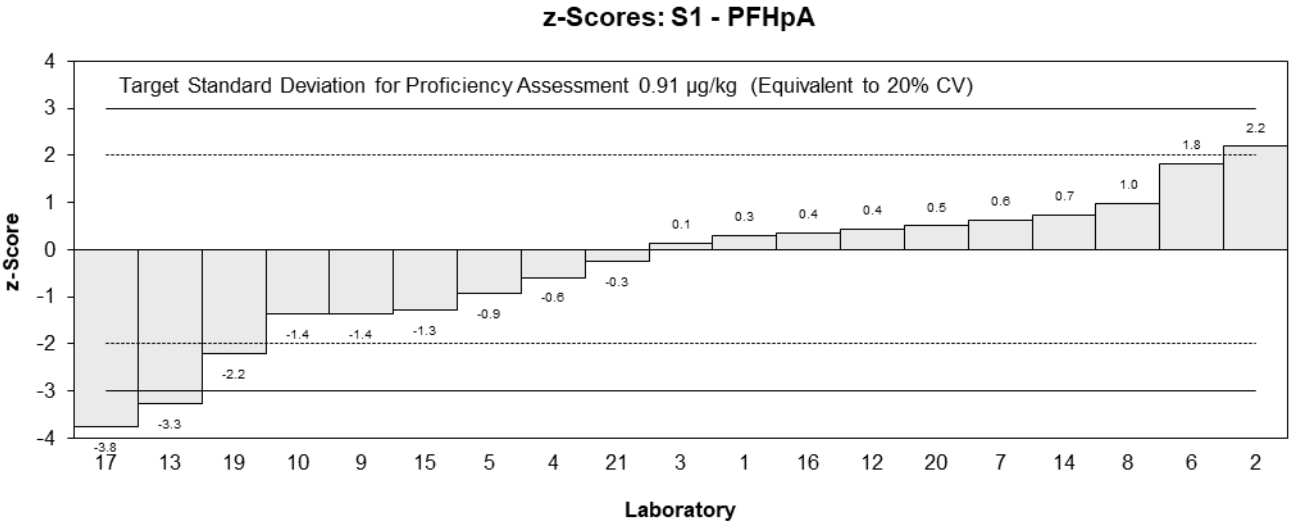
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 4.8 | 1.6 | 108 | 0.29 | 0.15 |
| **2** | 6.526442 | 3.5895 | 113 | 2.19 | 0.54 |
| **3** | 4.66 | 1.7 | 75 | 0.13 | 0.07 |
| **4** | 4 | 1 | NR | -0.59 | -0.44 |
| **5** | 3.7 | 0.9 | 63 | -0.93 | -0.74 |
| **6** | 6.20 | 0.71 | NR | 1.83 | 1.68 |
| **7** | 5.11 | 2.0 | 76 | 0.63 | 0.27 |
| **8** | 5.431 | 1.411 | 89 | 0.98 | 0.57 |
| **9** | 3.3 | 1.378 | 93 | -1.37 | -0.80 |
| **10** | 3.292 | 0.158 | NR | -1.37 | -1.76 |
| **12** | 4.94 | 1.43 | 99.0 | 0.44 | 0.25 |
| **13**** | 1.58 | 0.47 | 55 | -3.26 | -3.55 |
| **14** | 5.2 | 0.4 | 104 | 0.73 | 0.83 |
| **15** | 3.38 | 0.39 | 86.3 | -1.28 | -1.46 |
| **16** | 4.87 | 0.35 | NR | 0.36 | 0.43 |
| **17**** | 1.12 | 0.336 | 75 | -3.77 | -4.46 |
| **18** | NS | NS | NS | | |
| **19** | 2.533 | 0.315 | 88 | -2.21 | -2.65 |
| **20** | 4.99 | NR | NR | 0.50 | 0.65 |
| **21** | 4.3 | 0.19 | 94 | -0.26 | -0.34 |

** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 4.54 | 0.69 |
| **Spike Value** | 4.99 | 0.25 |
| **Robust Average** | 4.54 | 0.69 |
| **Median** | 4.80 | 0.57 |
| **Mean** | 4.54 | |
| **N** | 17 | |
| **Max** | 6.526442 | |
| **Min** | 2.533 | |
| **Robust SD** | 1.1 | |
| **Robust CV** | 25% | |


Kernel Density
Density
Result
Results: S1 - PFHpA
Assigned Value = 4.54 ± 0.69 µg/kg
Results (µg/kg)
Laboratory
17 13 19 10 9 15 5 4 21 3 1 16 12 20 7 14 8 6 2 18 Md RA SV


z-Scores: S1 - PFHpA
Target Standard Deviation for Proficiency Assessment 0.91 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
17 13 19 10 9 15 5 4 21 3 1 16 12 20 7 14 8 6 2
-3.8 -3.3 -2.2 -1.4 -1.4 -1.3 -0.9 -0.6 -0.3 0.1 0.3 0.4 0.4 0.5 0.6 0.7 1.0 1.8 2.2

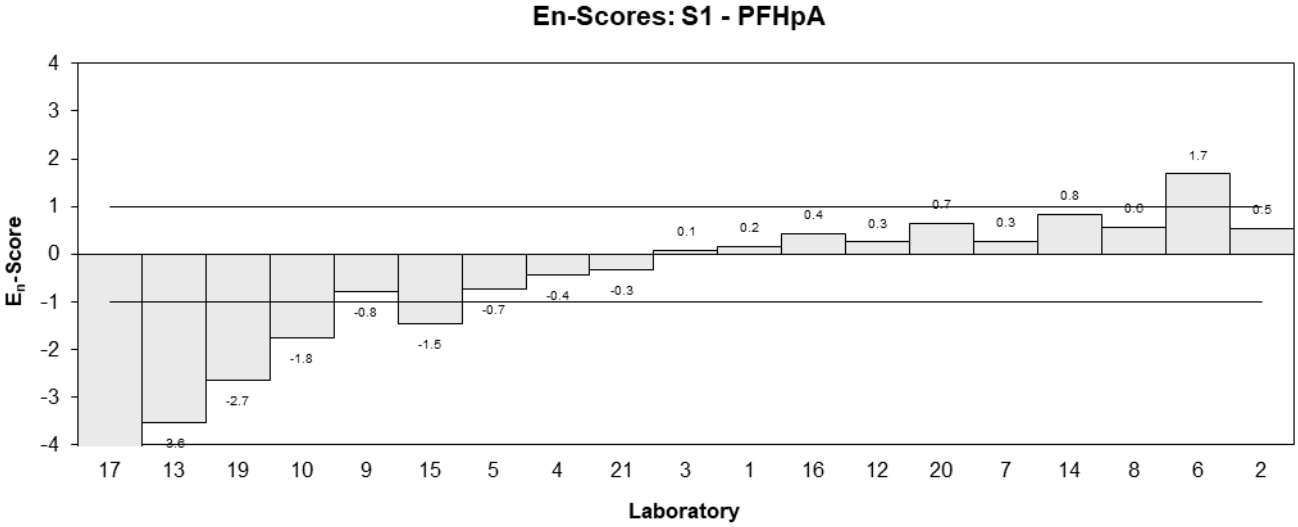

En-Scores: S1 - PFHpA
En-Score
Laboratory
17 13 19 10 9 15 5 4 21 3 1 16 12 20 7 14 8 6 2
-3.6 -2.7 -1.8 -0.8 -1.5 -0.7 -0.4 -0.3 0.1 0.2 0.4 0.3 0.7 0.3 0.8 0.6 1.7 0.5

Figure 13

Table 17

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | PFOA |
| **Unit** | µg/kg |

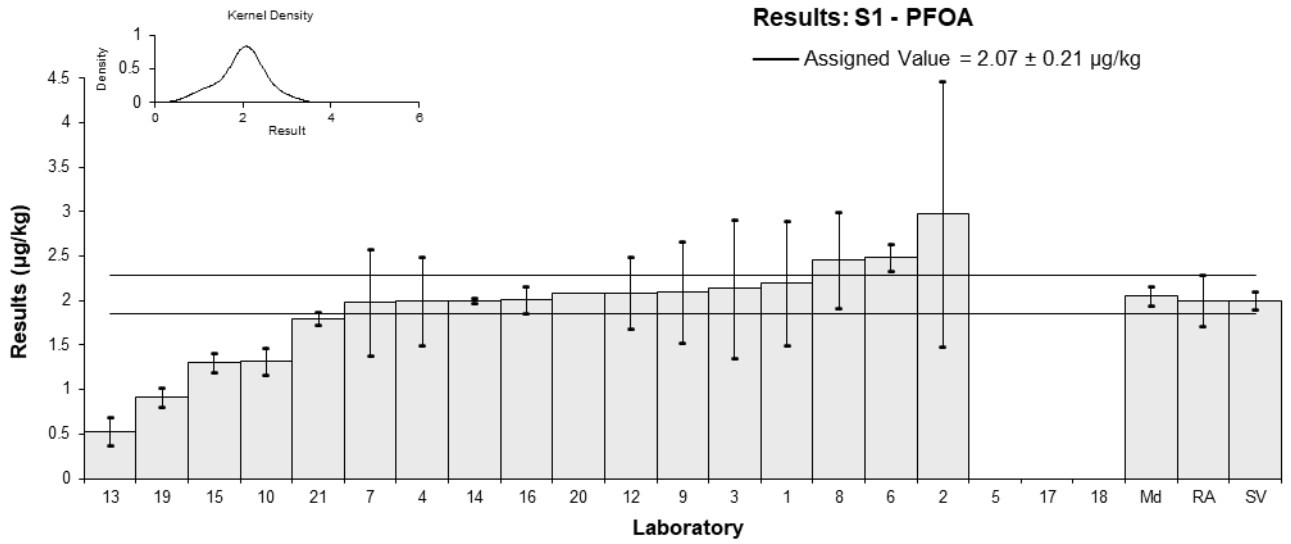
**Participant Results**

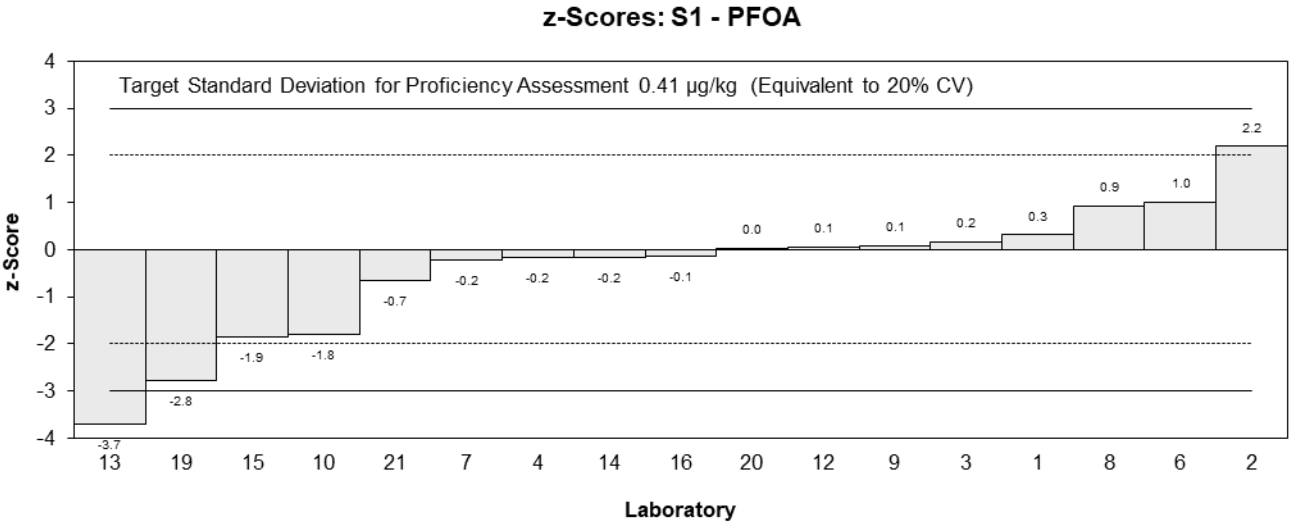
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 2.2 | 0.7 | 88 | 0.31 | 0.18 |
| **2** | 2.978435 | 1.4892 | 82 | 2.19 | 0.60 |
| **3** | 2.138 | 0.78 | 72 | 0.16 | 0.08 |
| **4** | 2 | 0.5 | NR | -0.17 | -0.13 |
| **5** | <0.1 | 0.1 | 39 | | |
| **6** | 2.49 | 0.15 | NR | 1.01 | 1.63 |
| **7** | 1.98 | 0.6 | 77 | -0.22 | -0.14 |
| **8** | 2.456 | 0.539 | 86 | 0.93 | 0.67 |
| **9** | 2.1 | 0.573 | 92 | 0.07 | 0.05 |
| **10** | 1.32 | 0.154 | 112.1 | -1.81 | -2.88 |
| **12** | 2.09 | 0.409 | 93.5 | 0.05 | 0.04 |
| **13**** | 0.53 | 0.16 | 58 | -3.72 | -5.83 |
| **14** | 2 | 0.03 | 106 | -0.17 | -0.33 |
| **15** | 1.30 | 0.11 | 88.3 | -1.86 | -3.25 |
| **16** | 2.01 | 0.15 | NR | -0.14 | -0.23 |
| **17** | <0.5 | NR | NR | | |
| **18** | NS | NS | NS | | |
| **19*** | 0.913 | 0.105 | 96 | -2.79 | -4.93 |
| **20** | 2.08 | NR | NR | 0.02 | 0.05 |
| **21** | 1.8 | 0.07 | 104 | -0.65 | -1.22 |

* Outlier, ** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 2.07 | 0.21 |
| **Spike Value** | 2.00 | 0.10 |
| **Robust Average** | 2.00 | 0.29 |
| **Median** | 2.05 | 0.11 |
| **Mean** | 1.99 | |
| **N** | 16 | |
| **Max** | 2.978435 | |
| **Min** | 0.913 | |
| **Robust SD** | 0.46 | |
| **Robust CV** | 23% | |


Kernel Density
Density
Result
Results: S1 - PFOA
Assigned Value = 2.07 ± 0.21 µg/kg
Results (µg/kg)
Laboratory
13 19 15 10 21 7 4 14 16 20 12 9 3 1 8 6 2 5 17 18 Md RA SV


z-Scores: S1 - PFOA
Target Standard Deviation for Proficiency Assessment 0.41 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
13 19 15 10 21 7 4 14 16 20 12 9 3 1 8 6 2
-3.7 -2.8 -1.9 -1.8 -0.7 -0.2 -0.2 -0.2 -0.1 0.0 0.1 0.1 0.2 0.3 0.9 1.0 2.2

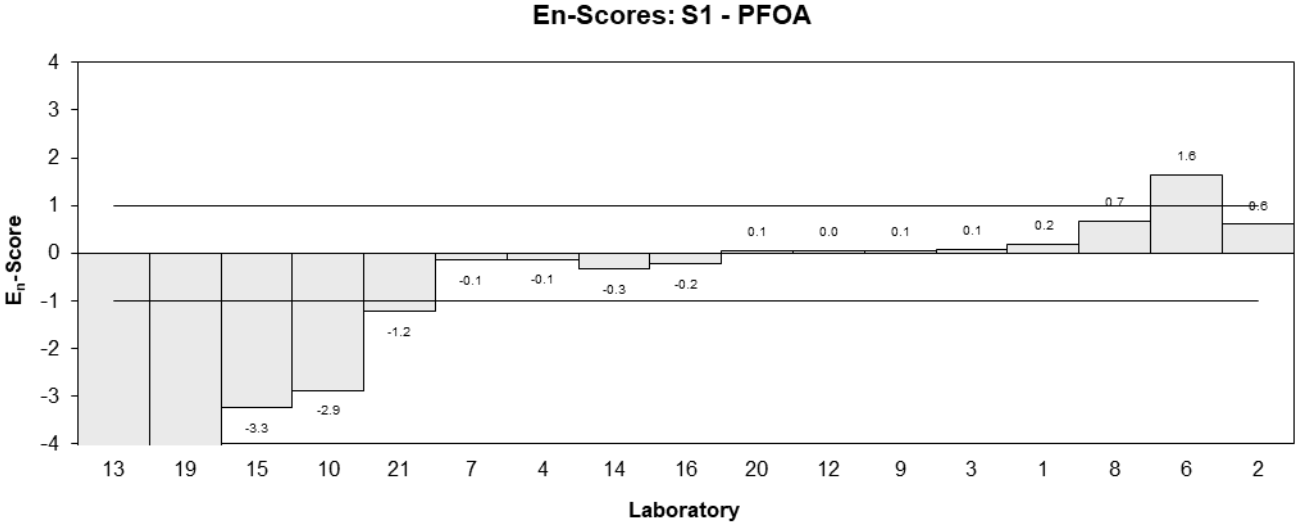

En-Scores: S1 - PFOA
En-Score
Laboratory
13 19 15 10 21 7 4 14 16 20 12 9 3 1 8 6 2
-3.3 -2.9 -1.2 -0.1 -0.1 -0.3 -0.2 0.1 0.0 0.1 0.1 0.2 0.7 1.6 0.6

Figure 14

Table 18

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | PFNA |
| **Unit** | µg/kg |

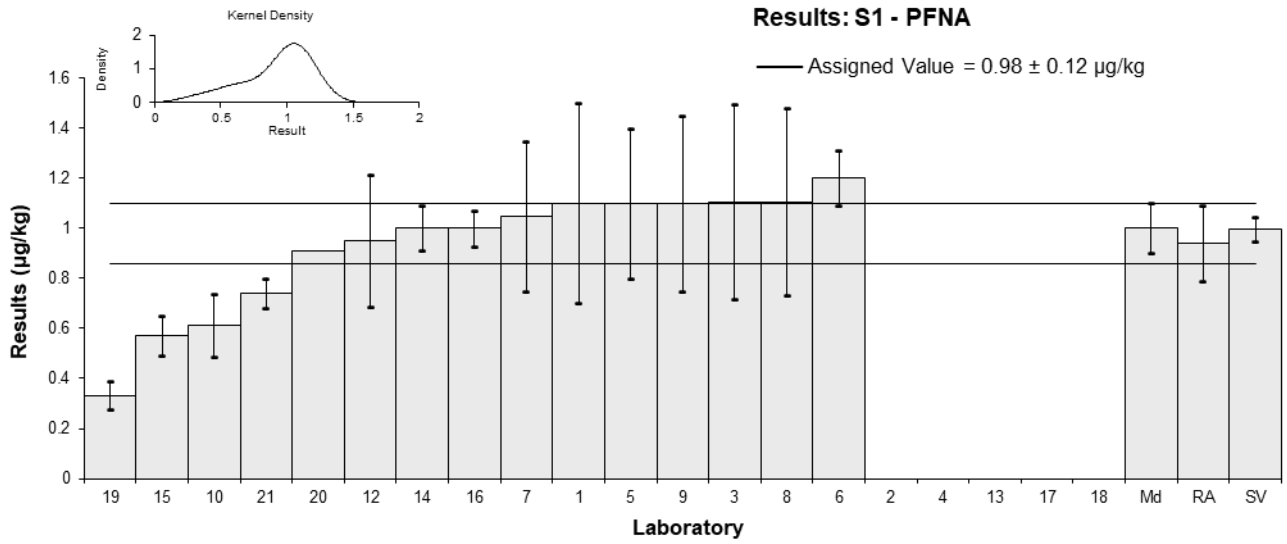
**Participant Results**

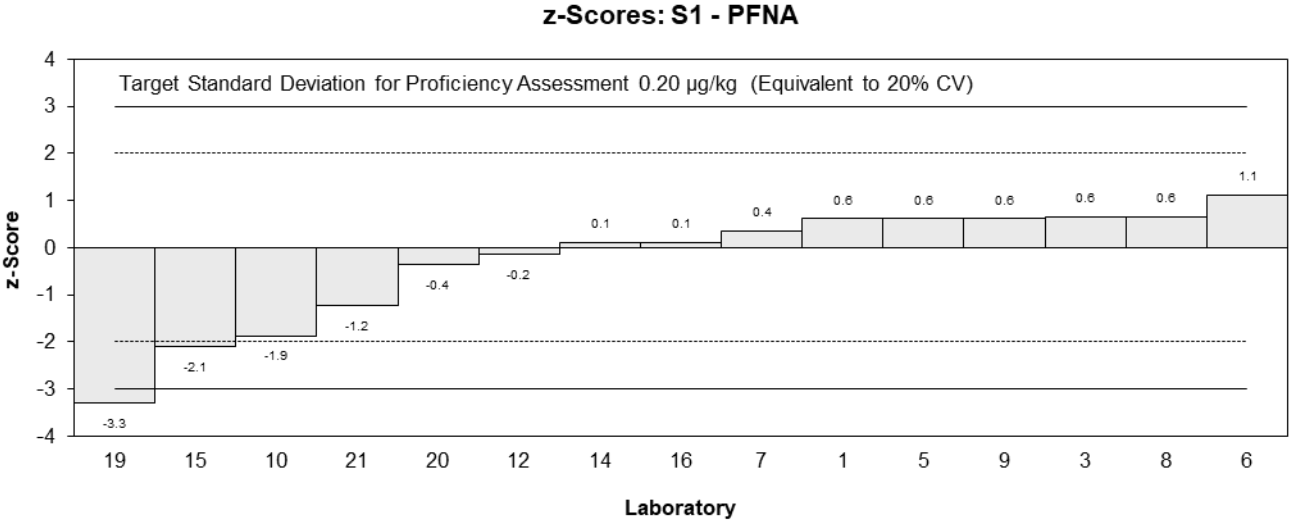
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 1.1 | 0.4 | 102 | 0.61 | 0.29 |
| **2** | <0.1 | NR | 122 | | |
| **3** | 1.106 | 0.39 | 75 | 0.64 | 0.31 |
| **4** | < 1 | NR | NR | | |
| **5** | 1.1 | 0.3 | 34 | 0.61 | 0.37 |
| **6** | 1.20 | 0.11 | NR | 1.12 | 1.35 |
| **7** | 1.05 | 0.3 | 80 | 0.36 | 0.22 |
| **8** | 1.106 | 0.375 | 46 | 0.64 | 0.32 |
| **9** | 1.1 | 0.349 | 90 | 0.61 | 0.33 |
| **10** | 0.613 | 0.125 | NR | -1.87 | -2.12 |
| **12** | 0.951 | 0.265 | 92.0 | -0.15 | -0.10 |
| **13** | <0.5 | NR | 77 | | |
| **14** | 1 | 0.09 | 98 | 0.10 | 0.13 |
| **15** | 0.57 | 0.08 | 79.8 | -2.09 | -2.84 |
| **16** | 1 | 0.07 | NR | 0.10 | 0.14 |
| **17** | <0.5 | NR | NR | | |
| **18** | NS | NS | NS | | |
| **19*** | 0.333 | 0.056 | 96 | -3.30 | -4.89 |
| **20** | 0.91 | NR | NR | -0.36 | -0.58 |
| **21** | 0.74 | 0.06 | 104 | -1.22 | -1.79 |

* Outlier, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.98 | 0.12 |
| **Spike Value** | 0.998 | 0.050 |
| **Robust Average** | 0.94 | 0.15 |
| **Median** | 1.00 | 0.10 |
| **Mean** | 0.93 | |
| **N** | 15 | |
| **Max** | 1.2 | |
| **Min** | 0.333 | |
| **Robust SD** | 0.24 | |
| **Robust CV** | 25% | |


Results: S1 - PFNA
Kernel Density
Density
Result
Assigned Value = 0.98 ± 0.12 µg/kg
Results (µg/kg)
Laboratory
19 15 10 21 20 12 14 16 7 1 5 9 3 8 6 2 4 13 17 18 Md RA SV


z-Scores: S1 - PFNA
Target Standard Deviation for Proficiency Assessment 0.20 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
19 15 10 21 20 12 14 16 7 1 5 9 3 8 6
-3.3 -2.1 -1.9 -1.2 -0.4 -0.2 0.1 0.1 0.4 0.6 0.6 0.6 0.6 0.6 1.1

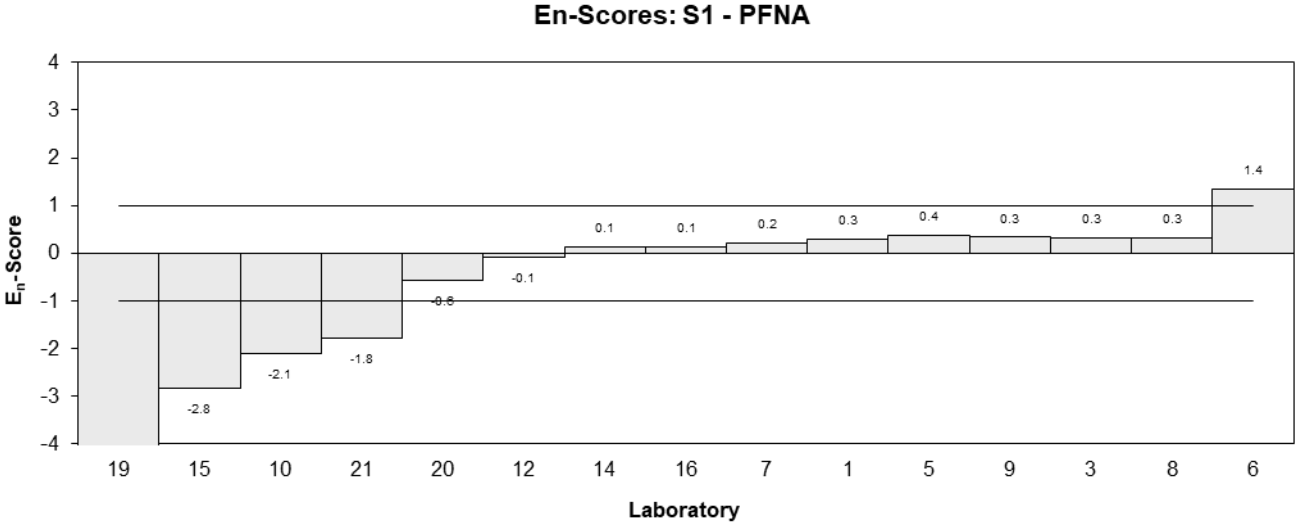

En-Scores: S1 - PFNA
En-Score
Laboratory
19 15 10 21 20 12 14 16 7 1 5 9 3 8 6
-2.8 -2.1 -1.8 -0.6 -0.1 0.1 0.1 0.2 0.3 0.4 0.3 0.3 0.3 1.4

Figure 15

Table 19

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | PFDA |
| **Unit** | µg/kg |

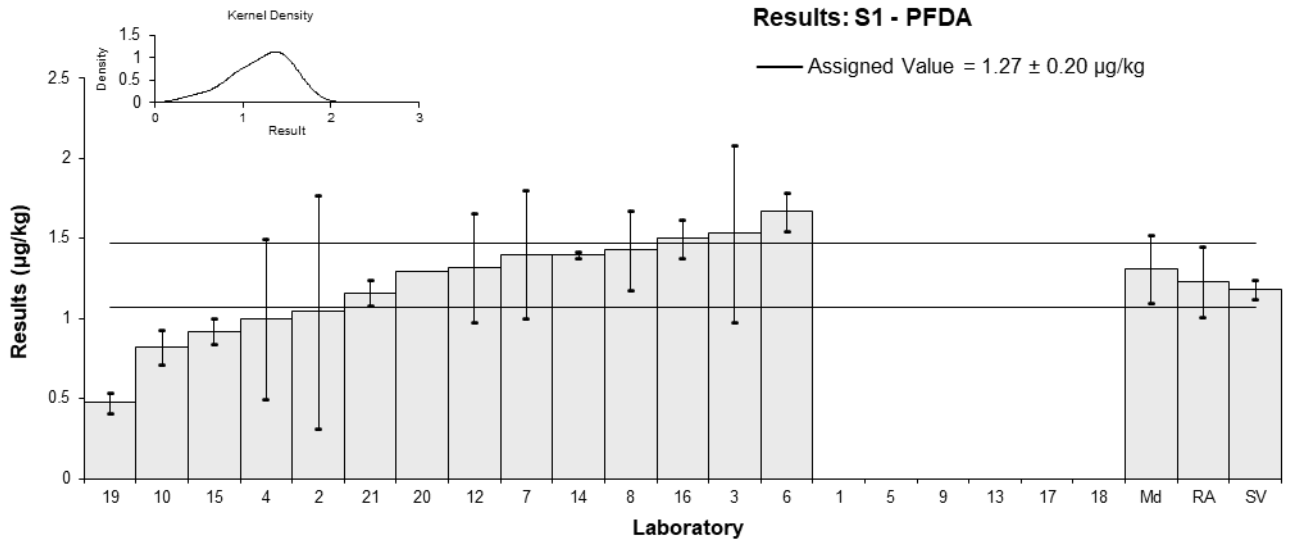
**Participant Results**

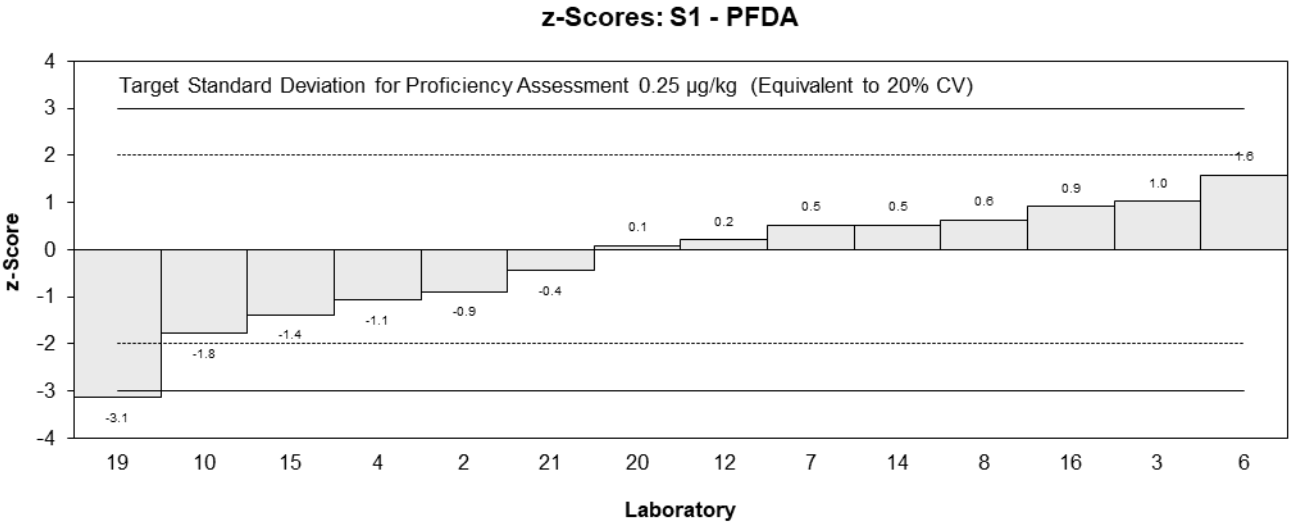
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | < 2 | NR | 109 | | |
| **2** | 1.042825 | 0.72997 | 96 | -0.89 | -0.30 |
| **3** | 1.53 | 0.55 | 89 | 1.02 | 0.44 |
| **4** | 1 | 0.5 | NR | -1.06 | -0.50 |
| **5** | <0.1 | 0.1 | 38 | | |
| **6** | 1.67 | 0.12 | NR | 1.57 | 1.71 |
| **7** | 1.40 | 0.4 | 76 | 0.51 | 0.29 |
| **8** | 1.429 | 0.249 | 82 | 0.63 | 0.50 |
| **9** | NR | NR | NR | | |
| **10** | 0.82 | 0.109 | NR | -1.77 | -1.98 |
| **12** | 1.32 | 0.341 | 90.2 | 0.20 | 0.13 |
| **13** | <0.5 | NR | 82 | | |
| **14** | 1.4 | 0.02 | 98 | 0.51 | 0.65 |
| **15** | 0.92 | 0.08 | 94 | -1.38 | -1.62 |
| **16** | 1.5 | 0.12 | NR | 0.91 | 0.99 |
| **17** | <0.5 | NR | NR | | |
| **18** | NS | NS | NS | | |
| **19*** | 0.473 | 0.063 | 96 | -3.14 | -3.80 |
| **20** | 1.29 | NR | NR | 0.08 | 0.10 |
| **21** | 1.16 | 0.08 | 104 | -0.43 | -0.51 |

* Outlier, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 1.27 | 0.20 |
| **Spike Value** | 1.18 | 0.06 |
| **Robust Average** | 1.23 | 0.22 |
| **Median** | 1.31 | 0.21 |
| **Mean** | 1.21 | |
| **N** | 14 | |
| **Max** | 1.67 | |
| **Min** | 0.473 | |
| **Robust SD** | 0.32 | |
| **Robust CV** | 26% | |


Kernel Density
Density
Result
Results: S1 - PFDA
Assigned Value = 1.27 ± 0.20 µg/kg
Results (µg/kg)
Laboratory
19 10 15 4 2 21 20 12 7 14 8 16 3 6 1 5 9 13 17 18 Md RA SV


z-Scores: S1 - PFDA
Target Standard Deviation for Proficiency Assessment 0.25 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
19 10 15 4 2 21 20 12 7 14 8 16 3 6
-3.1 -1.8 -1.4 -1.1 -0.9 -0.4 0.1 0.2 0.5 0.5 0.6 0.9 1.0 1.6

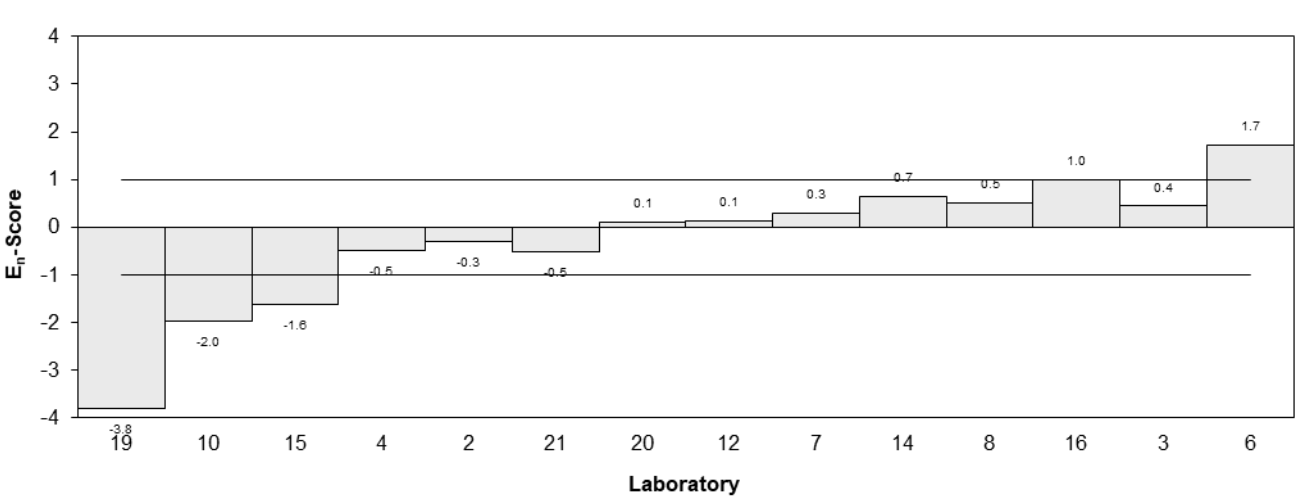

En-Scores: S1 - PFDA
En-Score
Laboratory
19 10 15 4 2 21 20 12 7 14 8 16 3 6
-3.8 -2.0 -1.6 -0.5 -0.3 -0.5 0.1 0.1 0.3 0.7 0.5 1.0 0.4 1.7

Figure 16

Table 20

**Sample Details**

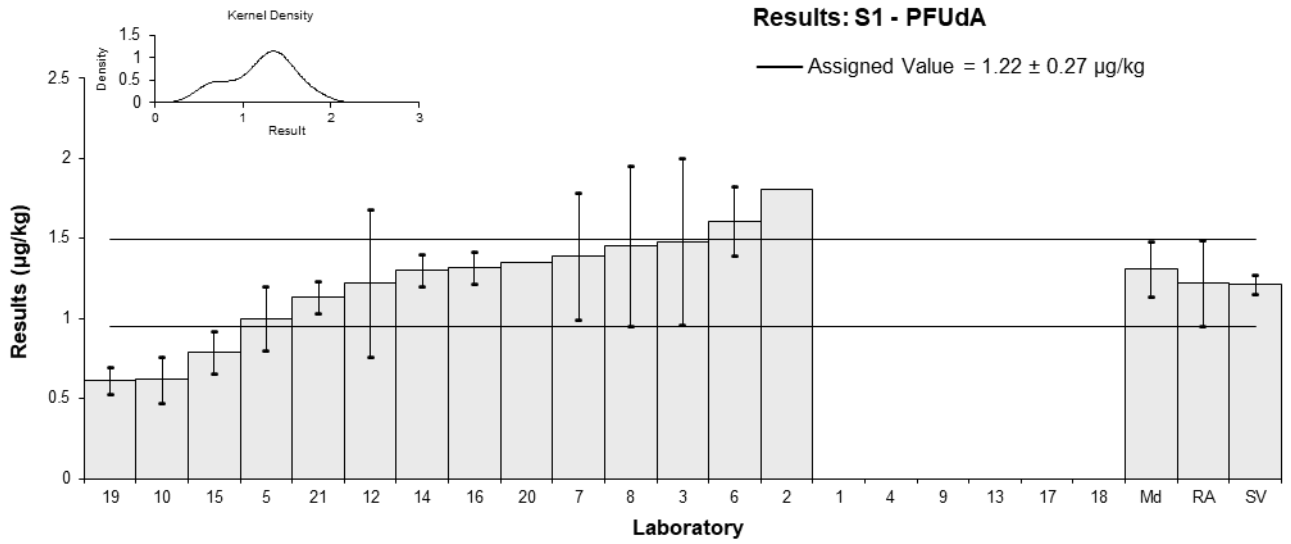
| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | PFUdA |
| **Unit** | µg/kg |

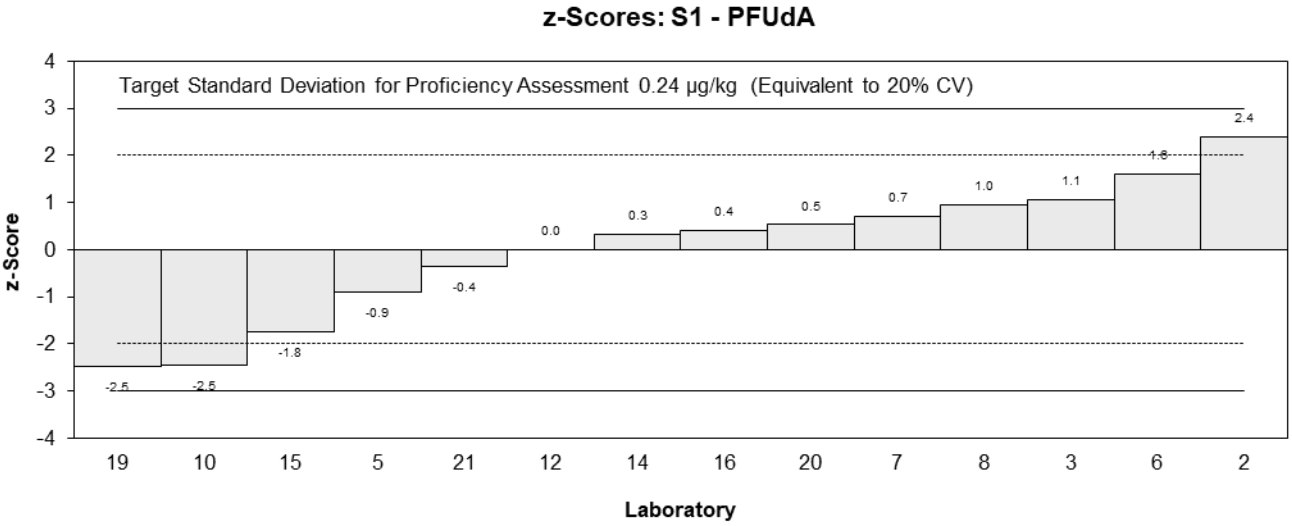
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | < 2 | NR | 108 | | |
| **2** | 1.804006 | NR | 101 | 2.39 | 2.16 |
| **3** | 1.48 | 0.52 | 71 | 1.07 | 0.44 |
| **4** | < 1 | NR | NR | | |
| **5** | 1 | 0.2 | 43 | -0.90 | -0.65 |
| **6** | 1.61 | 0.22 | NR | 1.60 | 1.12 |
| **7** | 1.39 | 0.4 | 69 | 0.70 | 0.35 |
| **8** | 1.454 | 0.504 | 77 | 0.96 | 0.41 |
| **9** | NR | NR | NR | | |
| **10** | 0.62 | 0.144 | 116.8 | -2.46 | -1.96 |
| **12** | 1.22 | 0.460 | 87.8 | 0.00 | 0.00 |
| **13** | <0.5 | NR | 63 | | |
| **14** | 1.3 | 0.1 | 99 | 0.33 | 0.28 |
| **15** | 0.79 | 0.13 | 69.4 | -1.76 | -1.43 |
| **16** | 1.32 | 0.1 | NR | 0.41 | 0.35 |
| **17** | <0.5 | NR | NR | | |
| **18** | NS | NS | NS | | |
| **19** | 0.613 | 0.085 | 74 | -2.49 | -2.14 |
| **20** | 1.35 | NR | NR | 0.53 | 0.48 |
| **21** | 1.13 | 0.1 | 85 | -0.37 | -0.31 |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 1.22 | 0.27 |
| **Spike Value** | 1.21 | 0.06 |
| **Robust Average** | 1.22 | 0.27 |
| **Median** | 1.31 | 0.17 |
| **Mean** | 1.22 | |
| **N** | 14 | |
| **Max** | 1.804006 | |
| **Min** | 0.613 | |
| **Robust SD** | 0.40 | |
| **Robust CV** | 33% | |


Kernel Density
Density
Result
Results: S1 - PFUdA
Assigned Value = 1.22 ± 0.27 µg/kg
Results (µg/kg)
19 10 15 5 21 12 14 16 20 7 8 3 6 2 1 4 9 13 17 18 Md RA SV
Laboratory


z-Scores: S1 - PFUdA
Target Standard Deviation for Proficiency Assessment 0.24 µg/kg (Equivalent to 20% CV)
z-Score
-2.5 -2.5 -1.8 -0.9 -0.4 0.0 0.3 0.4 0.5 0.7 1.0 1.1 1.6 2.4
19 10 15 5 21 12 14 16 20 7 8 3 6 2
Laboratory

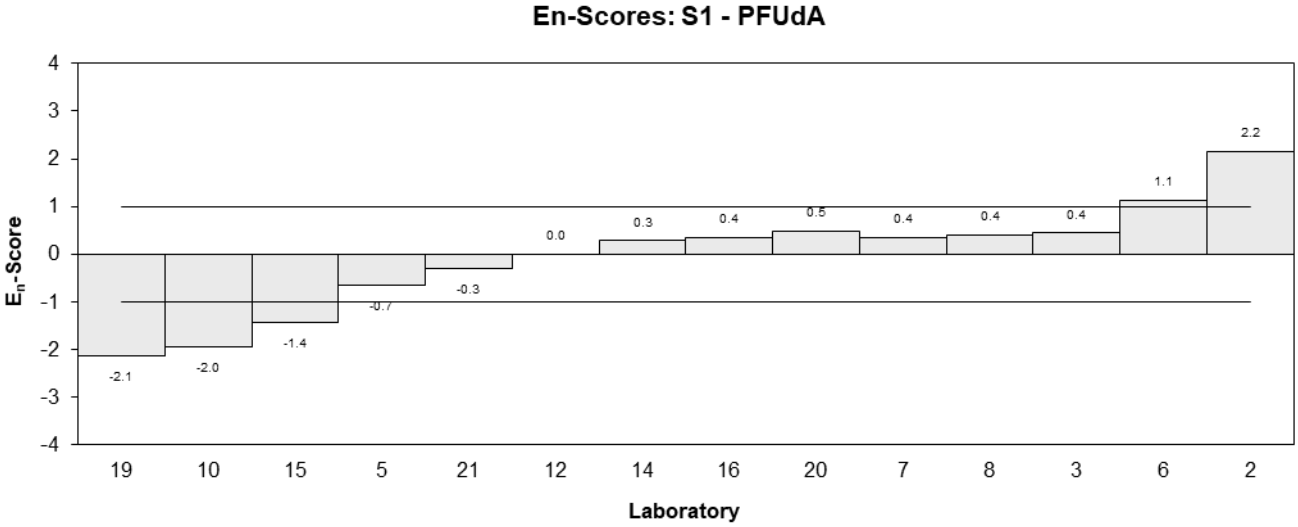

En-Scores: S1 - PFUdA
En-Score
-2.1 -2.0 -1.4 -0.7 -0.3 0.0 0.3 0.4 0.5 0.4 0.4 0.4 1.1 2.2
19 10 15 5 21 12 14 16 20 7 8 3 6 2
Laboratory

Figure 17

Table 21

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | PFTrDA |
| **Unit** | µg/kg |

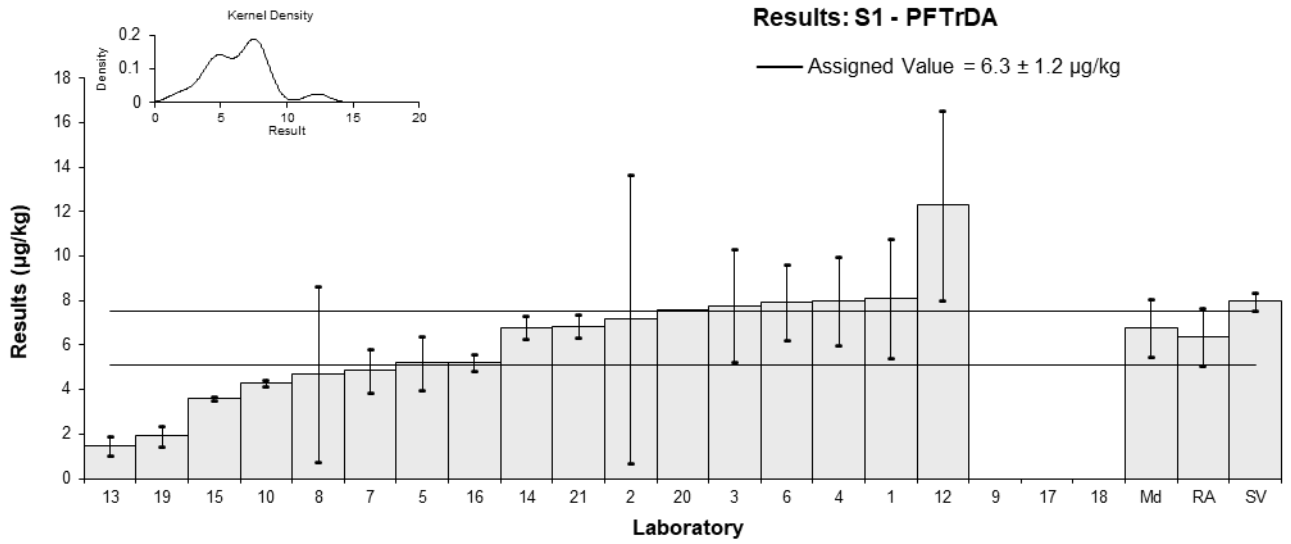
**Participant Results**

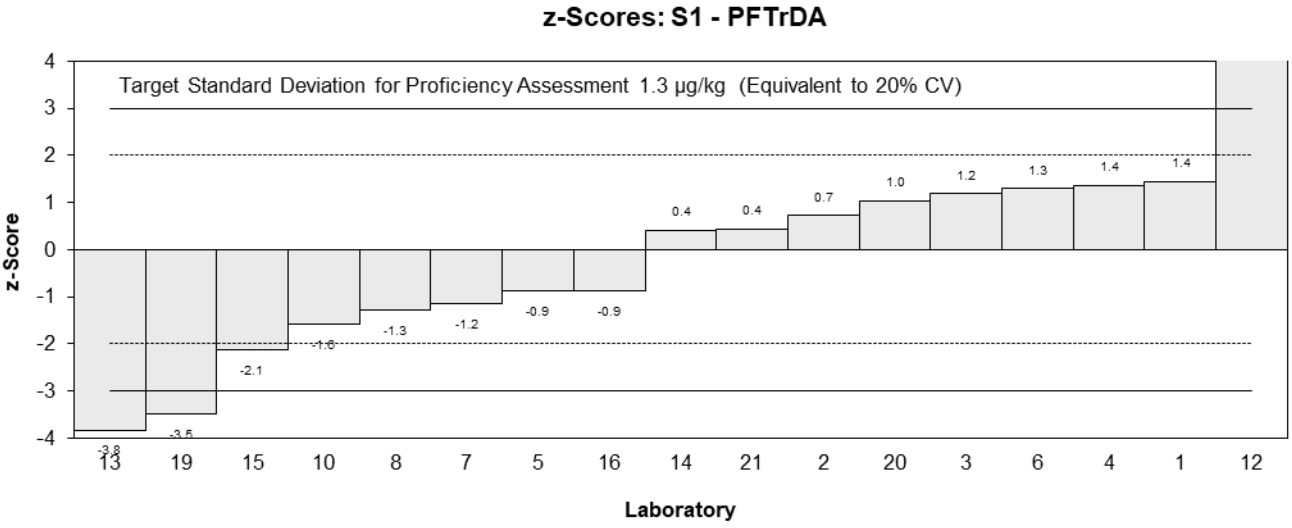
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 8.1 | 2.7 | 131 | 1.43 | 0.61 |
| **2** | 7.204325 | 6.48389 | NR | 0.72 | 0.14 |
| **3** | 7.782 | 2.54 | 69 | 1.18 | 0.53 |
| **4** | 8 | 2 | NR | 1.35 | 0.73 |
| **5** | 5.2 | 1.2 | NR | -0.87 | -0.65 |
| **6** | 7.92 | 1.71 | NR | 1.29 | 0.78 |
| **7** | 4.85 | 1.0 | NR | -1.15 | -0.93 |
| **8** | 4.691 | 3.938 | 59 | -1.28 | -0.39 |
| **9** | NR | NR | NR | | |
| **10** | 4.302 | 0.168 | NR | -1.59 | -1.65 |
| **12*** | 12.3 | 4.27 | 53.2 | 4.76 | 1.35 |
| **13**** | 1.47 | 0.44 | 31 | -3.83 | -3.78 |
| **14** | 6.8 | 0.5 | 96 | 0.40 | 0.38 |
| **15** | 3.60 | 0.08 | 35.2 | -2.14 | -2.25 |
| **16** | 5.2 | 0.38 | NR | -0.87 | -0.87 |
| **17** | <0.5 | NR | NR | | |
| **18** | NS | NS | NS | | |
| **19*** | 1.915 | 0.472 | 75 | -3.48 | -3.40 |
| **20** | 7.61 | NR | NR | 1.04 | 1.09 |
| **21** | 6.86 | 0.54 | 92 | 0.44 | 0.43 |

* Outlier, ** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 6.3 | 1.2 |
| **Spike Value** | 7.98 | 0.40 |
| **Robust Average** | 6.4 | 1.3 |
| **Median** | 6.8 | 1.3 |
| **Mean** | 6.4 | |
| **N** | 16 | |
| **Max** | 12.3 | |
| **Min** | 1.915 | |
| **Robust SD** | 2.1 | |
| **Robust CV** | 34% | |


Kernel Density
Density
Result
Results: S1 - PFTrDA
Assigned Value = 6.3 ± 1.2 µg/kg
Results (µg/kg)
Laboratory
13 19 15 10 8 7 5 16 14 21 2 20 3 6 4 1 12 9 17 18 Md RA SV


z-Scores: S1 - PFTrDA
Target Standard Deviation for Proficiency Assessment 1.3 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
13 19 15 10 8 7 5 16 14 21 2 20 3 6 4 1 12
-3.8 -3.5 -2.1 -1.6 -1.3 -1.2 -0.9 -0.9 0.4 0.4 0.7 1.0 1.2 1.3 1.4 1.4

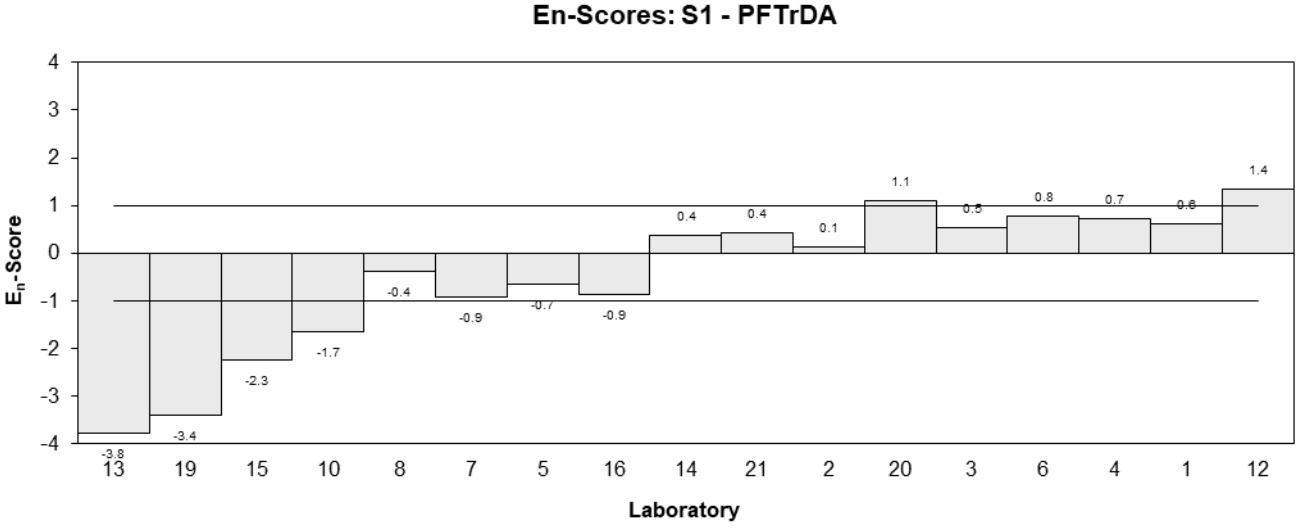

En-Scores: S1 - PFTrDA
En-Score
Laboratory
13 19 15 10 8 7 5 16 14 21 2 20 3 6 4 1 12
-3.8 -3.4 -2.3 -1.7 -0.4 -0.9 -0.7 -0.9 0.4 0.4 0.1 1.1 0.5 0.8 0.7 0.6 1.4

Figure 18

Table 22

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | PFTeDA |
| **Unit** | µg/kg |

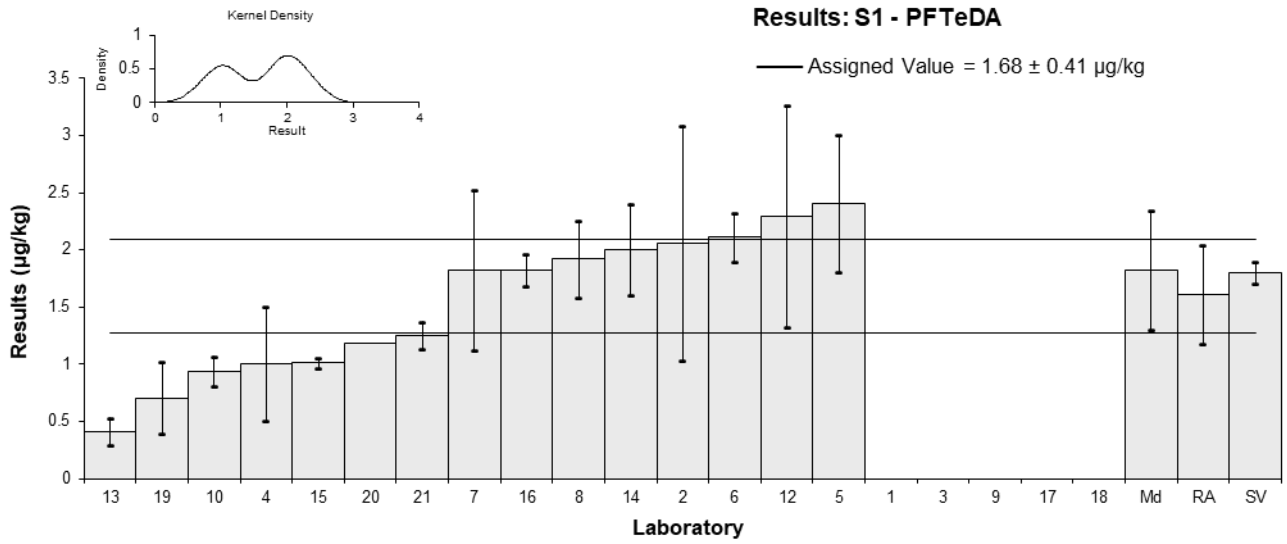
**Participant Results**

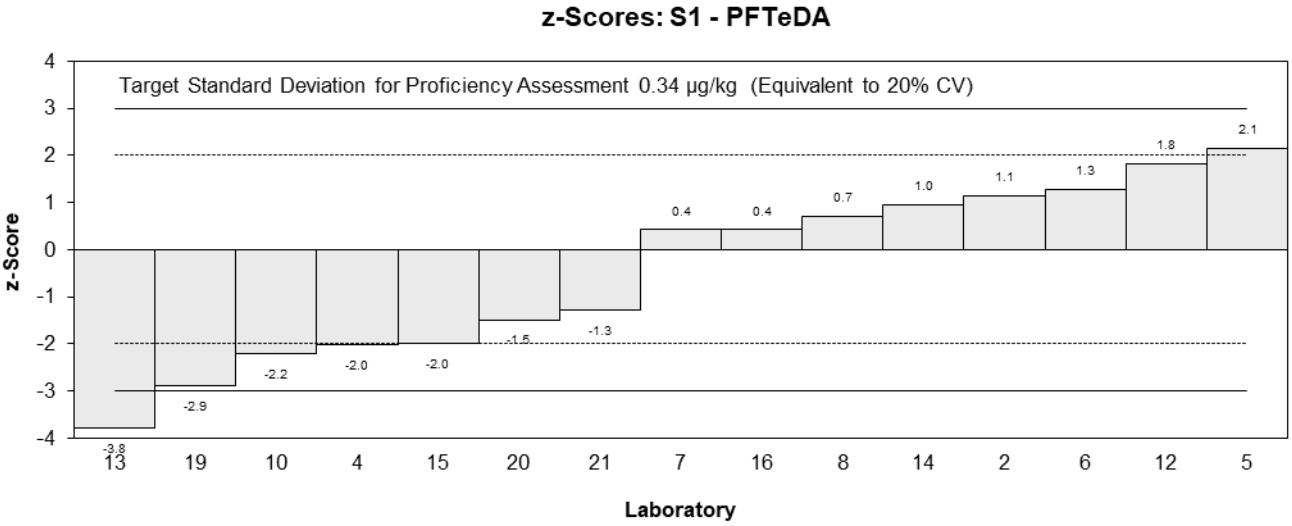
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | < 5 | NR | 131 | | |
| **2** | 2.058766 | 1.029383 | 128 | 1.13 | 0.34 |
| **3** | <2 | NR | 62 | | |
| **4** | 1 | 0.5 | NR | -2.02 | -1.05 |
| **5** | 2.4 | 0.6 | 54 | 2.14 | 0.99 |
| **6** | 2.11 | 0.21 | NR | 1.28 | 0.93 |
| **7** | 1.82 | 0.7 | 14 | 0.42 | 0.17 |
| **8** | 1.92 | 0.336 | 30 | 0.71 | 0.45 |
| **9** | NR | NR | NR | | |
| **10** | 0.938 | 0.131 | 103.7 | -2.21 | -1.72 |
| **12** | 2.29 | 0.968 | 53.2 | 1.82 | 0.58 |
| **13**** | 0.41 | 0.12 | 31 | -3.78 | -2.97 |
| **14** | 2 | 0.4 | 76 | 0.95 | 0.56 |
| **15** | 1.01 | 0.04 | 35.2 | -1.99 | -1.63 |
| **16** | 1.82 | 0.14 | NR | 0.42 | 0.32 |
| **17** | <0.5 | NR | NR | | |
| **18** | NS | NS | NS | | |
| **19*** | 0.705 | 0.314 | 42 | -2.90 | -1.89 |
| **20** | 1.18 | NR | NR | -1.49 | -1.22 |
| **21** | 1.25 | 0.12 | 82 | -1.28 | -1.01 |

* Outlier, ** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 1.68 | 0.41 |
| **Spike Value** | 1.80 | 0.09 |
| **Robust Average** | 1.61 | 0.43 |
| **Median** | 1.82 | 0.52 |
| **Mean** | 1.61 | |
| **N** | 14 | |
| **Max** | 2.4 | |
| **Min** | 0.705 | |
| **Robust SD** | 0.64 | |
| **Robust CV** | 40% | |


Kernel Density
Density
Result
Results: S1 - PFTeDA
Assigned Value = 1.68 ± 0.41 µg/kg
Results (µg/kg)
Laboratory
13 19 10 4 15 20 21 7 16 8 14 2 6 12 5 1 3 9 17 18 Md RA SV


z-Scores: S1 - PFTeDA
Target Standard Deviation for Proficiency Assessment 0.34 µg/kg (Equivalent to 20% CV)
z-Score
-3.8 -2.9 -2.2 -2.0 -2.0 -1.5 -1.3 0.4 0.4 0.7 1.0 1.1 1.3 1.8 2.1
Laboratory
13 19 10 4 15 20 21 7 16 8 14 2 6 12 5

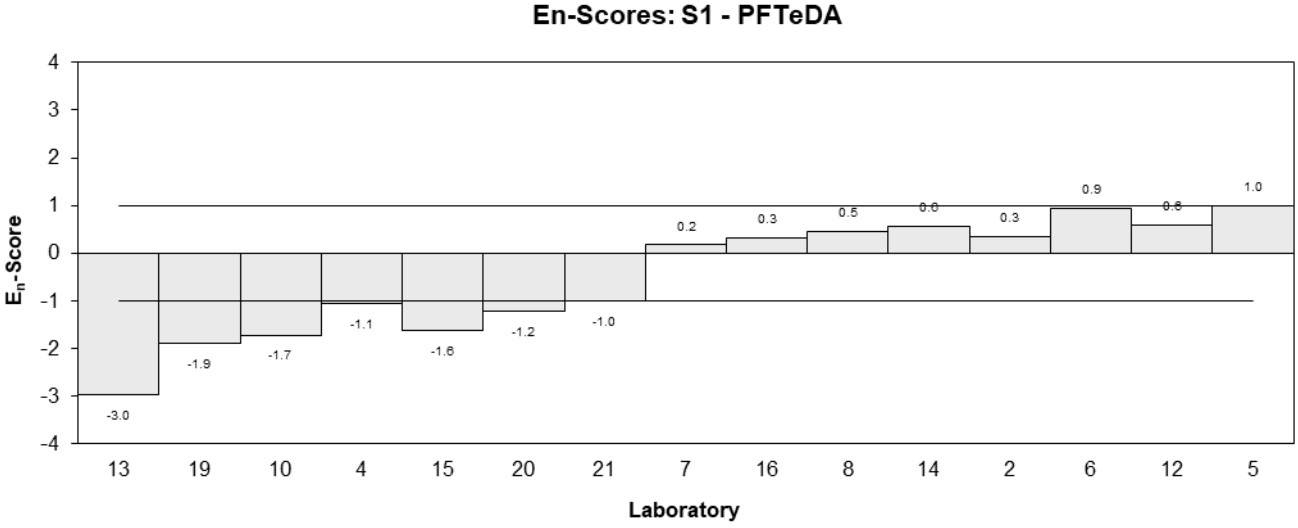

En-Scores: S1 - PFTeDA
En-Score
-3.0 -1.9 -1.7 -1.1 -1.6 -1.2 -1.0 0.2 0.3 0.5 0.6 0.3 0.9 0.6 1.0
Laboratory
13 19 10 4 15 20 21 7 16 8 14 2 6 12 5

Figure 19

Table 23

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | PFOSA |
| **Unit** | µg/kg |

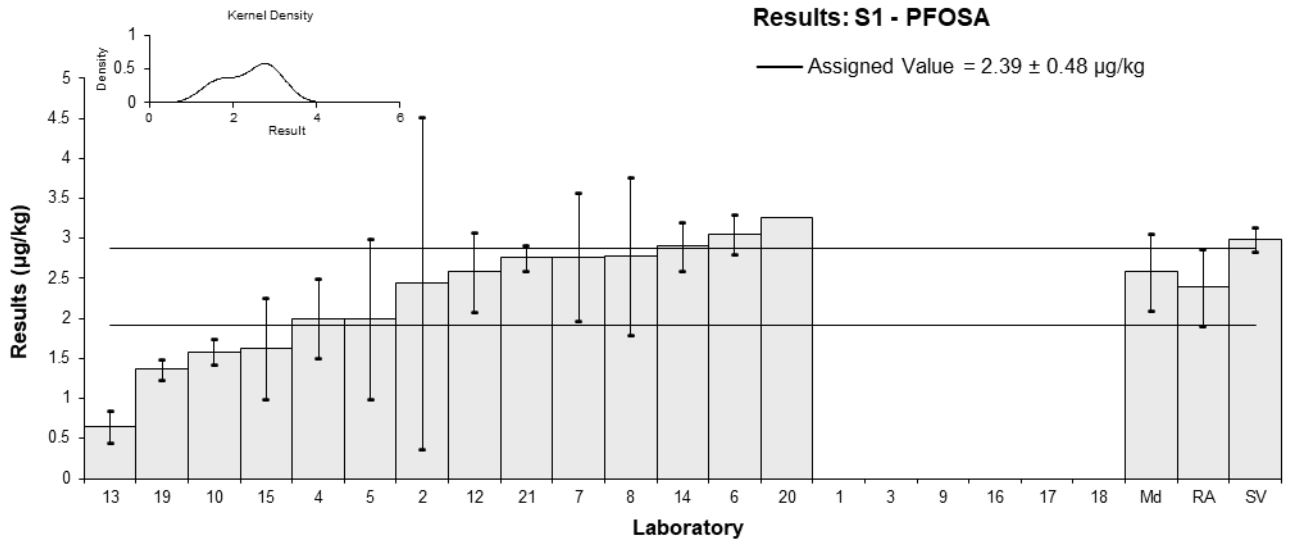
**Participant Results**

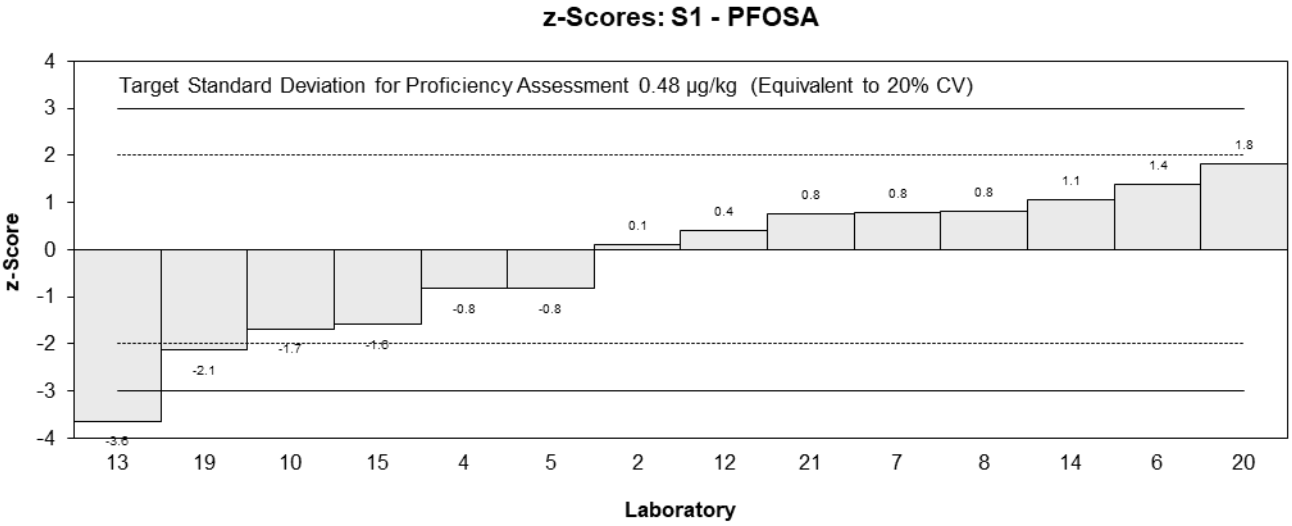
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | < 5 | NR | 123 | | |
| **2** | 2.438978 | 2.0731 | 119 | 0.10 | 0.02 |
| **3** | <5 | NR | 68 | | |
| **4** | 2 | 0.5 | NR | -0.82 | -0.56 |
| **5** | 2 | 1 | 33 | -0.82 | -0.35 |
| **6** | 3.05 | 0.25 | NR | 1.38 | 1.22 |
| **7** | 2.77 | 0.8 | 72 | 0.79 | 0.41 |
| **8** | 2.78 | 0.99 | 89 | 0.82 | 0.35 |
| **9** | NR | NR | NR | | |
| **10** | 1.586 | 0.159 | 109.2 | -1.68 | -1.59 |
| **12** | 2.58 | 0.490 | 29.9 | 0.40 | 0.28 |
| **13**** | 0.65 | 0.20 | 42 | -3.64 | -3.35 |
| **14** | 2.9 | 0.3 | 97 | 1.07 | 0.90 |
| **15** | 1.63 | 0.63 | 67.4 | -1.59 | -0.96 |
| **16** | NT | NT | NT | | |
| **17** | <0.5 | NR | NR | | |
| **18** | NS | NS | NS | | |
| **19** | 1.365 | 0.125 | 35 | -2.14 | -2.07 |
| **20** | 3.26 | NR | NR | 1.82 | 1.81 |
| **21** | 2.76 | 0.16 | 60 | 0.77 | 0.73 |

** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 2.39 | 0.48 |
| **Spike Value** | 2.99 | 0.15 |
| **Robust Average** | 2.39 | 0.48 |
| **Median** | 2.58 | 0.48 |
| **Mean** | 2.39 | |
| **N** | 13 | |
| **Max** | 3.26 | |
| **Min** | 1.365 | |
| **Robust SD** | 0.69 | |
| **Robust CV** | 29% | |


Kernel Density
Density
Result
Results: S1 - PFOSA
Assigned Value = 2.39 ± 0.48 µg/kg
Results (µg/kg)
Laboratory
13 19 10 15 4 5 2 12 21 7 8 14 6 20 1 3 9 16 17 18 Md RA SV


z-Scores: S1 - PFOSA
Target Standard Deviation for Proficiency Assessment 0.48 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
13 19 10 15 4 5 2 12 21 7 8 14 6 20
-3.6 -2.1 -1.7 -1.6 -0.8 -0.8 0.1 0.4 0.8 0.8 0.8 1.1 1.4 1.8

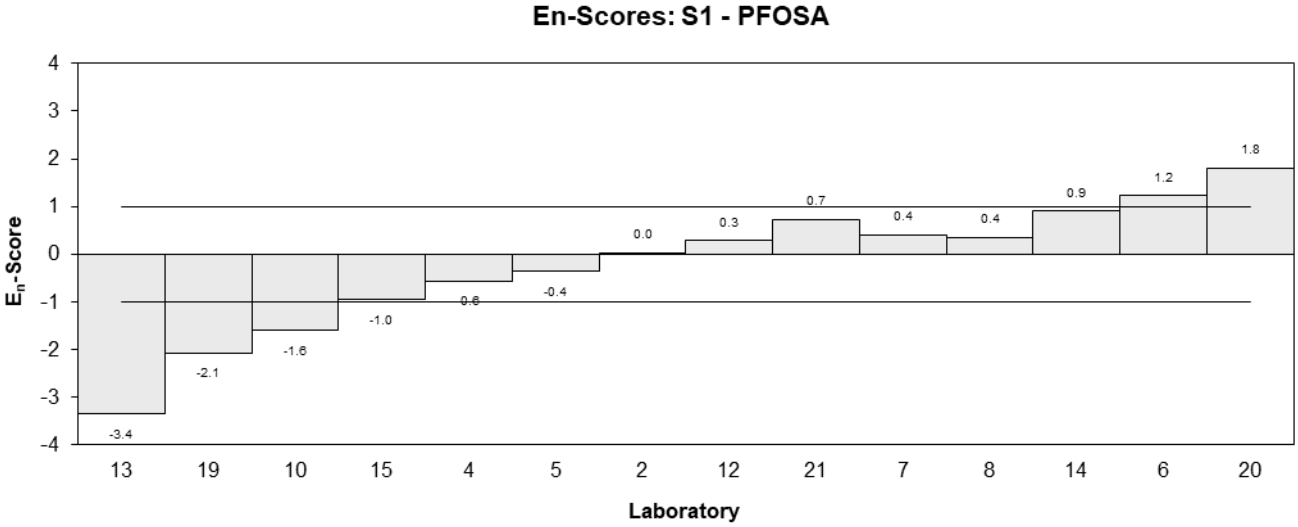

En-Scores: S1 - PFOSA
En-Score
Laboratory
13 19 10 15 4 5 2 12 21 7 8 14 6 20
-3.4 -2.1 -1.6 -1.0 -0.6 -0.4 0.0 0.3 0.7 0.4 0.4 0.9 1.2 1.8

Figure 20

Table 24

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | MeFOSA |
| **Unit** | µg/kg |

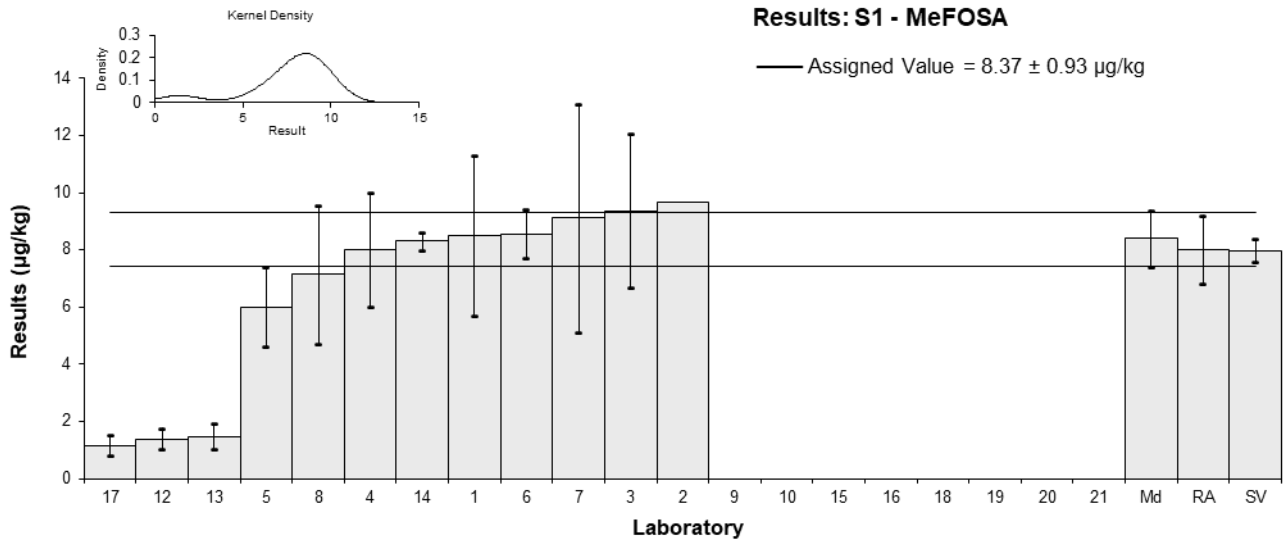
**Participant Results**

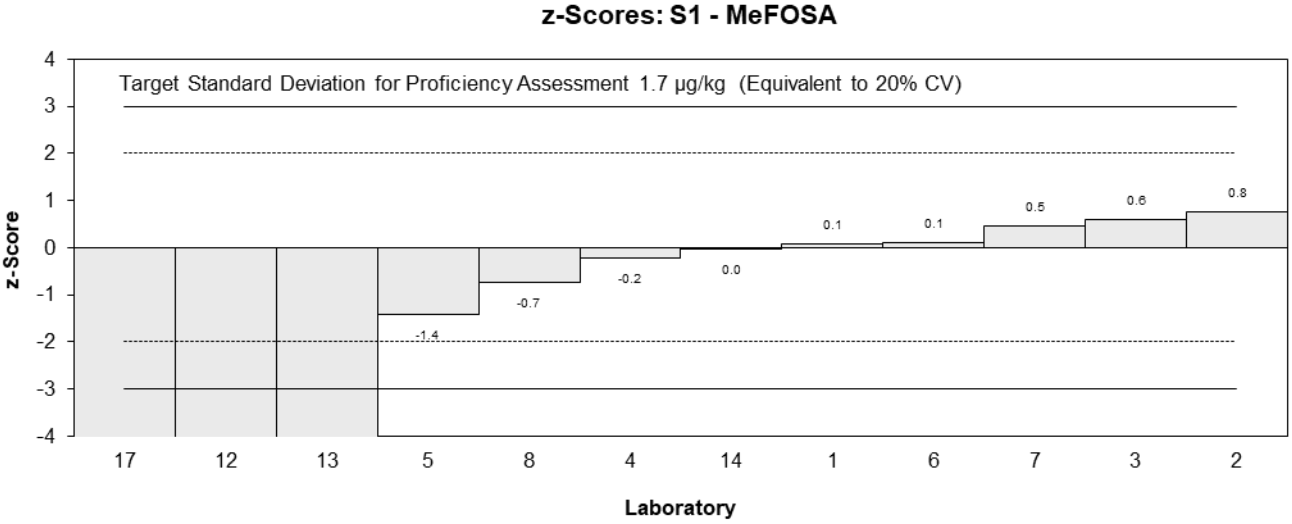
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 8.5 | 2.8 | 122 | 0.08 | 0.04 |
| **2** | 9.654848 | NR | 40 | 0.77 | 1.38 |
| **3** | 9.364 | 2.7 | 58 | 0.59 | 0.35 |
| **4** | 8 | 2 | NR | -0.22 | -0.17 |
| **5** | 6 | 1.4 | 33 | -1.42 | -1.41 |
| **6** | 8.56 | 0.85 | NR | 0.11 | 0.15 |
| **7** | 9.12 | 4.0 | 24 | 0.45 | 0.18 |
| **8** | 7.136 | 2.407 | 36 | -0.74 | -0.48 |
| **9** | NR | NR | NR | | |
| **10** | NT | NT | NT | | |
| **12*** | 1.39 | 0.361 | 29.9 | -4.17 | -7.00 |
| **13**** | 1.48 | 0.44 | 69 | -4.12 | -6.70 |
| **14** | 8.3 | 0.3 | 106 | -0.04 | -0.07 |
| **15** | NT | NT | NT | | |
| **16** | NT | NT | NT | | |
| **17**** | 1.16 | 0.349411764 | 85 | -4.31 | -7.26 |
| **18** | NS | NS | NS | | |
| **19** | NT | NT | NT | | |
| **20** | NT | NT | NT | | |
| **21** | NT | NT | NT | | |

* Outlier, ** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 8.37 | 0.93 |
| **Spike Value** | 7.98 | 0.40 |
| **Robust Average** | 8.0 | 1.2 |
| **Median** | 8.40 | 0.99 |
| **Mean** | 7.6 | |
| **N** | 10 | |
| **Max** | 9.654848 | |
| **Min** | 1.39 | |
| **Robust SD** | 1.5 | |
| **Robust CV** | 19% | |


Results: S1 - MeFOSA
Assigned Value = 8.37 ± 0.93 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
17 12 13 5 8 4 14 1 6 7 3 2 9 10 15 16 18 19 20 21 Md RA SV


z-Scores: S1 - MeFOSA
Target Standard Deviation for Proficiency Assessment 1.7 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
17 12 13 5 8 4 14 1 6 7 3 2
-1.4 -0.7 -0.2 0.0 0.1 0.1 0.5 0.6 0.8

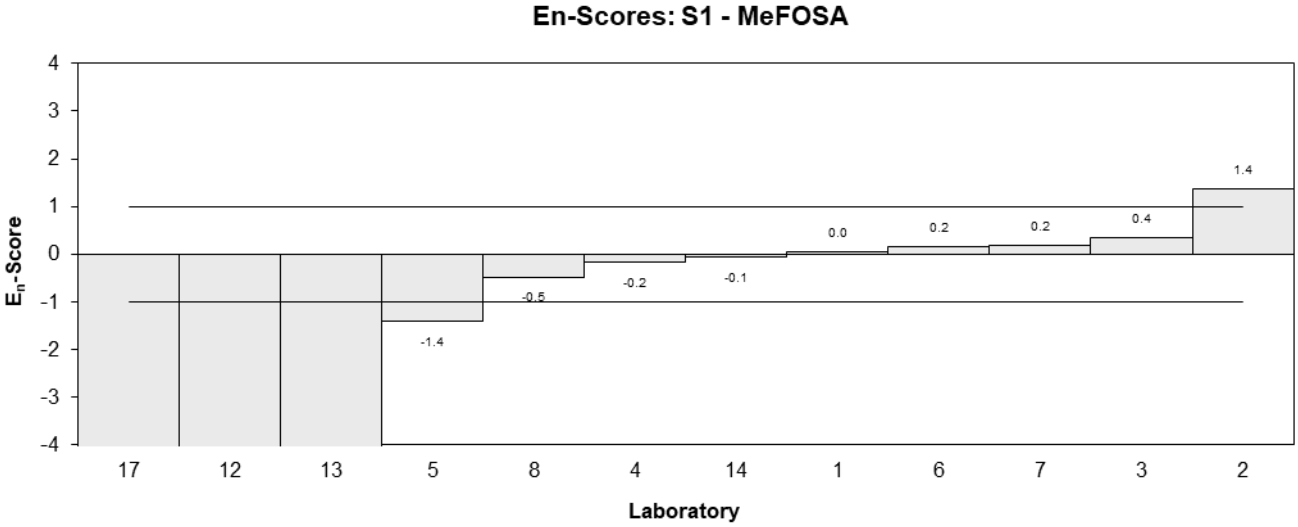

En-Scores: S1 - MeFOSA
En-Score
Laboratory
17 12 13 5 8 4 14 1 6 7 3 2
-1.4 -0.5 -0.2 -0.1 0.0 0.2 0.2 0.4 1.4

Figure 21

Table 25

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | EtFOSA |
| **Unit** | µg/kg |

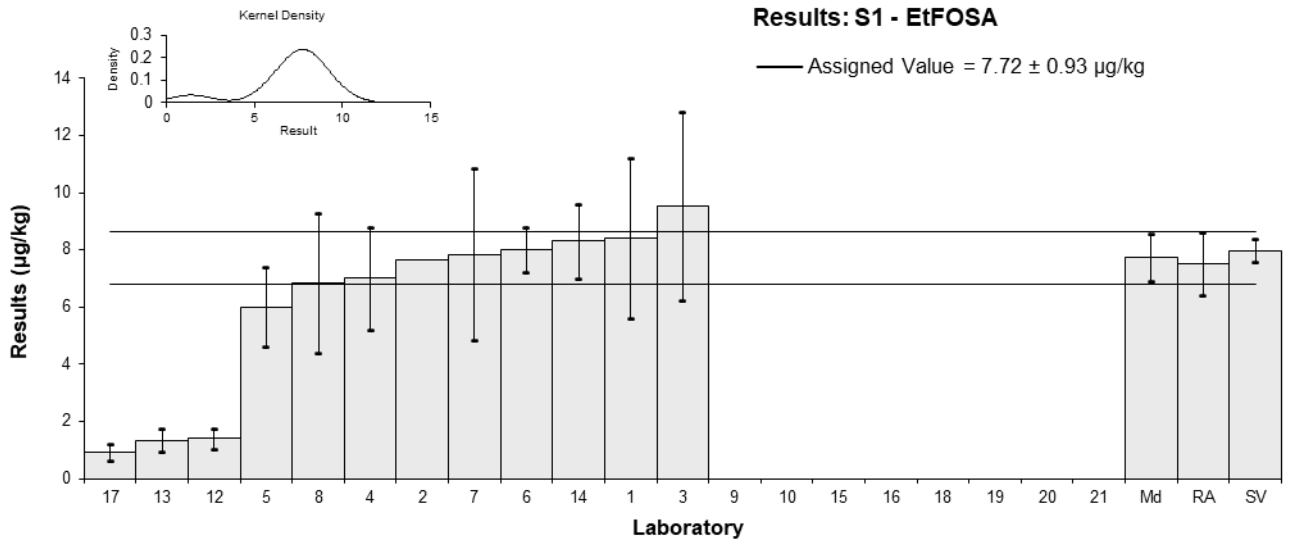
**Participant Results**

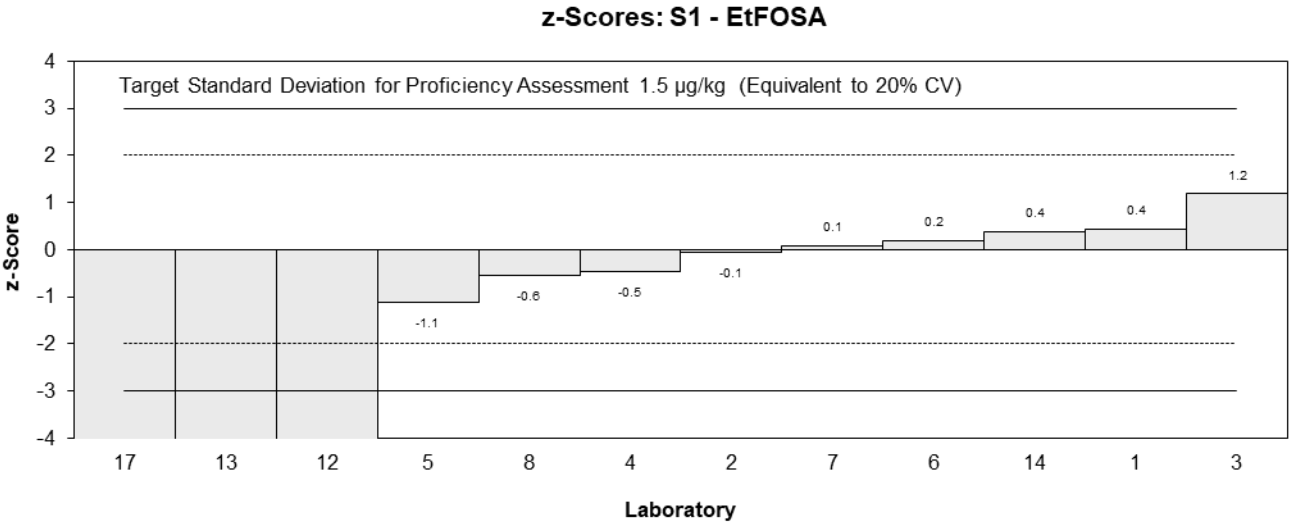
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 8.4 | 2.8 | 107 | 0.44 | 0.23 |
| **2** | 7.627154 | NR | 60 | -0.06 | -0.10 |
| **3** | 9.536 | 3.3 | 58 | 1.18 | 0.53 |
| **4** | 7 | 1.8 | NR | -0.47 | -0.36 |
| **5** | 6 | 1.4 | 35 | -1.11 | -1.02 |
| **6** | 8.01 | 0.80 | NR | 0.19 | 0.24 |
| **7** | 7.85 | 3.0 | 15 | 0.08 | 0.04 |
| **8** | 6.857 | 2.444 | 36 | -0.56 | -0.33 |
| **9** | NR | NR | NR | | |
| **10** | NT | NT | NT | | |
| **12*** | 1.40 | 0.360 | 29.9 | -4.09 | -6.34 |
| **13**** | 1.33 | 0.40 | 85 | -4.14 | -6.31 |
| **14** | 8.3 | 1.3 | 88 | 0.38 | 0.36 |
| **15** | NT | NT | NT | | |
| **16** | NT | NT | NT | | |
| **17**** | 0.920 | 0.276136363 | 88 | -4.40 | -7.01 |
| **18** | NS | NS | NS | | |
| **19** | NT | NT | NT | | |
| **20** | NT | NT | NT | | |
| **21** | NT | NT | NT | | |

* Outlier, ** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 7.72 | 0.93 |
| **Spike Value** | 7.98 | 0.40 |
| **Robust Average** | 7.5 | 1.1 |
| **Median** | 7.74 | 0.82 |
| **Mean** | 7.1 | |
| **N** | 10 | |
| **Max** | 9.536 | |
| **Min** | 1.4 | |
| **Robust SD** | 1.4 | |
| **Robust CV** | 18% | |


Kernel Density
Density
Result
Results: S1 - EtFOSA
Assigned Value = 7.72 ± 0.93 µg/kg
Results (µg/kg)
Laboratory
17 13 12 5 8 4 2 7 6 14 1 3 9 10 15 16 18 19 20 21 Md RA SV


z-Scores: S1 - EtFOSA
Target Standard Deviation for Proficiency Assessment 1.5 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
17 13 12 5 8 4 2 7 6 14 1 3
-1.1 -0.6 -0.5 -0.1 0.1 0.2 0.4 0.4 1.2

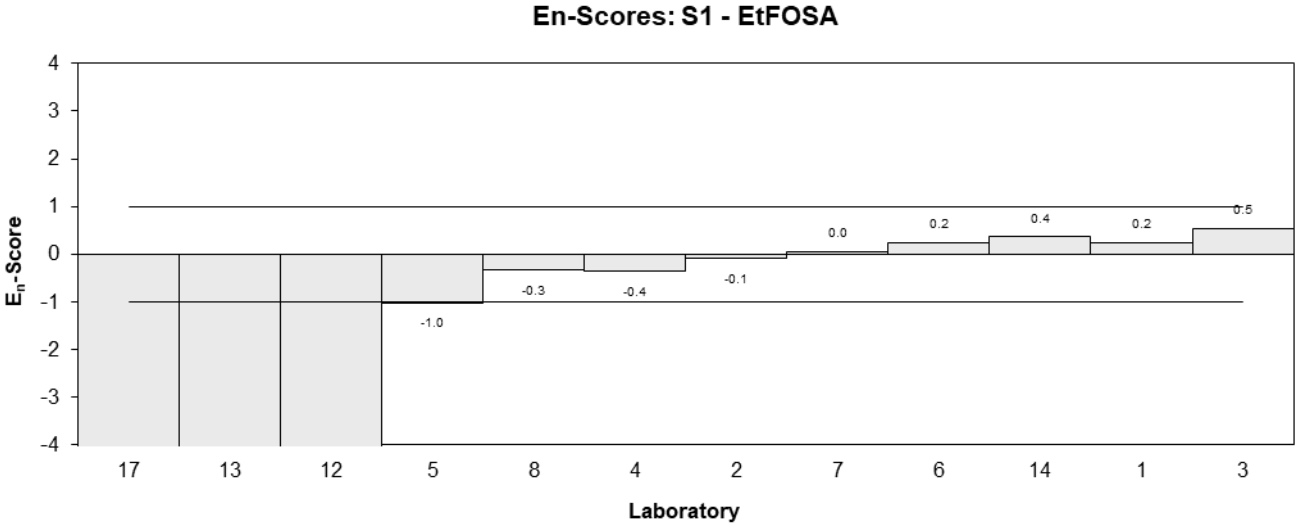

En-Scores: S1 - EtFOSA
En-Score
Laboratory
17 13 12 5 8 4 2 7 6 14 1 3
-1.0 -0.3 -0.4 -0.1 0.0 0.2 0.4 0.2 0.5

Figure 22

Table 26

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | MeFOSAA |
| **Unit** | µg/kg |

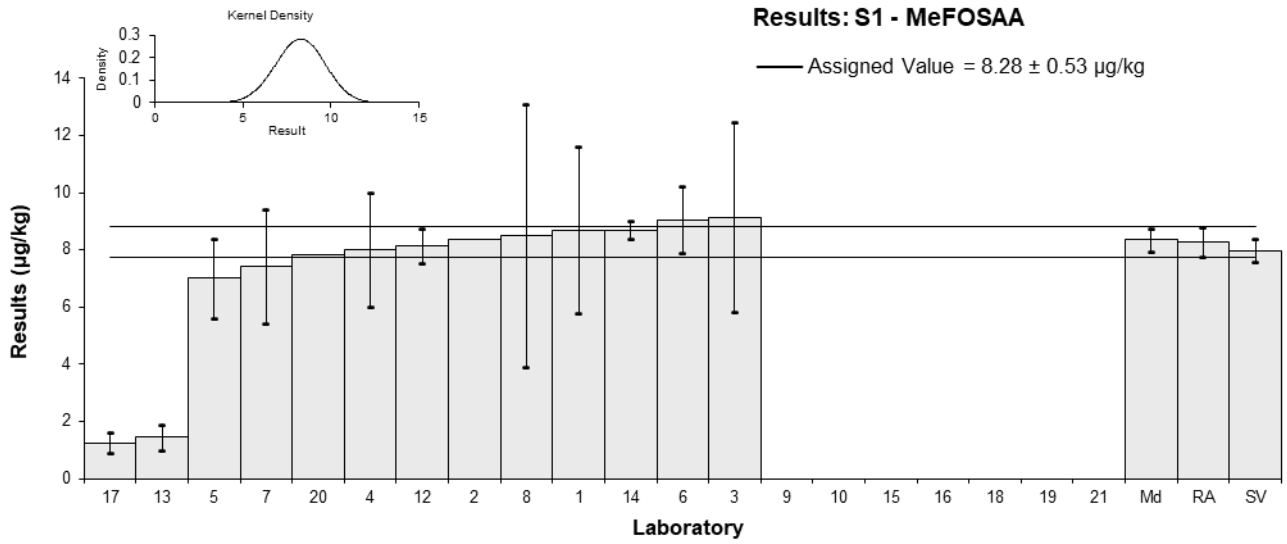
**Participant Results**

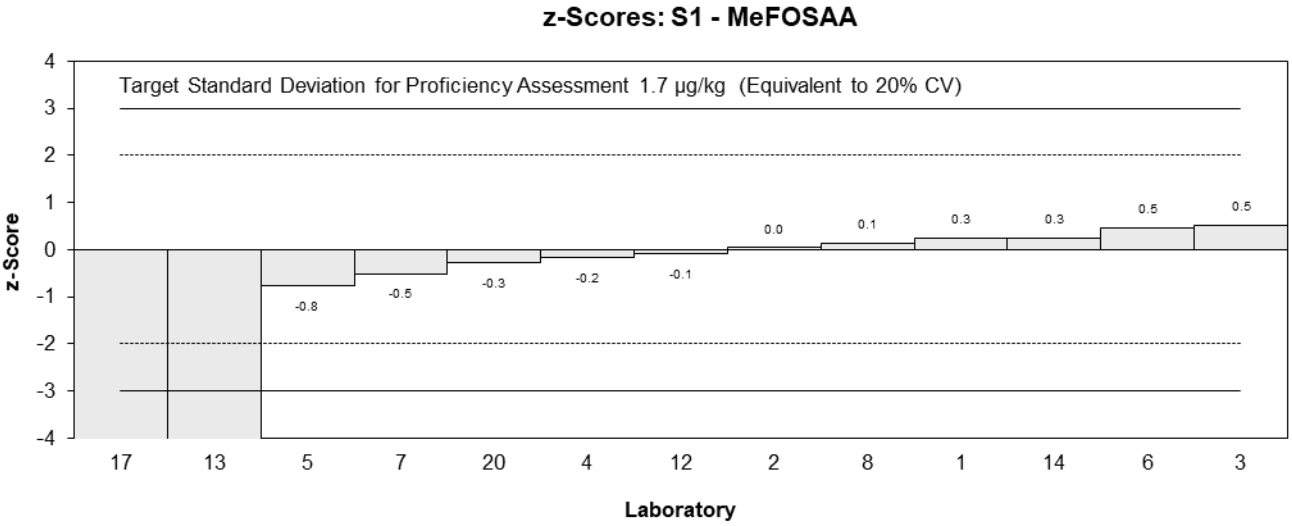
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 8.7 | 2.9 | 106 | 0.25 | 0.14 |
| **2** | 8.345072 | NR | 144 | 0.04 | 0.12 |
| **3** | 9.148 | 3.3 | 87 | 0.52 | 0.26 |
| **4** | 8 | 2 | NR | -0.17 | -0.14 |
| **5** | 7 | 1.4 | 28 | -0.77 | -0.86 |
| **6** | 9.05 | 1.16 | NR | 0.46 | 0.60 |
| **7** | 7.44 | 2.0 | 65 | -0.51 | -0.41 |
| **8** | 8.5 | 4.6 | 64 | 0.13 | 0.05 |
| **9** | NR | NR | NR | | |
| **10** | NT | NT | NT | | |
| **12** | 8.15 | 0.602 | 90.3 | -0.08 | -0.16 |
| **13**** | 1.45 | 0.44 | 60 | -4.12 | -9.92 |
| **14** | 8.7 | 0.3 | 89 | 0.25 | 0.69 |
| **15** | NT | NT | NT | | |
| **16** | NT | NT | NT | | |
| **17**** | 1.253 | 0.375903614 | 83 | -4.24 | -10.81 |
| **18** | NS | NS | NS | | |
| **19** | NT | NT | NT | | |
| **20** | 7.82 | NR | NR | -0.28 | -0.87 |
| **21** | NT | NT | NT | | |

** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 8.28 | 0.53 |
| **Spike Value** | 7.98 | 0.40 |
| **Robust Average** | 8.28 | 0.53 |
| **Median** | 8.35 | 0.40 |
| **Mean** | 8.26 | |
| **N** | 11 | |
| **Max** | 9.148 | |
| **Min** | 7 | |
| **Robust SD** | 0.71 | |
| **Robust CV** | 8.5% | |


Results: S1 - MeFOSAA
Kernel Density
Density
Result
Assigned Value = 8.28 ± 0.53 µg/kg
Results (µg/kg)
Laboratory
17 13 5 7 20 4 12 2 8 1 14 6 3 9 10 15 16 18 19 21 Md RA SV


z-Scores: S1 - MeFOSAA
Target Standard Deviation for Proficiency Assessment 1.7 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
17 13 5 7 20 4 12 2 8 1 14 6 3
-0.8 -0.5 -0.3 -0.2 -0.1 0.0 0.1 0.3 0.3 0.5 0.5

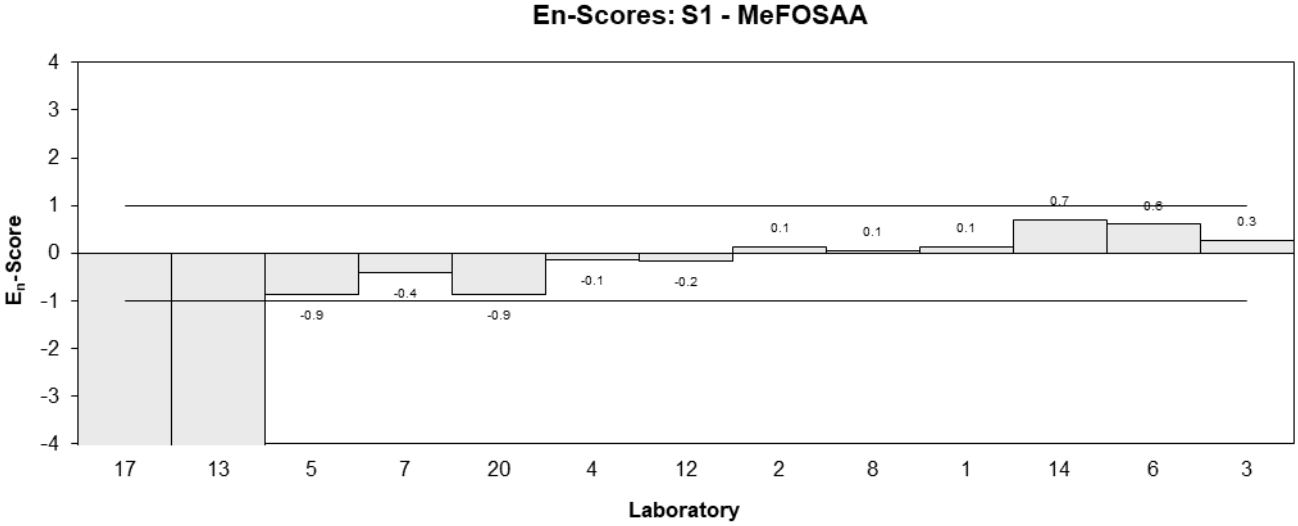

En-Scores: S1 - MeFOSAA
En-Score
Laboratory
17 13 5 7 20 4 12 2 8 1 14 6 3
-0.9 -0.4 -0.9 -0.1 -0.2 0.1 0.1 0.1 0.7 0.6 0.3

Figure 23

Table 27

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | EtFOSE |
| **Unit** | µg/kg |

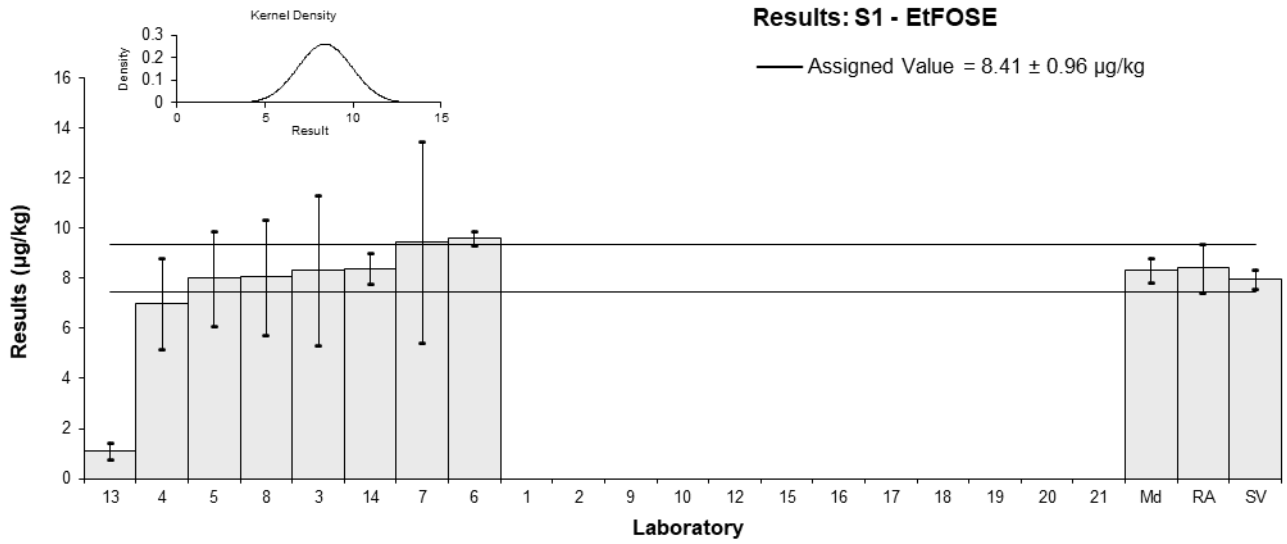
**Participant Results**

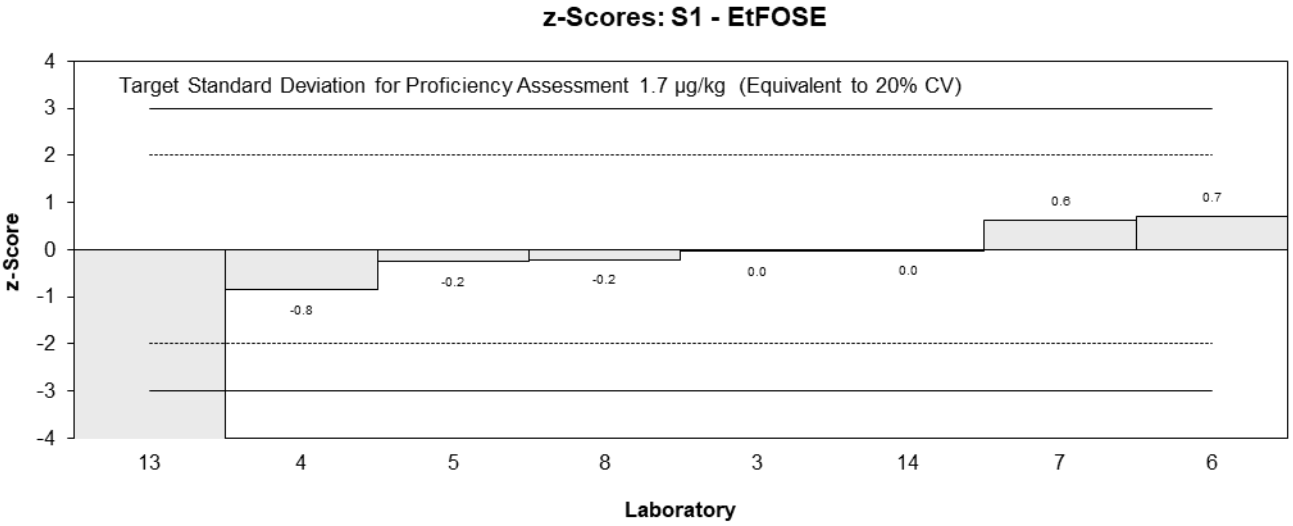
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | < 50 | NR | 103 | | |
| **2** | <0.5 | NR | 50 | | |
| **3** | 8.352 | 3 | 58 | -0.03 | -0.02 |
| **4** | 7 | 1.8 | NR | -0.84 | -0.69 |
| **5** | 8 | 1.9 | 55 | -0.24 | -0.19 |
| **6** | 9.61 | 0.3 | NR | 0.71 | 1.19 |
| **7** | 9.46 | 4.0 | 4 | 0.62 | 0.26 |
| **8** | 8.055 | 2.294 | 57 | -0.21 | -0.14 |
| **9** | NR | NR | NR | | |
| **10** | NT | NT | NT | | |
| **12** | NT | NT | NT | | |
| **13**** | 1.12 | 0.34 | 30 | -4.33 | -7.16 |
| **14** | 8.4 | 0.6 | 71 | -0.01 | -0.01 |
| **15** | NT | NT | NT | | |
| **16** | NT | NT | NT | | |
| **17** | <0.5 | NR | NR | | |
| **18** | NS | NS | NS | | |
| **19** | NT | NT | NT | | |
| **20** | NT | NT | NT | | |
| **21** | NT | NT | NT | | |

** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 8.41 | 0.96 |
| **Spike Value** | 7.98 | 0.40 |
| **Robust Average** | 8.41 | 0.96 |
| **Median** | 8.35 | 0.49 |
| **Mean** | 8.41 | |
| **N** | 7 | |
| **Max** | 9.61 | |
| **Min** | 7 | |
| **Robust SD** | 1.0 | |
| **Robust CV** | 12% | |


Kernel Density
Density
Result
Results: S1 - EtFOSE
Assigned Value = 8.41 ± 0.96 µg/kg
Results (µg/kg)
Laboratory
13 4 5 8 3 14 7 6 1 2 9 10 12 15 16 17 18 19 20 21 Md RA SV


z-Scores: S1 - EtFOSE
Target Standard Deviation for Proficiency Assessment 1.7 µg/kg (Equivalent to 20% CV)
z-Score
-0.8
-0.2
-0.2
0.0
0.0
0.6
0.7
Laboratory
13 4 5 8 3 14 7 6

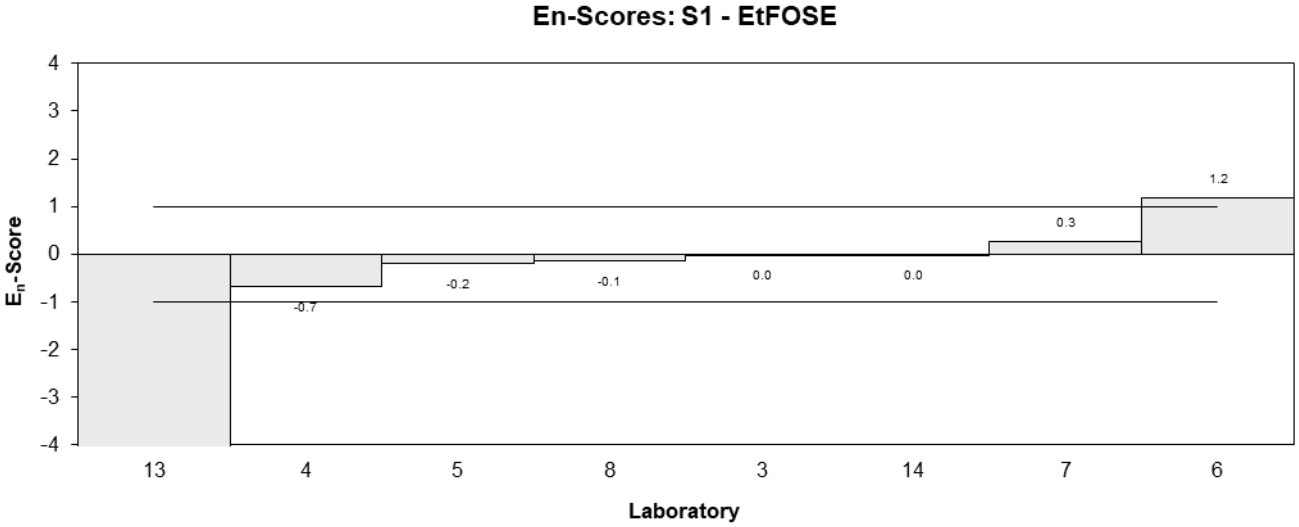

En-Scores: S1 - EtFOSE
En-Score
-0.7
-0.2
-0.1
0.0
0.0
0.3
1.2
Laboratory
13 4 5 8 3 14 7 6

Figure 24

Table 28

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | 6:2FTS |
| **Unit** | µg/kg |

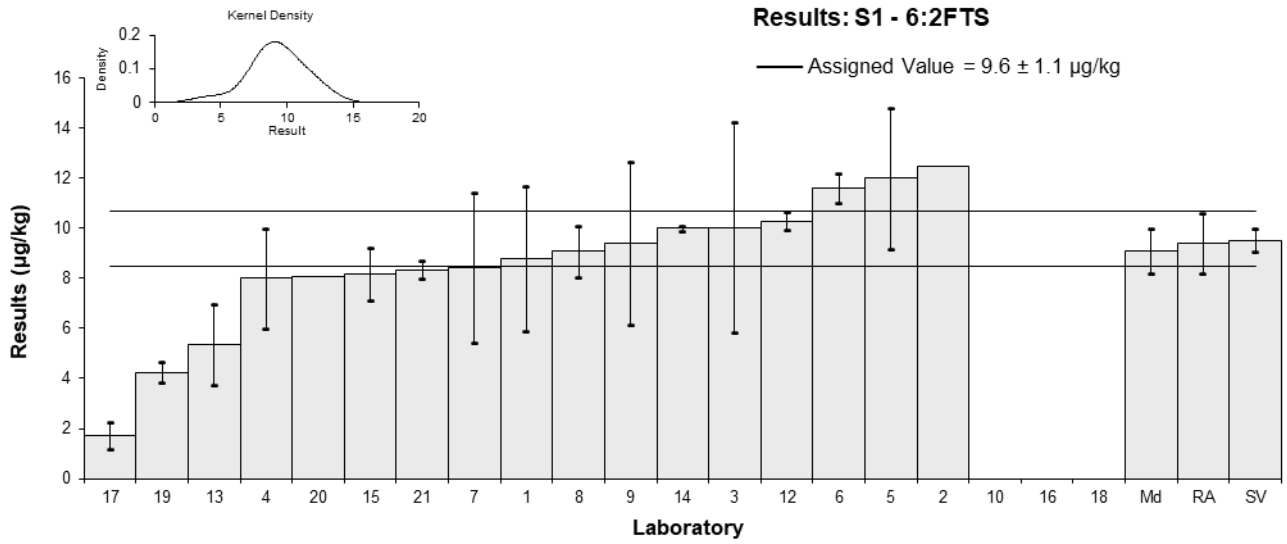
**Participant Results**

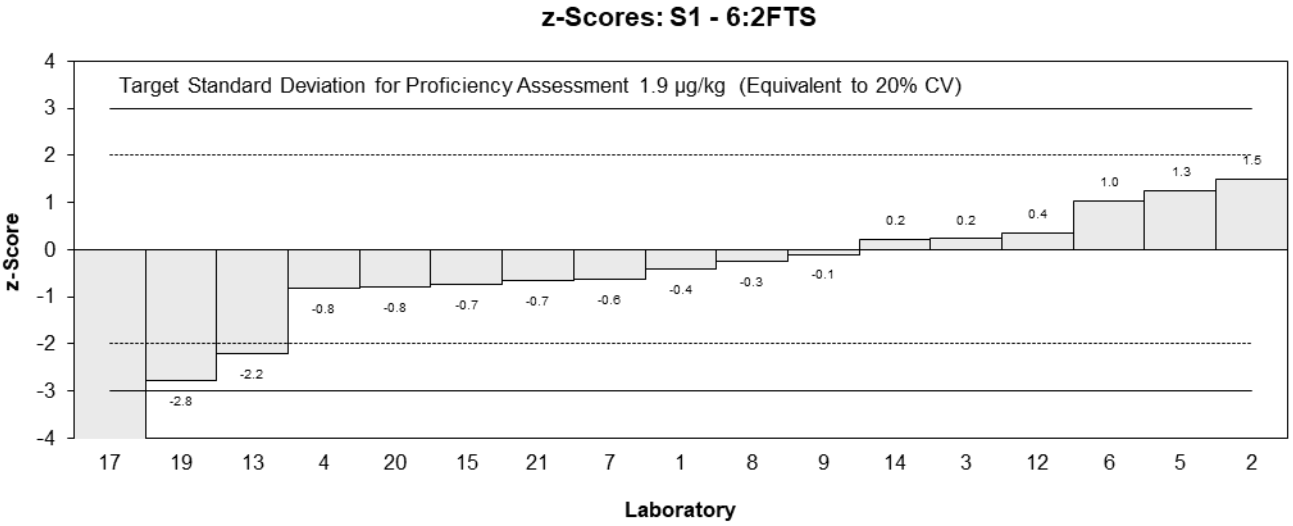
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 8.8 | 2.9 | 111 | -0.42 | -0.26 |
| **2** | 12.476199 | NR | 98 | 1.50 | 2.61 |
| **3** | 10.034 | 4.2 | 131 | 0.23 | 0.10 |
| **4** | 8 | 2 | NR | -0.83 | -0.70 |
| **5** | 12 | 2.8 | 32 | 1.25 | 0.80 |
| **6** | 11.59 | 0.59 | NR | 1.04 | 1.59 |
| **7** | 8.41 | 3.0 | 74 | -0.62 | -0.37 |
| **8** | 9.094 | 1.028 | 105 | -0.26 | -0.34 |
| **9** | 9.4 | 3.271 | 177 | -0.10 | -0.06 |
| **10** | NT | NT | NT | | |
| **12** | 10.30 | 0.355 | 82.7 | 0.36 | 0.61 |
| **13**** | 5.37 | 1.61 | 70 | -2.20 | -2.17 |
| **14** | 10 | 0.1 | 93 | 0.21 | 0.36 |
| **15** | 8.20 | 1.05 | 86.5 | -0.73 | -0.92 |
| **16** | NT | NT | NT | | |
| **17**** | 1.72 | 0.51555 | 120 | -4.10 | -6.49 |
| **18** | NS | NS | NS | | |
| **19*** | 4.255 | 0.427 | 87 | -2.78 | -4.53 |
| **20** | 8.08 | NR | NR | -0.79 | -1.38 |
| **21** | 8.35 | 0.36 | 85 | -0.65 | -1.08 |

* Outlier, ** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 9.6 | 1.1 |
| **Spike Value** | 9.53 | 0.48 |
| **Robust Average** | 9.4 | 1.2 |
| **Median** | 9.09 | 0.90 |
| **Mean** | 9.3 | |
| **N** | 15 | |
| **Max** | 12.476199 | |
| **Min** | 4.255 | |
| **Robust SD** | 1.8 | |
| **Robust CV** | 19% | |


Kernel Density
Density
Result
Results: S1 - 6:2FTS
Assigned Value = 9.6 ± 1.1 µg/kg
Results (µg/kg)
Laboratory
17 19 13 4 20 15 21 7 1 8 9 14 3 12 6 5 2 10 16 18 Md RA SV


z-Scores: S1 - 6:2FTS
Target Standard Deviation for Proficiency Assessment 1.9 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
17 19 13 4 20 15 21 7 1 8 9 14 3 12 6 5 2
-2.8 -2.2 -0.8 -0.8 -0.7 -0.7 -0.6 -0.4 -0.3 -0.1 0.2 0.2 0.4 1.0 1.3 1.5

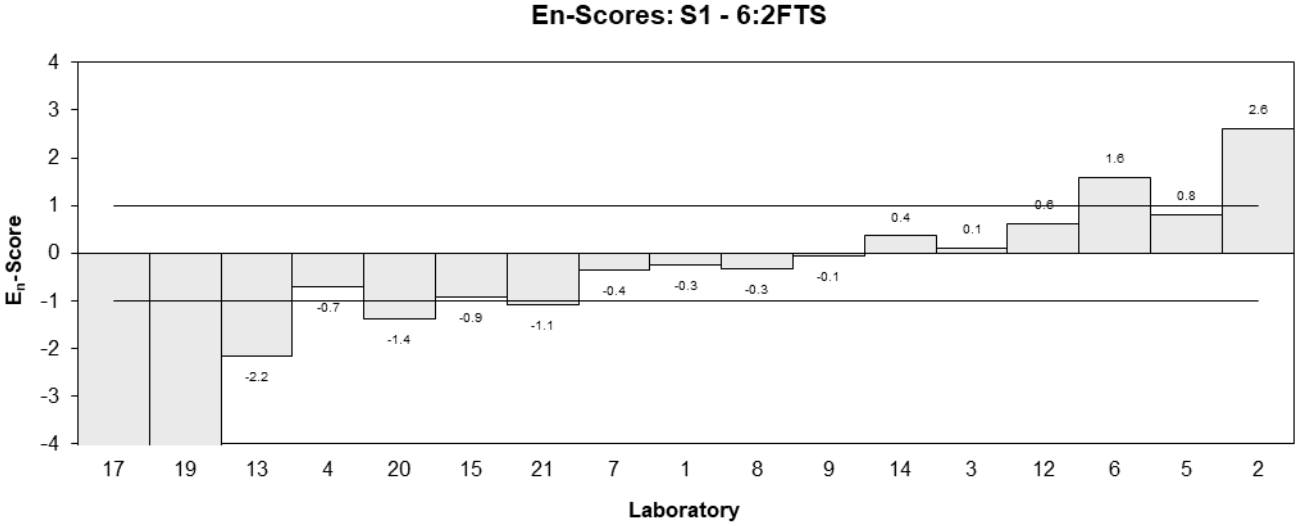

En-Scores: S1 - 6:2FTS
En-Score
Laboratory
17 19 13 4 20 15 21 7 1 8 9 14 3 12 6 5 2
-2.2 -0.7 -1.4 -0.9 -1.1 -0.4 -0.3 -0.3 -0.1 0.4 0.1 0.6 1.6 0.8 2.6

Figure 25

Table 29

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | 5:3FTCA |
| **Unit** | µg/kg |

**Participant Results**

| Lab. Code | Result | Uncertainty | Rec |
|---|---|---|---|
| **1** | 28 | 9 | 88 |
| **2** | NT | NT | NT |
| **3** | NT | NT | NT |
| **4** | NT | NT | NT |
| **5** | NT | NT | NT |
| **6** | 24.60 | 6.83 | NR |
| **7** | 25.1 | 10.0 | NR |
| **8** | 9.05 | 2.72 | 95 |
| **9** | NR | NR | NR |
| **10** | NT | NT | NT |
| **12** | NT | NT | NT |
| **13** | <0.5 | NR | 76 |
| **14** | NT | NT | NT |
| **15** | NT | NT | NT |
| **16** | NT | NT | NT |
| **17** | NT | NT | NT |
| **18** | NS | NS | NS |
| **19** | NT | NT | NT |
| **20** | 14.17 | NR | NR |
| **21** | NT | NT | NT |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | Not Set | |
| **Spike Value** | 24.8 | 1.2 |
| **Robust Average** | NA (N<6) | |
| **Median** | 24.6 | 5.6 |
| **Mean** | 20.2 | |
| **N** | 5 | |
| **Max** | 28 | |
| **Min** | 9.05 | |
| **Robust SD** | NA (N<6) | |
| **Robust CV** | NA (N<6) | |

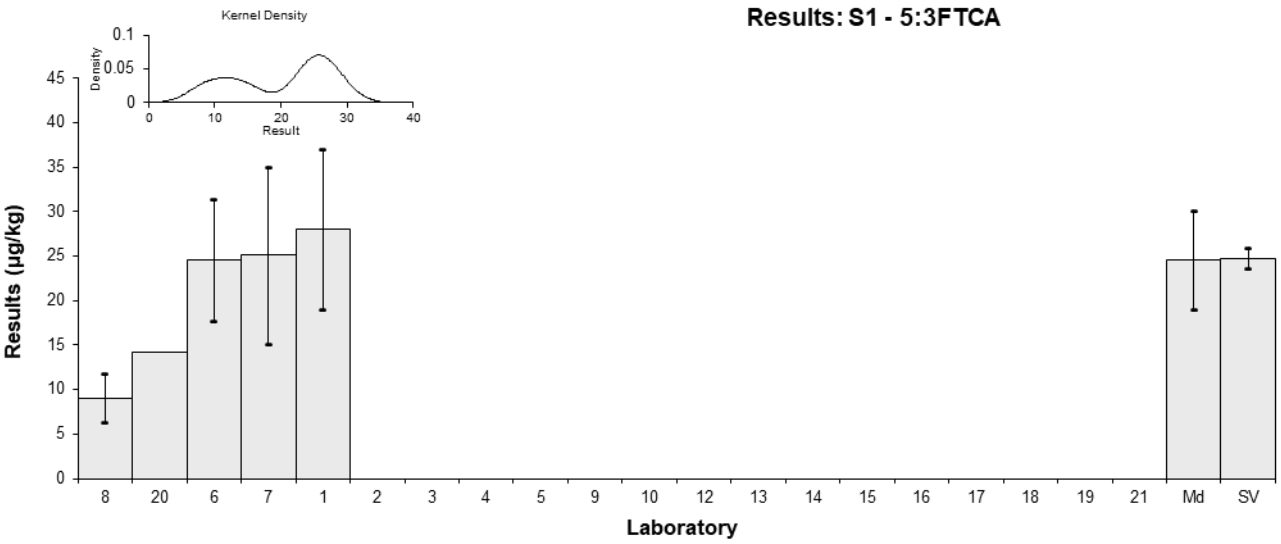

Results: S1 - 5:3FTCA
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
8
20
6
7
1
2
3
4
5
9
10
12
13
14
15
16
17
18
19
21
Md
SV

Figure 26

Table 30

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | GenX |
| **Unit** | µg/kg |

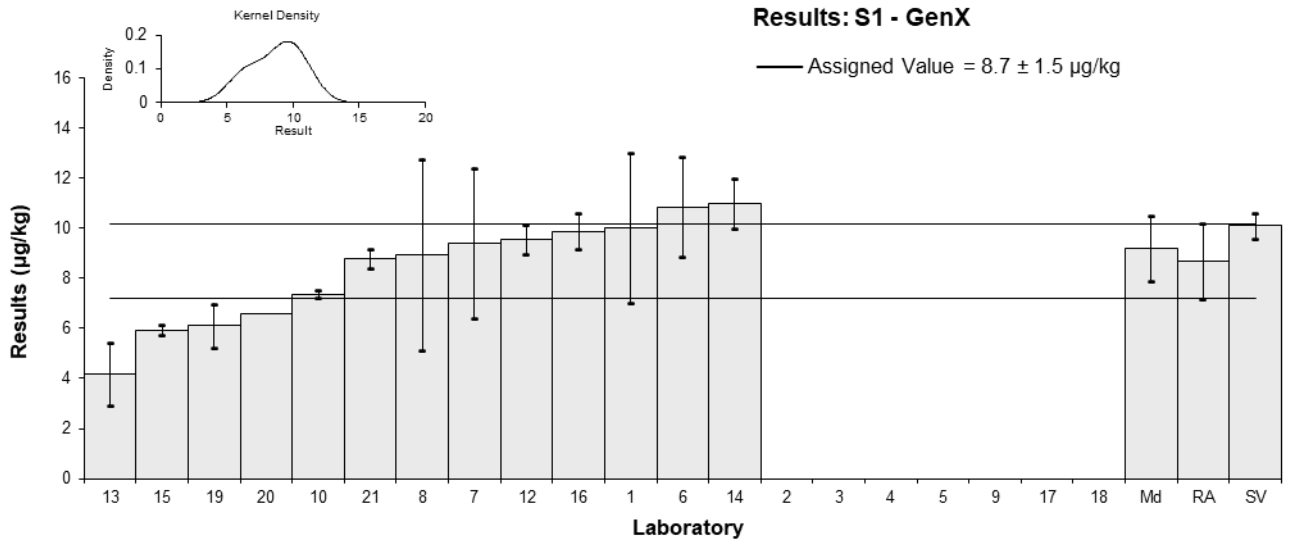
**Participant Results**

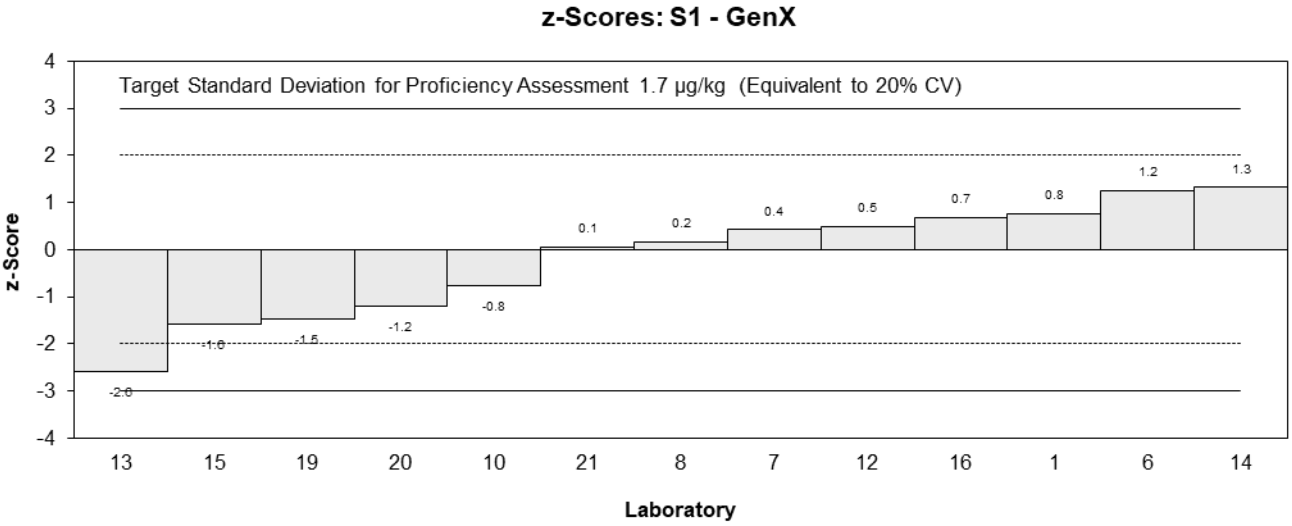
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 10 | 3 | 96 | 0.75 | 0.39 |
| **2** | NT | NT | NT | | |
| **3** | NT | NT | NT | | |
| **4** | NT | NT | NT | | |
| **5** | NT | NT | NT | | |
| **6** | 10.86 | 2.00 | NR | 1.24 | 0.86 |
| **7** | 9.43 | 3.0 | 72 | 0.42 | 0.22 |
| **8** | 8.955 | 3.811 | 100 | 0.15 | 0.06 |
| **9** | NR | NR | NR | | |
| **10** | 7.372 | 0.141 | 106.6 | -0.76 | -0.88 |
| **12** | 9.56 | 0.608 | 83.4 | 0.49 | 0.53 |
| **13**** | 4.18 | 1.25 | 55 | -2.60 | -2.31 |
| **14** | 11 | 1 | 110 | 1.32 | 1.28 |
| **15** | 5.94 | 0.20 | 85.9 | -1.59 | -1.82 |
| **16** | 9.89 | 0.7 | NR | 0.68 | 0.72 |
| **17** | NT | NT | NT | | |
| **18** | NS | NS | NS | | |
| **19** | 6.117 | 0.878 | 96 | -1.48 | -1.49 |
| **20** | 6.6 | NR | NR | -1.21 | -1.40 |
| **21** | 8.78 | 0.38 | 96 | 0.05 | 0.05 |

** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 8.7 | 1.5 |
| **Spike Value** | 10.1 | 0.5 |
| **Robust Average** | 8.7 | 1.5 |
| **Median** | 9.2 | 1.3 |
| **Mean** | 8.7 | |
| **N** | 12 | |
| **Max** | 11 | |
| **Min** | 5.94 | |
| **Robust SD** | 2.0 | |
| **Robust CV** | 23% | |


Results: S1 - GenX
Assigned Value = 8.7 ± 1.5 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
13 15 19 20 10 21 8 7 12 16 1 6 14 2 3 4 5 9 17 18 Md RA SV


z-Scores: S1 - GenX
Target Standard Deviation for Proficiency Assessment 1.7 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
13 15 19 20 10 21 8 7 12 16 1 6 14
-2.6 -1.6 -1.5 -1.2 -0.8 0.1 0.2 0.4 0.5 0.7 0.8 1.2 1.3

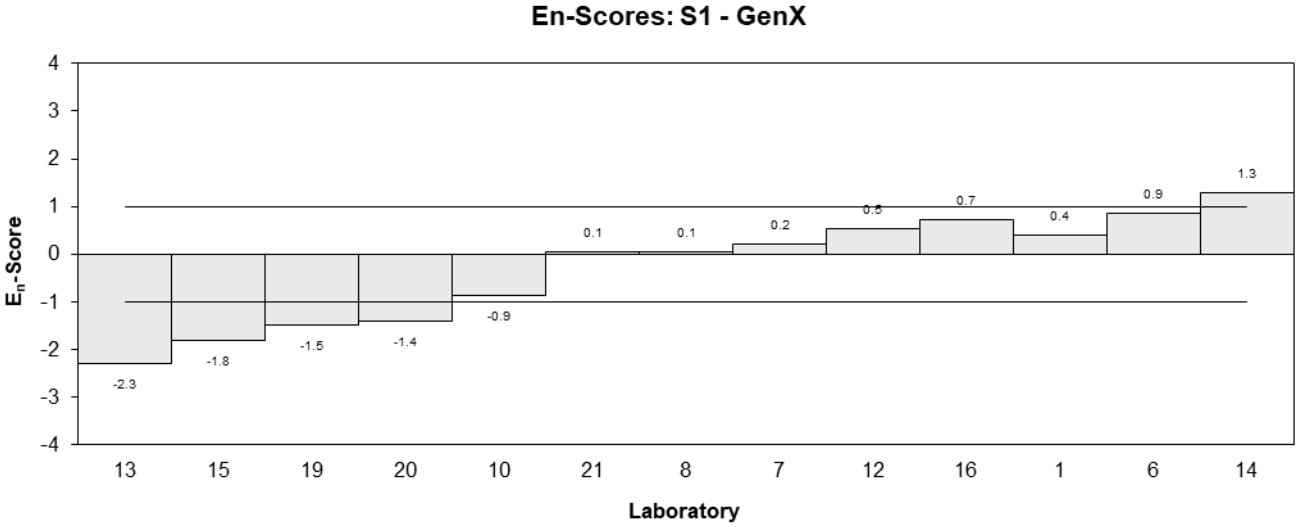

En-Scores: S1 - GenX
En-Score
Laboratory
13 15 19 20 10 21 8 7 12 16 1 6 14
-2.3 -1.8 -1.5 -1.4 -0.9 0.1 0.1 0.2 0.5 0.7 0.4 0.9 1.3

Figure 27

Table 31

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | ADONA |
| **Unit** | µg/kg |

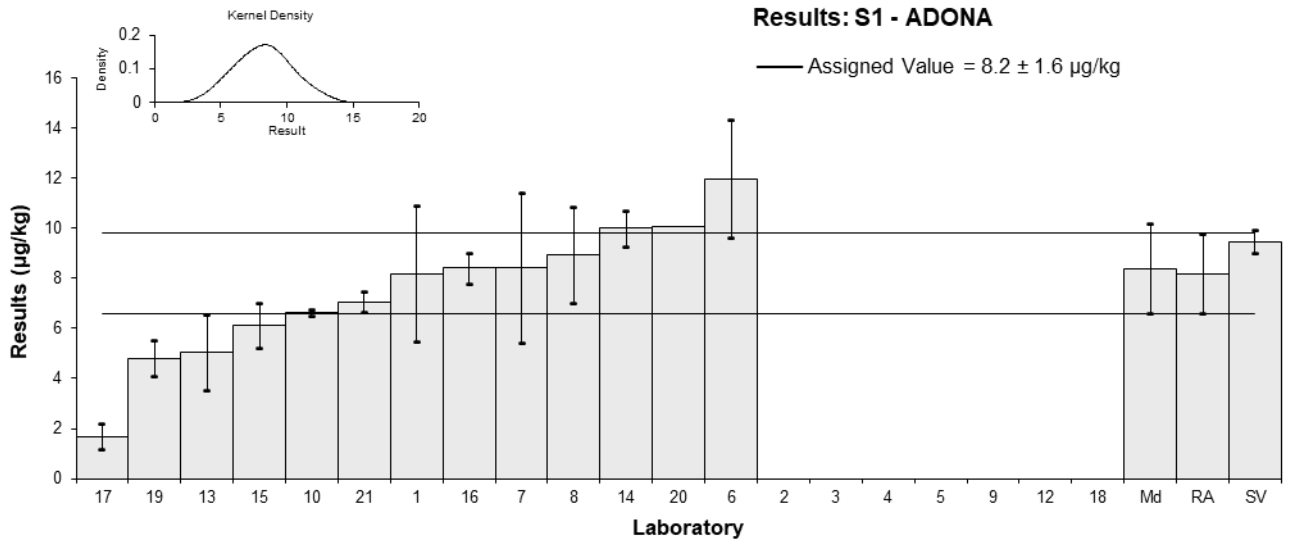
**Participant Results**

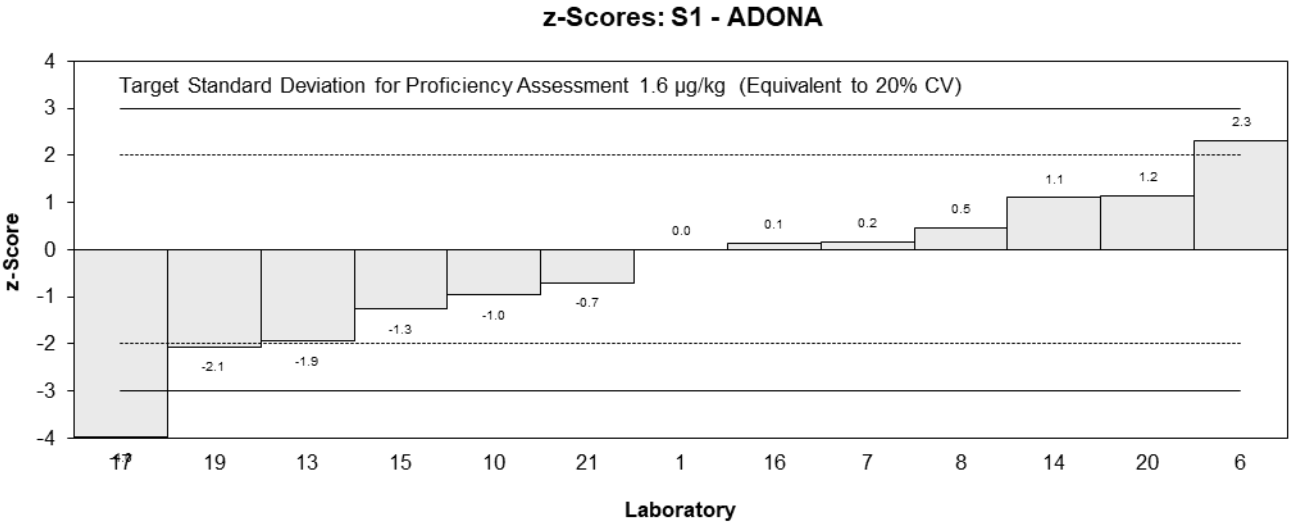
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 8.2 | 2.7 | 108 | 0.00 | 0.00 |
| **2** | NT | NT | NT | | |
| **3** | NT | NT | NT | | |
| **4** | NT | NT | NT | | |
| **5** | NT | NT | NT | | |
| **6** | 11.99 | 2.34 | NR | 2.31 | 1.34 |
| **7** | 8.45 | 3.0 | NR | 0.15 | 0.07 |
| **8** | 8.946 | 1.919 | 89 | 0.45 | 0.30 |
| **9** | NR | NR | NR | | |
| **10** | 6.642 | 0.109 | NR | -0.95 | -0.97 |
| **12** | NT | NT | NT | | |
| **13**** | 5.03 | 1.51 | 76 | -1.93 | -1.44 |
| **14** | 10 | 0.7 | 104 | 1.10 | 1.03 |
| **15** | 6.13 | 0.88 | 85.9 | -1.26 | -1.13 |
| **16** | 8.41 | 0.6 | NR | 0.13 | 0.12 |
| **17**** | 1.68 | 0.503583333 | 108 | -3.98 | -3.89 |
| **18** | NS | NS | NS | | |
| **19** | 4.817 | 0.697 | 96 | -2.06 | -1.94 |
| **20** | 10.09 | NR | NR | 1.15 | 1.18 |
| **21** | 7.06 | 0.42 | 104 | -0.70 | -0.69 |

** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 8.2 | 1.6 |
| **Spike Value** | 9.47 | 0.47 |
| **Robust Average** | 8.2 | 1.6 |
| **Median** | 8.4 | 1.8 |
| **Mean** | 8.2 | |
| **N** | 11 | |
| **Max** | 11.99 | |
| **Min** | 4.817 | |
| **Robust SD** | 2.2 | |
| **Robust CV** | 27% | |


Kernel Density
Density
Result
Results: S1 - ADONA
Assigned Value = 8.2 ± 1.6 µg/kg
Results (µg/kg)
Laboratory
17 19 13 15 10 21 1 16 7 8 14 20 6 2 3 4 5 9 12 18 Md RA SV


z-Scores: S1 - ADONA
Target Standard Deviation for Proficiency Assessment 1.6 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
17 19 13 15 10 21 1 16 7 8 14 20 6
-2.1 -1.9 -1.3 -1.0 -0.7 0.0 0.1 0.2 0.5 1.1 1.2 2.3

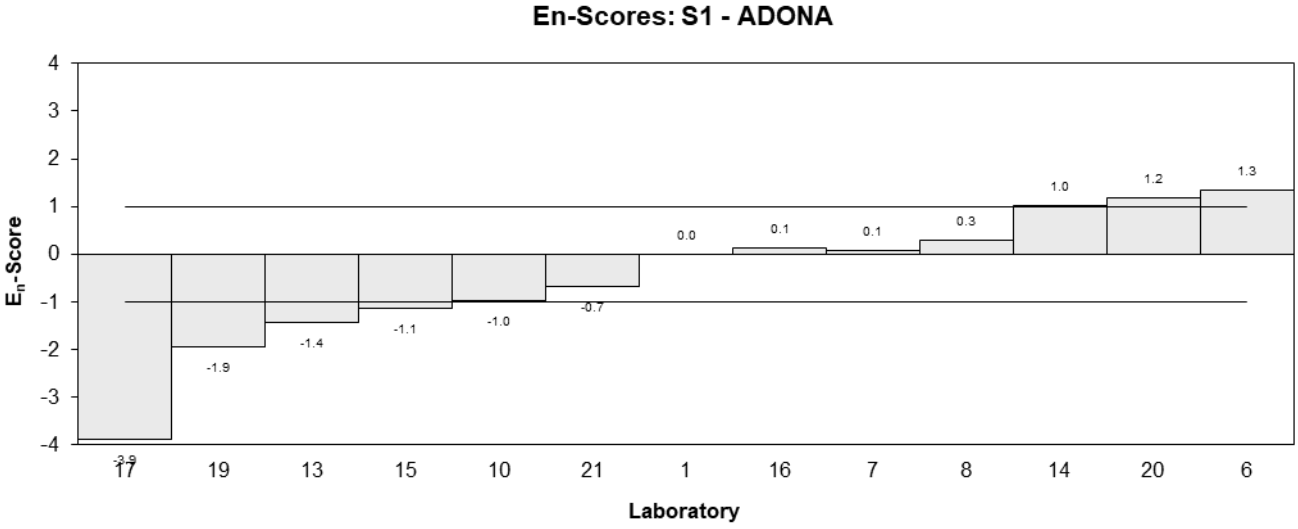

En-Scores: S1 - ADONA
En-Score
Laboratory
17 19 13 15 10 21 1 16 7 8 14 20 6
-1.9 -1.4 -1.1 -1.0 -0.7 0.0 0.1 0.1 0.3 1.0 1.2 1.3

Figure 28

Table 32

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | 9Cl-PF3ONS |
| **Unit** | µg/kg |

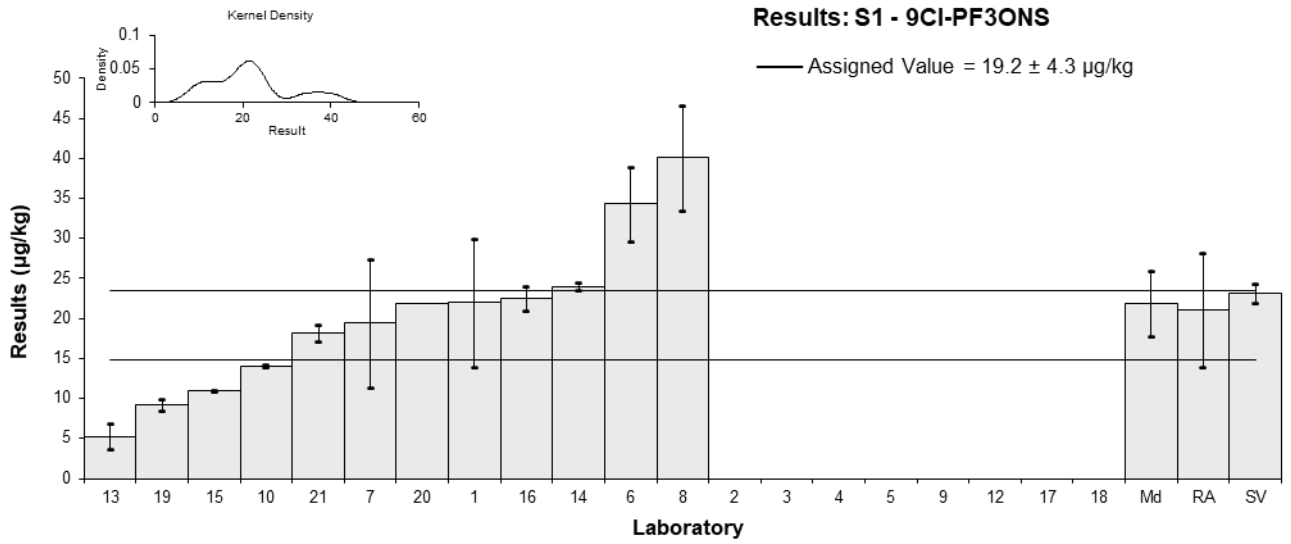
**Participant Results**

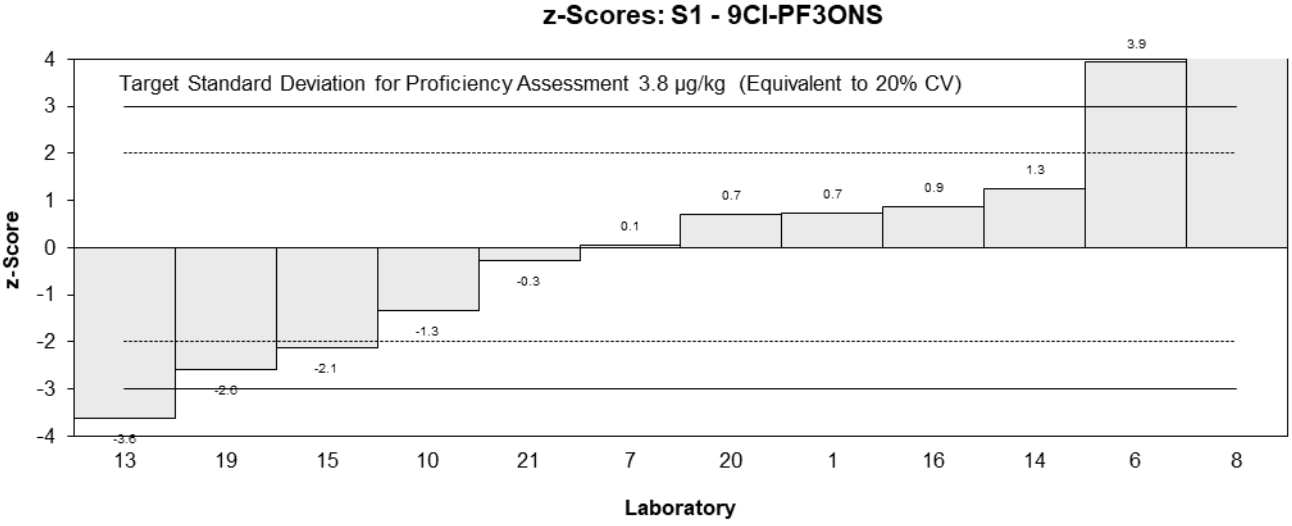
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 22 | 8 | 103 | 0.73 | 0.31 |
| **2** | NT | NT | NT | | |
| **3** | NT | NT | NT | | |
| **4** | NT | NT | NT | | |
| **5** | NT | NT | NT | | |
| **6*** | 34.30 | 4.62 | NR | 3.93 | 2.39 |
| **7** | 19.4 | 8.0 | NR | 0.05 | 0.02 |
| **8*** | 40.08 | 6.6 | 91 | 5.44 | 2.65 |
| **9** | NR | NR | NR | | |
| **10** | 14.048 | 0.151 | NR | -1.34 | -1.20 |
| **12** | NT | NT | NT | | |
| **13**** | 5.26 | 1.58 | 76 | -3.63 | -3.04 |
| **14** | 24 | 0.5 | 93 | 1.25 | 1.11 |
| **15** | 11.00 | 0.08 | 100.1 | -2.14 | -1.91 |
| **16** | 22.51 | 1.6 | NR | 0.86 | 0.72 |
| **17** | NT | NT | NT | | |
| **18** | NS | NS | NS | | |
| **19*** | 9.237 | 0.666 | 88 | -2.59 | -2.29 |
| **20** | 21.88 | NR | NR | 0.70 | 0.62 |
| **21** | 18.18 | 1.08 | 104 | -0.27 | -0.23 |

* Outlier, ** Excluded Result, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 19.2 | 4.3 |
| **Spike Value** | 23.2 | 1.2 |
| **Robust Average** | 21.1 | 7.1 |
| **Median** | 21.9 | 4.1 |
| **Mean** | 21.5 | |
| **N** | 11 | |
| **Max** | 40.08 | |
| **Min** | 9.237 | |
| **Robust SD** | 9.4 | |
| **Robust CV** | 45% | |


Kernel Density
Density
Result
Results: S1 - 9Cl-PF3ONS
Assigned Value = 19.2 ± 4.3 µg/kg
Results (µg/kg)
Laboratory
13 19 15 10 21 7 20 1 16 14 6 8 2 3 4 5 9 12 17 18 Md RA SV


z-Scores: S1 - 9Cl-PF3ONS
Target Standard Deviation for Proficiency Assessment 3.8 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
13 19 15 10 21 7 20 1 16 14 6 8
-3.6 -2.6 -2.1 -1.3 -0.3 0.1 0.7 0.7 0.9 1.3 3.9

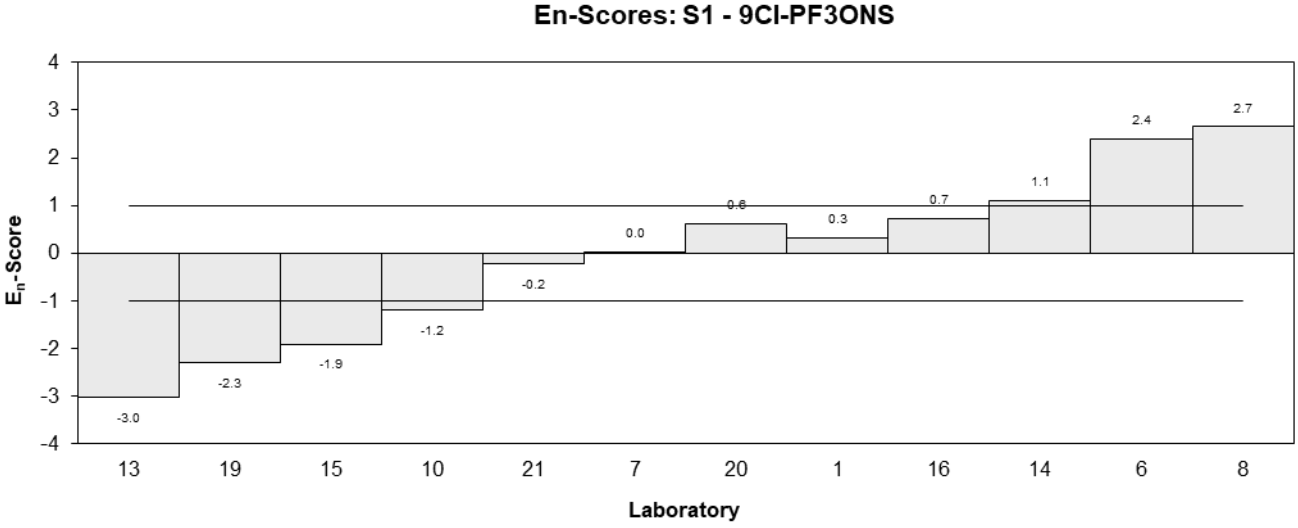

En-Scores: S1 - 9Cl-PF3ONS
En-Score
Laboratory
13 19 15 10 21 7 20 1 16 14 6 8
-3.0 -2.3 -1.9 -1.2 -0.2 0.0 0.6 0.3 0.7 1.1 2.4 2.7

Figure 29

Table 33

**Sample Details**

| | |
|---|---|
| **Sample No.** | S1 |
| **Matrix** | Prawn |
| **Analyte** | 11Cl-PF3OUdS |
| **Unit** | µg/kg |

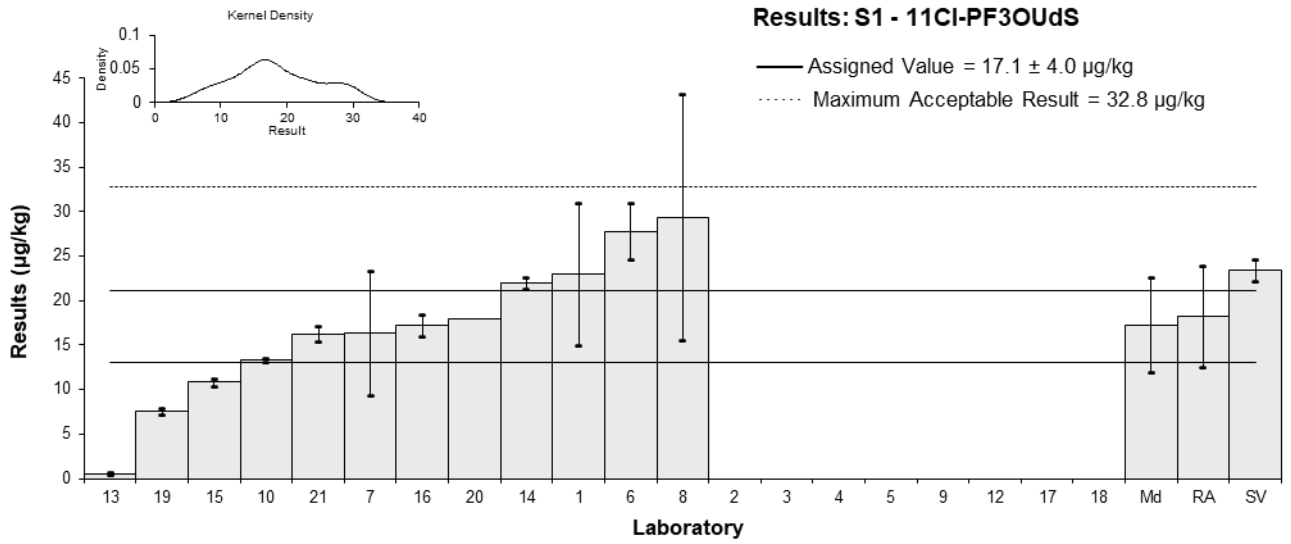
**Participant Results**

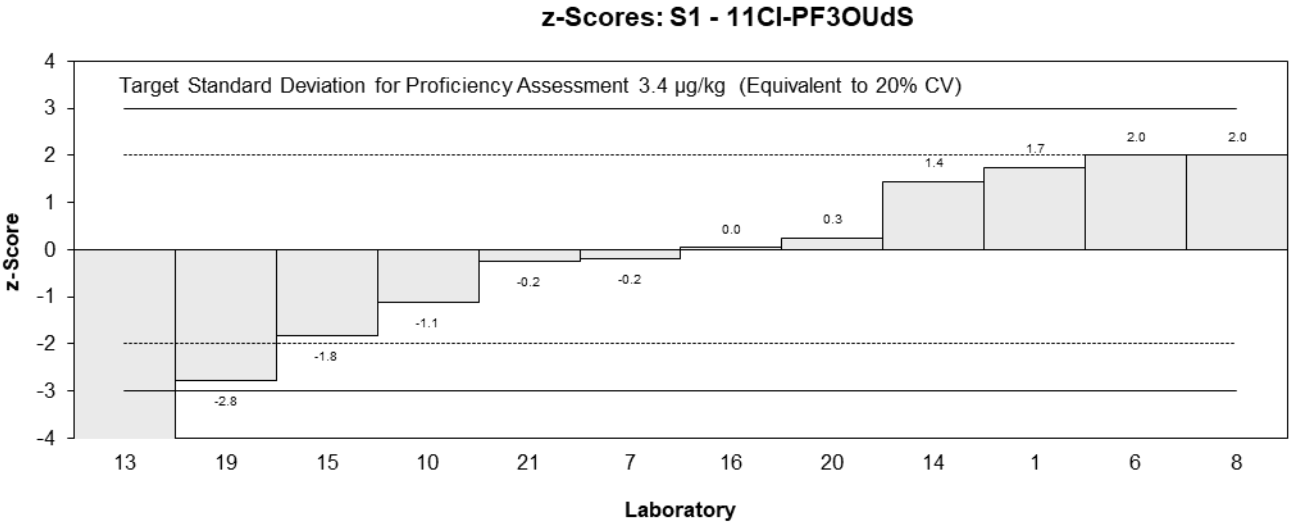
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 23 | 8 | 103 | 1.73 | 0.66 |
| **2** | NT | NT | NT | | |
| **3** | NT | NT | NT | | |
| **4** | NT | NT | NT | | |
| **5** | NT | NT | NT | | |
| **6*** | 27.80 | 3.14 | NR | 2.00▼ | |
| **7** | 16.4 | 7.0 | NR | -0.20 | -0.09 |
| **8*** | 29.38 | 13.84 | 91 | 2.00▼ | |
| **9** | NR | NR | NR | | |
| **10** | 13.309 | 0.226 | NR | -1.11 | -0.95 |
| **12** | NT | NT | NT | | |
| **13**** | 0.54 | 0.16 | 76 | -4.84 | -4.14 |
| **14** | 22 | 0.6 | 99 | 1.43 | 1.21 |
| **15** | 10.88 | 0.44 | 100.1 | -1.82 | -1.55 |
| **16** | 17.25 | 1.23 | NR | 0.04 | 0.04 |
| **17** | NT | NT | NT | | |
| **18** | NS | NS | NS | | |
| **19*** | 7.593 | 0.402 | 88 | -2.78 | -2.36 |
| **20** | 17.96 | NR | NR | 0.25 | 0.21 |
| **21** | 16.27 | 0.82 | 104 | -0.24 | -0.20 |

* Outlier, ** Excluded Result, see Section 4.2; ▼ Adjusted Score, see Section 6.3

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 17.1 | 4.0 |
| **Spike Value** | 23.4 | 1.2 |
| **Robust Average** | 18.3 | 5.7 |
| **Max Acceptable Result** | 32.8 | |
| **Median** | 17.3 | 5.3 |
| **Mean** | 18.3 | |
| **N** | 11 | |
| **Max** | 29.38 | |
| **Min** | 7.593 | |
| **Robust SD** | 7.6 | |
| **Robust CV** | 42% | |


Kernel Density
Density
Result
Results: S1 - 11Cl-PF3OUdS
Assigned Value = 17.1 ± 4.0 µg/kg
Maximum Acceptable Result = 32.8 µg/kg
Results (µg/kg)
13 19 15 10 21 7 16 20 14 1 6 8 2 3 4 5 9 12 17 18 Md RA SV
Laboratory


z-Scores: S1 - 11Cl-PF3OUdS
Target Standard Deviation for Proficiency Assessment 3.4 µg/kg (Equivalent to 20% CV)
z-Score
-2.8 -1.8 -1.1 -0.2 -0.2 0.0 0.3 1.4 1.7 2.0 2.0
13 19 15 10 21 7 16 20 14 1 6 8
Laboratory

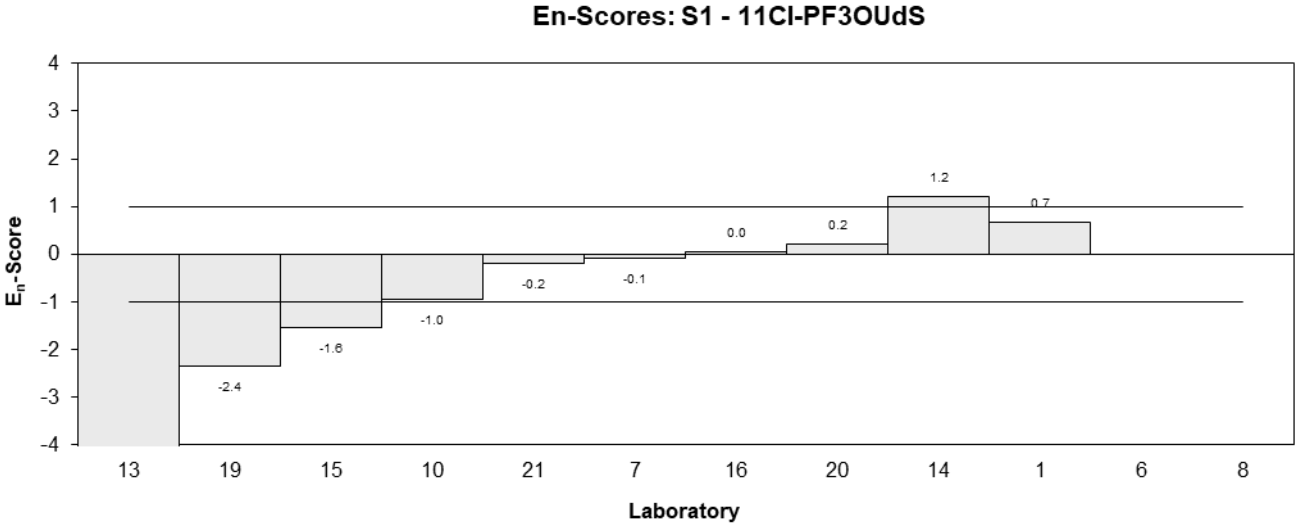

En-Scores: S1 - 11Cl-PF3OUdS
En-Score
-2.4 -1.6 -1.0 -0.2 -0.1 0.0 0.2 1.2 0.7
13 19 15 10 21 7 16 20 14 1 6 8
Laboratory

Figure 30

Table 34

**Sample Details**

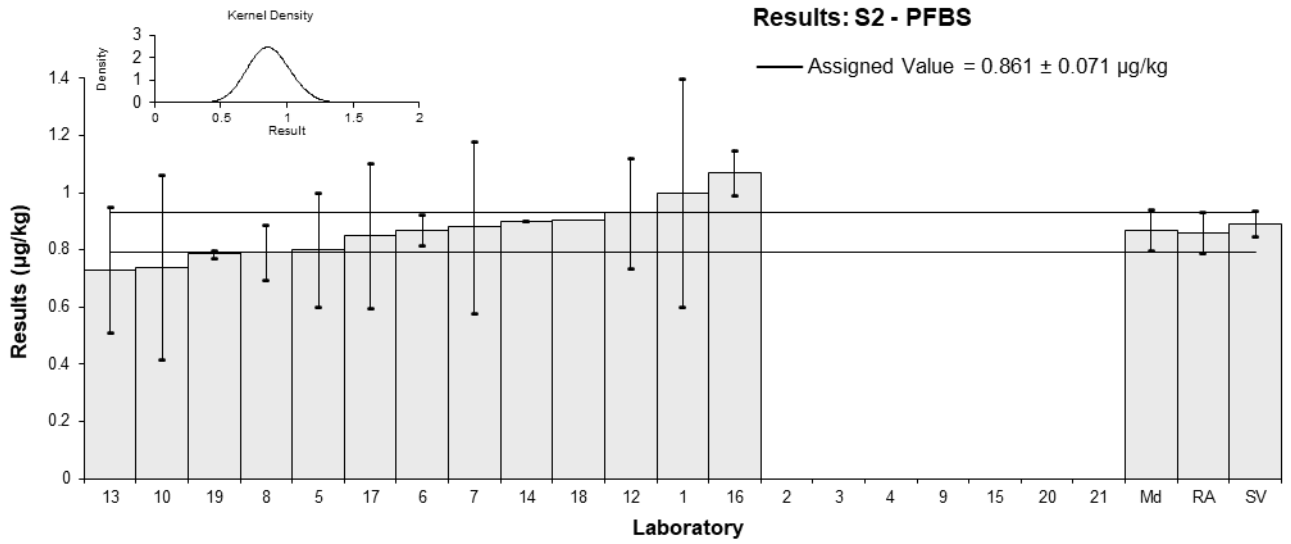
| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | PFBS |
| **Unit** | µg/kg |

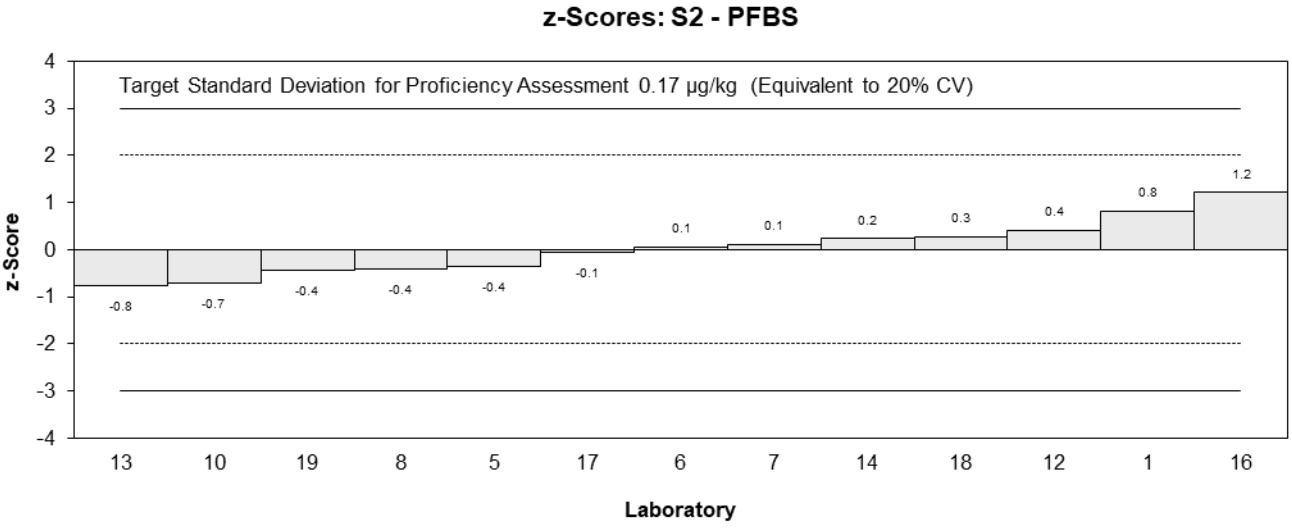
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 1.0 | 0.4 | 89 | 0.81 | 0.34 |
| **2** | NS | NS | NS | | |
| **3** | <1 | NR | 89 | | |
| **4** | < 1 | NR | NR | | |
| **5** | 0.8 | 0.2 | 95 | -0.35 | -0.29 |
| **6** | 0.87 | 0.052 | NR | 0.05 | 0.10 |
| **7** | 0.88 | 0.3 | 78 | 0.11 | 0.06 |
| **8** | 0.791 | 0.095 | 107 | -0.41 | -0.59 |
| **9** | NT | NT | NT | | |
| **10** | 0.739 | 0.324 | 108.9 | -0.71 | -0.37 |
| **12** | 0.930 | 0.193 | 81.9 | 0.40 | 0.34 |
| **13** | 0.73 | 0.22 | 58 | -0.76 | -0.57 |
| **14** | 0.9 | 0 | 101 | 0.23 | 0.55 |
| **15** | NS | NS | NS | | |
| **16** | 1.07 | 0.08 | NR | 1.21 | 1.95 |
| **17** | 0.85 | 0.253608247 | 97 | -0.06 | -0.04 |
| **18** | 0.906 | NR | NR | 0.26 | 0.63 |
| **19** | 0.786 | 0.014 | 86 | -0.44 | -1.04 |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.861 | 0.071 |
| **Spike Value** | 0.891 | 0.045 |
| **Robust Average** | 0.861 | 0.071 |
| **Median** | 0.870 | 0.072 |
| **Mean** | 0.866 | |
| **N** | 13 | |
| **Max** | 1.07 | |
| **Min** | 0.73 | |
| **Robust SD** | 0.10 | |
| **Robust CV** | 12% | |


Results: S2 - PFBS
Assigned Value = 0.861 ± 0.071 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
13 10 19 8 5 17 6 7 14 18 12 1 16 2 3 4 9 15 20 21 Md RA SV


z-Scores: S2 - PFBS
Target Standard Deviation for Proficiency Assessment 0.17 µg/kg (Equivalent to 20% CV)
z-Score
-0.8 -0.7 -0.4 -0.4 -0.4 -0.1 0.1 0.1 0.2 0.3 0.4 0.8 1.2
Laboratory
13 10 19 8 5 17 6 7 14 18 12 1 16

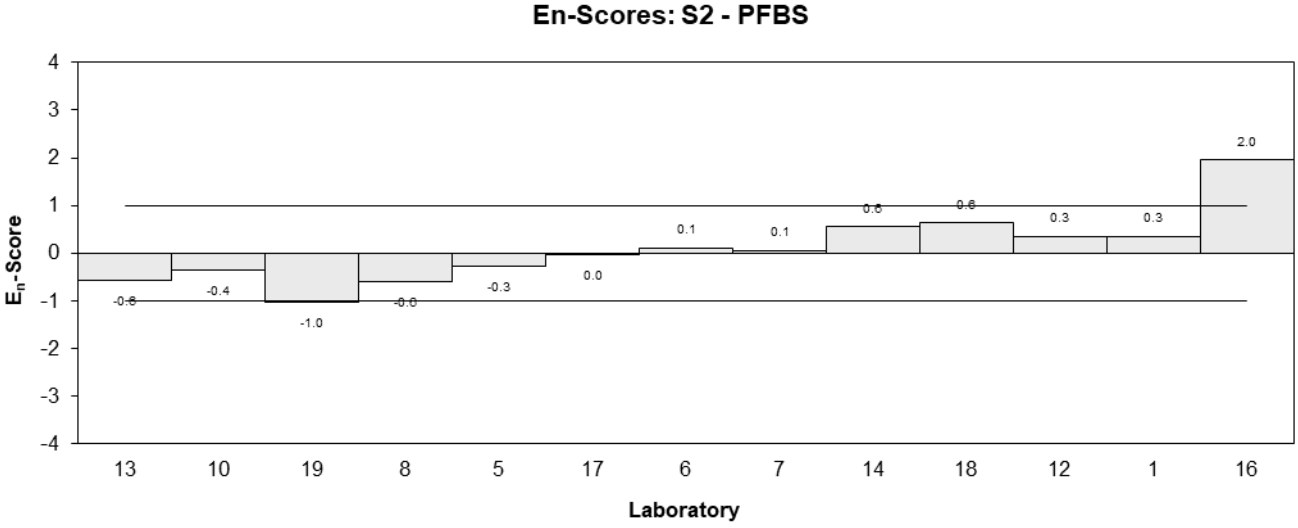

En-Scores: S2 - PFBS
En-Score
-0.6 -0.4 -1.0 -0.6 -0.3 0.0 0.1 0.1 0.6 0.6 0.3 0.3 2.0
Laboratory
13 10 19 8 5 17 6 7 14 18 12 1 16

Figure 31

Table 35

**Sample Details**

| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | PFPeS |
| **Unit** | µg/kg |

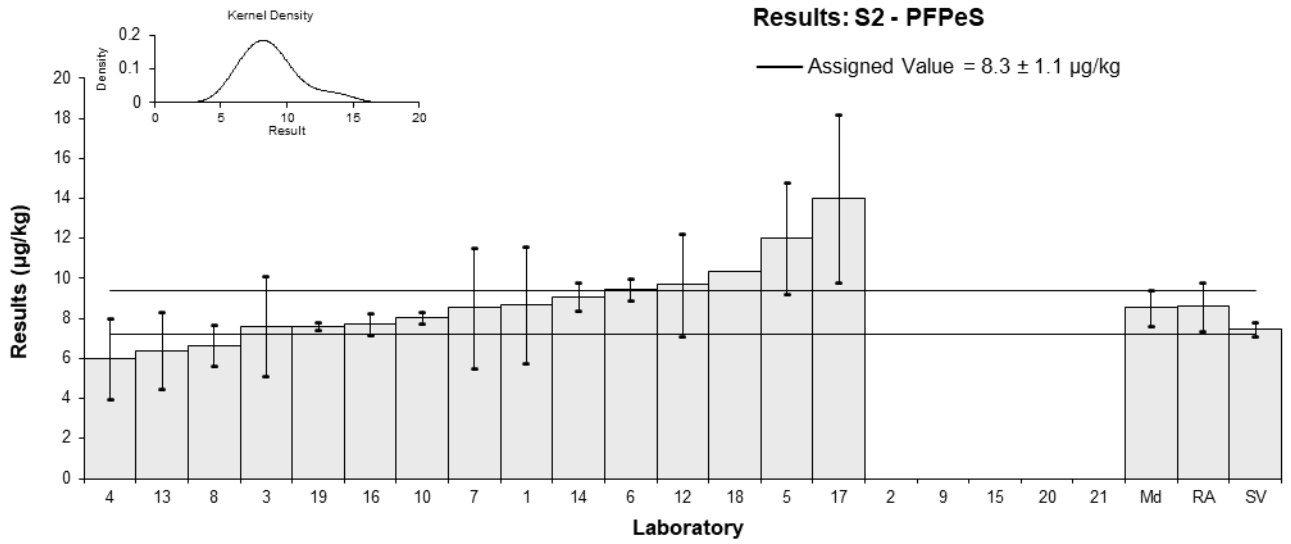
**Participant Results**

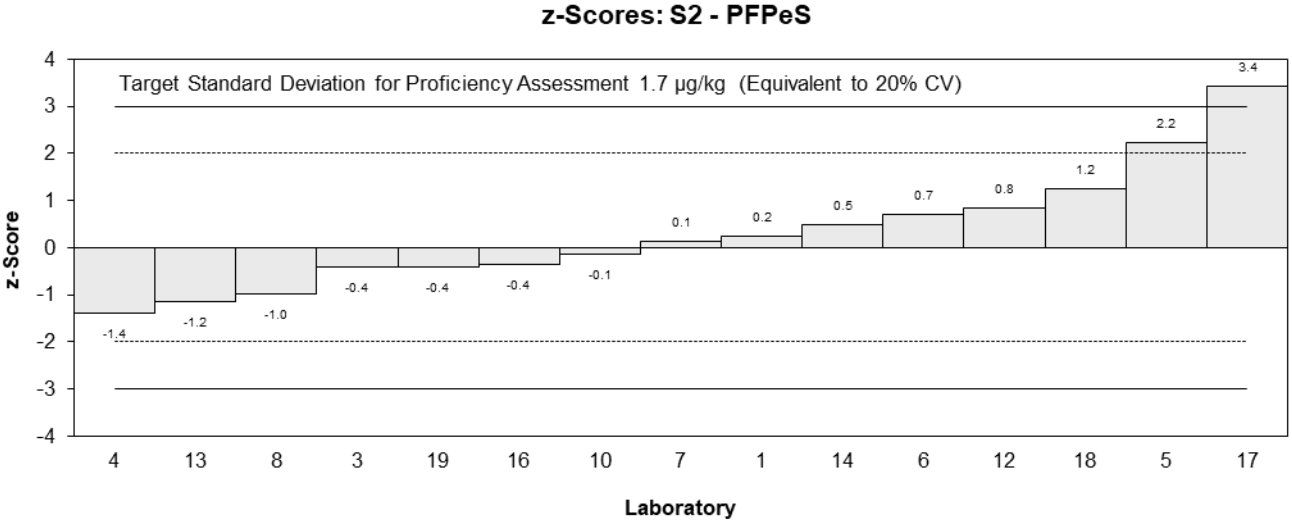
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 8.7 | 2.9 | 97 | 0.24 | 0.13 |
| **2** | NS | NS | NS | | |
| **3** | 7.608 | 2.5 | 103 | -0.42 | -0.25 |
| **4** | 6 | 2 | NR | -1.39 | -1.01 |
| **5** | 12 | 2.8 | NR | 2.23 | 1.23 |
| **6** | 9.48 | 0.54 | NR | 0.71 | 0.96 |
| **7** | 8.53 | 3.0 | NR | 0.14 | 0.07 |
| **8** | 6.653 | 1.04 | 107 | -0.99 | -1.09 |
| **9** | NT | NT | NT | | |
| **10** | 8.062 | 0.286 | NR | -0.14 | -0.21 |
| **12** | 9.70 | 2.56 | 81.9 | 0.84 | 0.50 |
| **13** | 6.39 | 1.92 | 58 | -1.15 | -0.86 |
| **14** | 9.1 | 0.7 | 99 | 0.48 | 0.61 |
| **15** | NS | NS | NS | | |
| **16** | 7.7 | 0.55 | NR | -0.36 | -0.49 |
| **17*** | 14 | 4.2 | 92 | 3.43 | 1.31 |
| **18** | 10.36 | NR | NR | 1.24 | 1.87 |
| **19** | 7.618 | 0.196 | 89 | -0.41 | -0.61 |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

* Outlier, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 8.3 | 1.1 |
| **Spike Value** | 7.47 | 0.37 |
| **Robust Average** | 8.6 | 1.2 |
| **Median** | 8.53 | 0.91 |
| **Mean** | 8.8 | |
| **N** | 15 | |
| **Max** | 14 | |
| **Min** | 6 | |
| **Robust SD** | 1.9 | |
| **Robust CV** | 22% | |


Kernel Density
Density
Result
Results: S2 - PFPeS
Assigned Value = 8.3 ± 1.1 µg/kg
Results (µg/kg)
Laboratory
4 13 8 3 19 16 10 7 1 14 6 12 18 5 17 2 9 15 20 21 Md RA SV


z-Scores: S2 - PFPeS
Target Standard Deviation for Proficiency Assessment 1.7 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
4 13 8 3 19 16 10 7 1 14 6 12 18 5 17
-1.4 -1.2 -1.0 -0.4 -0.4 -0.4 -0.1 0.1 0.2 0.5 0.7 0.8 1.2 2.2 3.4

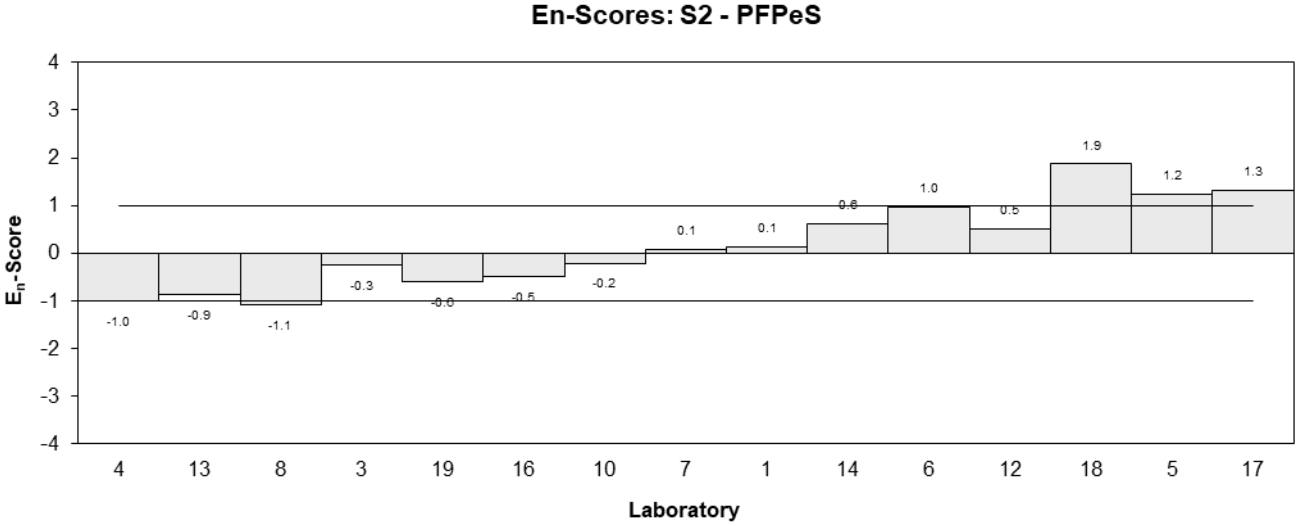

En-Scores: S2 - PFPeS
En-Score
Laboratory
4 13 8 3 19 16 10 7 1 14 6 12 18 5 17
-1.0 -0.9 -1.1 -0.3 -0.6 -0.5 -0.2 0.1 0.1 0.6 1.0 0.5 1.9 1.2 1.3

Figure 32

Table 36

**Sample Details**

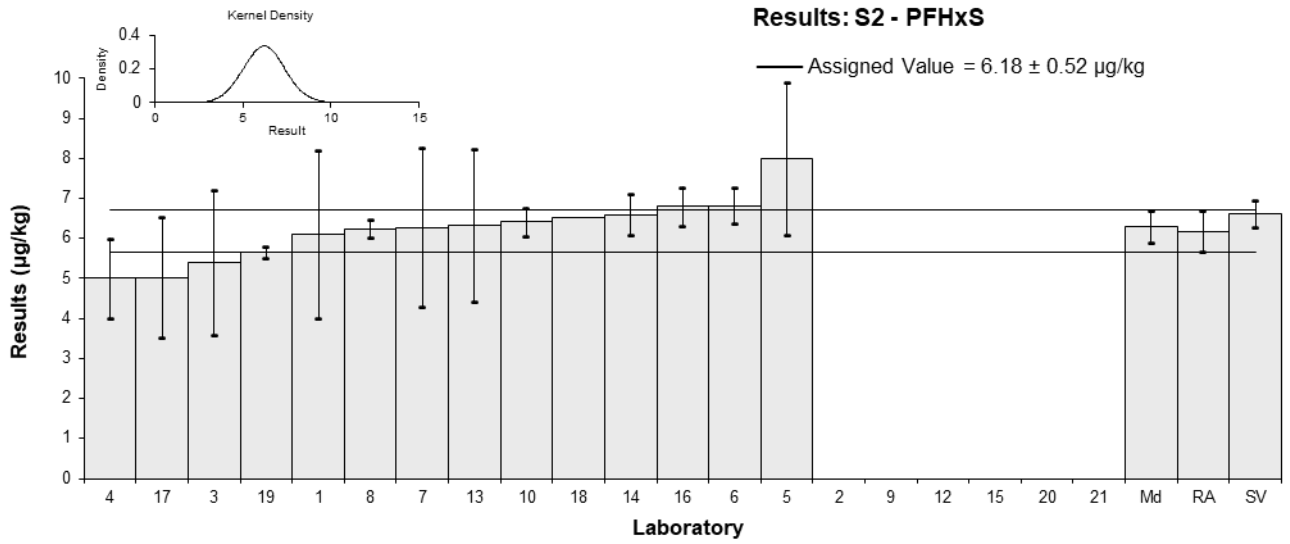
| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | PFHxS |
| **Unit** | µg/kg |

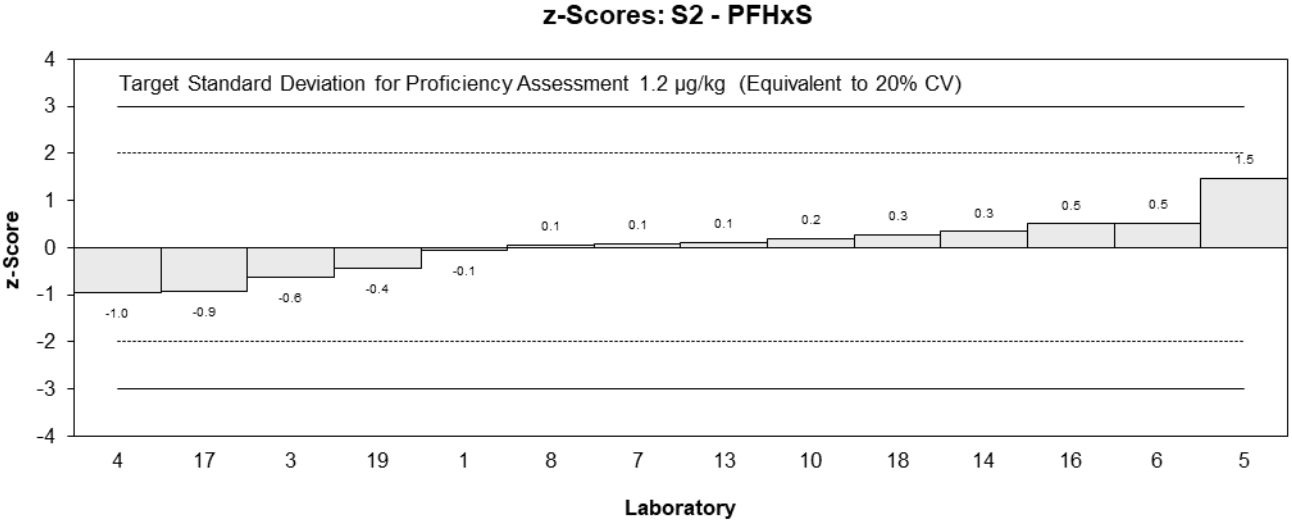
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 6.1 | 2.1 | 97 | -0.06 | -0.04 |
| **2** | NS | NS | NS | | |
| **3** | 5.4 | 1.8 | 103 | -0.63 | -0.42 |
| **4** | 5 | 1 | NR | -0.95 | -1.05 |
| **5** | 8 | 1.9 | 73 | 1.47 | 0.92 |
| **6** | 6.82 | 0.45 | NR | 0.52 | 0.93 |
| **7** | 6.28 | 2.0 | 81 | 0.08 | 0.05 |
| **8** | 6.245 | 0.219 | 107 | 0.05 | 0.12 |
| **9** | NT | NT | NT | | |
| **10** | 6.411 | 0.355 | NR | 0.19 | 0.37 |
| **12** | NT | NT | NT | | |
| **13** | 6.32 | 1.90 | 84 | 0.11 | 0.07 |
| **14** | 6.6 | 0.5 | 116 | 0.34 | 0.58 |
| **15** | NS | NS | NS | | |
| **16** | 6.8 | 0.48 | NR | 0.50 | 0.88 |
| **17** | 5.02 | 1.506060606 | 99 | -0.94 | -0.73 |
| **18** | 6.53 | NR | NR | 0.28 | 0.67 |
| **19** | 5.651 | 0.145 | 89 | -0.43 | -0.98 |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 6.18 | 0.52 |
| **Spike Value** | 6.61 | 0.33 |
| **Robust Average** | 6.18 | 0.52 |
| **Median** | 6.30 | 0.40 |
| **Mean** | 6.23 | |
| **N** | 14 | |
| **Max** | 8 | |
| **Min** | 5 | |
| **Robust SD** | 0.78 | |
| **Robust CV** | 13% | |


Results: S2 - PFHxS
Kernel Density
Density
Result
Assigned Value = 6.18 ± 0.52 µg/kg
Results (µg/kg)
Laboratory
4 17 3 19 1 8 7 13 10 18 14 16 6 5 2 9 12 15 20 21 Md RA SV


z-Scores: S2 - PFHxS
Target Standard Deviation for Proficiency Assessment 1.2 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
4 17 3 19 1 8 7 13 10 18 14 16 6 5
-1.0 -0.9 -0.6 -0.4 -0.1 0.1 0.1 0.1 0.2 0.3 0.3 0.5 0.5 1.5

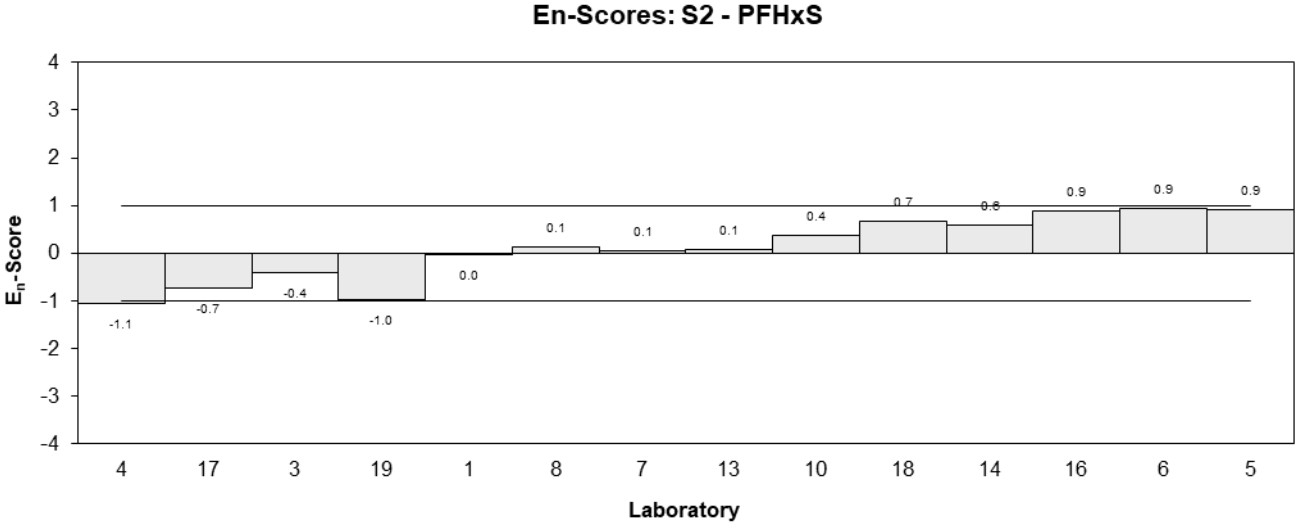

En-Scores: S2 - PFHxS
En-Score
Laboratory
4 17 3 19 1 8 7 13 10 18 14 16 6 5
-1.1 -0.7 -0.4 -1.0 0.0 0.1 0.1 0.1 0.4 0.7 0.8 0.9 0.9 0.9

Figure 33

Table 37

**Sample Details**

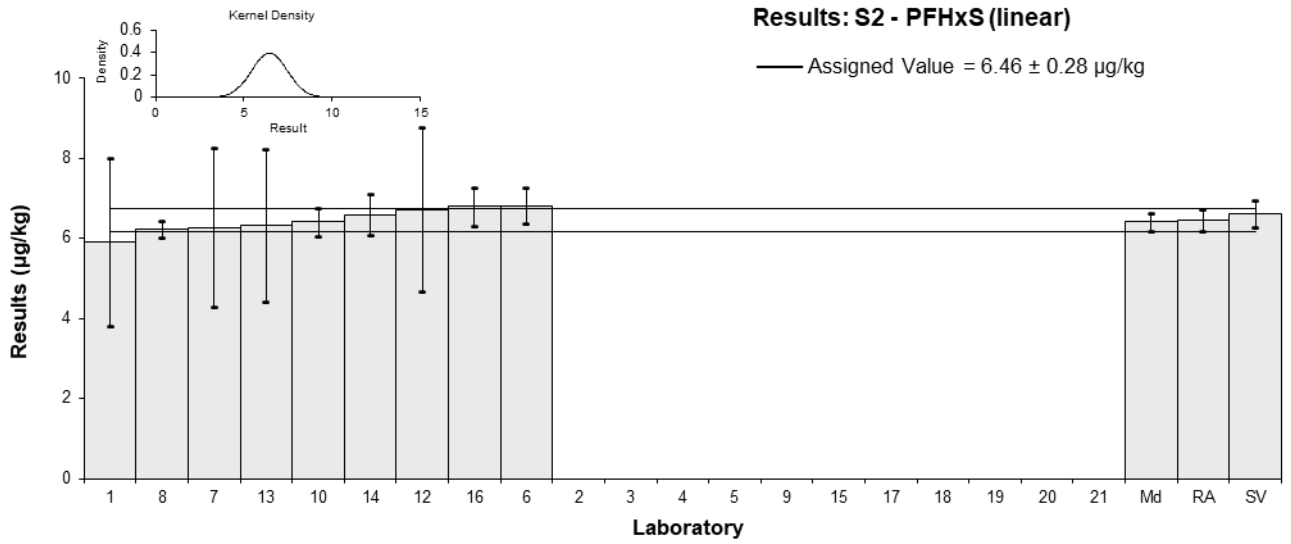
| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | PFHxS (linear) |
| **Unit** | µg/kg |

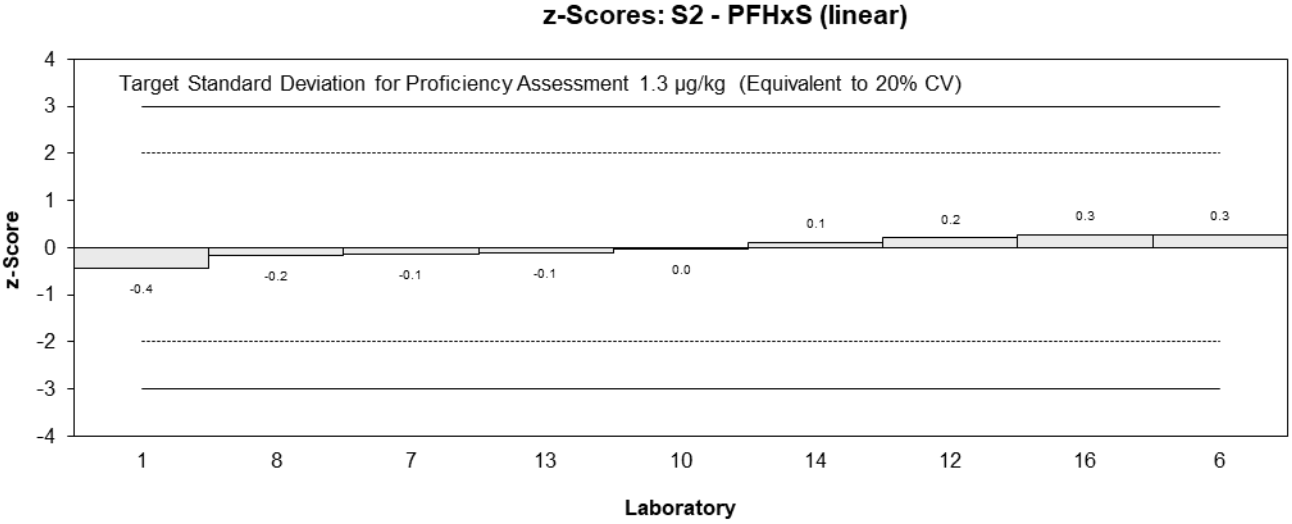
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 5.9 | 2.1 | 97 | -0.43 | -0.26 |
| **2** | NS | NS | NS | | |
| **3** | NT | NT | NT | | |
| **4** | NT | NT | NT | | |
| **5** | NT | NT | NT | | |
| **6** | 6.82 | 0.45 | NR | 0.28 | 0.68 |
| **7** | 6.28 | 2.0 | NR | -0.14 | -0.09 |
| **8** | 6.238 | 0.213 | 107 | -0.17 | -0.63 |
| **9** | NT | NT | NT | | |
| **10** | 6.41 | 0.355 | 110.7 | -0.04 | -0.11 |
| **12** | 6.72 | 2.05 | 81.9 | 0.20 | 0.13 |
| **13** | 6.32 | 1.90 | 84 | -0.11 | -0.07 |
| **14** | 6.6 | 0.5 | 116 | 0.11 | 0.24 |
| **15** | NS | NS | NS | | |
| **16** | 6.8 | 0.48 | NR | 0.26 | 0.61 |
| **17** | NT | NT | NT | | |
| **18** | NT | NT | NT | | |
| **19** | NR | NR | NR | | |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 6.46 | 0.28 |
| **Spike Value** | 6.61 | 0.33 |
| **Robust Average** | 6.46 | 0.28 |
| **Median** | 6.41 | 0.23 |
| **Mean** | 6.45 | |
| **N** | 9 | |
| **Max** | 6.82 | |
| **Min** | 5.9 | |
| **Robust SD** | 0.33 | |
| **Robust CV** | 5.1% | |


Kernel Density
Density
Result
Results: S2 - PFHxS (linear)
Assigned Value = 6.46 ± 0.28 µg/kg
Results (µg/kg)
Laboratory
1 8 7 13 10 14 12 16 6 2 3 4 5 9 15 17 18 19 20 21 Md RA SV


z-Scores: S2 - PFHxS (linear)
Target Standard Deviation for Proficiency Assessment 1.3 µg/kg (Equivalent to 20% CV)
z-Score
-0.4 -0.2 -0.1 -0.1 0.0 0.1 0.2 0.3 0.3
Laboratory
1 8 7 13 10 14 12 16 6

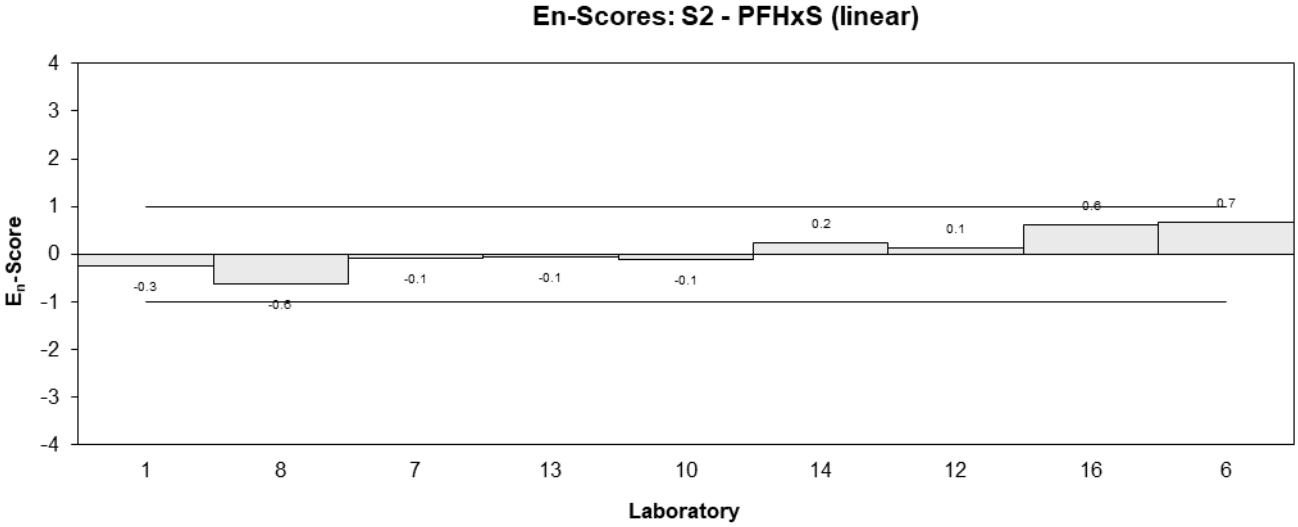

En-Scores: S2 - PFHxS (linear)
En-Score
-0.3 -0.6 -0.1 -0.1 -0.1 0.2 0.1 0.6 0.7
Laboratory
1 8 7 13 10 14 12 16 6

Figure 34

Table 38

**Sample Details**

| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | PFHpS |
| **Unit** | µg/kg |

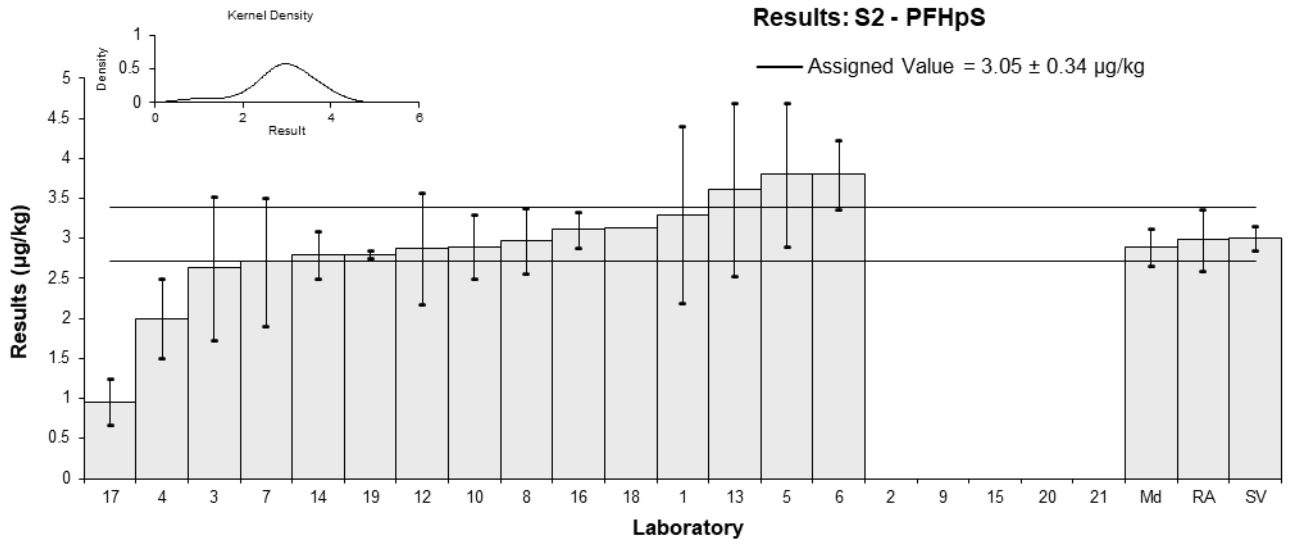
**Participant Results**

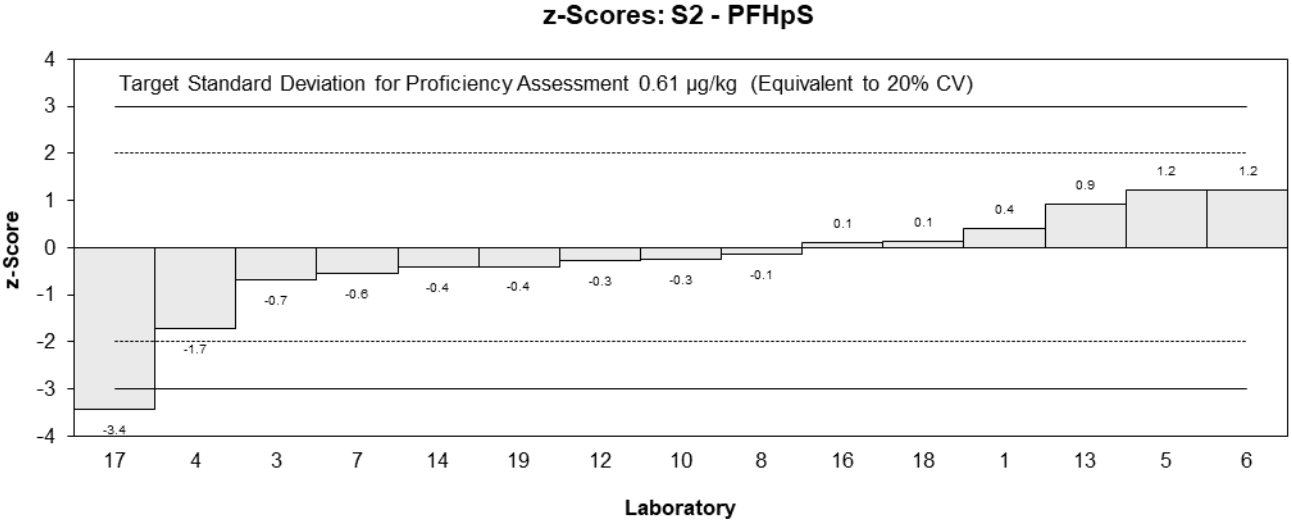
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 3.3 | 1.1 | 99 | 0.41 | 0.22 |
| **2** | NS | NS | NS | | |
| **3** | 2.628 | 0.9 | 97 | -0.69 | -0.44 |
| **4** | 2 | 0.5 | NR | -1.72 | -1.74 |
| **5** | 3.8 | 0.9 | NR | 1.23 | 0.78 |
| **6** | 3.80 | 0.43 | NR | 1.23 | 1.37 |
| **7** | 2.71 | 0.8 | NR | -0.56 | -0.39 |
| **8** | 2.972 | 0.404 | 107 | -0.13 | -0.15 |
| **9** | NT | NT | NT | | |
| **10** | 2.894 | 0.402 | NR | -0.26 | -0.30 |
| **12** | 2.88 | 0.697 | 81.9 | -0.28 | -0.22 |
| **13** | 3.61 | 1.08 | 84 | 0.92 | 0.49 |
| **14** | 2.8 | 0.3 | 116 | -0.41 | -0.55 |
| **15** | NS | NS | NS | | |
| **16** | 3.11 | 0.22 | NR | 0.10 | 0.15 |
| **17*** | 0.96 | 0.287704918 | 122 | -3.43 | -4.69 |
| **18** | 3.13 | NR | NR | 0.13 | 0.24 |
| **19** | 2.803 | 0.046 | 89 | -0.40 | -0.72 |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

* Outlier, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 3.05 | 0.34 |
| **Spike Value** | 3.00 | 0.15 |
| **Robust Average** | 2.98 | 0.38 |
| **Median** | 2.89 | 0.23 |
| **Mean** | 2.89 | |
| **N** | 15 | |
| **Max** | 3.8 | |
| **Min** | 0.96 | |
| **Robust SD** | 0.58 | |
| **Robust CV** | 20% | |


Results: S2 - PFHpS
Kernel Density
Density
Result
Assigned Value = 3.05 ± 0.34 µg/kg
Results (µg/kg)
Laboratory
17 4 3 7 14 19 12 10 8 16 18 1 13 5 6 2 9 15 20 21 Md RA SV


z-Scores: S2 - PFHpS
Target Standard Deviation for Proficiency Assessment 0.61 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
17 4 3 7 14 19 12 10 8 16 18 1 13 5 6
-3.4 -1.7 -0.7 -0.6 -0.4 -0.4 -0.3 -0.3 -0.1 0.1 0.1 0.4 0.9 1.2 1.2

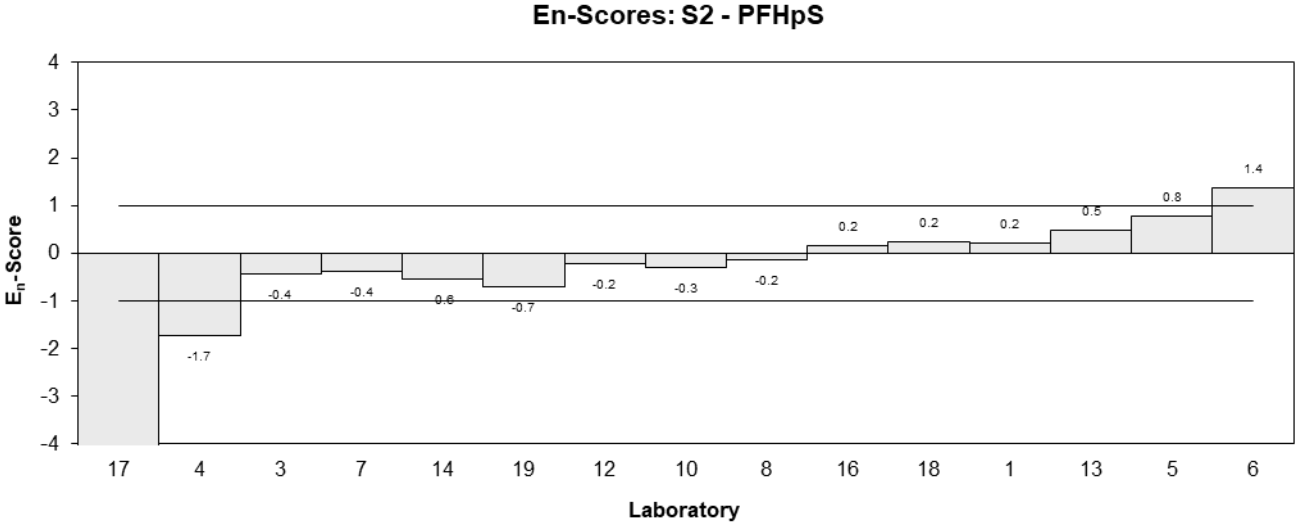

En-Scores: S2 - PFHpS
En-Score
Laboratory
17 4 3 7 14 19 12 10 8 16 18 1 13 5 6
-1.7 -0.4 -0.4 -0.6 -0.7 -0.2 -0.3 -0.2 0.2 0.2 0.2 0.5 0.8 1.4

Figure 35

Table 39

**Sample Details**

| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | PFOS |
| **Unit** | µg/kg |

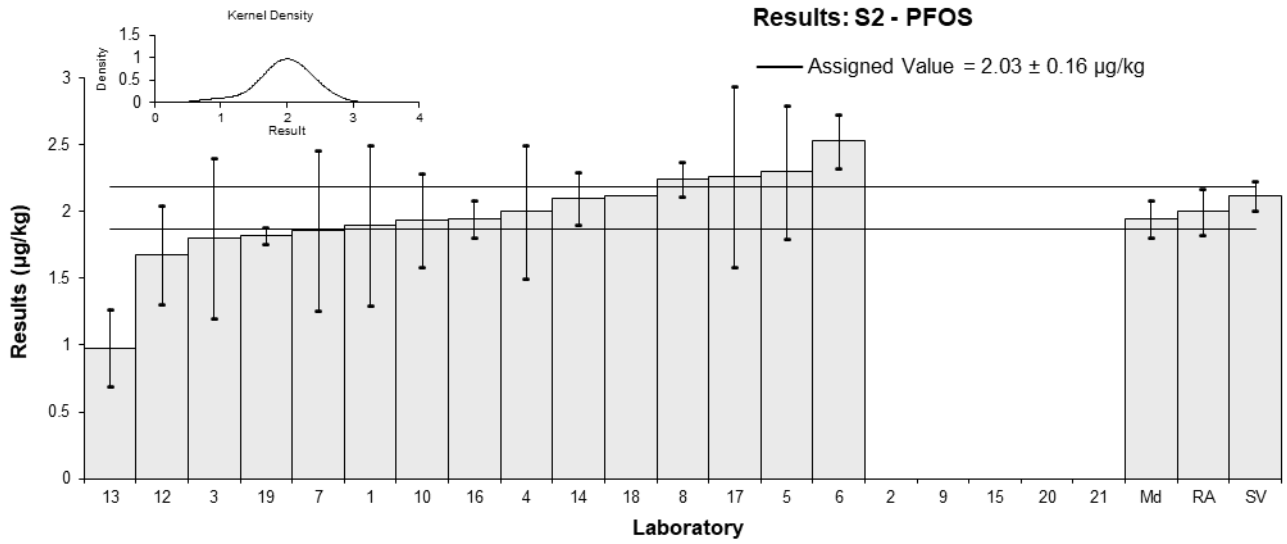
**Participant Results**

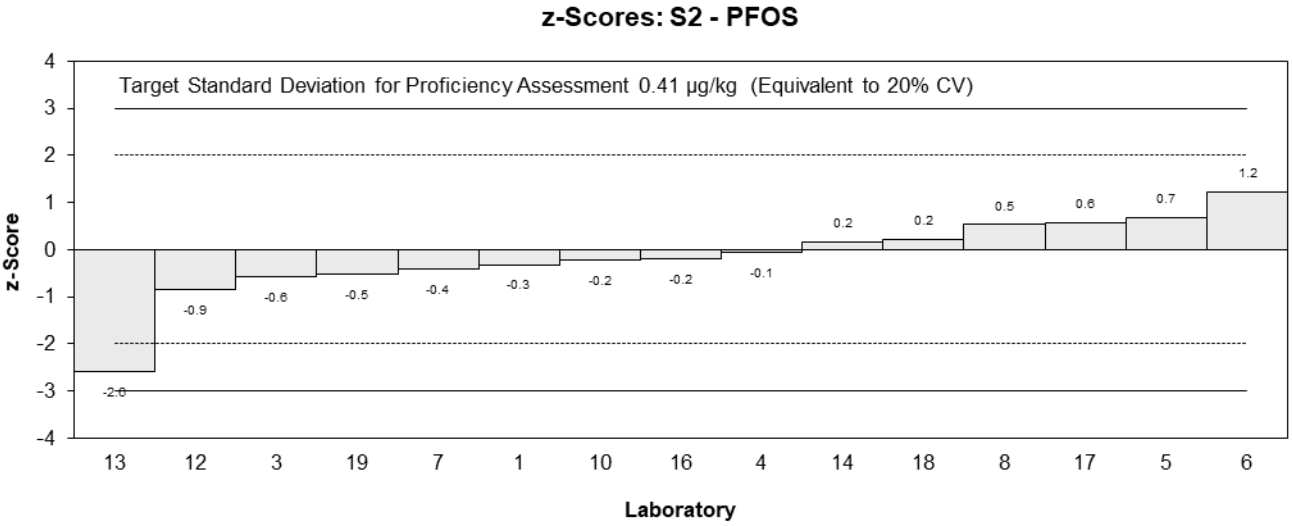
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 1.9 | 0.6 | 99 | -0.32 | -0.21 |
| **2** | NS | NS | NS | | |
| **3** | 1.8 | 0.6 | 97 | -0.57 | -0.37 |
| **4** | 2 | 0.5 | NR | -0.07 | -0.06 |
| **5** | 2.3 | 0.5 | 80 | 0.67 | 0.51 |
| **6** | 2.53 | 0.2 | NR | 1.23 | 1.95 |
| **7** | 1.86 | 0.6 | 86 | -0.42 | -0.27 |
| **8** | 2.246 | 0.128 | 93 | 0.53 | 1.05 |
| **9** | NT | NT | NT | | |
| **10** | 1.939 | 0.351 | NR | -0.22 | -0.24 |
| **12** | 1.68 | 0.369 | 88.9 | -0.86 | -0.87 |
| **13*** | 0.98 | 0.29 | 92 | -2.59 | -3.17 |
| **14** | 2.1 | 0.2 | 150 | 0.17 | 0.27 |
| **15** | NS | NS | NS | | |
| **16** | 1.95 | 0.14 | NR | -0.20 | -0.38 |
| **17** | 2.26 | 0.678 | 100 | 0.57 | 0.33 |
| **18** | 2.12 | NR | NR | 0.22 | 0.56 |
| **19** | 1.82 | 0.061 | 83 | -0.52 | -1.23 |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

* Outlier, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 2.03 | 0.16 |
| **Spike Value** | 2.12 | 0.11 |
| **Robust Average** | 2.00 | 0.17 |
| **Median** | 1.95 | 0.14 |
| **Mean** | 1.97 | |
| **N** | 15 | |
| **Max** | 2.53 | |
| **Min** | 0.98 | |
| **Robust SD** | 0.27 | |
| **Robust CV** | 13% | |


Kernel Density
Density
Result
Results: S2 - PFOS
Assigned Value = 2.03 ± 0.16 µg/kg
Results (µg/kg)
Laboratory
13 12 3 19 7 1 10 16 4 14 18 8 17 5 6 2 9 15 20 21 Md RA SV


z-Scores: S2 - PFOS
Target Standard Deviation for Proficiency Assessment 0.41 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
13 12 3 19 7 1 10 16 4 14 18 8 17 5 6
-2.6 -0.9 -0.6 -0.5 -0.4 -0.3 -0.2 -0.2 -0.1 0.2 0.2 0.5 0.6 0.7 1.2

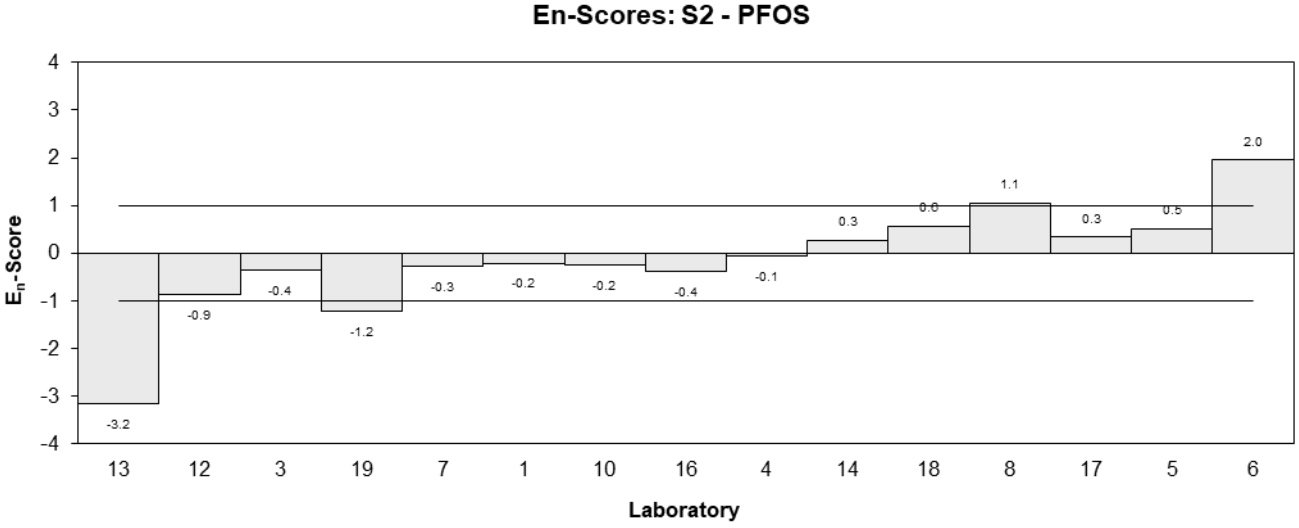

En-Scores: S2 - PFOS
En-Score
Laboratory
13 12 3 19 7 1 10 16 4 14 18 8 17 5 6
-3.2 -0.9 -0.4 -1.2 -0.3 -0.2 -0.2 -0.4 -0.1 0.3 0.6 1.1 0.3 0.5 2.0

Figure 36

Table 40

**Sample Details**

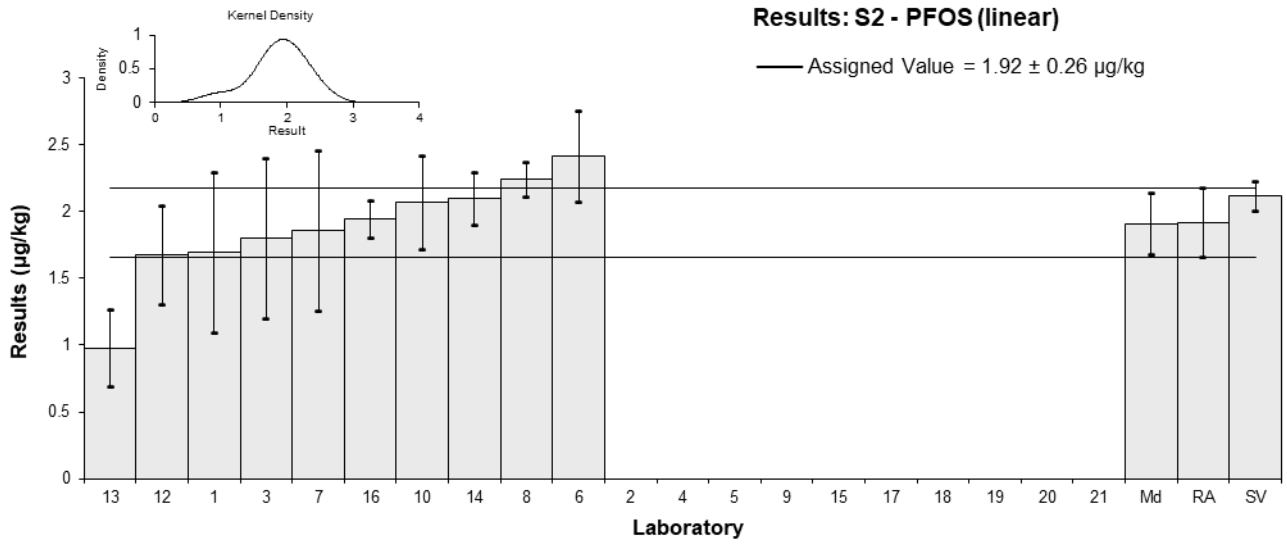
| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | PFOS (linear) |
| **Unit** | µg/kg |

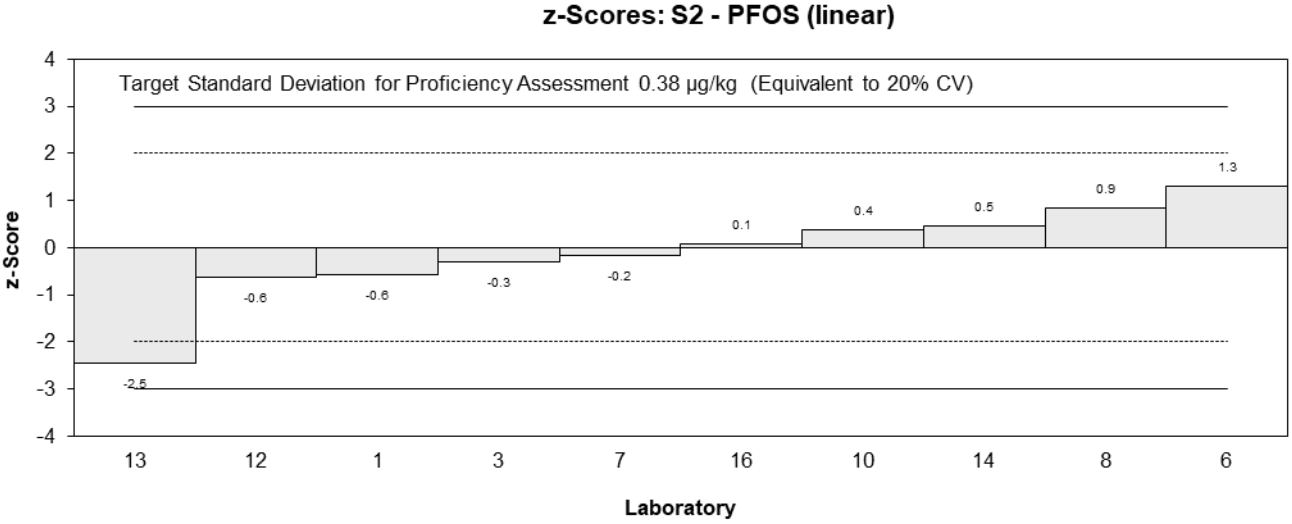
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 1.7 | 0.6 | 99 | -0.57 | -0.34 |
| **2** | NS | NS | NS | | |
| **3** | 1.8 | 0.6 | 97 | -0.31 | -0.18 |
| **4** | NT | NT | NT | | |
| **5** | NT | NT | NT | | |
| **6** | 2.42 | 0.34 | NR | 1.30 | 1.17 |
| **7** | 1.86 | 0.6 | NR | -0.16 | -0.09 |
| **8** | 2.246 | 0.128 | 93 | 0.85 | 1.12 |
| **9** | NT | NT | NT | | |
| **10** | 2.067 | 0.351 | 103.6 | 0.38 | 0.34 |
| **12** | 1.68 | 0.369 | 88.9 | -0.62 | -0.53 |
| **13** | 0.98 | 0.29 | 92 | -2.45 | -2.41 |
| **14** | 2.1 | 0.2 | 150 | 0.47 | 0.55 |
| **15** | NS | NS | NS | | |
| **16** | 1.95 | 0.14 | NR | 0.08 | 0.10 |
| **17** | NT | NT | NT | | |
| **18** | NT | NT | NT | | |
| **19** | NR | NR | NR | | |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 1.92 | 0.26 |
| **Spike Value** | 2.12 | 0.11 |
| **Robust Average** | 1.92 | 0.26 |
| **Median** | 1.91 | 0.23 |
| **Mean** | 1.88 | |
| **N** | 10 | |
| **Max** | 2.42 | |
| **Min** | 0.98 | |
| **Robust SD** | 0.33 | |
| **Robust CV** | 17% | |


Kernel Density
Density
Result
Results: S2 - PFOS (linear)
Assigned Value = 1.92 ± 0.26 µg/kg
Results (µg/kg)
13 12 1 3 7 16 10 14 8 6 2 4 5 9 15 17 18 19 20 21 Md RA SV
Laboratory


z-Scores: S2 - PFOS (linear)
Target Standard Deviation for Proficiency Assessment 0.38 µg/kg (Equivalent to 20% CV)
z-Score
-2.5 -0.6 -0.6 -0.3 -0.2 0.1 0.4 0.5 0.9 1.3
13 12 1 3 7 16 10 14 8 6
Laboratory

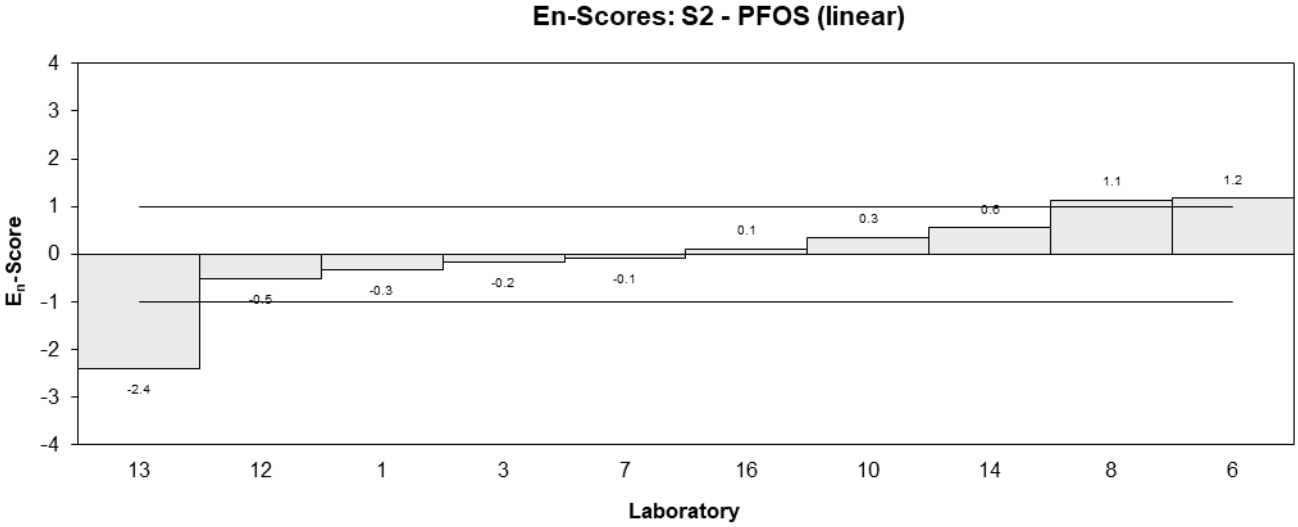

En-Scores: S2 - PFOS (linear)
En-Score
-2.4 -0.5 -0.3 -0.2 -0.1 0.1 0.3 0.6 1.1 1.2
13 12 1 3 7 16 10 14 8 6
Laboratory

Figure 37

Table 41

**Sample Details**

| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | PFNS |
| **Unit** | µg/kg |

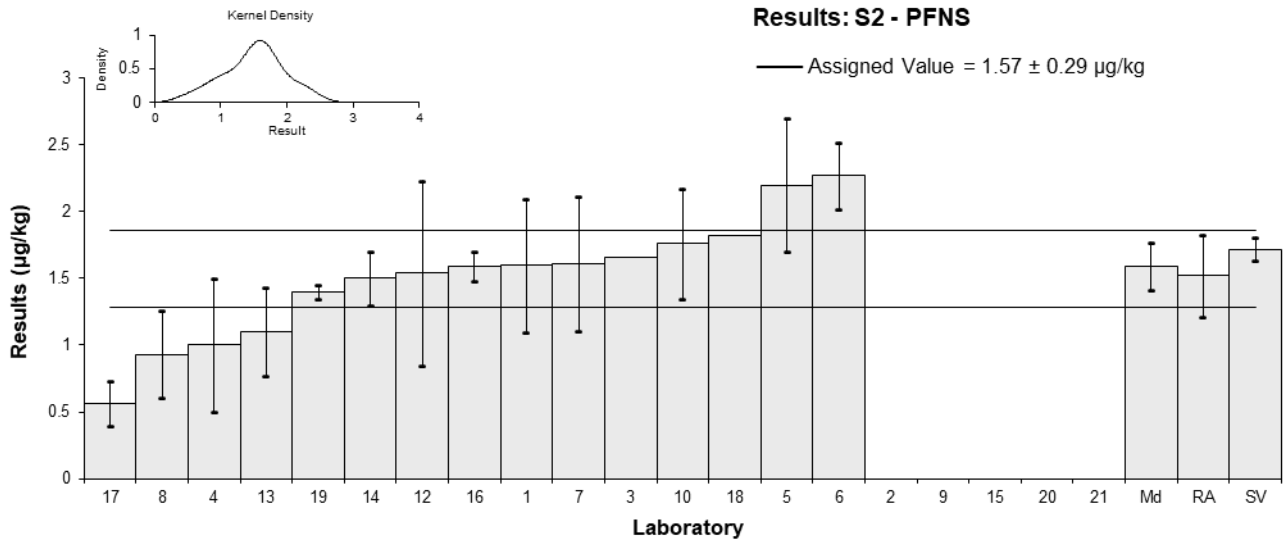
**Participant Results**

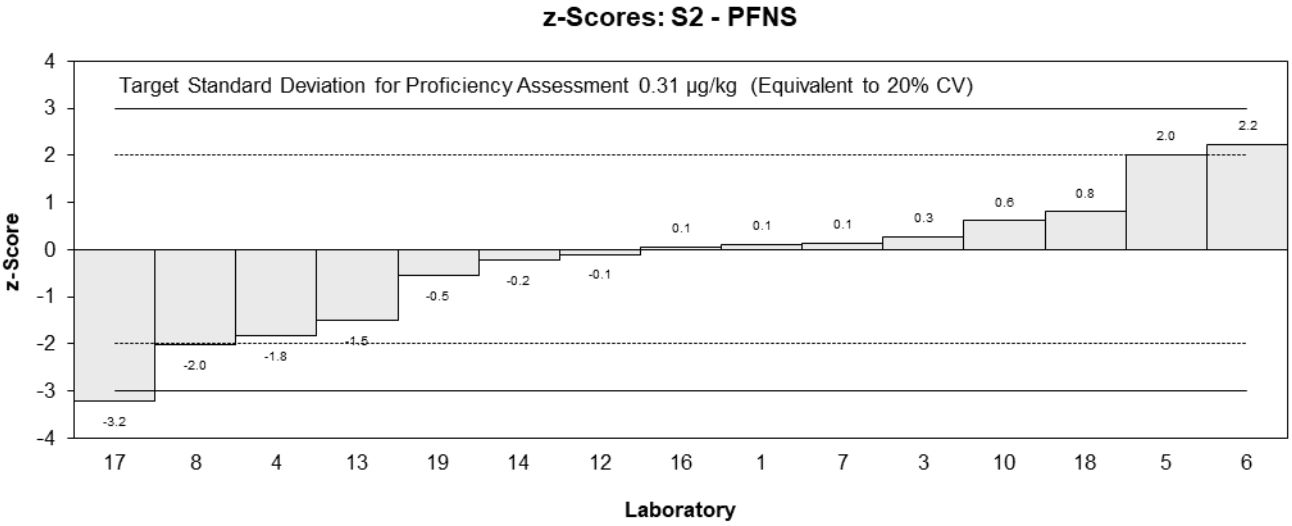
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 1.6 | 0.5 | 99 | 0.10 | 0.05 |
| **2** | NS | NS | NS | | |
| **3** | 1.658 | NR | 97 | 0.28 | 0.30 |
| **4** | 1 | 0.5 | NR | -1.82 | -0.99 |
| **5** | 2.2 | 0.5 | NR | 2.01 | 1.09 |
| **6** | 2.27 | 0.25 | NR | 2.23 | 1.83 |
| **7** | 1.61 | 0.5 | NR | 0.13 | 0.07 |
| **8** | 0.932 | 0.325 | 93 | -2.03 | -1.46 |
| **9** | NT | NT | NT | | |
| **10** | 1.762 | 0.413 | NR | 0.61 | 0.38 |
| **12** | 1.54 | 0.693 | 88.9 | -0.10 | -0.04 |
| **13** | 1.10 | 0.33 | 92 | -1.50 | -1.07 |
| **14** | 1.5 | 0.2 | 150 | -0.22 | -0.20 |
| **15** | NS | NS | NS | | |
| **16** | 1.59 | 0.11 | NR | 0.06 | 0.06 |
| **17*** | 0.56 | 0.167213114 | 61 | -3.22 | -3.02 |
| **18** | 1.82 | NR | NR | 0.80 | 0.86 |
| **19** | 1.399 | 0.049 | 83 | -0.54 | -0.58 |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

* Outlier, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 1.57 | 0.29 |
| **Spike Value** | 1.72 | 0.09 |
| **Robust Average** | 1.52 | 0.31 |
| **Median** | 1.59 | 0.18 |
| **Mean** | 1.50 | |
| **N** | 15 | |
| **Max** | 2.27 | |
| **Min** | 0.56 | |
| **Robust SD** | 0.48 | |
| **Robust CV** | 31% | |


Kernel Density
Density
Result
Results: S2 - PFNS
Assigned Value = 1.57 ± 0.29 µg/kg
Results (µg/kg)
17 8 4 13 19 14 12 16 1 7 3 10 18 5 6 2 9 15 20 21 Md RA SV
Laboratory


z-Scores: S2 - PFNS
Target Standard Deviation for Proficiency Assessment 0.31 µg/kg (Equivalent to 20% CV)
z-Score
-3.2 -2.0 -1.8 -1.5 -0.5 -0.2 -0.1 0.1 0.1 0.1 0.3 0.6 0.8 2.0 2.2
17 8 4 13 19 14 12 16 1 7 3 10 18 5 6
Laboratory

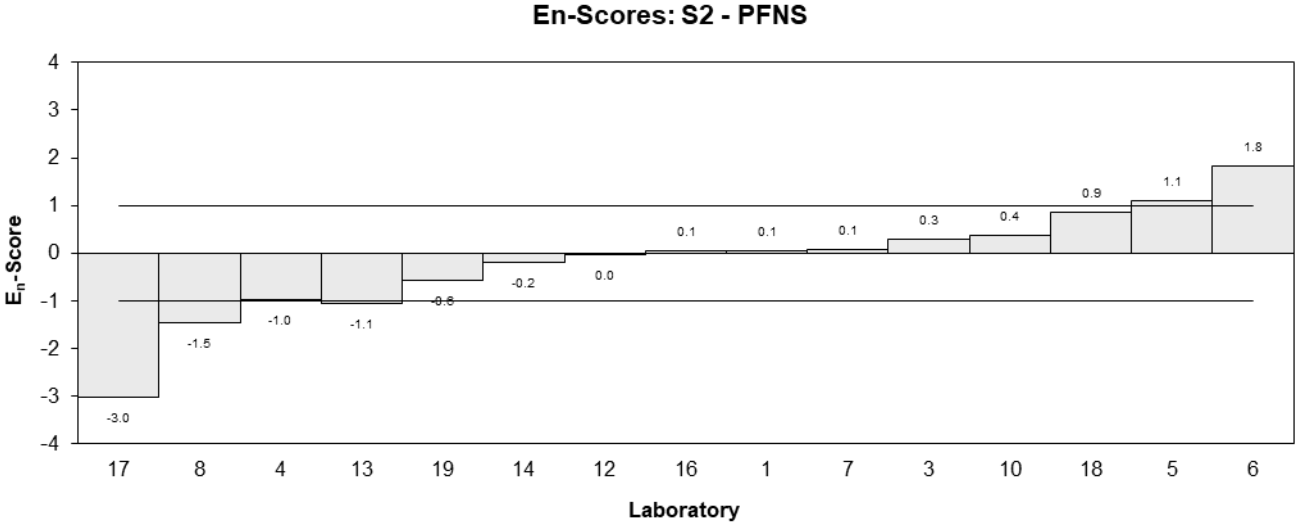

En-Scores: S2 - PFNS
En-Score
-3.0 -1.5 -1.0 -1.1 -0.6 -0.2 0.0 0.1 0.1 0.1 0.3 0.4 0.9 1.1 1.8
17 8 4 13 19 14 12 16 1 7 3 10 18 5 6
Laboratory

Figure 38

Table 42

**Sample Details**

| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | PFDS |
| **Unit** | µg/kg |

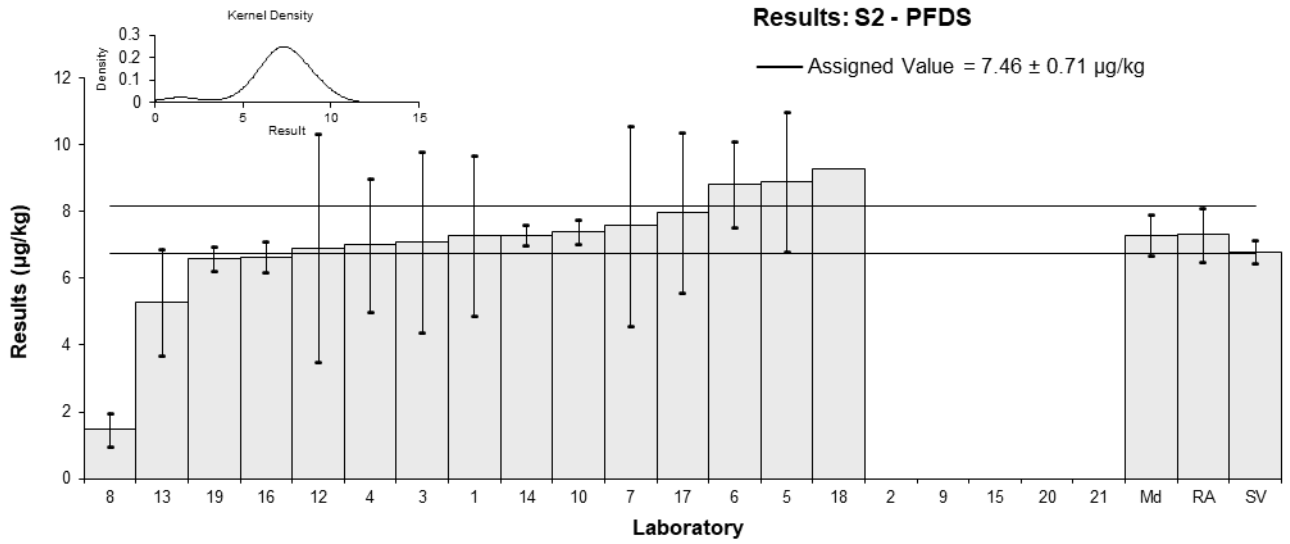
**Participant Results**

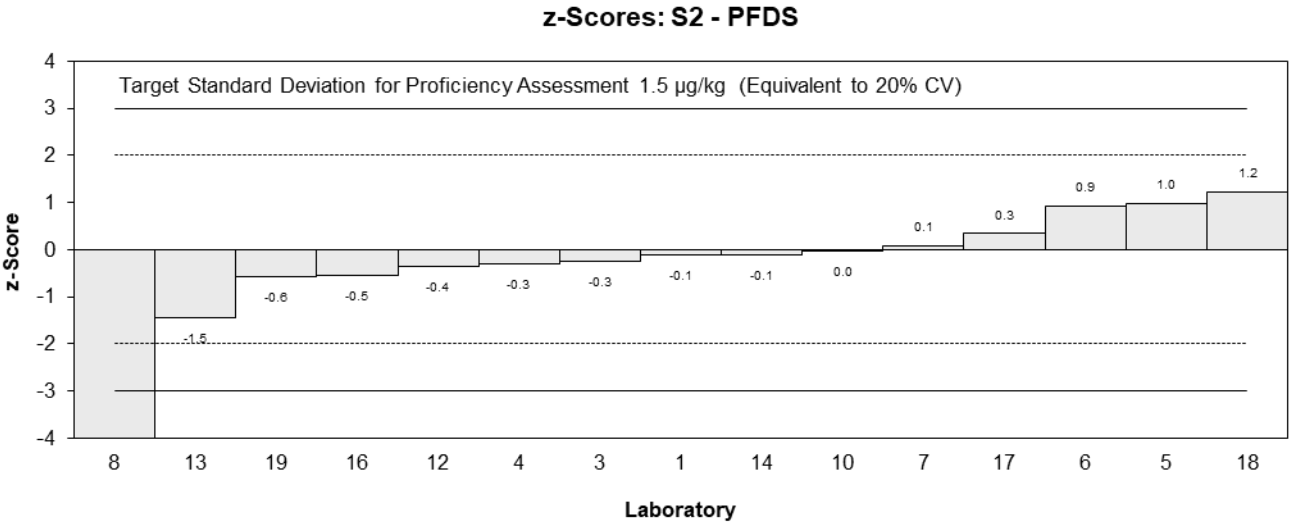
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 7.3 | 2.4 | 99 | -0.11 | -0.06 |
| **2** | NS | NS | NS | | |
| **3** | 7.09 | 2.7 | 97 | -0.25 | -0.13 |
| **4** | 7 | 2 | NR | -0.31 | -0.22 |
| **5** | 8.9 | 2.1 | NR | 0.97 | 0.65 |
| **6** | 8.83 | 1.3 | NR | 0.92 | 0.92 |
| **7** | 7.59 | 3.0 | NR | 0.09 | 0.04 |
| **8*** | 1.474 | 0.506 | 93 | -4.01 | -6.87 |
| **9** | NT | NT | NT | | |
| **10** | 7.41 | 0.367 | NR | -0.03 | -0.06 |
| **12** | 6.92 | 3.41 | 88.9 | -0.36 | -0.16 |
| **13** | 5.3 | 1.59 | 92 | -1.45 | -1.24 |
| **14** | 7.3 | 0.3 | 150 | -0.11 | -0.21 |
| **15** | NS | NS | NS | | |
| **16** | 6.65 | 0.47 | NR | -0.54 | -0.95 |
| **17** | 7.97 | 2.392105263 | 77 | 0.34 | 0.20 |
| **18** | 9.28 | NR | NR | 1.22 | 2.56 |
| **19** | 6.597 | 0.363 | 83 | -0.58 | -1.08 |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

* Outlier, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 7.46 | 0.71 |
| **Spike Value** | 6.80 | 0.34 |
| **Robust Average** | 7.31 | 0.81 |
| **Median** | 7.30 | 0.62 |
| **Mean** | 7.04 | |
| **N** | 15 | |
| **Max** | 9.28 | |
| **Min** | 1.474 | |
| **Robust SD** | 1.3 | |
| **Robust CV** | 17% | |


Results: S2 - PFDS
Assigned Value = 7.46 ± 0.71 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
8 13 19 16 12 4 3 1 14 10 7 17 6 5 18 2 9 15 20 21 Md RA SV


z-Scores: S2 - PFDS
Target Standard Deviation for Proficiency Assessment 1.5 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
8 13 19 16 12 4 3 1 14 10 7 17 6 5 18
-1.5 -0.6 -0.5 -0.4 -0.3 -0.3 -0.1 -0.1 0.0 0.1 0.3 0.9 1.0 1.2

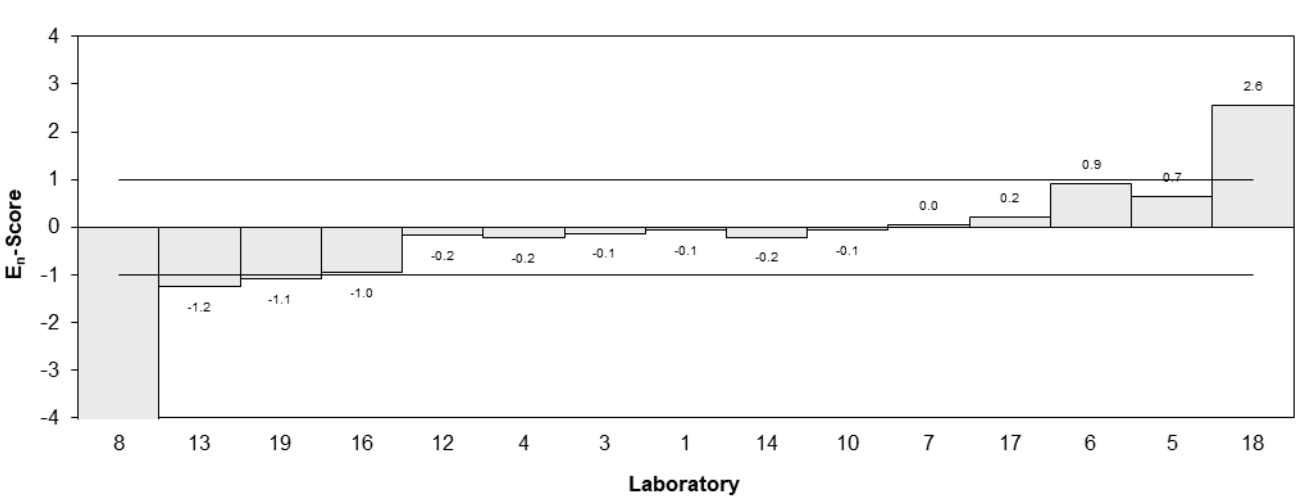

En-Scores: S2 - PFDS
En-Score
Laboratory
8 13 19 16 12 4 3 1 14 10 7 17 6 5 18
-1.2 -1.1 -1.0 -0.2 -0.2 -0.1 -0.1 -0.2 -0.1 0.0 0.2 0.9 0.7 2.6

Figure 39

Table 43

**Sample Details**

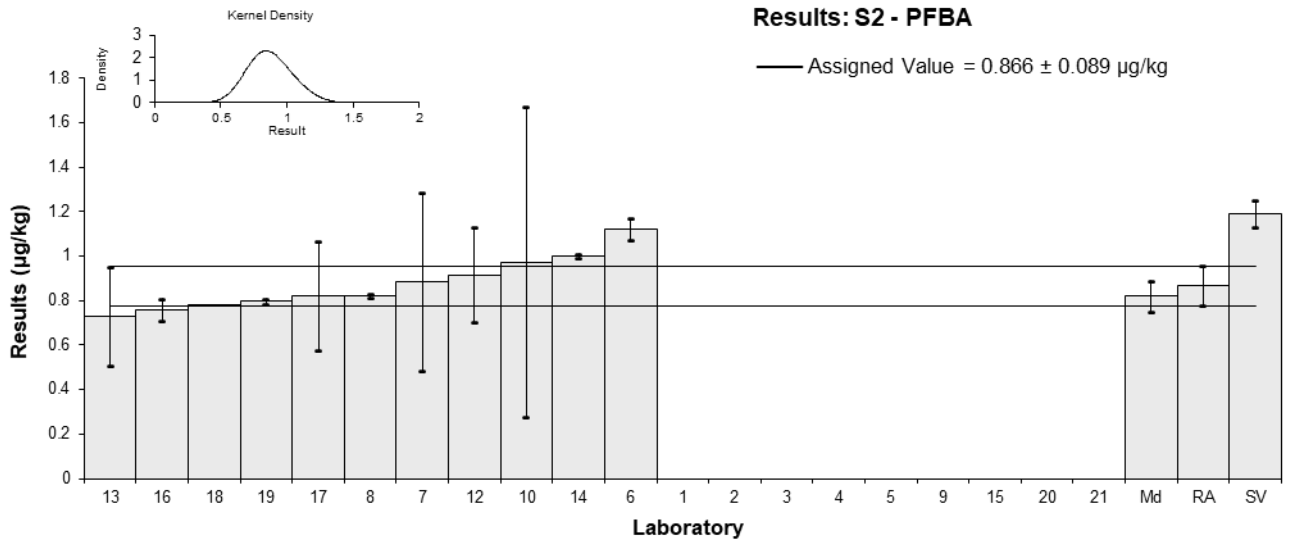
| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | PFBA |
| **Unit** | µg/kg |

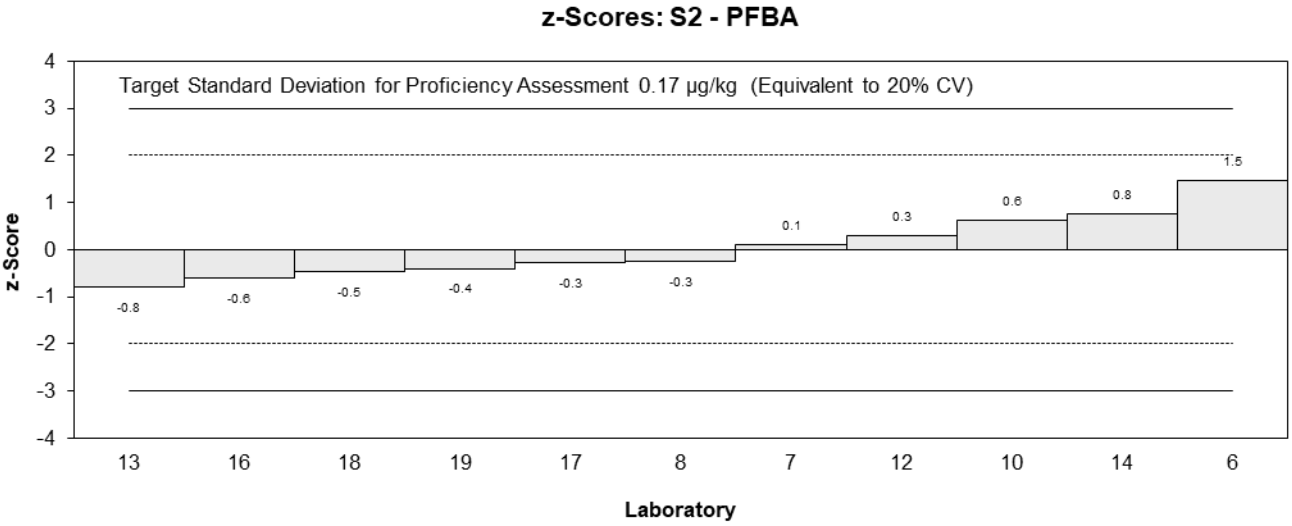
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | < 2 | NR | 103 | | |
| **2** | NS | NS | NS | | |
| **3** | <5 | NR | 79 | | |
| **4** | < 1 | NR | NR | | |
| **5** | <1 | 1 | 89 | | |
| **6** | 1.12 | 0.05 | NR | 1.47 | 2.49 |
| **7** | 0.884 | 0.4 | 85 | 0.10 | 0.04 |
| **8** | 0.821 | 0.009 | 93 | -0.26 | -0.50 |
| **9** | NT | NT | NT | | |
| **10** | 0.974 | 0.696 | 101 | 0.62 | 0.15 |
| **12** | 0.917 | 0.212 | 90.2 | 0.29 | 0.22 |
| **13** | 0.73 | 0.22 | 77 | -0.79 | -0.57 |
| **14** | 1 | 0.01 | 107 | 0.77 | 1.50 |
| **15** | NS | NS | NS | | |
| **16** | 0.76 | 0.05 | NR | -0.61 | -1.04 |
| **17** | 0.82 | 0.246 | 91 | -0.27 | -0.18 |
| **18** | 0.784 | NR | NR | -0.47 | -0.92 |
| **19** | 0.797 | 0.012 | 76 | -0.40 | -0.77 |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.866 | 0.089 |
| **Spike Value** | 1.19 | 0.06 |
| **Robust Average** | 0.866 | 0.089 |
| **Median** | 0.821 | 0.070 |
| **Mean** | 0.873 | |
| **N** | 11 | |
| **Max** | 1.12 | |
| **Min** | 0.73 | |
| **Robust SD** | 0.12 | |
| **Robust CV** | 14% | |


Kernel Density
Density
Result
Results: S2 - PFBA
Assigned Value = 0.866 ± 0.089 µg/kg
Results (µg/kg)
Laboratory
13 16 18 19 17 8 7 12 10 14 6 1 2 3 4 5 9 15 20 21 Md RA SV


z-Scores: S2 - PFBA
Target Standard Deviation for Proficiency Assessment 0.17 µg/kg (Equivalent to 20% CV)
z-Score
-0.8 -0.6 -0.5 -0.4 -0.3 -0.3 0.1 0.3 0.6 0.8 1.5
Laboratory
13 16 18 19 17 8 7 12 10 14 6

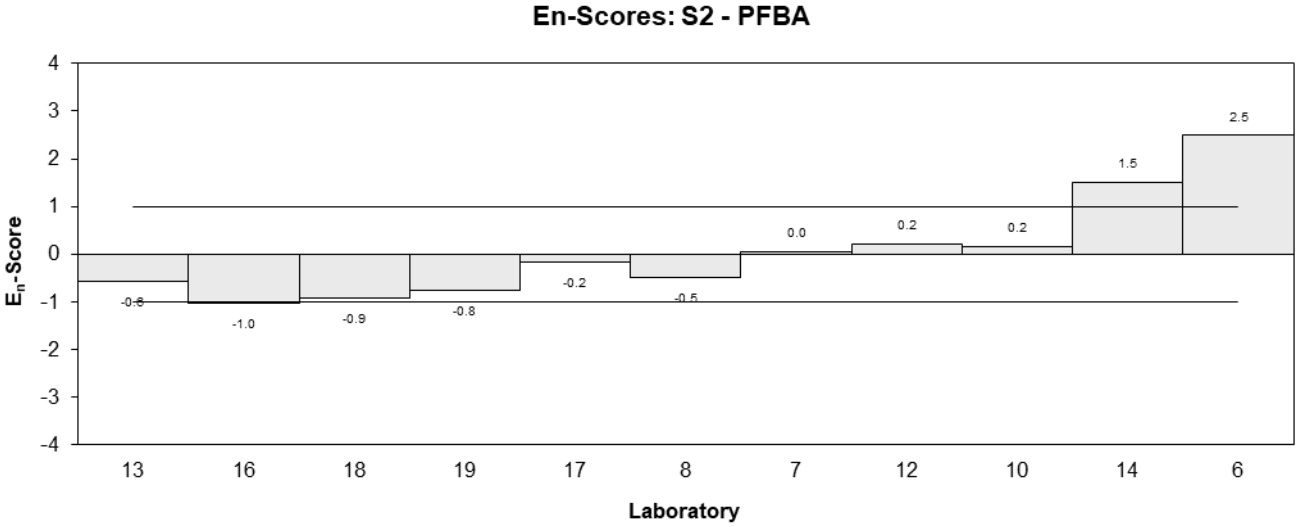

En-Scores: S2 - PFBA
En-Score
-0.6 -1.0 -0.9 -0.8 -0.2 -0.5 0.0 0.2 0.2 1.5 2.5
Laboratory
13 16 18 19 17 8 7 12 10 14 6

Figure 40

Table 44

**Sample Details**

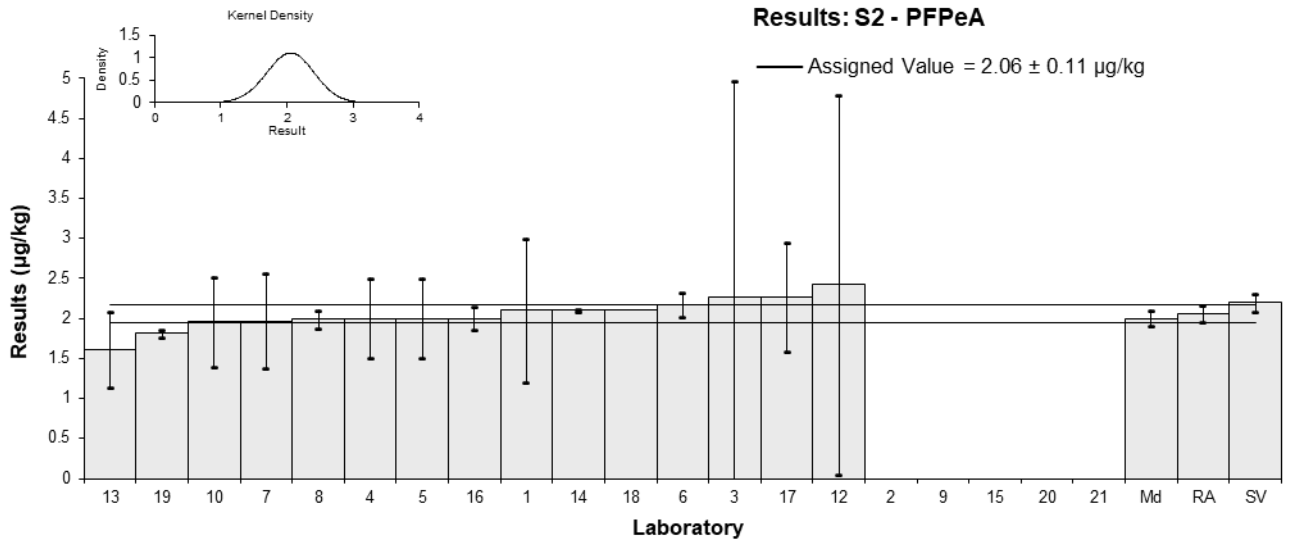
| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | PFPeA |
| **Unit** | µg/kg |

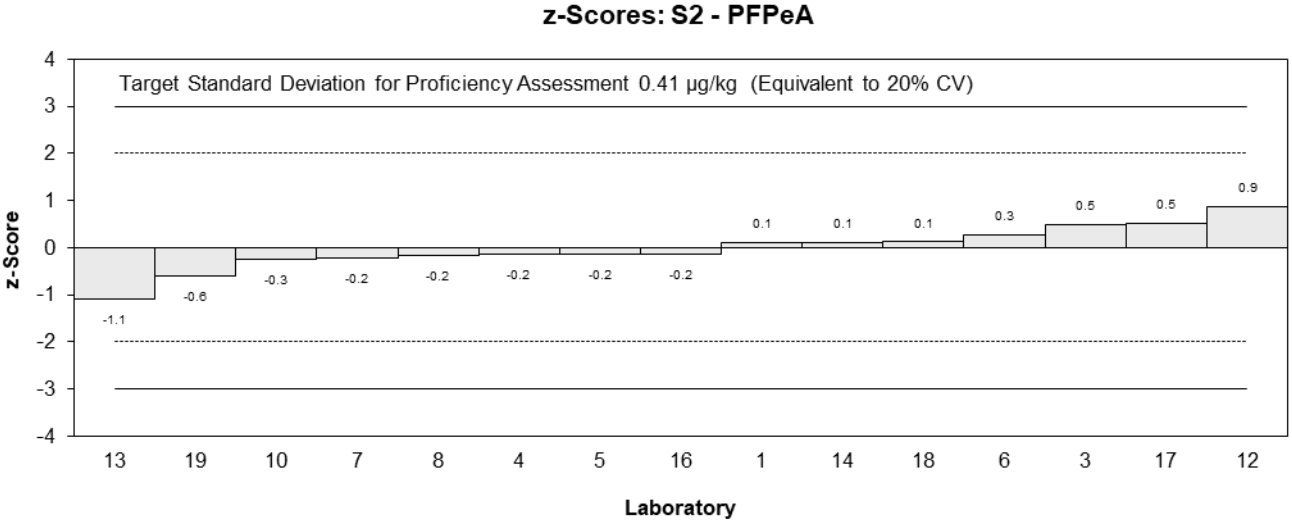
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 2.1 | 0.9 | 104 | 0.10 | 0.04 |
| **2** | NS | NS | NS | | |
| **3** | 2.262 | 2.7 | 108 | 0.49 | 0.07 |
| **4** | 2 | 0.5 | NR | -0.15 | -0.12 |
| **5** | 2 | 0.5 | 96 | -0.15 | -0.12 |
| **6** | 2.17 | 0.15 | NR | 0.27 | 0.59 |
| **7** | 1.97 | 0.6 | 81 | -0.22 | -0.15 |
| **8** | 1.991 | 0.115 | 101 | -0.17 | -0.43 |
| **9** | NT | NT | NT | | |
| **10** | 1.956 | 0.562 | 101.7 | -0.25 | -0.18 |
| **12** | 2.42 | 2.37 | 105.0 | 0.87 | 0.15 |
| **13** | 1.61 | 0.48 | 60 | -1.09 | -0.91 |
| **14** | 2.1 | 0.01 | 106 | 0.10 | 0.36 |
| **15** | NS | NS | NS | | |
| **16** | 2 | 0.14 | NR | -0.15 | -0.34 |
| **17** | 2.27 | 0.680232558 | 86 | 0.51 | 0.30 |
| **18** | 2.11 | NR | NR | 0.12 | 0.45 |
| **19** | 1.812 | 0.044 | 81 | -0.60 | -2.09 |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 2.06 | 0.11 |
| **Spike Value** | 2.20 | 0.11 |
| **Robust Average** | 2.06 | 0.11 |
| **Median** | 2.00 | 0.10 |
| **Mean** | 2.05 | |
| **N** | 15 | |
| **Max** | 2.42 | |
| **Min** | 1.61 | |
| **Robust SD** | 0.18 | |
| **Robust CV** | 8.6% | |


Kernel Density
Density
Result
Results: S2 - PFPeA
Assigned Value = 2.06 ± 0.11 µg/kg
Results (µg/kg)
Laboratory
13 19 10 7 8 4 5 16 1 14 18 6 3 17 12 2 9 15 20 21 Md RA SV


z-Scores: S2 - PFPeA
Target Standard Deviation for Proficiency Assessment 0.41 µg/kg (Equivalent to 20% CV)
z-Score
-1.1 -0.6 -0.3 -0.2 -0.2 -0.2 -0.2 -0.2 0.1 0.1 0.1 0.3 0.5 0.5 0.9
Laboratory
13 19 10 7 8 4 5 16 1 14 18 6 3 17 12

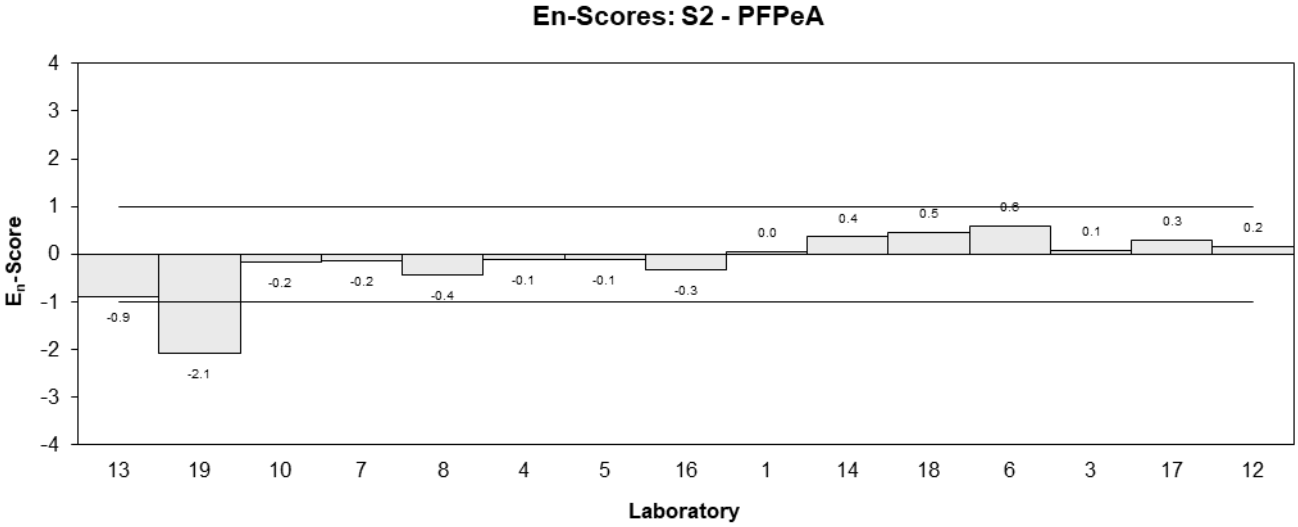

En-Scores: S2 - PFPeA
En-Score
-0.9 -2.1 -0.2 -0.2 -0.4 -0.1 -0.1 -0.3 0.0 0.4 0.5 0.6 0.1 0.3 0.2
Laboratory
13 19 10 7 8 4 5 16 1 14 18 6 3 17 12

Figure 41

Table 45

**Sample Details**

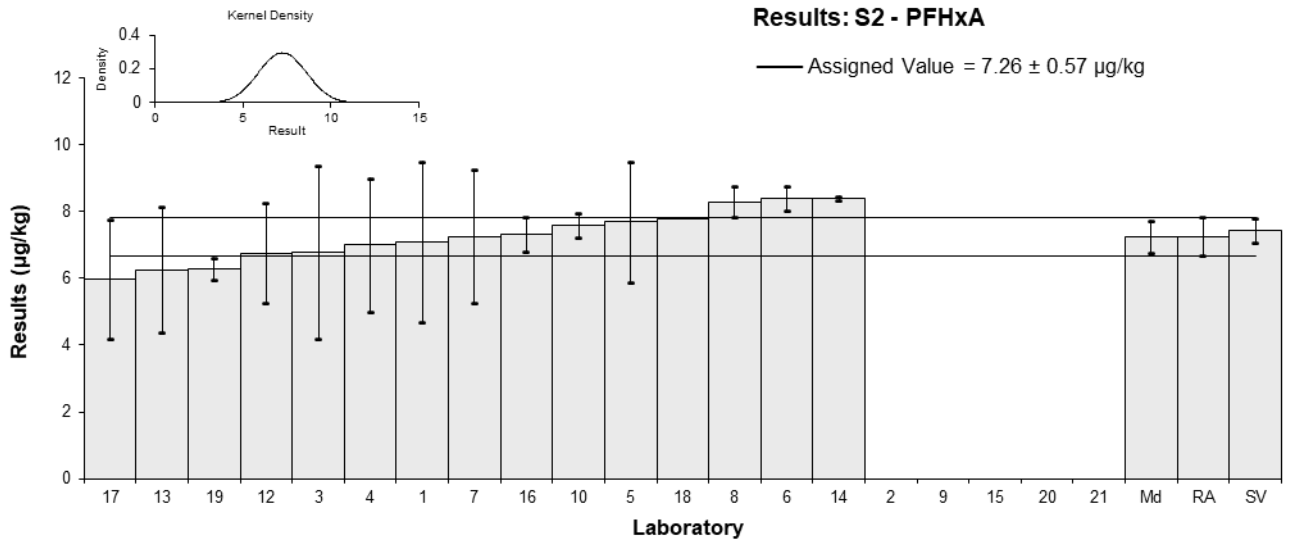
| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | PFHxA |
| **Unit** | µg/kg |

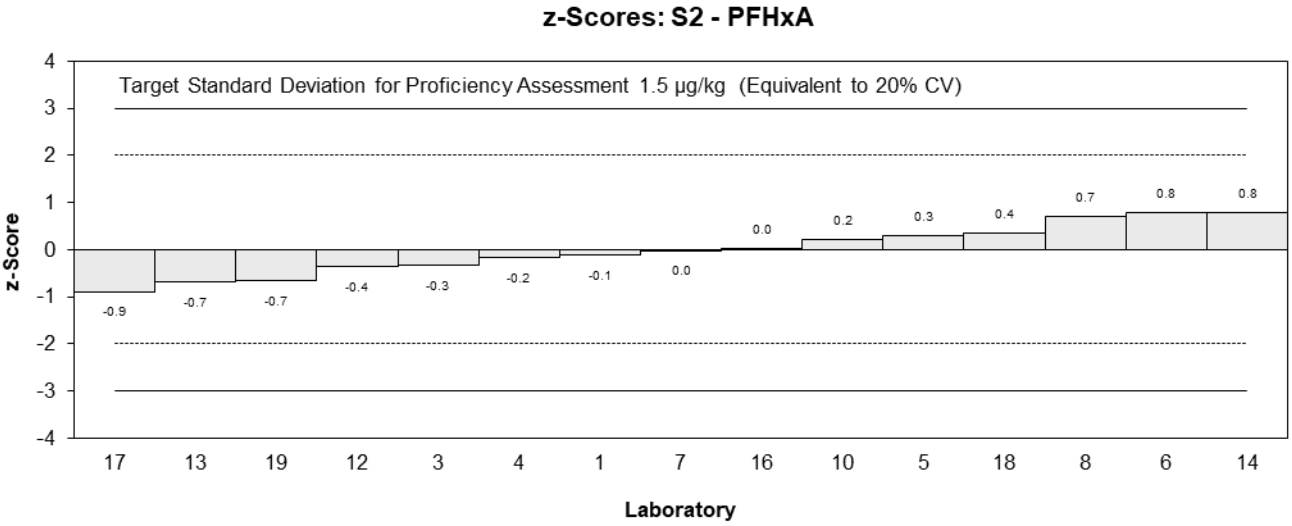
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 7.1 | 2.4 | 104 | -0.11 | -0.06 |
| **2** | NS | NS | NS | | |
| **3** | 6.774 | 2.6 | 108 | -0.33 | -0.18 |
| **4** | 7 | 2 | NR | -0.18 | -0.13 |
| **5** | 7.7 | 1.8 | 97 | 0.30 | 0.23 |
| **6** | 8.40 | 0.38 | NR | 0.79 | 1.66 |
| **7** | 7.25 | 2.0 | 81 | -0.01 | 0.00 |
| **8** | 8.295 | 0.457 | 113 | 0.71 | 1.42 |
| **9** | NT | NT | NT | | |
| **10** | 7.58 | 0.365 | 97.6 | 0.22 | 0.47 |
| **12** | 6.75 | 1.50 | 143.4 | -0.35 | -0.32 |
| **13** | 6.26 | 1.88 | 60 | -0.69 | -0.51 |
| **14** | 8.4 | 0.07 | 99 | 0.79 | 1.99 |
| **15** | NS | NS | NS | | |
| **16** | 7.31 | 0.52 | NR | 0.03 | 0.06 |
| **17** | 5.97 | 1.790217391 | 92 | -0.89 | -0.69 |
| **18** | 7.77 | NR | NR | 0.35 | 0.89 |
| **19** | 6.293 | 0.339 | 80 | -0.67 | -1.46 |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 7.26 | 0.57 |
| **Spike Value** | 7.45 | 0.37 |
| **Robust Average** | 7.26 | 0.57 |
| **Median** | 7.25 | 0.48 |
| **Mean** | 7.26 | |
| **N** | 15 | |
| **Max** | 8.4 | |
| **Min** | 5.97 | |
| **Robust SD** | 0.88 | |
| **Robust CV** | 12% | |


Kernel Density
Density
Result
Results: S2 - PFHxA
Assigned Value = 7.26 ± 0.57 µg/kg
Results (µg/kg)
Laboratory
17 13 19 12 3 4 1 7 16 10 5 18 8 6 14 2 9 15 20 21 Md RA SV


z-Scores: S2 - PFHxA
Target Standard Deviation for Proficiency Assessment 1.5 µg/kg (Equivalent to 20% CV)
z-Score
-0.9 -0.7 -0.7 -0.4 -0.3 -0.2 -0.1 0.0 0.0 0.2 0.3 0.4 0.7 0.8 0.8
Laboratory
17 13 19 12 3 4 1 7 16 10 5 18 8 6 14

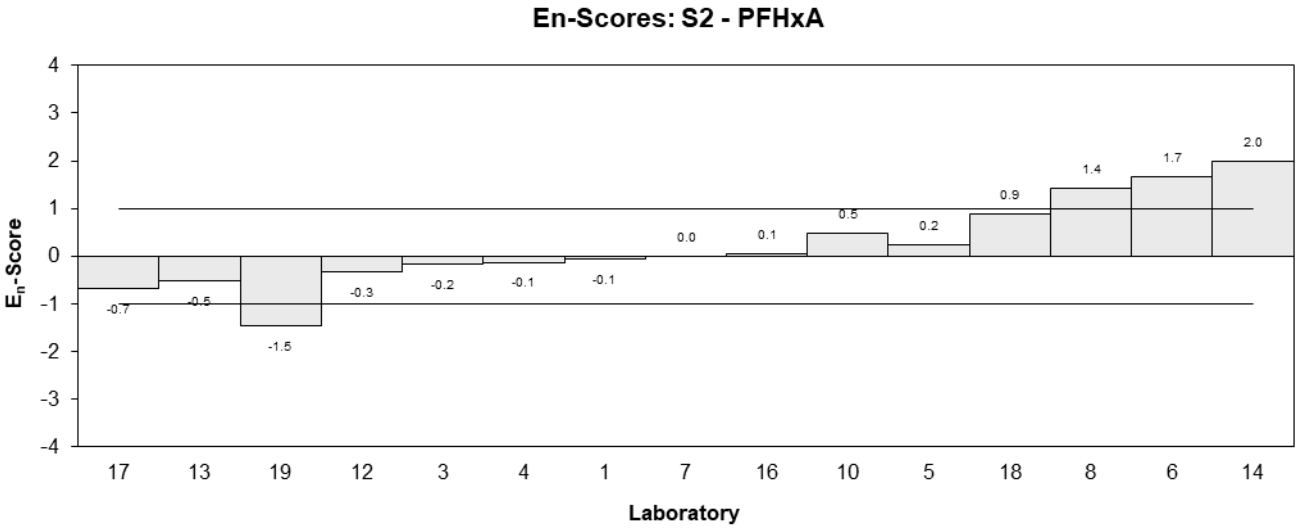

En-Scores: S2 - PFHxA
En-Score
-0.7 -0.5 -1.5 -0.3 -0.2 -0.1 -0.1 0.0 0.1 0.5 0.2 0.9 1.4 1.7 2.0
Laboratory
17 13 19 12 3 4 1 7 16 10 5 18 8 6 14

Figure 42

Table 46

**Sample Details**

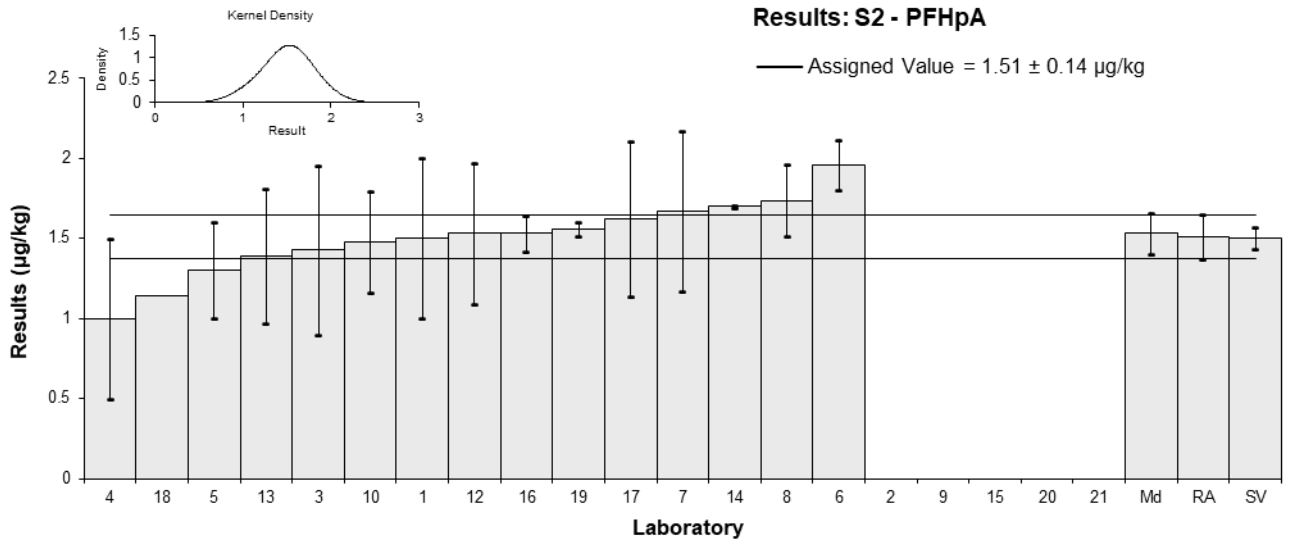
| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | PFHpA |
| **Unit** | µg/kg |

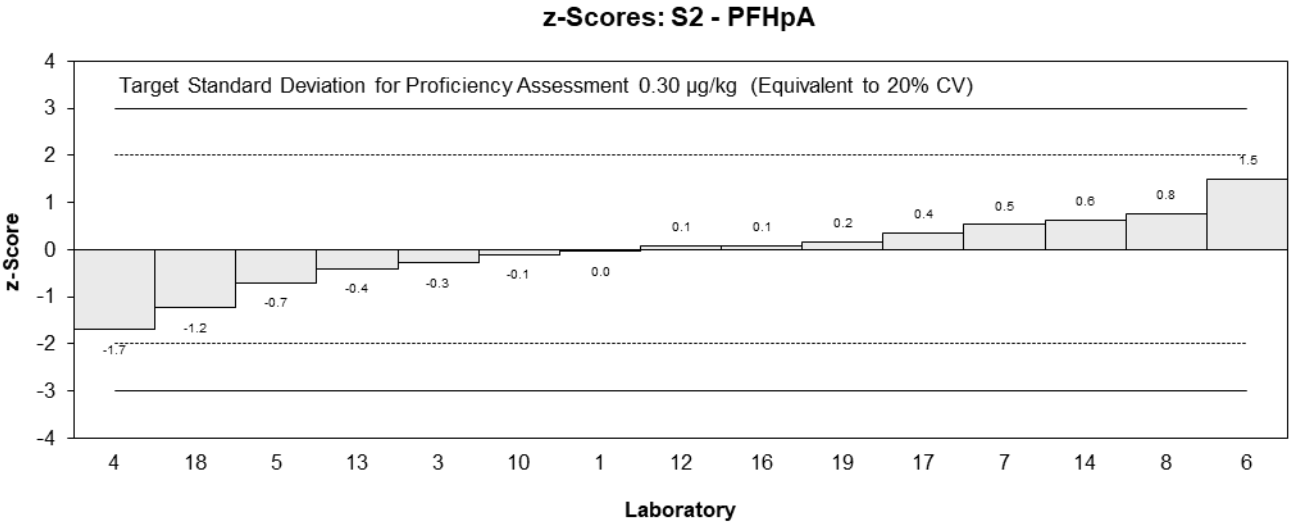
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 1.5 | 0.5 | 105 | -0.03 | -0.02 |
| **2** | NS | NS | NS | | |
| **3** | 1.426 | 0.53 | 104 | -0.28 | -0.15 |
| **4** | 1 | 0.5 | NR | -1.69 | -0.98 |
| **5** | 1.3 | 0.3 | 86 | -0.70 | -0.63 |
| **6** | 1.96 | 0.1554 | NR | 1.49 | 2.15 |
| **7** | 1.67 | 0.5 | 77 | 0.53 | 0.31 |
| **8** | 1.736 | 0.225 | 93 | 0.75 | 0.85 |
| **9** | NT | NT | NT | | |
| **10** | 1.479 | 0.317 | NR | -0.10 | -0.09 |
| **12** | 1.53 | 0.443 | 148.0 | 0.07 | 0.04 |
| **13** | 1.39 | 0.42 | 121 | -0.40 | -0.27 |
| **14** | 1.7 | 0.01 | 103 | 0.63 | 1.35 |
| **15** | NS | NS | NS | | |
| **16** | 1.53 | 0.11 | NR | 0.07 | 0.11 |
| **17** | 1.62 | 0.485869565 | 92 | 0.36 | 0.22 |
| **18** | 1.14 | NR | NR | -1.23 | -2.64 |
| **19** | 1.555 | 0.045 | 80 | 0.15 | 0.31 |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 1.51 | 0.14 |
| **Spike Value** | 1.50 | 0.07 |
| **Robust Average** | 1.51 | 0.14 |
| **Median** | 1.53 | 0.13 |
| **Mean** | 1.50 | |
| **N** | 15 | |
| **Max** | 1.96 | |
| **Min** | 1 | |
| **Robust SD** | 0.22 | |
| **Robust CV** | 14% | |


Kernel Density
Density
Result
Results: S2 - PFHpA
Assigned Value = 1.51 ± 0.14 µg/kg
Results (µg/kg)
Laboratory
4 18 5 13 3 10 1 12 16 19 17 7 14 8 6 2 9 15 20 21 Md RA SV


z-Scores: S2 - PFHpA
Target Standard Deviation for Proficiency Assessment 0.30 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
4 18 5 13 3 10 1 12 16 19 17 7 14 8 6
-1.7 -1.2 -0.7 -0.4 -0.3 -0.1 0.0 0.1 0.1 0.2 0.4 0.5 0.6 0.8 1.5

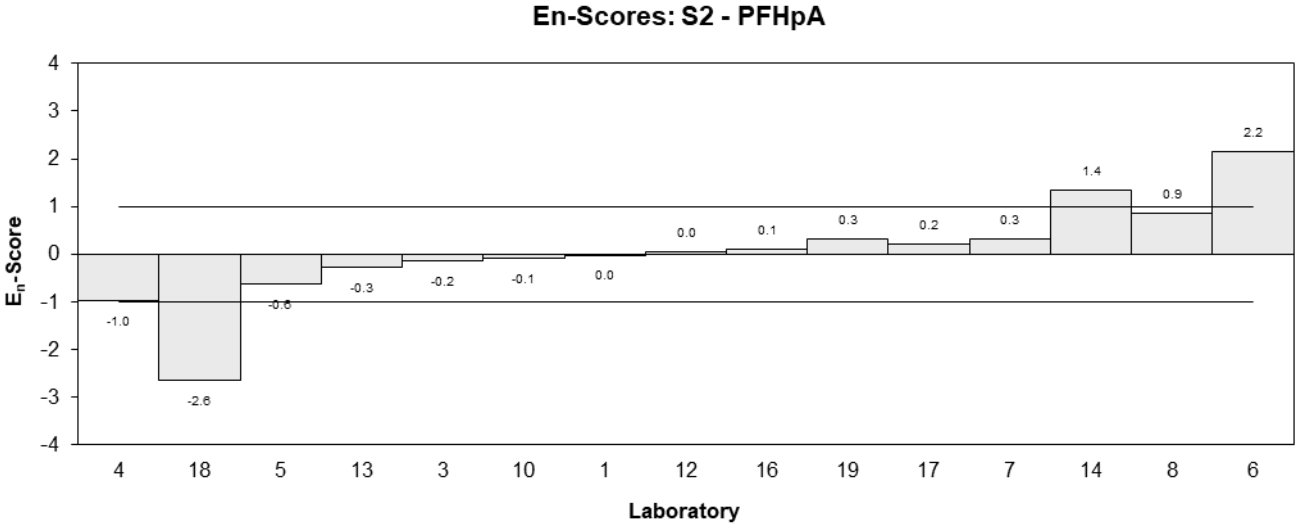

En-Scores: S2 - PFHpA
En-Score
Laboratory
4 18 5 13 3 10 1 12 16 19 17 7 14 8 6
-1.0 -2.6 -0.6 -0.3 -0.2 -0.1 0.0 0.0 0.1 0.3 0.2 0.3 1.4 0.9 2.2

Figure 43

Table 47

**Sample Details**

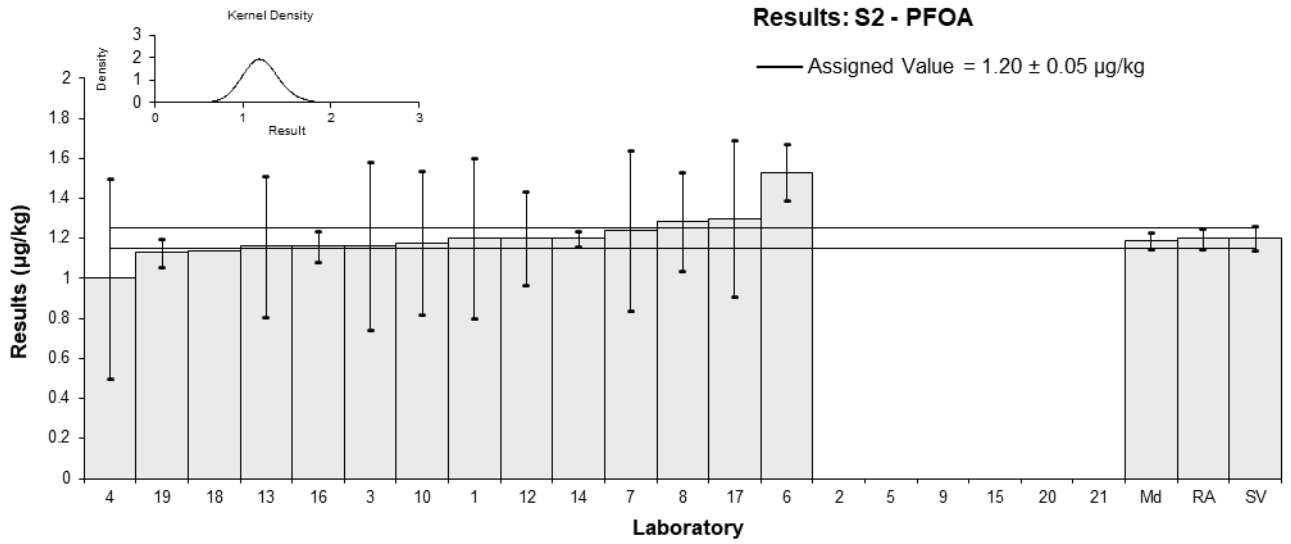
| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | PFOA |
| **Unit** | µg/kg |

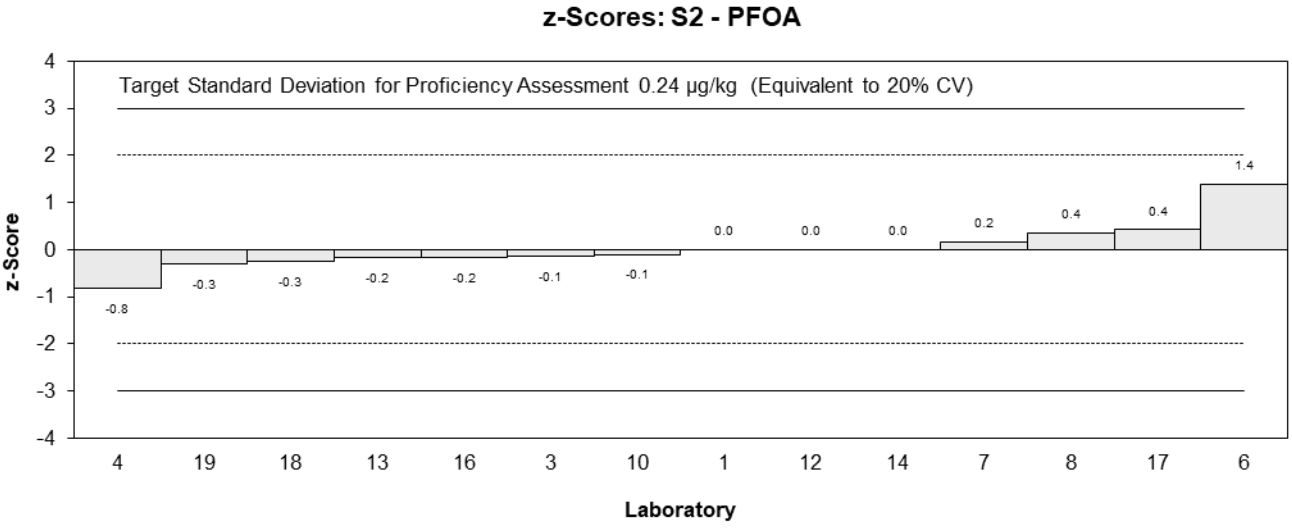
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 1.2 | 0.4 | 93 | 0.00 | 0.00 |
| **2** | NS | NS | NS | | |
| **3** | 1.166 | 0.42 | 102 | -0.14 | -0.08 |
| **4** | 1 | 0.5 | NR | -0.83 | -0.40 |
| **5** | <0.1 | 0.1 | 86 | | |
| **6** | 1.53 | 0.14 | NR | 1.38 | 2.22 |
| **7** | 1.24 | 0.4 | 81 | 0.17 | 0.10 |
| **8** | 1.285 | 0.249 | 104 | 0.35 | 0.33 |
| **9** | NT | NT | NT | | |
| **10** | 1.177 | 0.359 | 109.1 | -0.10 | -0.06 |
| **12** | 1.20 | 0.235 | 90.3 | 0.00 | 0.00 |
| **13** | 1.16 | 0.35 | 73 | -0.17 | -0.11 |
| **14** | 1.2 | 0.04 | 120 | 0.00 | 0.00 |
| **15** | NS | NS | NS | | |
| **16** | 1.16 | 0.08 | NR | -0.17 | -0.42 |
| **17** | 1.3 | 0.39 | 98 | 0.42 | 0.25 |
| **18** | 1.14 | NR | NR | -0.25 | -1.20 |
| **19** | 1.129 | 0.069 | 86 | -0.30 | -0.83 |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 1.20 | 0.05 |
| **Spike Value** | 1.20 | 0.06 |
| **Robust Average** | 1.20 | 0.05 |
| **Median** | 1.19 | 0.04 |
| **Mean** | 1.21 | |
| **N** | 14 | |
| **Max** | 1.53 | |
| **Min** | 1 | |
| **Robust SD** | 0.076 | |
| **Robust CV** | 6.3% | |


Kernel Density
Density
Result
Results: S2 - PFOA
Assigned Value = 1.20 ± 0.05 µg/kg
Results (µg/kg)
Laboratory
4 19 18 13 16 3 10 1 12 14 7 8 17 6 2 5 9 15 20 21 Md RA SV


z-Scores: S2 - PFOA
Target Standard Deviation for Proficiency Assessment 0.24 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
-0.8 -0.3 -0.3 -0.2 -0.2 -0.1 -0.1 0.0 0.0 0.0 0.2 0.4 0.4 1.4
4 19 18 13 16 3 10 1 12 14 7 8 17 6

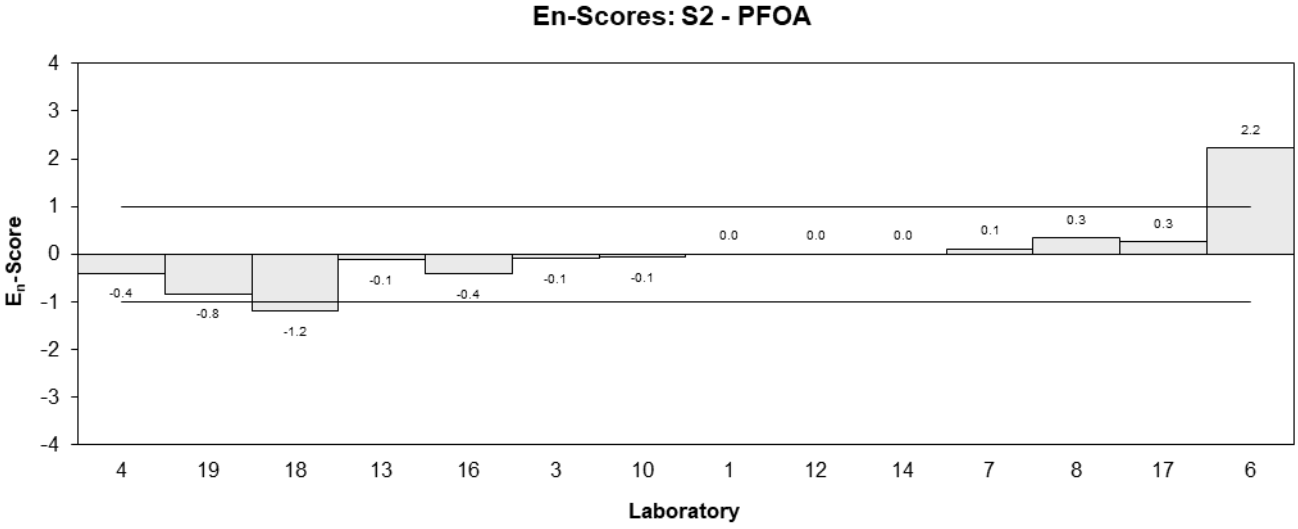

En-Scores: S2 - PFOA
En-Score
Laboratory
-0.4 -0.8 -1.2 -0.1 -0.4 -0.1 -0.1 0.0 0.0 0.0 0.1 0.3 0.3 2.2
4 19 18 13 16 3 10 1 12 14 7 8 17 6

Figure 44

Table 48

**Sample Details**

| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | PFNA |
| **Unit** | µg/kg |

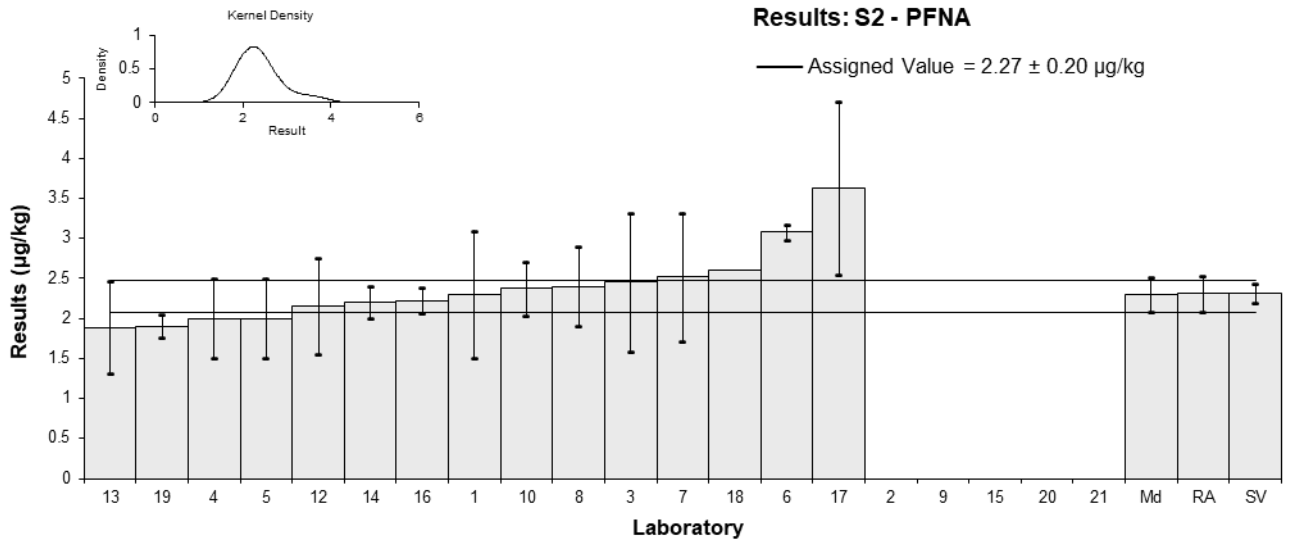
**Participant Results**

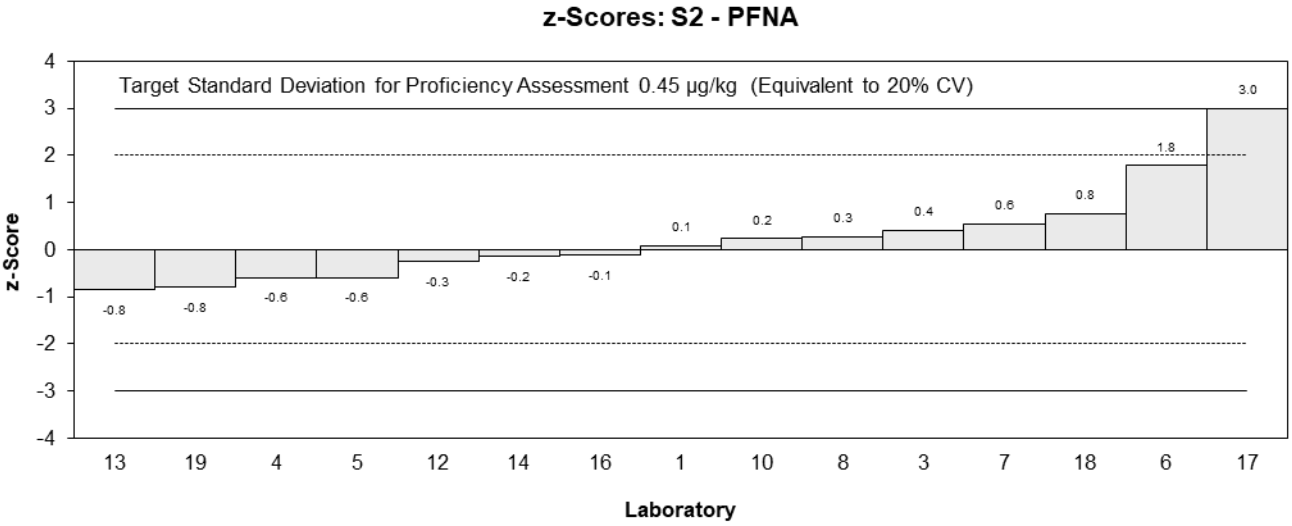
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 2.3 | 0.8 | 108 | 0.07 | 0.04 |
| **2** | NS | NS | NS | | |
| **3** | 2.454 | 0.86 | 125 | 0.41 | 0.21 |
| **4** | 2 | 0.5 | NR | -0.59 | -0.50 |
| **5** | 2 | 0.5 | 91 | -0.59 | -0.50 |
| **6** | 3.08 | 0.10 | NR | 1.78 | 3.62 |
| **7** | 2.52 | 0.8 | 84 | 0.55 | 0.30 |
| **8** | 2.397 | 0.497 | 72 | 0.28 | 0.24 |
| **9** | NT | NT | NT | | |
| **10** | 2.375 | 0.334 | NR | 0.23 | 0.27 |
| **12** | 2.15 | 0.599 | 90.4 | -0.26 | -0.19 |
| **13** | 1.89 | 0.57 | 86 | -0.84 | -0.63 |
| **14** | 2.2 | 0.2 | 136 | -0.15 | -0.25 |
| **15** | NS | NS | NS | | |
| **16** | 2.22 | 0.16 | NR | -0.11 | -0.20 |
| **17*** | 3.63 | 1.0875 | 104 | 3.00 | 1.23 |
| **18** | 2.61 | NR | NR | 0.75 | 1.70 |
| **19** | 1.905 | 0.141 | 86 | -0.80 | -1.49 |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

* Outlier, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 2.27 | 0.20 |
| **Spike Value** | 2.31 | 0.12 |
| **Robust Average** | 2.31 | 0.22 |
| **Median** | 2.30 | 0.21 |
| **Mean** | 2.38 | |
| **N** | 15 | |
| **Max** | 3.63 | |
| **Min** | 1.89 | |
| **Robust SD** | 0.34 | |
| **Robust CV** | 15% | |


Kernel Density
Density
Result
Results: S2 - PFNA
Assigned Value = 2.27 ± 0.20 µg/kg
Results (µg/kg)
Laboratory
13 19 4 5 12 14 16 1 10 8 3 7 18 6 17 2 9 15 20 21 Md RA SV


z-Scores: S2 - PFNA
Target Standard Deviation for Proficiency Assessment 0.45 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
13 19 4 5 12 14 16 1 10 8 3 7 18 6 17
-0.8 -0.8 -0.6 -0.6 -0.3 -0.2 -0.1 0.1 0.2 0.3 0.4 0.6 0.8 1.8 3.0

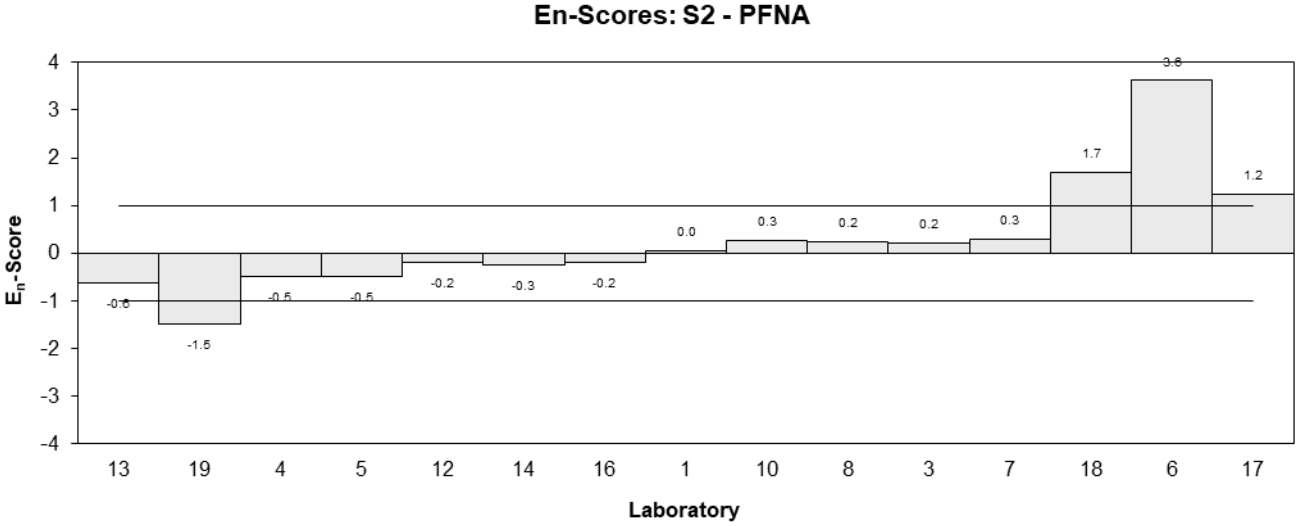

En-Scores: S2 - PFNA
En-Score
Laboratory
13 19 4 5 12 14 16 1 10 8 3 7 18 6 17
-0.6 -1.5 -0.5 -0.5 -0.2 -0.3 -0.2 0.0 0.3 0.2 0.2 0.3 1.7 3.6 1.2

Figure 45

Table 49

**Sample Details**

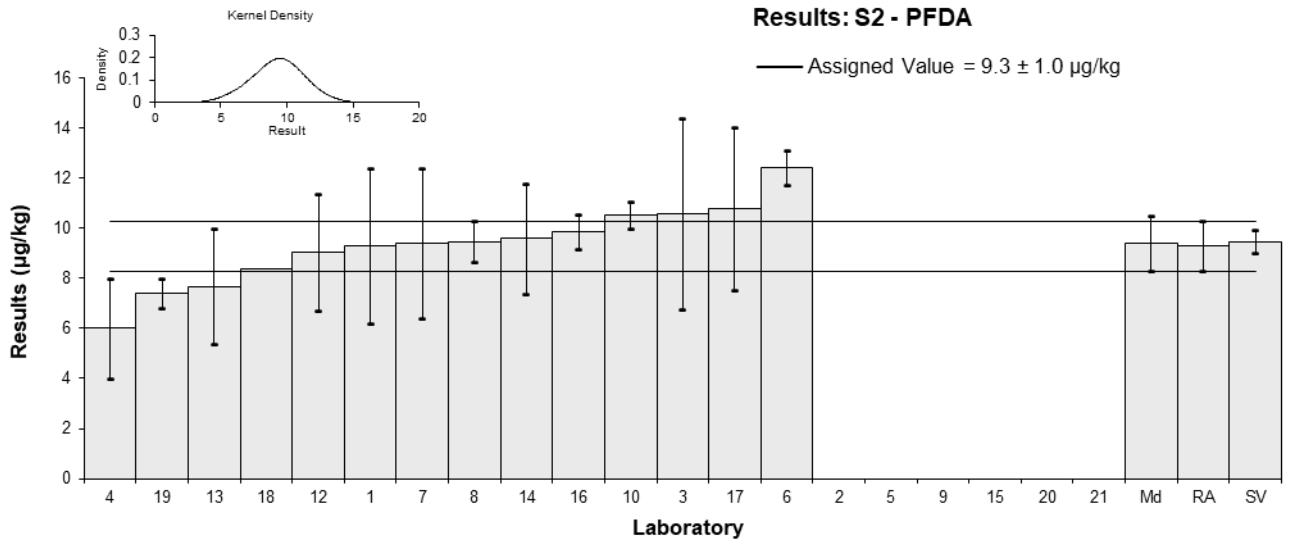
| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | PFDA |
| **Unit** | µg/kg |

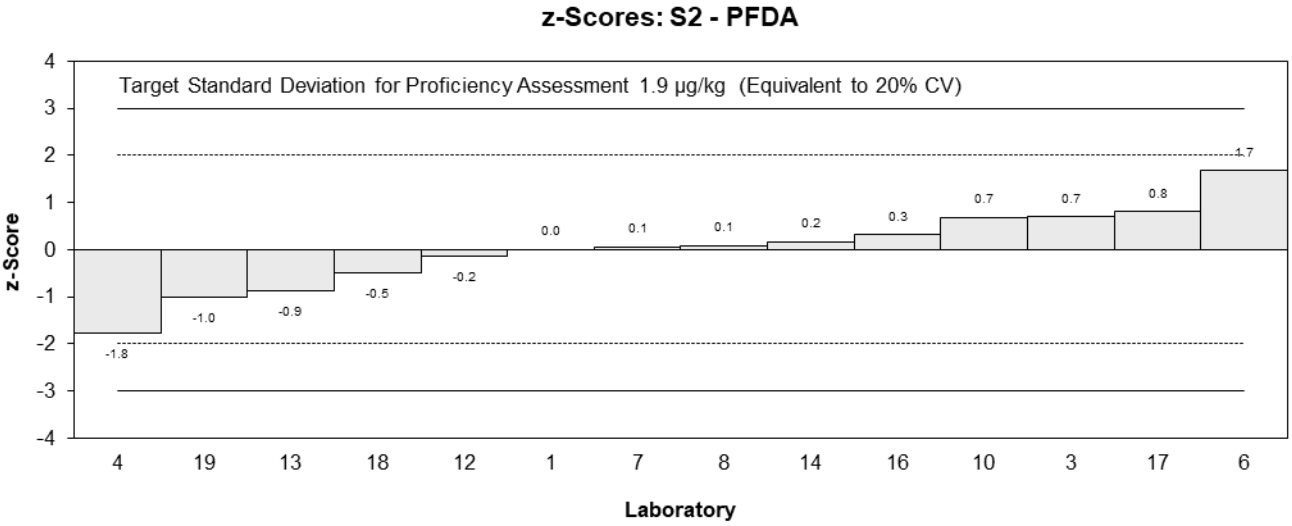
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 9.3 | 3.1 | 112 | 0.00 | 0.00 |
| **2** | NS | NS | NS | | |
| **3** | 10.582 | 3.8 | 123 | 0.69 | 0.33 |
| **4** | 6 | 2 | NR | -1.77 | -1.48 |
| **5** | <0.1 | 0.1 | 101 | | |
| **6** | 12.41 | 0.69 | NR | 1.67 | 2.56 |
| **7** | 9.4 | 3.0 | 82 | 0.05 | 0.03 |
| **8** | 9.473 | 0.812 | 57 | 0.09 | 0.13 |
| **9** | NT | NT | NT | | |
| **10** | 10.545 | 0.527 | NR | 0.67 | 1.10 |
| **12** | 9.03 | 2.33 | 138.4 | -0.15 | -0.11 |
| **13** | 7.68 | 2.30 | 101 | -0.87 | -0.65 |
| **14** | 9.6 | 2.2 | 147 | 0.16 | 0.12 |
| **15** | NS | NS | NS | | |
| **16** | 9.87 | 0.7 | NR | 0.31 | 0.47 |
| **17** | 10.79 | 3.235714285 | 70 | 0.80 | 0.44 |
| **18** | 8.38 | NR | NR | -0.49 | -0.92 |
| **19** | 7.412 | 0.57 | 86 | -1.02 | -1.64 |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 9.3 | 1.0 |
| **Spike Value** | 9.47 | 0.47 |
| **Robust Average** | 9.3 | 1.0 |
| **Median** | 9.4 | 1.1 |
| **Mean** | 9.32 | |
| **N** | 14 | |
| **Max** | 12.41 | |
| **Min** | 6 | |
| **Robust SD** | 1.5 | |
| **Robust CV** | 16% | |


Kernel Density
Density
Result
Results: S2 - PFDA
Assigned Value = 9.3 ± 1.0 µg/kg
Results (µg/kg)
Laboratory
4 19 13 18 12 1 7 8 14 16 10 3 17 6 2 5 9 15 20 21 Md RA SV


z-Scores: S2 - PFDA
Target Standard Deviation for Proficiency Assessment 1.9 µg/kg (Equivalent to 20% CV)
z-Score
-1.8 -1.0 -0.9 -0.5 -0.2 0.0 0.1 0.1 0.2 0.3 0.7 0.7 0.8 1.7
Laboratory
4 19 13 18 12 1 7 8 14 16 10 3 17 6

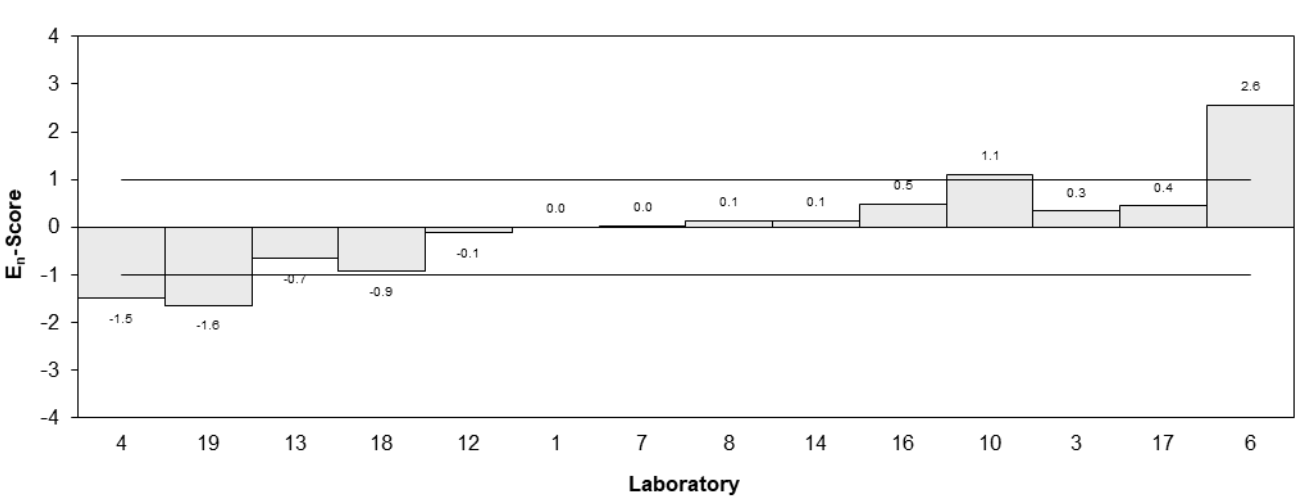

En-Scores: S2 - PFDA
En-Score
-1.5 -1.6 -0.7 -0.9 -0.1 0.0 0.0 0.1 0.1 0.5 1.1 0.3 0.4 2.6
Laboratory
4 19 13 18 12 1 7 8 14 16 10 3 17 6

Figure 46

Table 50

**Sample Details**

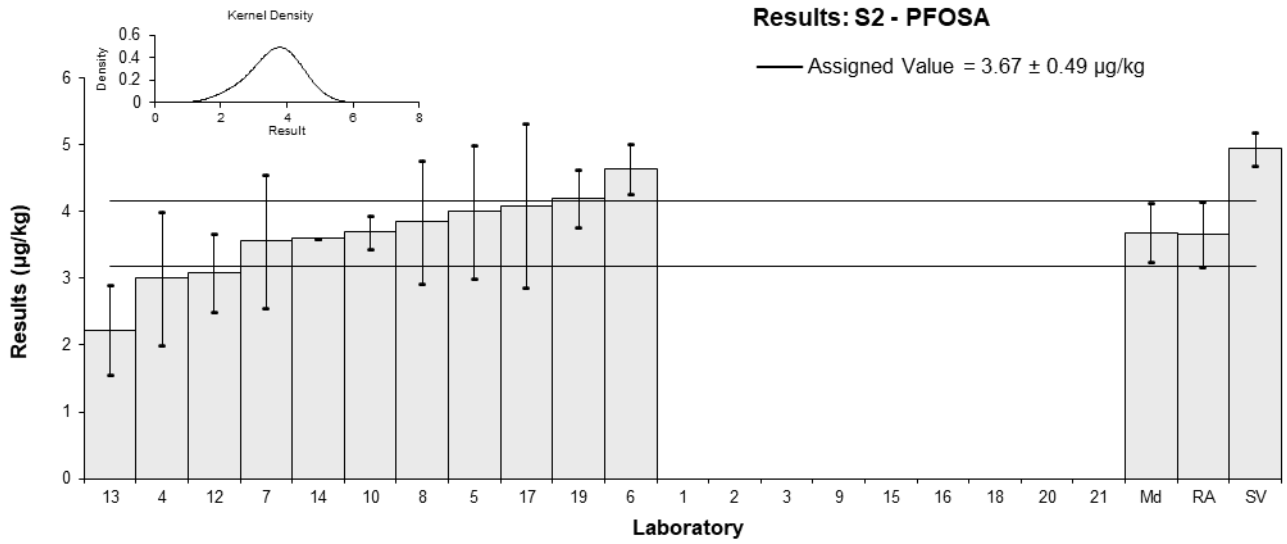
| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | PFOSA |
| **Unit** | µg/kg |

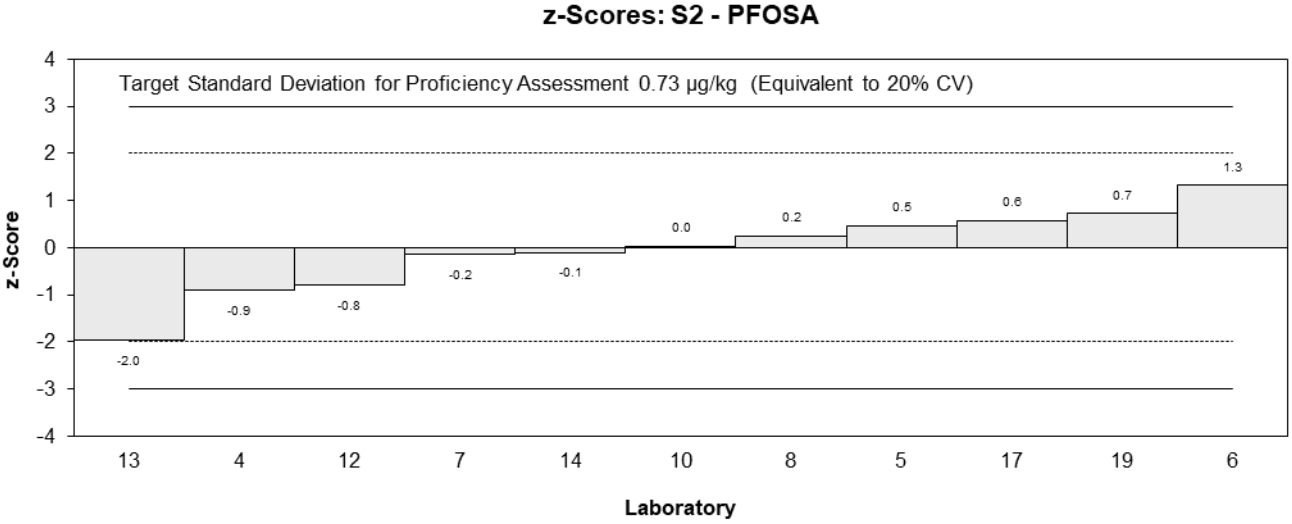
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | < 5 | NR | 115 | | |
| **2** | NS | NS | NS | | |
| **3** | <5 | NR | 101 | | |
| **4** | 3 | 1 | NR | -0.91 | -0.60 |
| **5** | 4 | 1 | 93 | 0.45 | 0.30 |
| **6** | 4.64 | 0.38 | NR | 1.32 | 1.56 |
| **7** | 3.56 | 1.0 | 80 | -0.15 | -0.10 |
| **8** | 3.849 | 0.926 | 24.2 | 0.24 | 0.17 |
| **9** | NT | NT | NT | | |
| **10** | 3.693 | 0.251 | 86.6 | 0.03 | 0.04 |
| **12** | 3.08 | 0.584 | 27.5 | -0.80 | -0.77 |
| **13** | 2.23 | 0.67 | 58 | -1.96 | -1.73 |
| **14** | 3.6 | 0 | 120 | -0.10 | -0.14 |
| **15** | NS | NS | NS | | |
| **16** | NT | NT | NT | | |
| **17** | 4.09 | 1.22625 | 80 | 0.57 | 0.32 |
| **18** | NT | NT | NT | | |
| **19** | 4.202 | 0.435 | 24 | 0.72 | 0.81 |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 3.67 | 0.49 |
| **Spike Value** | 4.95 | 0.25 |
| **Robust Average** | 3.67 | 0.49 |
| **Median** | 3.69 | 0.44 |
| **Mean** | 3.63 | |
| **N** | 11 | |
| **Max** | 4.64 | |
| **Min** | 2.23 | |
| **Robust SD** | 0.65 | |
| **Robust CV** | 18% | |


Results: S2 - PFOSA
Assigned Value = 3.67 ± 0.49 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
13 4 12 7 14 10 8 5 17 19 6 1 2 3 9 15 16 18 20 21 Md RA SV
Laboratory


z-Scores: S2 - PFOSA
Target Standard Deviation for Proficiency Assessment 0.73 µg/kg (Equivalent to 20% CV)
z-Score
-2.0 -0.9 -0.8 -0.2 -0.1 0.0 0.2 0.5 0.6 0.7 1.3
13 4 12 7 14 10 8 5 17 19 6
Laboratory

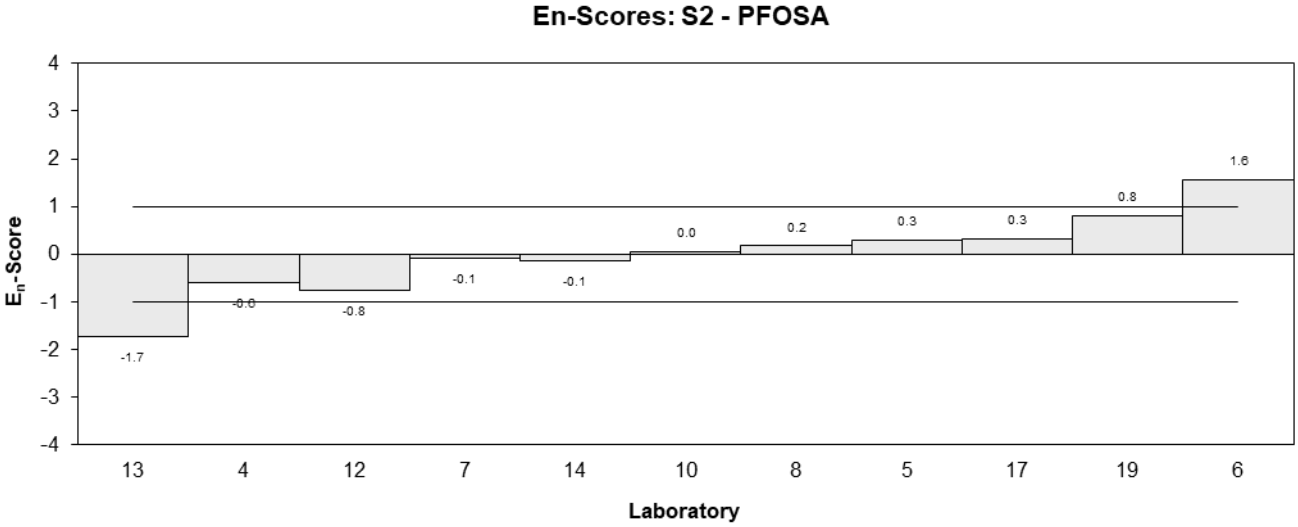

En-Scores: S2 - PFOSA
En-Score
-1.7 -0.6 -0.8 -0.1 -0.1 0.0 0.2 0.3 0.3 0.8 1.6
13 4 12 7 14 10 8 5 17 19 6
Laboratory

Figure 47

Table 51

**Sample Details**

| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | MeFOSA |
| **Unit** | µg/kg |

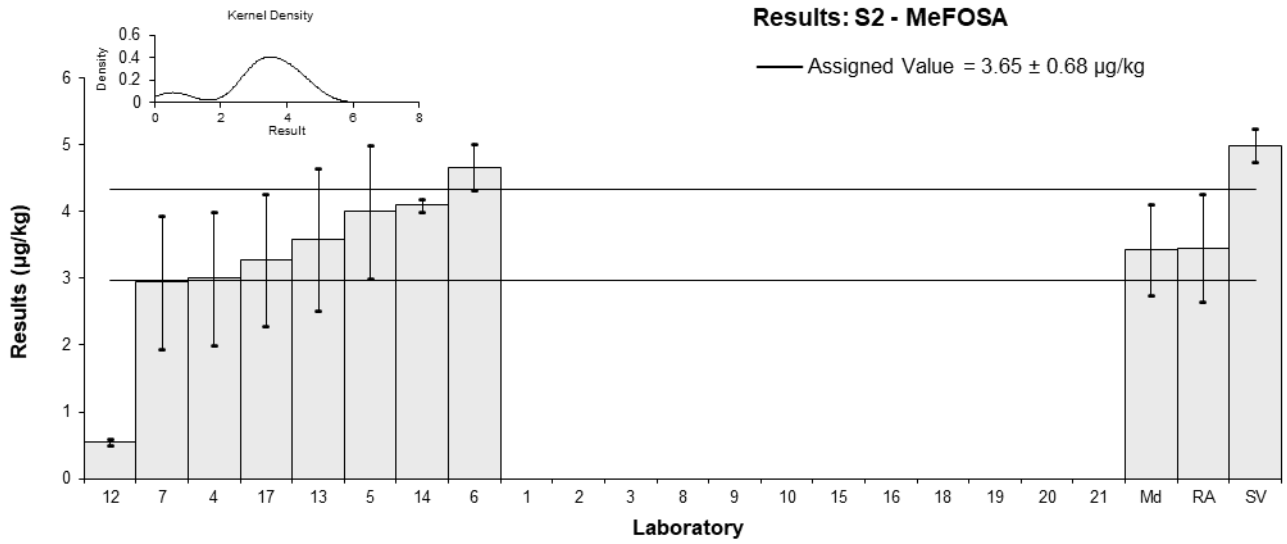
**Participant Results**

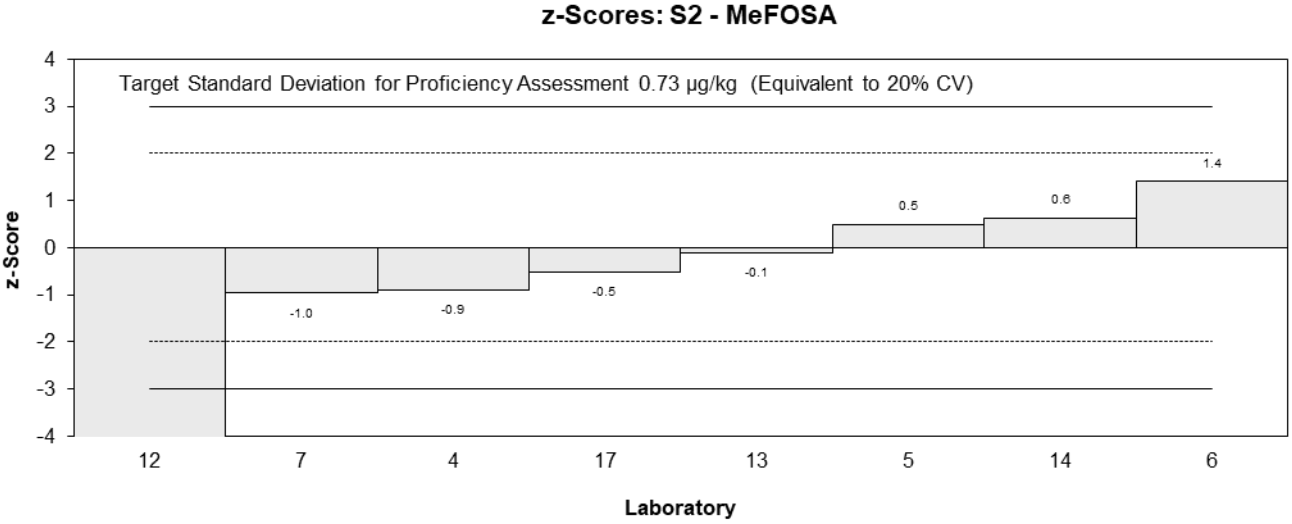
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | < 5 | NR | 117 | | |
| **2** | NS | NS | NS | | |
| **3** | <5 | NR | 80 | | |
| **4** | 3 | 1 | NR | -0.89 | -0.54 |
| **5** | 4 | 1 | 72 | 0.48 | 0.29 |
| **6** | 4.67 | 0.35 | NR | 1.40 | 1.33 |
| **7** | 2.95 | 1.0 | 11 | -0.96 | -0.58 |
| **8** | NT | NT | NT | | |
| **9** | NT | NT | NT | | |
| **10** | NT | NT | NT | | |
| **12*** | 0.548 | 0.0433 | 27.5 | -4.25 | -4.55 |
| **13** | 3.58 | 1.07 | 57 | -0.10 | -0.06 |
| **14** | 4.1 | 0.1 | 98 | 0.62 | 0.65 |
| **15** | NS | NS | NS | | |
| **16** | NT | NT | NT | | |
| **17** | 3.28 | 0.984466019 | 103 | -0.51 | -0.31 |
| **18** | NT | NT | NT | | |
| **19** | NT | NT | NT | | |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

* Outlier, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 3.65 | 0.68 |
| **Spike Value** | 4.99 | 0.25 |
| **Robust Average** | 3.46 | 0.81 |
| **Median** | 3.43 | 0.69 |
| **Mean** | 3.27 | |
| **N** | 8 | |
| **Max** | 4.67 | |
| **Min** | 0.548 | |
| **Robust SD** | 0.92 | |
| **Robust CV** | 27% | |


Kernel Density
Density
Result
Results: S2 - MeFOSA
Assigned Value = 3.65 ± 0.68 µg/kg
Results (µg/kg)
Laboratory
12 7 4 17 13 5 14 6 1 2 3 8 9 10 15 16 18 19 20 21 Md RA SV


z-Scores: S2 - MeFOSA
Target Standard Deviation for Proficiency Assessment 0.73 µg/kg (Equivalent to 20% CV)
z-Score
-1.0
-0.9
-0.5
-0.1
0.5
0.6
1.4
Laboratory
12 7 4 17 13 5 14 6

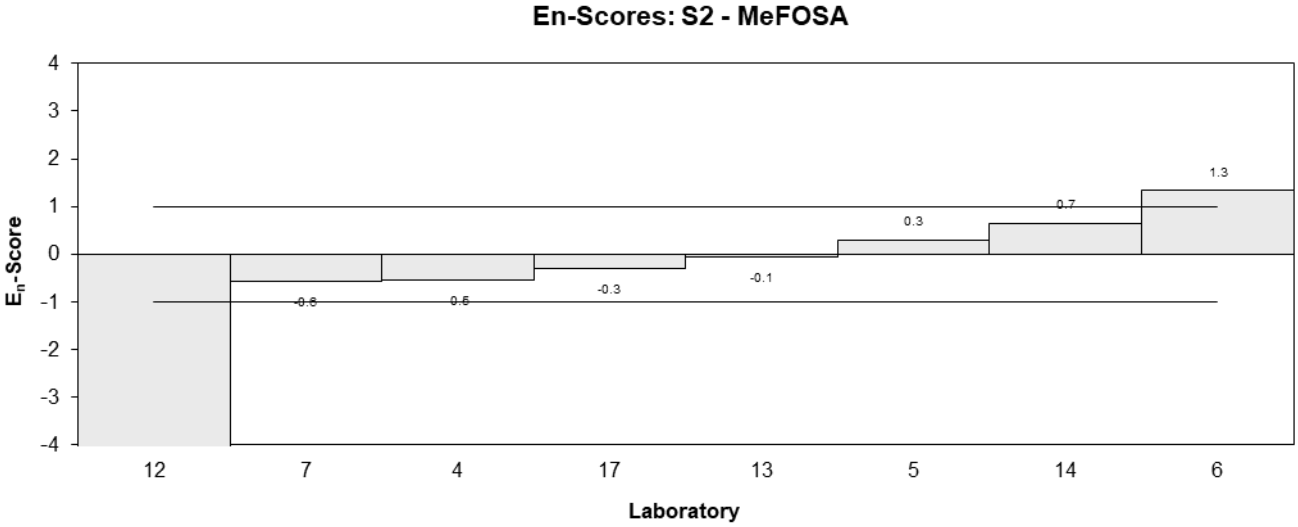

En-Scores: S2 - MeFOSA
En-Score
-0.6
-0.6
-0.3
-0.1
0.3
0.7
1.3
Laboratory
12 7 4 17 13 5 14 6

Figure 48

Table 52

**Sample Details**

| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | EtFOSA |
| **Unit** | µg/kg |

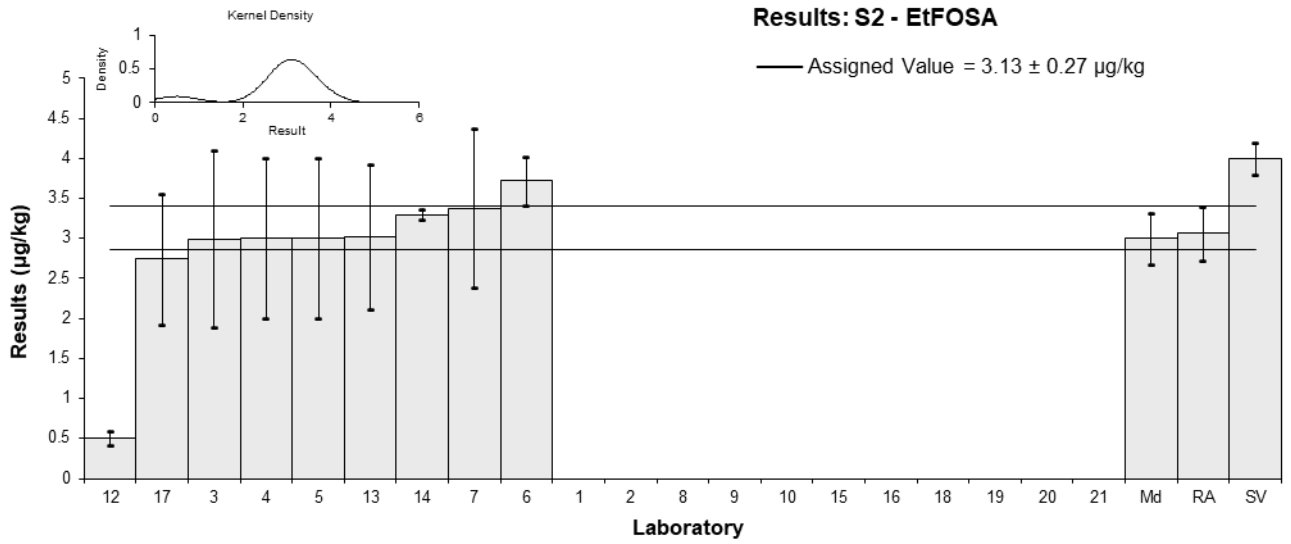
**Participant Results**

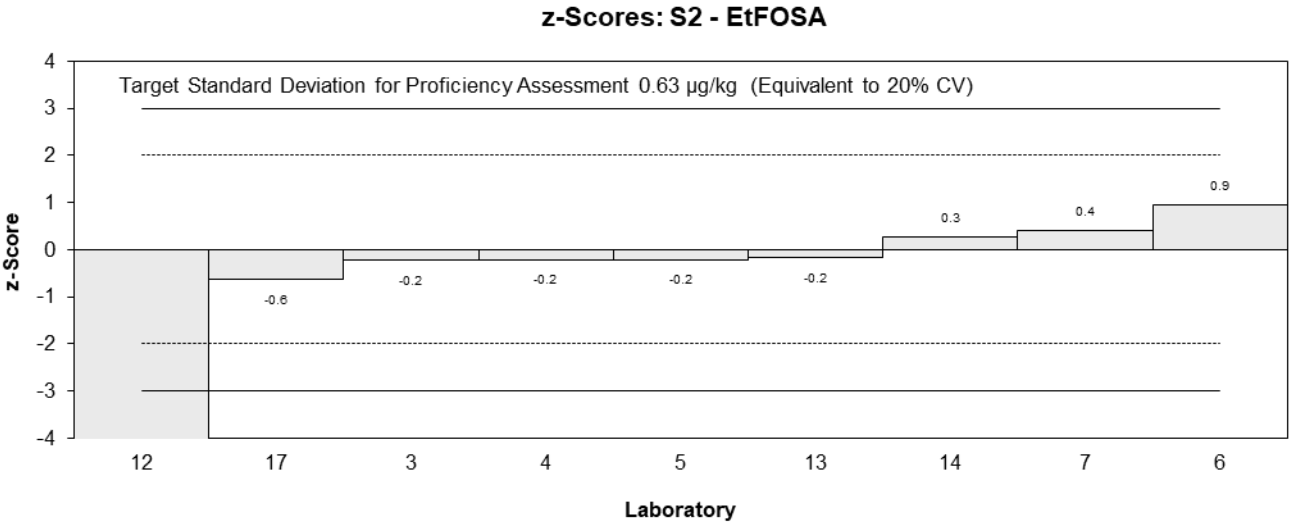
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | < 5 | NR | 107 | | |
| **2** | NS | NS | NS | | |
| **3** | 2.994 | 1.1 | 82 | -0.22 | -0.12 |
| **4** | 3 | 1 | NR | -0.21 | -0.13 |
| **5** | 3 | 1 | 87 | -0.21 | -0.13 |
| **6** | 3.72 | 0.30 | NR | 0.94 | 1.46 |
| **7** | 3.38 | 1.0 | 7 | 0.40 | 0.24 |
| **8** | NT | NT | NT | | |
| **9** | NT | NT | NT | | |
| **10** | NT | NT | NT | | |
| **12*** | 0.509 | 0.0854 | 27.5 | -4.19 | -9.26 |
| **13** | 3.02 | 0.91 | 56 | -0.18 | -0.12 |
| **14** | 3.3 | 0.07 | 114 | 0.27 | 0.61 |
| **15** | NS | NS | NS | | |
| **16** | NT | NT | NT | | |
| **17** | 2.74 | 0.822 | 86 | -0.62 | -0.45 |
| **18** | NT | NT | NT | | |
| **19** | NT | NT | NT | | |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

* Outlier, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 3.13 | 0.27 |
| **Spike Value** | 3.99 | 0.20 |
| **Robust Average** | 3.06 | 0.33 |
| **Median** | 3.00 | 0.32 |
| **Mean** | 2.85 | |
| **N** | 9 | |
| **Max** | 3.72 | |
| **Min** | 0.509 | |
| **Robust SD** | 0.40 | |
| **Robust CV** | 13% | |


Kernel Density
Density
Result
Results: S2 - EtFOSA
Assigned Value = 3.13 ± 0.27 µg/kg
Results (µg/kg)
Laboratory
12 17 3 4 5 13 14 7 6 1 2 8 9 10 15 16 18 19 20 21 Md RA SV


z-Scores: S2 - EtFOSA
Target Standard Deviation for Proficiency Assessment 0.63 µg/kg (Equivalent to 20% CV)
z-Score
-0.6
-0.2
-0.2
-0.2
-0.2
0.3
0.4
0.9
Laboratory
12 17 3 4 5 13 14 7 6

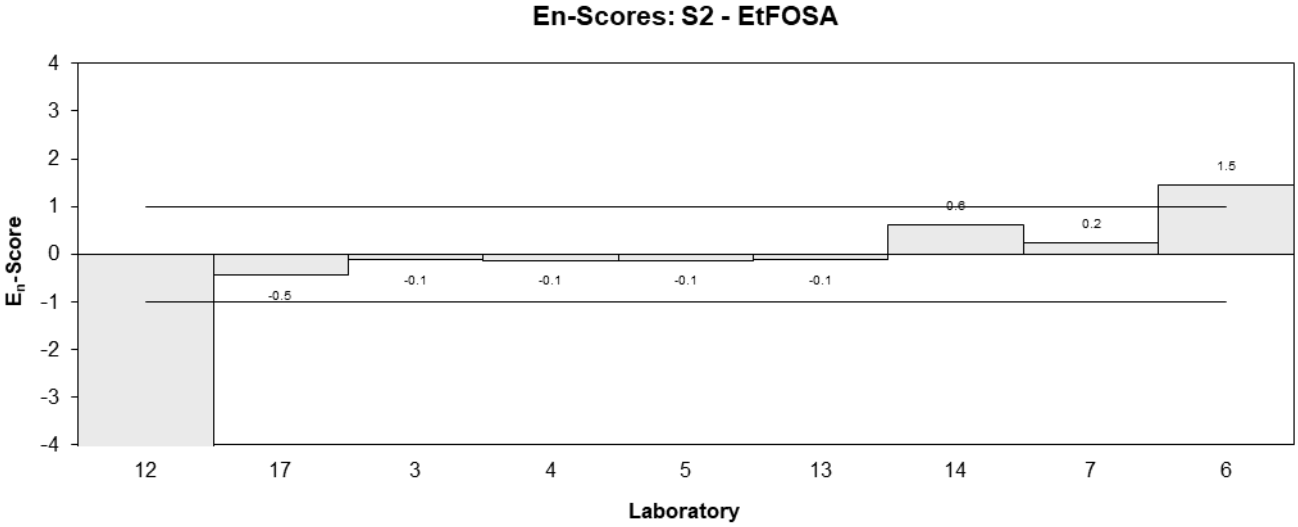

En-Scores: S2 - EtFOSA
En-Score
-0.5
-0.1
-0.1
-0.1
-0.1
0.6
0.2
1.5
Laboratory
12 17 3 4 5 13 14 7 6

Figure 49

Table 53

**Sample Details**

| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | 6:2FTS |
| **Unit** | µg/kg |

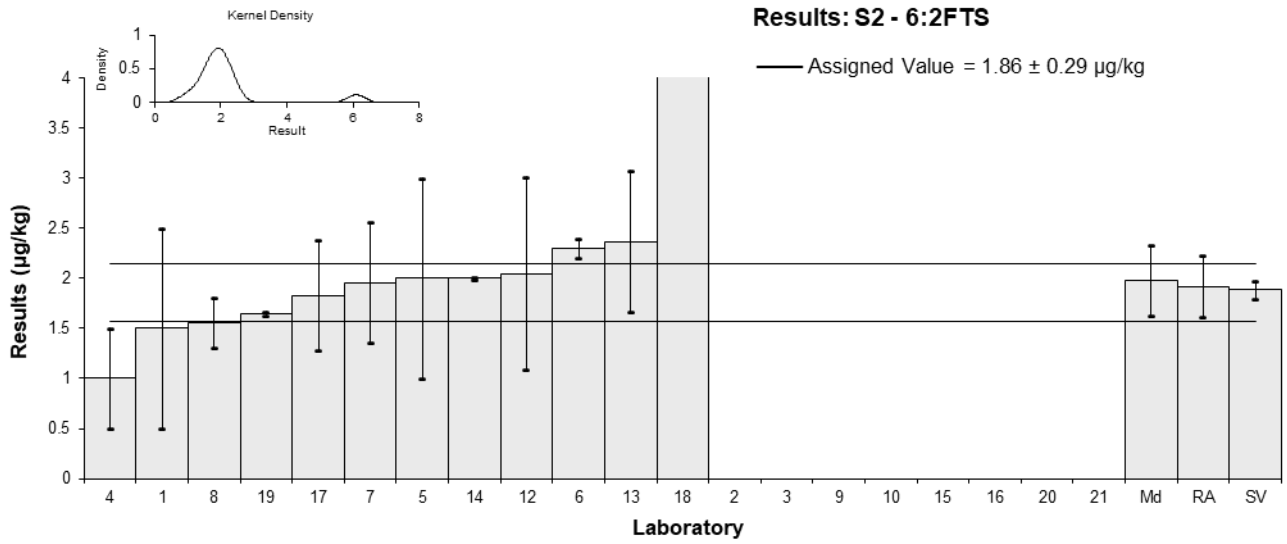
**Participant Results**

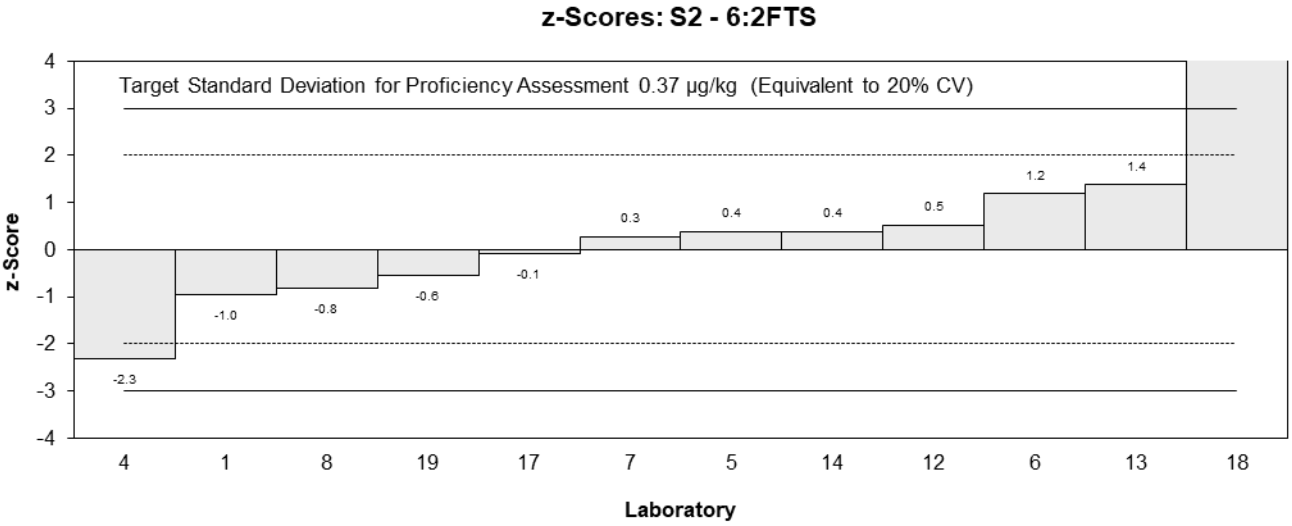
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 1.5 | 1 | 125 | -0.97 | -0.35 |
| **2** | NS | NS | NS | | |
| **3** | <2 | NR | 388 | | |
| **4** | 1 | 0.5 | NR | -2.31 | -1.49 |
| **5** | 2 | 1 | 102 | 0.38 | 0.13 |
| **6** | 2.30 | 0.10 | NR | 1.18 | 1.43 |
| **7** | 1.96 | 0.6 | 84 | 0.27 | 0.15 |
| **8** | 1.556 | 0.254 | 133 | -0.82 | -0.79 |
| **9** | NT | NT | NT | | |
| **10** | NT | NT | NT | | |
| **12** | 2.05 | 0.965 | 70.6 | 0.51 | 0.19 |
| **13** | 2.37 | 0.71 | 73 | 1.37 | 0.66 |
| **14** | 2 | 0.01 | 104 | 0.38 | 0.48 |
| **15** | NS | NS | NS | | |
| **16** | NT | NT | NT | | |
| **17** | 1.83 | 0.548780487 | 82 | -0.08 | -0.05 |
| **18*** | 6.1 | NR | NR | 11.40 | 14.62 |
| **19** | 1.65 | 0.018 | 77 | -0.56 | -0.72 |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

* Outlier, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 1.86 | 0.29 |
| **Spike Value** | 1.89 | 0.09 |
| **Robust Average** | 1.92 | 0.31 |
| **Median** | 1.98 | 0.35 |
| **Mean** | 2.19 | |
| **N** | 12 | |
| **Max** | 6.1 | |
| **Min** | 1 | |
| **Robust SD** | 0.44 | |
| **Robust CV** | 23% | |


Kernel Density
Density
Result
Results: S2 - 6:2FTS
Assigned Value = 1.86 ± 0.29 µg/kg
Results (µg/kg)
Laboratory
4 1 8 19 17 7 5 14 12 6 13 18 2 3 9 10 15 16 20 21 Md RA SV


z-Scores: S2 - 6:2FTS
Target Standard Deviation for Proficiency Assessment 0.37 µg/kg (Equivalent to 20% CV)
z-Score
-2.3 -1.0 -0.8 -0.6 -0.1 0.3 0.4 0.4 0.5 1.2 1.4
Laboratory
4 1 8 19 17 7 5 14 12 6 13 18

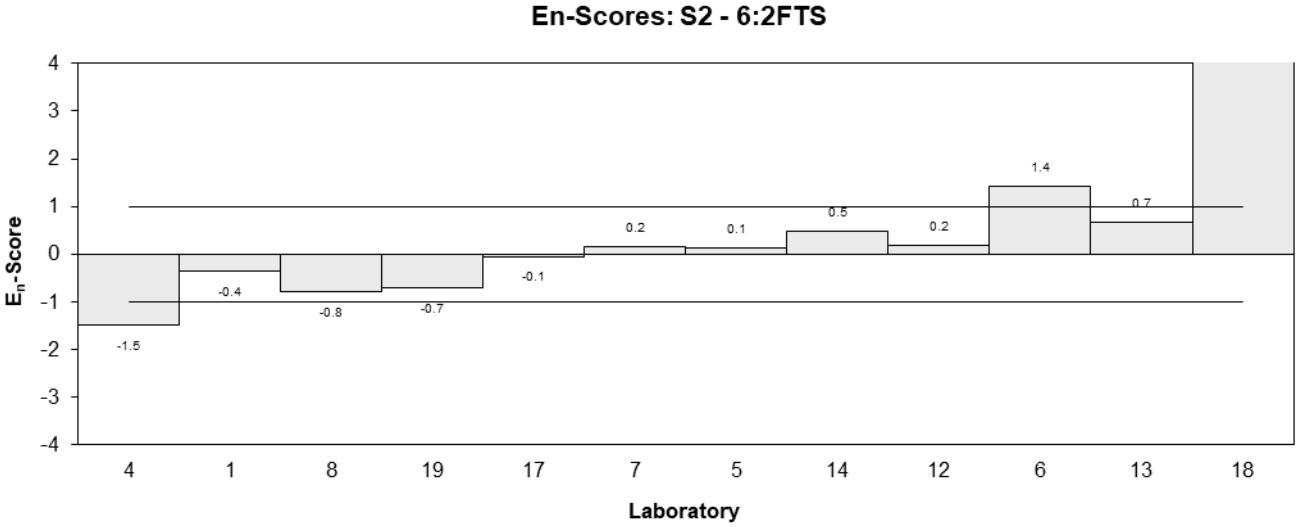

En-Scores: S2 - 6:2FTS
En-Score
-1.5 -0.4 -0.8 -0.7 -0.1 0.2 0.1 0.5 0.2 1.4 0.7
Laboratory
4 1 8 19 17 7 5 14 12 6 13 18

Figure 50

Table 54

**Sample Details**

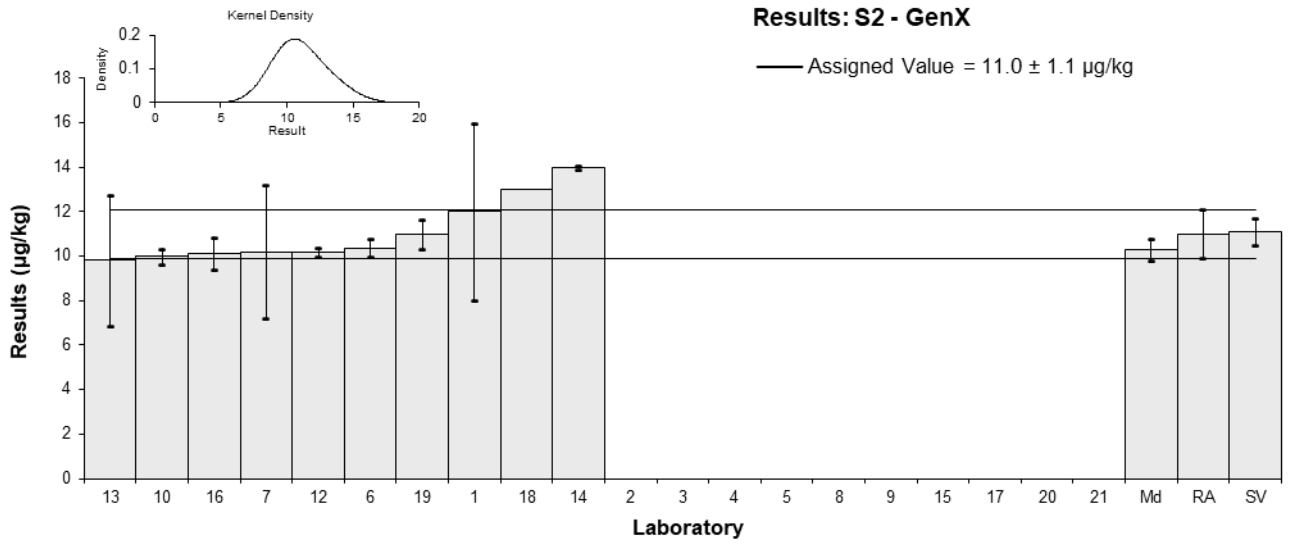
| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | GenX |
| **Unit** | µg/kg |

**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 12 | 4 | 84 | 0.45 | 0.24 |
| **2** | NS | NS | NS | | |
| **3** | NT | NT | NT | | |
| **4** | NT | NT | NT | | |
| **5** | NT | NT | NT | | |
| **6** | 10.38 | 0.39 | NR | -0.28 | -0.53 |
| **7** | 10.2 | 3.0 | 77 | -0.36 | -0.25 |
| **8** | NT | NT | NT | | |
| **9** | NT | NT | NT | | |
| **10** | 9.979 | 0.372 | 95 | -0.46 | -0.88 |
| **12** | 10.2 | 0.203 | 69.2 | -0.36 | -0.72 |
| **13** | 9.81 | 2.94 | 32 | -0.54 | -0.38 |
| **14** | 14 | 0.1 | 52 | 1.36 | 2.72 |
| **15** | NS | NS | NS | | |
| **16** | 10.13 | 0.72 | NR | -0.40 | -0.66 |
| **17** | NT | NT | NT | | |
| **18** | 13.03 | NR | NR | 0.92 | 1.85 |
| **19** | 10.997 | 0.677 | 85 | 0.00 | 0.00 |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 11.0 | 1.1 |
| **Spike Value** | 11.1 | 0.6 |
| **Robust Average** | 11.0 | 1.1 |
| **Median** | 10.3 | 0.5 |
| **Mean** | 11.1 | |
| **N** | 10 | |
| **Max** | 14 | |
| **Min** | 9.81 | |
| **Robust SD** | 1.4 | |
| **Robust CV** | 13% | |


Results: S2 - GenX
Assigned Value = 11.0 ± 1.1 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
13 10 16 7 12 6 19 1 18 14 2 3 4 5 8 9 15 17 20 21 Md RA SV


z-Scores: S2 - GenX
Target Standard Deviation for Proficiency Assessment 2.2 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
13 10 16 7 12 6 19 1 18 14
-0.5 -0.5 -0.4 -0.4 -0.4 -0.3 0.0 0.5 0.9 1.4

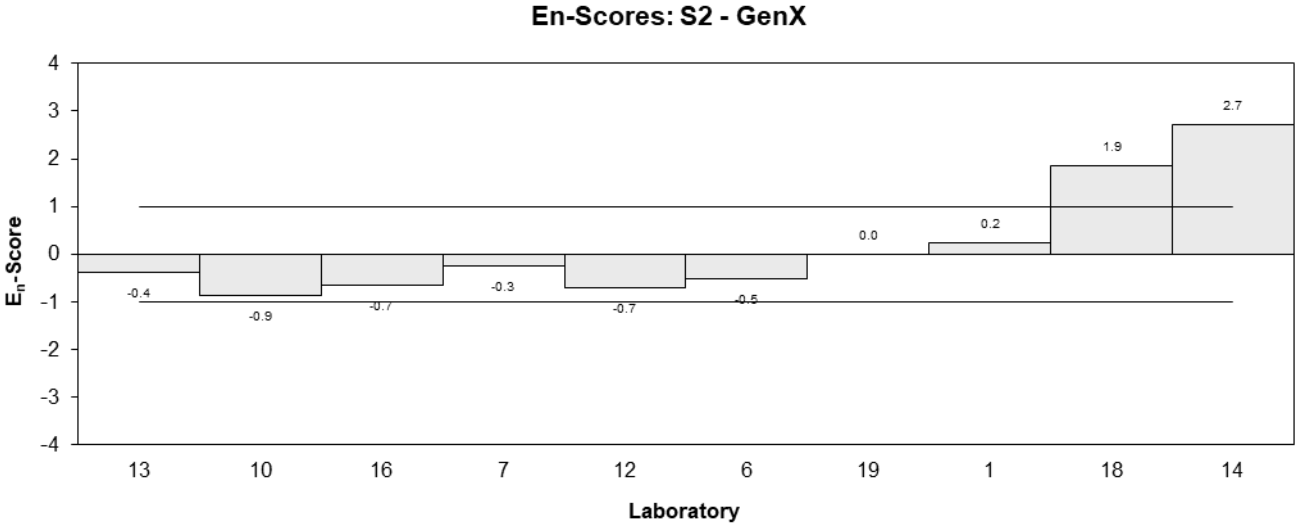

En-Scores: S2 - GenX
En-Score
Laboratory
13 10 16 7 12 6 19 1 18 14
-0.4 -0.9 -0.7 -0.3 -0.7 -0.5 0.0 0.2 1.9 2.7

Figure 51

Table 55

**Sample Details**

| | |
|---|---|
| **Sample No.** | S2 |
| **Matrix** | Carrot |
| **Analyte** | ADONA |
| **Unit** | µg/kg |

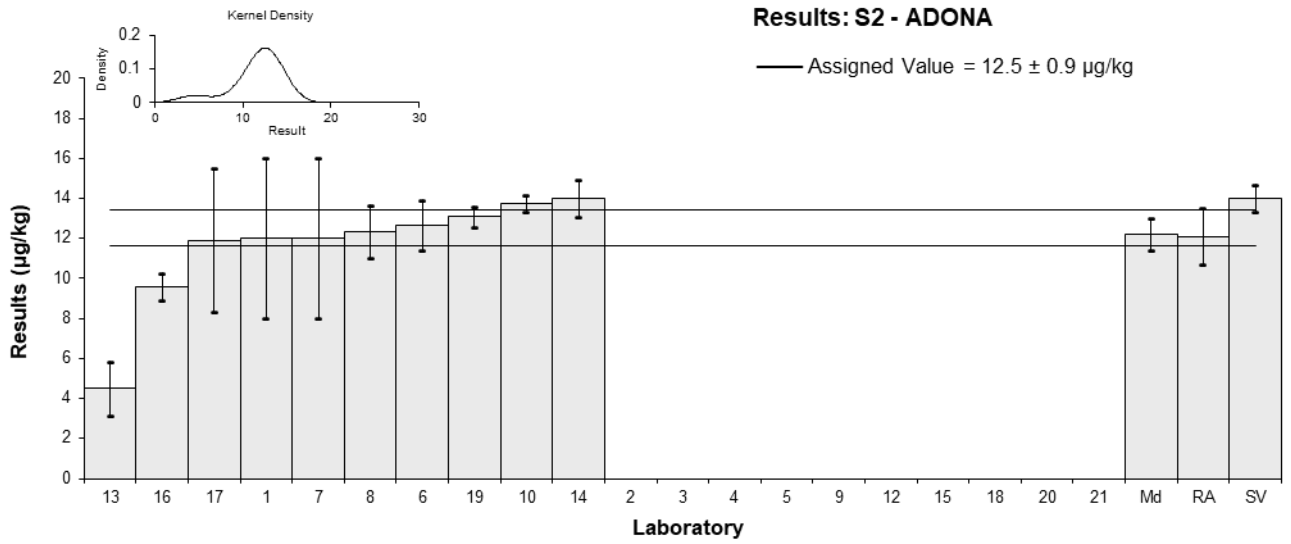
**Participant Results**

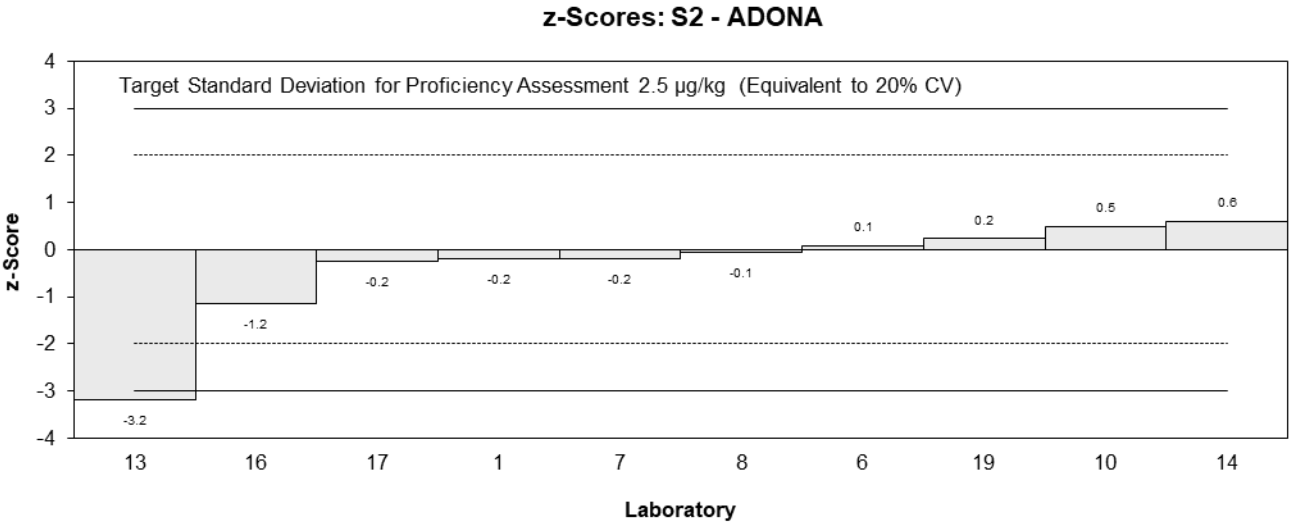
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | 12 | 4 | 105 | -0.20 | -0.12 |
| **2** | NS | NS | NS | | |
| **3** | NT | NT | NT | | |
| **4** | NT | NT | NT | | |
| **5** | NT | NT | NT | | |
| **6** | 12.68 | 1.25 | NR | 0.07 | 0.12 |
| **7** | 12 | 4.0 | NR | -0.20 | -0.12 |
| **8** | 12.345 | 1.305 | 93 | -0.06 | -0.10 |
| **9** | NT | NT | NT | | |
| **10** | 13.734 | 0.408 | NR | 0.49 | 1.25 |
| **12** | NT | NT | NT | | |
| **13*** | 4.50 | 1.35 | 92 | -3.20 | -4.93 |
| **14** | 14 | 0.9 | 103 | 0.60 | 1.18 |
| **15** | NS | NS | NS | | |
| **16** | 9.6 | 0.68 | NR | -1.16 | -2.57 |
| **17** | 11.91 | 3.573913043 | 92 | -0.24 | -0.16 |
| **18** | NT | NT | NT | | |
| **19** | 13.076 | 0.541 | 86 | 0.23 | 0.55 |
| **20** | NS | NS | NS | | |
| **21** | NT | NT | NT | | |

* Outlier, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 12.5 | 0.9 |
| **Spike Value** | 14.0 | 0.7 |
| **Robust Average** | 12.1 | 1.4 |
| **Median** | 12.2 | 0.8 |
| **Mean** | 11.6 | |
| **N** | 10 | |
| **Max** | 14 | |
| **Min** | 4.5 | |
| **Robust SD** | 1.7 | |
| **Robust CV** | 14% | |


Results: S2 - ADONA
Assigned Value = 12.5 ± 0.9 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
13 16 17 1 7 8 6 19 10 14 2 3 4 5 9 12 15 18 20 21 Md RA SV


z-Scores: S2 - ADONA
Target Standard Deviation for Proficiency Assessment 2.5 µg/kg (Equivalent to 20% CV)
z-Score
-3.2
-1.2
-0.2
-0.2
-0.2
-0.1
0.1
0.2
0.5
0.6
Laboratory
13 16 17 1 7 8 6 19 10 14

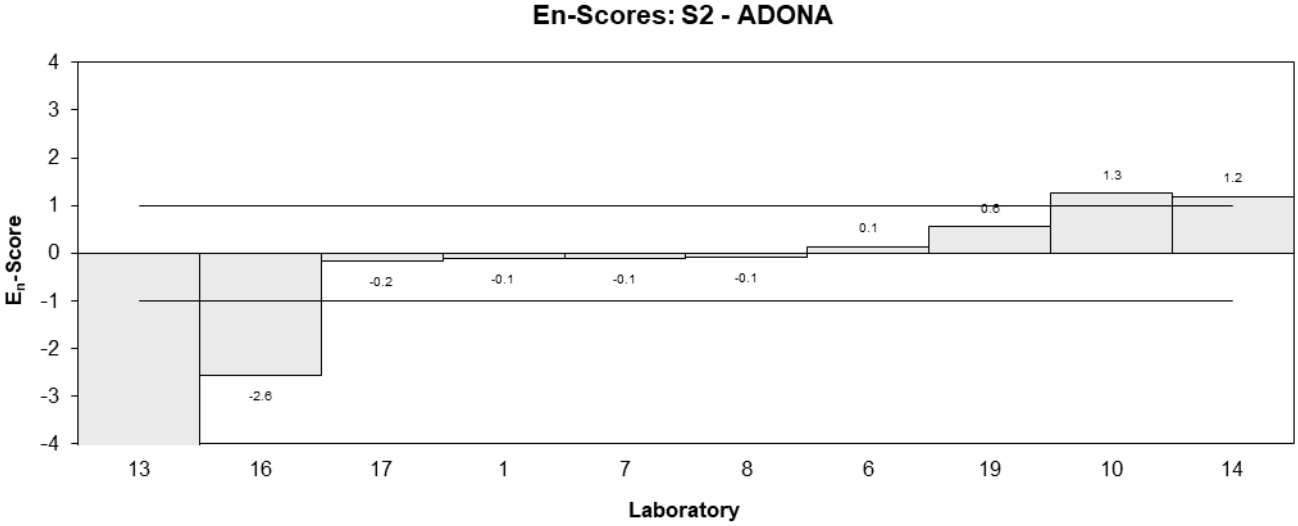

En-Scores: S2 - ADONA
En-Score
-2.6
-0.2
-0.1
-0.1
-0.1
0.1
0.6
1.3
1.2
Laboratory
13 16 17 1 7 8 6 19 10 14

Figure 52

Table 56

**Sample Details**

| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFBS |
| **Unit** | µg/kg |

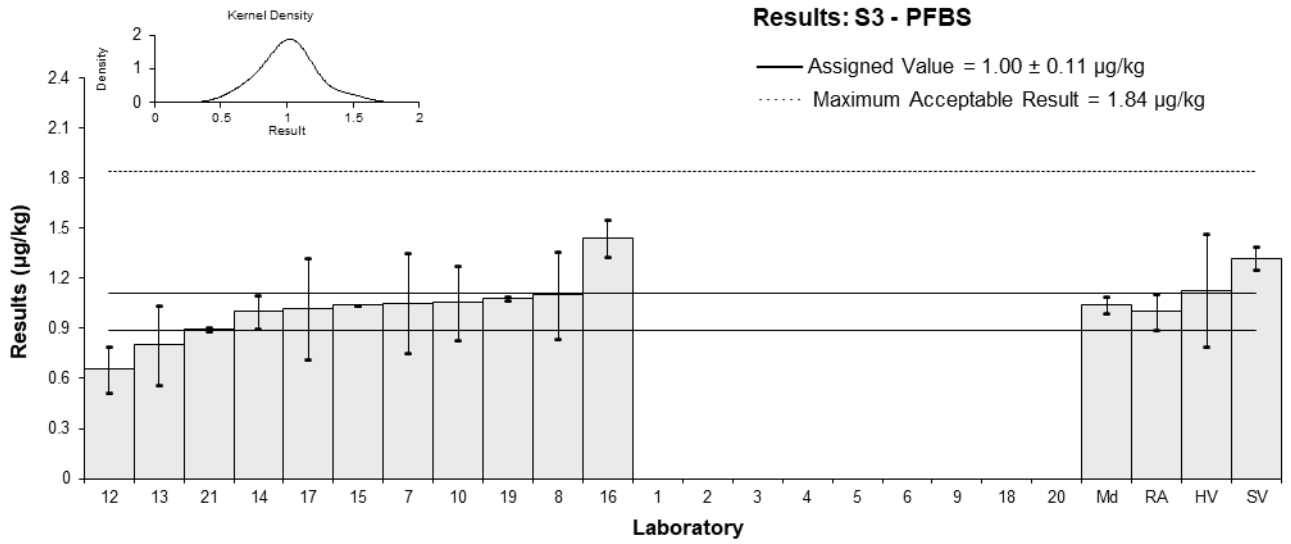
**Participant Results**

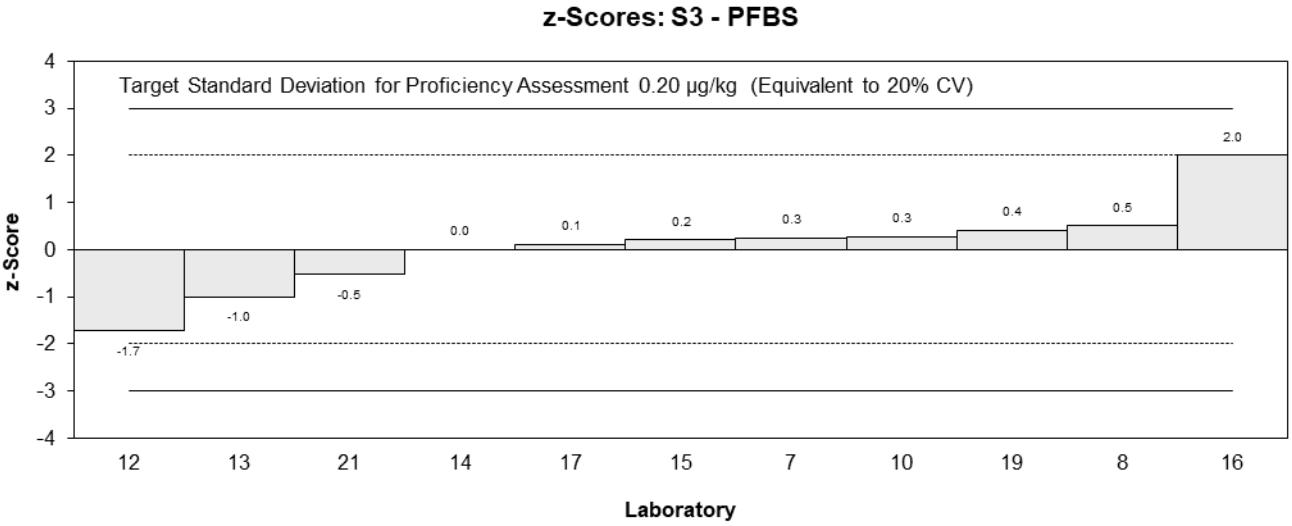
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 1.05 | 0.3 | 76 | 0.25 | 0.16 |
| **8** | 1.101 | 0.263 | 89 | 0.50 | 0.35 |
| **9** | NS | NS | NS | | |
| **10** | 1.054 | 0.22 | 107.9 | 0.27 | 0.22 |
| **12** | 0.655 | 0.136 | 80.7 | -1.72 | -1.97 |
| **13** | 0.80 | 0.24 | 107 | -1.00 | -0.76 |
| **14** | 1 | 0.1 | 99 | 0.00 | 0.00 |
| **15** | 1.04 | 0.00 | 76.5 | 0.20 | 0.36 |
| **16** | 1.44 | 0.11 | NR | 2.00▼ | |
| **17** | 1.02 | 0.306185567 | 97 | 0.10 | 0.06 |
| **18** | NS | NS | NS | | |
| **19** | 1.083 | 0.012 | 91 | 0.41 | 0.75 |
| **20** | NS | NS | NS | | |
| **21** | 0.894 | 0.01 | 97 | -0.53 | -0.96 |

▼ Adjusted Score, see Section 6.3

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 1.00 | 0.11 |
| **Spike Value** | 1.32 | 0.07 |
| **Homogeneity Value** | 1.13 | 0.34 |
| **Robust Average** | 1.00 | 0.11 |
| **Max Acceptable Result** | 1.84 | |
| **Median** | 1.04 | 0.05 |
| **Mean** | 1.01 | |
| **N** | 11 | |
| **Max** | 1.44 | |
| **Min** | 0.655 | |
| **Robust SD** | 0.15 | |
| **Robust CV** | 15% | |


Kernel Density
Density
Result
Results: S3 - PFBS
Assigned Value = 1.00 ± 0.11 µg/kg
Maximum Acceptable Result = 1.84 µg/kg
Results (µg/kg)
Laboratory
12 13 21 14 17 15 7 10 19 8 16 1 2 3 4 5 6 9 18 20 Md RA HV SV


z-Scores: S3 - PFBS
Target Standard Deviation for Proficiency Assessment 0.20 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
12 13 21 14 17 15 7 10 19 8 16
-1.7 -1.0 -0.5 0.0 0.1 0.2 0.3 0.3 0.4 0.5 2.0

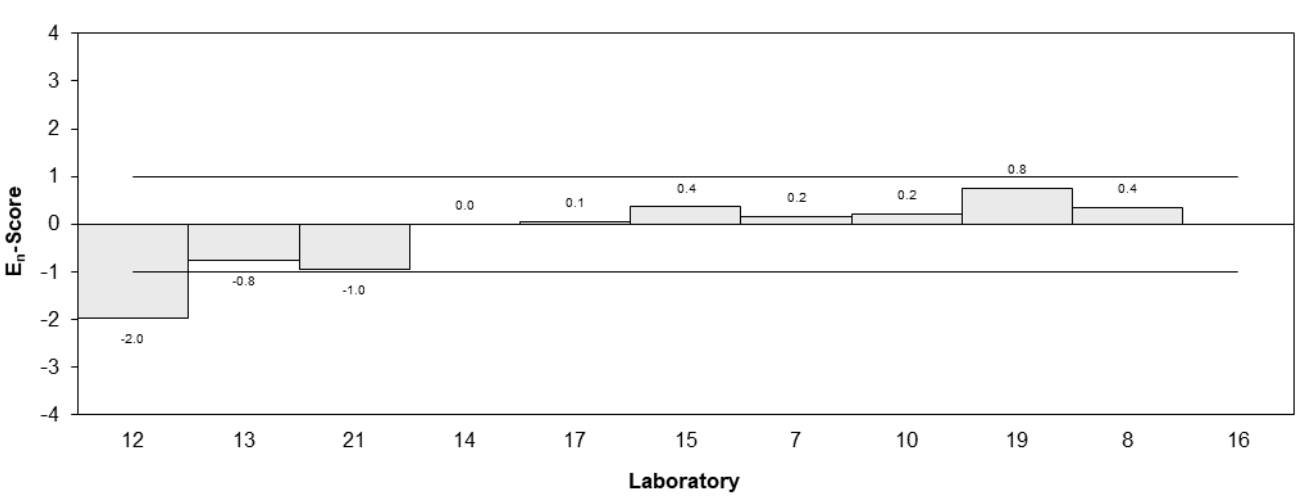

En-Scores: S3 - PFBS
En-Score
Laboratory
12 13 21 14 17 15 7 10 19 8 16
-2.0 -0.8 -1.0 0.0 0.1 0.4 0.2 0.2 0.8 0.4

Figure 53

Table 57

**Sample Details**

| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFPeS |
| **Unit** | µg/kg |

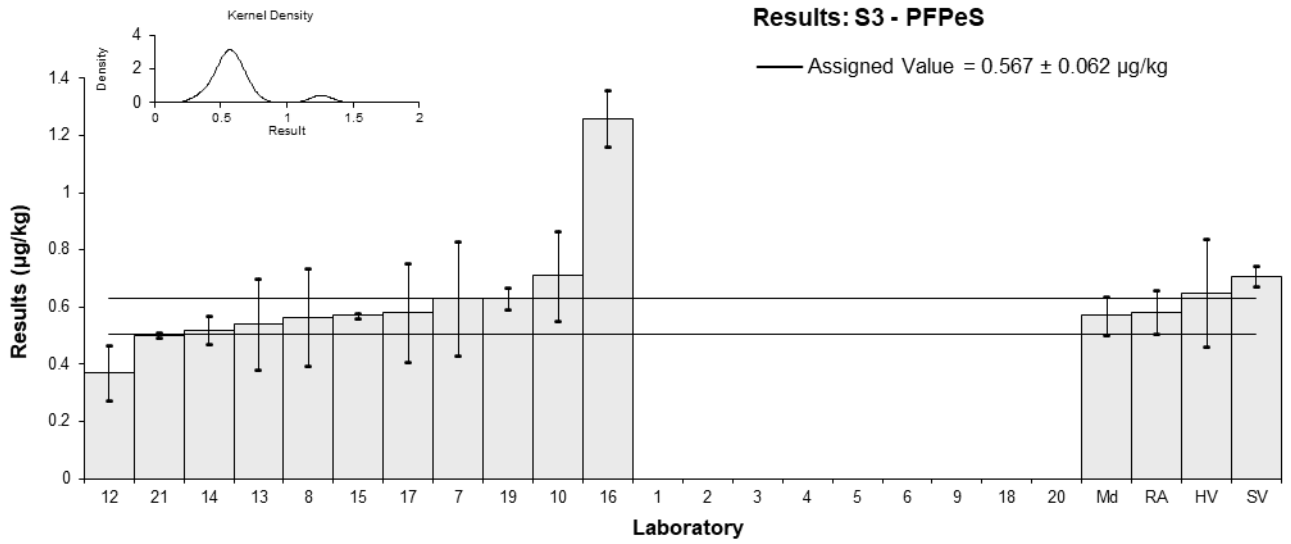
**Participant Results**

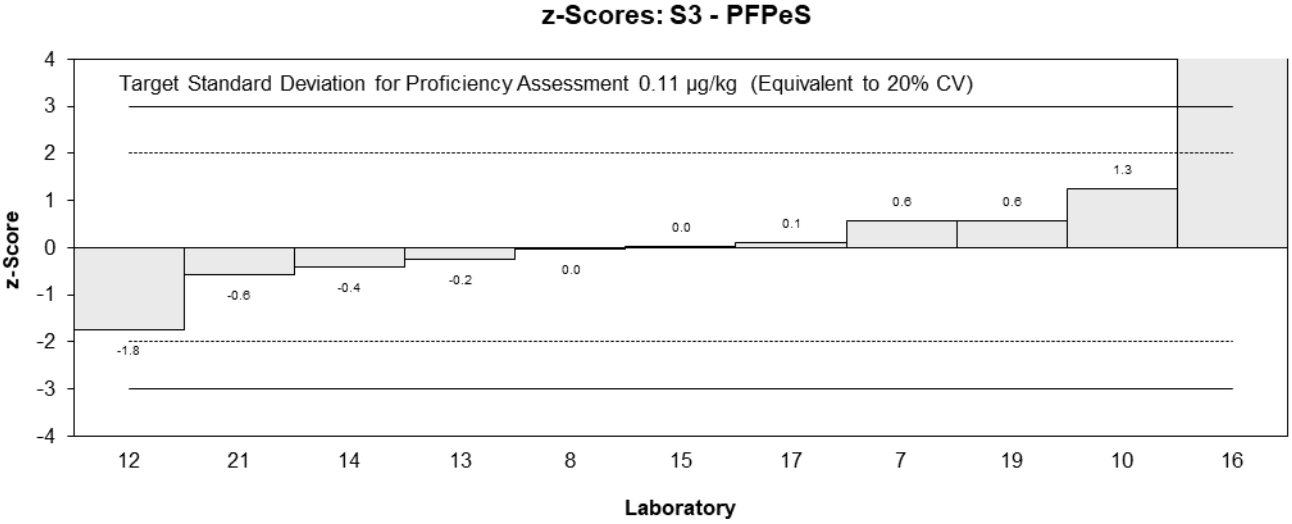
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 0.630 | 0.2 | NR | 0.56 | 0.30 |
| **8** | 0.564 | 0.17 | 93 | -0.03 | -0.02 |
| **9** | NS | NS | NS | | |
| **10** | 0.709 | 0.158 | NR | 1.25 | 0.84 |
| **12** | 0.369 | 0.0972 | 80.7 | -1.75 | -1.72 |
| **13** | 0.54 | 0.16 | 107 | -0.24 | -0.16 |
| **14** | 0.52 | 0.05 | 97 | -0.41 | -0.59 |
| **15** | 0.57 | 0.01 | 76.5 | 0.03 | 0.05 |
| **16*** | 1.26 | 0.1 | NR | 6.11 | 5.89 |
| **17** | 0.58 | 0.172826086 | 92 | 0.11 | 0.07 |
| **18** | NS | NS | NS | | |
| **19** | 0.631 | 0.037 | 93 | 0.56 | 0.89 |
| **20** | NS | NS | NS | | |
| **21** | 0.501 | 0.009 | 100 | -0.58 | -1.05 |

* Outlier, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.567 | 0.062 |
| **Spike Value** | 0.708 | 0.035 |
| **Homogeneity Value** | 0.65 | 0.19 |
| **Robust Average** | 0.583 | 0.076 |
| **Median** | 0.570 | 0.067 |
| **Mean** | 0.62 | |
| **N** | 11 | |
| **Max** | 1.26 | |
| **Min** | 0.369 | |
| **Robust SD** | 0.10 | |
| **Robust CV** | 17% | |


Results: S3 - PFPeS
Assigned Value = 0.567 ± 0.062 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
12 21 14 13 8 15 17 7 19 10 16 1 2 3 4 5 6 9 18 20 Md RA HV SV


z-Scores: S3 - PFPeS
Target Standard Deviation for Proficiency Assessment 0.11 µg/kg (Equivalent to 20% CV)
z-Score
-1.8 -0.6 -0.4 -0.2 0.0 0.0 0.1 0.6 0.6 1.3
Laboratory
12 21 14 13 8 15 17 7 19 10 16

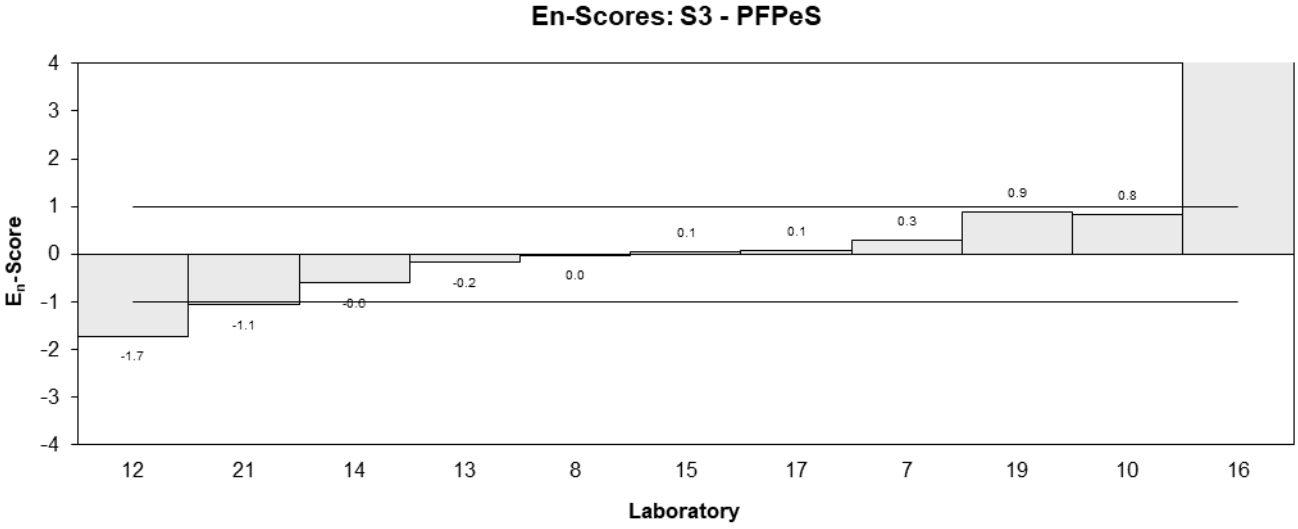

En-Scores: S3 - PFPeS
En-Score
-1.7 -1.1 -0.6 -0.2 0.0 0.1 0.1 0.3 0.9 0.8
Laboratory
12 21 14 13 8 15 17 7 19 10 16

Figure 54

Table 58

**Sample Details**

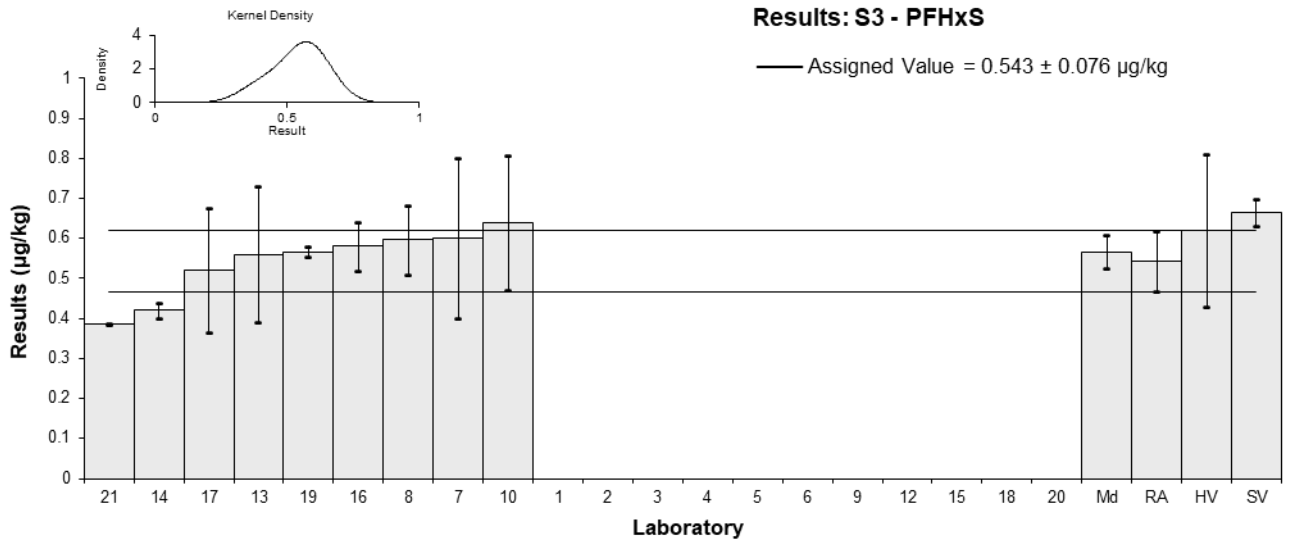
| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFHxS |
| **Unit** | µg/kg |

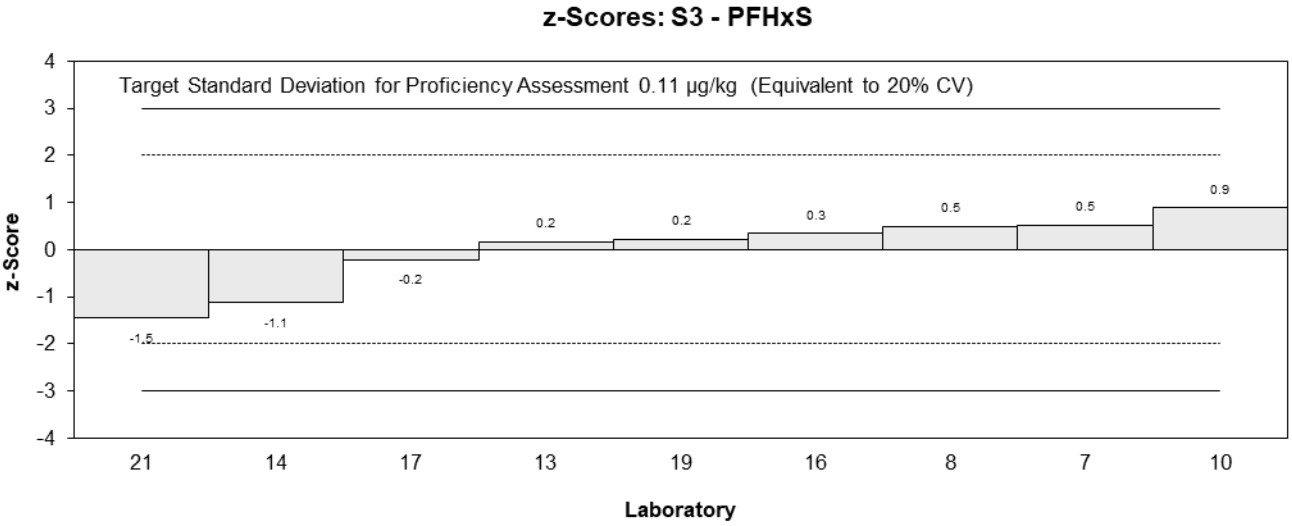
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 0.600 | 0.2 | 73 | 0.52 | 0.27 |
| **8** | 0.596 | 0.086 | 93 | 0.49 | 0.46 |
| **9** | NS | NS | NS | | |
| **10** | 0.639 | 0.167 | NR | 0.88 | 0.52 |
| **12** | NT | NT | NT | | |
| **13** | 0.56 | 0.17 | 119 | 0.16 | 0.09 |
| **14** | 0.42 | 0.02 | 104 | -1.13 | -1.57 |
| **15** | NT | NT | NT | | |
| **16** | 0.58 | 0.06 | NR | 0.34 | 0.38 |
| **17** | 0.52 | 0.154545454 | 99 | -0.21 | -0.13 |
| **18** | NS | NS | NS | | |
| **19** | 0.567 | 0.014 | 93 | 0.22 | 0.31 |
| **20** | NS | NS | NS | | |
| **21** | 0.385 | 0.002 | 100 | -1.45 | -2.08 |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.543 | 0.076 |
| **Spike Value** | 0.664 | 0.033 |
| **Homogeneity Value** | 0.62 | 0.19 |
| **Robust Average** | 0.543 | 0.076 |
| **Median** | 0.567 | 0.041 |
| **Mean** | 0.541 | |
| **N** | 9 | |
| **Max** | 0.639 | |
| **Min** | 0.385 | |
| **Robust SD** | 0.091 | |
| **Robust CV** | 17% | |


Kernel Density
Density
Result
Results: S3 - PFHxS
Assigned Value = 0.543 ± 0.076 µg/kg
Results (µg/kg)
Laboratory
21 14 17 13 19 16 8 7 10 1 2 3 4 5 6 9 12 15 18 20 Md RA HV SV


z-Scores: S3 - PFHxS
Target Standard Deviation for Proficiency Assessment 0.11 µg/kg (Equivalent to 20% CV)
z-Score
-1.5
-1.1
-0.2
0.2
0.2
0.3
0.5
0.5
0.9
Laboratory
21 14 17 13 19 16 8 7 10

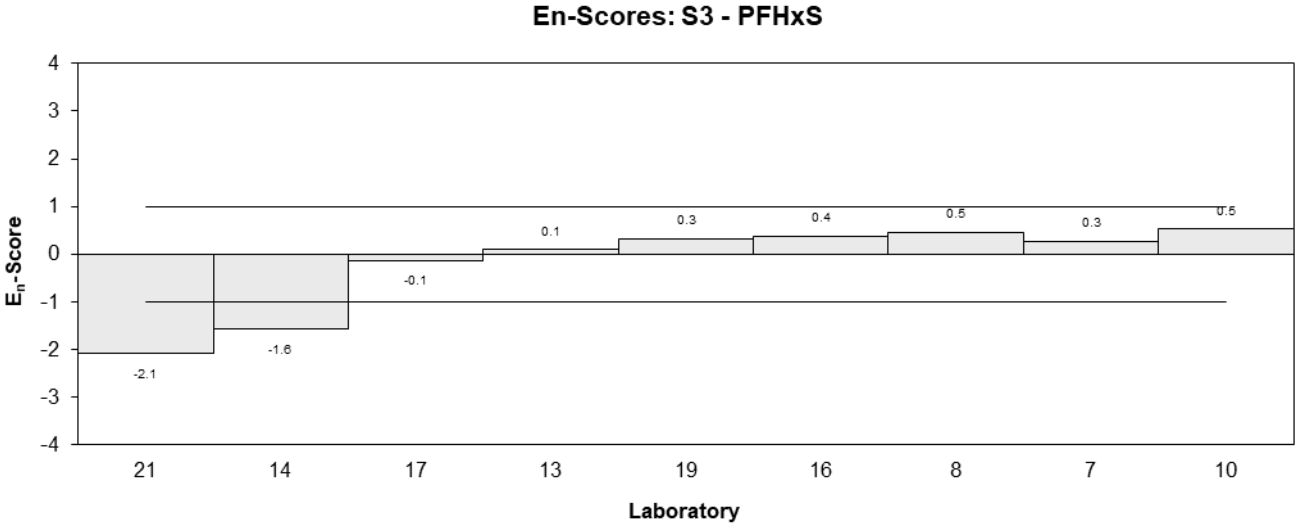

En-Scores: S3 - PFHxS
En-Score
-2.1
-1.6
-0.1
0.1
0.3
0.4
0.5
0.3
0.5
Laboratory
21 14 17 13 19 16 8 7 10

Figure 55

Table 59

**Sample Details**

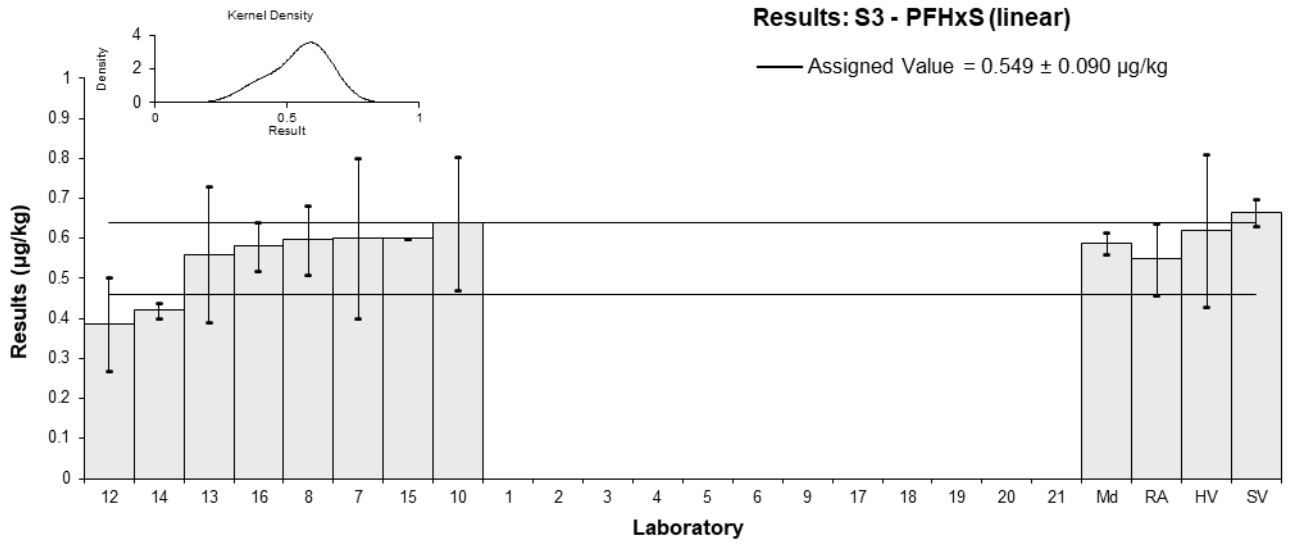
| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFHxS (linear) |
| **Unit** | µg/kg |

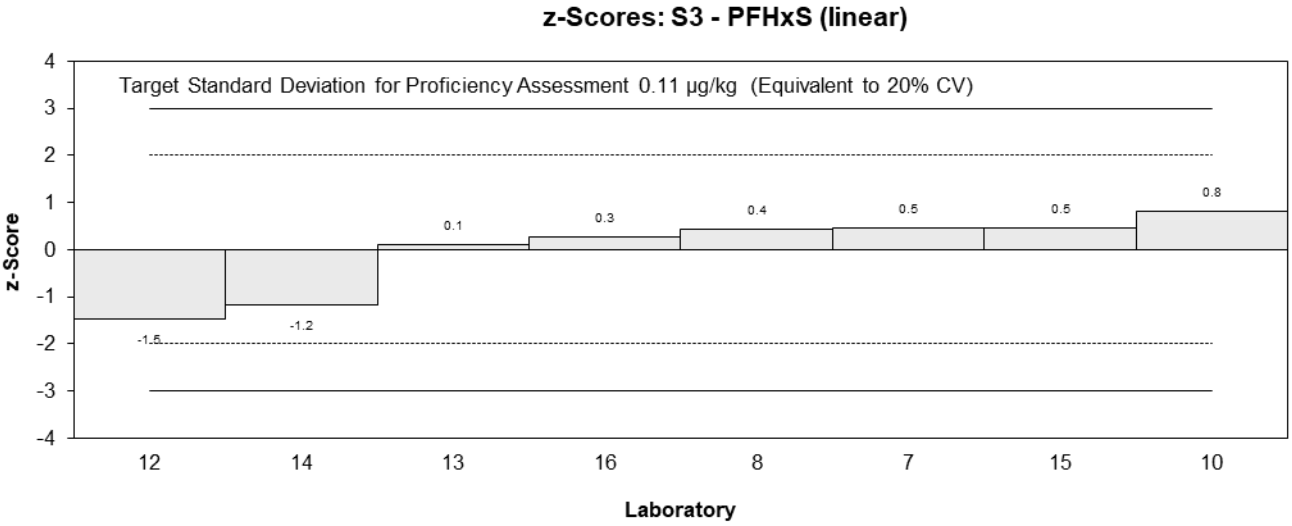
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 0.600 | 0.2 | NR | 0.46 | 0.23 |
| **8** | 0.596 | 0.086 | 93 | 0.43 | 0.38 |
| **9** | NS | NS | NS | | |
| **10** | 0.638 | 0.167 | 114.3 | 0.81 | 0.47 |
| **12** | 0.386 | 0.118 | 80.7 | -1.48 | -1.10 |
| **13** | 0.56 | 0.17 | 119 | 0.10 | 0.06 |
| **14** | 0.42 | 0.02 | 104 | -1.17 | -1.40 |
| **15** | 0.60 | 0.00 | 77.9 | 0.46 | 0.57 |
| **16** | 0.58 | 0.06 | NR | 0.28 | 0.29 |
| **17** | NT | NT | NT | | |
| **18** | NS | NS | NS | | |
| **19** | NR | NR | NR | | |
| **20** | NS | NS | NS | | |
| **21** | NR | NR | NR | | |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.549 | 0.090 |
| **Spike Value** | 0.664 | 0.033 |
| **Homogeneity Value** | 0.62 | 0.19 |
| **Robust Average** | 0.549 | 0.090 |
| **Median** | 0.588 | 0.026 |
| **Mean** | 0.548 | |
| **N** | 8 | |
| **Max** | 0.638 | |
| **Min** | 0.386 | |
| **Robust SD** | 0.10 | |
| **Robust CV** | 18% | |


Kernel Density
Density
Result
Results: S3 - PFHxS (linear)
Assigned Value = 0.549 ± 0.090 µg/kg
Results (µg/kg)
Laboratory
12 14 13 16 8 7 15 10 1 2 3 4 5 6 9 17 18 19 20 21 Md RA HV SV


z-Scores: S3 - PFHxS (linear)
Target Standard Deviation for Proficiency Assessment 0.11 µg/kg (Equivalent to 20% CV)
z-Score
-1.5
-1.2
0.1
0.3
0.4
0.5
0.5
0.8
Laboratory
12 14 13 16 8 7 15 10

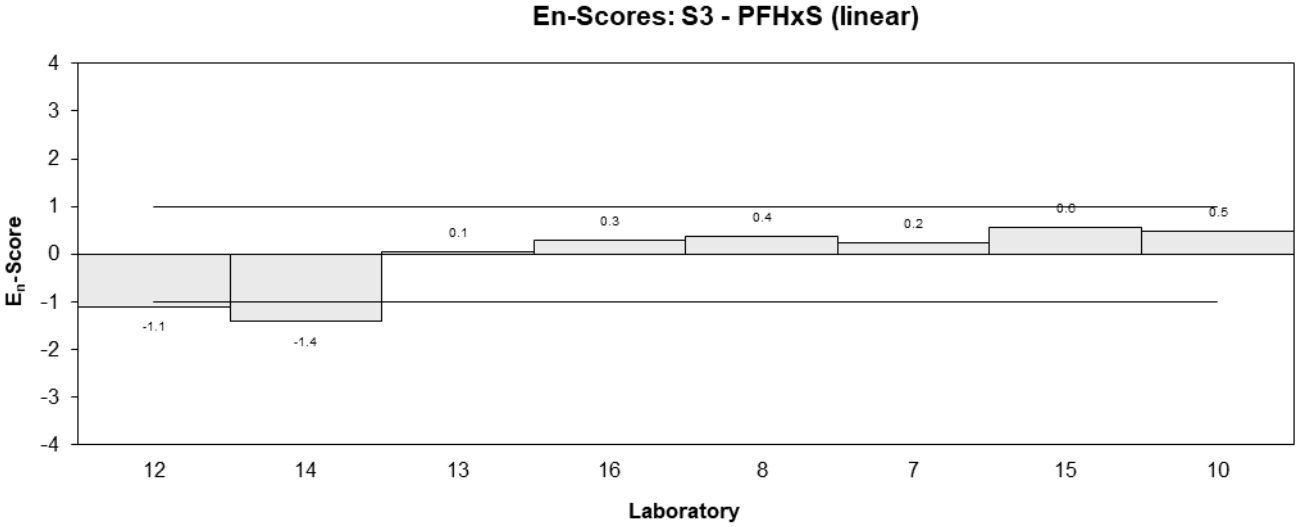

En-Scores: S3 - PFHxS (linear)
En-Score
-1.1
-1.4
0.1
0.3
0.4
0.2
0.6
0.5
Laboratory
12 14 13 16 8 7 15 10

Figure 56

Table 60

**Sample Details**

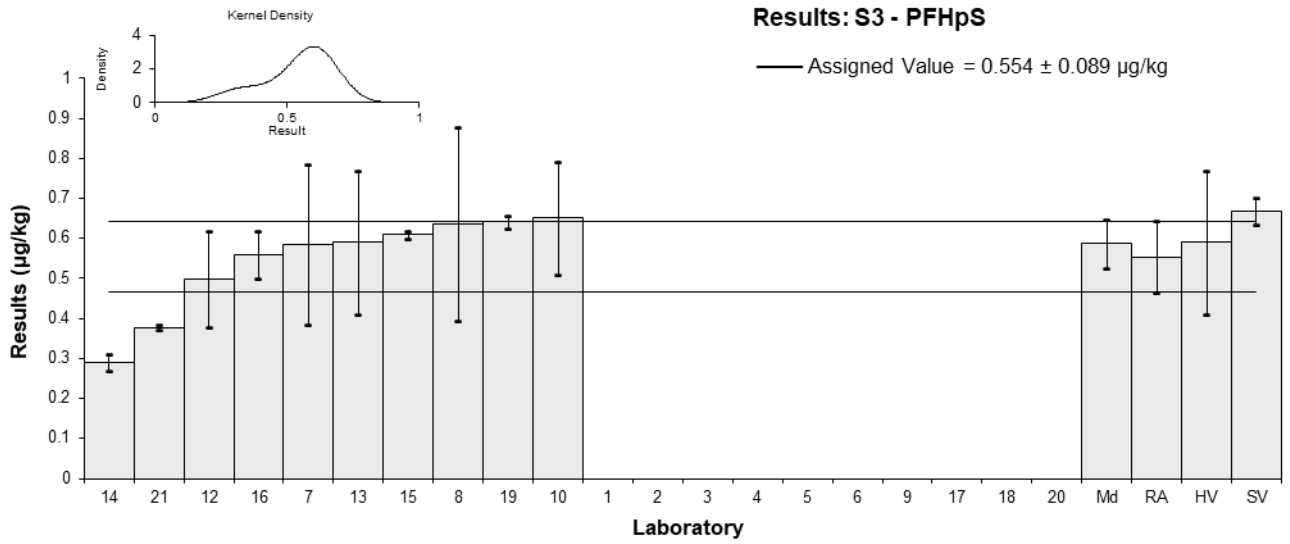
| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFHpS |
| **Unit** | µg/kg |

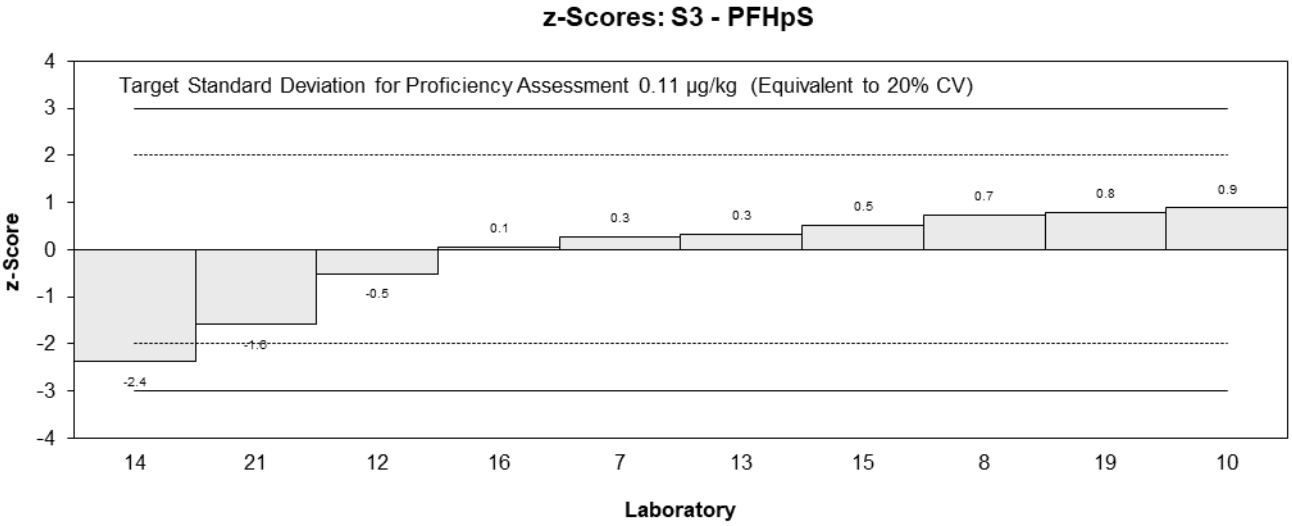
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 0.584 | 0.2 | NR | 0.27 | 0.14 |
| **8** | 0.636 | 0.242 | 93 | 0.74 | 0.32 |
| **9** | NS | NS | NS | | |
| **10** | 0.651 | 0.141 | NR | 0.88 | 0.58 |
| **12** | 0.497 | 0.120 | 80.7 | -0.51 | -0.38 |
| **13** | 0.59 | 0.18 | 119 | 0.32 | 0.18 |
| **14** | 0.29 | 0.02 | 104 | -2.38 | -2.89 |
| **15** | 0.61 | 0.01 | 77.9 | 0.51 | 0.63 |
| **16** | 0.56 | 0.06 | NR | 0.05 | 0.06 |
| **17** | <0.5 | NR | NR | | |
| **18** | NS | NS | NS | | |
| **19** | 0.641 | 0.015 | 93 | 0.79 | 0.96 |
| **20** | NS | NS | NS | | |
| **21** | 0.378 | 0.006 | 100 | -1.59 | -1.97 |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.554 | 0.089 |
| **Spike Value** | 0.668 | 0.033 |
| **Homogeneity Value** | 0.59 | 0.18 |
| **Robust Average** | 0.554 | 0.089 |
| **Median** | 0.587 | 0.060 |
| **Mean** | 0.544 | |
| **N** | 10 | |
| **Max** | 0.651 | |
| **Min** | 0.29 | |
| **Robust SD** | 0.11 | |
| **Robust CV** | 20% | |


Kernel Density
Density
Result
Results: S3 - PFHpS
Assigned Value = 0.554 ± 0.089 µg/kg
Results (µg/kg)
14 21 12 16 7 13 15 8 19 10 1 2 3 4 5 6 9 17 18 20 Md RA HV SV
Laboratory


z-Scores: S3 - PFHpS
Target Standard Deviation for Proficiency Assessment 0.11 µg/kg (Equivalent to 20% CV)
z-Score
-2.4
-1.6
-0.5
0.1
0.3
0.3
0.5
0.7
0.8
0.9
14 21 12 16 7 13 15 8 19 10
Laboratory

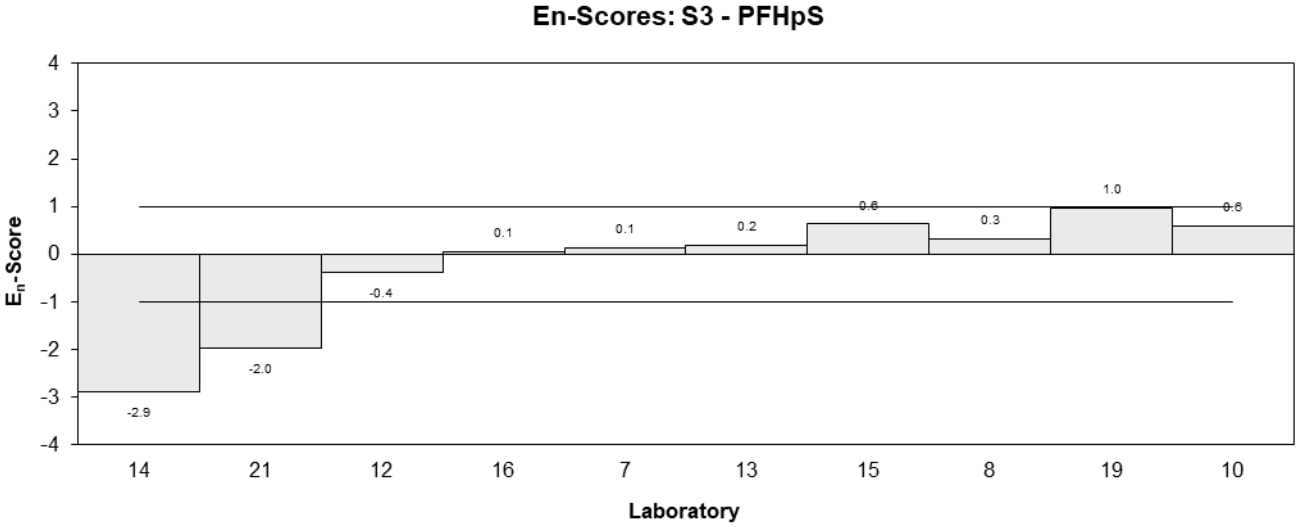

En-Scores: S3 - PFHpS
En-Score
-2.9
-2.0
-0.4
0.1
0.1
0.2
0.6
0.3
1.0
0.6
14 21 12 16 7 13 15 8 19 10
Laboratory

Figure 57

Table 61

**Sample Details**

| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFOS |
| **Unit** | µg/kg |

**Participant Results**

| Lab. Code | Result | Uncertainty | Rec |
|---|---|---|---|
| **1** | NS | NS | NS |
| **2** | NS | NS | NS |
| **3** | NS | NS | NS |
| **4** | NS | NS | NS |
| **5** | NS | NS | NS |
| **6** | NS | NS | NS |
| **7** | 0.137 | 0.04 | 81 |
| **8** | 0.229 | 0.17 | 84 |
| **9** | NS | NS | NS |
| **10** | 0.174 | 0.172 | NR |
| **12** | 0.113 | 0.0293 | 88.1 |
| **13** | <0.3 | NR | 95 |
| **14** | 0.08 | 0.011 | 102 |
| **15** | 0.20 | 0.02 | 97.1 |
| **16** | 0.15 | 0.05 | NR |
| **17** | <0.5 | NR | NR |
| **18** | NS | NS | NS |
| **19** | 0.198 | 0.008 | 92 |
| **20** | NS | NS | NS |
| **21** | 0.12 | 0.002 | 104 |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | Not Set | |
| **Spike Value** | 0.277 | 0.014 |
| **Homogeneity Value** | 0.167 | 0.050 |
| **Robust Average** | 0.156 | 0.046 |
| **Median** | 0.150 | 0.046 |
| **Mean** | 0.156 | |
| **N** | 9 | |
| **Max** | 0.229 | |
| **Min** | 0.08 | |
| **Robust SD** | 0.055 | |
| **Robust CV** | 35% | |

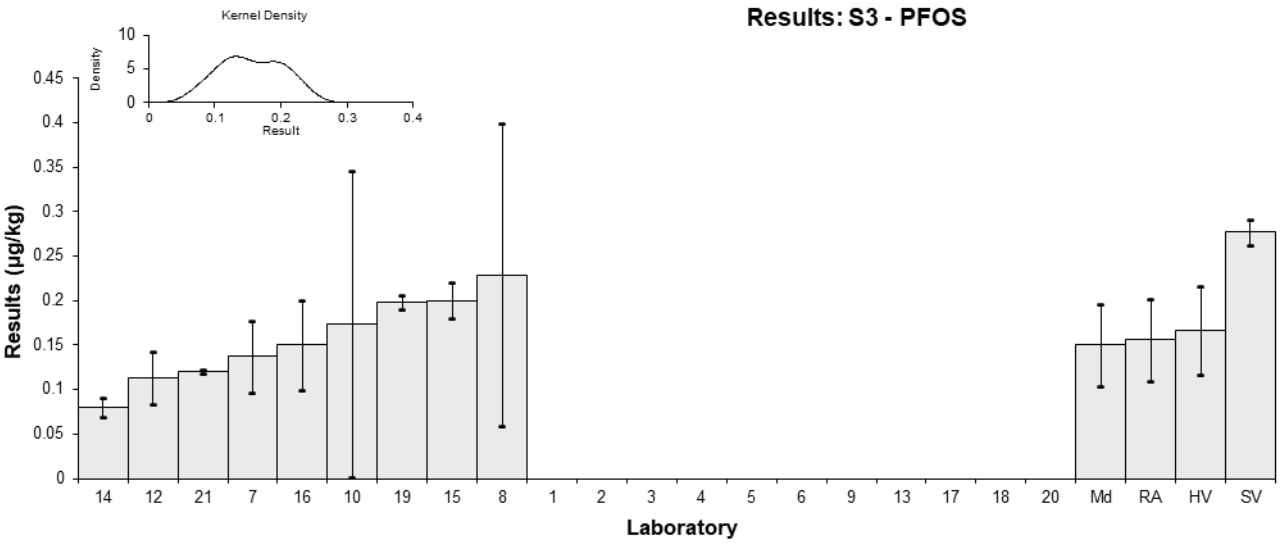

Results: S3 - PFOS
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
14
12
21
7
16
10
19
15
8
1
2
3
4
5
6
9
13
17
18
20
Md
RA
HV
SV

Figure 58

Table 62

**Sample Details**

| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFOS (linear) |
| **Unit** | µg/kg |

**Participant Results**

| Lab. Code | Result | Uncertainty | Rec |
|---|---|---|---|
| **1** | NS | NS | NS |
| **2** | NS | NS | NS |
| **3** | NS | NS | NS |
| **4** | NS | NS | NS |
| **5** | NS | NS | NS |
| **6** | NS | NS | NS |
| **7** | 0.137 | 0.04 | NR |
| **8** | 0.164 | 0.089 | 84 |
| **9** | NS | NS | NS |
| **10** | 0.137 | 0.172 | 113.6 |
| **12** | 0.0774 | 0.0170 | 88.1 |
| **13** | <0.3 | NR | 95 |
| **14** | 0.08 | 0.011 | 102 |
| **15** | 0.14 | 0.00 | 97.1 |
| **16** | 0.15 | 0.05 | NR |
| **17** | NT | NT | NT |
| **18** | NS | NS | NS |
| **19** | NR | NR | NR |
| **20** | NS | NS | NS |
| **21** | NR | NR | NR |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | Not Set | |
| **Spike Value** | 0.218 | 0.011 |
| **Robust Average** | 0.126 | 0.036 |
| **Median** | 0.137 | 0.018 |
| **Mean** | 0.126 | |
| **N** | 7 | |
| **Max** | 0.164 | |
| **Min** | 0.0774 | |
| **Robust SD** | 0.039 | |
| **Robust CV** | 30% | |

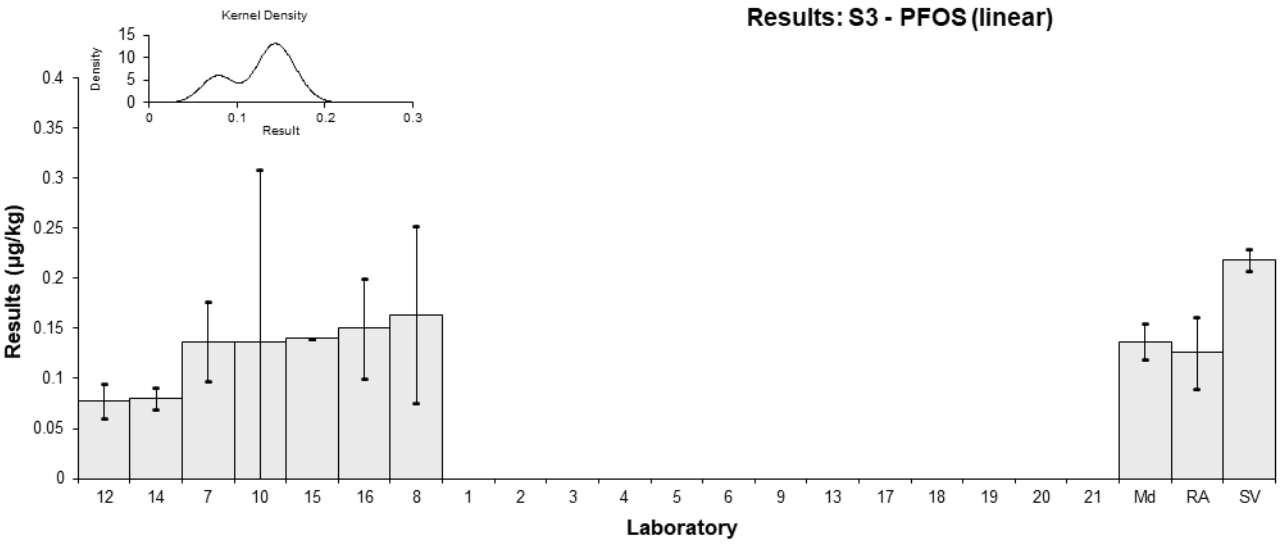

Results: S3 - PFOS (linear)
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
12
14
7
10
15
16
8
1
2
3
4
5
6
9
13
17
18
19
20
21
Md
RA
SV

Figure 59

Table 63

**Sample Details**

| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFNS |
| **Unit** | µg/kg |

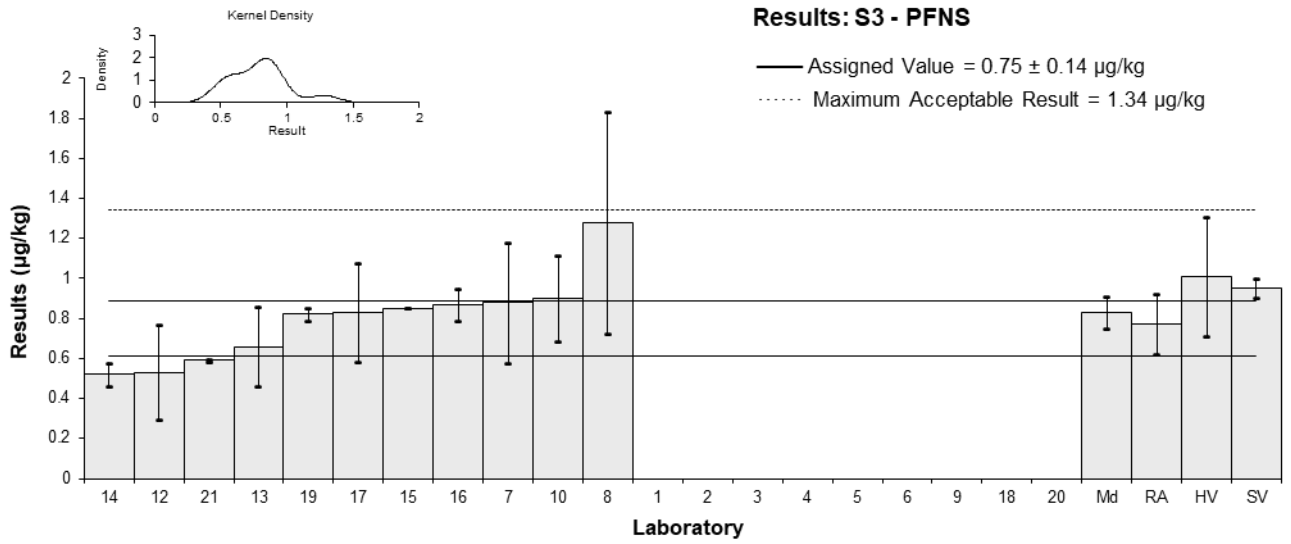
**Participant Results**

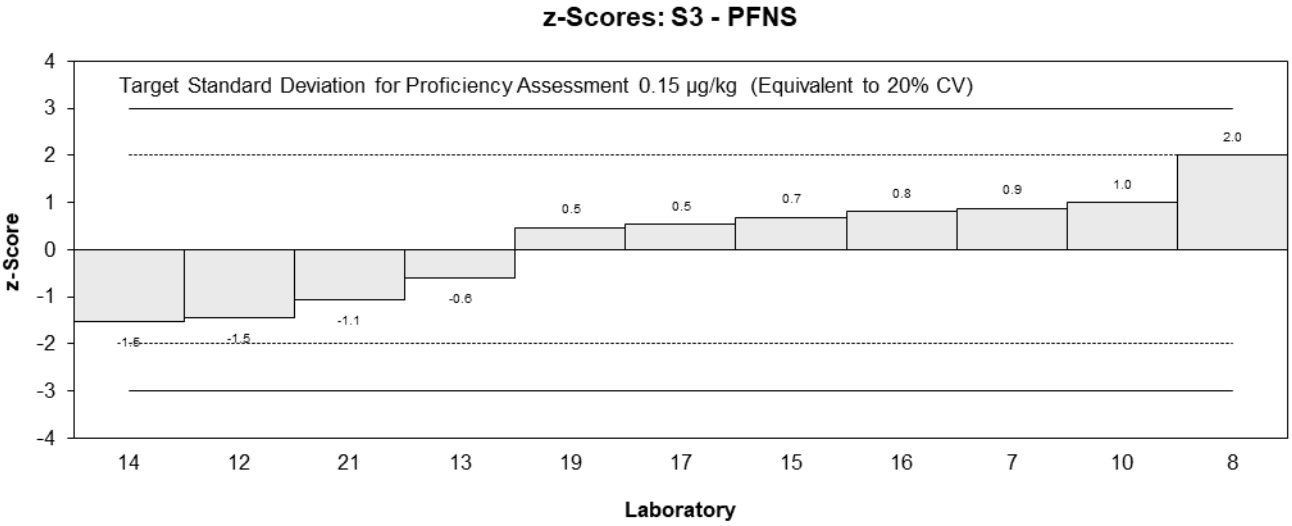
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 0.879 | 0.3 | NR | 0.86 | 0.39 |
| **8*** | 1.279 | 0.552 | 84 | 2.00▼ | |
| **9** | NS | NS | NS | | |
| **10** | 0.899 | 0.215 | NR | 0.99 | 0.58 |
| **12** | 0.531 | 0.238 | 88.1 | -1.46 | -0.79 |
| **13** | 0.66 | 0.20 | 95 | -0.60 | -0.37 |
| **14** | 0.52 | 0.06 | 108 | -1.53 | -1.51 |
| **15** | 0.85 | 0.00 | 97.1 | 0.67 | 0.71 |
| **16** | 0.87 | 0.08 | NR | 0.80 | 0.74 |
| **17** | 0.83 | 0.247868852 | 61 | 0.53 | 0.28 |
| **18** | NS | NS | NS | | |
| **19** | 0.821 | 0.031 | 92 | 0.47 | 0.50 |
| **20** | NS | NS | NS | | |
| **21** | 0.591 | 0.006 | 104 | -1.06 | -1.13 |

* Outlier, see Section 4.2; ▼ Adjusted Score, see Section 6.3

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.75 | 0.14 |
| **Spike Value** | 0.954 | 0.048 |
| **Homogeneity Value** | 1.01 | 0.30 |
| **Robust Average** | 0.77 | 0.15 |
| **Max Acceptable Result** | 1.34 | |
| **Median** | 0.830 | 0.077 |
| **Mean** | 0.79 | |
| **N** | 11 | |
| **Max** | 1.279 | |
| **Min** | 0.52 | |
| **Robust SD** | 0.20 | |
| **Robust CV** | 26% | |


Results: S3 - PFNS
Kernel Density
Density
Result
Assigned Value = 0.75 ± 0.14 µg/kg
Maximum Acceptable Result = 1.34 µg/kg
Results (µg/kg)
14 12 21 13 19 17 15 16 7 10 8 1 2 3 4 5 6 9 18 20 Md RA HV SV
Laboratory


z-Scores: S3 - PFNS
Target Standard Deviation for Proficiency Assessment 0.15 µg/kg (Equivalent to 20% CV)
z-Score
-1.5 -1.5 -1.1 -0.6 0.5 0.5 0.7 0.8 0.9 1.0 2.0
14 12 21 13 19 17 15 16 7 10 8
Laboratory

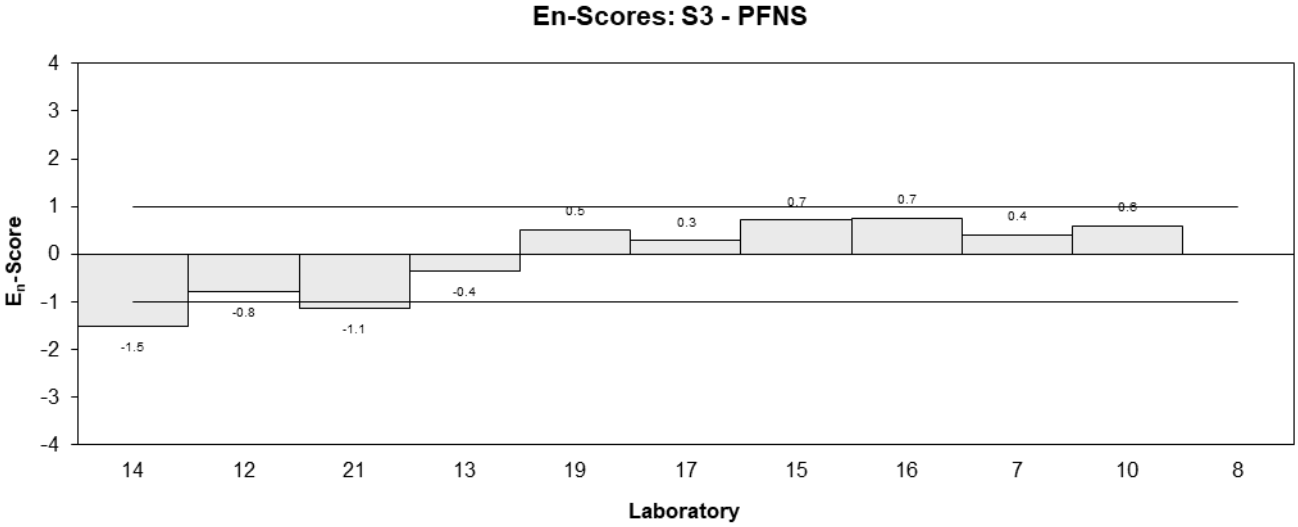

En-Scores: S3 - PFNS
En-Score
-1.5 -0.8 -1.1 -0.4 0.5 0.3 0.7 0.7 0.4 0.6
14 12 21 13 19 17 15 16 7 10 8
Laboratory

Figure 60

Table 64

**Sample Details**

| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFDS |
| **Unit** | µg/kg |

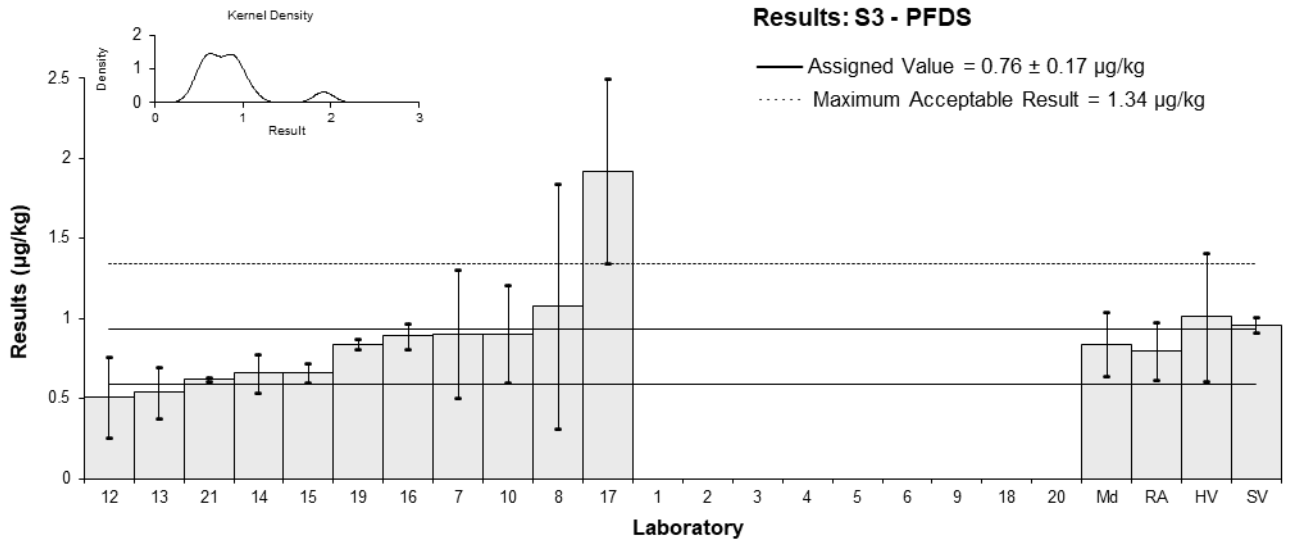
**Participant Results**

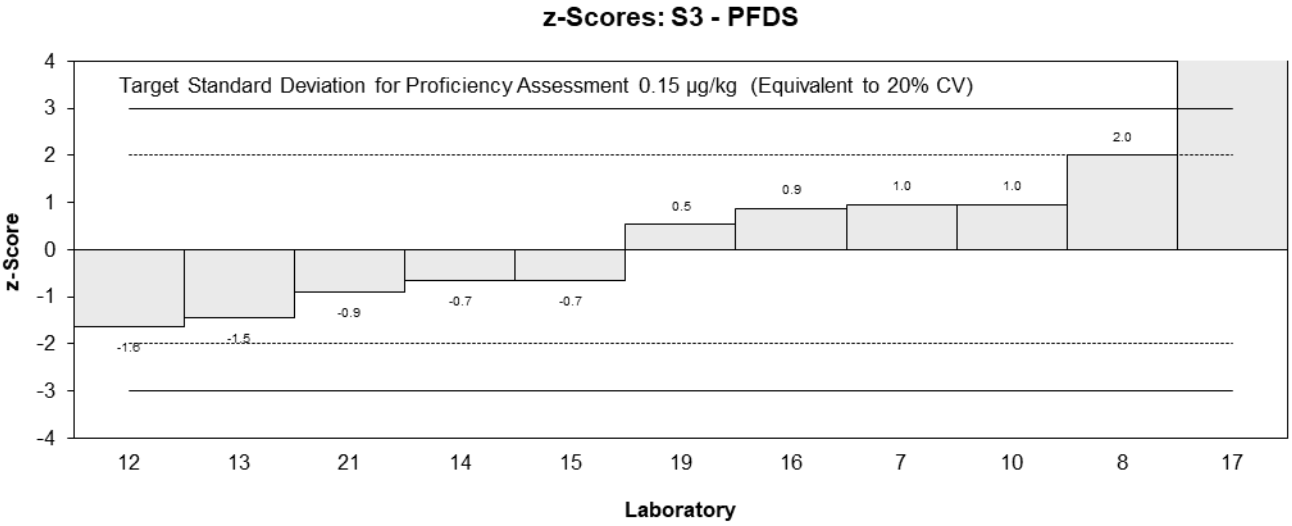
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 0.904 | 0.4 | NR | 0.95 | 0.33 |
| **8** | 1.076 | 0.763 | 84 | 2.00▼ | |
| **9** | NS | NS | NS | | |
| **10** | 0.905 | 0.308 | NR | 0.95 | 0.41 |
| **12** | 0.510 | 0.251 | 88.1 | -1.64 | -0.82 |
| **13** | 0.54 | 0.16 | 95 | -1.45 | -0.94 |
| **14** | 0.66 | 0.12 | 103 | -0.66 | -0.48 |
| **15** | 0.66 | 0.06 | 97.1 | -0.66 | -0.55 |
| **16** | 0.89 | 0.08 | NR | 0.86 | 0.69 |
| **17*** | 1.92 | 0.576315789 | 77 | 7.63 | 1.93 |
| **18** | NS | NS | NS | | |
| **19** | 0.841 | 0.03 | 92 | 0.53 | 0.47 |
| **20** | NS | NS | NS | | |
| **21** | 0.622 | 0.013 | 104 | -0.91 | -0.81 |

* Outlier, see Section 4.2; ▼ Adjusted Score, see Section 6.3

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.76 | 0.17 |
| **Spike Value** | 0.958 | 0.048 |
| **Homogeneity Value** | 1.01 | 0.40 |
| **Robust Average** | 0.80 | 0.18 |
| **Max Acceptable Result** | 1.34 | |
| **Median** | 0.84 | 0.20 |
| **Mean** | 0.87 | |
| **N** | 11 | |
| **Max** | 1.92 | |
| **Min** | 0.51 | |
| **Robust SD** | 0.24 | |
| **Robust CV** | 31% | |


Results: S3 - PFDS
Kernel Density
Density
Result
Assigned Value = 0.76 ± 0.17 µg/kg
Maximum Acceptable Result = 1.34 µg/kg
Results (µg/kg)
12 13 21 14 15 19 16 7 10 8 17 1 2 3 4 5 6 9 18 20 Md RA HV SV
Laboratory


z-Scores: S3 - PFDS
Target Standard Deviation for Proficiency Assessment 0.15 µg/kg (Equivalent to 20% CV)
z-Score
-1.6 -1.5 -0.9 -0.7 -0.7 0.5 0.9 1.0 1.0 2.0
12 13 21 14 15 19 16 7 10 8 17
Laboratory

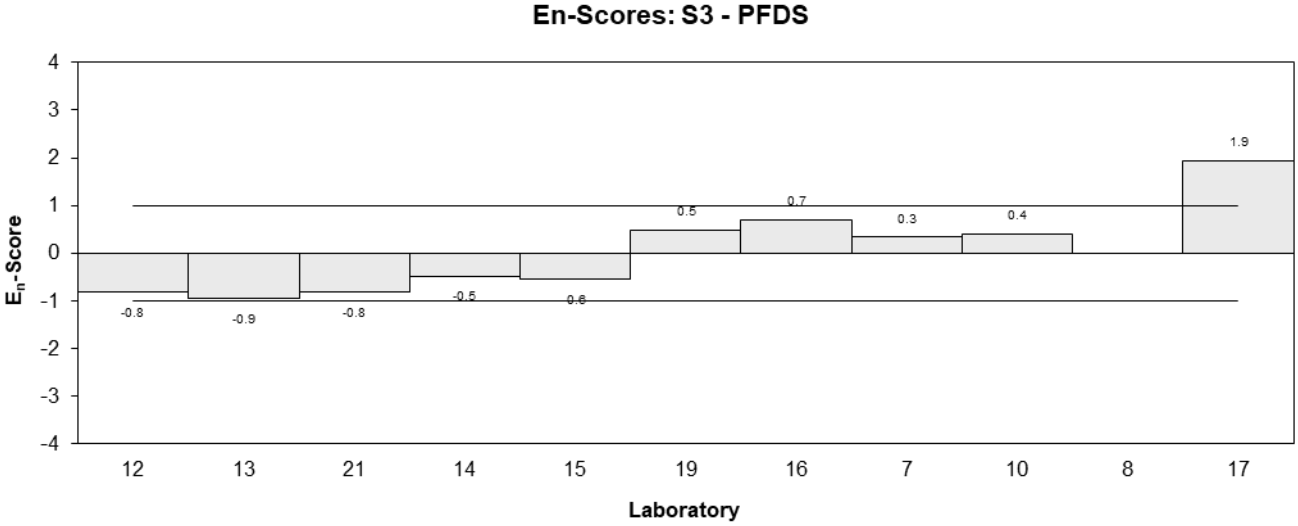

En-Scores: S3 - PFDS
En-Score
-0.8 -0.9 -0.8 -0.5 -0.6 0.5 0.7 0.3 0.4 1.9
12 13 21 14 15 19 16 7 10 8 17
Laboratory

Figure 61

Table 65

**Sample Details**

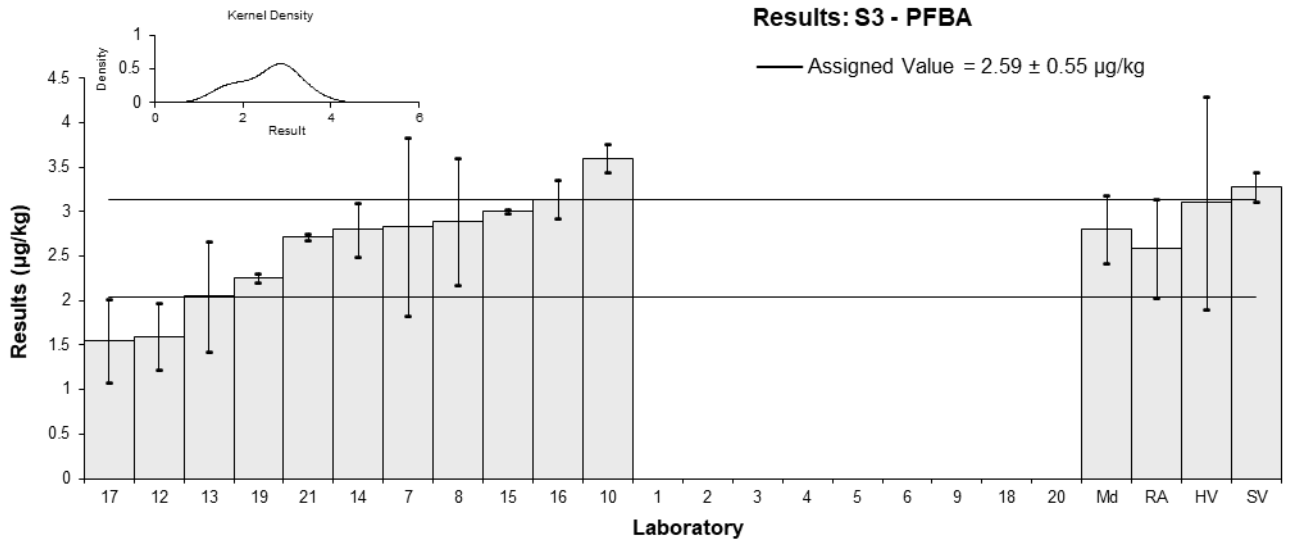
| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFBA |
| **Unit** | µg/kg |

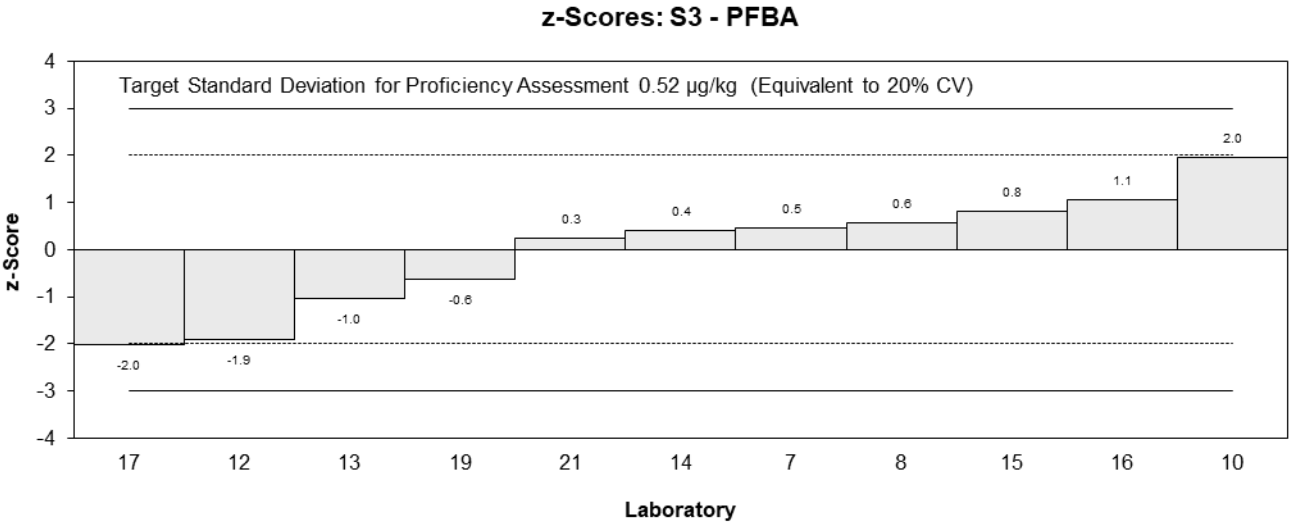
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 2.83 | 1.0 | 77 | 0.46 | 0.21 |
| **8** | 2.889 | 0.712 | 58 | 0.58 | 0.33 |
| **9** | NS | NS | NS | | |
| **10** | 3.601 | 0.156 | 92.4 | 1.95 | 1.77 |
| **12** | 1.60 | 0.370 | 60.8 | -1.91 | -1.49 |
| **13** | 2.05 | 0.62 | 11 | -1.04 | -0.65 |
| **14** | 2.8 | 0.3 | 99 | 0.41 | 0.34 |
| **15** | 3.01 | 0.02 | 64.5 | 0.81 | 0.76 |
| **16** | 3.14 | 0.22 | NR | 1.06 | 0.93 |
| **17** | 1.55 | 0.465 | 91 | -2.01 | -1.44 |
| **18** | NS | NS | NS | | |
| **19** | 2.26 | 0.05 | 71 | -0.64 | -0.60 |
| **20** | NS | NS | NS | | |
| **21** | 2.72 | 0.038 | 78 | 0.25 | 0.24 |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 2.59 | 0.55 |
| **Spike Value** | 3.28 | 0.16 |
| **Homogeneity Value** | 3.1 | 1.2 |
| **Robust Average** | 2.59 | 0.55 |
| **Median** | 2.80 | 0.38 |
| **Mean** | 2.59 | |
| **N** | 11 | |
| **Max** | 3.601 | |
| **Min** | 1.55 | |
| **Robust SD** | 0.73 | |
| **Robust CV** | 28% | |


Kernel Density
Density
Result
Results: S3 - PFBA
Assigned Value = 2.59 ± 0.55 µg/kg
Results (µg/kg)
Laboratory
17 12 13 19 21 14 7 8 15 16 10 1 2 3 4 5 6 9 18 20 Md RA HV SV


z-Scores: S3 - PFBA
Target Standard Deviation for Proficiency Assessment 0.52 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
17 12 13 19 21 14 7 8 15 16 10
-2.0 -1.9 -1.0 -0.6 0.3 0.4 0.5 0.6 0.8 1.1 2.0

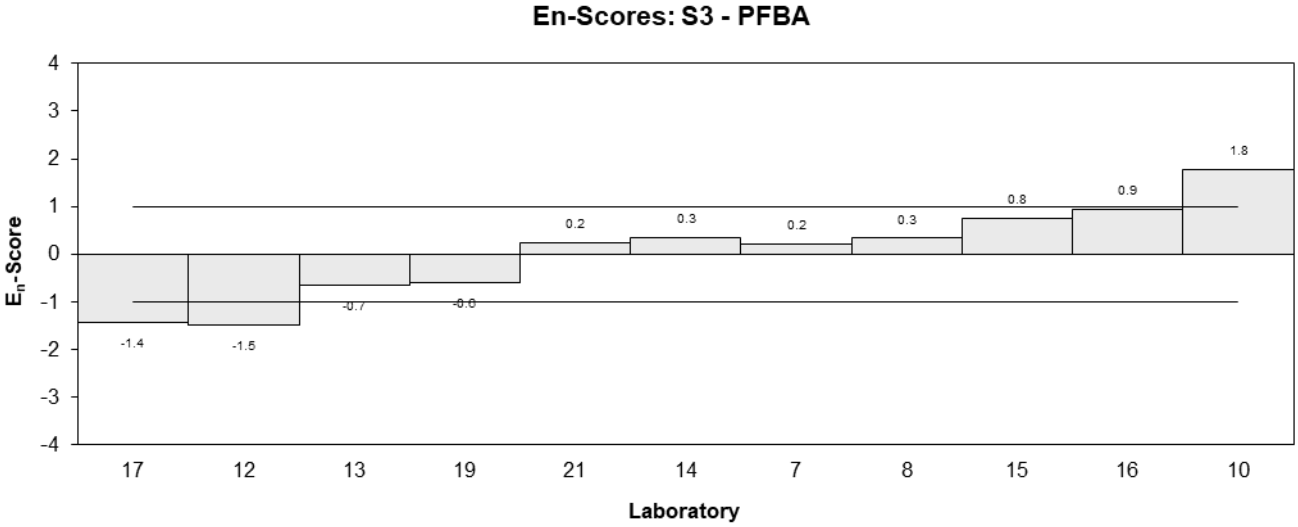

En-Scores: S3 - PFBA
En-Score
Laboratory
17 12 13 19 21 14 7 8 15 16 10
-1.4 -1.5 -0.7 -0.6 0.2 0.3 0.2 0.3 0.8 0.9 1.8

Figure 62

Table 66

**Sample Details**

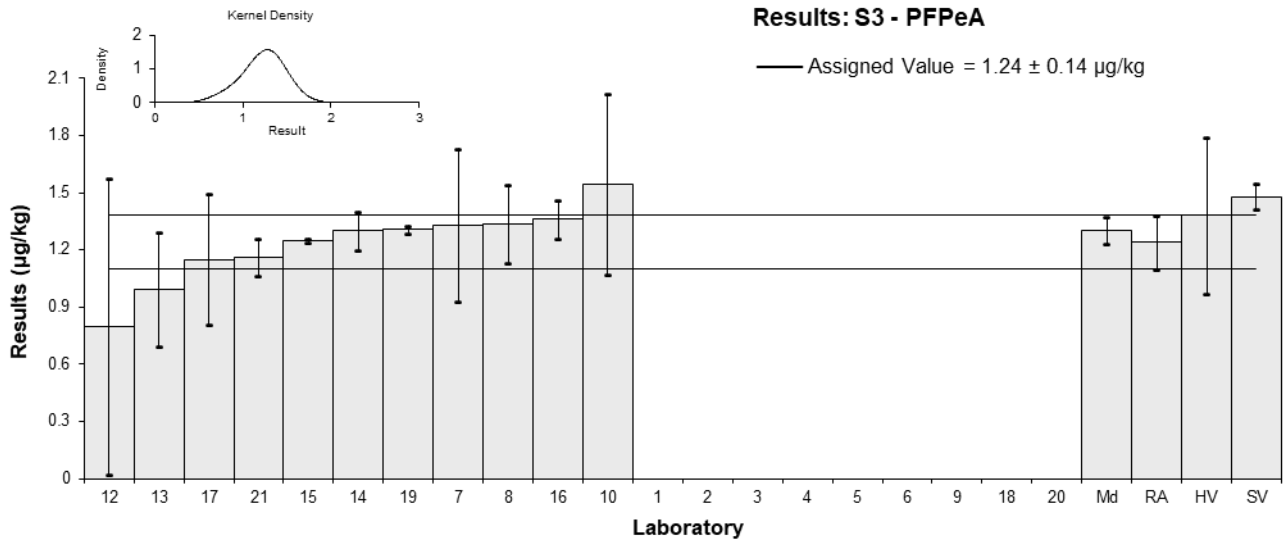
| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFPeA |
| **Unit** | µg/kg |

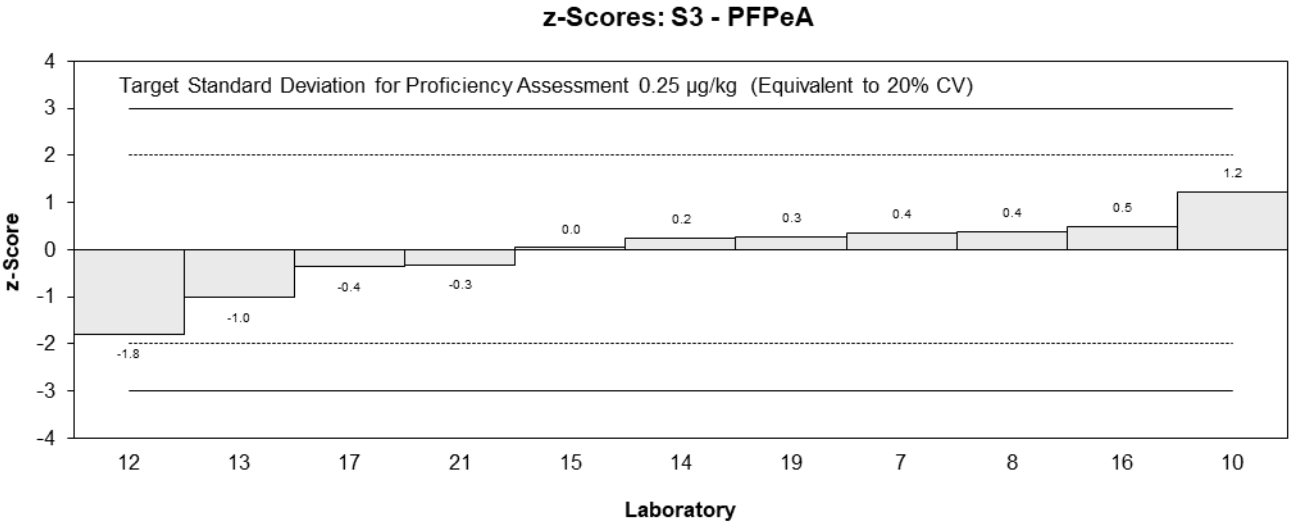
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 1.33 | 0.4 | 70 | 0.36 | 0.21 |
| **8** | 1.337 | 0.206 | 63 | 0.39 | 0.39 |
| **9** | NS | NS | NS | | |
| **10** | 1.544 | 0.474 | 98.3 | 1.23 | 0.62 |
| **12** | 0.795 | 0.778 | 76.9 | -1.79 | -0.56 |
| **13** | 0.99 | 0.30 | 27 | -1.01 | -0.76 |
| **14** | 1.3 | 0.1 | 101 | 0.24 | 0.35 |
| **15** | 1.25 | 0.01 | 79.2 | 0.04 | 0.07 |
| **16** | 1.36 | 0.1 | NR | 0.48 | 0.70 |
| **17** | 1.15 | 0.345348837 | 86 | -0.36 | -0.24 |
| **18** | NS | NS | NS | | |
| **19** | 1.306 | 0.02 | 75 | 0.27 | 0.47 |
| **20** | NS | NS | NS | | |
| **21** | 1.16 | 0.1 | 85 | -0.32 | -0.46 |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 1.24 | 0.14 |
| **Spike Value** | 1.48 | 0.07 |
| **Homogeneity Value** | 1.38 | 0.41 |
| **Robust Average** | 1.24 | 0.14 |
| **Median** | 1.30 | 0.07 |
| **Mean** | 1.23 | |
| **N** | 11 | |
| **Max** | 1.544 | |
| **Min** | 0.795 | |
| **Robust SD** | 0.19 | |
| **Robust CV** | 15% | |


Kernel Density
Density
Result
Results: S3 - PFPeA
Assigned Value = 1.24 ± 0.14 µg/kg
Results (µg/kg)
Laboratory
12 13 17 21 15 14 19 7 8 16 10 1 2 3 4 5 6 9 18 20 Md RA HV SV


z-Scores: S3 - PFPeA
Target Standard Deviation for Proficiency Assessment 0.25 µg/kg (Equivalent to 20% CV)
z-Score
-1.8 -1.0 -0.4 -0.3 0.0 0.2 0.3 0.4 0.4 0.5 1.2
Laboratory
12 13 17 21 15 14 19 7 8 16 10

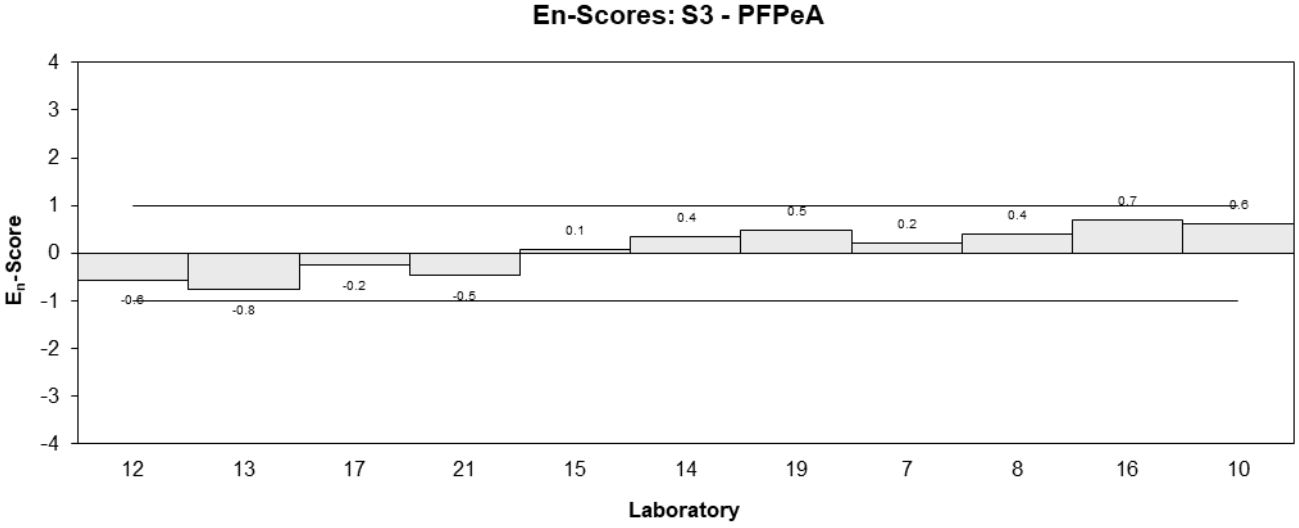

En-Scores: S3 - PFPeA
En-Score
-0.6 -0.8 -0.2 -0.5 0.1 0.4 0.5 0.2 0.4 0.7 0.6
Laboratory
12 13 17 21 15 14 19 7 8 16 10

Figure 63

Table 67

**Sample Details**

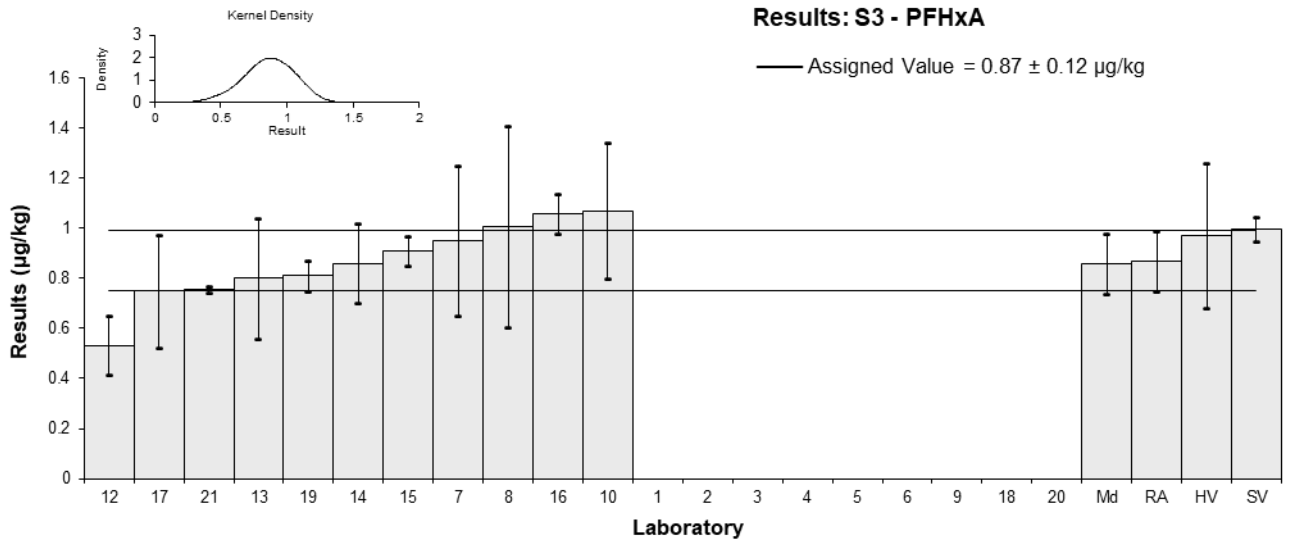
| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFHxA |
| **Unit** | µg/kg |

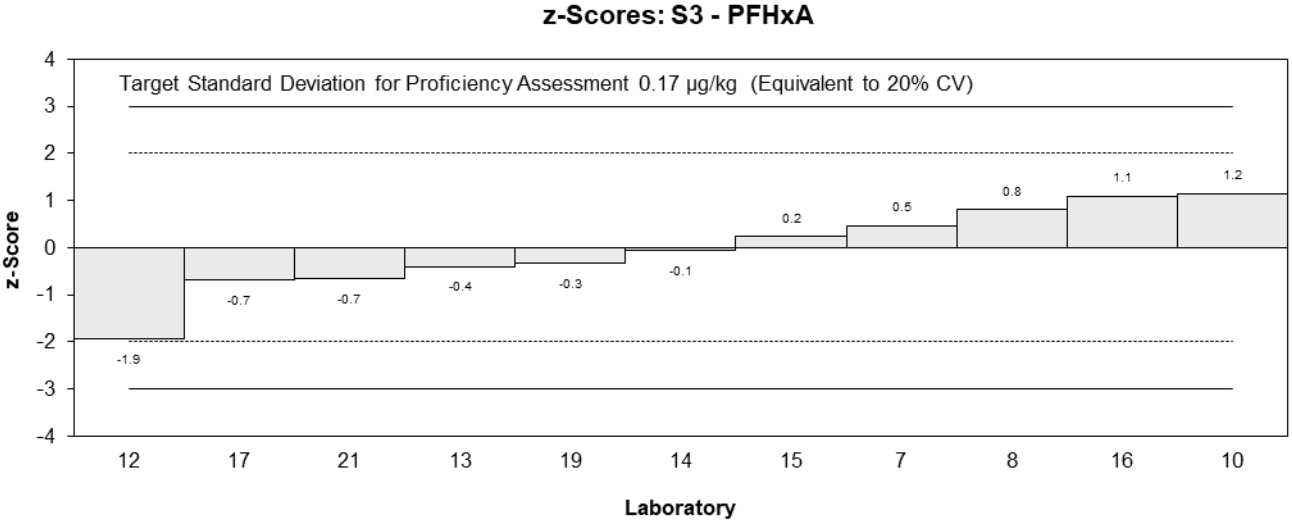
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 0.951 | 0.3 | 76 | 0.47 | 0.25 |
| **8** | 1.009 | 0.402 | 61 | 0.80 | 0.33 |
| **9** | NS | NS | NS | | |
| **10** | 1.07 | 0.272 | 95.5 | 1.15 | 0.67 |
| **12** | 0.533 | 0.119 | 79.17 | -1.94 | -1.99 |
| **13** | 0.80 | 0.24 | 89 | -0.40 | -0.26 |
| **14** | 0.86 | 0.16 | 97 | -0.06 | -0.05 |
| **15** | 0.91 | 0.06 | 83.1 | 0.23 | 0.30 |
| **16** | 1.06 | 0.08 | NR | 1.09 | 1.32 |
| **17** | 0.75 | 0.225 | 92 | -0.69 | -0.47 |
| **18** | NS | NS | NS | | |
| **19** | 0.812 | 0.062 | 73 | -0.33 | -0.43 |
| **20** | NS | NS | NS | | |
| **21** | 0.756 | 0.014 | 94 | -0.66 | -0.94 |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.87 | 0.12 |
| **Spike Value** | 0.996 | 0.050 |
| **Homogeneity Value** | 0.97 | 0.29 |
| **Robust Average** | 0.87 | 0.12 |
| **Median** | 0.86 | 0.12 |
| **Mean** | 0.865 | |
| **N** | 11 | |
| **Max** | 1.07 | |
| **Min** | 0.533 | |
| **Robust SD** | 0.16 | |
| **Robust CV** | 18% | |


Kernel Density
Density
Result
Results: S3 - PFHxA
Assigned Value = 0.87 ± 0.12 µg/kg
Results (µg/kg)
Laboratory
12 17 21 13 19 14 15 7 8 16 10 1 2 3 4 5 6 9 18 20 Md RA HV SV


z-Scores: S3 - PFHxA
Target Standard Deviation for Proficiency Assessment 0.17 µg/kg (Equivalent to 20% CV)
z-Score
-1.9 -0.7 -0.7 -0.4 -0.3 -0.1 0.2 0.5 0.8 1.1 1.2
Laboratory
12 17 21 13 19 14 15 7 8 16 10

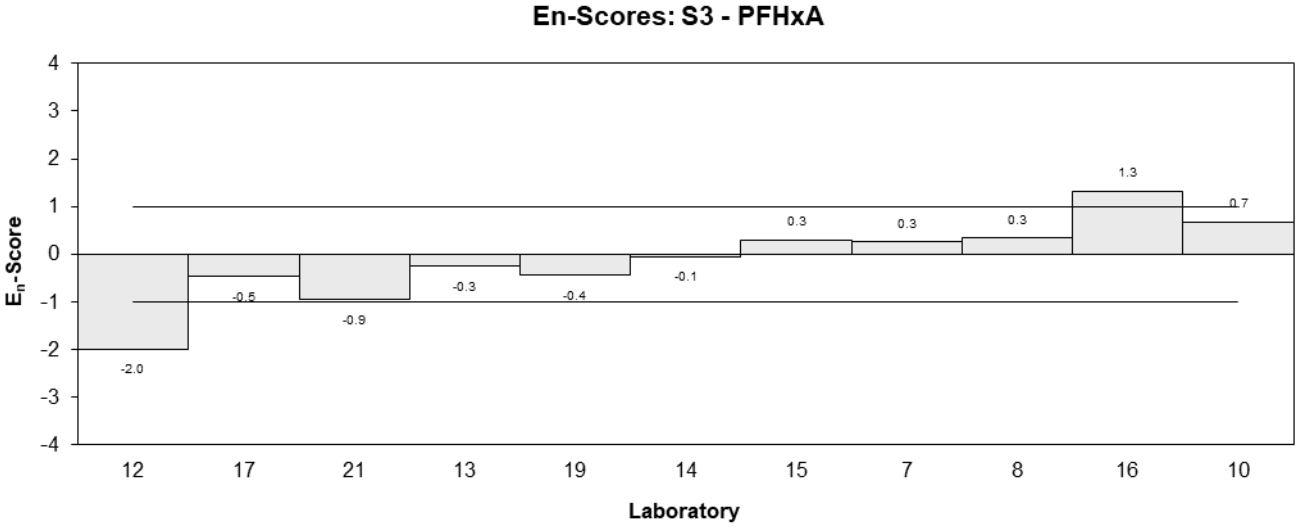

En-Scores: S3 - PFHxA
En-Score
-2.0 -0.5 -0.9 -0.3 -0.4 -0.1 0.3 0.3 0.3 1.3 0.7
Laboratory
12 17 21 13 19 14 15 7 8 16 10

Figure 64

Table 68

**Sample Details**

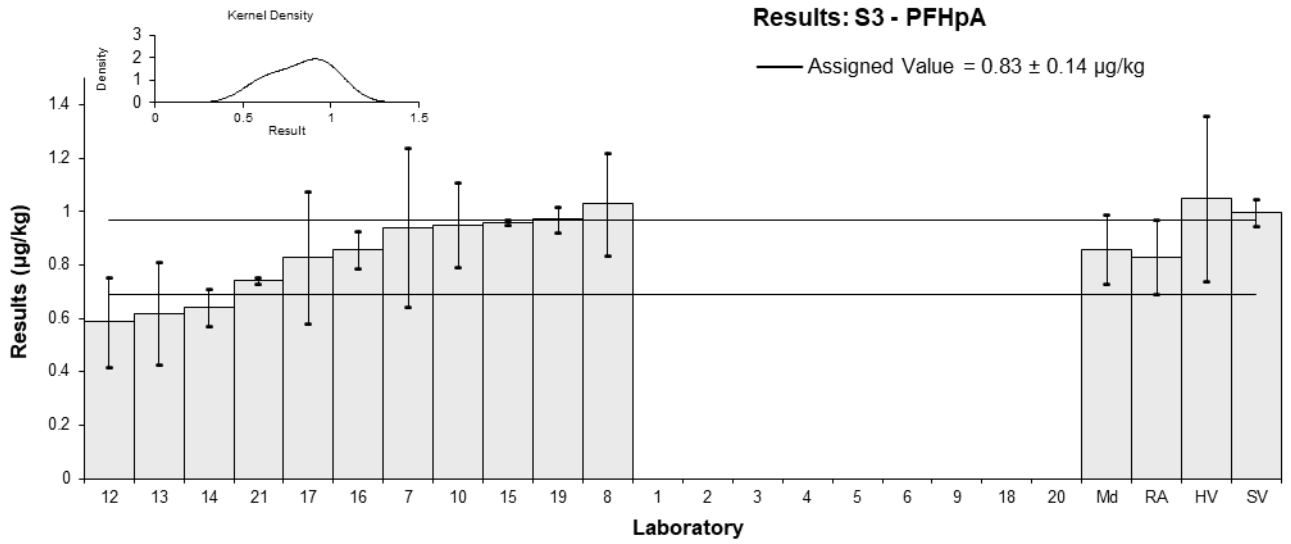
| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFHpA |
| **Unit** | µg/kg |

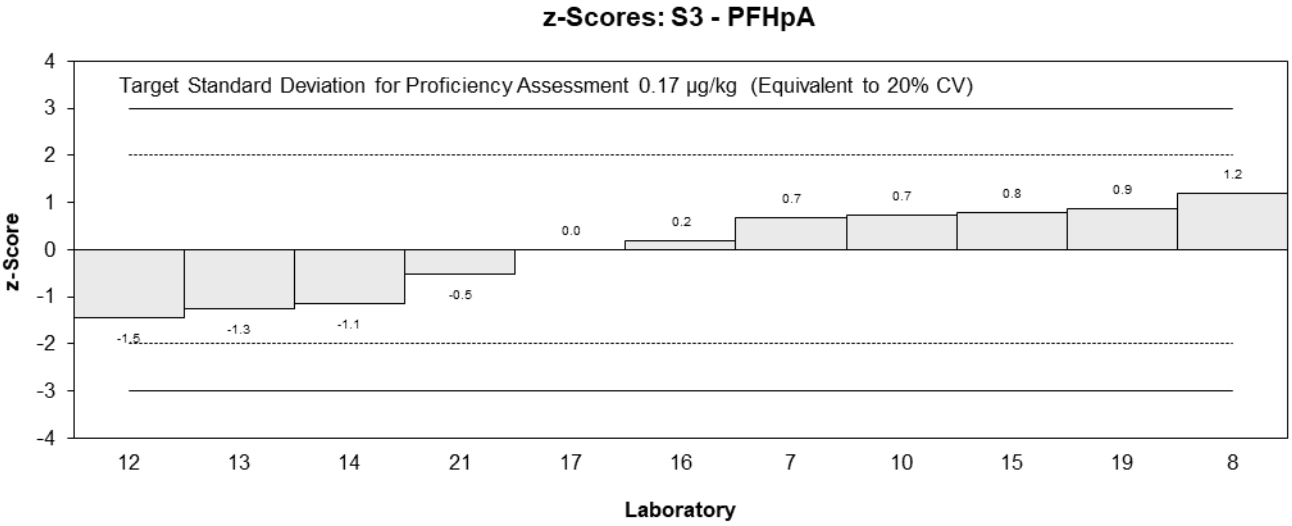
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 0.942 | 0.3 | 75 | 0.67 | 0.34 |
| **8** | 1.029 | 0.194 | 54 | 1.20 | 0.83 |
| **9** | NS | NS | NS | | |
| **10** | 0.951 | 0.16 | NR | 0.73 | 0.57 |
| **12** | 0.587 | 0.170 | 79.23 | -1.46 | -1.10 |
| **13** | 0.62 | 0.19 | 38 | -1.27 | -0.89 |
| **14** | 0.64 | 0.07 | 96 | -1.14 | -1.21 |
| **15** | 0.96 | 0.01 | 83.5 | 0.78 | 0.93 |
| **16** | 0.86 | 0.07 | NR | 0.18 | 0.19 |
| **17** | 0.83 | 0.247826086 | 92 | 0.00 | 0.00 |
| **18** | NS | NS | NS | | |
| **19** | 0.972 | 0.049 | 73 | 0.86 | 0.96 |
| **20** | NS | NS | NS | | |
| **21** | 0.743 | 0.013 | 99 | -0.52 | -0.62 |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.83 | 0.14 |
| **Spike Value** | 0.997 | 0.050 |
| **Homogeneity Value** | 1.05 | 0.31 |
| **Robust Average** | 0.83 | 0.14 |
| **Median** | 0.86 | 0.13 |
| **Mean** | 0.830 | |
| **N** | 11 | |
| **Max** | 1.029 | |
| **Min** | 0.587 | |
| **Robust SD** | 0.18 | |
| **Robust CV** | 22% | |


Kernel Density
Density
Result
Results: S3 - PFHpA
Assigned Value = 0.83 ± 0.14 µg/kg
Results (µg/kg)
Laboratory
12 13 14 21 17 16 7 10 15 19 8 1 2 3 4 5 6 9 18 20 Md RA HV SV


z-Scores: S3 - PFHpA
Target Standard Deviation for Proficiency Assessment 0.17 µg/kg (Equivalent to 20% CV)
z-Score
-1.5 -1.3 -1.1 -0.5 0.0 0.2 0.7 0.7 0.8 0.9 1.2
Laboratory
12 13 14 21 17 16 7 10 15 19 8

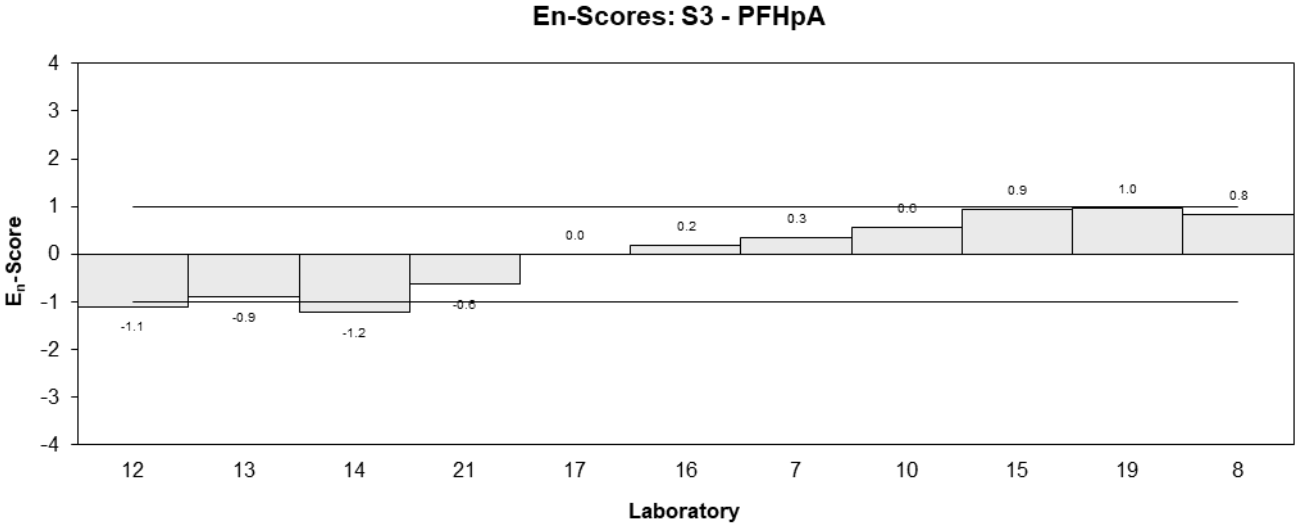

En-Scores: S3 - PFHpA
En-Score
-1.1 -0.9 -1.2 -0.6 0.0 0.2 0.3 0.6 0.9 1.0 0.8
Laboratory
12 13 14 21 17 16 7 10 15 19 8

Figure 65

Table 69

**Sample Details**

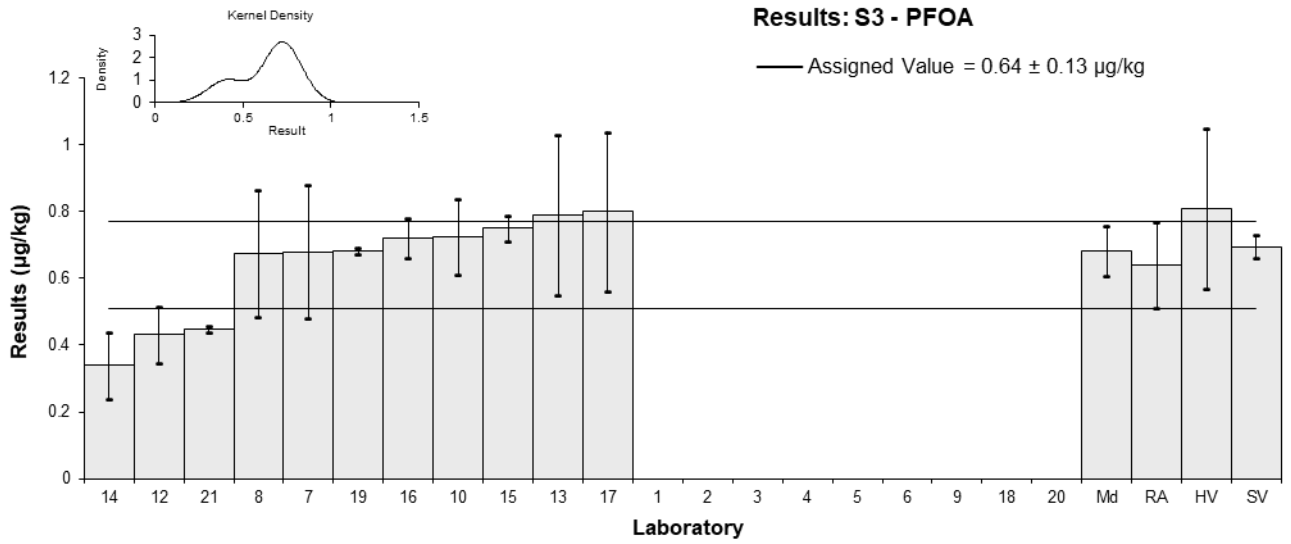
| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFOA |
| **Unit** | µg/kg |

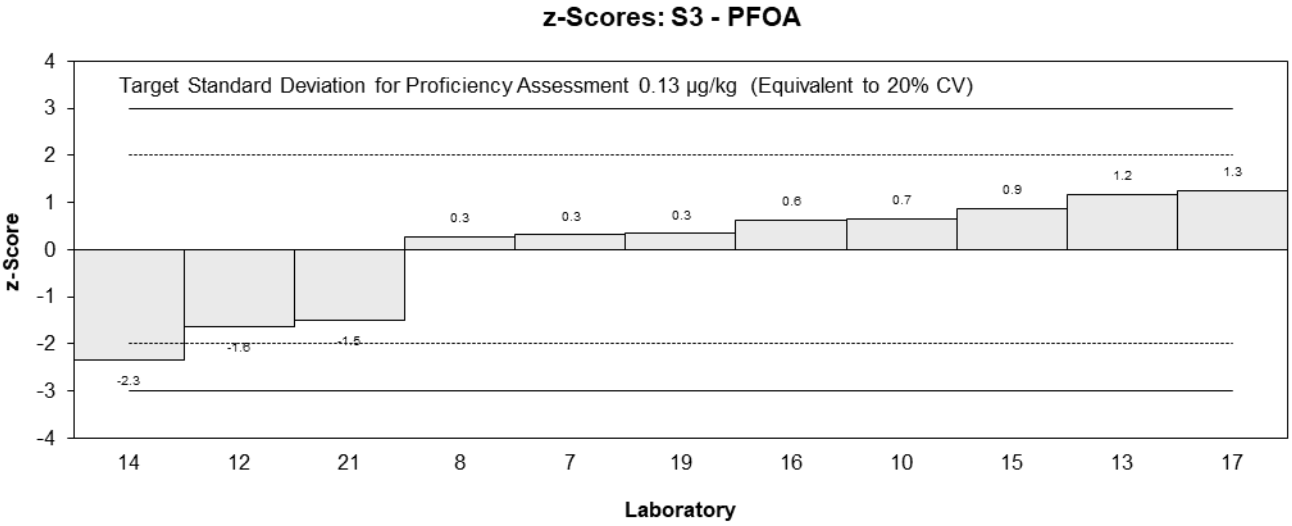
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 0.680 | 0.2 | 82 | 0.31 | 0.17 |
| **8** | 0.675 | 0.19 | 63 | 0.27 | 0.15 |
| **9** | NS | NS | NS | | |
| **10** | 0.725 | 0.112 | 102.2 | 0.66 | 0.50 |
| **12** | 0.431 | 0.0843 | 84.37 | -1.63 | -1.35 |
| **13** | 0.79 | 0.24 | 97 | 1.17 | 0.55 |
| **14** | 0.34 | 0.1 | 101 | -2.34 | -1.83 |
| **15** | 0.75 | 0.04 | 80.5 | 0.86 | 0.81 |
| **16** | 0.72 | 0.06 | NR | 0.62 | 0.56 |
| **17** | 0.8 | 0.24 | 98 | 1.25 | 0.59 |
| **18** | NS | NS | NS | | |
| **19** | 0.683 | 0.011 | 84 | 0.34 | 0.33 |
| **20** | NS | NS | NS | | |
| **21** | 0.447 | 0.009 | 104 | -1.51 | -1.48 |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.64 | 0.13 |
| **Spike Value** | 0.695 | 0.035 |
| **Homogeneity Value** | 0.81 | 0.24 |
| **Robust Average** | 0.64 | 0.13 |
| **Median** | 0.683 | 0.075 |
| **Mean** | 0.640 | |
| **N** | 11 | |
| **Max** | 0.8 | |
| **Min** | 0.34 | |
| **Robust SD** | 0.17 | |
| **Robust CV** | 26% | |


Results: S3 - PFOA
Assigned Value = 0.64 ± 0.13 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
14 12 21 8 7 19 16 10 15 13 17 1 2 3 4 5 6 9 18 20 Md RA HV SV


z-Scores: S3 - PFOA
Target Standard Deviation for Proficiency Assessment 0.13 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
14 12 21 8 7 19 16 10 15 13 17
-2.3
-1.6
-1.5
0.3
0.3
0.3
0.6
0.7
0.9
1.2
1.3

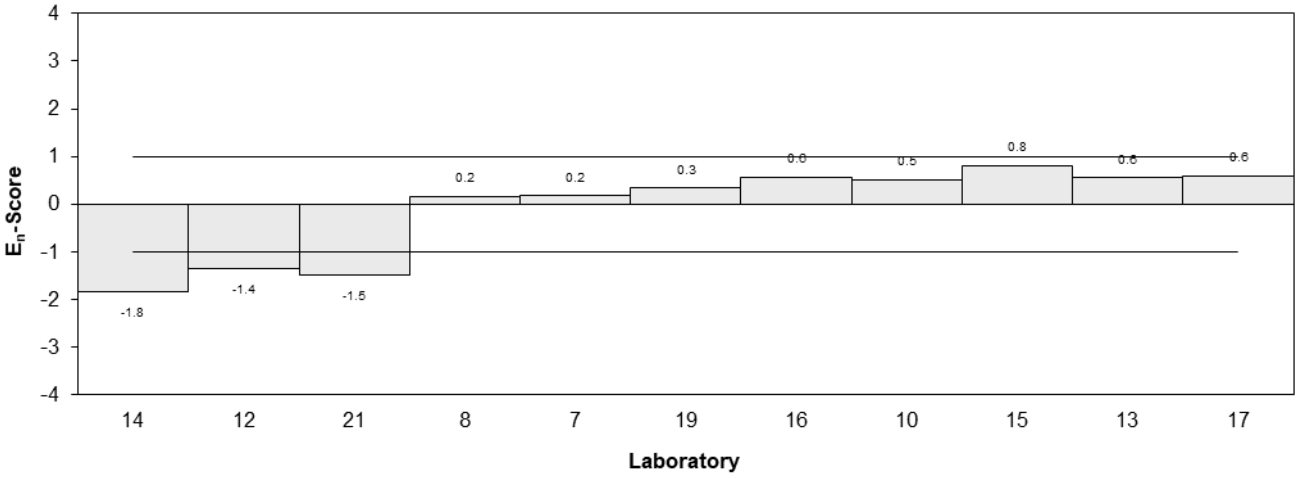

En-Scores: S3 - PFOA
En-Score
Laboratory
14 12 21 8 7 19 16 10 15 13 17
-1.8
-1.4
-1.5
0.2
0.2
0.3
0.6
0.5
0.8
0.6
0.6

Figure 66

Table 70

**Sample Details**

| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFNA |
| **Unit** | µg/kg |

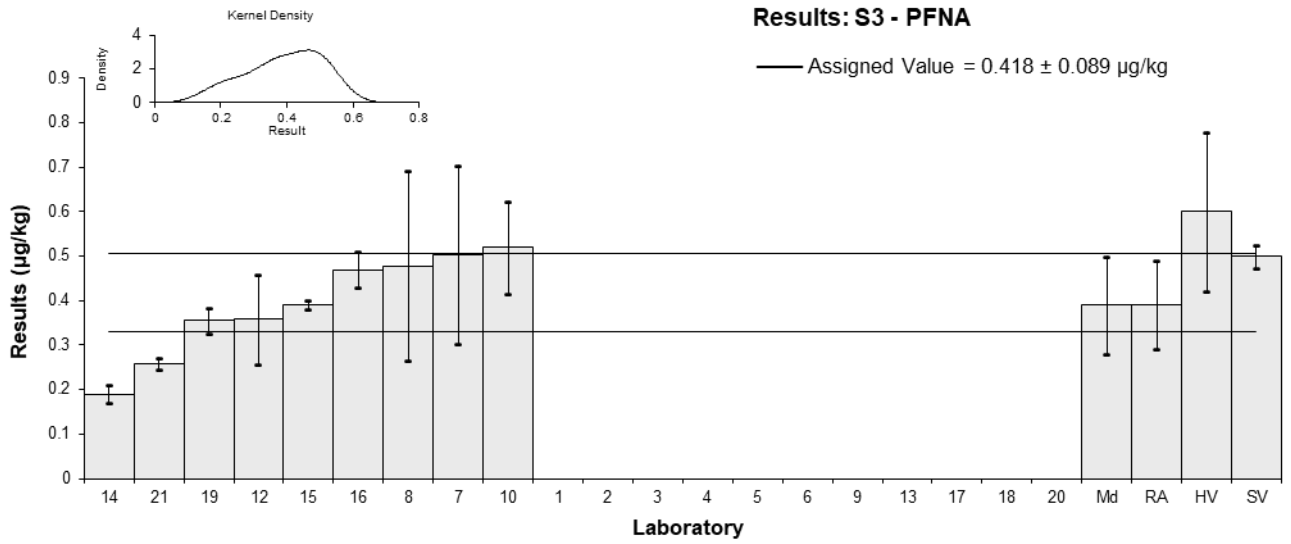
**Participant Results**

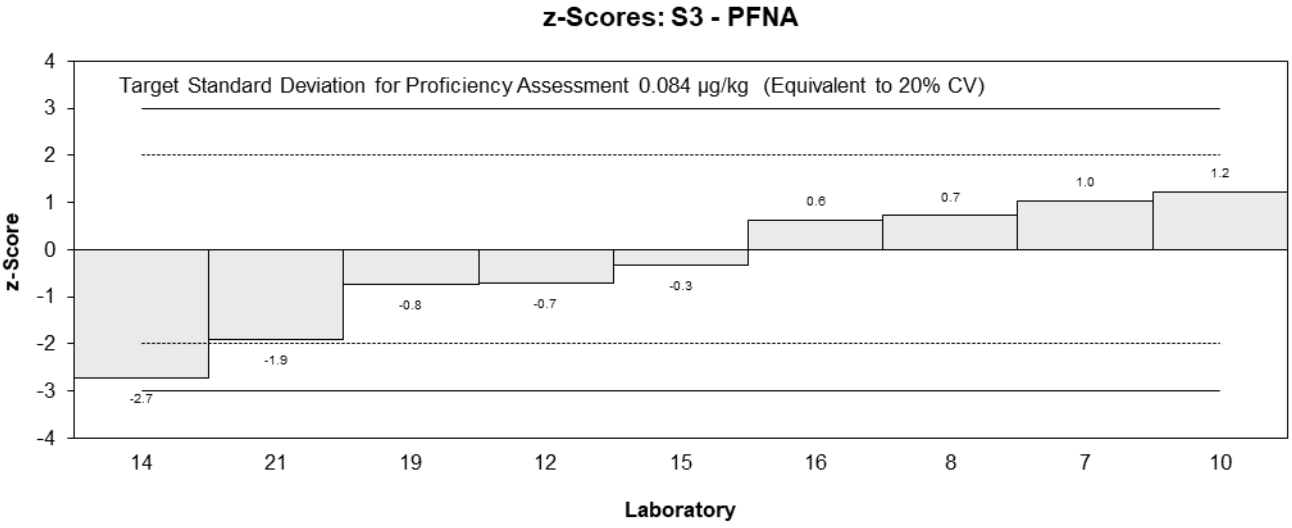
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 0.504 | 0.2 | 80 | 1.03 | 0.39 |
| **8** | 0.478 | 0.213 | 40 | 0.72 | 0.26 |
| **9** | NS | NS | NS | | |
| **10** | 0.52 | 0.104 | NR | 1.22 | 0.75 |
| **12** | 0.358 | 0.100 | 81.17 | -0.72 | -0.45 |
| **13** | <0.5 | NR | 99 | | |
| **14*** | 0.19 | 0.02 | 97 | -2.73 | -2.50 |
| **15** | 0.39 | 0.01 | 83.1 | -0.33 | -0.31 |
| **16** | 0.47 | 0.04 | NR | 0.62 | 0.53 |
| **17** | <0.5 | NR | NR | | |
| **18** | NS | NS | NS | | |
| **19** | 0.355 | 0.028 | 84 | -0.75 | -0.68 |
| **20** | NS | NS | NS | | |
| **21** | 0.259 | 0.013 | 103 | -1.90 | -1.77 |

* Outlier, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.418 | 0.089 |
| **Spike Value** | 0.499 | 0.025 |
| **Homogeneity Value** | 0.60 | 0.18 |
| **Robust Average** | 0.39 | 0.10 |
| **Median** | 0.39 | 0.11 |
| **Mean** | 0.392 | |
| **N** | 9 | |
| **Max** | 0.52 | |
| **Min** | 0.19 | |
| **Robust SD** | 0.13 | |
| **Robust CV** | 32% | |


Kernel Density
Density
Result
Results: S3 - PFNA
Assigned Value = 0.418 ± 0.089 µg/kg
Results (µg/kg)
Laboratory
14 21 19 12 15 16 8 7 10 1 2 3 4 5 6 9 13 17 18 20 Md RA HV SV


z-Scores: S3 - PFNA
Target Standard Deviation for Proficiency Assessment 0.084 µg/kg (Equivalent to 20% CV)
z-Score
-2.7
-1.9
-0.8
-0.7
-0.3
0.6
0.7
1.0
1.2
Laboratory
14 21 19 12 15 16 8 7 10

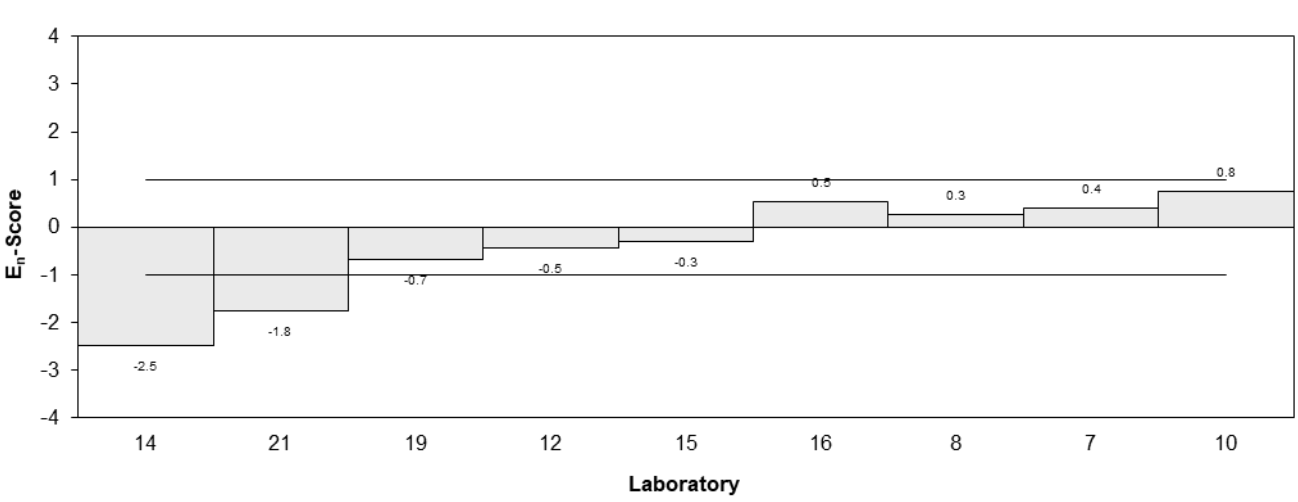

En-Scores: S3 - PFNA
En-Score
-2.5
-1.8
-0.7
-0.5
-0.3
0.5
0.3
0.4
0.8
Laboratory
14 21 19 12 15 16 8 7 10

Figure 67

Table 71

**Sample Details**

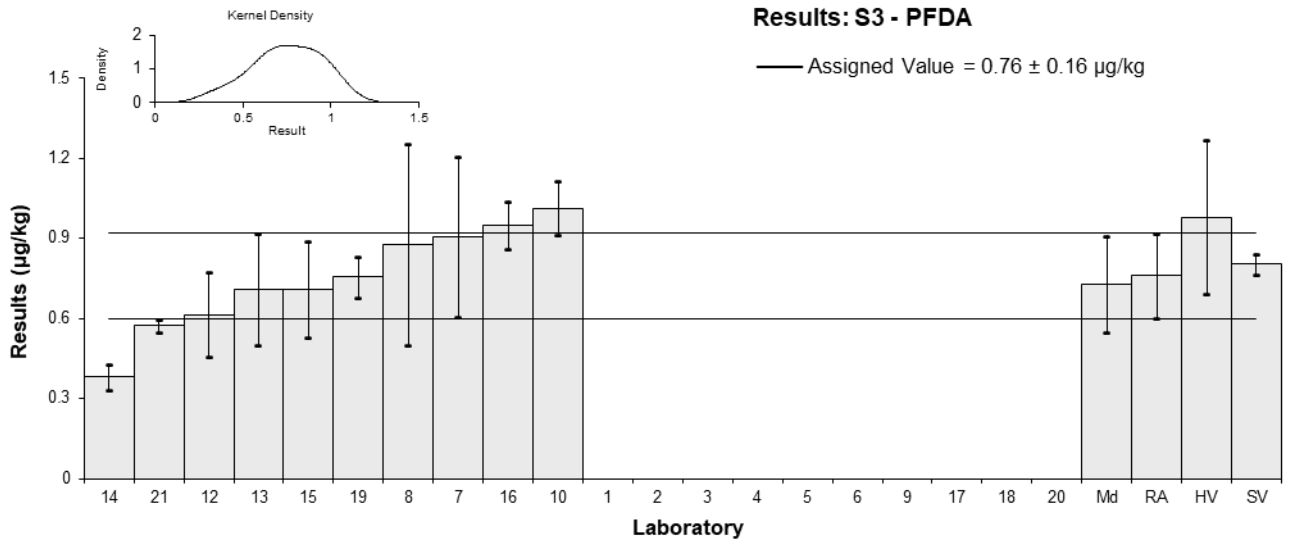
| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFDA |
| **Unit** | µg/kg |

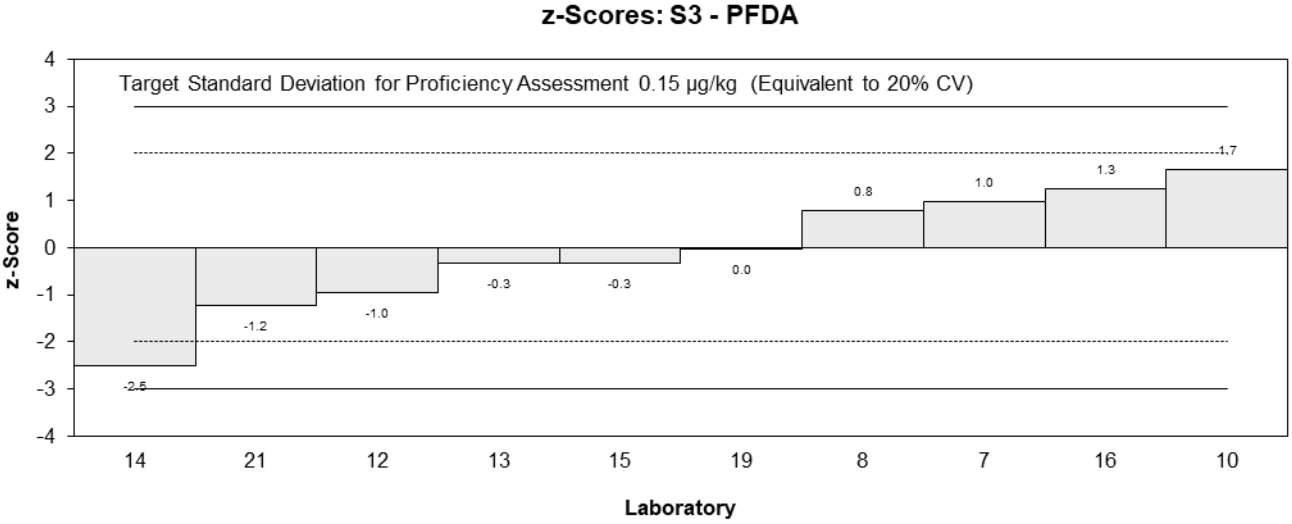
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 0.908 | 0.3 | 79 | 0.97 | 0.44 |
| **8** | 0.878 | 0.376 | 62 | 0.78 | 0.29 |
| **9** | NS | NS | NS | | |
| **10** | 1.013 | 0.101 | NR | 1.66 | 1.34 |
| **12** | 0.614 | 0.158 | 81.87 | -0.96 | -0.65 |
| **13** | 0.71 | 0.21 | 54 | -0.33 | -0.19 |
| **14** | 0.38 | 0.05 | 108 | -2.50 | -2.27 |
| **15** | 0.71 | 0.18 | 111.7 | -0.33 | -0.21 |
| **16** | 0.95 | 0.09 | NR | 1.25 | 1.03 |
| **17** | <0.5 | NR | NR | | |
| **18** | NS | NS | NS | | |
| **19** | 0.755 | 0.075 | 84 | -0.03 | -0.03 |
| **20** | NS | NS | NS | | |
| **21** | 0.572 | 0.026 | 96 | -1.24 | -1.16 |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.76 | 0.16 |
| **Spike Value** | 0.803 | 0.040 |
| **Homogeneity Value** | 0.98 | 0.29 |
| **Robust Average** | 0.76 | 0.16 |
| **Median** | 0.73 | 0.18 |
| **Mean** | 0.75 | |
| **N** | 10 | |
| **Max** | 1.013 | |
| **Min** | 0.38 | |
| **Robust SD** | 0.21 | |
| **Robust CV** | 27% | |


Results: S3 - PFDA
Assigned Value = 0.76 ± 0.16 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
14 21 12 13 15 19 8 7 16 10 1 2 3 4 5 6 9 17 18 20 Md RA HV SV


z-Scores: S3 - PFDA
Target Standard Deviation for Proficiency Assessment 0.15 µg/kg (Equivalent to 20% CV)
z-Score
Laboratory
14 21 12 13 15 19 8 7 16 10
-2.5 -1.2 -1.0 -0.3 -0.3 0.0 0.8 1.0 1.3 1.7

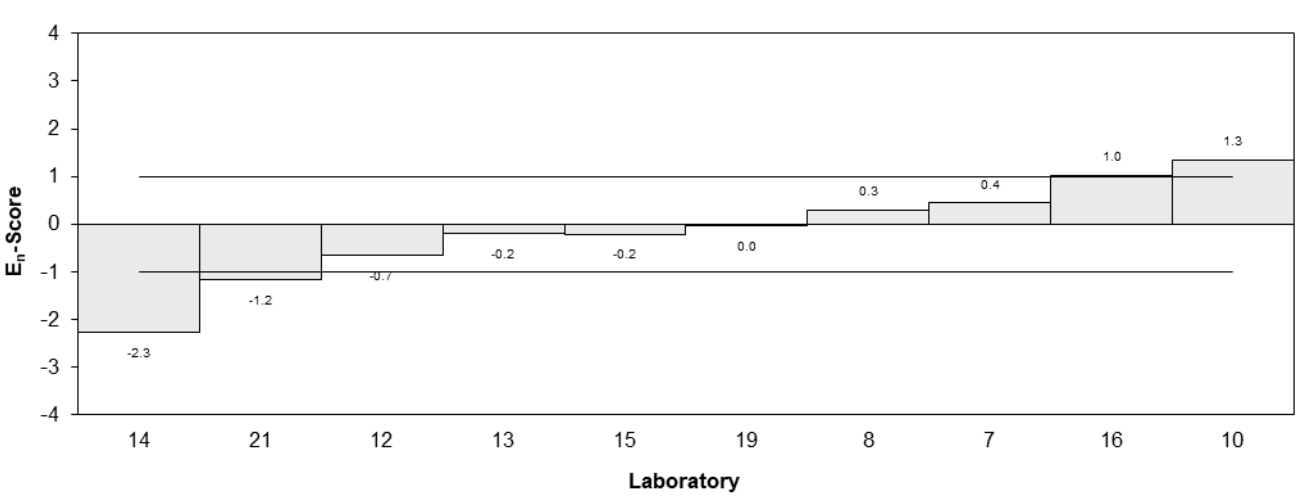

En-Scores: S3 - PFDA
En-Score
Laboratory
14 21 12 13 15 19 8 7 16 10
-2.3 -1.2 -0.7 -0.2 -0.2 0.0 0.3 0.4 1.0 1.3

Figure 68

Table 72

**Sample Details**

| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFUdA |
| **Unit** | µg/kg |

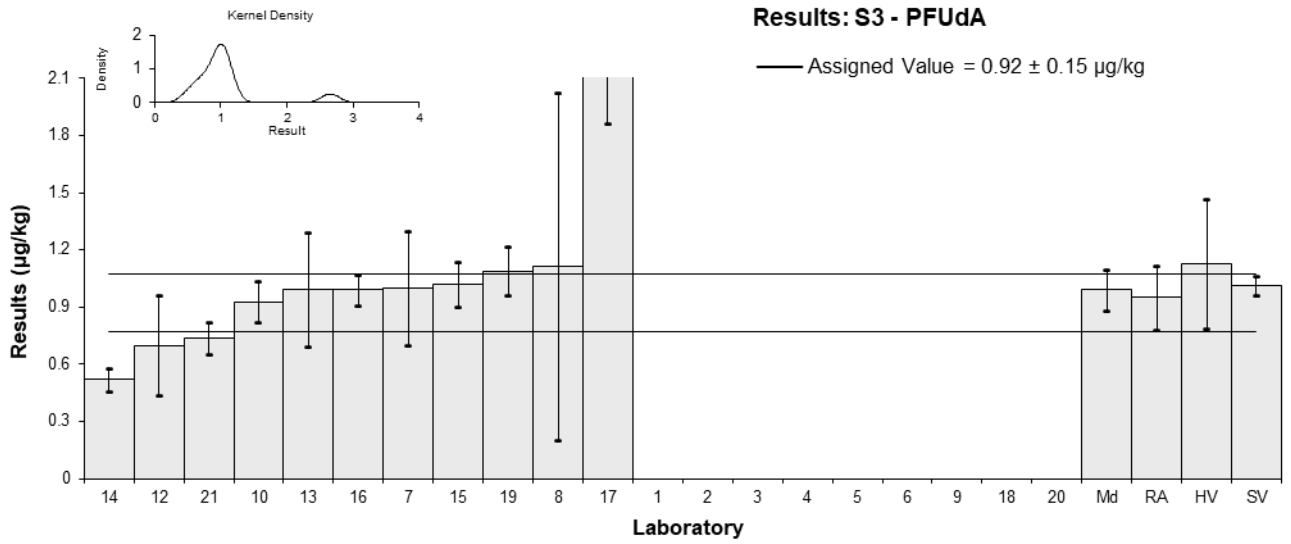
**Participant Results**

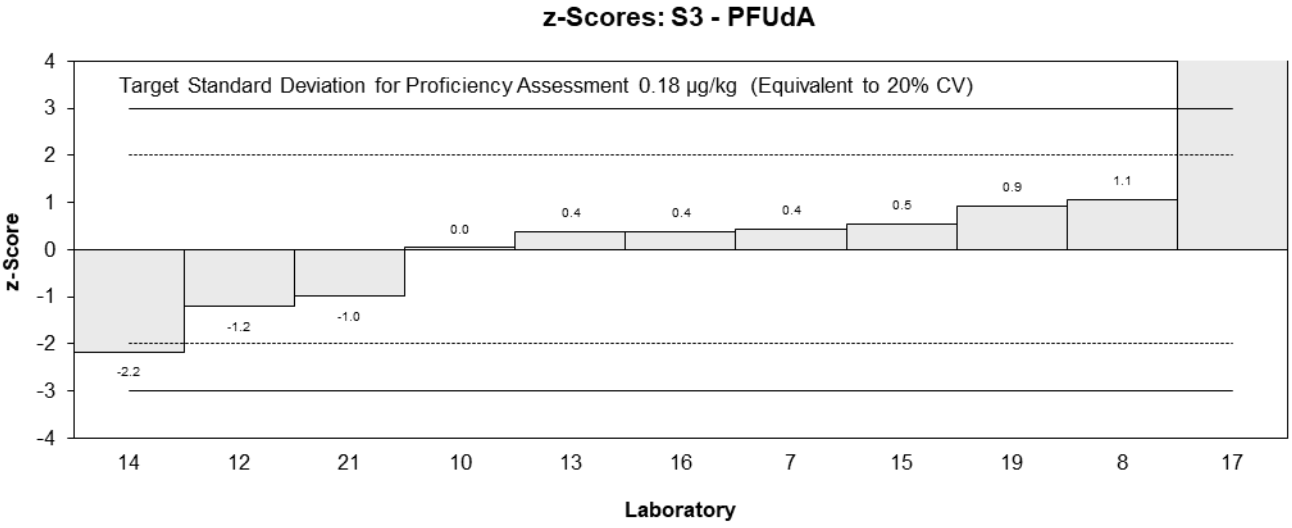
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 1.00 | 0.3 | 82 | 0.43 | 0.24 |
| **8** | 1.114 | 0.911 | 51 | 1.05 | 0.21 |
| **9** | NS | NS | NS | | |
| **10** | 0.928 | 0.109 | 105.9 | 0.04 | 0.04 |
| **12** | 0.699 | 0.264 | 80.57 | -1.20 | -0.73 |
| **13** | 0.99 | 0.30 | 65 | 0.38 | 0.21 |
| **14** | 0.52 | 0.06 | 103 | -2.17 | -2.48 |
| **15** | 1.02 | 0.12 | 87.9 | 0.54 | 0.52 |
| **16** | 0.99 | 0.08 | NR | 0.38 | 0.41 |
| **17*** | 2.66 | 0.796551724 | 58 | 9.46 | 2.15 |
| **18** | NS | NS | NS | | |
| **19** | 1.09 | 0.13 | 76 | 0.92 | 0.86 |
| **20** | NS | NS | NS | | |
| **21** | 0.737 | 0.082 | 92 | -0.99 | -1.07 |

* Outlier, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.92 | 0.15 |
| **Spike Value** | 1.01 | 0.05 |
| **Homogeneity Value** | 1.13 | 0.34 |
| **Robust Average** | 0.95 | 0.17 |
| **Median** | 0.99 | 0.11 |
| **Mean** | 1.07 | |
| **N** | 11 | |
| **Max** | 2.66 | |
| **Min** | 0.52 | |
| **Robust SD** | 0.22 | |
| **Robust CV** | 24% | |


Results: S3 - PFUdA
Assigned Value = 0.92 ± 0.15 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
14 12 21 10 13 16 7 15 19 8 17 1 2 3 4 5 6 9 18 20 Md RA HV SV


z-Scores: S3 - PFUdA
Target Standard Deviation for Proficiency Assessment 0.18 µg/kg (Equivalent to 20% CV)
z-Score
-2.2 -1.2 -1.0 0.0 0.4 0.4 0.4 0.5 0.9 1.1
Laboratory
14 12 21 10 13 16 7 15 19 8 17

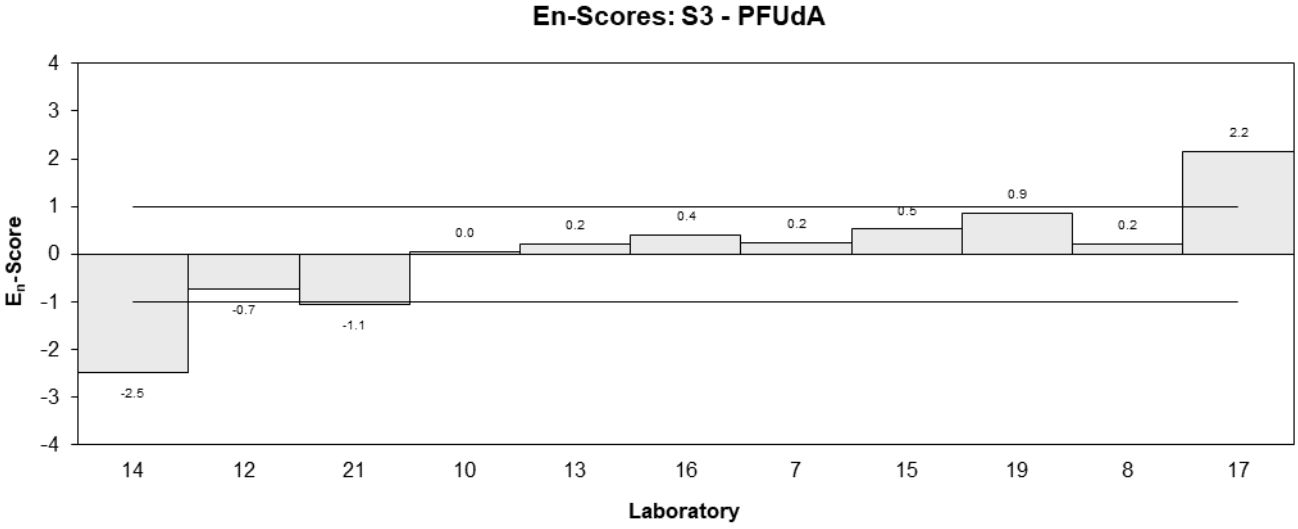

En-Scores: S3 - PFUdA
En-Score
-2.5 -0.7 -1.1 0.0 0.2 0.4 0.2 0.5 0.9 0.2 2.2
Laboratory
14 12 21 10 13 16 7 15 19 8 17

Figure 69

Table 73

**Sample Details**

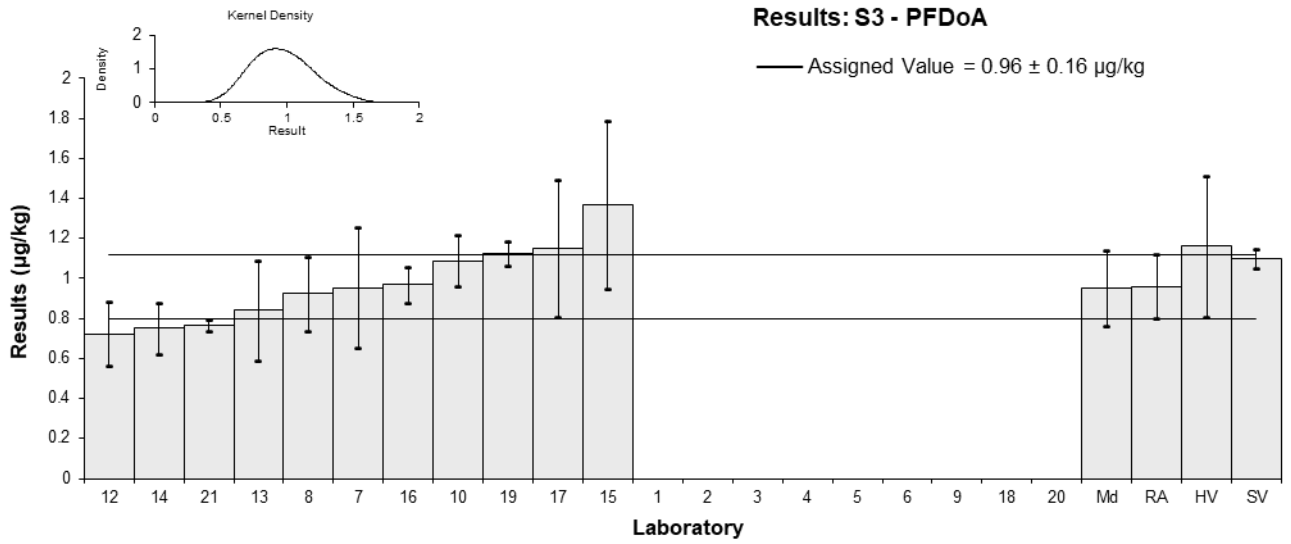
| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFDoA |
| **Unit** | µg/kg |

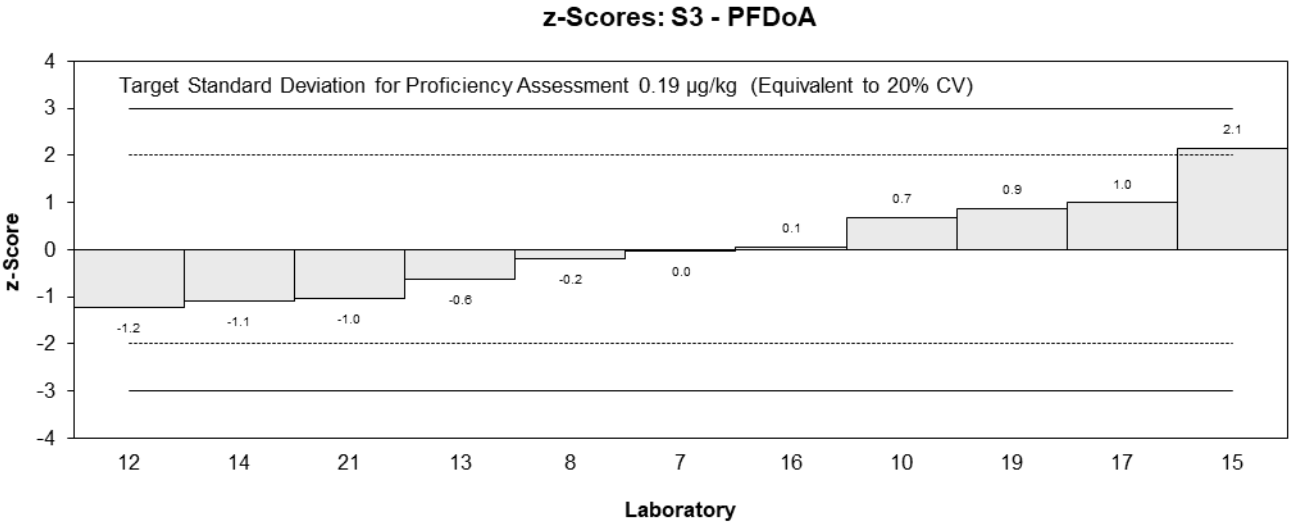
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 0.954 | 0.3 | 72 | -0.03 | -0.02 |
| **8** | 0.924 | 0.186 | 43 | -0.19 | -0.15 |
| **9** | NS | NS | NS | | |
| **10** | 1.088 | 0.129 | 105.9 | 0.67 | 0.62 |
| **12** | 0.723 | 0.160 | 68.8 | -1.23 | -1.05 |
| **13** | 0.84 | 0.25 | 48 | -0.62 | -0.40 |
| **14** | 0.75 | 0.13 | 100 | -1.09 | -1.02 |
| **15** | 1.37 | 0.42 | 70.1 | 2.14 | 0.91 |
| **16** | 0.97 | 0.09 | NR | 0.05 | 0.05 |
| **17** | 1.15 | 0.345 | 40 | 0.99 | 0.50 |
| **18** | NS | NS | NS | | |
| **19** | 1.125 | 0.061 | 73 | 0.86 | 0.96 |
| **20** | NS | NS | NS | | |
| **21** | 0.763 | 0.029 | 92 | -1.03 | -1.21 |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.96 | 0.16 |
| **Spike Value** | 1.10 | 0.05 |
| **Homogeneity Value** | 1.16 | 0.35 |
| **Robust Average** | 0.96 | 0.16 |
| **Median** | 0.95 | 0.19 |
| **Mean** | 0.97 | |
| **N** | 11 | |
| **Max** | 1.37 | |
| **Min** | 0.723 | |
| **Robust SD** | 0.21 | |
| **Robust CV** | 21% | |


Kernel Density
Density
Result
Results: S3 - PFDoA
Assigned Value = 0.96 ± 0.16 µg/kg
Results (µg/kg)
Laboratory
12 14 21 13 8 7 16 10 19 17 15 1 2 3 4 5 6 9 18 20 Md RA HV SV


z-Scores: S3 - PFDoA
Target Standard Deviation for Proficiency Assessment 0.19 µg/kg (Equivalent to 20% CV)
z-Score
-1.2 -1.1 -1.0 -0.6 -0.2 0.0 0.1 0.7 0.9 1.0 2.1
Laboratory
12 14 21 13 8 7 16 10 19 17 15

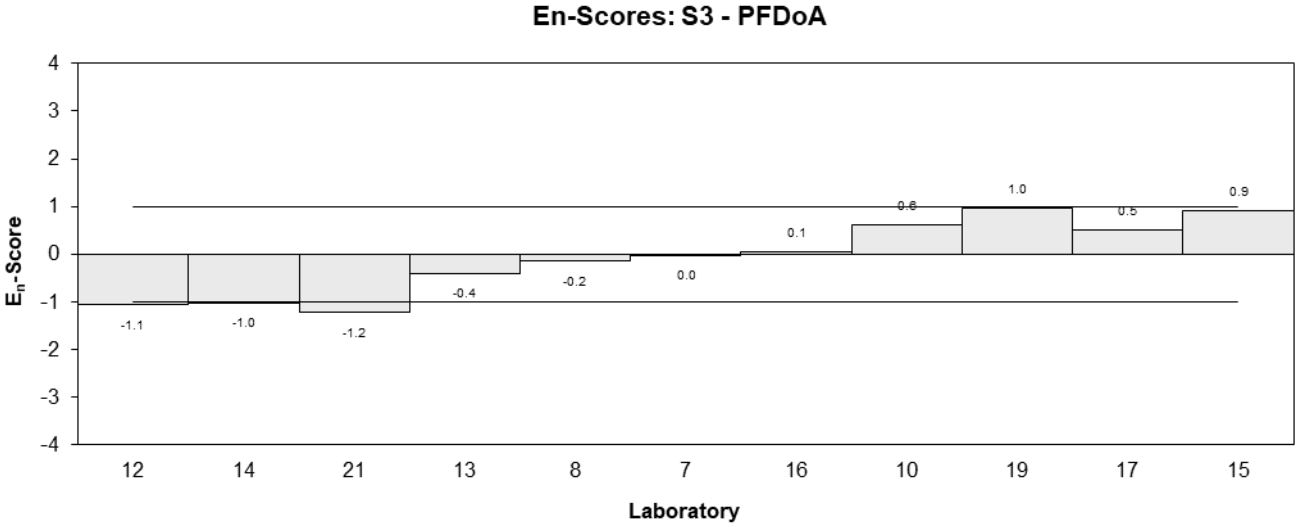

En-Scores: S3 - PFDoA
En-Score
-1.1 -1.0 -1.2 -0.4 -0.2 0.0 0.1 0.6 1.0 0.5 0.9
Laboratory
12 14 21 13 8 7 16 10 19 17 15

Figure 70

Table 74

**Sample Details**

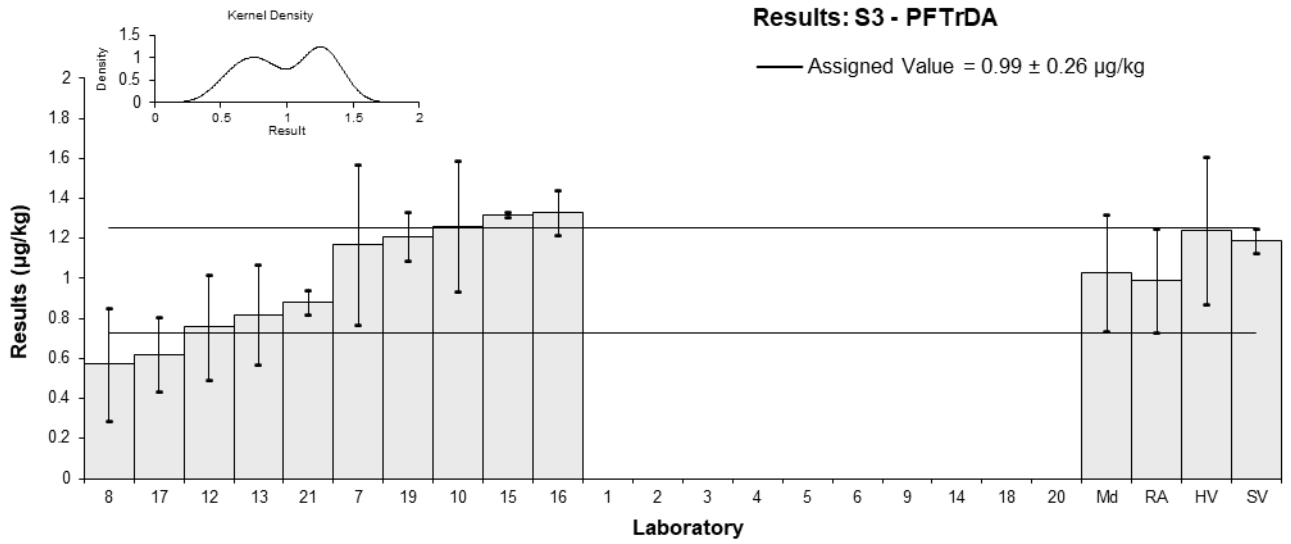
| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFTrDA |
| **Unit** | µg/kg |

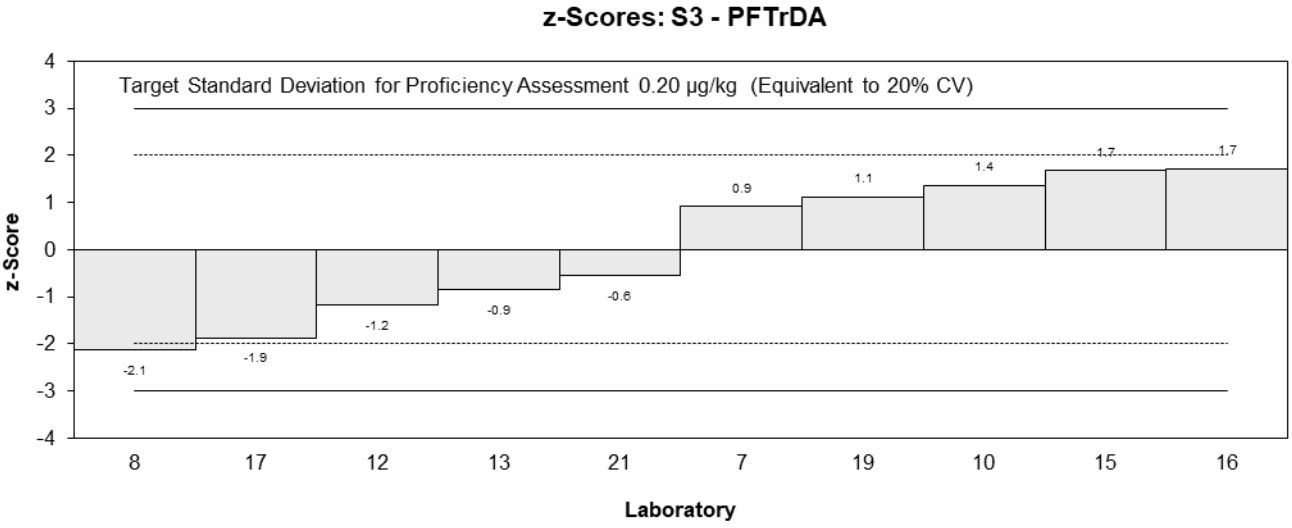
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 1.17 | 0.4 | NR | 0.91 | 0.38 |
| **8** | 0.571 | 0.283 | 43 | -2.12 | -1.09 |
| **9** | NS | NS | NS | | |
| **10** | 1.26 | 0.327 | NR | 1.36 | 0.65 |
| **12** | 0.758 | 0.263 | 69.7 | -1.17 | -0.63 |
| **13** | 0.82 | 0.25 | 46 | -0.86 | -0.47 |
| **14** | < 1.2 | NR | 100 | | |
| **15** | 1.32 | 0.01 | 72.9 | 1.67 | 1.27 |
| **16** | 1.33 | 0.11 | NR | 1.72 | 1.20 |
| **17** | 0.62 | 0.185 | 120 | -1.87 | -1.16 |
| **18** | NS | NS | NS | | |
| **19** | 1.211 | 0.119 | 73 | 1.12 | 0.77 |
| **20** | NS | NS | NS | | |
| **21** | 0.881 | 0.062 | 101 | -0.55 | -0.41 |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.99 | 0.26 |
| **Spike Value** | 1.19 | 0.06 |
| **Homogeneity Value** | 1.24 | 0.37 |
| **Robust Average** | 0.99 | 0.26 |
| **Median** | 1.03 | 0.29 |
| **Mean** | 0.99 | |
| **N** | 10 | |
| **Max** | 1.33 | |
| **Min** | 0.571 | |
| **Robust SD** | 0.34 | |
| **Robust CV** | 34% | |


Kernel Density
Density
Result
Results: S3 - PFTrDA
Assigned Value = 0.99 ± 0.26 µg/kg
Results (µg/kg)
Laboratory
8 17 12 13 21 7 19 10 15 16 1 2 3 4 5 6 9 14 18 20 Md RA HV SV


z-Scores: S3 - PFTrDA
Target Standard Deviation for Proficiency Assessment 0.20 µg/kg (Equivalent to 20% CV)
z-Score
-2.1
-1.9
-1.2
-0.9
-0.6
0.9
1.1
1.4
1.7
1.7
Laboratory
8 17 12 13 21 7 19 10 15 16

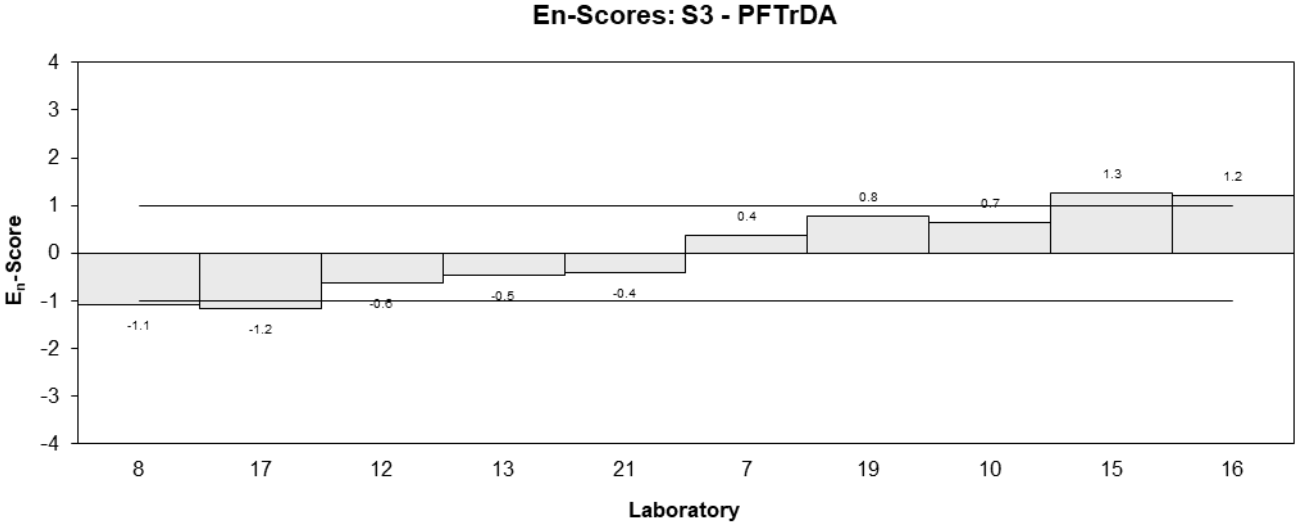

En-Scores: S3 - PFTrDA
En-Score
-1.1
-1.2
-0.6
-0.5
-0.4
0.4
0.8
0.7
1.3
1.2
Laboratory
8 17 12 13 21 7 19 10 15 16

Figure 71

Table 75

**Sample Details**

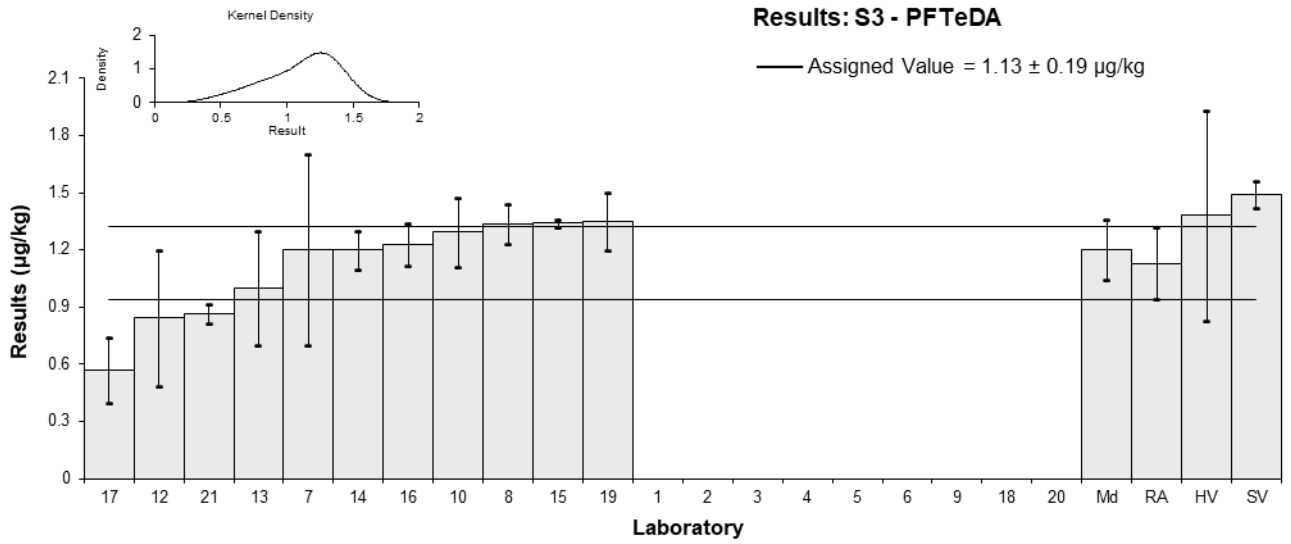
| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | PFTeDA |
| **Unit** | µg/kg |

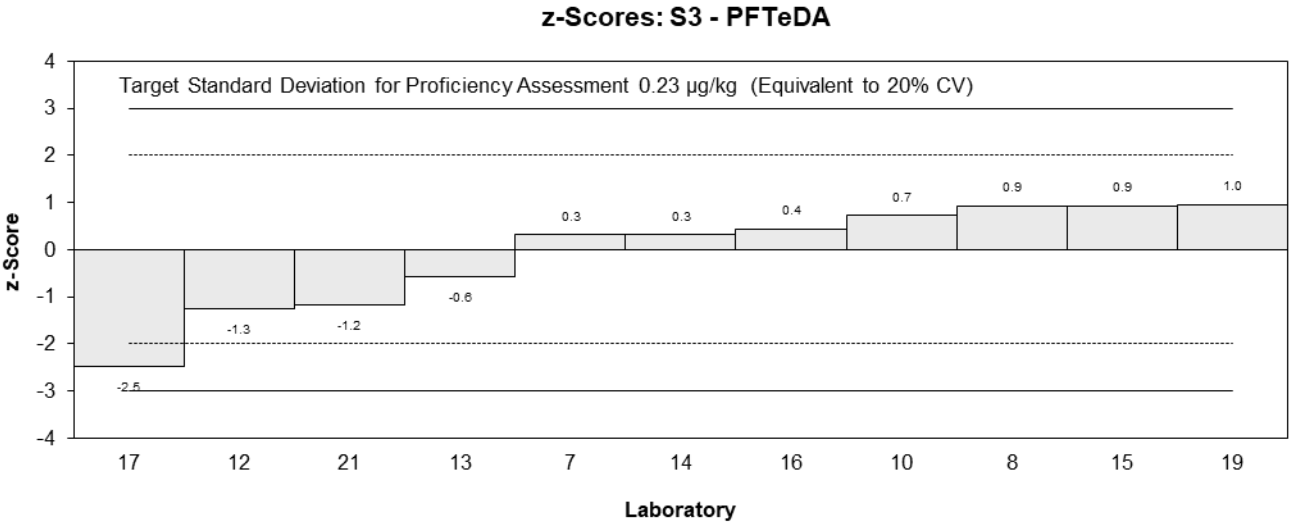
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 1.20 | 0.5 | 68 | 0.31 | 0.13 |
| **8** | 1.337 | 0.106 | 19 | 0.92 | 0.95 |
| **9** | NS | NS | NS | | |
| **10** | 1.292 | 0.181 | 90.4 | 0.72 | 0.62 |
| **12** | 0.842 | 0.356 | 69.7 | -1.27 | -0.71 |
| **13** | 1.00 | 0.30 | 30 | -0.58 | -0.37 |
| **14** | 1.2 | 0.1 | 91 | 0.31 | 0.33 |
| **15** | 1.34 | 0.02 | 72.9 | 0.93 | 1.10 |
| **16** | 1.23 | 0.11 | NR | 0.44 | 0.46 |
| **17** | 0.57 | 0.172093023 | 129 | -2.48 | -2.18 |
| **18** | NS | NS | NS | | |
| **19** | 1.347 | 0.151 | 59 | 0.96 | 0.89 |
| **20** | NS | NS | NS | | |
| **21** | 0.865 | 0.048 | 101 | -1.17 | -1.35 |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 1.13 | 0.19 |
| **Spike Value** | 1.49 | 0.07 |
| **Homogeneity Value** | 1.38 | 0.55 |
| **Robust Average** | 1.13 | 0.19 |
| **Median** | 1.20 | 0.16 |
| **Mean** | 1.11 | |
| **N** | 11 | |
| **Max** | 1.347 | |
| **Min** | 0.57 | |
| **Robust SD** | 0.25 | |
| **Robust CV** | 22% | |


Results: S3 - PFTeDA
Assigned Value = 1.13 ± 0.19 µg/kg
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
17 12 21 13 7 14 16 10 8 15 19 1 2 3 4 5 6 9 18 20 Md RA HV SV


z-Scores: S3 - PFTeDA
Target Standard Deviation for Proficiency Assessment 0.23 µg/kg (Equivalent to 20% CV)
z-Score
-2.5
-1.3
-1.2
-0.6
0.3
0.3
0.4
0.7
0.9
0.9
1.0
Laboratory
17 12 21 13 7 14 16 10 8 15 19

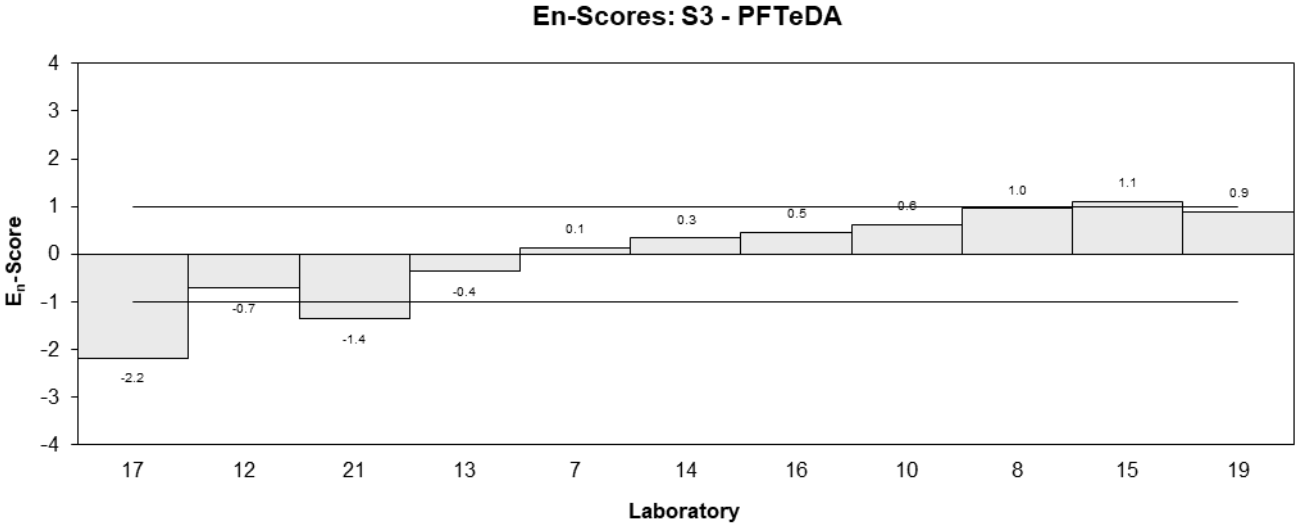

En-Scores: S3 - PFTeDA
En-Score
-2.2
-0.7
-1.4
-0.4
0.1
0.3
0.5
0.6
1.0
1.1
0.9
Laboratory
17 12 21 13 7 14 16 10 8 15 19

Figure 72

Table 76

**Sample Details**

| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | MeFOSAA |
| **Unit** | µg/kg |

**Participant Results**

| Lab. Code | Result | Uncertainty | Rec |
|---|---|---|---|
| **1** | NS | NS | NS |
| **2** | NS | NS | NS |
| **3** | NS | NS | NS |
| **4** | NS | NS | NS |
| **5** | NS | NS | NS |
| **6** | NS | NS | NS |
| **7** | 1.73 | 0.5 | 70 |
| **8** | 1.69 | 0.548 | 58 |
| **9** | NS | NS | NS |
| **10** | NT | NT | NT |
| **12** | 1.18 | 0.126 | 51.5 |
| **13** | 1.69 | 0.51 | 64 |
| **14** | 0.95 | 0.14 | 95 |
| **15** | NT | NT | NT |
| **16** | NT | NT | NT |
| **17** | 2.90 | 0.868656716 | 67 |
| **18** | NS | NS | NS |
| **19** | NT | NT | NT |
| **20** | NS | NS | NS |
| **21** | NT | NT | NT |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | Not Set | |
| **Spike Value** | 1.99 | 0.10 |
| **Homogeneity Value** | 1.91 | 0.57 |
| **Robust Average** | 1.65 | 0.67 |
| **Median** | 1.69 | 0.42 |
| **Mean** | 1.69 | |
| **N** | 6 | |
| **Max** | 2.9 | |
| **Min** | 0.95 | |
| **Robust SD** | 0.66 | |
| **Robust CV** | 40% | |

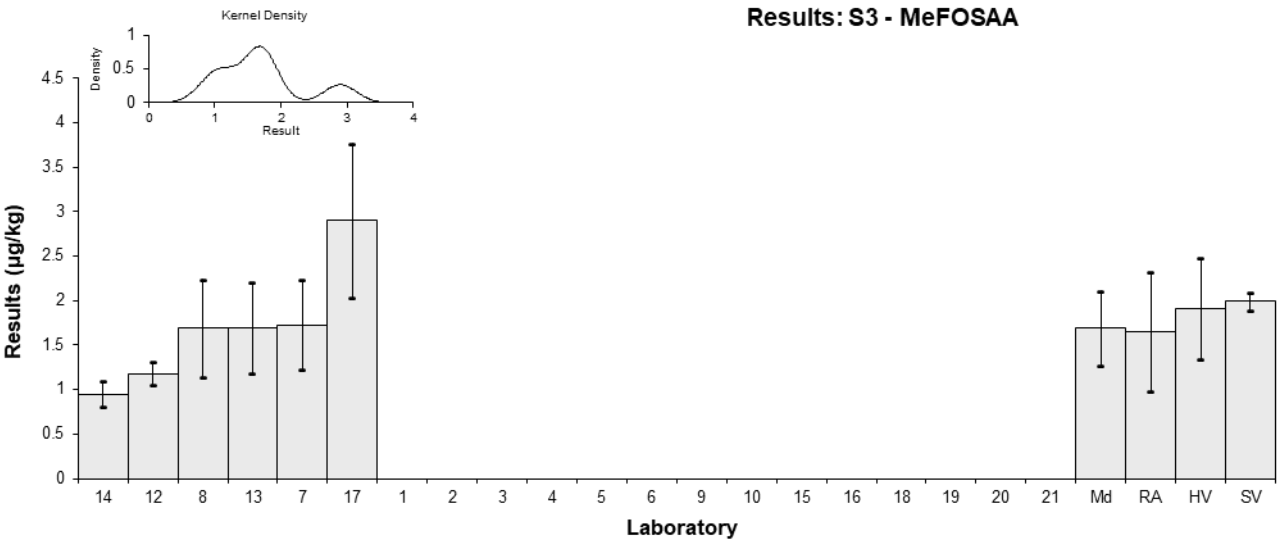

Results: S3 - MeFOSAA
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
14
12
8
13
7
17
1
2
3
4
5
6
9
10
15
16
18
19
20
21
Md
RA
HV
SV

Figure 73

Table 77

**Sample Details**

| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | EtFOSAA |
| **Unit** | µg/kg |

**Participant Results**

| Lab. Code | Result | Uncertainty | Rec |
|---|---|---|---|
| **1** | NS | NS | NS |
| **2** | NS | NS | NS |
| **3** | NS | NS | NS |
| **4** | NS | NS | NS |
| **5** | NS | NS | NS |
| **6** | NS | NS | NS |
| **7** | 1.77 | 0.5 | 81 |
| **8** | 1.697 | 0.647 | 32 |
| **9** | NS | NS | NS |
| **10** | NT | NT | NT |
| **12** | 1.41 | 0.0658 | 51.5 |
| **13** | 1.69 | 0.51 | 66 |
| **14** | 0.94 | 0.15 | 87 |
| **15** | NT | NT | NT |
| **16** | NT | NT | NT |
| **17** | 3.1 | 0.93 | 70 |
| **18** | NS | NS | NS |
| **19** | NT | NT | NT |
| **20** | NS | NS | NS |
| **21** | NT | NT | NT |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | Not Set | |
| **Spike Value** | 1.99 | 0.10 |
| **Homogeneity Value** | 1.99 | 0.60 |
| **Robust Average** | 1.69 | 0.64 |
| **Median** | 1.69 | 0.27 |
| **Mean** | 1.77 | |
| **N** | 6 | |
| **Max** | 3.1 | |
| **Min** | 0.94 | |
| **Robust SD** | 0.63 | |
| **Robust CV** | 37% | |

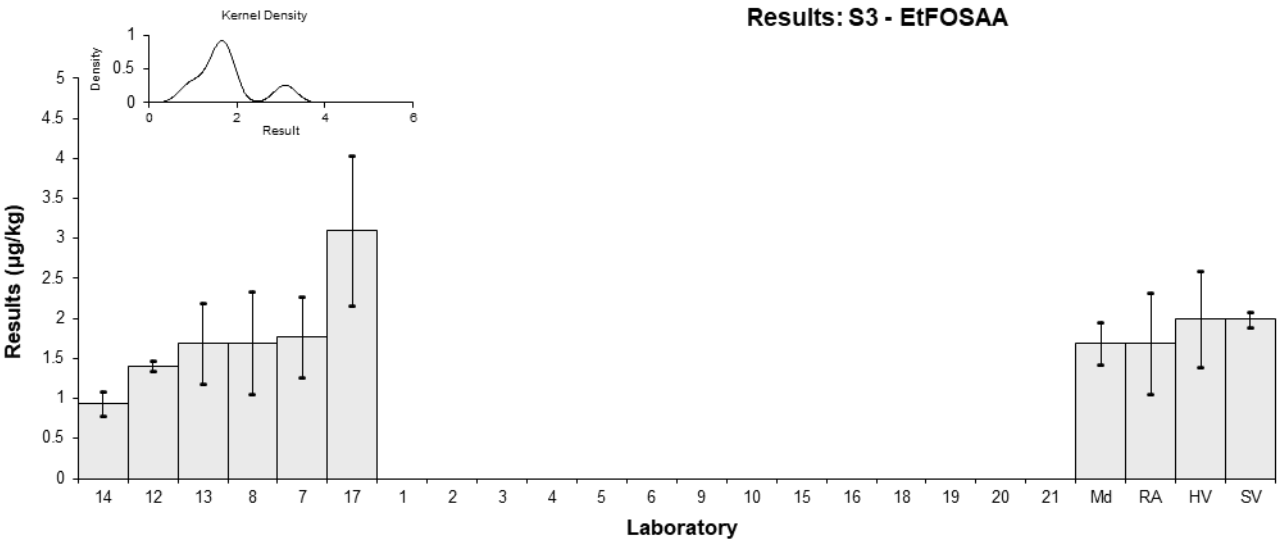

Results: S3 - EtFOSAA
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
14
12
13
8
7
17
1
2
3
4
5
6
9
10
15
16
18
19
20
21
Md
RA
HV
SV

Figure 74

Table 78

**Sample Details**

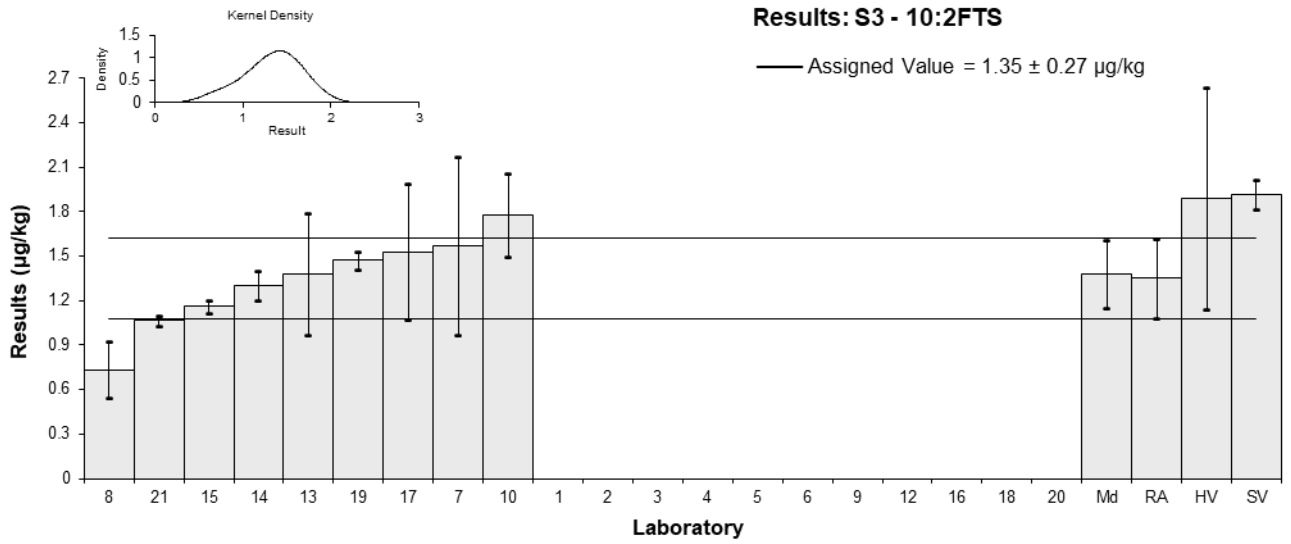
| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | 10:2FTS |
| **Unit** | µg/kg |

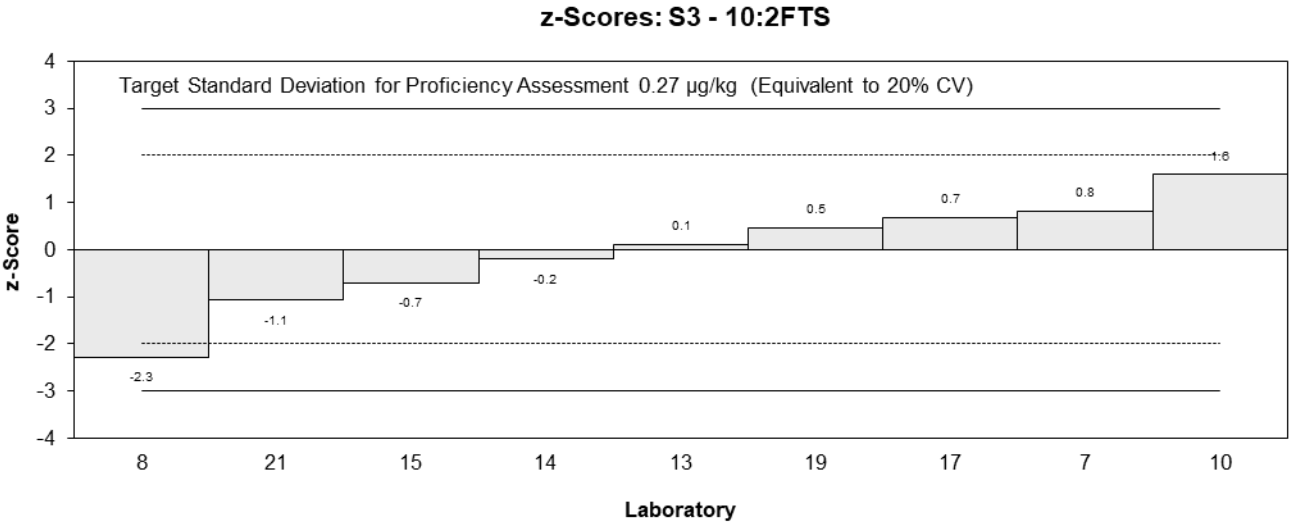
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 1.57 | 0.6 | NR | 0.81 | 0.33 |
| **8** | 0.734 | 0.191 | 128 | -2.28 | -1.86 |
| **9** | NS | NS | NS | | |
| **10** | 1.778 | 0.279 | 162.9 | 1.59 | 1.10 |
| **12** | NT | NT | NT | | |
| **13** | 1.38 | 0.41 | 71 | 0.11 | 0.06 |
| **14** | 1.3 | 0.1 | 103 | -0.19 | -0.17 |
| **15** | 1.16 | 0.04 | 103.6 | -0.70 | -0.70 |
| **16** | NT | NT | NT | | |
| **17** | 1.53 | 0.459782608 | 92 | 0.67 | 0.34 |
| **18** | NS | NS | NS | | |
| **19** | 1.472 | 0.059 | 71 | 0.45 | 0.44 |
| **20** | NS | NS | NS | | |
| **21** | 1.065 | 0.036 | 88 | -1.06 | -1.05 |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 1.35 | 0.27 |
| **Spike Value** | 1.92 | 0.10 |
| **Homogeneity Value** | 1.89 | 0.75 |
| **Robust Average** | 1.35 | 0.27 |
| **Median** | 1.38 | 0.23 |
| **Mean** | 1.33 | |
| **N** | 9 | |
| **Max** | 1.778 | |
| **Min** | 0.734 | |
| **Robust SD** | 0.32 | |
| **Robust CV** | 24% | |


Kernel Density
Density
Result
Results: S3 - 10:2FTS
Assigned Value = 1.35 ± 0.27 µg/kg
Results (µg/kg)
Laboratory
8 21 15 14 13 19 17 7 10 1 2 3 4 5 6 9 12 16 18 20 Md RA HV SV


z-Scores: S3 - 10:2FTS
Target Standard Deviation for Proficiency Assessment 0.27 µg/kg (Equivalent to 20% CV)
z-Score
-2.3
-1.1
-0.7
-0.2
0.1
0.5
0.7
0.8
1.6
Laboratory
8 21 15 14 13 19 17 7 10

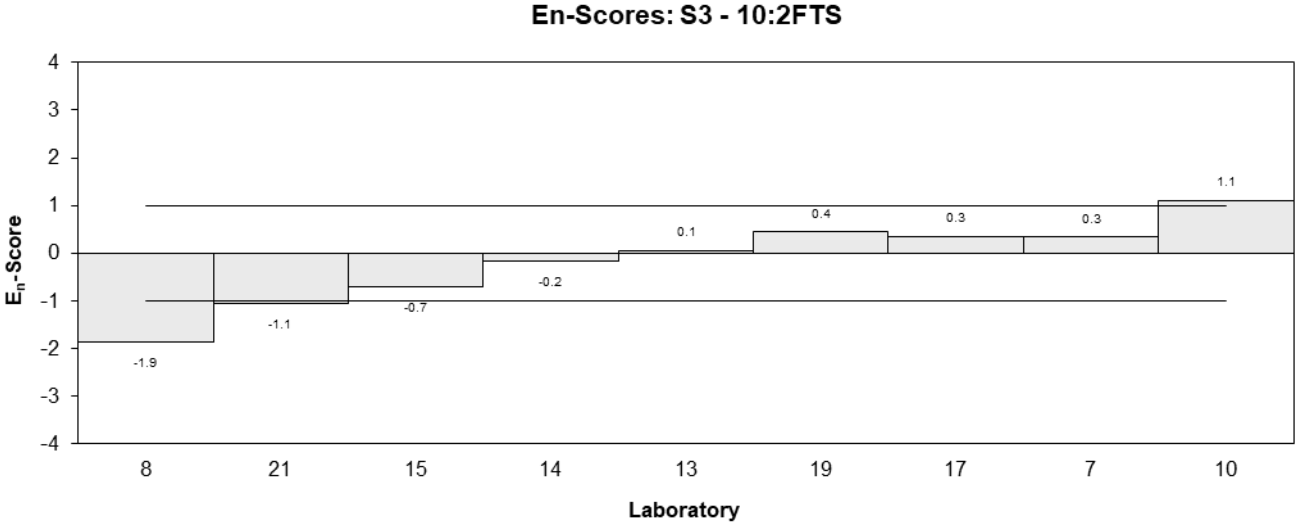

En-Scores: S3 - 10:2FTS
En-Score
-1.9
-1.1
-0.7
-0.2
0.1
0.4
0.3
0.3
1.1
Laboratory
8 21 15 14 13 19 17 7 10

Figure 75

Table 79

**Sample Details**

| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | GenX |
| **Unit** | µg/kg |

**Participant Results**

| Lab. Code | Result | Uncertainty | Rec |
|---|---|---|---|
| **1** | NS | NS | NS |
| **2** | NS | NS | NS |
| **3** | NS | NS | NS |
| **4** | NS | NS | NS |
| **5** | NS | NS | NS |
| **6** | NS | NS | NS |
| **7** | 0.107 | 0.03 | 75 |
| **8** | <2.0 | NR | 75 |
| **9** | NS | NS | NS |
| **10** | 0.113 | 0.162 | 90.9 |
| **12** | <0.0453 | NR | 1.3 |
| **13** | <0.5 | NR | 91 |
| **14** | < 0.36 | NR | 92 |
| **15** | <0.62 | NR | 79.6 |
| **16** | 0.08 | 0.03 | NR |
| **17** | NT | NT | NT |
| **18** | NS | NS | NS |
| **19** | NR | NR | 80 |
| **20** | NS | NS | NS |
| **21** | NR | NR | 89 |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | Not Set | |
| **Spike Value** | 0.994 | 0.050 |
| **Homogeneity Value** | 0.119 | 0.036 |
| **Robust Average** | NA (N<6) | |
| **Median** | 0.107 | 0.013 |
| **Mean** | 0.100 | |
| **N** | 3 | |
| **Max** | 0.113 | |
| **Min** | 0.08 | |
| **Robust SD** | NA (N<6) | |
| **Robust CV** | NA (N<6) | |

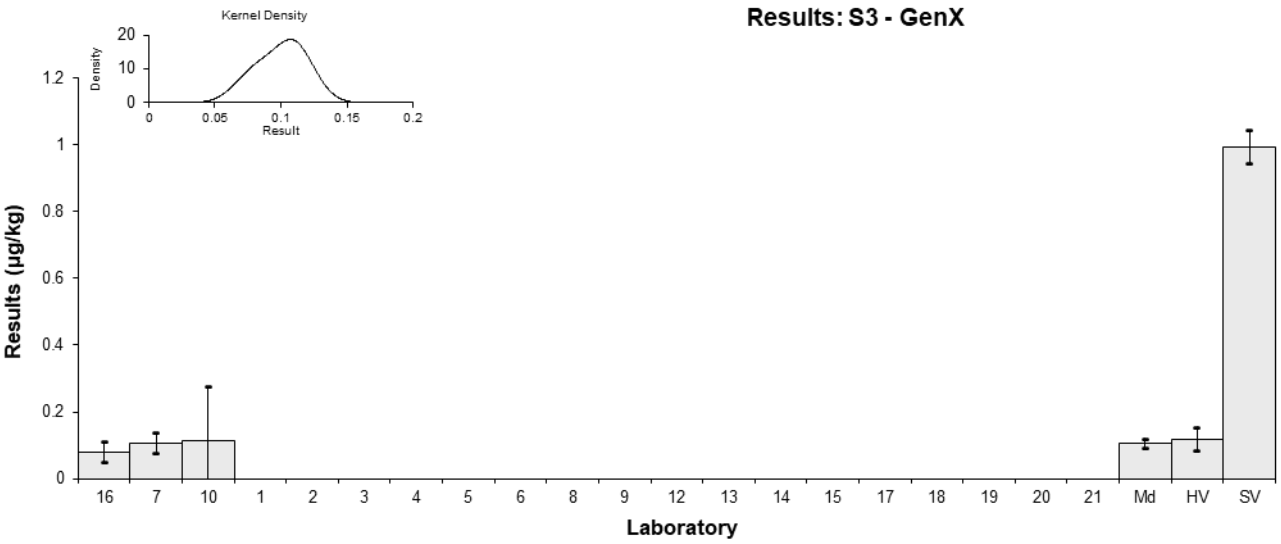

Results: S3 - GenX
Kernel Density
Density
Result
Results (µg/kg)
Laboratory
16
7
10
1
2
3
4
5
6
8
9
12
13
14
15
17
18
19
20
21
Md
HV
SV

Figure 76

Table 80

**Sample Details**

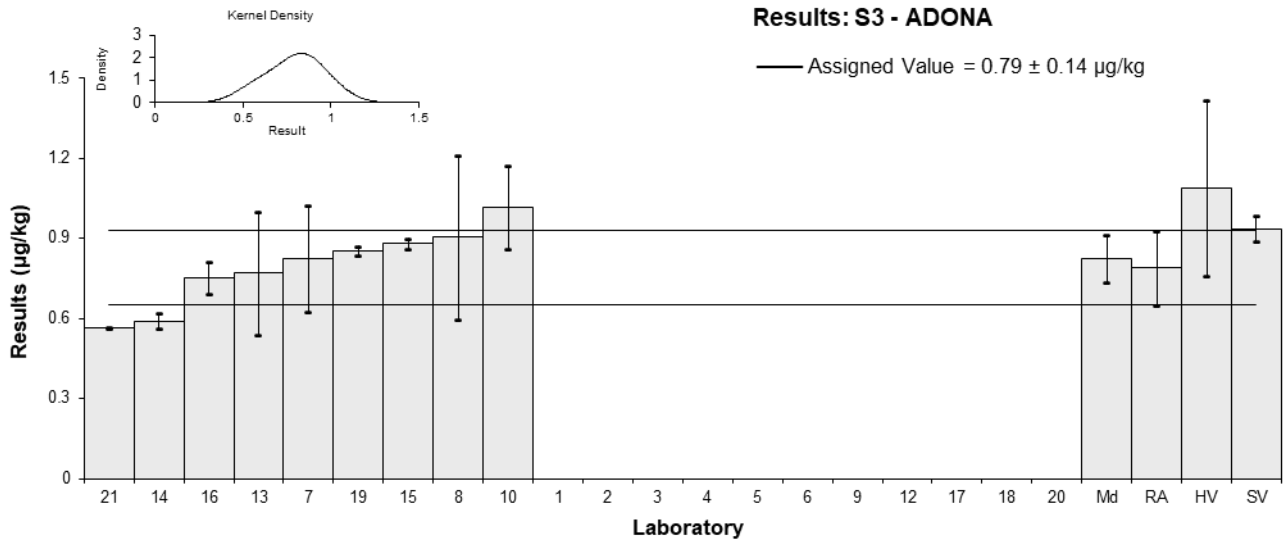
| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | ADONA |
| **Unit** | µg/kg |

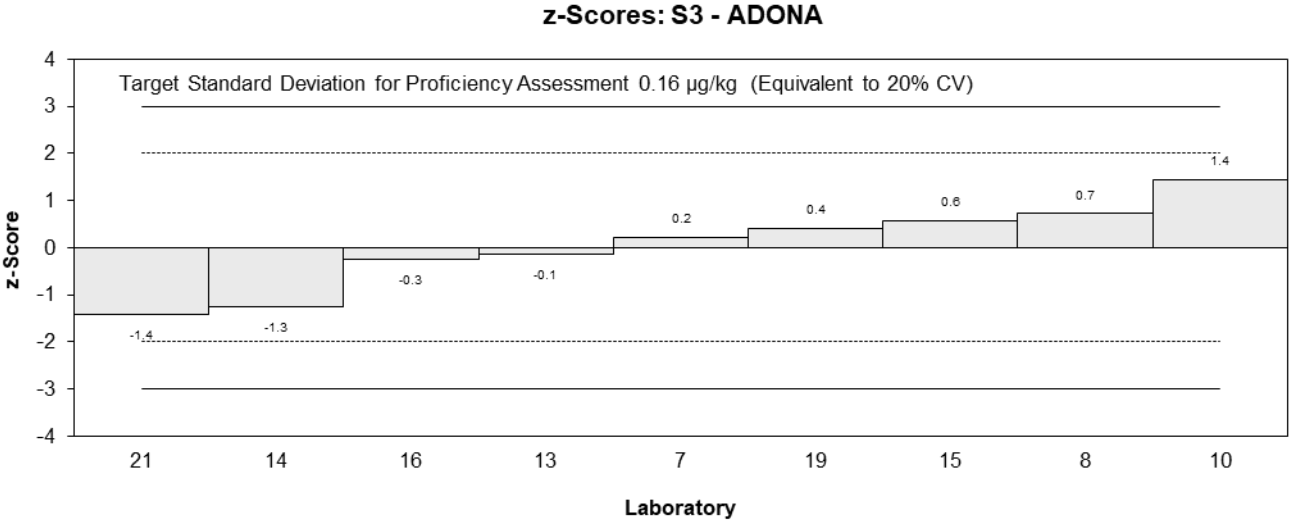
**Participant Results**

| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 0.823 | 0.2 | NR | 0.21 | 0.14 |
| **8** | 0.904 | 0.307 | 54 | 0.72 | 0.34 |
| **9** | NS | NS | NS | | |
| **10** | 1.017 | 0.155 | NR | 1.44 | 1.09 |
| **12** | NT | NT | NT | | |
| **13** | 0.77 | 0.23 | 95 | -0.13 | -0.07 |
| **14** | 0.59 | 0.03 | 96 | -1.27 | -1.40 |
| **15** | 0.88 | 0.02 | 79.6 | 0.57 | 0.64 |
| **16** | 0.75 | 0.06 | NR | -0.25 | -0.26 |
| **17** | <0.5 | NR | NR | | |
| **18** | NS | NS | NS | | |
| **19** | 0.853 | 0.018 | 84 | 0.40 | 0.45 |
| **20** | NS | NS | NS | | |
| **21** | 0.565 | 0.002 | 104 | -1.42 | -1.61 |

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.79 | 0.14 |
| **Spike Value** | 0.936 | 0.047 |
| **Homogeneity Value** | 1.09 | 0.33 |
| **Robust Average** | 0.79 | 0.14 |
| **Median** | 0.823 | 0.090 |
| **Mean** | 0.795 | |
| **N** | 9 | |
| **Max** | 1.017 | |
| **Min** | 0.565 | |
| **Robust SD** | 0.17 | |
| **Robust CV** | 21% | |


Kernel Density
Density
Result
Results: S3 - ADONA
Assigned Value = 0.79 ± 0.14 µg/kg
Results (µg/kg)
Laboratory
21 14 16 13 7 19 15 8 10 1 2 3 4 5 6 9 12 17 18 20 Md RA HV SV


z-Scores: S3 - ADONA
Target Standard Deviation for Proficiency Assessment 0.16 µg/kg (Equivalent to 20% CV)
z-Score
-1.4
-1.3
-0.3
-0.1
0.2
0.4
0.6
0.7
1.4
Laboratory
21 14 16 13 7 19 15 8 10

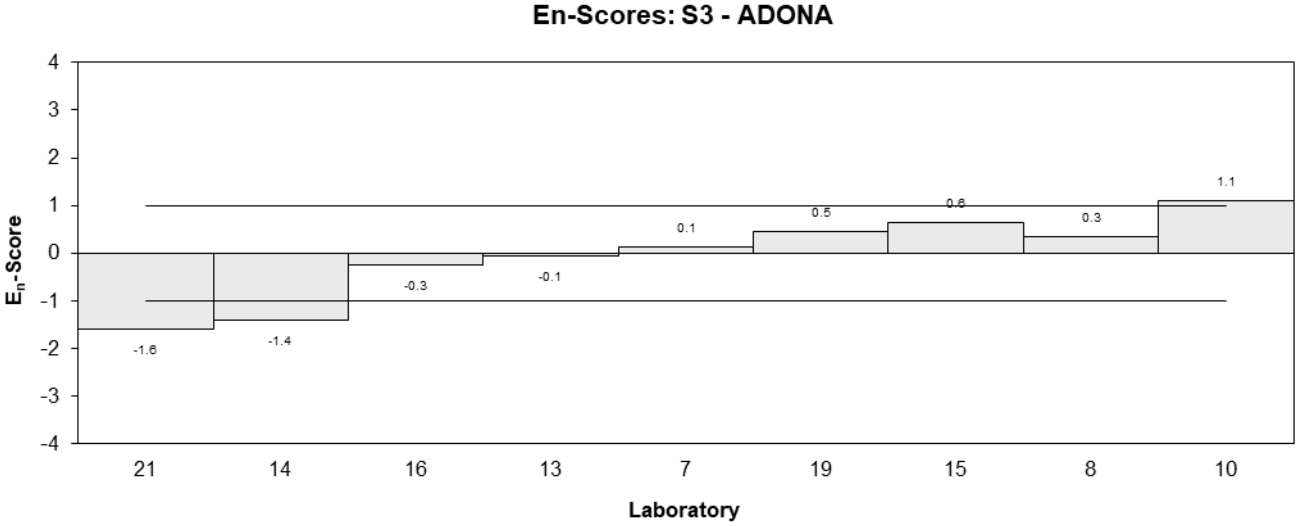

En-Scores: S3 - ADONA
En-Score
-1.6
-1.4
-0.3
-0.1
0.1
0.5
0.6
0.3
1.1
Laboratory
21 14 16 13 7 19 15 8 10

Figure 77

Table 81

**Sample Details**

| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | 9Cl-PF3ONS |
| **Unit** | µg/kg |

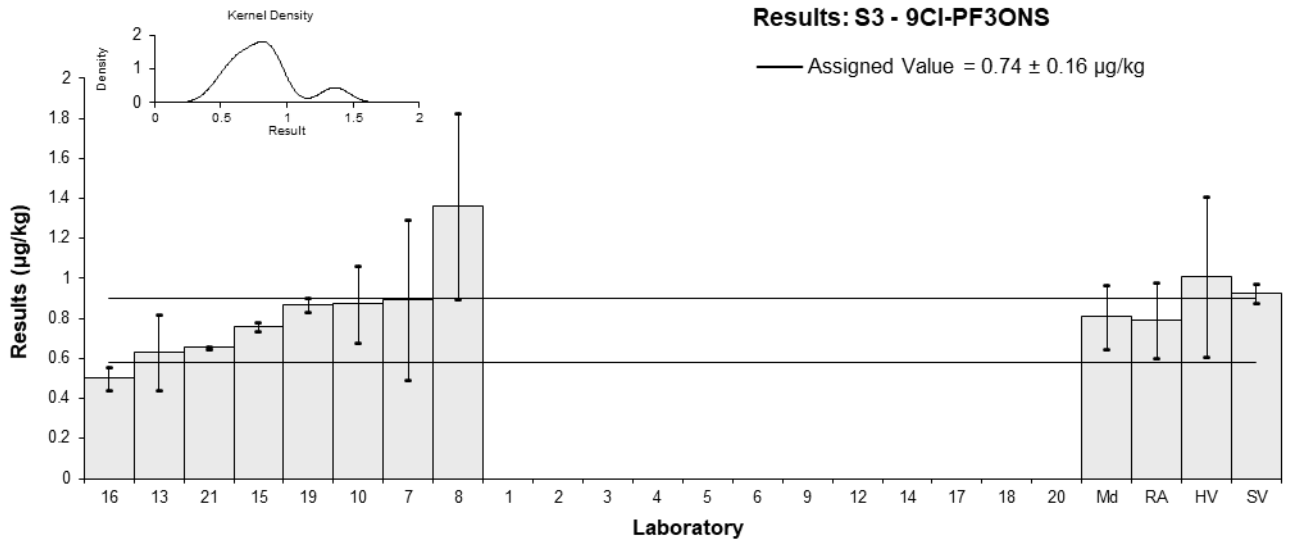
**Participant Results**

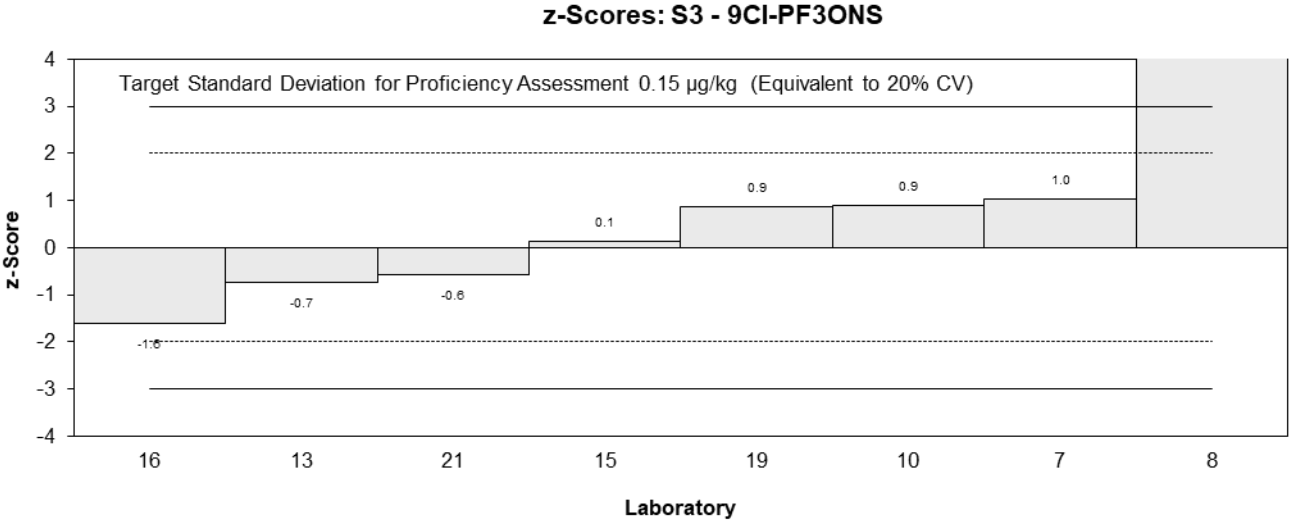
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 0.892 | 0.4 | NR | 1.03 | 0.35 |
| **8*** | 1.364 | 0.464 | 84 | 4.22 | 1.27 |
| **9** | NS | NS | NS | | |
| **10** | 0.872 | 0.192 | NR | 0.89 | 0.53 |
| **12** | NT | NT | NT | | |
| **13** | 0.63 | 0.19 | 95 | -0.74 | -0.44 |
| **14** | < 0.72 | NR | 102 | | |
| **15** | 0.76 | 0.02 | 97.1 | 0.14 | 0.12 |
| **16** | 0.5 | 0.06 | NR | -1.62 | -1.40 |
| **17** | NT | NT | NT | | |
| **18** | NS | NS | NS | | |
| **19** | 0.869 | 0.036 | 92 | 0.87 | 0.79 |
| **20** | NS | NS | NS | | |
| **21** | 0.654 | 0.008 | 104 | -0.58 | -0.54 |

* Outlier, see Section 4.2

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.74 | 0.16 |
| **Spike Value** | 0.926 | 0.046 |
| **Homogeneity Value** | 1.01 | 0.40 |
| **Robust Average** | 0.79 | 0.19 |
| **Median** | 0.81 | 0.16 |
| **Mean** | 0.82 | |
| **N** | 8 | |
| **Max** | 1.364 | |
| **Min** | 0.5 | |
| **Robust SD** | 0.22 | |
| **Robust CV** | 28% | |


Kernel Density
Density
Result
Results: S3 - 9Cl-PF3ONS
Assigned Value = 0.74 ± 0.16 µg/kg
Results (µg/kg)
16 13 21 15 19 10 7 8 1 2 3 4 5 6 9 12 14 17 18 20 Md RA HV SV
Laboratory


z-Scores: S3 - 9Cl-PF3ONS
Target Standard Deviation for Proficiency Assessment 0.15 µg/kg (Equivalent to 20% CV)
z-Score
-1.6
-0.7
-0.6
0.1
0.9
0.9
1.0
16 13 21 15 19 10 7 8
Laboratory

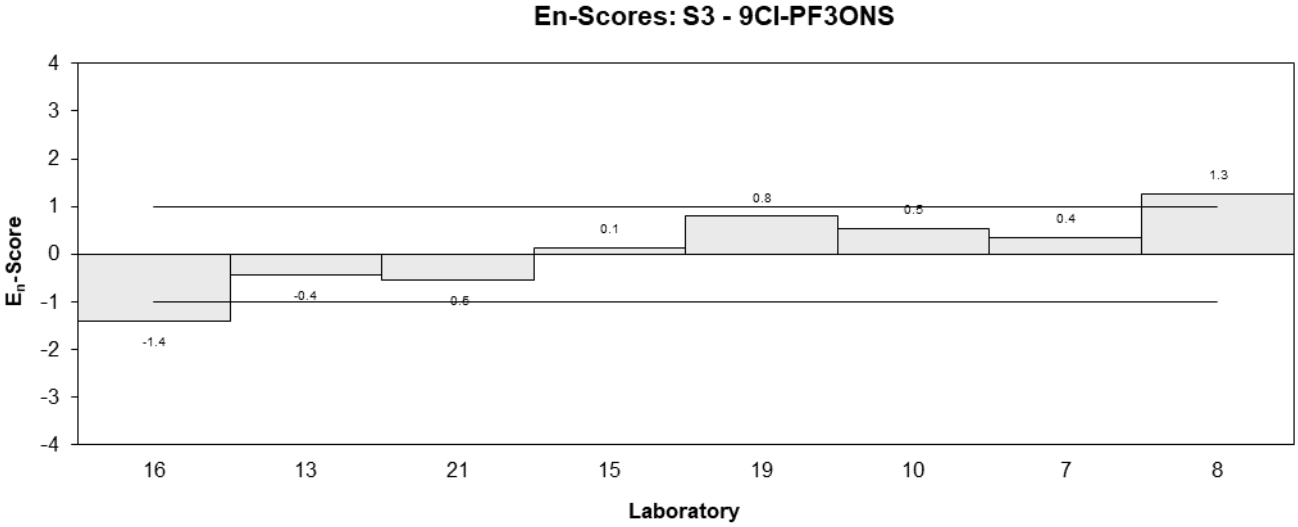

En-Scores: S3 - 9Cl-PF3ONS
En-Score
-1.4
-0.4
-0.6
0.1
0.8
0.5
0.4
1.3
16 13 21 15 19 10 7 8
Laboratory

Figure 78

Table 82

**Sample Details**

| | |
|---|---|
| **Sample No.** | S3 |
| **Matrix** | Milk Powder |
| **Analyte** | 11Cl-PF3OUdS |
| **Unit** | µg/kg |

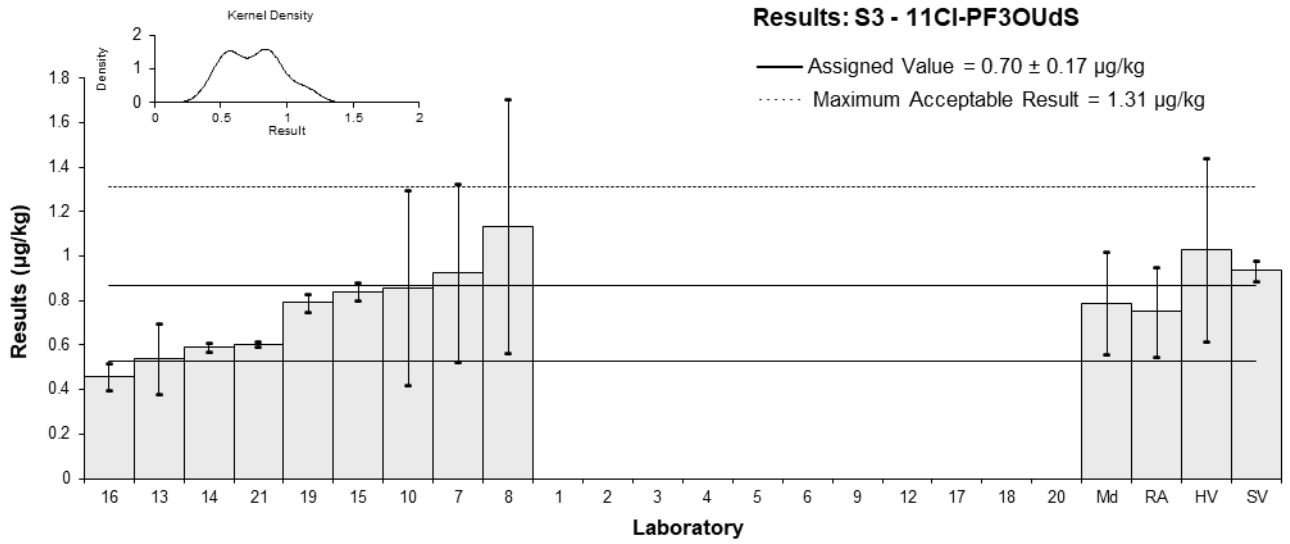
**Participant Results**

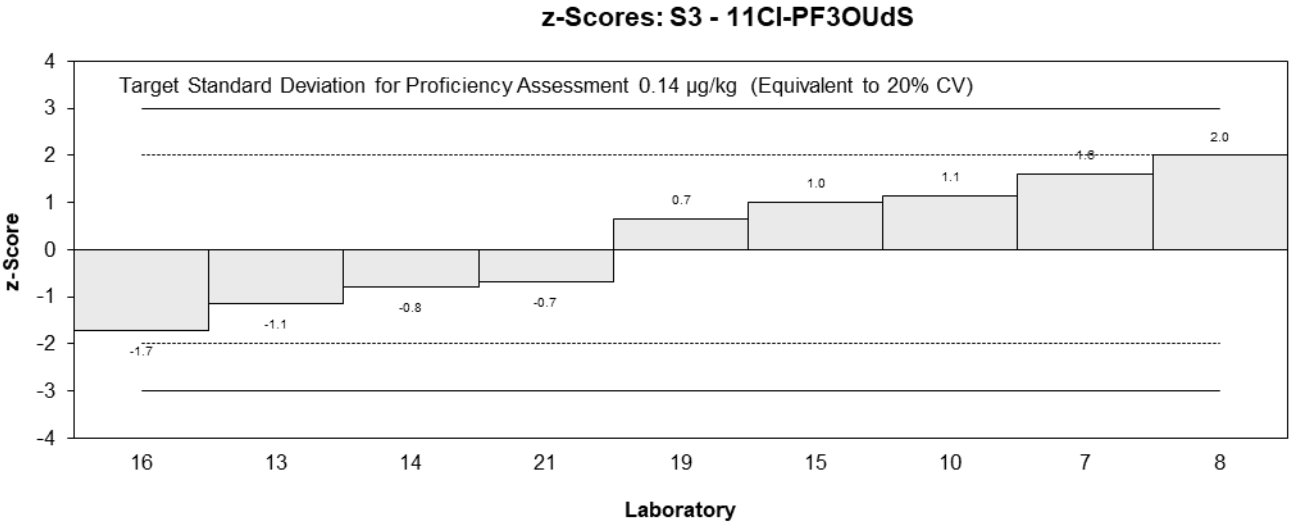
| Lab. Code | Result | Uncertainty | Rec | z | $E_n$ |
|---|---|---|---|---|---|
| **1** | NS | NS | NS | | |
| **2** | NS | NS | NS | | |
| **3** | NS | NS | NS | | |
| **4** | NS | NS | NS | | |
| **5** | NS | NS | NS | | |
| **6** | NS | NS | NS | | |
| **7** | 0.925 | 0.4 | NR | 1.61 | 0.52 |
| **8*** | 1.135 | 0.571 | 84 | 2.00▼ | |
| **9** | NS | NS | NS | | |
| **10** | 0.858 | 0.438 | NR | 1.13 | 0.34 |
| **12** | NT | NT | NT | | |
| **13** | 0.54 | 0.16 | 95 | -1.14 | -0.69 |
| **14** | 0.59 | 0.02 | 103 | -0.79 | -0.64 |
| **15** | 0.84 | 0.04 | 97.1 | 1.00 | 0.80 |
| **16** | 0.46 | 0.06 | NR | -1.71 | -1.33 |
| **17** | NT | NT | NT | | |
| **18** | NS | NS | NS | | |
| **19** | 0.791 | 0.039 | 92 | 0.65 | 0.52 |
| **20** | NS | NS | NS | | |
| **21** | 0.605 | 0.013 | 104 | -0.68 | -0.56 |

* Outlier, see Section 4.2; ▼ Adjusted Score, see Section 6.3

**Statistics**

| | | |
|---|---|---|
| **Assigned Value** | 0.70 | 0.17 |
| **Spike Value** | 0.936 | 0.047 |
| **Homogeneity Value** | 1.03 | 0.41 |
| **Robust Average** | 0.75 | 0.20 |
| **Max Acceptable Result** | 1.31 | |
| **Median** | 0.79 | 0.23 |
| **Mean** | 0.75 | |
| **N** | 9 | |
| **Max** | 1.135 | |
| **Min** | 0.46 | |
| **Robust SD** | 0.24 | |
| **Robust CV** | 32% | |


Kernel Density
Density
Result
Results: S3 - 11Cl-PF3OUdS
Assigned Value = 0.70 ± 0.17 µg/kg
Maximum Acceptable Result = 1.31 µg/kg
Results (µg/kg)
16 13 14 21 19 15 10 7 8 1 2 3 4 5 6 9 12 17 18 20 Md RA HV SV
Laboratory


z-Scores: S3 - 11Cl-PF3OUdS
Target Standard Deviation for Proficiency Assessment 0.14 µg/kg (Equivalent to 20% CV)
z-Score
-1.7
-1.1
-0.8
-0.7
0.7
1.0
1.1
1.6
2.0
16 13 14 21 19 15 10 7 8
Laboratory

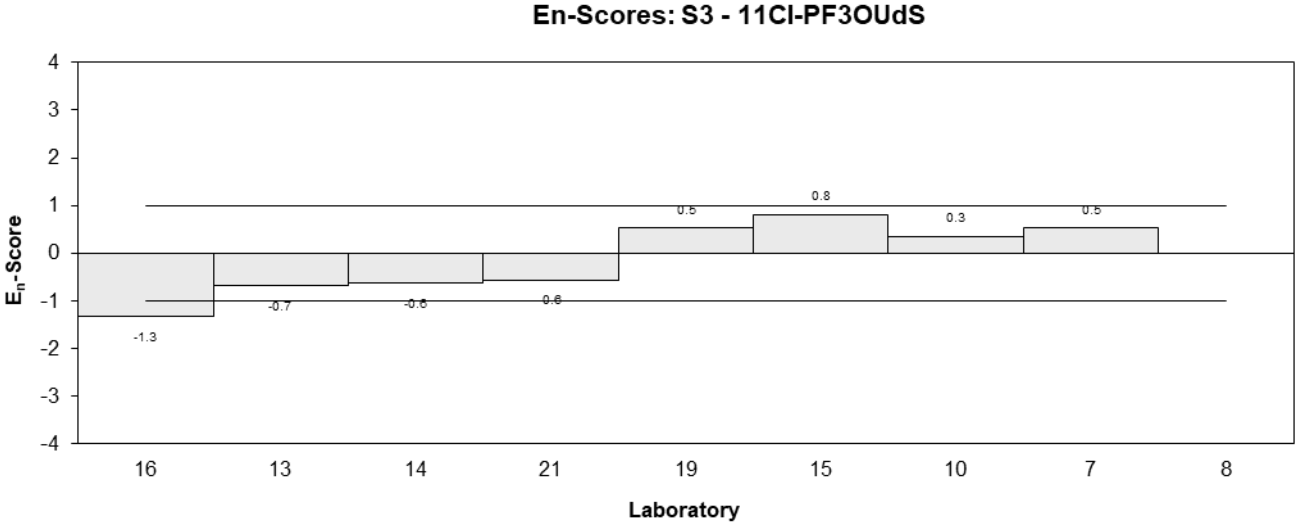

En-Scores: S3 - 11Cl-PF3OUdS
En-Score
-1.3
-0.7
-0.6
0.6
0.5
0.8
0.3
0.5
16 13 14 21 19 15 10 7 8
Laboratory

Figure 79

# 6 DISCUSSION OF RESULTS

## 6.1 Assigned Value

The assigned values for all scored analytes were the robust averages of participants' results. If there were results less than 50% or greater than 150% of the robust average, these were excluded from the calculation of each assigned value.[3,4] The robust averages and associated expanded uncertainties were calculated using the procedure described in ISO 13528.[7] The calculation of the expanded uncertainty for the robust average is presented in Appendix 3, using Sample S2 PFHpA as an example.

**Traceability**: The consensus of participants' results is not traceable to any external reference, so although expressed in SI units, metrological traceability has not been established.

No assigned values were set for Sample S1 5:3FTCA, and Sample S3 MeFOSAA and EtFOSAA as there were too few numeric results reported by participants, however the consensus values were close to the spiked values. No assigned values were set for Sample S3 PFOS, PFOS (linear) and GenX as the consensus values were significantly lower than the spiked values; this may have been due to difficulties in the analysis caused by the matrix, analyte mass fraction level, properties of the analyte itself, or a combination of these factors. For these analytes without assigned values, participants may still compare their results with the descriptive statistics and spiked value as presented in Section 5. Further discussion on Sample S3 GenX is presented in Appendix 2.

A comparison of the assigned values (or consensus value if no assigned value was set) and spiked values is presented in Table 83. For this study, the assigned values for scored analytes were within 73% to 108%, 73% to 111% and 70% to 95% of the spiked values for Samples S1, S2 and S3 respectively. In this study it was observed that the ratio of the assigned values to the spiked values for analytes in milk powder were generally lower than for prawn and carrot; there may have been lower extraction efficiency for the milk powder matrix as compared to the other matrices. Nevertheless, these ratios are similar to previous NMIA PFAS in biota and food PT studies and provides good support for the assigned values.

Table 83 Comparison of Assigned Values and Spiked Values

| Sample | Analyte | Assigned Value (µg/kg) | Spiked Value (µg/kg) | Assigned Value / Spiked Value (%) |
|---|---|---|---|---|
| S1 | PFBS | 1.25 | 1.34 | 93 |
| S1 | PFHxS | 1.82 | 1.89 | 96 |
| S1 | PFHxS (linear) | 1.82 | 1.89 | 96 |
| S1 | PFHpS | 1.36 | 1.44 | 94 |
| S1 | PFOS | 2.52 | 2.78 | 91 |
| S1 | PFOS (linear) | 1.97 | 2.19 | 90 |
| S1 | PFNS | 9.02 | 9.65 | 93 |
| S1 | PFDS | 6.5 | 6.77 | 96 |
| S1 | PFBA | 4.43 | 5.34 | 83 |
| S1 | PFPeA | 1.39 | 1.50 | 93 |
| S1 | PFHxA | 4.10 | 4.02 | 102 |
| S1 | PFHpA | 4.54 | 4.99 | 91 |
| S1 | PFOA | 2.07 | 2.00 | 104 |

| Sample | Analyte | Assigned Value (µg/kg) | Spiked Value (µg/kg) | Assigned Value / Spiked Value (%) |
|---|---|---|---|---|
| S1 | PFNA | 0.98 | 0.998 | 98 |
| S1 | PFDA | 1.27 | 1.18 | 108 |
| S1 | PFUdA | 1.22 | 1.21 | 101 |
| S1 | PFTrDA | 6.3 | 7.98 | 79 |
| S1 | PFTeDA | 1.68 | 1.80 | 93 |
| S1 | PFOSA | 2.39 | 2.99 | 80 |
| S1 | MeFOSA | 8.37 | 7.98 | 105 |
| S1 | EtFOSA | 7.72 | 7.98 | 97 |
| S1 | MeFOSAA | 8.28 | 7.98 | 104 |
| S1 | EtFOSE | 8.41 | 7.98 | 105 |
| S1 | 6:2FTS | 9.6 | 9.53 | 101 |
| S1 | 5:3FTCA | 24.6* | 24.8 | 99 |
| S1 | GenX | 8.7 | 10.1 | 86 |
| S1 | ADONA | 8.2 | 9.47 | 87 |
| S1 | 9Cl-PF3ONS | 19.2 | 23.2 | 83 |
| S1 | 11Cl-PF3OUdS | 17.1 | 23.4 | 73 |
| S2 | PFBS | 0.861 | 0.891 | 97 |
| S2 | PFPeS | 8.3 | 7.47 | 111 |
| S2 | PFHxS | 6.18 | 6.61 | 93 |
| S2 | PFHxS (linear) | 6.46 | 6.61 | 98 |
| S2 | PFHpS | 3.05 | 3.00 | 102 |
| S2 | PFOS | 2.03 | 2.12 | 96 |
| S2 | PFOS (linear) | 1.92 | 2.12 | 91 |
| S2 | PFNS | 1.57 | 1.72 | 91 |
| S2 | PFDS | 7.46 | 6.80 | 110 |
| S2 | PFBA | 0.866 | 1.19 | 73 |
| S2 | PFPeA | 2.06 | 2.20 | 94 |
| S2 | PFHxA | 7.26 | 7.45 | 97 |
| S2 | PFHpA | 1.51 | 1.50 | 101 |
| S2 | PFOA | 1.20 | 1.20 | 100 |
| S2 | PFNA | 2.27 | 2.31 | 98 |
| S2 | PFDA | 9.3 | 9.47 | 98 |
| S2 | PFOSA | 3.67 | 4.95 | 74 |
| S2 | MeFOSA | 3.65 | 4.99 | 73 |
| S2 | EtFOSA | 3.13 | 3.99 | 78 |
| S2 | 6:2FTS | 1.86 | 1.89 | 98 |
| S2 | GenX | 11.0 | 11.1 | 99 |

| Sample | Analyte | Assigned Value (µg/kg) | Spiked Value (µg/kg) | Assigned Value / Spiked Value (%) |
|---|---|---|---|---|
| S2 | ADONA | 12.5 | 14.0 | 89 |
| S3 | PFBS | 1.00 | 1.32 | 76 |
| S3 | PFPeS | 0.567 | 0.708 | 80 |
| S3 | PFHxS | 0.543 | 0.664 | 82 |
| S3 | PFHxS (linear) | 0.549 | 0.664 | 83 |
| S3 | PFHpS | 0.554 | 0.668 | 83 |
| S3 | PFOS | 0.156** | 0.277 | 56 |
| S3 | PFOS (linear) | 0.126** | 0.218 | 58 |
| S3 | PFNS | 0.75 | 0.954 | 79 |
| S3 | PFDS | 0.76 | 0.958 | 79 |
| S3 | PFBA | 2.59 | 3.28 | 79 |
| S3 | PFPeA | 1.24 | 1.48 | 84 |
| S3 | PFHxA | 0.87 | 0.996 | 87 |
| S3 | PFHpA | 0.83 | 0.997 | 83 |
| S3 | PFOA | 0.64 | 0.695 | 92 |
| S3 | PFNA | 0.418 | 0.499 | 84 |
| S3 | PFDA | 0.76 | 0.803 | 95 |
| S3 | PFUdA | 0.92 | 1.01 | 91 |
| S3 | PFDoA | 0.96 | 1.10 | 87 |
| S3 | PFTrDA | 0.99 | 1.19 | 83 |
| S3 | PFTeDA | 1.13 | 1.49 | 76 |
| S3 | MeFOSAA | 1.65** | 1.99 | 83 |
| S3 | EtFOSAA | 1.69** | 1.99 | 85 |
| S3 | 10:2FTS | 1.35 | 1.92 | 70 |
| S3 | GenX | 0.107* | 0.994 | 11 |
| S3 | ADONA | 0.79 | 0.936 | 84 |
| S3 | 9Cl-PF3ONS | 0.74 | 0.926 | 80 |
| S3 | 11Cl-PF3OUdS | 0.70 | 0.936 | 75 |

* Median value (assigned value not set).

** Robust average (assigned value not set).

## 6.2 Measurement Uncertainty Reported by Participants

Participants were asked to report an estimate of the expanded MU associated with their results and the basis of this uncertainty estimate. It is a requirement of ISO/IEC 17025 that laboratories have procedures to estimate the uncertainty of chemical measurements and to report this in specific circumstances, including when the client's instruction so requires.[9]

Of 951 numeric results reported for spiked analytes in this study, 896 (94%) were reported with a measurement uncertainty. Laboratories **2** and **3** did not report uncertainties for some of their numeric results and Laboratory **18** did not report uncertainties for all their numeric results; these participants reported being accredited to ISO/IEC 17025. Laboratory **20** did not

report uncertainties for any of their numeric results, however, they did not report holding third party technical accreditation for this analysis.

Laboratory **5** attached estimates of MU to all their reported 'less-than' results (< *x*). An uncertainty expressed as a value should not be attached to a non-value result.[10]

Participants' procedures for estimating their uncertainty are presented in Table 3. One participant reported using the NATA GAG Estimating and Reporting MU as their guide; NATA no longer publishes this document.[11]

Laboratories **14** and **15** reported an uncertainty of '0' for several of their results. Other than these results, the magnitudes of the MUs for analytes in this study were within the range 0.35% to 143% of the reported value. In general, an expanded uncertainty of less than 10% relative is likely to be unrealistically small for the routine analysis of PFAS, while over 50% is likely too large to be fit for purpose. In particular, uncertainties less than 5% relative may not have included all sources of uncertainties, including, for example, the bias or precision. Of the 896 MUs, 575 (64%) were between 10% and 50% relative, 295 were less than 10% relative and 26 were greater than 50% relative.

Uncertainties associated with results returning an acceptable *z*-score but an unacceptable $E_n$-score may have been underestimated.

In some cases, results and/or uncertainties were reported with an inappropriate number of significant figures. Including too many significant figures may inaccurately reflect the precision of measurements. The recommended format is to write the uncertainty to no more than two significant figures and then to write the result with the corresponding number of decimal places. For example, instead of 2.631234 ± 1.7366 µg/kg, it is better to report this as 2.6 ± 1.7 µg/kg.[10]

Laboratory **17** reported some uncertainties with a large number of significant figures. Although all significant figures were used for results assessment (z-score and $E_n$-score calculation), the last few digits were omitted for these values presented in tables in Section 5 due to lack of space.

### 6.3 z-Score

Target SDs equivalent to 20% PCV were used to calculate *z*-scores. CVs predicted by the Thompson-Horwitz equation,[8] the between-laboratory CVs obtained in this study, and the target SDs (as PCVs) are presented for comparison in Table 84.

Table 84 Comparison of Thompson-Horwitz CVs, Between-Laboratory CVs and Target SDs*

| Sample | Analyte | Assigned Value (µg/kg) | Thompson-Horwitz CV (%) | Between-Laboratory CV (%) | Target SD (as PCV) (%) |
|---|---|---|---|---|---|
| S1 | PFBS | 1.25 | 22 | 21 | 20 |
| S1 | PFHxS | 1.82 | 22 | 17 | 20 |
| S1 | PFHxS (linear) | 1.82 | 22 | 14 | 20 |
| S1 | PFHpS | 1.36 | 22 | 24 | 20 |
| S1 | PFOS | 2.52 | 22 | 22 | 20 |
| S1 | PFOS (linear) | 1.97 | 22 | 15 | 20 |
| S1 | PFNS | 9.02 | 22 | 14 | 20 |
| S1 | PFDS | 6.5 | 22 | 24 | 20 |
| S1 | PFBA | 4.43 | 22 | 17 | 20 |
| S1 | PFPeA | 1.39 | 22 | 15 | 20 |
| S1 | PFHxA | 4.10 | 22 | 21 | 20 |

| Sample | Analyte | Assigned Value (µg/kg) | Thompson-Horwitz CV (%) | Between-Laboratory CV (%) | Target SD (as PCV) (%) |
|---|---|---|---|---|---|
| S1 | PFHpA | 4.54 | 22 | 25 | 20 |
| S1 | PFOA | 2.07 | 22 | 16 | 20 |
| S1 | PFNA | 0.98 | 22 | 18 | 20 |
| S1 | PFDA | 1.27 | 22 | 23 | 20 |
| S1 | PFUdA | 1.22 | 22 | 33 | 20 |
| S1 | PFTrDA | 6.3 | 22 | 28 | 20 |
| S1 | PFTeDA | 1.68 | 22 | 36 | 20 |
| S1 | PFOSA | 2.39 | 22 | 29 | 20 |
| S1 | MeFOSA | 8.37 | 22 | 13 | 20 |
| S1 | EtFOSA | 7.72 | 22 | 14 | 20 |
| S1 | MeFOSAA | 8.28 | 22 | 8.5 | 20 |
| S1 | EtFOSE | 8.41 | 22 | 12 | 20 |
| S1 | 6:2FTS | 9.6 | 22 | 17 | 20 |
| S1 | 5:3FTCA | 24.6** | 22 | 46 | Not Set |
| S1 | GenX | 8.7 | 22 | 23 | 20 |
| S1 | ADONA | 8.2 | 22 | 27 | 20 |
| S1 | 9Cl-PF3ONS | 19.2 | 22 | 25 | 20 |
| S1 | 11Cl-PF3OUdS | 17.1 | 22 | 27 | 20 |
| S2 | PFBS | 0.861 | 22 | 12 | 20 |
| S2 | PFPeS | 8.3 | 22 | 20 | 20 |
| S2 | PFHxS | 6.18 | 22 | 13 | 20 |
| S2 | PFHxS (linear) | 6.46 | 22 | 5.1 | 20 |
| S2 | PFHpS | 3.05 | 22 | 16 | 20 |
| S2 | PFOS | 2.03 | 22 | 12 | 20 |
| S2 | PFOS (linear) | 1.92 | 22 | 17 | 20 |
| S2 | PFNS | 1.57 | 22 | 28 | 20 |
| S2 | PFDS | 7.46 | 22 | 14 | 20 |
| S2 | PFBA | 0.866 | 22 | 14 | 20 |
| S2 | PFPeA | 2.06 | 22 | 8.6 | 20 |
| S2 | PFHxA | 7.26 | 22 | 12 | 20 |
| S2 | PFHpA | 1.51 | 22 | 14 | 20 |
| S2 | PFOA | 1.20 | 22 | 6.3 | 20 |
| S2 | PFNA | 2.27 | 22 | 13 | 20 |
| S2 | PFDA | 9.3 | 22 | 16 | 20 |
| S2 | PFOSA | 3.67 | 22 | 18 | 20 |
| S2 | MeFOSA | 3.65 | 22 | 20 | 20 |
| S2 | EtFOSA | 3.13 | 22 | 9.9 | 20 |

| Sample | Analyte | Assigned Value (µg/kg) | Thompson-Horwitz CV (%) | Between-Laboratory CV (%) | Target SD (as PCV) (%) |
|---|---|---|---|---|---|
| S2 | 6:2FTS | 1.86 | 22 | 20 | 20 |
| S2 | GenX | 11.0 | 22 | 13 | 20 |
| S2 | ADONA | 12.5 | 22 | 8.9 | 20 |
| S3 | PFBS | 1.00 | 22 | 15 | 20 |
| S3 | PFPeS | 0.567 | 22 | 14 | 20 |
| S3 | PFHxS | 0.543 | 22 | 17 | 20 |
| S3 | PFHxS (linear) | 0.549 | 22 | 18 | 20 |
| S3 | PFHpS | 0.554 | 22 | 20 | 20 |
| S3 | PFOS | 0.156*** | 22 | 35 | Not Set |
| S3 | PFOS (linear) | 0.126*** | 22 | 30 | Not Set |
| S3 | PFNS | 0.75 | 22 | 23 | 20 |
| S3 | PFDS | 0.76 | 22 | 28 | 20 |
| S3 | PFBA | 2.59 | 22 | 28 | 20 |
| S3 | PFPeA | 1.24 | 22 | 15 | 20 |
| S3 | PFHxA | 0.87 | 22 | 18 | 20 |
| S3 | PFHpA | 0.83 | 22 | 22 | 20 |
| S3 | PFOA | 0.64 | 22 | 26 | 20 |
| S3 | PFNA | 0.418 | 22 | 24 | 20 |
| S3 | PFDA | 0.76 | 22 | 27 | 20 |
| S3 | PFUdA | 0.92 | 22 | 21 | 20 |
| S3 | PFDoA | 0.96 | 22 | 21 | 20 |
| S3 | PFTrDA | 0.99 | 22 | 34 | 20 |
| S3 | PFTeDA | 1.13 | 22 | 22 | 20 |
| S3 | MeFOSAA | 1.65*** | 22 | 40 | Not Set |
| S3 | EtFOSAA | 1.69*** | 22 | 37 | Not Set |
| S3 | 10:2FTS | 1.35 | 22 | 24 | 20 |
| S3 | GenX | 0.107** | 22 | 20 | Not Set |
| S3 | ADONA | 0.79 | 22 | 21 | 20 |
| S3 | 9Cl-PF3ONS | 0.74 | 22 | 23 | 20 |
| S3 | 11Cl-PF3OUdS | 0.70 | 22 | 28 | 20 |

* Thompson-Horwitz CV calculated from the assigned value. The between-laboratory CV is the robust between-laboratory CV with outliers removed, if applicable. Shaded cells represent between-laboratory CVs higher than both the target SD and the Thompson-Horwitz CV for scored analytes.

** Median value (assigned value not set).

*** Robust average (assigned value not set).

To account for possible low bias in the consensus value due to laboratories using inefficient analytical or extraction techniques, six *z*-scores were adjusted across the following analytes: Sample S1 11Cl-PF3OUdS, and Sample S3 PFBS, PFNS, PFDS, and 11Cl-PF3OUdS. A maximum acceptable result was set as the spiked value plus two target SDs of the spiked

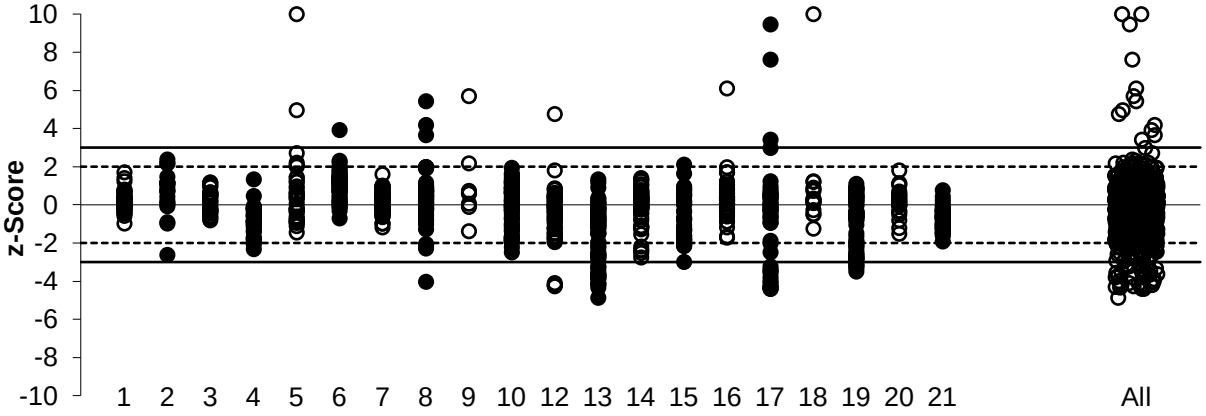
value. Results lower than the maximum acceptable result but with a *z*-score greater than 2.0 had their *z*-score adjusted to 2.0. This ensured that any participants reporting results close to the spiked value were not penalised. *z*-Scores for results greater than the maximum acceptable result, and *z*-scores less than 2.0, were left unaltered.

Of 915 results for which *z*-scores were calculated, 809 (88%) returned $|z| \leq 2.0$, indicating an acceptable performance.

Nine participants analysed all three matrices. Laboratory **7** reported numeric results for all 72 scored analytes and returned acceptable *z*-scores across all analytes.

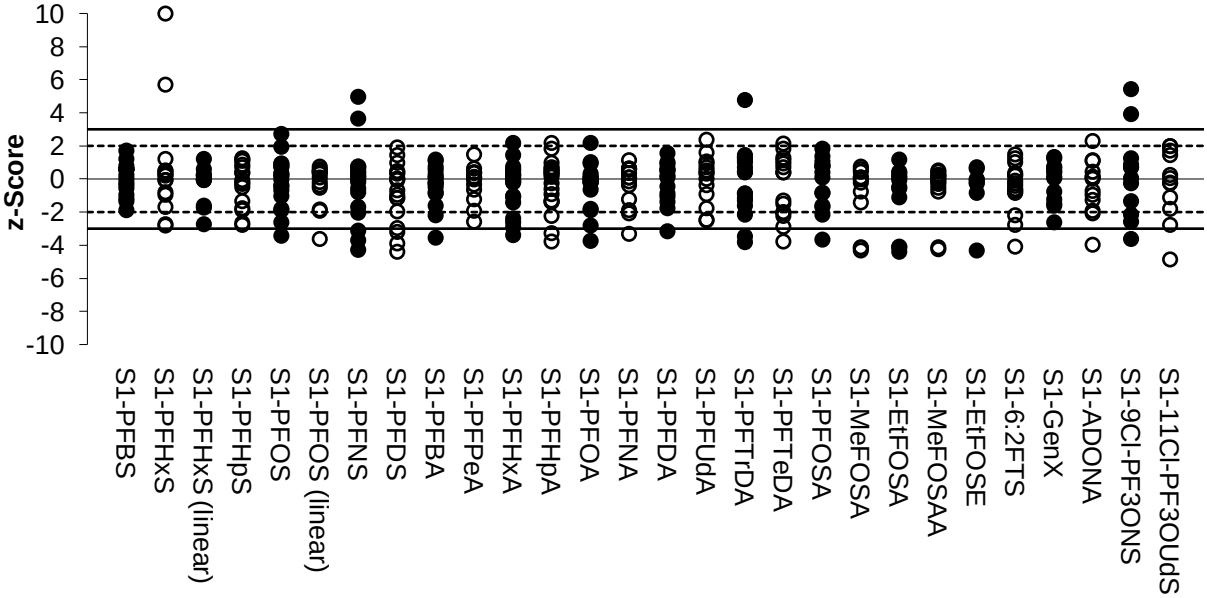
Five participants analysed Sample S1 prawn and Sample S2 carrot only, two participants analysed Sample S1 prawn and Sample S3 milk powder only, three participants analysed Sample S1 prawn only, and one participant analysed Sample S2 carrot only. Of these participants, four received acceptable *z*-scores for all scored reported results: Laboratories **21** (43), **1** (41), **3** (32) and **20** (24). Sample S3 milk powder was a delayed offering for this PT study, and may explain why there were fewer number of results for this sample.

The dispersal of participants' *z*-scores is presented graphically by laboratory in Figure 80 and by analyte in Figures 81 to 83.



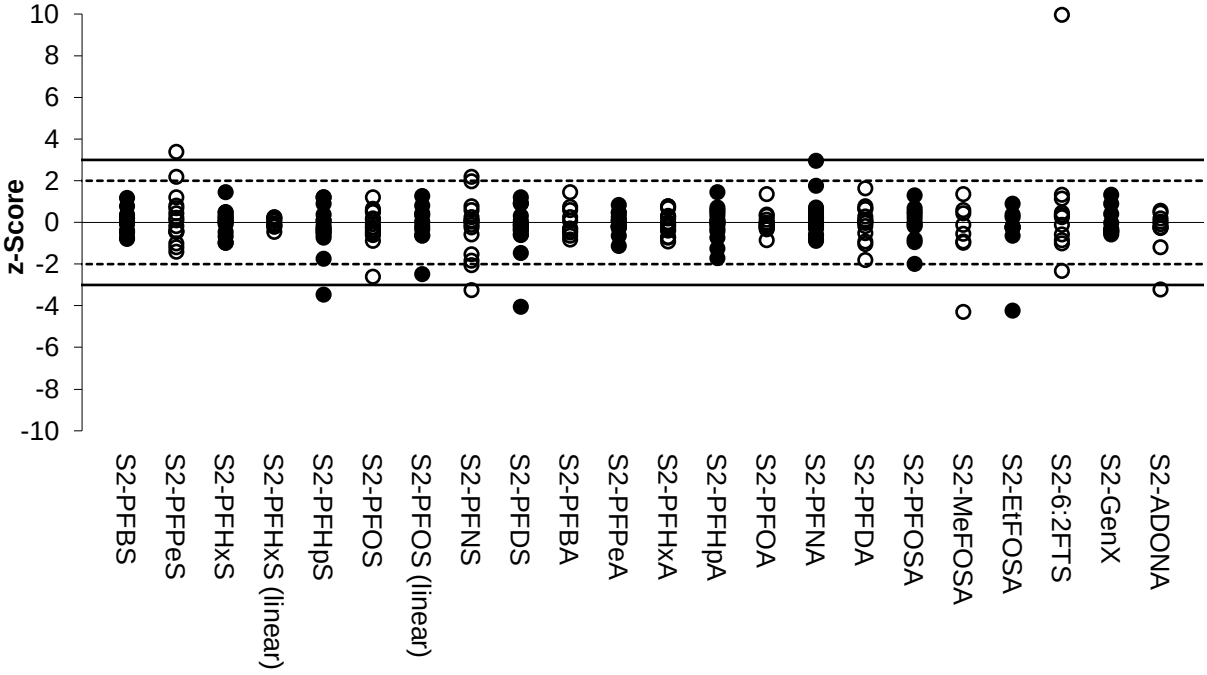

*z*-Scores greater than 10.0 have been plotted at 10.0.

Figure 80 *z*-Score Dispersal by Laboratory




*z*-Scores greater than 10.0 have been plotted at 10.0.

Figure 81 *z*-Score Dispersal by Analyte for Sample S1 Prawn




*z*-Scores greater than 10.0 have been plotted at 10.0.

Figure 82 *z*-Score Dispersal by Analyte for Sample S2 Carrot

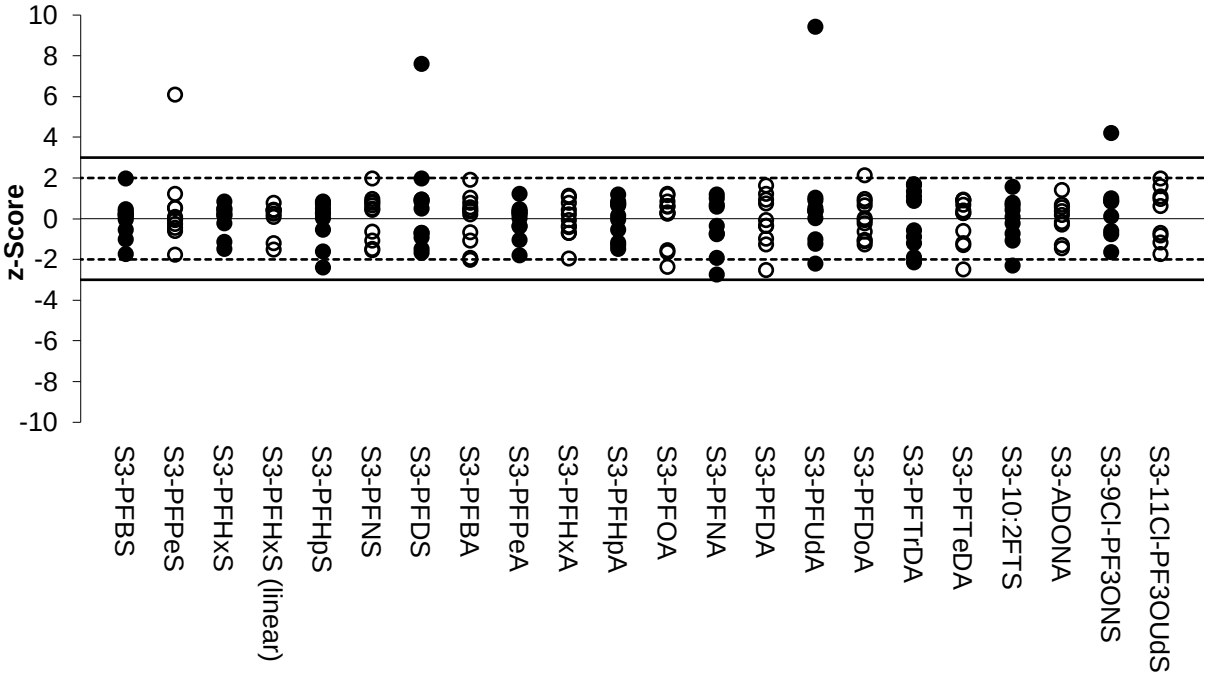



Figure 83 *z*-Score Dispersal by Analyte for Sample S3 Milk Powder

Scatter plots of *z*-scores for analytes scored in both Samples S1 and S2 are presented in Figures 84 to 104. Scores are predominantly in the upper right and lower left quadrants, indicating that laboratory bias was the major contributor to the variability of results, and that participants were generally biased in a similar manner for both prawn and carrot analysis. Points close to the diagonal axis demonstrate excellent repeatability, while points close to the zero demonstrate excellent repeatability and accuracy.

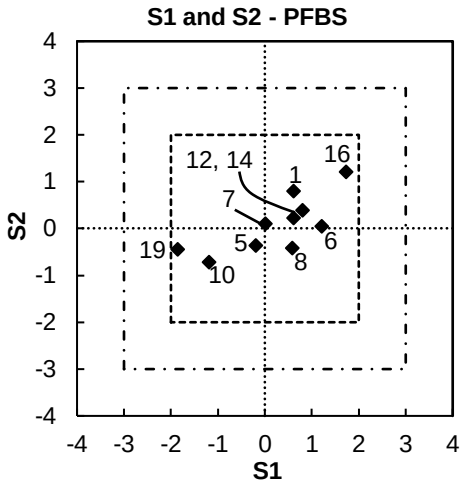
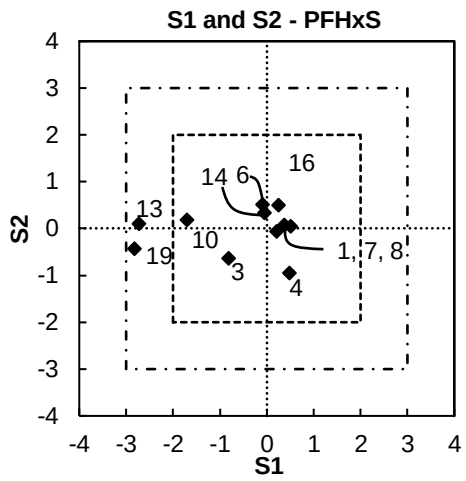



Figure 84 *z*-Score Scatter Plot – PFBS




Laboratory **5** is off-scale.

Figure 85 *z*-Score Scatter Plot – PFHxS

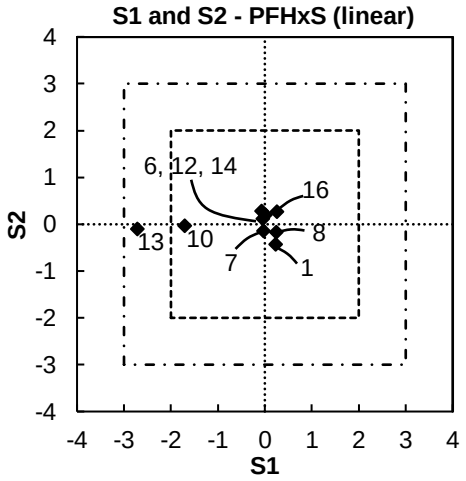



Figure 86 *z*-Score Scatter Plot – PFHxS (linear)

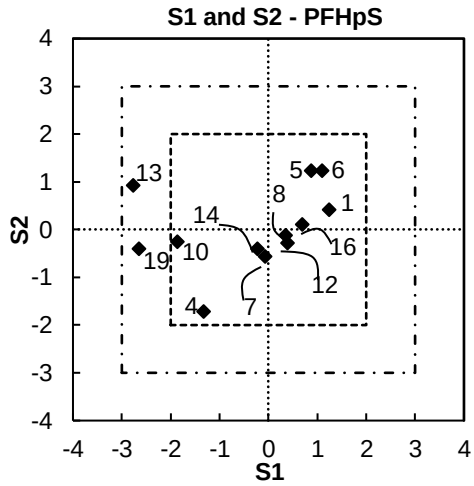



Figure 87 *z*-Score Scatter Plot – PFHpS

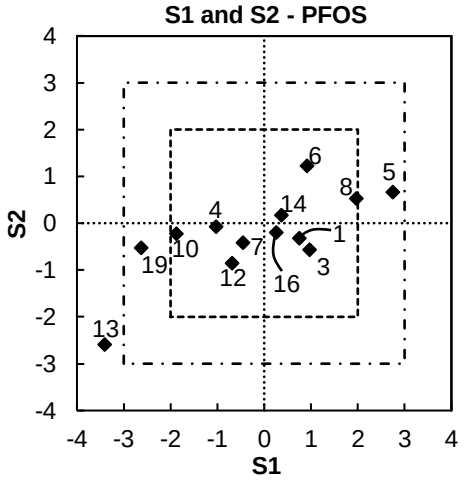



Figure 88 *z*-Score Scatter Plot – PFOS

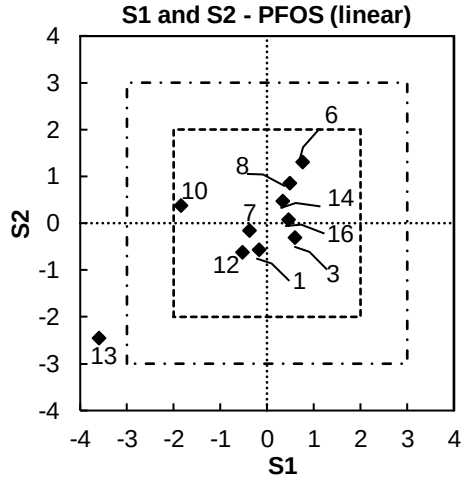
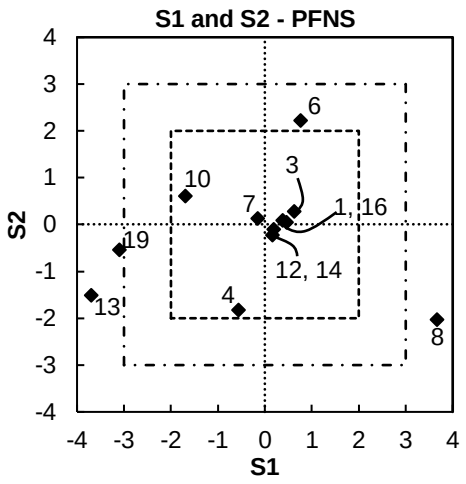
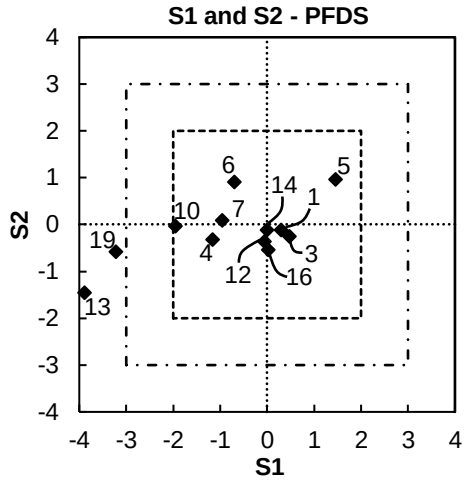



Figure 89 *z*-Score Scatter Plot – PFOS (linear)




Laboratories **5** and **17** are off-scale.

Figure 90 *z*-Score Scatter Plot – PFNS




Laboratories **8** and **17** are off-scale.

Figure 91 *z*-Score Scatter Plot – PFDS

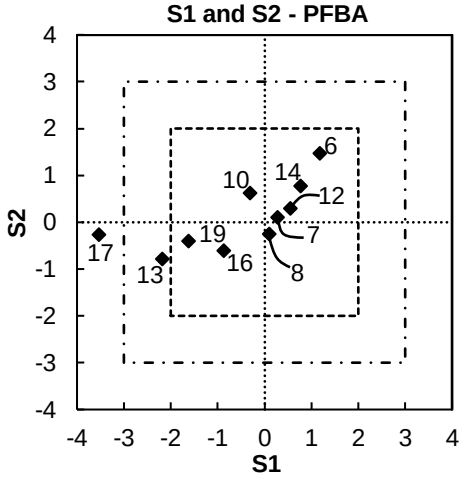



Figure 92 *z*-Score Scatter Plot – PFBA

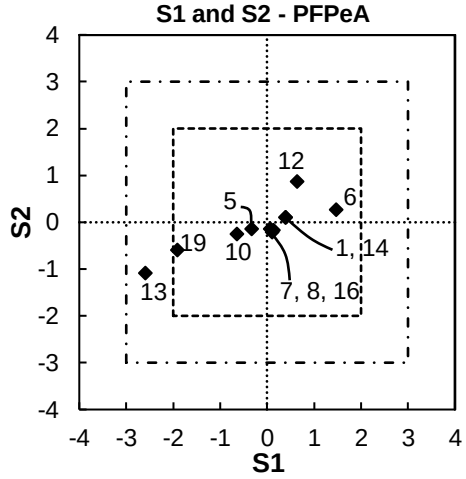



Figure 93 *z*-Score Scatter Plot – PFPeA

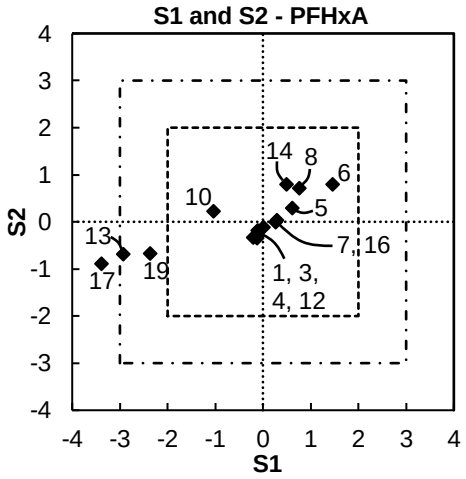



Figure 94 *z*-Score Scatter Plot – PFHxA

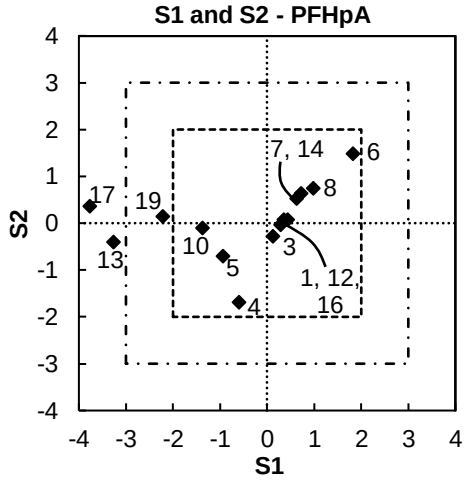



Figure 95 *z*-Score Scatter Plot – PFHpA

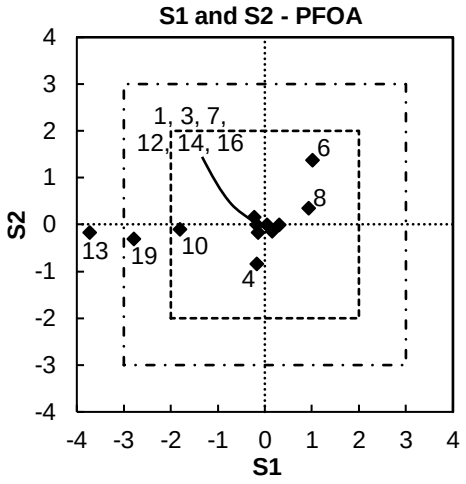



Figure 96 *z*-Score Scatter Plot – PFOA

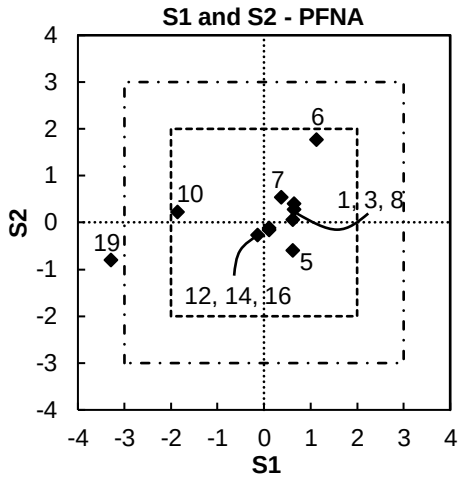



Figure 97 *z*-Score Scatter Plot – PFNA

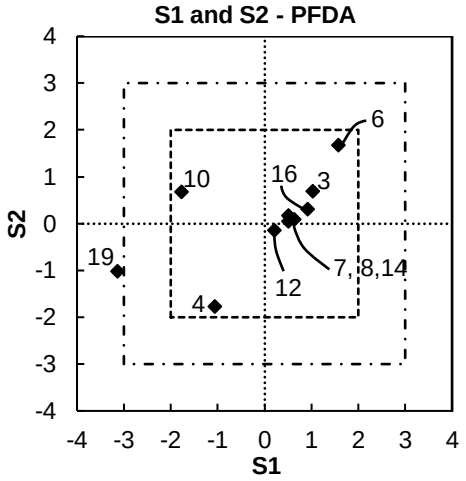



Figure 98 *z*-Score Scatter Plot – PFDA

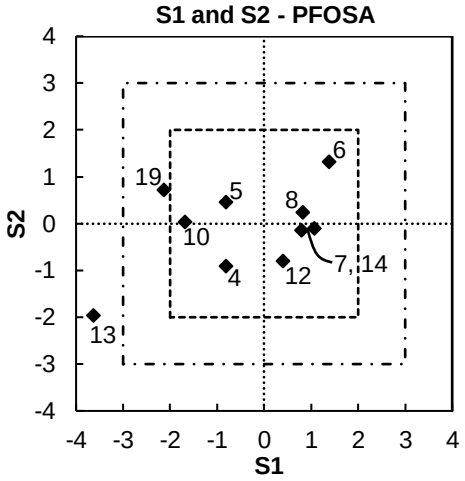
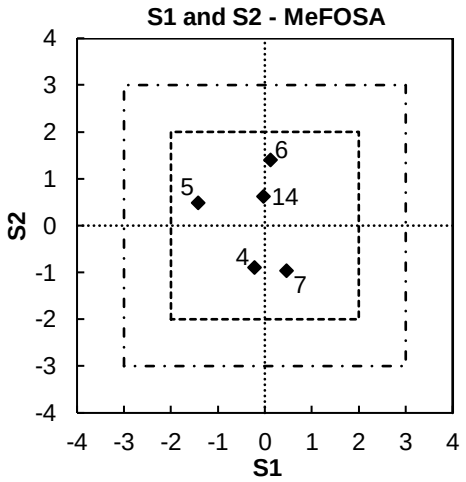
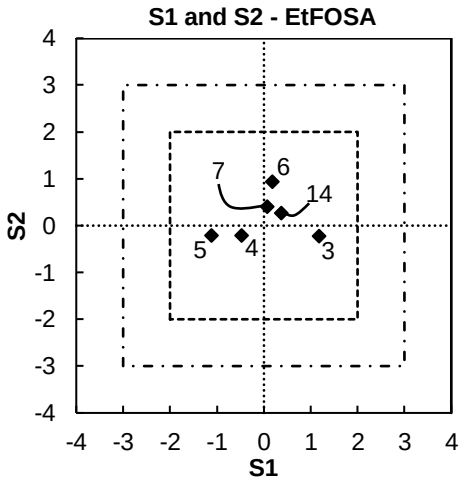



Figure 99 *z*-Score Scatter Plot – PFOSA



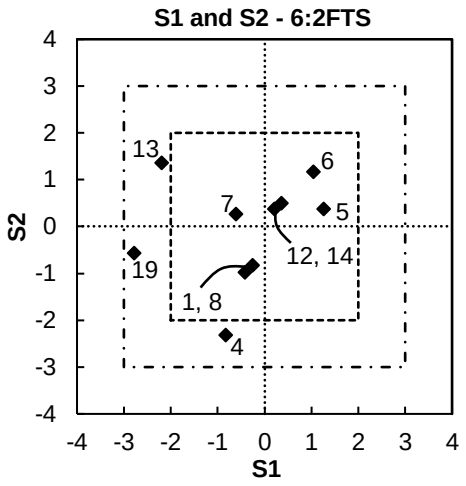

Laboratories **12**, **13** and **17** are off-scale.

Figure 100 *z*-Score Scatter Plot – MeFOSA




Laboratories **12**, **13** and **17** are off-scale.

Figure 101 *z*-Score Scatter Plot – EtFOSA




Laboratory **17** is off-scale.

Figure 102 *z*-Score Scatter Plot – 6:2FTS

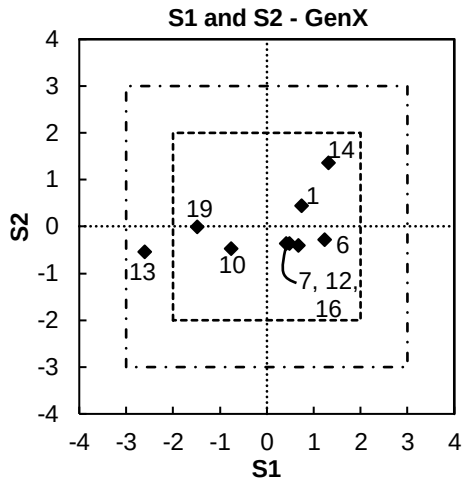



Figure 103 *z*-Score Scatter Plot – GenX

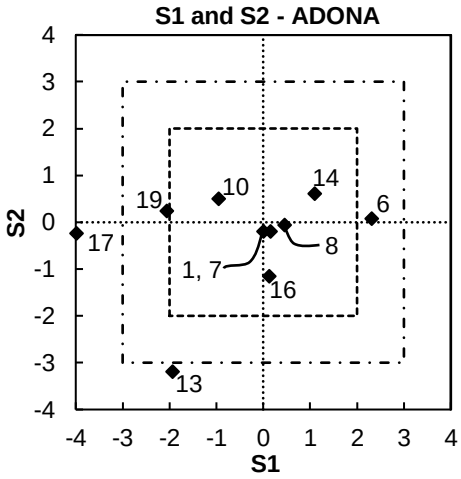



Figure 104 *z*-Score Scatter Plot – ADONA

### 6.4 $E_n$-Score

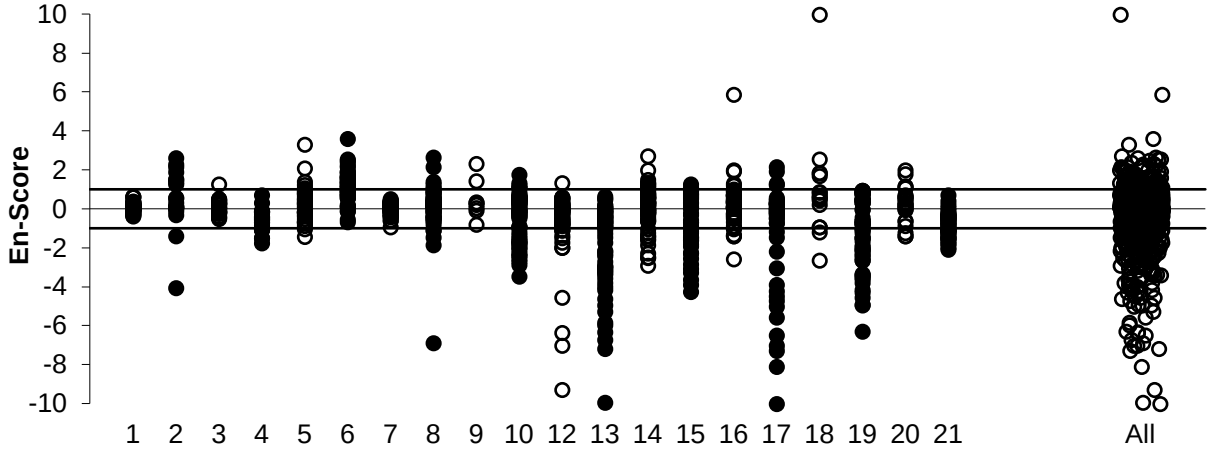
$E_n$-Scores can be interpreted in conjunction with *z*-scores, as an unacceptable $E_n$-score can either be caused by issues with measurement, or uncertainty, or both. If a participant did not report any uncertainty with a result, an expanded uncertainty of zero (0) was used to calculate the $E_n$-score. For results whose *z*-scores were adjusted as discussed in Section 6.3 z-Score, no $E_n$-score has been calculated.

Of 909 results for which $E_n$-scores were calculated, 640 (70%) returned $|E_n| < 1.0$, indicating agreement of the participant's result with the assigned value within their respective expanded uncertainties.

Laboratory **7** returned acceptable $E_n$-scores for all 72 scored analytes in this study.

Of participants analysing a subset of samples, one received acceptable $E_n$-scores for all results that were scored: Laboratory **1** (41).

The dispersal of participants' $E_n$-scores is presented graphically in Figure 105.




$E_n$-scores greater than 10.0 and less than -10.0 have been plotted at 10.0 and -10.0 respectively.

Figure 105 $E_n$-Score Dispersal by Laboratory

### 6.5 Range of PFAS Analysed by Participants

Participants were provided with a list of analytes that may have been spiked into the test samples (Table 1). Of these, 33 different analytes were spiked for this study, with 29 analytes spiked into Sample S1, 22 analytes spiked into Sample S2, and 27 analytes spiked into Sample S3. For PFHxS and PFOS, participants were requested to report linear and total value. Participants were not required to test for all potential analytes, and were requested to report 'NT' (for 'Not Tested') for any analyte they did not test the samples for.

A summary of participants' testing of the spiked analytes is presented in Table 85.

Of the participants analysing all three samples, Laboratories **7**, **8** and **13** reported testing for all spiked analytes. Of the participants analysing a subset of samples, Laboratories **1**, **6** and **9** reported testing for all analytes spiked into the samples they tested. All participants tested for at least one spiked analyte, with the proportion of analytes being tested for by each participant ranging from 73% to 100%.

In this study, PFBS, PFPeS, PFHpS, PFOS, PFNS, PFDS, PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFNA, PFDA, PFUdA, PFDoA, PFTrDA and PFTeDA were tested for by all participants. In general, perfluoroalkyl acids (PFAA) were very well represented by participants, with the overall proportion of analysis by participants being 93% and 100% for perfluoroalkane sulfonates (PFSA) and perfluoroalkyl carboxylic acids (PFCA) respectively.

For the PFAA precursors, perfluoroalkane sulfonamide (PFOSA) was also tested for by 90% of participants. A lower proportion of participants (64%) tested for the perfluoroalkane sulfonamido compounds (MeFOSA, EtFOSA, MeFOSAA, EtFOSAA and EtFOSE). Of the fluorotelomer compounds, the fluorotelomer sulfonates (6:2FTS and 10:2FTS) were tested for by 86% of participants. This study was the first NMIA study to include a fluorotelomer carboxylic acid (5:3FTCA) in biota and food, and this analyte was only tested for by 37% of participants.

For the PFAS replacement compounds, per- and polyfluoroether carboxylic acids (PFECA) (GenX and ADONA) and per- and polyfluoroether sulfonates (PFESA) (9Cl-PF3ONS and 11Cl-PF3OUdS) were tested for by 73% and 68% of participants respectively.

The proportion of analytes tested for by participants has increased across all types of PFAS, as compared to previous NMIA PT studies in biota and food. This reflects the improvement in the range of PFAS analytes that participants can test for.

Table 85 Summary of PFAS Analysed by Participants[a]

| Analyte \ Lab. Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | Proportion of Participants (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PFBS | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 100 |
| PFPeS[b] | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | 100 |
| PFHxS | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | NT | ✓ | ✓ | NT | ✓ | ✓ | ✓ | ✓ | NT | ✓ | 85 |
| PFHxS (linear) | ✓ | ✓ | NT | NT | NT | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | NT | NT | ✓ | ✓ | ✓ | 75 |
| PFHpS | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 100 |
| PFOS | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 100 |
| PFOS (linear) | ✓ | ✓ | ✓ | NT | NT | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | NT | NT | ✓ | ✓ | ✓ | 80 |
| PFNS | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 100 |
| PFDS | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 100 |
| PFBA | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 100 |
| PFPeA | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 100 |
| PFHxA | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 100 |
| PFHpA | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 100 |
| PFOA | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 100 |
| PFNA | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 100 |
| PFDA | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 100 |
| PFUdA[b] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | 100 |
| PFDoA[b] | | | | | | | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ | 100 |
| PFTrDA[b] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | 100 |
| PFTeDA[b] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | 100 |
| PFOSA[b] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | NT | ✓ | NT | ✓ | ✓ | ✓ | 90 |
| MeFOSA[b] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓[c] | ✓ | NT | ✓ | ✓ | ✓ | NT | NT | ✓ | NT | NT | NT | NT | 65 |

| Analyte \ Lab. Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | Proportion of Participants (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EtFOSA[b] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓[c] | ✓ | NT | ✓ | ✓ | ✓ | NT | NT | ✓ | NT | NT | NT | NT | 65 |
| MeFOSAA[b] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | NT | ✓ | ✓ | ✓ | NT | NT | ✓ | | NT | ✓ | NT | 74 |
| EtFOSAA[b] | | | | | | | ✓ | ✓ | | NT | ✓ | ✓ | ✓ | NT | NT | ✓ | | NT | | NT | 55 |
| EtFOSE[b] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | NT | NT | ✓ | ✓ | NT | NT | ✓ | | NT | NT | NT | 63 |
| 6:2FTS[b] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | NT | ✓ | ✓ | ✓ | ✓ | NT | ✓ | ✓ | ✓ | ✓ | ✓ | 90 |
| 10:2FTS[b] | | | | | | | ✓ | ✓ | | ✓ | NT | ✓ | ✓ | ✓ | NT | ✓ | | ✓ | | ✓ | 82 |
| 5:3FTCA[b] | ✓ | NT | NT | NT | NT | ✓ | ✓ | ✓ | ✓ | NT | NT | ✓ | NT | NT | NT | NT | | NT | ✓ | NT | 37 |
| GenX | ✓ | NT | NT | NT | NT | ✓ | ✓ | ✓[c] | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | NT | ✓ | ✓ | ✓ | ✓ | 75 |
| ADONA | ✓ | NT | NT | NT | NT | ✓ | ✓ | ✓ | ✓ | ✓ | NT | ✓ | ✓ | ✓ | ✓ | ✓ | NT | ✓ | ✓ | ✓ | 70 |
| 9Cl-PF3ONS[b] | ✓ | NT | NT | NT | NT | ✓ | ✓ | ✓ | ✓ | ✓ | NT | ✓ | ✓ | ✓ | ✓ | NT | | ✓ | ✓ | ✓ | 68 |
| 11Cl-PF3OUdS[b] | ✓ | NT | NT | NT | NT | ✓ | ✓ | ✓ | ✓ | ✓ | NT | ✓ | ✓ | ✓ | ✓ | NT | | ✓ | ✓ | ✓ | 68 |
| Proportion of Analytes (%) | 100 | 83 | 80 | 77 | 77 | 100 | 100 | 100 | 100 | 79 | 79 | 100 | 97 | 79 | 73 | 82 | 73 | 82 | 86 | 82 | |

[a] Shaded cells indicate that the participant was not supplied or did not test a sample containing that analyte; proportions have been adjusted accordingly.

[b] These analytes were spiked into a subset of samples only.

[c] Laboratory **8** reported testing for MeFOSA, EtFOSA and GenX in Sample S1, but not Sample S2.

### 6.6 PFAS in Food Trigger Points

There are currently no maximum regulatory limits in Australia for PFAS contaminants in food. However, Food Standards Australia New Zealand (FSANZ) has proposed non-regulatory 'trigger points' in a variety of food products for three common PFAS compounds (PFHxS, PFOS and PFOA) based on food consumption rates and set tolerable daily intakes for these analytes.[12] Where an analyte is found to be exceeding the corresponding trigger point, this may indicate that further investigation is required.

The assigned values in this study and relevant FSANZ trigger points are given in Table 86.

With the very high trigger points for crustaceans, Sample S1 PFHxS, PFOS and PFOA were all spiked at well below the relevant trigger points. For Sample S2, PFHxS and PFOS were spiked at above the trigger point, and PFOA was spiked at below the trigger point. For Sample S3,

PFHxS was spiked at above the trigger point, and PFOS and PFOA were spiked at below the trigger point. The assigned values (or robust average where no assigned value was set) were in agreement with the spiked values relative to the trigger points across all analytes.

Table 86 Spiked Values, Assigned Values and FSANZ Trigger Points for PFHxS, PFOS and PFOA[12]

| Sample | Matrix | Classification | PFHxS (µg/kg) | | | PFOS (µg/kg) | | | PFOA (µg/kg) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Spiked Value | Assigned Value | Trigger Point | Spiked Value | Assigned Value | Trigger Point | Spiked Value | Assigned Value | Trigger Point |
| S1 | Prawn | Crustaceans | 1.89 ± 0.09 | 1.82 ± 0.23 | 65 | 2.78 ± 0.14 | 2.52 ± 0.36 | 65 | 2.00 ± 0.10 | 2.07 ± 0.21 | 520 |
| S2 | Carrot | Vegetables | 6.61 ± 0.33 | 6.18 ± 0.52 | 1.1 | 2.12 ± 0.11 | 2.03 ± 0.16 | 1.1 | 1.20 ± 0.06 | 1.20 ± 0.05 | 8.8 |
| S3 | Milk Powder | Milk | 0.664 ± 0.033 | 0.543 ± 0.076 | 0.4 | 0.277 ± 0.014 | 0.156 ± 0.046* | 0.4 | 0.695 ± 0.035 | 0.64 ± 0.13 | 2.8 |

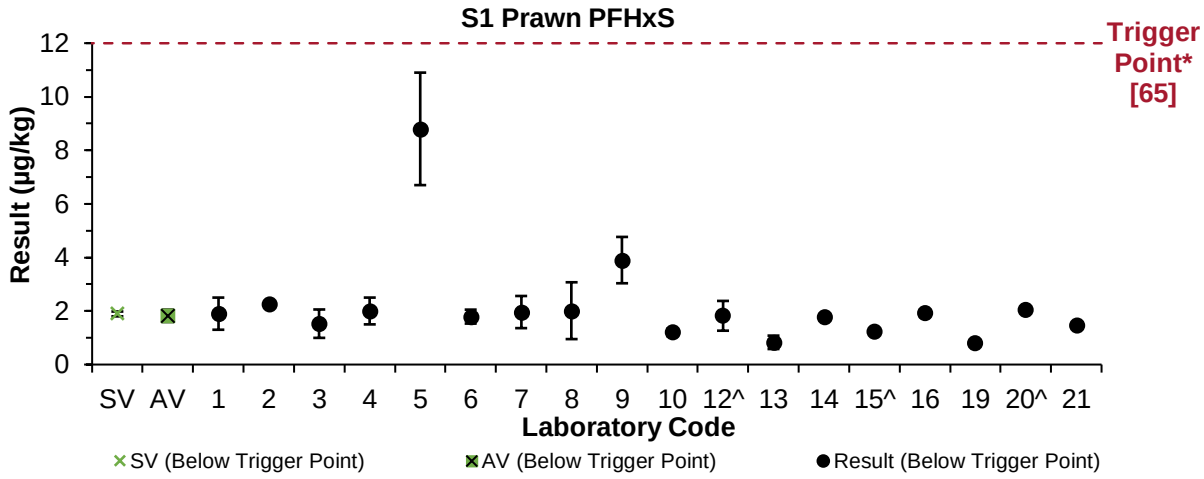
* Robust average (assigned value not set).

Figures 106 to 114 show comparisons of the spiked values (SV), assigned values (AV) or robust average (RA), participants' results, and FSANZ trigger points for these analytes. Where no numeric result was reported, or if a 'less-than' value (< *x*) was reported, these results have been excluded from consideration. Where a participant did not report the total value of an analyte, but did report a linear isomers only value, the linear value has been plotted.

Of the results considered, 123 of a total 128 results (96%) matched the SV and AV/RA with respect to being above or below the trigger point; two other results also matched however with uncertainties spanning the trigger point. Three results did not match the SV and AV/RA with respect to being above or below the trigger point, of which two results had uncertainties spanning the trigger point.

Results from Laboratories **7**, **8**, **10**, **14**, **16** and **19** correctly reflected whether the analyte mass fractions (inclusive of uncertainties) were above or below the trigger points for all nine assessed analytes.

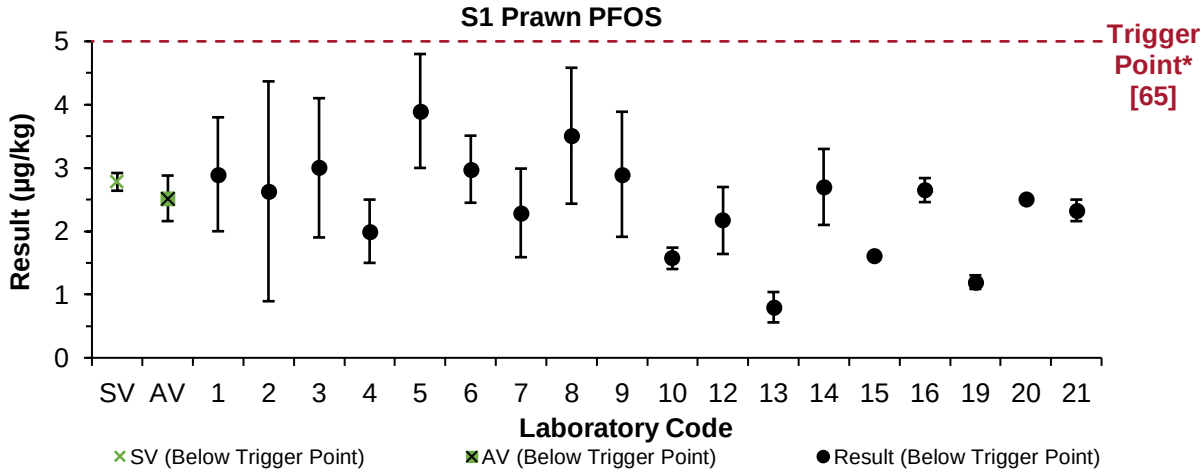
For some analytes, participants reported values very close to the trigger point but the associated uncertainties did not span the trigger point as they were unrealistically small, and this may have implications on the interpretation of the result. For example, for Sample S3 PFHxS (Figure **112**), Laboratory **14** reported a value with uncertainty above the trigger point. However, if this result had a more realistic relative MU, the uncertainty would have spanned the trigger point and the result would be conditional above trigger point instead; or vice versa for the result and uncertainty reported by Laboratory **21**.




* The trigger point has been scaled to fit on the chart; actual value in parentheses.

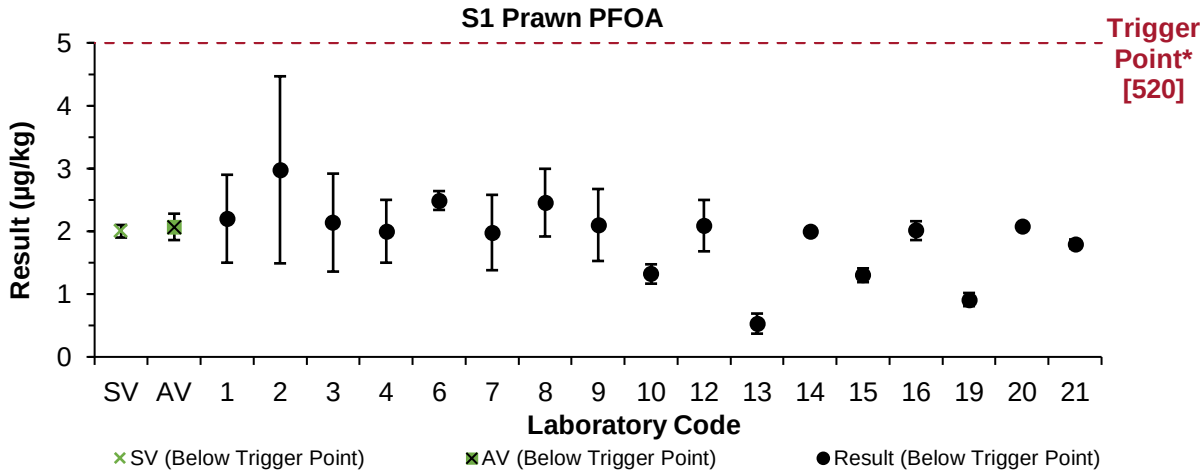
^ Result for linear isomers only has been plotted.

Figure 106 Sample S1 Prawn PFHxS Spiked and Assigned Values, Participant Results and Trigger Point



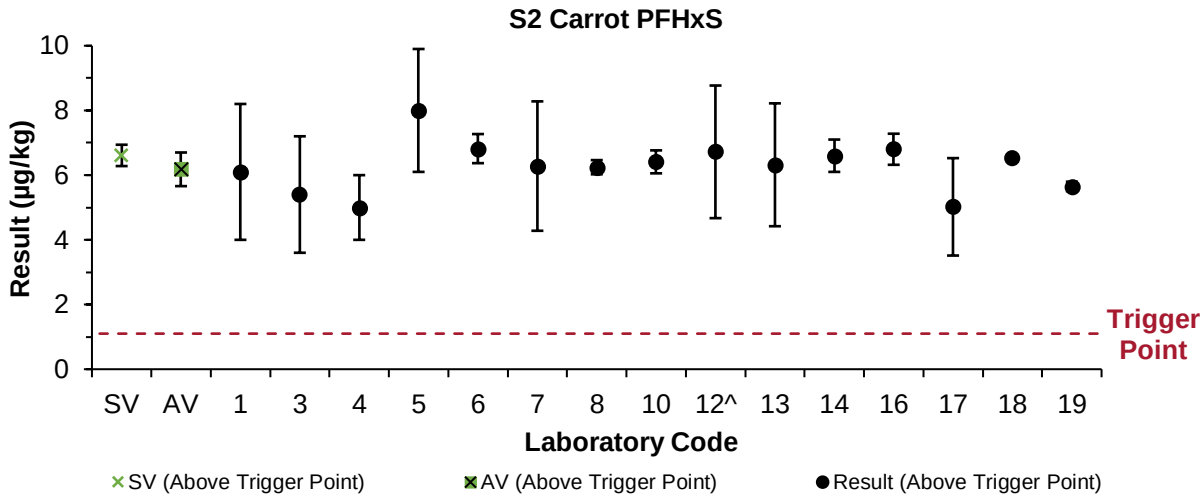

* The trigger point has been scaled to fit on the chart; actual value in parentheses.

Figure 107 Sample S1 Prawn PFOS Spiked and Assigned Values, Participant Results and Trigger Point




* The trigger point has been scaled to fit on the chart; actual value in brackets.

Figure 108 Sample S1 Prawn PFOA Spiked and Assigned Values, Participant Results and Trigger Point




^ Result for linear isomers only has been plotted.

Figure 109 Sample S2 Carrot PFHxS Spiked and Assigned Values, Participant Results and Trigger Point

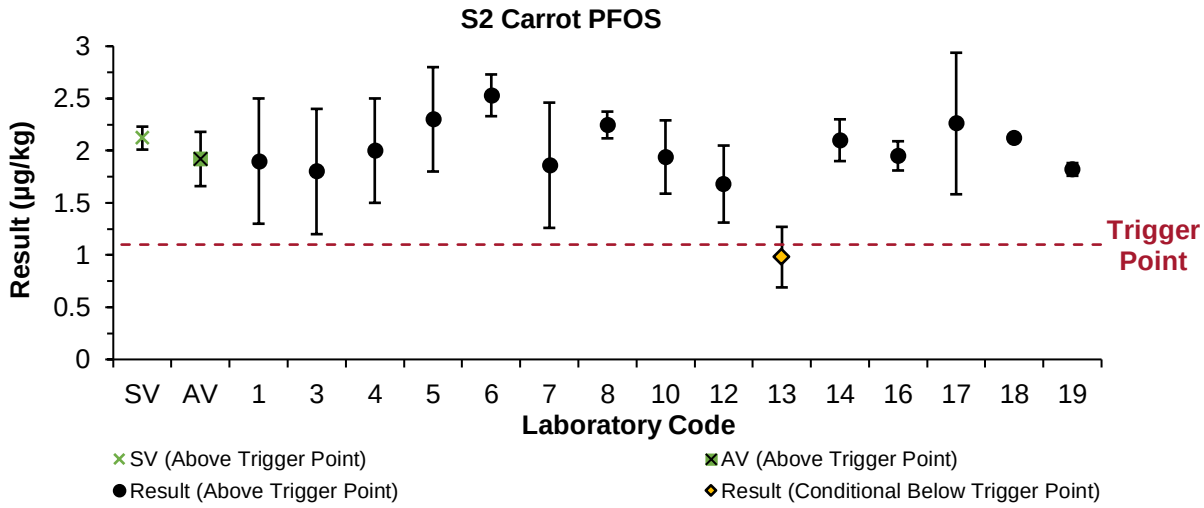
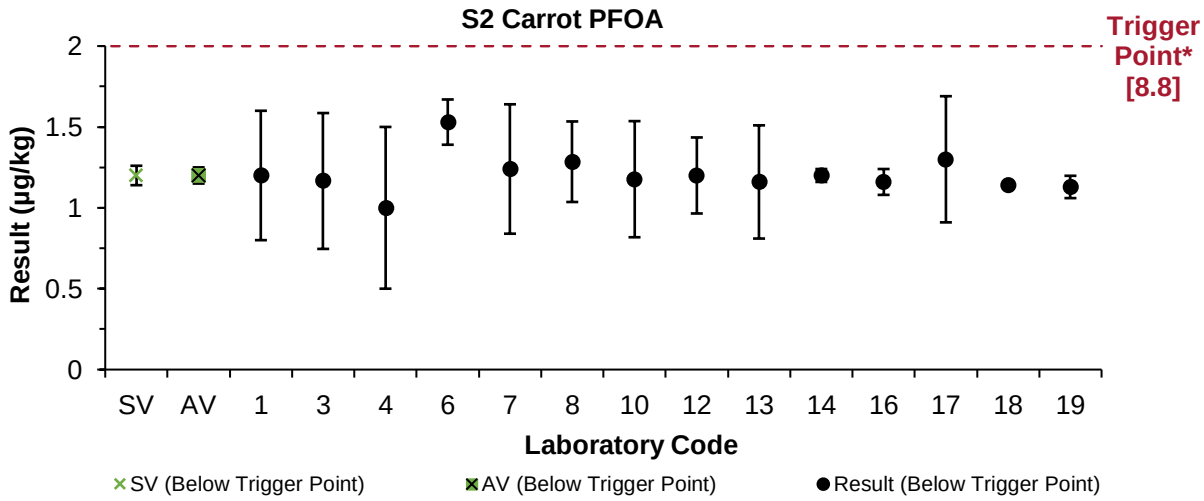
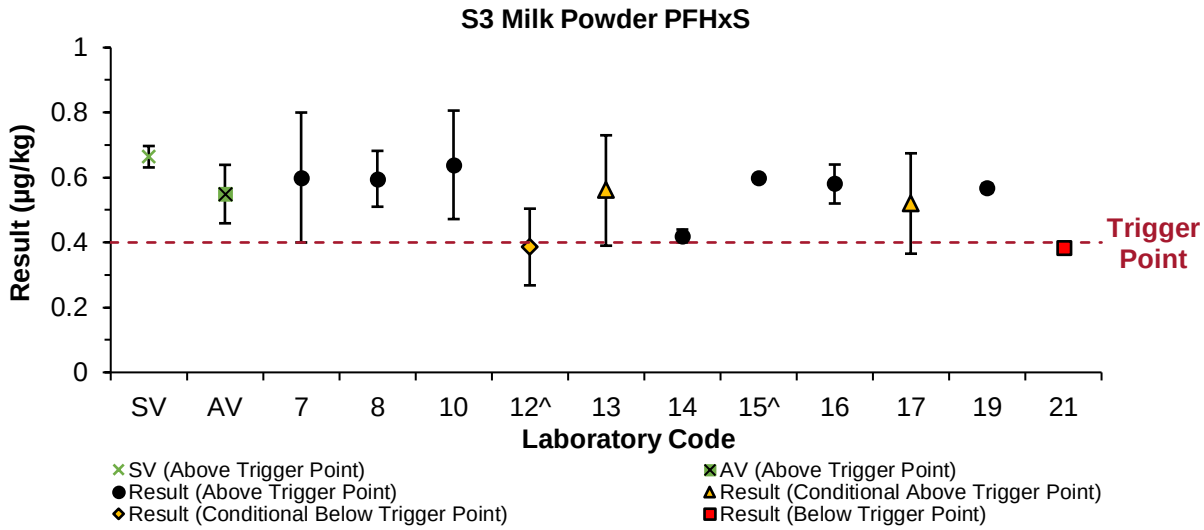



Figure 110 Sample S2 Carrot PFOS Spiked and Assigned Values, Participant Results and Trigger Point




* The trigger point has been scaled to fit on the chart; actual value in brackets.

Figure 111 Sample S2 Carrot PFOA Spiked and Assigned Values, Participant Results and Trigger Point




^ Result for linear isomers only has been plotted.

Figure 112 Sample S3 Milk Powder PFHxS Spiked and Assigned Values, Participant Results and Trigger Point

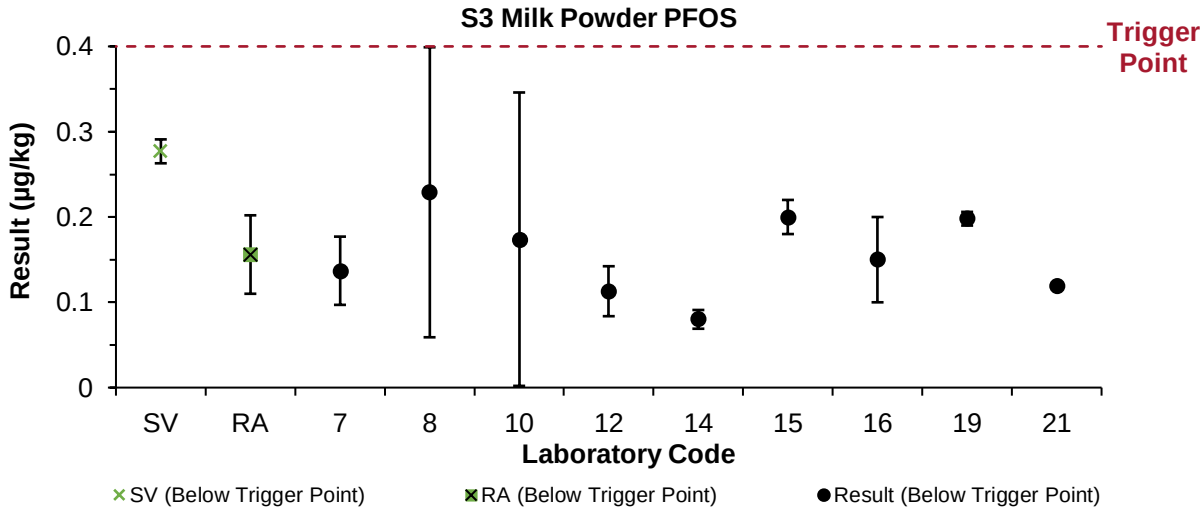



Figure 113 Sample S3 Milk Powder PFOS Spiked Value and Robust Average, Participant Results and Trigger Point

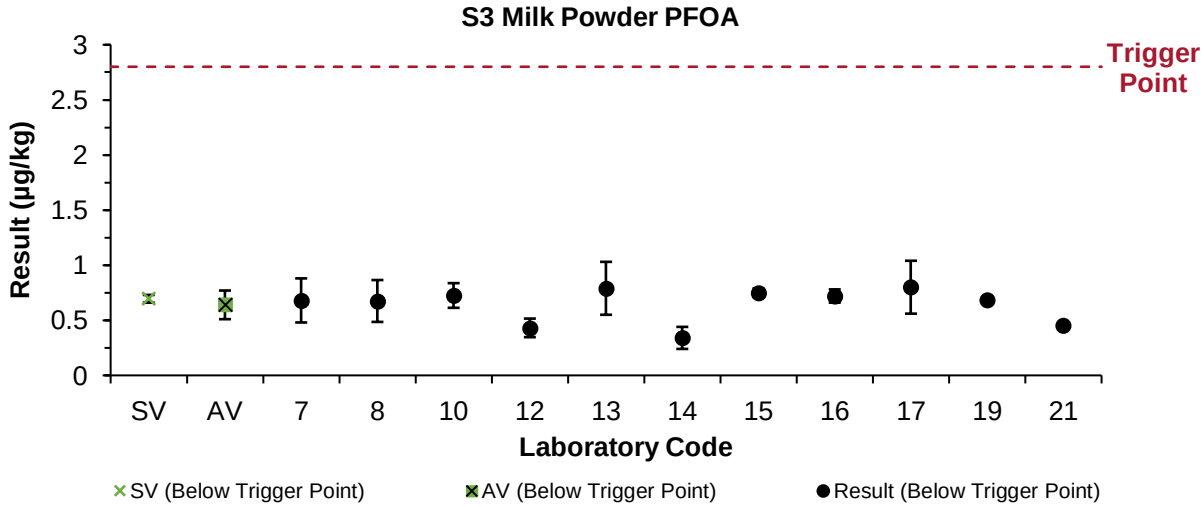



Figure 114 Sample S3 Milk Powder PFOA Spiked and Assigned Values, Participant Results and Trigger Point

## 6.7 False Negatives

Table 87 presents false negative results. These are analytes present in the samples which a participant tested for, but did not report a result; for example, when participants reported a 'less-than' result (< *x*) when the assigned value was higher than their limit of reporting (LOR), or if no value was reported. For analytes where no assigned value was set, results have only been considered to be false negatives where the consensus value and spiked value were significantly higher than the participants' LOR (i.e. the consensus value minus the expanded uncertainty and the spiked value minus the expanded uncertainty were both greater than the LOR), or if no value was reported.

Table 87 False Negatives

| Lab. Code | Sample | Analyte | Assigned Value (µg/kg) | Spiked Value (µg/kg) | Result* (µg/kg) |
|---|---|---|---|---|---|
| 2 | S1 | PFBA | 4.43 | 5.34 | <0.1 |
| | | PFPeA | 1.39 | 1.50 | <0.1 |
| | | PFNA | 0.98 | 0.998 | <0.1 |
| | | EtFOSE | 8.41 | 7.98 | <0.5 |
| 3 | S1 | PFHpS | 1.36 | 1.44 | <1 |
| 4 | S1 | PFBS | 1.25 | 1.34 | < 1 |
| | | PFPeA | 1.39 | 1.50 | < 1 |
| | | PFUdA | 1.22 | 1.21 | < 1 |
| 5 | S1 | PFOA | 2.07 | 2.00 | <0.1 |
| | | PFDA | 1.27 | 1.18 | <0.1 |
| | S2 | PFOA | 1.20 | 1.20 | <0.1 |
| | | PFDA | 9.3 | 9.47 | <0.1 |
| 9** | S1 | PFHxS (linear) | 1.82 | 1.89 | NR |
| | | PFHpS | 1.36 | 1.44 | NR |
| | | PFOS (linear) | 1.97 | 2.19 | NR |
| | | PFNS | 9.02 | 9.65 | NR |
| | | PFDS | 6.5 | 6.77 | NR |
| | | PFBA | 4.43 | 5.34 | NR |
| | | PFPeA | 1.39 | 1.50 | NR |
| | | PFDA | 1.27 | 1.18 | NR |
| | | PFUdA | 1.22 | 1.21 | NR |
| | | PFTrDA | 6.3 | 7.98 | NR |
| | | PFTeDA | 1.68 | 1.80 | NR |
| | | PFOSA | 2.39 | 2.99 | NR |
| | | MeFOSA | 8.37 | 7.98 | NR |
| | | EtFOSA | 7.72 | 7.98 | NR |
| | | MeFOSAA | 8.28 | 7.98 | NR |
| | | EtFOSE | 8.41 | 7.98 | NR |

| Lab. Code | Sample | Analyte | Assigned Value (µg/kg) | Spiked Value (µg/kg) | Result* (µg/kg) |
|---|---|---|---|---|---|
| | | 5:3FTCA | 24.6*** | 24.8 | NR |
| | | GenX | 8.7 | 10.1 | NR |
| | | ADONA | 8.2 | 9.47 | NR |
| | | 9Cl-PF3ONS | 19.2 | 23.2 | NR |
| | | 11Cl-PF3OUdS | 17.1 | 23.4 | NR |
| 12 | S3 | GenX | 0.107*** | 0.994 | <0.0453 |
| 13 | S1 | PFBS | 1.25 | 1.34 | <0.5 |
| | | PFNA | 0.98 | 0.998 | <0.5 |
| | | PFDA | 1.27 | 1.18 | <0.5 |
| | | PFUdA | 1.22 | 1.21 | <0.5 |
| | | 5:3FTCA | 24.6*** | 24.8 | <0.5 |
| 14 | S3 | 9Cl-PF3ONS | 0.74 | 0.926 | < 0.72 |
| 17 | S1 | PFBS | 1.25 | 1.34 | <0.5 |
| | | PFHxS (total) | 1.82 | 1.89 | <0.5 |
| | | PFHpS | 1.36 | 1.44 | <0.5 |
| | | PFOS (total) | 2.52 | 2.78 | <0.5 |
| | | PFPeA | 1.39 | 1.50 | <0.5 |
| | | PFOA | 2.07 | 2.00 | <0.5 |
| | | PFNA | 0.98 | 0.998 | <0.5 |
| | | PFDA | 1.27 | 1.18 | <0.5 |
| | | PFUdA | 1.22 | 1.21 | <0.5 |
| | | PFTrDA | 6.3 | 7.98 | <0.5 |
| | | PFTeDA | 1.68 | 1.80 | <0.5 |
| | | PFOSA | 2.39 | 2.99 | <0.5 |
| | | EtFOSE | 8.41 | 7.98 | <0.5 |
| | S3 | PFHpS | 0.554 | 0.668 | <0.5 |
| | | PFDA | 0.76 | 0.803 | <0.5 |
| | | ADONA | 0.79 | 0.936 | <0.5 |
| 19** | S1 | PFHxS (linear) | 1.82 | 1.89 | NR |
| | | PFOS (linear) | 1.97 | 2.19 | NR |
| | S2 | PFHxS (linear) | 6.46 | 6.61 | NR |
| | | PFOS (linear) | 1.92 | 2.12 | NR |
| | S3 | PFHxS (linear) | 0.549 | 0.664 | NR |
| | | PFOS (linear) | 0.126**** | 0.218 | NR |
| | | GenX | 0.107*** | 0.994 | NR |
| 21** | S1 | PFHxS (linear) | 1.82 | 1.89 | NR |
| | | PFOS (linear) | 1.97 | 2.19 | NR |

| Lab. Code | Sample | Analyte | Assigned Value (µg/kg) | Spiked Value (µg/kg) | Result* (µg/kg) |
|---|---|---|---|---|---|
| | S3 | PFHxS (linear) | 0.549 | 0.664 | NR |
| | | PFOS (linear) | 0.126**** | 0.218 | NR |
| | | GenX | 0.107*** | 0.994 | NR |

* NR results may or may not be false negatives, depending on the participant's actual LOR.

** Laboratories **9**, **19** and **21** reported numeric results for the totals of PFHxS and PFOS. Their linear PFHxS and PFOS results have been included in this table as they did not report results for these analytes, and they also did not mark them as 'NT'.

*** Median value (assigned value not set).

**** Robust average (assigned value not set).

### 6.8 Reporting of Additional Analytes

Table 88 presents results reported by participants for analytes that were not spiked into the test samples by the study coordinator. Participants should take care to avoid any potential cross-contamination between samples during analysis.

Table 88 Non-Spiked Analytes Reported by Participants

| Lab. Code | Sample | Analyte | Result (µg/kg) | Uncertainty (µg/kg) | Recovery (%) |
|---|---|---|---|---|---|
| 9 | S1 | 8:2FTS | 0.54 | 0.328 | 109 |
| 10 | S1 | PFDoA | 0.03 | 0.13 | 111.7 |
| | S2 | PFDoS | 0.041 | 0.437 | NR |
| 12 | S1 | PFPeS | 0.0664 | 0.0175 | 95.0 |
| | | PFDoS | 0.0461 | 0.0208 | 53.2 |
| | S2 | PFDoS | 0.0537 | 0.0283 | 113.9 |
| | | PFHxDA | 0.0147 | 0.003 | 113.9 |
| | | MeFOSAA | 0.093 | NR | 86.5 |
| | S3 | PFHxDA | 0.008 | 0.0019 | 69.7 |
| | | FOUEA | 0.0760 | 0.0734 | 23.4 |
| | | 6:2FTS | 0.801 | 0.253 | 77.2 |
| 15 | S1 | 4:2FTS | 0.06 | 0.00 | 112 |
| | | 8:2FTS | 0.03 | 0.00 | 102.6 |
| | S3 | 6:2FTS | 1.83 | 2.13 | 87.5 |
| 16 | S1 | PFPeS | 0.66 | 0.07 | NR |
| | | PFDoA | 0.04 | 0.06 | NR |
| | S2 | PFDoA | 0.01 | 0.02 | NR |
| 19 | S2 | PFDoS | 0.026 | 0.004 | 83 |

### 6.9 Participants' Results and Analytical Methods

Participants' results excluded from all summary statistics calculations in Section 5 have also been excluded from discussion in this section.

Participants were requested to analyse the samples using their normal test method and to report a single result as they would normally report to a client. Methodologies as provided by

participants are presented in Appendix 4. Most participants did not base their methodology on a standard method.

Comparisons of *z*-scores with various sample preparation and analysis parameters are given in Figures 115 to 126 (for all charts, where the *z*-score was greater than 10.0, this has been plotted at 10.0). Participants used a wide variety of methodologies for the analysis of the samples in this study, and these different methodologies produced generally compatible results.

The samples in this study covered a range of different matrix types: Sample S1 prawn, Sample S2 carrot and Sample S3 milk powder. Laboratory **14** reported using a different extraction and cleanup procedure for prawn and carrot as compared to milk powder; this participant used solid-liquid extraction (SLE) with acidified acetonitrile (ACN) and a carbon clean-up using dispersive solid phase extraction (dSPE) for prawn and carrot, whereas they used SLE with ACN and a hexane wash for fat removal for the milk powder. However, the other participants used the same analysis procedure across all three matrices, with only minor differences (e.g. sample mass used for analysis, or volume of reagent added for pre-treatment). Generally, the ratio of the assigned values to the spiked values for analytes in milk powder were lower than for prawn and carrot, and there may have been lower extraction efficiency for the milk powder matrix as compared to the other matrices.

USEPA Method 1633 notes that samples must undergo cleanup to remove interferences, and that specifically carbon cleanup is required (for the relevant matrices as covered by the method: aqueous, solid, biosolids, and tissue); however, that this procedure 'may remove analytes if the sample has a very low organic carbon content'.[5] One participant reported only using filtration with no carbon as their cleanup step and while their results were biased low, their results returned acceptable *z*-scores. Another participant reported not using a clean-up step for the milk powder sample, and they were also biased low.

One participant allowed their labelled standards to equilibrate for five minutes; this participant returned generally acceptable results but biased low. USEPA Method 1633 specifies to allow labelled standards to equilibrate for at least 30 minutes for solid and tissue matrices.[5]

It was seen in this study participants using a long extraction time (960 minutes or more) returned results with higher acceptable *z*-scores, corresponding to greater extraction efficiency of the analytes. These participants also used long extract concentration times (120 minutes or more). USEPA Method 1633 notes that slowly concentrating extracts prevents the loss of neutral and more volatile compounds, and that excess methanol present during SPE clean-up results in poor recoveries of long-chain PFCAs and PFSAs.[5]

All participants submitting their methodology reported adding labelled standards before extraction. Participants reported a very broad range of recoveries for the labelled standards, ranging from 1.3% to 388%, though around half of the reported recoveries were between 75% and 100%. The majority of participants reported that their results were corrected for recovery, though there was no significant difference observed between the results from participants who did and those who didn't in this study.

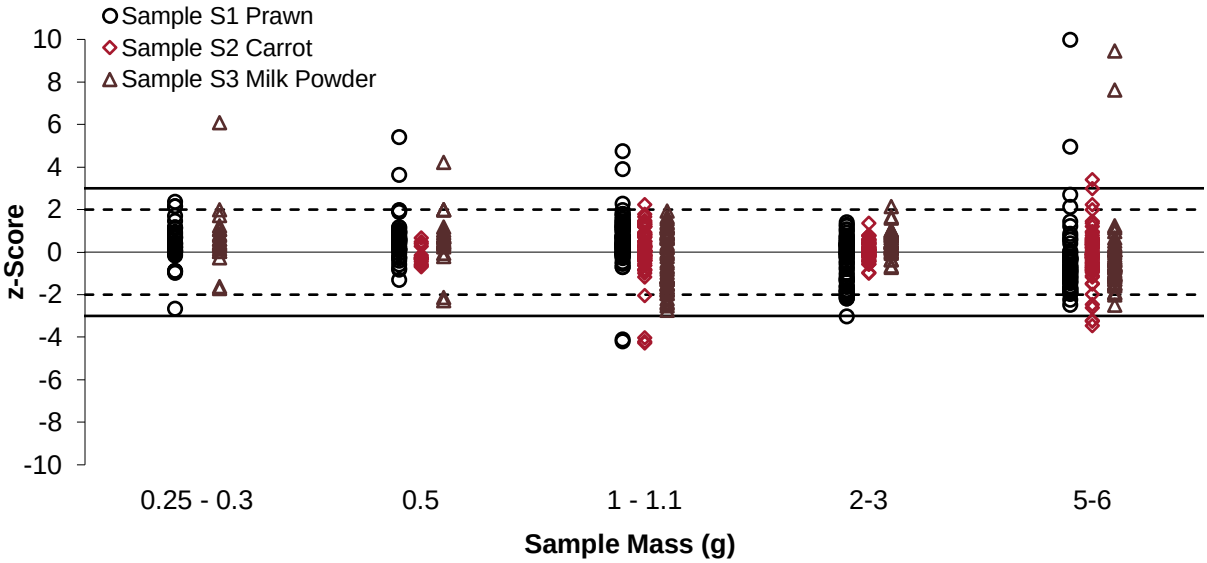



Figure 115 *z*-Score vs Sample Mass Used for Analysis

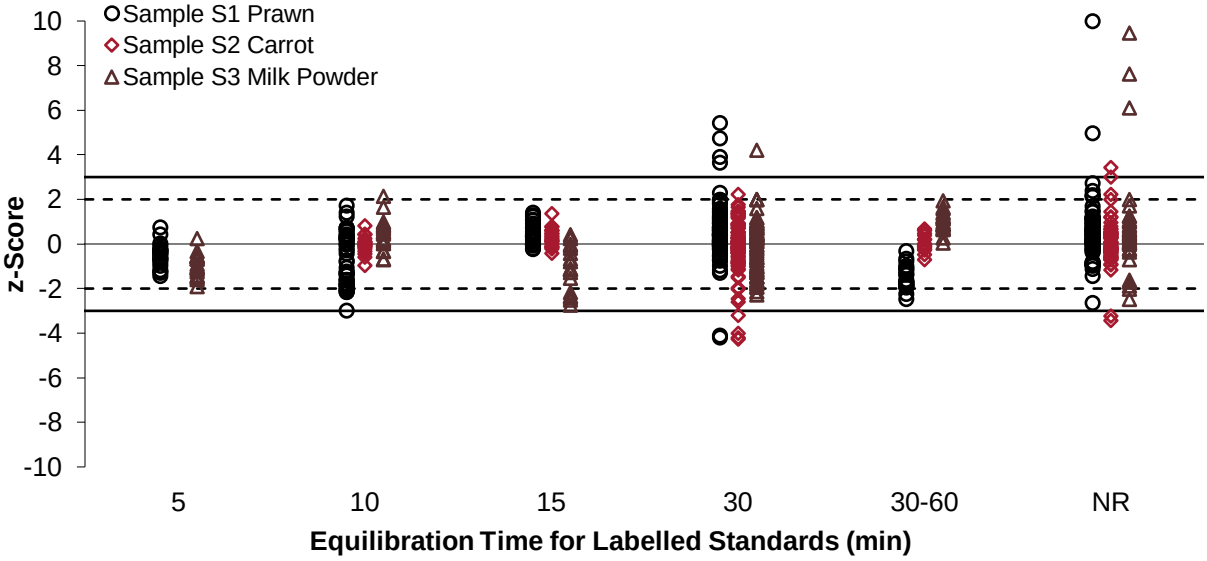



Figure 116 *z*-Score vs Equilibration Time for Labelled Standards

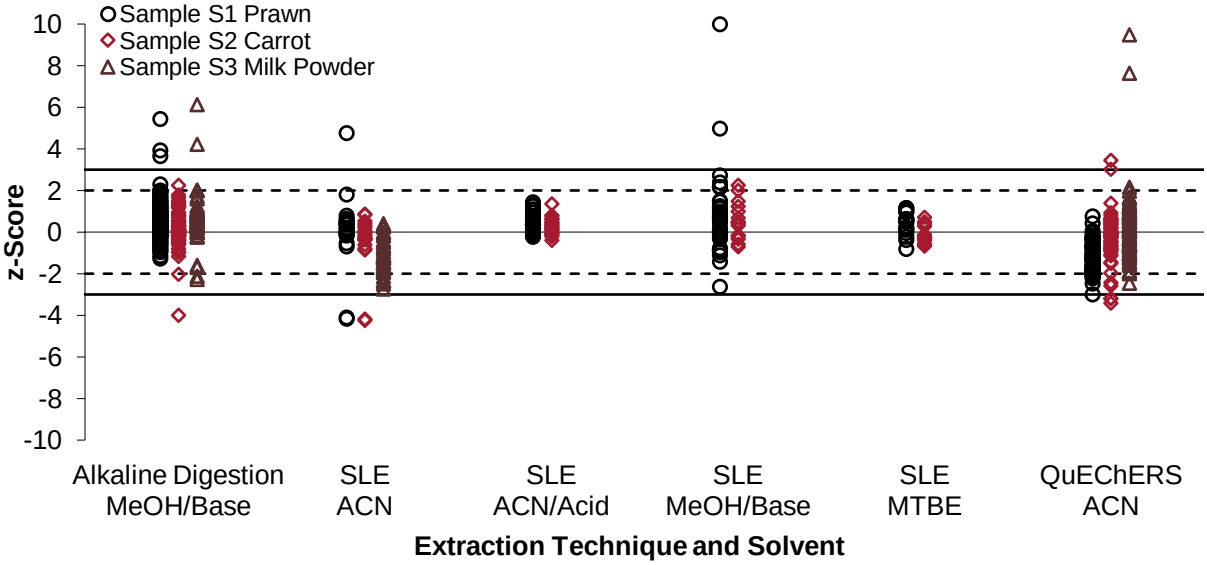



Figure 117 *z*-Score vs Extraction Technique and Solvent

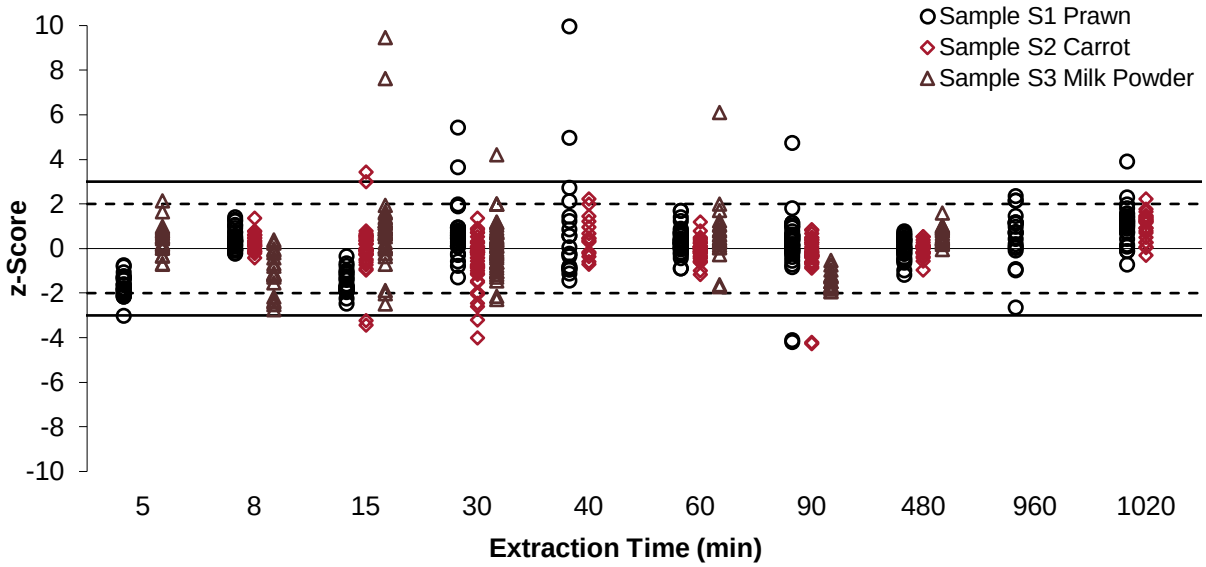



Figure 118 *z*-Score vs Extraction Time

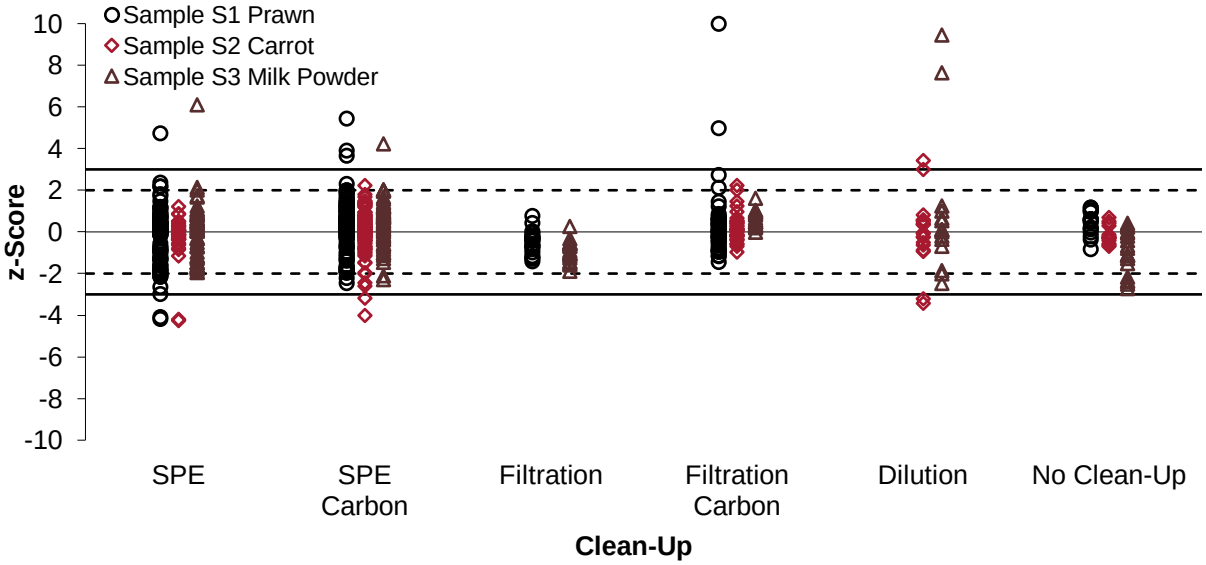



Figure 119 *z*-Score vs Clean-Up

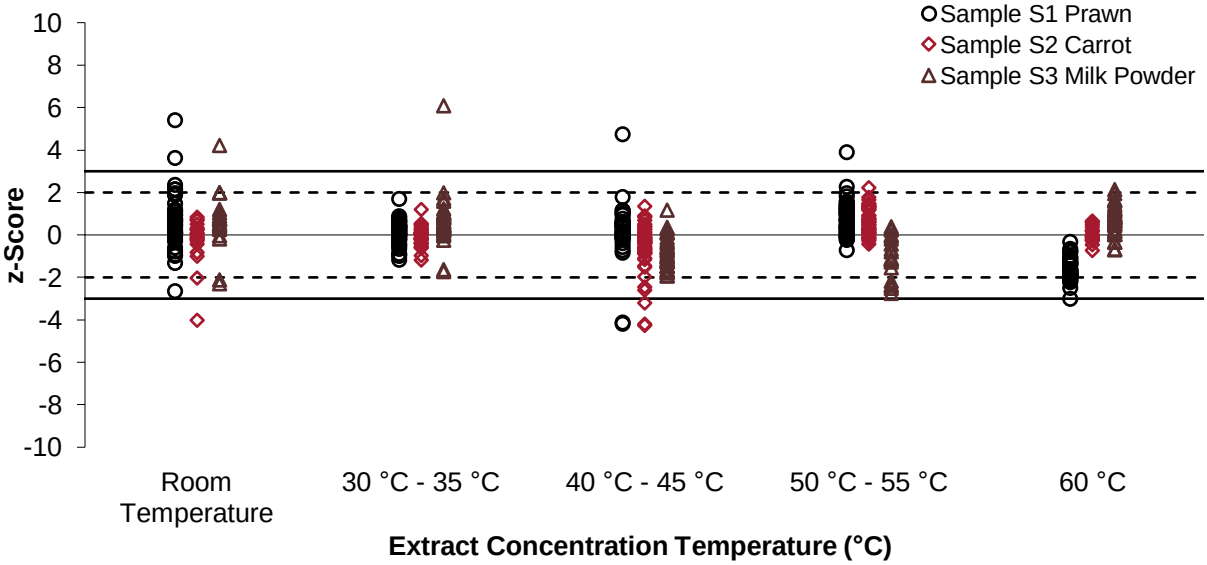



Figure 120 *z*-Score vs Extract Concentration Temperature

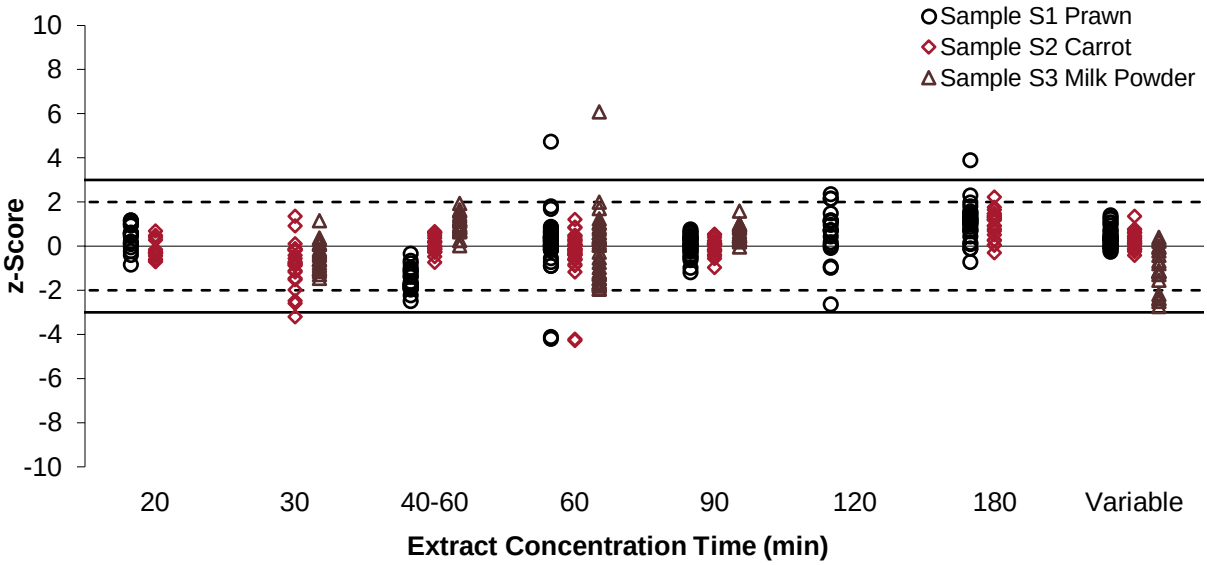



Figure 121 *z*-Score vs Extract Concentration Time

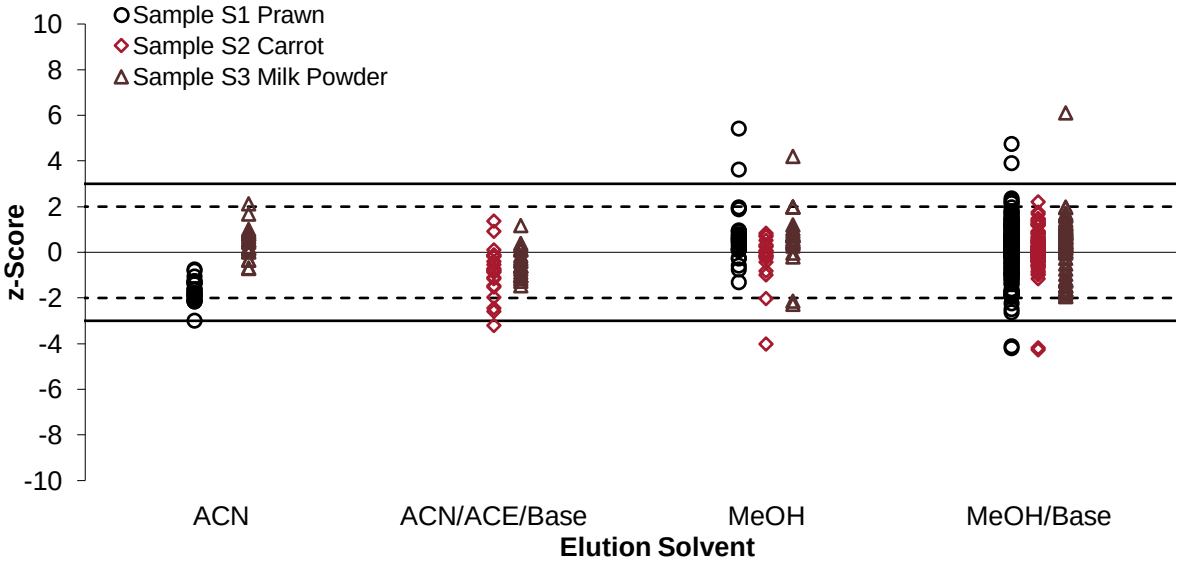



Figure 122 *z*-Score vs Elution Solvent

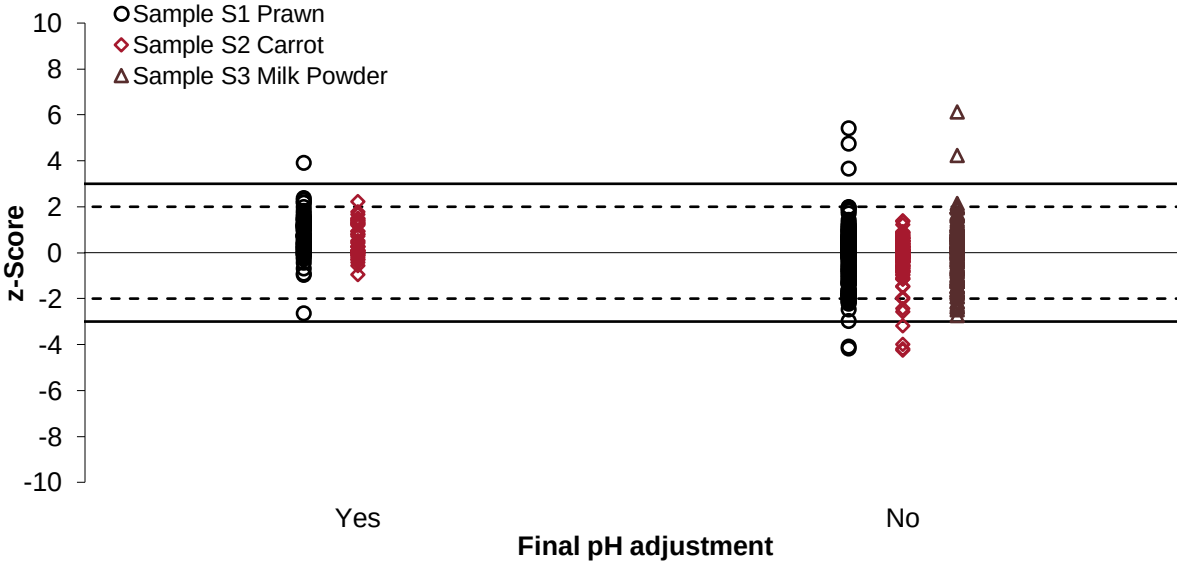



Figure 123 *z*-Score vs Final pH Adjustment

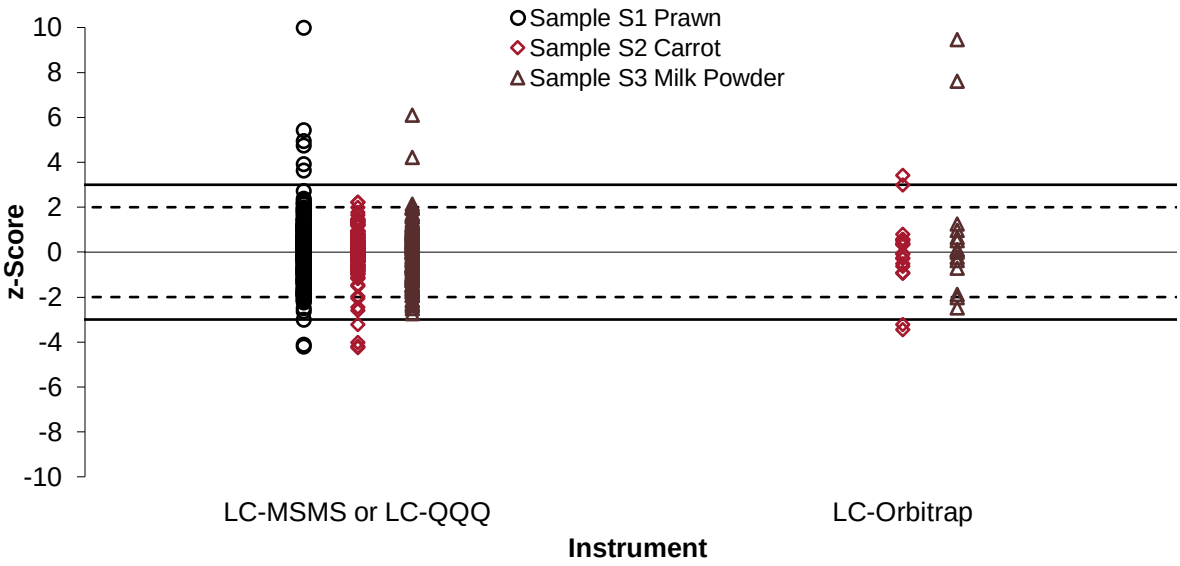



Figure 124 *z*-Score vs Measurement Instrument

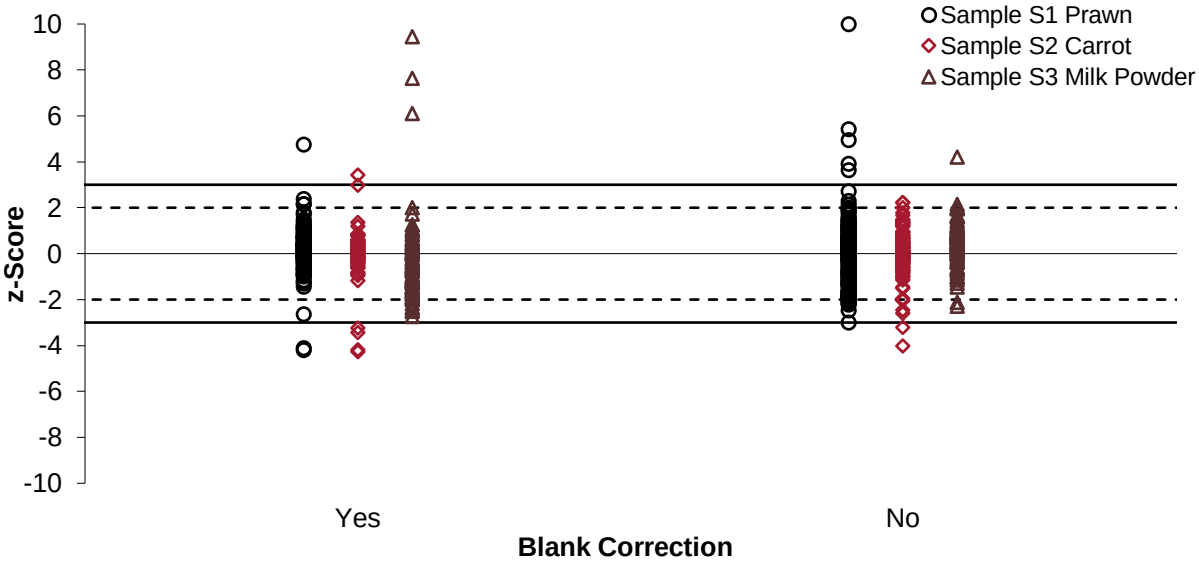



Figure 125 *z*-Score vs Blank Correction

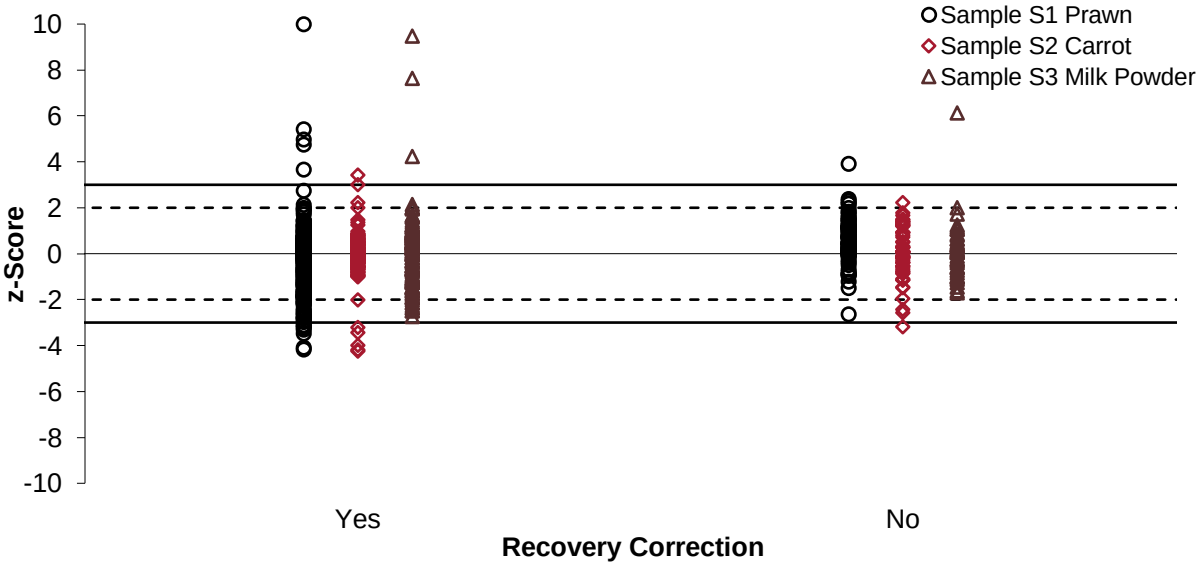



Figure 126 *z*-Score vs Recovery Correction

### 5:3FTCA

5:3FTCA was introduced to biota for the first time in this study, being spiked into Sample S1. No assigned value was set for this analyte as too few numeric results were reported. A comparison of the reported numeric results and methodologies is presented in Figure 127 (listing the sample size, extraction technique, solvent and time, and labelled standard used before extraction and before instrument analysis). One participant reported adding a labelled standard both before extraction and before instrument analysis, while two other participants reported adding a labelled standard before extraction only; all participants selected different labelled standards. Three of the numeric results reported were similar to the spiked value; these participants employed longer extraction times.

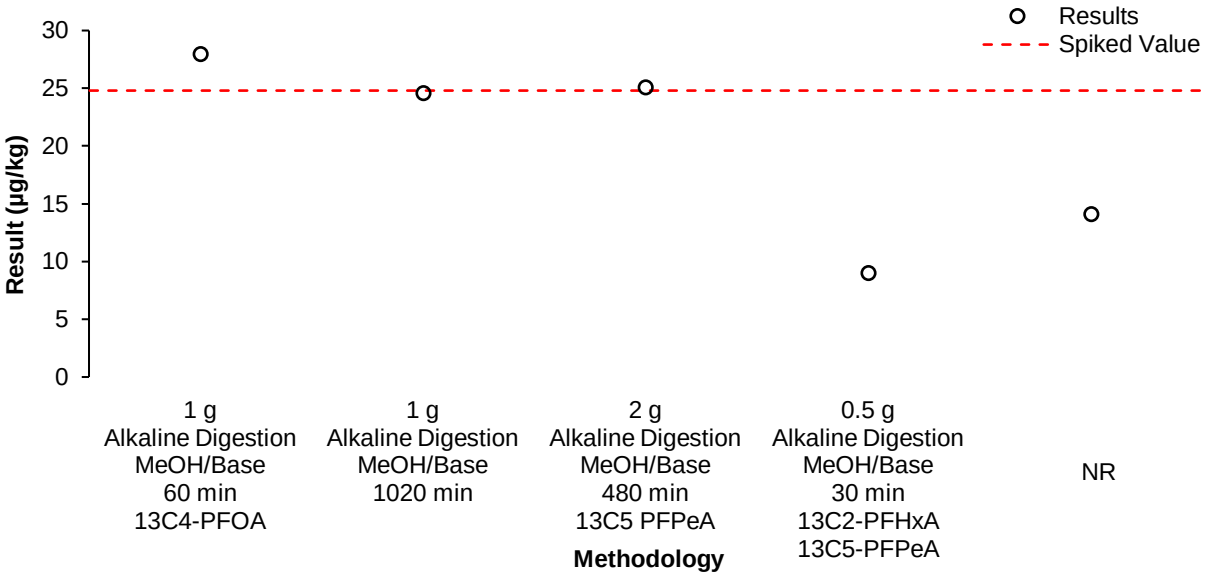



Figure 127 Sample S1 5:3FTCA Results vs Methodology

### PFTrDA and PFTeDA

The long-chain PFCAs PFTrDA and PFTeDA were challenging for participants in this study. These were spiked into Samples S1 and S3 and returned relatively high between-laboratory CVs (with bimodal distribution observed in some cases). There was no clear trend observed between methodology used and result reported. A plot of the normalised result to spiked value versus laboratory code for PFTrDA and PFTeDA is presented in Figure 128.

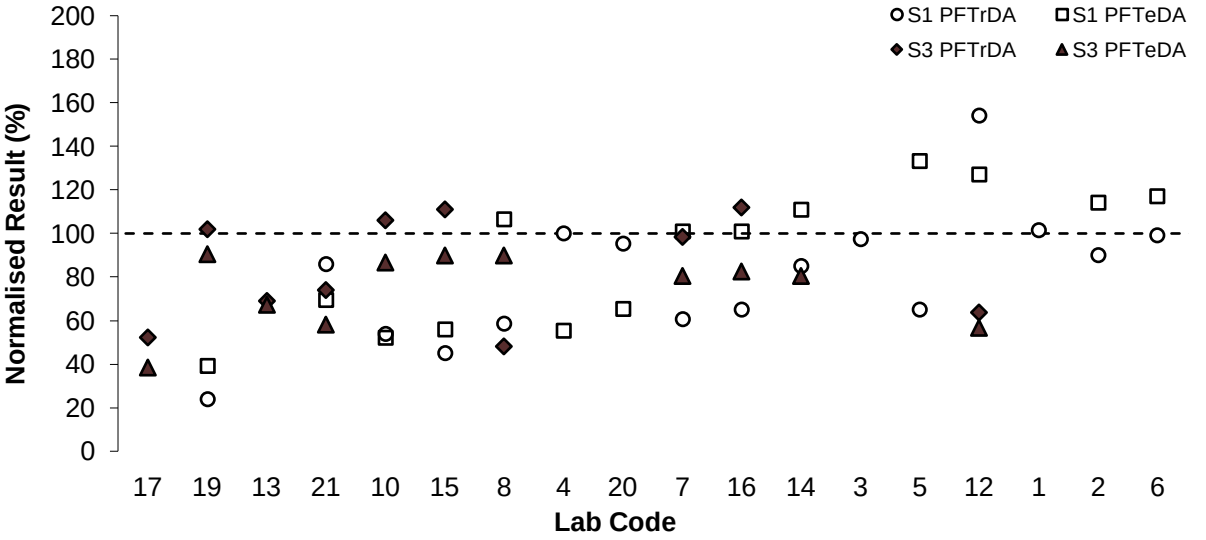


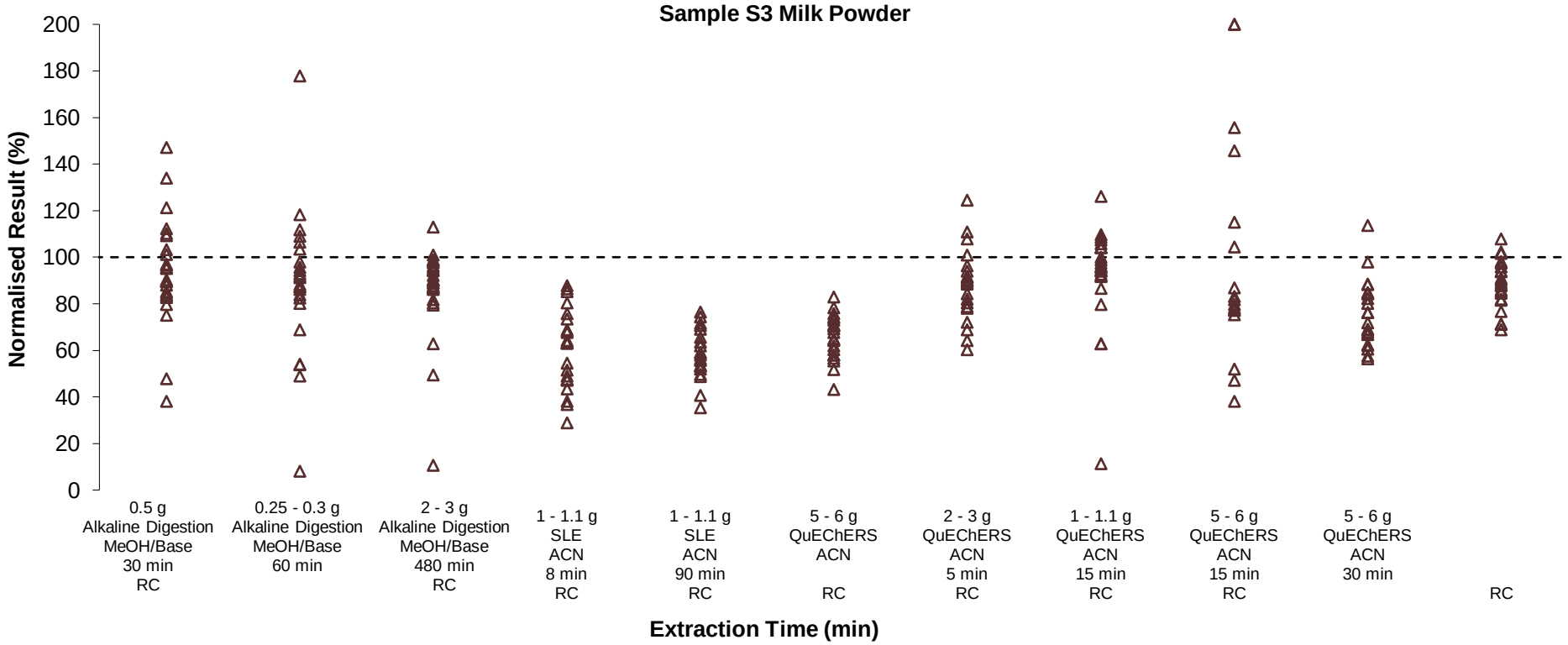

Figure 128 PFTrDA and PFTeDA Normalised Results vs Lab Code

**Sample S3 Milk Powder Analytes**

In this study it was observed that the ratio of the consensus of participants' results to the spiked values for analytes in milk powder was generally lower than for prawn and carrot. There may have been lower extraction efficiency for the milk powder matrix as compared to the other matrices.

A plot of normalised results to spiked value versus methodology for all spiked analytes in Sample S3 is presented in Figure 129 (listing sample mass, extraction technique, solvent and time, and whether recovery correction was applied). In this study, participants using alkaline digestion with methanol (MeOH)/base returned close to 100% normalised results. There was variation seen for participants who extracted using QuEChERS with ACN. For those participants using SLE with ACN as the extraction technique, these results were generally biased lower.

There was no clear difference observed when comparing participants who corrected their results for recoveries, and those who did not.




Normalised results greater than 200% have been plotted at 200%. RC = Recovery Corrected.

Figure 129 Sample S3 Results Normalised to Spike Value vs Methodology

**Sample S3 PFOS and PFOS (linear)**

No assigned values were set for Sample S3 PFOS and PFOS (linear) as the consensus of participants' results was significantly lower than the spiked value. This was observed only for this milk powder sample. Plots of the results reported and the methodology used are presented in Figures 130 and 131 (listing the sample size, extraction technique, solvent and time, and labelled standard used before extraction and before instrument analysis).

As with the other Sample S3 analytes, those participants using SLE with ACN as their extraction technique returned lower results relative to the spiked value. Most participants added labelled standards before extraction (using 13C4-PFOS or 13C8-PFOS), while three participants added labelled standards before instrument analysis (using 13C4-PFOS, 13C8-PFOS or 18O2-PFOS).

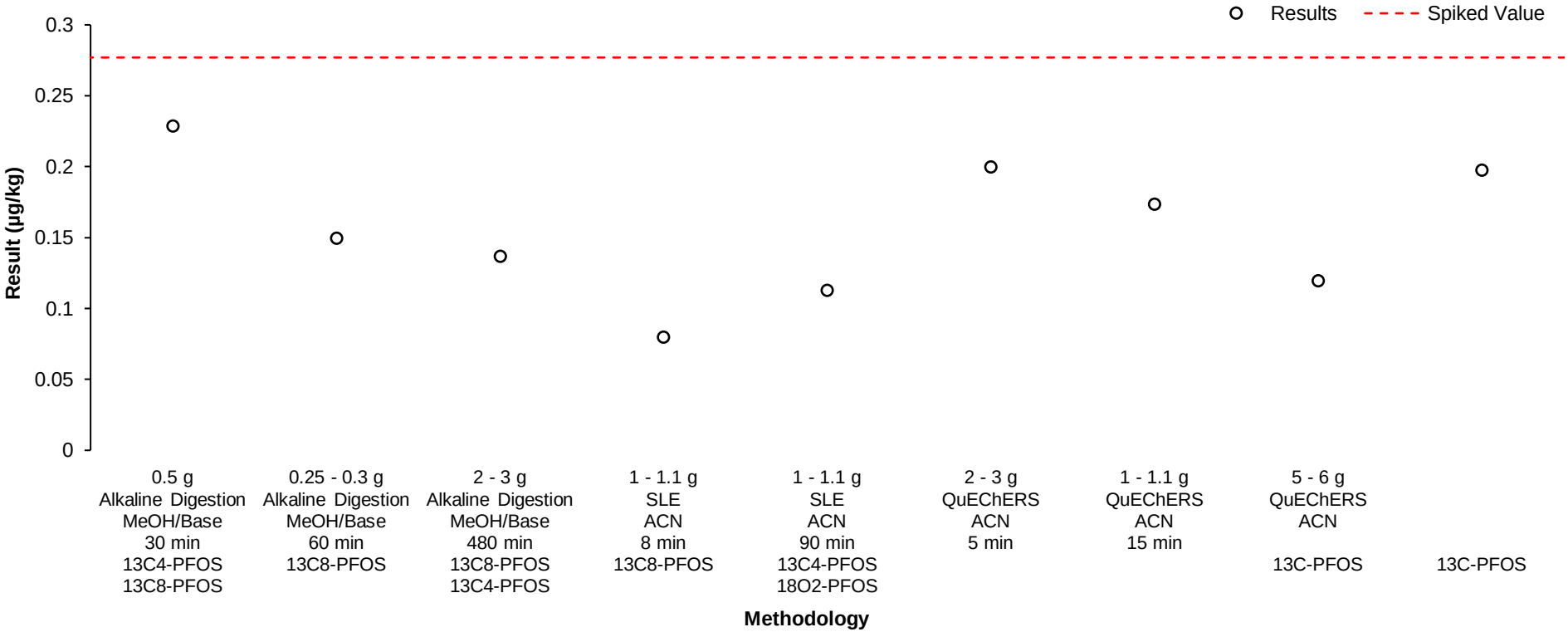



Figure 130 Sample S3 PFOS Results vs Methodology

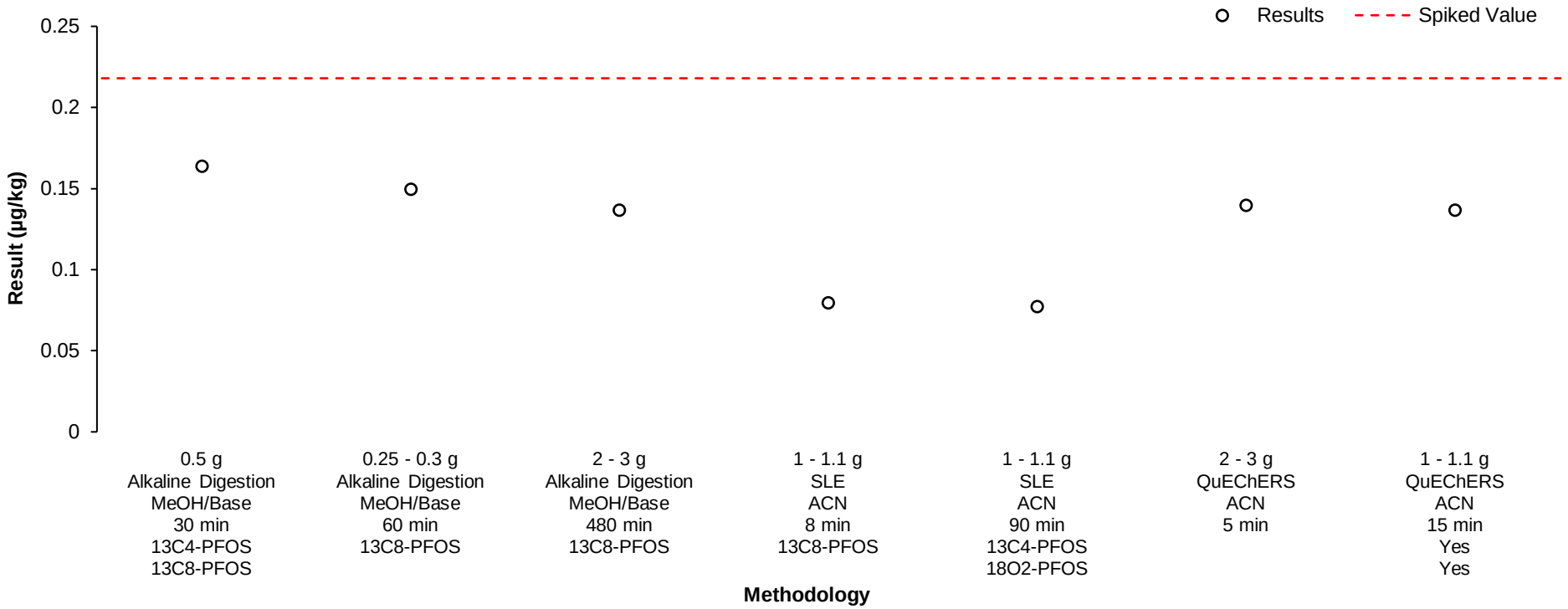



Figure 131 Sample S3 PFOS (linear) Results vs Methodology

**Sample S3 MeFOSAA and EtFOSAA**

No assigned values set for Sample S3 MeFOSAA and EtFOSAA as too few numeric results were reported by participants. However, the consensuses of participants' results were close to the spiked values for both analytes. A comparison of the reported numeric results and reported methodologies is presented in Figures 132 and 133 (listing the sample size, extraction technique, solvent and time, and labelled standard used before extraction and before instrument analysis). As with the other Sample S3 analytes, those participants using SLE with ACN as their extraction technique reported lower results as compared to the spiked value for both analytes.

For Sample S3 MeFOSAA, all but one participant reported using d3-N-MeFOSAA as the labelled standard added before extraction. Two participants reported also using a labelled standard before instrument analysis.

For Sample S3 EtFOSAA, four participants used d5-N-EtFOSAA as the labelled standard added before extraction, and one participant used d3-N-MeFOSAA instead. Two participants reported also using a labelled standard before instrument analysis.

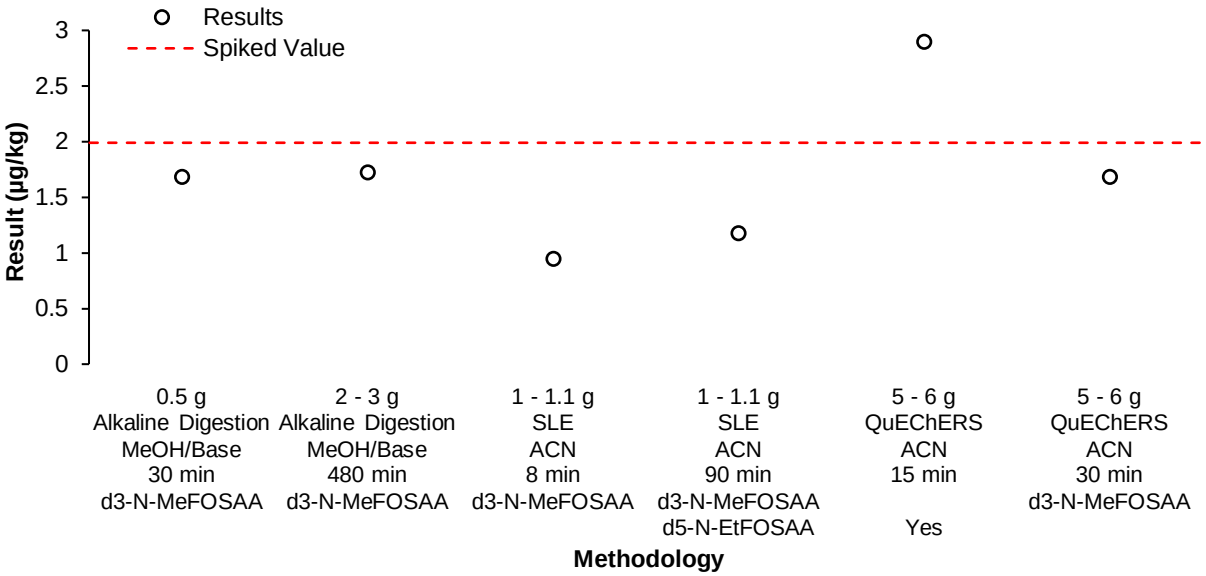



Figure 132 Sample S3 MeFOSAA Results vs Methodology

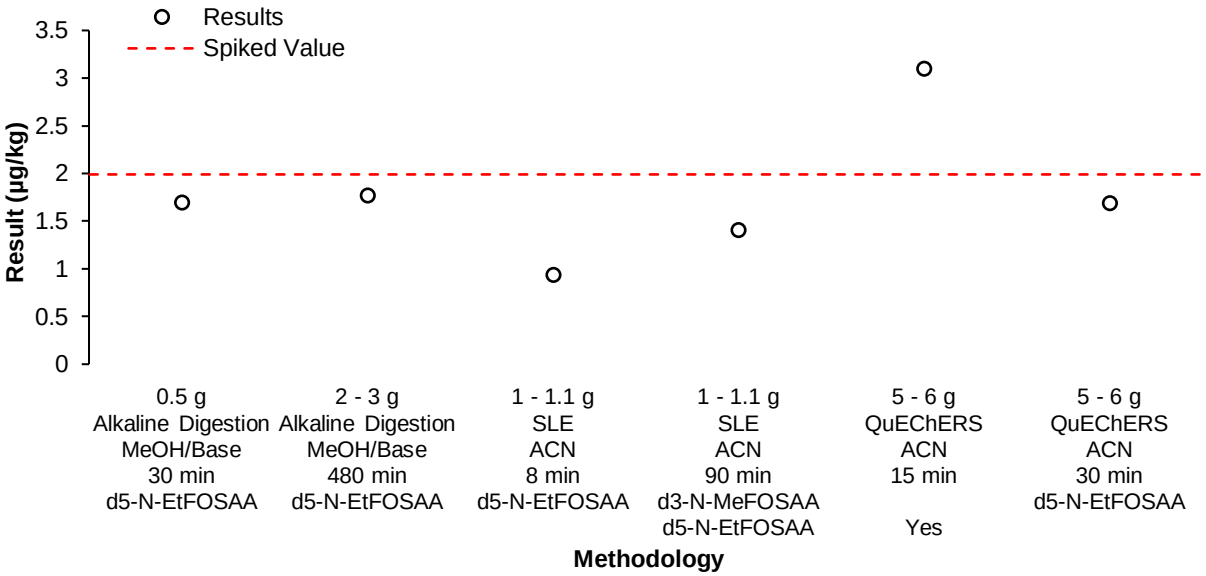



Figure 133 Sample S3 EtFOSAA Results vs Methodology

### 6.10 Total vs Linear Isomers – PFHxS and PFOS

In this study, participants were requested to report both the linear and total (sum of linear and branched isomers) for PFHxS and PFOS. A summary of results reported by participants is presented in Table 89. Most participants reported linear and total numeric results for both analytes.

Table 89 Number of Participants Reporting Numeric PFHxS and PFOS Results

| Sample | PFHxS | | | PFOS | | |
|---|---|---|---|---|---|---|
| | Linear and Total | Linear Only | Total Only | Linear and Total | Linear Only | Total Only |
| S1 | 9 | 3 | 6 | 13 | - | 5 |
| S2 | 8 | 1 | 6 | 10 | - | 5 |
| S3 | 6 | 2 | 3 | 7 | - | 2 |

**PFHxS**

Summaries of participants' results for linear and total PFHxS and their ratios, in Samples S1, S2 and S3 are presented in Figures 134 to 136 (only participants reporting numeric results for both analytes have been included; the ratio from the AV is calculated based on the results reported by all participants, including those who reported results for only one analyte).

In this study, all samples were spiked with only linear PFHxS standard, and therefore the linear to total ratio for the two analytes was expected to be 100%.

The majority of participants correctly reported the same result for both linear and total PFHxS in all three samples. For those participants not reporting the same result, the linear value was generally only slightly lower than the total value, with the ratio of linear to total ranging from 92% to 100% (when rounded); all linear and total results were in agreement with each other within their respective uncertainties.

The assigned value ratio for linear to total PFHxS was 100%, 105% and 101% for Samples S1, S2 and S3 respectively.

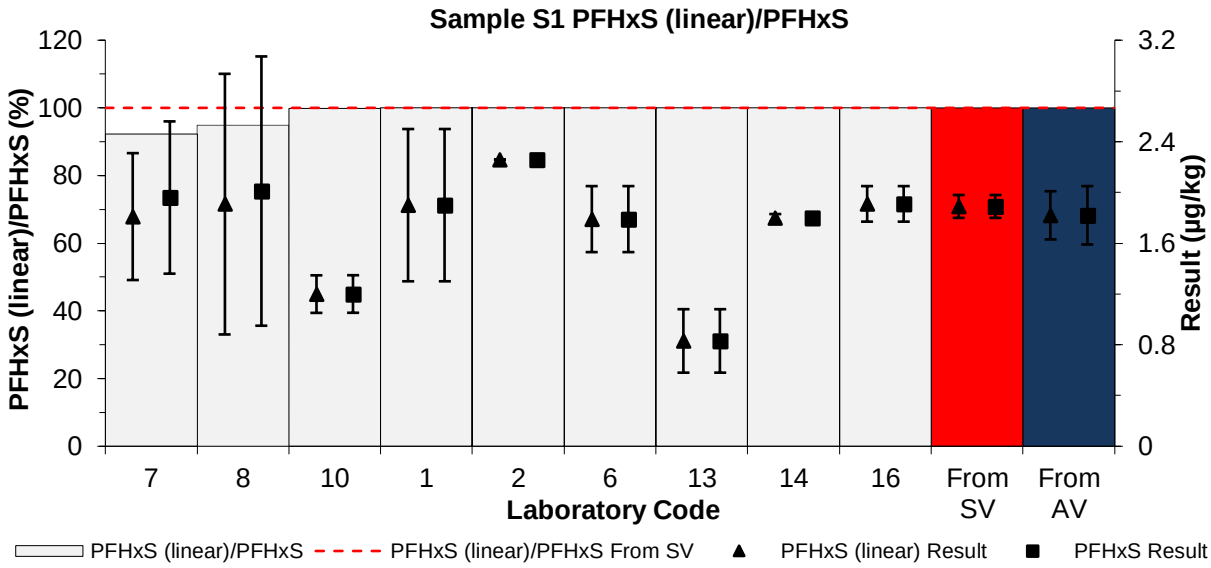



Figure 134 Results for Sample S1 PFHxS (linear and total)

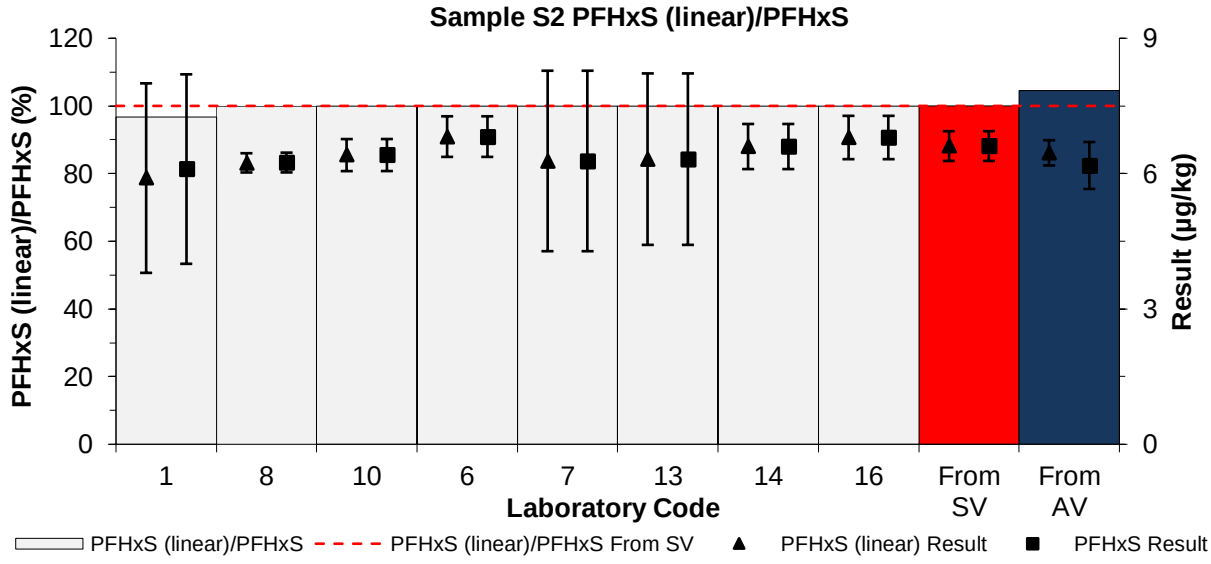



Figure 135 Results for Sample S2 PFHxS (linear and total)

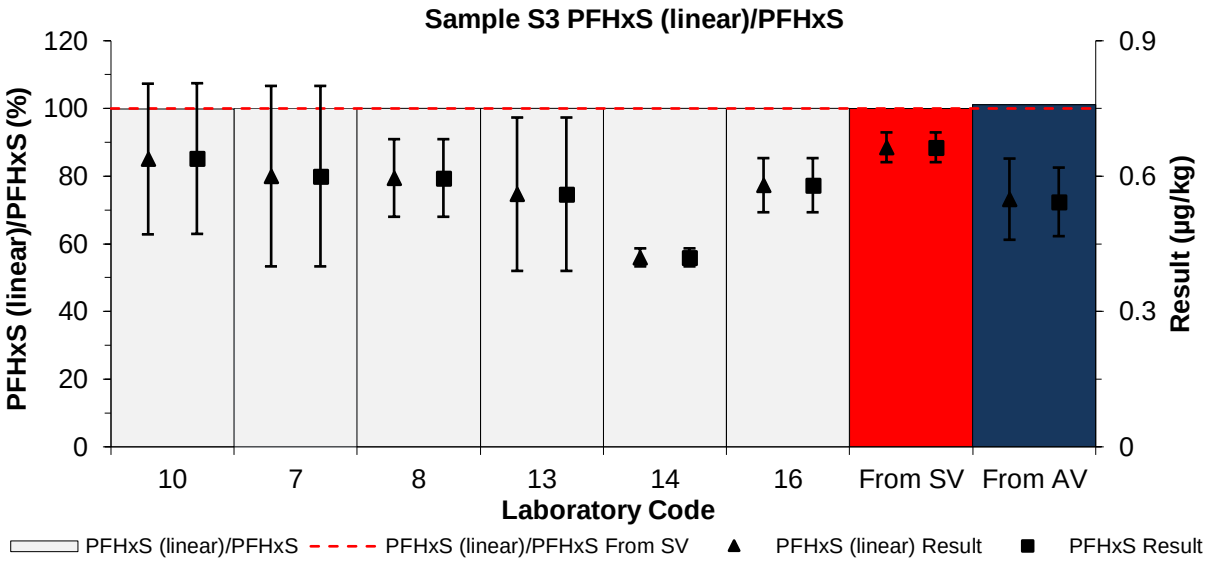



Figure 136 Results for Sample S3 PFHxS (linear and total)

**PFOS**

Summaries of participants' results for linear and total PFOS in Samples S1, S2 and S3 are presented in Figures 137 to 139 (only participants reporting numeric results for both analytes have been included; the ratio from the AV is calculated based on the results reported by all participants, including those who reported results for only one analyte).

In this study, Samples S1 and S3 were spiked with a mixture of PFOS isomers (with the standard reportedly containing 78.8% linear PFOS), while Sample S2 was spiked with linear PFOS only.

For Sample S1, participants reported a ratio of linear to total PFOS in the range of 62% to 82%, and the assigned value ratio for linear to total PFOS was 78%.

For Sample S2, most participants correctly reported the same result for both linear and total PFOS. Two participants reported linear values slightly lower than the total value (ratios of 89% and 96%), while one participant reported a higher linear value than total value (ratio of 107%). All linear and total results were in agreement with each other within their respective uncertainties. The assigned value ratio for linear to total PFOS was 95%.

For Sample S3, three participants reported the same linear PFOS value as total. Excluding these participants, the ratios of linear to total PFOS were in the range of 68% to 79%. The robust average ratio for linear to total PFOS was 81% (no assigned values were set for these analytes).

When a laboratory is using combined branched/linear standard and integrate branched/linear together for totals, the result could be different to a linear only result due to response factor differences between the isomers.

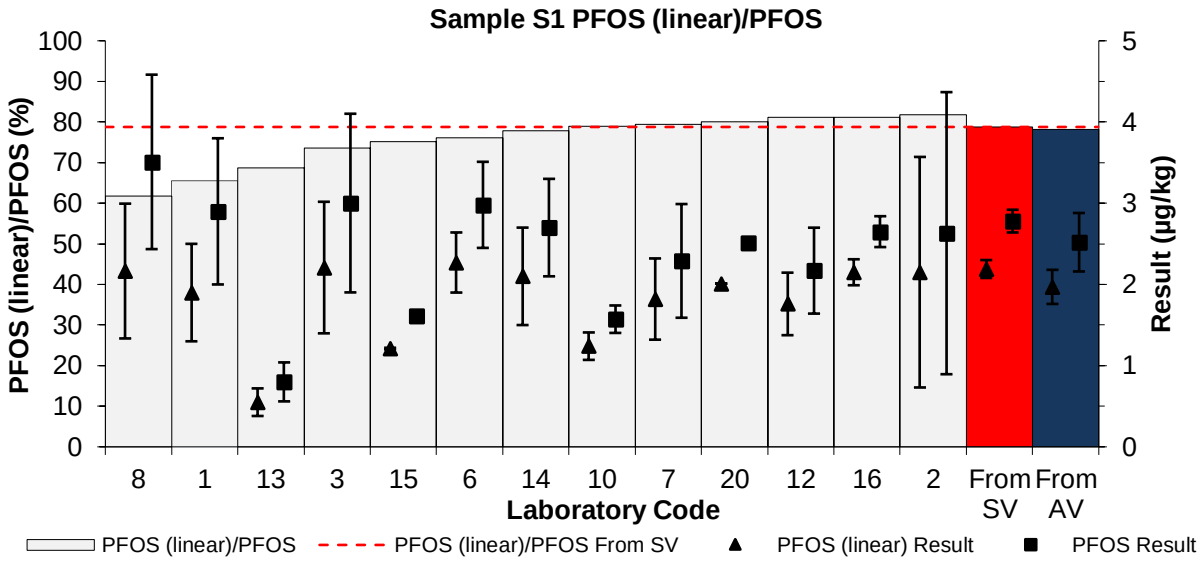



Figure 137 Results for Sample S1 PFOS (linear and total)

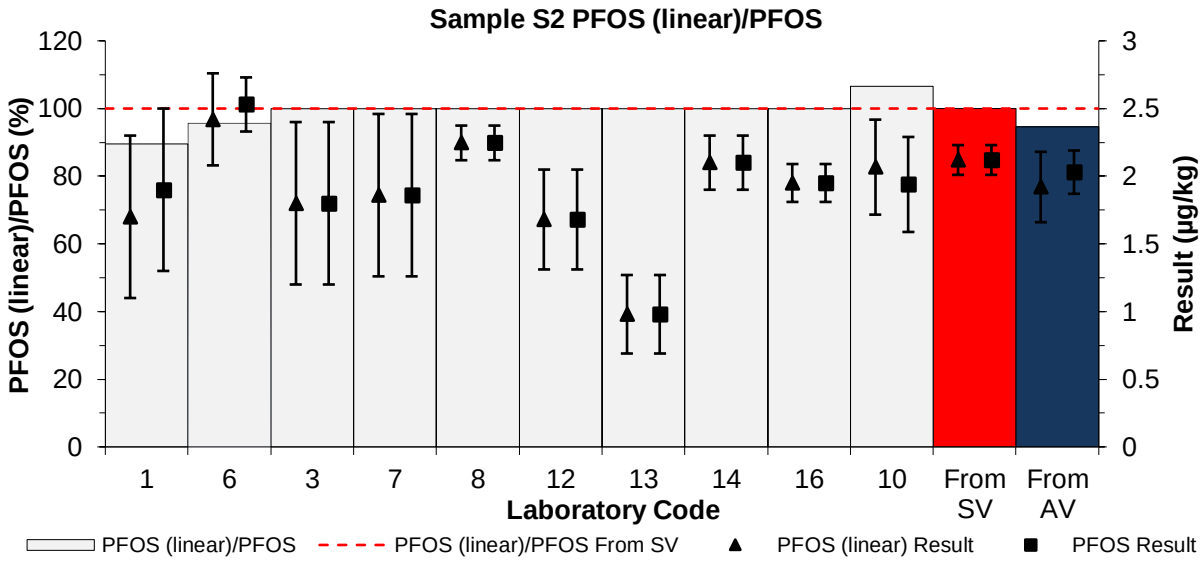



Figure 138 Results for Sample S2 PFOS (linear and total)

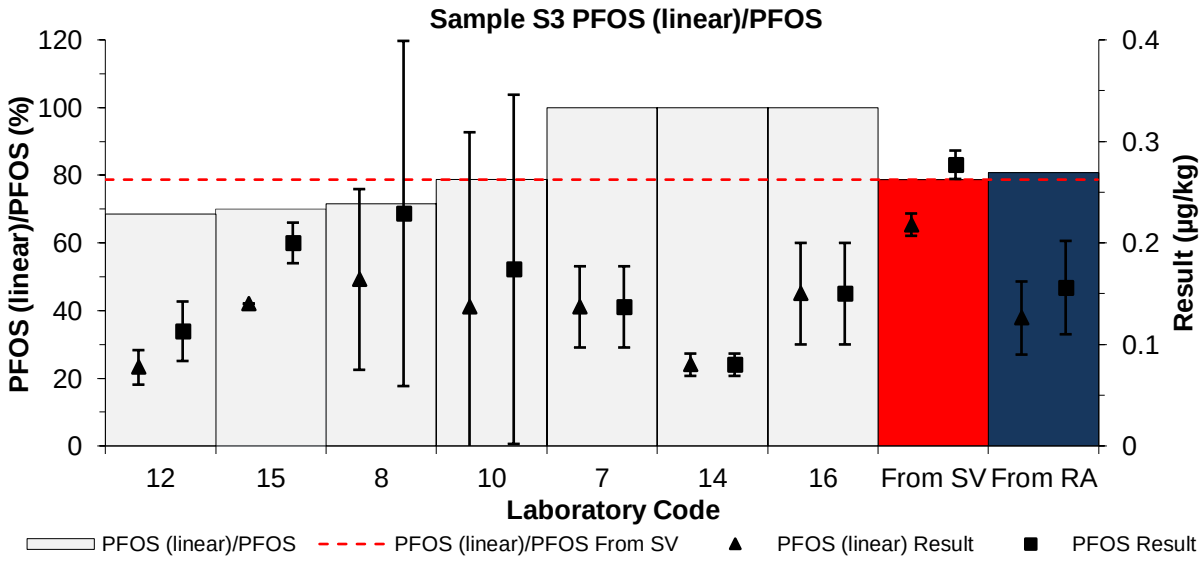



Figure 139 Results for Sample S3 PFOS (linear and total)

### 6.11 Effects of Sample Matrix

The samples in this study were spiked prawn (Sample S1), carrot (Sample S2) and milk powder (Sample S3). A summary of the results reported and *z*-scores obtained by matrix is presented in Table 90.

For this study, participants reported a higher proportion of numeric results for the milk powder matrix. Participants performed better in the carrot and milk powder matrices, achieving a higher proportion of acceptable *z*-scores as compared to prawn.

Table 90 Result Comparison by Matrix

| Sample | Matrix | Expected Number of Results | Numeric Results Reported | *z*-Scores Calculated | Acceptable *z*-Scores |
|---|---|---|---|---|---|
| S1 | Prawn | 551 | 417 (76%) | 412 | 336 (82%) |
| S2 | Carrot | 374 | 280 (75%) | 280 | 264 (94%) |
| S3 | Milk Powder | 297 | 254 (86%) | 223 | 209 (94%) |

### 6.12 Summary of Participants' Results and Performances

Summaries of participants' results and performances for scored analytes in this PT study are presented in Tables 91 to 96, and Figure 140.

Table 91 Summary of Participants' Sample S1 Results (part 1)*

| Lab. Code | PFBS | PFHxS | PFHxS (linear) | PFHpS | PFOS | PFOS (linear) | PFNS | PFDS | PFBA | PFPeA | PFHxA | PFHpA | PFOA | PFNA | PFDA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AV | 1.25 | 1.82 | 1.82 | 1.36 | 2.52 | 1.97 | 9.02 | 6.5 | 4.43 | 1.39 | 4.10 | 4.54 | 2.07 | 0.98 | 1.27 |
| SV | 1.34 | 1.89 | 1.89 | 1.44 | 2.78 | 2.19 | 9.65 | 6.77 | 5.34 | 1.50 | 4.02 | 4.99 | 2.00 | 0.998 | 1.18 |
| 1 | 1.4 | 1.9 | 1.9 | 1.7 | 2.9 | 1.9 | 9.7 | 6.9 | 4.2 | 1.5 | 4.1 | 4.8 | 2.2 | 1.1 | < 2 |
| 2 | 1.012807 | 2.257456 | 2.257456 | 1.675445 | 2.631234 | 2.150748 | 10.350991 | 7.79047 | <0.1 | <0.1 | 1.955149 | 6.526442 | 2.978435 | <0.1 | 1.042825 |
| 3 | 1.16 | 1.526 | NT | <1 | 3.002 | 2.208 | 10.14 | 7.12 | <5 | <2 | 3.928 | 4.66 | 2.138 | 1.106 | 1.53 |
| 4 | < 1 | 2 | NT | 1 | 2 | NT | 8 | 5 | 4 | < 1 | 4 | 4 | 2 | < 1 | 1 |
| 5 | 1.2 | 8.8 | NT | 1.6 | 3.9 | NT | 18 | 8.4 | 4.5 | 1.3 | 4.6 | 3.7 | <0.1 | 1.1 | <0.1 |
| 6 | 1.55 | 1.79 | 1.79 | 1.66 | 2.98 | 2.27 | 10.40 | 5.60 | 5.47 | 1.80 | 5.30 | 6.20 | 2.49 | 1.20 | 1.67 |
| 7 | 1.25 | 1.96 | 1.81 | 1.34 | 2.29 | 1.82 | 8.74 | 5.26 | 4.67 | 1.42 | 4.31 | 5.11 | 1.98 | 1.05 | 1.40 |
| 8 | 1.396 | 2.011 | 1.908 | 1.454 | 3.509 | 2.165 | 15.63 | 8.984 | 4.523 | 1.428 | 4.719 | 5.431 | 2.456 | 1.106 | 1.429 |
| 9 | 1.4 | 3.9 | NR | NR | 2.9 | NR | NR | NR | NR | NR | 5.9 | 3.3 | 2.1 | 1.1 | NR |
| 10 | 0.949 | 1.2 | 1.199 | 0.855 | 1.572 | 1.24 | 5.954 | 3.977 | 4.154 | 1.213 | 3.244 | 3.292 | 1.32 | 0.613 | 0.82 |
| 12 | 1.45 | NT | 1.82 | 1.47 | 2.17 | 1.76 | 9.34 | 6.43 | 4.92 | 1.57 | 3.99 | 4.94 | 2.09 | 0.951 | 1.32 |
| 13 | <0.5 | 0.83 | 0.83 | 0.61 | 0.80 | 0.55 | 2.35 | 1.45 | 2.5 | 0.67 | 1.69 | 1.58 | 0.53 | <0.5 | <0.5 |
| 14 | 1.4 | 1.8 | 1.8 | 1.3 | 2.7 | 2.1 | 9.3 | 6.5 | 5.1 | 1.5 | 4.5 | 5.2 | 2 | 1 | 1.4 |
| 15 | 0.92 | NT | 1.23 | 0.88 | 1.61 | 1.21 | 5.33 | 2.62 | 3.74 | 1.05 | 3.24 | 3.38 | 1.3 | 0.57 | 0.92 |
| 16 | 1.68 | 1.91 | 1.91 | 1.55 | 2.65 | 2.15 | 9.84 | 6.54 | 3.66 | 1.41 | 4.33 | 4.87 | 2.01 | 1 | 1.5 |
| 17 | <0.5 | <0.5 | NT | <0.5 | <0.5 | NT | 1.31 | 0.78 | 1.297 | <0.5 | 1.32 | 1.12 | <0.5 | <0.5 | <0.5 |
| 18 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 19 | 0.785 | 0.798 | NR | 0.642 | 1.196 | NR | 3.435 | 2.332 | 2.993 | 0.863 | 2.154 | 2.533 | 0.913 | 0.333 | 0.473 |
| 20 | 1.31 | NT | 2.04 | 1.23 | 2.51 | 2.01 | 9.01 | 7.05 | 5.41 | 1.49 | 4.24 | 4.99 | 2.08 | 0.91 | 1.29 |
| 21 | 1.11 | 1.47 | NR | 1.28 | 2.33 | NR | 7.55 | 5.01 | 4.28 | 1.38 | 2.94 | 4.3 | 1.8 | 0.74 | 1.16 |

* AV = Assigned Value; SV = Spiked Value. All values are in µg/kg. Shaded cells are results which returned a questionable or unacceptable z-score.

Table 92 Summary of Participants' Sample S1 Results (part 2)*

| Lab. Code | PFUdA | PFTrDA | PFTeDA | PFOSA | MeFOSA | EtFOSA | MeFOSAA | EtFOSE | 6:2FTS | GenX | ADONA | 9Cl-PF3ONS | 11Cl-PF3OUdS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AV | 1.22 | 6.3 | 1.68 | 2.39 | 8.37 | 7.72 | 8.28 | 8.41 | 9.6 | 8.7 | 8.2 | 19.2 | 17.1 |
| SV | 1.21 | 7.98 | 1.80 | 2.99 | 7.98 | 7.98 | 7.98 | 7.98 | 9.53 | 10.1 | 9.47 | 23.2 | 23.4 |
| 1 | < 2 | 8.1 | < 5 | < 5 | 8.5 | 8.4 | 8.7 | < 50 | 8.8 | 10 | 8.2 | 22 | 23 |
| 2 | 1.804006 | 7.204325 | 2.058766 | 2.438978 | 9.654848 | 7.627154 | 8.345072 | <0.5 | 12.476199 | NT | NT | NT | NT |
| 3 | 1.48 | 7.782 | <2 | <5 | 9.364 | 9.536 | 9.148 | 8.352 | 10.034 | NT | NT | NT | NT |
| 4 | < 1 | 8 | 1 | 2 | 8 | 7 | 8 | 7 | 8 | NT | NT | NT | NT |
| 5 | 1 | 5.2 | 2.4 | 2 | 6 | 6 | 7 | 8 | 12 | NT | NT | NT | NT |
| 6 | 1.61 | 7.92 | 2.11 | 3.05 | 8.56 | 8.01 | 9.05 | 9.61 | 11.59 | 10.86 | 11.99 | 34.30 | 27.80 |
| 7 | 1.39 | 4.85 | 1.82 | 2.77 | 9.12 | 7.85 | 7.44 | 9.46 | 8.41 | 9.43 | 8.45 | 19.4 | 16.4 |
| 8 | 1.454 | 4.691 | 1.92 | 2.78 | 7.136 | 6.857 | 8.5 | 8.055 | 9.094 | 8.955 | 8.946 | 40.08 | 29.38 |
| 9 | NR | NR | NR | NR | NR | NR | NR | NR | 9.4 | NR | NR | NR | NR |
| 10 | 0.62 | 4.302 | 0.938 | 1.586 | NT | NT | NT | NT | NT | 7.372 | 6.642 | 14.048 | 13.309 |
| 12 | 1.22 | 12.3 | 2.29 | 2.58 | 1.39 | 1.40 | 8.15 | NT | 10.30 | 9.56 | NT | NT | NT |
| 13 | <0.5 | 1.47 | 0.41 | 0.65 | 1.48 | 1.33 | 1.45 | 1.12 | 5.37 | 4.18 | 5.03 | 5.26 | 0.54 |
| 14 | 1.3 | 6.8 | 2 | 2.9 | 8.3 | 8.3 | 8.7 | 8.4 | 10 | 11 | 10 | 24 | 22 |
| 15 | 0.79 | 3.60 | 1.01 | 1.63 | NT | NT | NT | NT | 8.20 | 5.94 | 6.13 | 11.00 | 10.88 |
| 16 | 1.32 | 5.2 | 1.82 | NT | NT | NT | NT | NT | NT | 9.89 | 8.41 | 22.51 | 17.25 |
| 17 | <0.5 | <0.5 | <0.5 | <0.5 | 1.16 | 0.920 | 1.253 | <0.5 | 1.72 | NT | 1.68 | NT | NT |
| 18 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 19 | 0.613 | 1.915 | 0.705 | 1.365 | NT | NT | NT | NT | 4.255 | 6.117 | 4.817 | 9.237 | 7.593 |
| 20 | 1.35 | 7.61 | 1.18 | 3.26 | NT | NT | 7.82 | NT | 8.08 | 6.6 | 10.09 | 21.88 | 17.96 |
| 21 | 1.13 | 6.86 | 1.25 | 2.76 | NT | NT | NT | NT | 8.35 | 8.78 | 7.06 | 18.18 | 16.27 |

* AV = Assigned Value; HV = Homogeneity Value; SV = Spiked Value. All values are in µg/kg. Shaded cells are results which returned a questionable or unacceptable z-score.

Table 93 Summary of Participants' Sample S2 Results (part 1)*

| Lab. Code | PFBS | PFPeS | PFHxS | PFHxS (linear) | PFHpS | PFOS | PFOS (linear) | PFNS | PFDS | PFBA | PFPeA |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AV | 0.861 | 8.3 | 6.18 | 6.46 | 3.05 | 2.03 | 1.92 | 1.57 | 7.46 | 0.866 | 2.06 |
| SV | 0.891 | 7.47 | 6.61 | 6.61 | 3.00 | 2.12 | 2.12 | 1.72 | 6.80 | 1.19 | 2.20 |
| 1 | 1.0 | 8.7 | 6.1 | 5.9 | 3.3 | 1.9 | 1.7 | 1.6 | 7.3 | < 2 | 2.1 |
| 2 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 3 | <1 | 7.608 | 5.4 | NT | 2.628 | 1.8 | 1.8 | 1.658 | 7.09 | <5 | 2.262 |
| 4 | < 1 | 6 | 5 | NT | 2 | 2 | NT | 1 | 7 | < 1 | 2 |
| 5 | 0.8 | 12 | 8 | NT | 3.8 | 2.3 | NT | 2.2 | 8.9 | <1 | 2 |
| 6 | 0.87 | 9.48 | 6.82 | 6.82 | 3.80 | 2.53 | 2.42 | 2.27 | 8.83 | 1.12 | 2.17 |
| 7 | 0.88 | 8.53 | 6.28 | 6.28 | 2.71 | 1.86 | 1.86 | 1.61 | 7.59 | 0.884 | 1.97 |
| 8 | 0.791 | 6.653 | 6.245 | 6.238 | 2.972 | 2.246 | 2.246 | 0.932 | 1.474 | 0.821 | 1.991 |
| 9 | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT |
| 10 | 0.739 | 8.062 | 6.411 | 6.41 | 2.894 | 1.939 | 2.067 | 1.762 | 7.41 | 0.974 | 1.956 |
| 12 | 0.930 | 9.70 | NT | 6.72 | 2.88 | 1.68 | 1.68 | 1.54 | 6.92 | 0.917 | 2.42 |
| 13 | 0.73 | 6.39 | 6.32 | 6.32 | 3.61 | 0.98 | 0.98 | 1.10 | 5.3 | 0.73 | 1.61 |
| 14 | 0.9 | 9.1 | 6.6 | 6.6 | 2.8 | 2.1 | 2.1 | 1.5 | 7.3 | 1 | 2.1 |
| 15 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 16 | 1.07 | 7.7 | 6.8 | 6.8 | 3.11 | 1.95 | 1.95 | 1.59 | 6.65 | 0.76 | 2 |
| 17 | 0.85 | 14 | 5.02 | NT | 0.96 | 2.26 | NT | 0.56 | 7.97 | 0.82 | 2.27 |
| 18 | 0.906 | 10.36 | 6.53 | NT | 3.13 | 2.12 | NT | 1.82 | 9.28 | 0.784 | 2.11 |
| 19 | 0.786 | 7.618 | 5.651 | NR | 2.803 | 1.82 | NR | 1.399 | 6.597 | 0.797 | 1.812 |
| 20 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 21 | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT |

* AV = Assigned Value; SV = Spiked Value. All values are in µg/kg. Shaded cells are results which returned a questionable or unacceptable *z*-score.

Table 94 Summary of Participants' Sample S2 Results (part 2)*

| Lab. Code | PFHxA | PFHpA | PFOA | PFNA | PFDA | PFOSA | MeFOSA | EtFOSA | 6:2FTS | GenX | ADONA |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AV | 7.26 | 1.51 | 1.20 | 2.27 | 9.3 | 3.67 | 3.65 | 3.13 | 1.86 | 11.0 | 12.5 |
| SV | 7.45 | 1.50 | 1.20 | 2.31 | 9.47 | 4.95 | 4.99 | 3.99 | 1.89 | 11.1 | 14.0 |
| 1 | 7.1 | 1.5 | 1.2 | 2.3 | 9.3 | < 5 | < 5 | < 5 | 1.5 | 12 | 12 |
| 2 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 3 | 6.774 | 1.426 | 1.166 | 2.454 | 10.582 | <5 | <5 | 2.994 | <2 | NT | NT |
| 4 | 7 | 1 | 1 | 2 | 6 | 3 | 3 | 3 | 1 | NT | NT |
| 5 | 7.7 | 1.3 | <0.1 | 2 | <0.1 | 4 | 4 | 3 | 2 | NT | NT |
| 6 | 8.40 | 1.96 | 1.53 | 3.08 | 12.41 | 4.64 | 4.67 | 3.72 | 2.30 | 10.38 | 12.68 |
| 7 | 7.25 | 1.67 | 1.24 | 2.52 | 9.4 | 3.56 | 2.95 | 3.38 | 1.96 | 10.2 | 12 |
| 8 | 8.295 | 1.736 | 1.285 | 2.397 | 9.473 | 3.849 | NT | NT | 1.556 | NT | 12.345 |
| 9 | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT |
| 10 | 7.58 | 1.479 | 1.177 | 2.375 | 10.545 | 3.693 | NT | NT | NT | 9.979 | 13.734 |
| 12 | 6.75 | 1.53 | 1.20 | 2.15 | 9.03 | 3.08 | 0.548 | 0.509 | 2.05 | 10.2 | NT |
| 13 | 6.26 | 1.39 | 1.16 | 1.89 | 7.68 | 2.23 | 3.58 | 3.02 | 2.37 | 9.81 | 4.50 |
| 14 | 8.4 | 1.7 | 1.2 | 2.2 | 9.6 | 3.6 | 4.1 | 3.3 | 2 | 14 | 14 |
| 15 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 16 | 7.31 | 1.53 | 1.16 | 2.22 | 9.87 | NT | NT | NT | NT | 10.13 | 9.6 |
| 17 | 5.97 | 1.62 | 1.3 | 3.63 | 10.79 | 4.09 | 3.28 | 2.74 | 1.83 | NT | 11.91 |
| 18 | 7.77 | 1.14 | 1.14 | 2.61 | 8.38 | NT | NT | NT | 6.1 | 13.03 | NT |
| 19 | 6.293 | 1.555 | 1.129 | 1.905 | 7.412 | 4.202 | NT | NT | 1.65 | 10.997 | 13.076 |
| 20 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 21 | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT |

* AV = Assigned Value; SV = Spiked Value. All values are in µg/kg. Shaded cells are results which returned a questionable or unacceptable *z*-score.

Table 95 Summary of Participants' Sample S3 Results (part 1)*

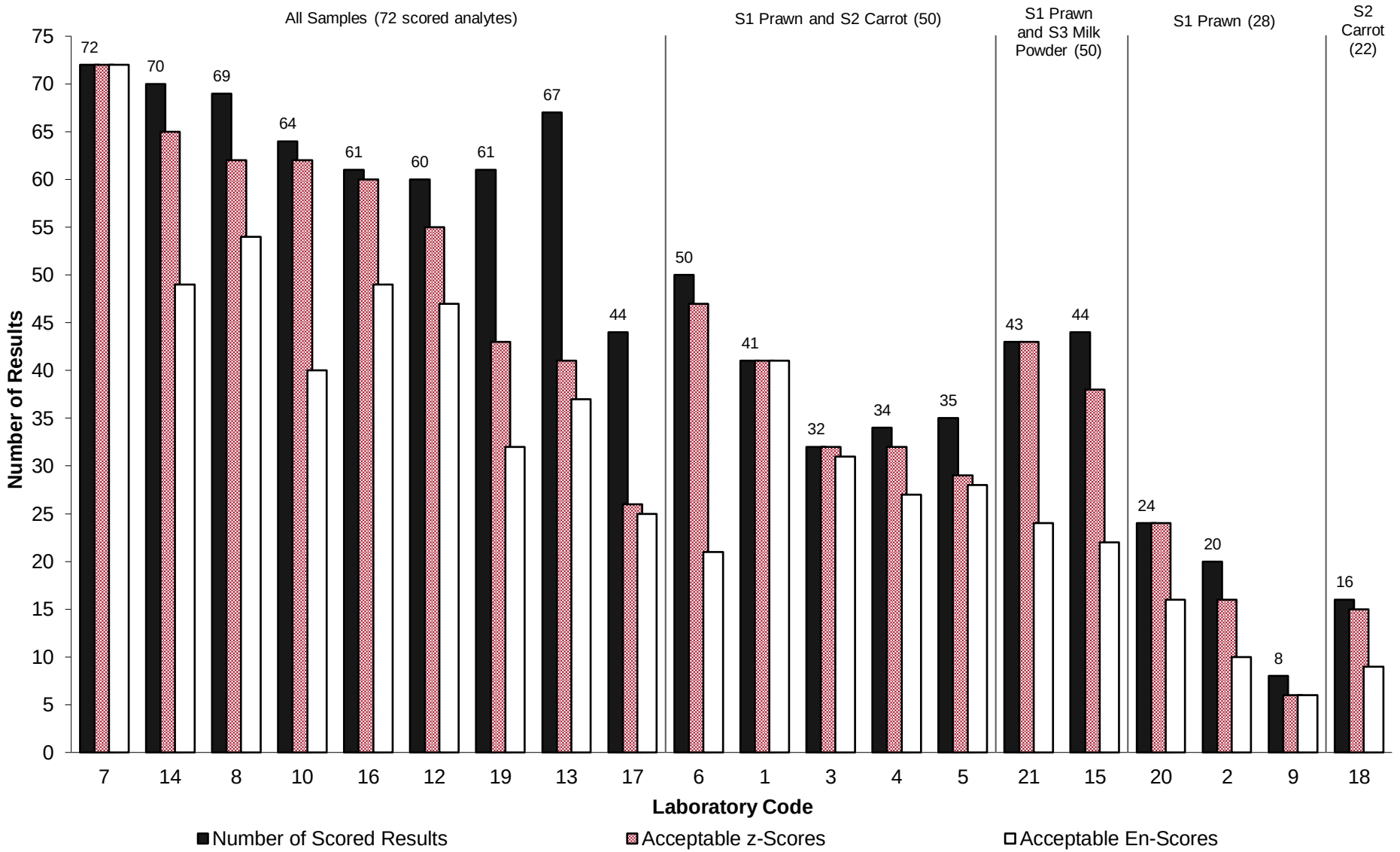
| Lab. Code | PFBS | PFPeS | PFHxS | PFHxS (linear) | PFHpS | PFNS | PFDS | PFBA | PFPeA | PFHxA | PFHpA | PFOA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AV | 1.00 | 0.567 | 0.543 | 0.549 | 0.554 | 0.75 | 0.76 | 2.59 | 1.24 | 0.87 | 0.83 | 0.64 |
| HV | 1.13 | 0.65 | 0.62 | 0.62 | 0.59 | 1.01 | 1.01 | 3.1 | 1.38 | 0.97 | 1.05 | 0.81 |
| SV | 1.32 | 0.708 | 0.664 | 0.664 | 0.668 | 0.954 | 0.958 | 3.28 | 1.48 | 0.996 | 0.997 | 0.695 |
| 1 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 2 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 3 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 4 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 5 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 6 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 7 | 1.05 | 0.630 | 0.600 | 0.600 | 0.584 | 0.879 | 0.904 | 2.83 | 1.33 | 0.951 | 0.942 | 0.680 |
| 8 | 1.101 | 0.564 | 0.596 | 0.596 | 0.636 | 1.279 | 1.076 | 2.889 | 1.337 | 1.009 | 1.029 | 0.675 |
| 9 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 10 | 1.054 | 0.709 | 0.639 | 0.638 | 0.651 | 0.899 | 0.905 | 3.601 | 1.544 | 1.07 | 0.951 | 0.725 |
| 12 | 0.655 | 0.369 | NT | 0.386 | 0.497 | 0.531 | 0.510 | 1.60 | 0.795 | 0.533 | 0.587 | 0.431 |
| 13 | 0.80 | 0.54 | 0.56 | 0.56 | 0.59 | 0.66 | 0.54 | 2.05 | 0.99 | 0.80 | 0.62 | 0.79 |
| 14 | 1 | 0.52 | 0.42 | 0.42 | 0.29 | 0.52 | 0.66 | 2.8 | 1.3 | 0.86 | 0.64 | 0.34 |
| 15 | 1.04 | 0.57 | NT | 0.60 | 0.61 | 0.85 | 0.66 | 3.01 | 1.25 | 0.91 | 0.96 | 0.75 |
| 16 | 1.44 | 1.26 | 0.58 | 0.58 | 0.56 | 0.87 | 0.89 | 3.14 | 1.36 | 1.06 | 0.86 | 0.72 |
| 17 | 1.02 | 0.58 | 0.52 | NT | <0.5 | 0.83 | 1.92 | 1.55 | 1.15 | 0.75 | 0.83 | 0.8 |
| 18 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 19 | 1.083 | 0.631 | 0.567 | NR | 0.641 | 0.821 | 0.841 | 2.26 | 1.306 | 0.812 | 0.972 | 0.683 |
| 20 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 21 | 0.894 | 0.501 | 0.385 | NR | 0.378 | 0.591 | 0.622 | 2.72 | 1.16 | 0.756 | 0.743 | 0.447 |

* AV = Assigned Value; HV = Homogeneity Value; SV = Spiked Value. All values are in µg/kg. Shaded cells are results which returned a questionable or unacceptable z-score.

Table 96 Summary of Participants' Sample S3 Results (part 2)*

| Lab. Code | PFNA | PFDA | PFUdA | PFDoA | PFTrDA | PFTeDA | MeFOSAA | 10:2FTS | ADONA | 9Cl-PF3ONS | 11Cl-PF3OUdS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AV | 0.418 | 0.76 | 0.92 | 0.96 | 0.99 | 1.13 | Not Set | 1.35 | 0.79 | 0.74 | 0.70 |
| HV | 0.60 | 0.98 | 1.13 | 1.16 | 1.24 | 1.38 | 1.91 | 1.89 | 1.09 | 1.01 | 1.03 |
| SV | 0.499 | 0.803 | 1.01 | 1.10 | 1.19 | 1.49 | 1.99 | 1.92 | 0.936 | 0.926 | 0.936 |
| 1 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 2 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 3 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 4 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 5 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 6 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 7 | 0.504 | 0.908 | 1.00 | 0.954 | 1.17 | 1.20 | 1.73 | 1.57 | 0.823 | 0.892 | 0.925 |
| 8 | 0.478 | 0.878 | 1.114 | 0.924 | 0.571 | 1.337 | 1.69 | 0.734 | 0.904 | 1.364 | 1.135 |
| 9 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 10 | 0.52 | 1.013 | 0.928 | 1.088 | 1.26 | 1.292 | NT | 1.778 | 1.017 | 0.872 | 0.858 |
| 12 | 0.358 | 0.614 | 0.699 | 0.723 | 0.758 | 0.842 | 1.18 | NT | NT | NT | NT |
| 13 | <0.5 | 0.71 | 0.99 | 0.84 | 0.82 | 1.00 | 1.69 | 1.38 | 0.77 | 0.63 | 0.54 |
| 14 | 0.19 | 0.38 | 0.52 | 0.75 | < 1.2 | 1.2 | 0.95 | 1.3 | 0.59 | < 0.72 | 0.59 |
| 15 | 0.39 | 0.71 | 1.02 | 1.37 | 1.32 | 1.34 | NT | 1.16 | 0.88 | 0.76 | 0.84 |
| 16 | 0.47 | 0.95 | 0.99 | 0.97 | 1.33 | 1.23 | NT | NT | 0.75 | 0.5 | 0.46 |
| 17 | <0.5 | <0.5 | 2.66 | 1.15 | 0.62 | 0.57 | 2.90 | 1.53 | <0.5 | NT | NT |
| 18 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 19 | 0.355 | 0.755 | 1.09 | 1.125 | 1.211 | 1.347 | NT | 1.472 | 0.853 | 0.869 | 0.791 |
| 20 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| 21 | 0.259 | 0.572 | 0.737 | 0.763 | 0.881 | 0.865 | NT | 1.065 | 0.565 | 0.654 | 0.605 |

* AV = Assigned Value; HV = Homogeneity Value; SV = Spiked Value. All values are in µg/kg. Shaded cells are results which returned a questionable or unacceptable z-score.




Laboratory **21** was supplied all three samples and Laboratory **9** was supplied Samples S1 prawn and S2 carrot; however, both participants did not test Sample S2 carrot.

Figure 140 Summary of Participants' Performance

### 6.13 Comparison with Previous PFAS in Biota and Food Studies

NMIA has run PFAS in Biota and Food PT studies since 2016. A summary of participation and reported results rates over the last nine studies (2016 to 2024) is presented in Figure 141. Proportions of PFAS analysed and numeric results reported have remained steady over this period, despite the increased number of spiked analytes as compared to the original studies.

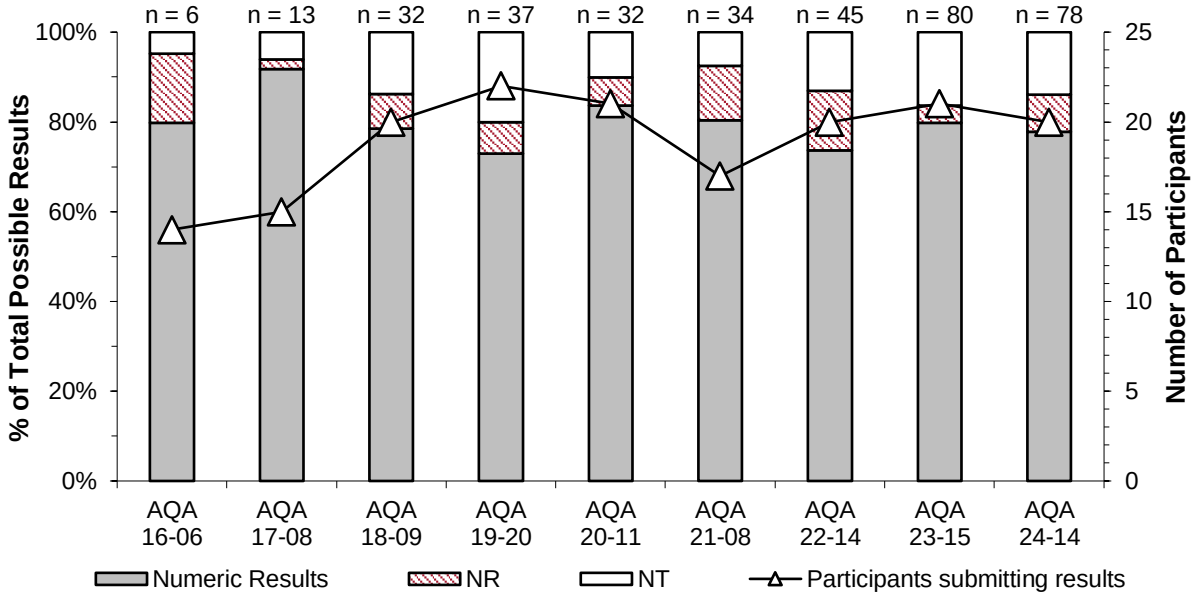



Figure 141 Summary of Participation and Reported Results in PFAS in Biota and Food PT Studies (n = number of spiked analytes)

A summary of the acceptable performance (presented as a percentage of the total number of scores for each study) in PFAS in Biota and Food PT studies over the last nine studies (2016 to 2024) is presented in Figure 142. The target SD used to calculate *z*-scores has been kept constant at 20% PCV, which enables comparison between different studies. Proportions of acceptable scores has remained relatively consistent. The average proportion of acceptable scores over this period being 89% for *z*-scores and 76% for $E_n$-scores.

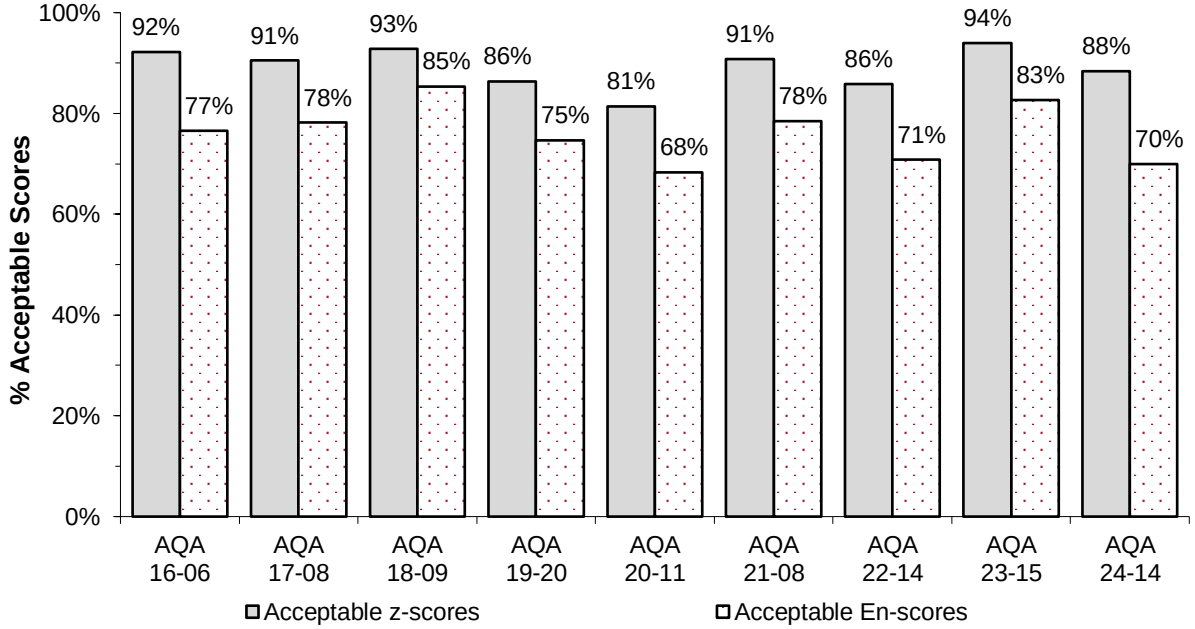



Figure 142 Summary of Participants' Performance for PFAS in Biota and Food PT Studies

The number of analytes assessed in each study has increased significantly as compared to the initial PFAS in Biota and Food study, and the studies have increased in size and complexity. As a point of comparison, PFOS and PFOA have been assessed in every study, and a summary of the proportion of acceptable scores for these analytes over the last nine studies is presented in Figure 143.

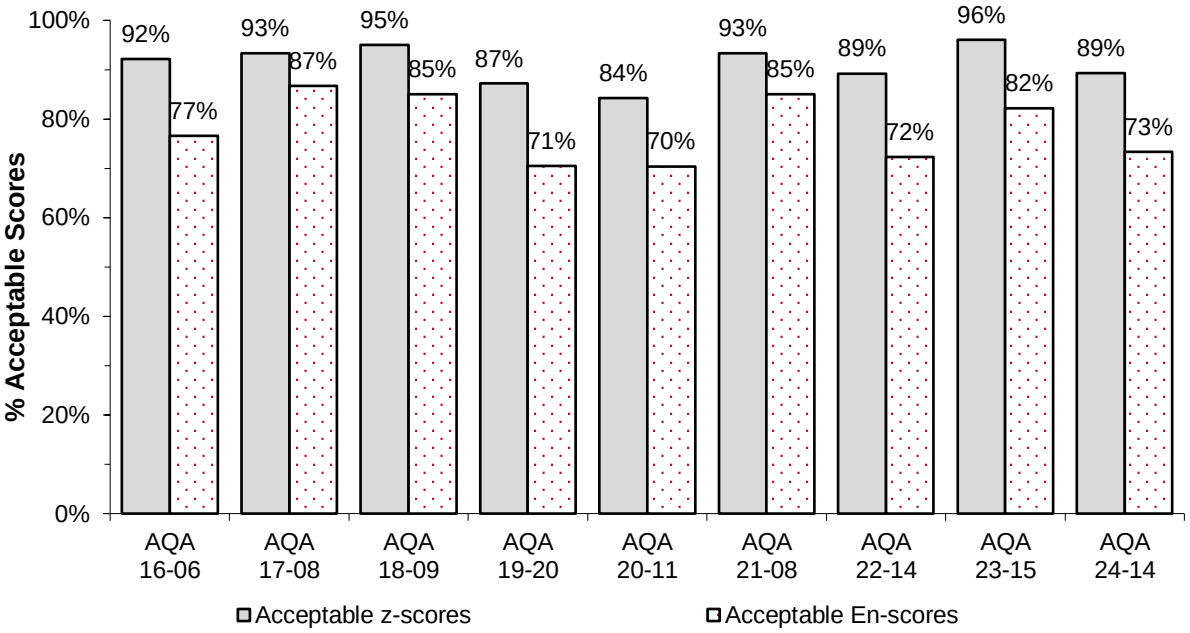



Figure 143 Summary of Participants' Performance for PFOS and PFOA in Biota and Food PT Studies

Individual performance history reports are emailed to participants at the end of each PT study; the consideration of *z*-scores over time provides much more useful information than a single *z*-score. Over time, laboratories should expect at least 95% of their *z*-scores to lie within the range $|z| \leq 2.0$. Scores in the range $2.0 < |z| < 3.0$ can occasionally occur, however these should be interpreted in conjunction with the other scores obtained by that laboratory. For example, a trend of *z*-scores on one side of the zero line is an indication of method or laboratory bias.

As discussed in Section 6.2, it is a requirement of ISO/IEC 17025 that laboratories report their uncertainty when the client's instruction so requires.[9] Figure 144 presents a summary of relative uncertainties as reported by participants over the last nine studies (2016 to 2024). Over this period, most numeric results were reported with uncertainties (97%), despite only 58% of participants reporting that they were accredited to ISO/IEC 17025. A few participants are still reporting non-numeric results with numeric uncertainties.

Over the last few studies, there has been an increasing number of participants reporting potentially unrealistically small or large relative uncertainties for routine PFAS measurements (i.e. less than 10% or larger than 50% relative). Participants reporting results with acceptable *z*-scores, but with smaller relative uncertainties and unacceptable $E_n$-scores, may need to assess whether their uncertainties have been underestimated.

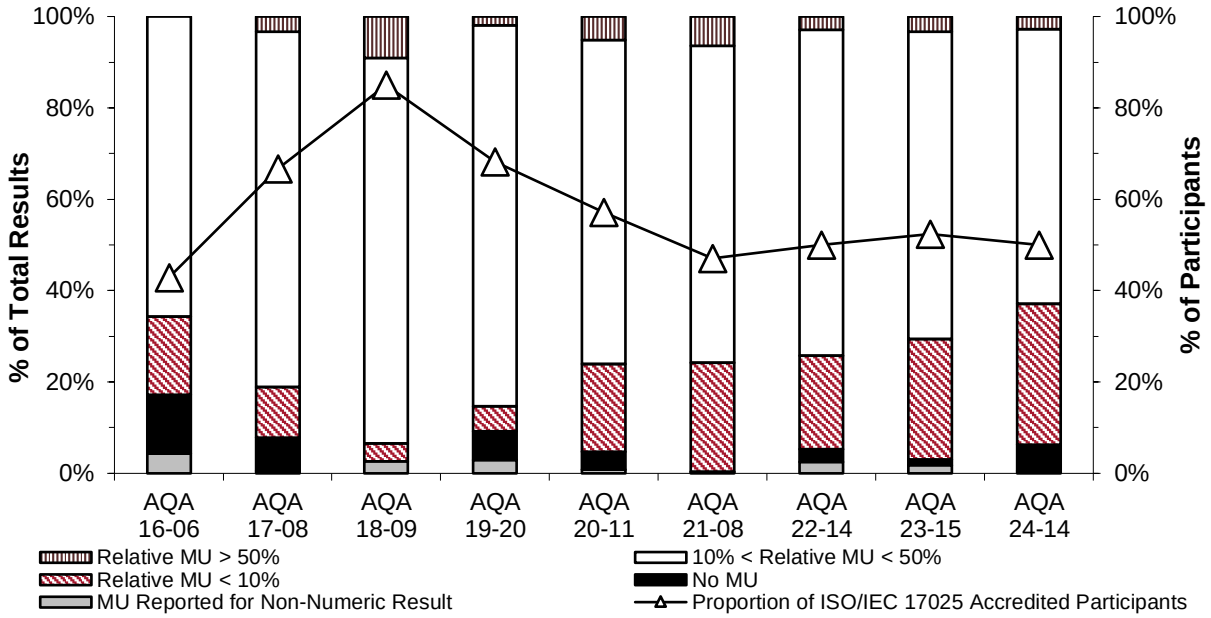



Figure 144 Summary of Participants' Relative Uncertainties for PFAS in Biota and Food PT Studies

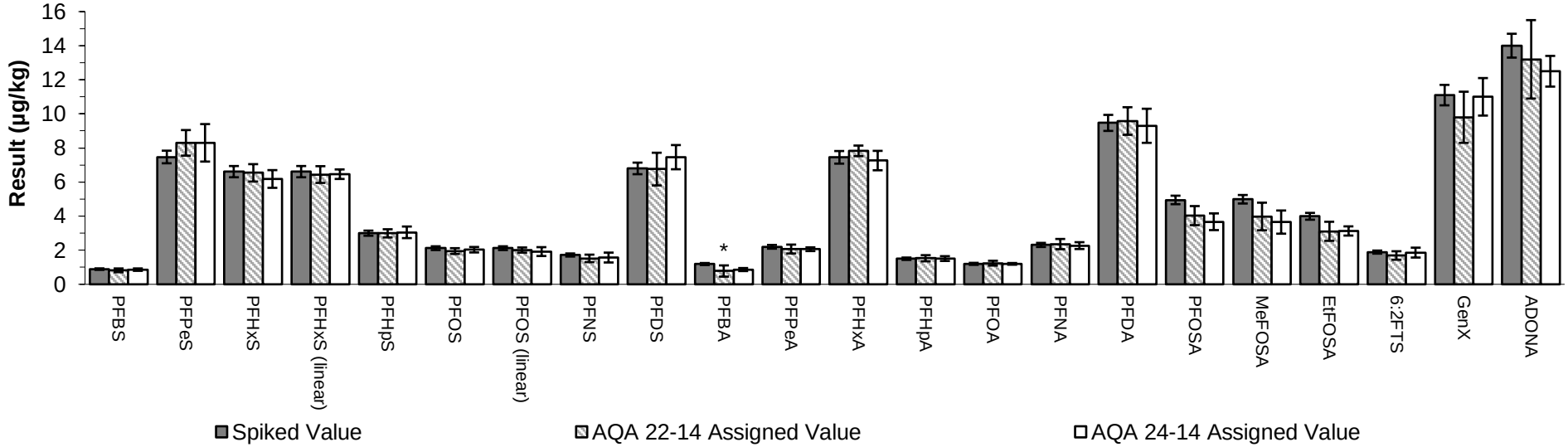
Sample S2 carrot in this study was previously prepared as AQA 22-14 Sample S2. Comparisons of participants' results and performance in AQA 22-14 and AQA 24-14 are presented in Figures 145 to 147.[6]

For all analytes, the consensus of participants' results were similar between the two studies, and the assigned values of both studies were in agreement with each other within their respectively uncertainties. The range of proportions of the assigned value to the spiked value improved from 66% – 111% in AQA 22-14 to 73% – 111% in AQA 24-14.

The majority of PFAAs had a higher proportion of participants reporting numeric results in AQA 24-14 as compared to AQA 22-14, reflecting improved variety of PFAAs being analysed by participant laboratories. However, for the PFAA precursors, only the PFECAs GenX and ADONA had an increase in the proportion of numeric results reported.

For most analytes, there was an improvement in the agreement of participants' results with each other in this study, with lower between-laboratory CVs achieved in this study as compared to AQA 22-14 for 15 of the 22 spiked analytes.

The types of methodologies employed for analysis of this sample remained similar across both studies.




* Robust average (no assigned value set).

Figure 145 Comparison of AQA 22-14 and AQA 24-14 Sample S2 Carrot Results

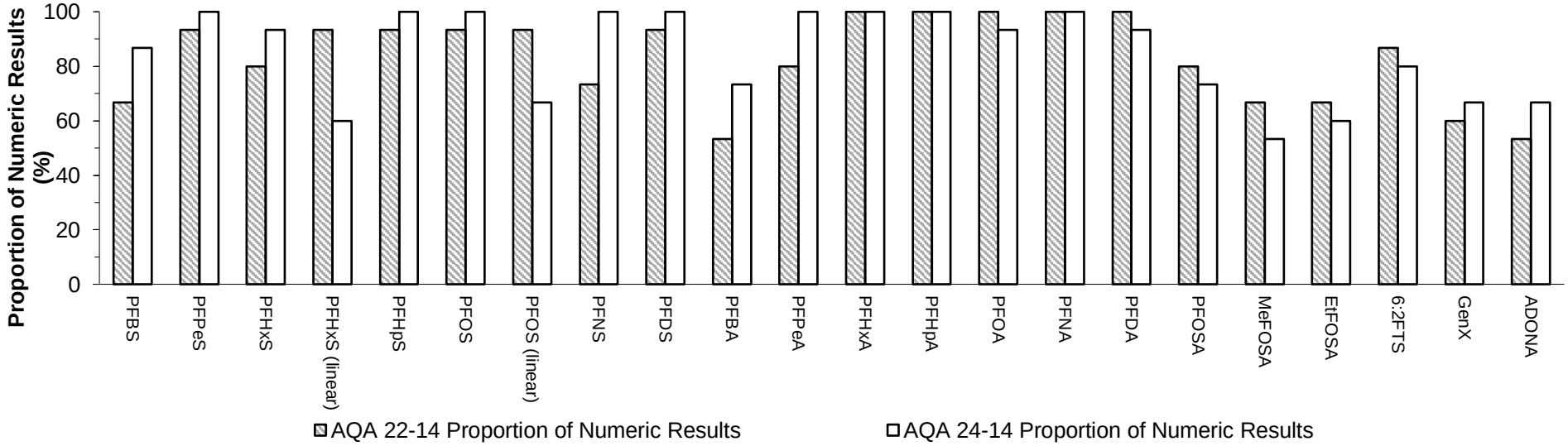
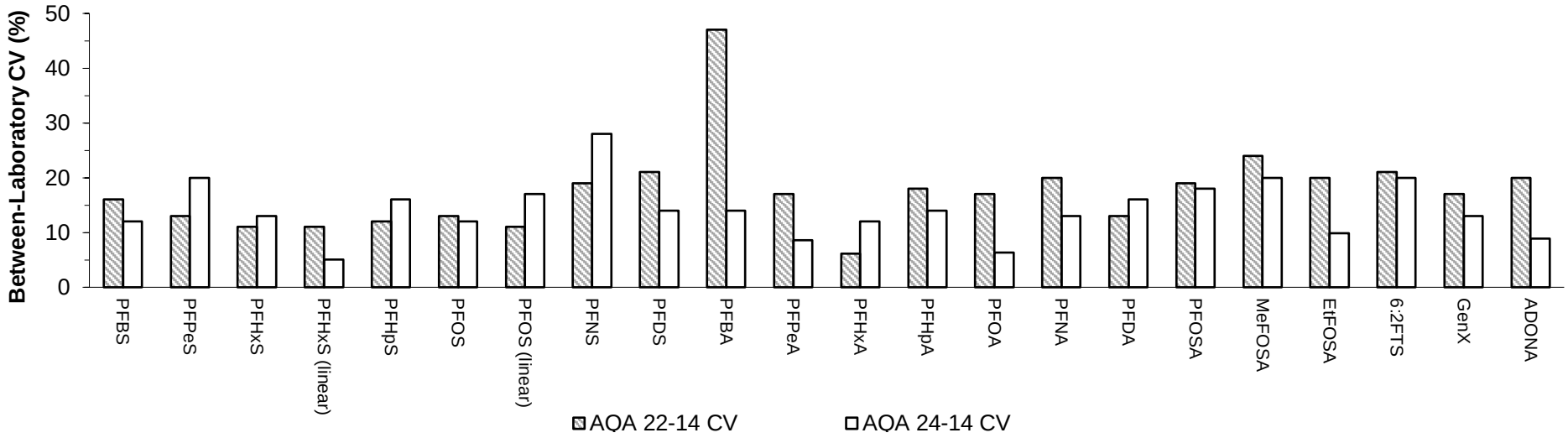



Figure 146 Comparison of AQA 22-14 and AQA 24-14 Sample S2 Carrot Proportions of Numeric Results




Robust between-laboratory CV with outliers removed, if applicable.

Figure 147 Comparison of AQA 22-14 and AQA 24-14 Sample S2 Carrot Between-Laboratory CVs

## 7 REFERENCES

Please note that for all undated references, the latest edition of the referenced document (including any amendments) applies.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[2] Commonwealth of Australia, Department of Industry, Science and Resources, NMIA, 2024, *Study Protocol for Proficiency Testing*, viewed January 2025, <https://www.industry.gov.au/sites/default/files/2020-10/cpt_study_protocol.pdf>.

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[15] NMIA, 2022, *Proficiency Test Final Report AQA 21-07 PFAS in Soil and Water.*

[16] Commonwealth of Australia, Department of Industry, Science and Resources, NMIA, 2023, *Proficiency Test Final Report AQA 22-13 PFAS in Soil and Water.*

[17] Commonwealth of Australia, Department of Industry, Science and Resources, NMIA, 2024, *Proficiency Test Final Report AQA 23-14 PFAS in Soil and Water.*

[18] Liberatore, H.K., Jackson, S.R., Strynar, M.J., and McCord, J.P., 2020, 'Solvent Suitability for HFPO-DA ("GenX" Parent Acid) in Toxicological Studies', *Environ Sci Technol Lett.*, vol. 7, no. 7, pp. 477-481.

## APPENDIX 1 SAMPLE PREPARATION

**Sample S1**: Pre-peeled prawns were purchase from a grocery store. After defrosting, the prawns were rinsed three times with deionised water. The prawns were blended using a food processor. After blending, 750.1 g of blended prawns was placed into a Retsch knife mill and a pre-prepared composite spike solution was added. The prawns and spike solution were mixed thoroughly. The blended spiked prawns were dispensed in portions of at least 5 g into 50 mL centrifuge tubes, labelled in fill order, shrink-wrapped and stored in a freezer at -20 ℃.

**Sample S2**: This sample was previously prepared as AQA 22-14 Sample S2. Organic carrots were bought from a Sydney organic fruit and vegetable wholesaler. The carrots were rinsed, cut and blended. A stainless steel tray was lined with aluminium foil and the carrot was spread evenly over the tray. The tray was tilted at 45 degrees and a prepared composite in methanol was sprayed over the carrot with regular mixing steps to homogenise the carrot. The spiked carrot was then formed into patties of no more than 6 cm in diameter and placed on trays which were covered with baking paper. The trays were then placed into a freezer over the weekend at -80 °C. The frozen patties were then ground using a Retsch knife mill which was kept cold using liquid nitrogen and dry ice. The dry ice was then allowed to sublime off, before portions of at least 25 g of the spiked carrot was packed into 50 mL centrifuge tubes. The tubes were labelled, shrink-wrapped, and then stored at -80 °C prior to dispatch.

**Sample S3**: Skim milk powder was purchased from a grocery store. In a 10 L stainless steel pot, 1.5 kg of skim milk powder was moistened with acetone and stirred. The composite spike solutions were added and the resultant slurry was stirred overnight to allow the acetone to evaporate off. After stirring overnight, the powder was divided between three aluminium trays and the pot to allow the remaining acetone to evaporate of with clumps being broken up during the day. After drying the spiked milk powder was mixed using a hoop mixer. The mixed powder was then sieved through a 355 µm sieve. The sieved milk powder was then divided into portions of at least 20 g using a rotary sample divider. The samples were placed in 50 mL centrifuge tubes, labelled in fill order, vacuum sealed and stored in a freezer at -20 ℃.

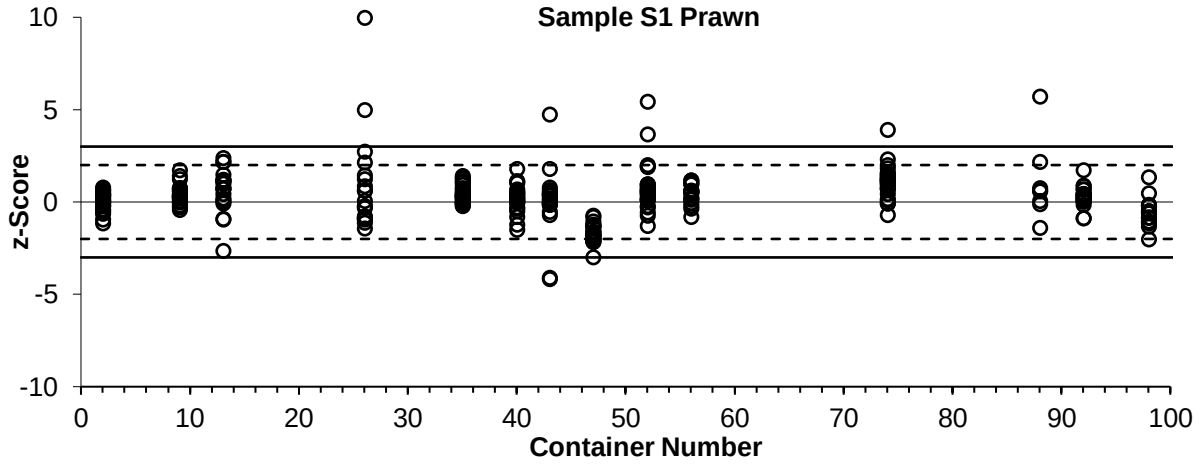
## APPENDIX 2 HOMOGENEITY AND STABILITY ASSESSMENT, AND OTHER INVESTIGATIONS

### A2.1 Homogeneity Assessment

#### Sample S1 Prawn Homogeneity

Sample S1 prawn was prepared using a process previously demonstrated to produce sufficiently homogeneous PT samples for similar analytes and matrices.

A comparison of *z*-scores to the container number analysed by participants for all scored analytes is presented in Figure 148 (results removed from all statistical calculations in Section 5, as well as results from participants sent multiple sample sets, have not been included). Participants' results in this study gave no reason to question the samples' homogeneity.



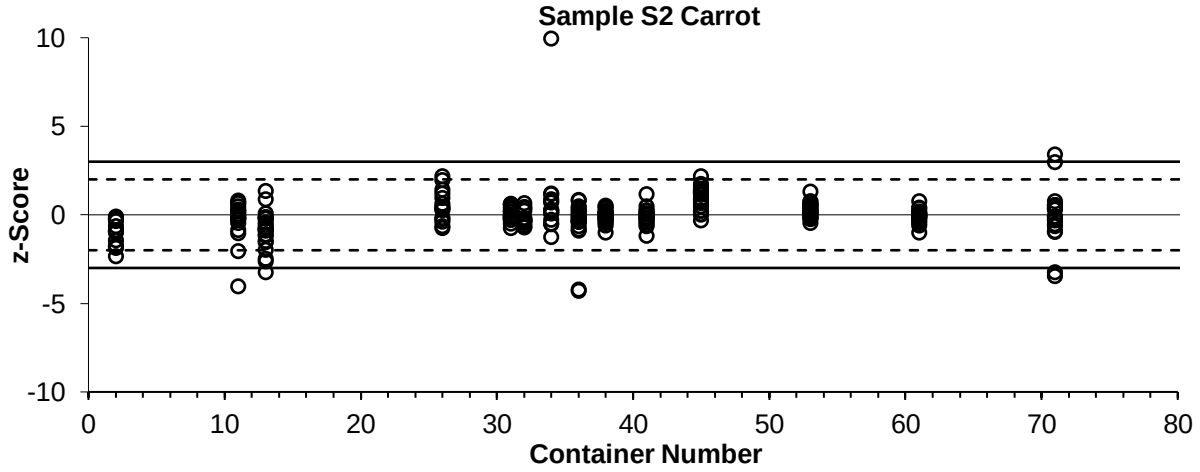

*z*-Scores greater than 10.0 have been plotted at 10.0.

Figure 148 Sample S1 Prawn *z*-Score vs Container Number

#### Sample S2 Carrot Homogeneity

Sample S2 carrot was prepared previously for NMIA PT study AQA 22-14. These PT samples were shown to be sufficiently homogeneous.[6]

A comparison of *z*-scores to the container number analysed by participants for all scored analytes is presented in Figure 149 (results from participants sent multiple sample sets have not been included). Participants' results in this study gave no reason to question the samples' homogeneity.




*z*-Scores greater than 10.0 have been plotted at 10.0.

Figure 149 Sample S2 Carrot *z*-Score vs Container Number

**Sample S3 Milk Powder Homogeneity**

Milk powder was a new matrix introduced in this PT study. Homogeneity testing for Sample S3 milk powder samples was performed by the NMIA Australian Ultra Trace Laboratory.

For homogeneity testing, measurements were made under repeatability conditions in a random order. Samples were prepared in duplicate by accurately weighing 1 g of the sample then spiking with 100 µL of labelled internal standard in methanol. The samples were extracted by overnight tumbling in alkaline methanol (0.01 N potassium hydroxide), then centrifuged and a portion was purified by passing through activated carbon (SUPLCLEAN ENVI-CARB, 500 mg, 120-400 Mesh) eluted using methanol. After evaporation under nitrogen, the concentrated extract was topped up to 600 µL in mobile phase and spiked with 20 µL labelled recovery standard in methanol. All chemicals were analytical reagents or LCMS grade solvents. Instrument analysis was performed using an Ultra Performance Liquid Chromatography (UPLC) coupled with a Liquid Chromatography Qtrap Mass Spectrometer (ABSciex 6500+), operating in multiple reaction monitoring mode. 2 µL of extract was injected onto a Waters Acquity BEH C18 column (2.1 mm x 50 mm x 1.7 µm, 130 Å) with a mobile phase gradient consisting of water:methanol (2 mM ammonium acetate). Two mass transitions were monitored for each target analyte and labelled internal standard, and abundance ratios checked. The instrument mass accuracy was calibrated annually during preventative maintenance, and the nine-point calibration curve established for each analytical batch. A solvent batch blank was extracted and analysed with each batch, and sample results were reported if results were at least three times the level of any analyte detected in the batch blank. Quantification was based on the use of the labelled internal standards using relative retention factors from the multipoint calibration and was corrected for internal standard recoveries. The analysis was based on USEPA Method 1633 and used calibration, internal and recovery standards supplied by Wellington Laboratories.

Homogeneity checks were based on that described by Thompson and Fearn,[13] which is also the procedure as described in the International Harmonized Protocol.[4] The results are presented in Tables 97 to 122. Samples were found to be sufficiently homogeneous for use in a PT study with a target SD (as PCV) of 20%.

Table 97 Sample S3 PFBS Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1* | 1.10 | 1.21 |
| 20 | 1.10 | 1.10 |
| 36 | 1.19 | 1.17 |
| 39 | 1.11 | 1.12 |
| 47 | 1.10 | 1.13 |
| 51 | 1.12 | 1.13 |
| 52 | 1.11 | 1.16 |
| Mean | 1.13 | |
| CV | 3.2% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.724 | 0.781 | **Pass** |
| $s_{an}/\sigma$ | 0.067 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.001 | 0.011 | **Pass** |

* Results from container 1 were not included in the test for homogeneity, being identified as Cochran outliers due to the difference between replicates.[13]

Table 98 Sample S3 PFPeS Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 0.64 | 0.71 |
| 20 | 0.68 | 0.60 |
| 36 | 0.61 | 0.64 |
| 39 | 0.67 | 0.66 |
| 47 | 0.63 | 0.65 |
| 51 | 0.60 | 0.64 |
| 52 | 0.65 | 0.66 |
| Mean | 0.65 | |
| CV | 4.5% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.461 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.238 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.000 | 0.005 | **Pass** |

Table 99 Sample S3 PFHxS Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 0.64 | 0.67 |
| 20 | 0.62 | 0.63 |
| 36 | 0.61 | 0.64 |
| 39 | 0.61 | 0.56 |
| 47 | 0.63 | 0.61 |
| 51 | 0.61 | 0.60 |
| 52 | 0.61 | 0.60 |
| Mean | 0.62 | |
| CV | 4.1% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.549 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.146 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.000 | 0.003 | **Pass** |

Table 100 Sample S3 PFHxS (linear) Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 0.64 | 0.67 |
| 20 | 0.62 | 0.63 |
| 36 | 0.61 | 0.64 |
| 39 | 0.61 | 0.56 |
| 47 | 0.63 | 0.61 |
| 51 | 0.61 | 0.60 |
| 52 | 0.61 | 0.60 |
| Mean | 0.62 | |
| CV | 4.1% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.549 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.146 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.000 | 0.003 | **Pass** |

Table 101 Sample S3 PFHpS Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 0.59 | 0.65 |
| 20 | 0.60 | 0.61 |
| 36 | 0.60 | 0.62 |
| 39 | 0.55 | 0.60 |
| 47 | 0.58 | 0.58 |
| 51 | 0.54 | 0.59 |
| 52 | 0.56 | 0.59 |
| Mean | 0.59 | |
| CV | 4.9% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.396 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.234 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.000 | 0.004 | **Pass** |

Table 102 Sample S3 PFOS Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1* | 0.163 | 0.184 |
| 20 | 0.167 | 0.159 |
| 36 | 0.155 | 0.159 |
| 39 | 0.170 | 0.166 |
| 47 | 0.168 | 0.165 |
| 51 | 0.168 | 0.166 |
| 52 | 0.173 | 0.175 |
| Mean | 0.167 | |
| CV | 4.4% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.559 | 0.781 | **Pass** |
| $s_{an}/\sigma$ | 0.095 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.000 | 0.000 | **Pass** |

* Results from container 1 were not included in the test for homogeneity, being identified as Cochran outliers due to the difference between replicates.[13]

Table 103 Sample S3 PFNS Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1* | 0.93 | 1.09 |
| 20 | 1.12 | 1.10 |
| 36 | 0.92 | 0.98 |
| 39 | 0.98 | 0.94 |
| 47 | 1.00 | 1.06 |
| 51 | 0.96 | 0.99 |
| 52 | 1.04 | 1.04 |
| Mean | 1.01 | |
| CV | 6.5% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.352 | 0.781 | **Pass** |
| $s_{an}/\sigma$ | 0.135 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.004 | 0.009 | **Pass** |

* Results from container 1 were not included in the test for homogeneity, being identified as Cochran outliers due to the difference between replicates.[13]

Table 104 Sample S3 PFDS Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 0.95 | 1.09 |
| 20 | 1.07 | 1.06 |
| 36 | 0.94 | 0.97 |
| 39 | 1.10 | 1.02 |
| 47 | 0.91 | 0.93 |
| 51 | 1.00 | 0.95 |
| 52 | 1.10 | 1.04 |
| Mean | 1.01 | |
| CV | 6.8% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.585 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.245 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.002 | 0.011 | **Pass** |

Table 105 Sample S3 PFBA Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 3.1 | 3.1 |
| 20 | 3.2 | 3.0 |
| 36 | 3.1 | 3.1 |
| 39 | 3.0 | 3.1 |
| 47 | 3.2 | 3.0 |
| 51 | 3.1 | 3.1 |
| 52 | 3.1 | 3.1 |
| Mean | 3.1 | |
| CV | 2.0% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.547 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.130 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.000 | 0.082 | **Pass** |

Table 106 Sample S3 PFPeA Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 1.42 | 1.43 |
| 20 | 1.38 | 1.36 |
| 36 | 1.39 | 1.35 |
| 39 | 1.34 | 1.31 |
| 47 | 1.41 | 1.37 |
| 51 | 1.42 | 1.36 |
| 52 | 1.37 | 1.36 |
| Mean | 1.38 | |
| CV | 2.5% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.389 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.090 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.001 | 0.015 | **Pass** |

Table 107 Sample S3 PFHxA Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 0.96 | 0.98 |
| 20 | 0.98 | 0.98 |
| 36 | 0.98 | 0.98 |
| 39 | 0.96 | 0.95 |
| 47 | 0.97 | 0.98 |
| 51 | 0.98 | 0.95 |
| 52 | 0.97 | 0.98 |
| Mean | 0.97 | |
| CV | 1.4% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.596 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.060 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.000 | 0.007 | **Pass** |

Table 108 Sample S3 PFHpA Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 1.07 | 1.06 |
| 20 | 1.05 | 1.04 |
| 36 | 1.04 | 1.06 |
| 39 | 1.03 | 1.07 |
| 47 | 1.02 | 1.01 |
| 51 | 1.03 | 1.05 |
| 52 | 1.06 | 1.06 |
| Mean | 1.05 | |
| CV | 1.8% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.641 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.063 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.000 | 0.009 | **Pass** |

Table 109 Sample S3 PFOA Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 0.80 | 0.84 |
| 20 | 0.82 | 0.79 |
| 36 | 0.81 | 0.80 |
| 39 | 0.83 | 0.85 |
| 47 | 0.79 | 0.80 |
| 51 | 0.84 | 0.75 |
| 52 | 0.81 | 0.83 |
| Mean | 0.81 | |
| CV | 3.3% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.714 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.174 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.000 | 0.006 | **Pass** |

Table 110 Sample S3 PFNA Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 0.60 | 0.61 |
| 20 | 0.60 | 0.60 |
| 36 | 0.63 | 0.60 |
| 39 | 0.63 | 0.58 |
| 47 | 0.61 | 0.57 |
| 51 | 0.59 | 0.62 |
| 52 | 0.60 | 0.60 |
| Mean | 0.60 | |
| CV | 2.5% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.391 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.155 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.000 | 0.003 | **Pass** |

Table 111 Sample S3 PFDA Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 1.02 | 1.01 |
| 20 | 0.98 | 1.02 |
| 36 | 1.02 | 0.97 |
| 39 | 1.00 | 0.97 |
| 47 | 0.91 | 0.96 |
| 51 | 0.94 | 0.98 |
| 52 | 0.97 | 1.00 |
| Mean | 0.98 | |
| CV | 3.3% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.297 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.133 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.000 | 0.008 | **Pass** |

Table 112 Sample S3 PFUdA Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 1.11 | 1.19 |
| 20 | 1.16 | 1.11 |
| 36 | 1.11 | 1.06 |
| 39 | 1.17 | 1.18 |
| 47 | 1.15 | 1.11 |
| 51 | 1.10 | 1.13 |
| 52 | 1.10 | 1.11 |
| Mean | 1.13 | |
| CV | 3.3% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.407 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.142 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.000 | 0.011 | **Pass** |

Table 113 Sample S3 PFDoA Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 1.17 | 1.24 |
| 20 | 1.20 | 1.17 |
| 36 | 1.14 | 1.13 |
| 39 | 1.13 | 1.19 |
| 47 | 1.19 | 1.12 |
| 51 | 1.07 | 1.18 |
| 52 | 1.17 | 1.12 |
| Mean | 1.16 | |
| CV | 3.7% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.431 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.198 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.000 | 0.013 | **Pass** |

Table 114 Sample S3 PFTrDA Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 1.28 | 1.19 |
| 20 | 1.24 | 1.22 |
| 36 | 1.18 | 1.28 |
| 39 | 1.25 | 1.26 |
| 47 | 1.22 | 1.27 |
| 51 | 1.25 | 1.23 |
| 52 | 1.22 | 1.30 |
| Mean | 1.24 | |
| CV | 2.8% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.363 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.178 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.000 | 0.014 | **Pass** |

Table 115 Sample S3 PFTeDA Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 1.39 | 1.41 |
| 20 | 1.20 | 1.28 |
| 36 | 1.35 | 1.40 |
| 39* | 1.33 | 1.52 |
| 47 | 1.35 | 1.33 |
| 51 | 1.45 | 1.45 |
| 52 | 1.37 | 1.44 |
| Mean | 1.38 | |
| CV | 5.9% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.427 | 0.781 | **Pass** |
| $s_{an}/\sigma$ | 0.125 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.005 | 0.017 | **Pass** |

* Results from container 39 were not included in the test for homogeneity, being identified as Cochran outliers due to the difference between replicates.[13]

Table 116 Sample S3 MeFOSAA Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 1.93 | 2.01 |
| 20 | 1.71 | 1.70 |
| 36 | 1.83 | 1.64 |
| 39 | 1.97 | 1.86 |
| 47 | 1.87 | 2.06 |
| 51 | 1.92 | 1.97 |
| 52 | 2.11 | 2.08 |
| Mean | 1.91 | |
| CV | 7.6% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.390 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.213 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.016 | 0.037 | **Pass** |

Table 117 Sample S3 EtFOSAA Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 1.96 | 2.12 |
| 20 | 2.07 | 2.05 |
| 36 | 1.99 | 1.91 |
| 39 | 1.94 | 1.88 |
| 47 | 1.87 | 2.12 |
| 51 | 2.03 | 2.00 |
| 52 | 1.96 | 1.92 |
| Mean | 1.99 | |
| CV | 4.1% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.623 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.212 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.000 | 0.040 | **Pass** |

Table 118 Sample S3 10:2FTS Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 1.93 | 2.05 |
| 20 | 1.76 | 1.94 |
| 36 | 1.85 | 1.89 |
| 39 | 1.78 | 1.80 |
| 47 | 1.99 | 2.00 |
| 51 | 1.94 | 1.82 |
| 52 | 1.87 | 1.77 |
| Mean | 1.89 | |
| CV | 4.9% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.439 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.194 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.004 | 0.035 | **Pass** |

Table 119 Sample S3 GenX Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 0.121 | 0.128 |
| 20 | 0.122 | 0.114 |
| 36 | 0.124 | 0.124 |
| 39 | 0.116 | 0.113 |
| 47 | 0.112 | 0.121 |
| 51 | 0.119 | 0.114 |
| 52 | 0.112 | 0.131 |
| Mean | 0.119 | |
| CV | 5.1% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.607 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.270 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.000 | 0.000 | **Pass** |

Table 120 Sample S3 ADONA Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 1.09 | 1.14 |
| 20 | 1.14 | 1.07 |
| 36 | 1.08 | 1.11 |
| 39 | 1.05 | 1.08 |
| 47 | 1.10 | 1.08 |
| 51 | 1.08 | 1.11 |
| 52 | 1.14 | 1.03 |
| Mean | 1.09 | |
| CV | 3.1% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.542 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.190 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.000 | 0.011 | **Pass** |

Table 121 Sample S3 9Cl-PF3ONS Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 0.92 | 1.00 |
| 20 | 1.07 | 0.96 |
| 36 | 1.02 | 0.98 |
| 39 | 0.98 | 1.00 |
| 47 | 1.09 | 1.07 |
| 51 | 0.98 | 1.01 |
| 52 | 1.04 | 0.97 |
| Mean | 1.01 | |
| CV | 4.7% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.483 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.212 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.000 | 0.010 | **Pass** |

Table 122 Sample S3 11Cl-PF3OUdS Homogeneity Testing

| Container Number | Result (µg/kg) | |
|---|---|---|
| | Replicate 1 | Replicate 2 |
| 1 | 0.95 | 1.00 |
| 20 | 1.06 | 0.99 |
| 36 | 1.10 | 1.04 |
| 39 | 1.00 | 0.96 |
| 47 | 1.03 | 0.97 |
| 51 | 1.04 | 1.20 |
| 52 | 1.14 | 1.00 |
| Mean | 1.03 | |
| CV | 6.9% | |

Thompson and Fearn Homogeneity Tests[13]

| Test | Value | Critical | Result |
|---|---|---|---|
| Cochran | 0.415 | 0.727 | **Pass** |
| $s_{an}/\sigma$ | 0.315 | 0.500 | **Pass** |
| $s^2_{sam}$ | 0.001 | 0.014 | **Pass** |

A comparison of *z*-scores to the container number analysed by participants for all scored analytes is presented in Figure 150 (results from participants sent multiple sample sets have not been included). Participants' results in this study gave no reason to question the samples' homogeneity.

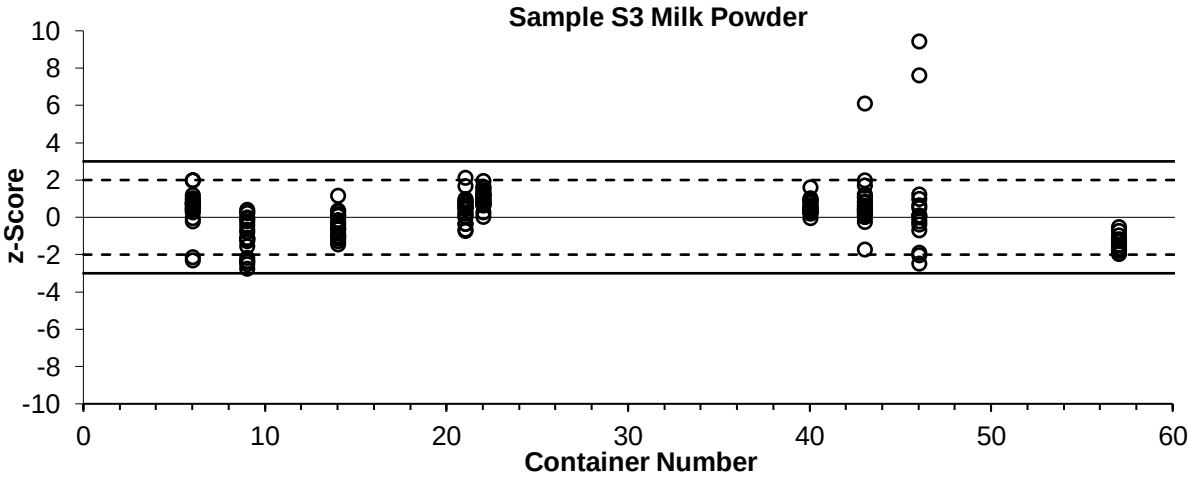


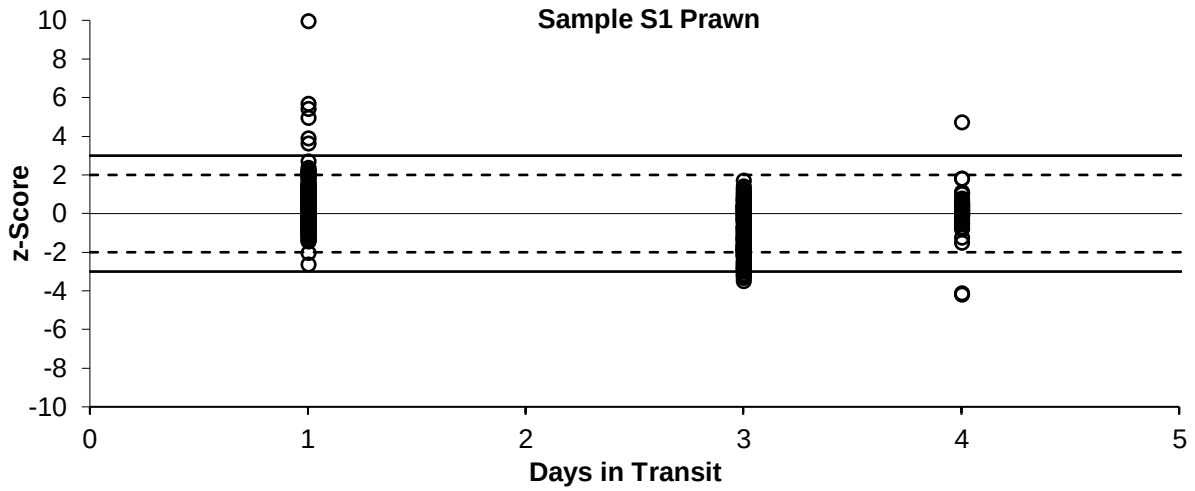

Figure 150 Sample S3 Milk Powder *z*-Score vs Container Number

### A2.2 Stability Assessment

**Sample S1 Prawn Stability**

Sample S1 prawn was prepared, stored and dispatched using a process previously demonstrated to produce sufficiently stable PT samples for similar analytes and matrices.

A comparison of *z*-scores to the number of days the samples spent in transit for all scored analytes is presented in Figure 151 (results removed from all statistical calculations in Section 5 have not been included). Participants' results in this study gave no reason to question the samples' transportation stability.



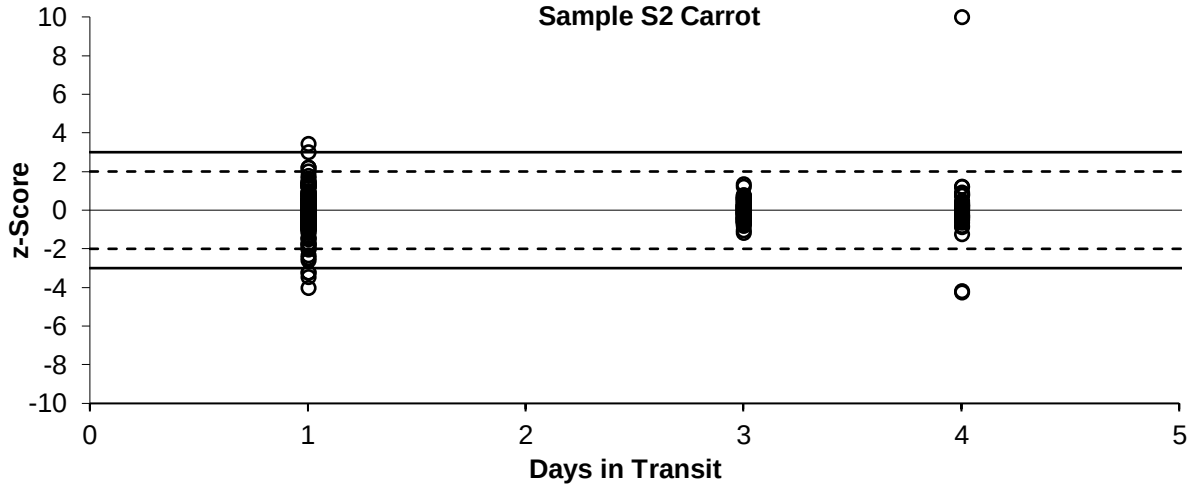

*z*-Scores greater than 10.0 have been plotted at 10.0.

Figure 151 Sample S1 Prawn *z*-Score vs Days in Transit

**Sample S2 Carrot Stability**

Sample S2 carrot was prepared previously for NMIA PT study AQA 22-14. These PT samples were shown to be sufficiently stable.[6]

A comparison of *z*-scores to the number of days the samples spent in transit for all scored analytes is presented in Figure 152. Participants' results in this study gave no reason to question the samples' transportation stability.




*z*-Scores greater than 10.0 have been plotted at 10.0.

Figure 152 Sample S2 Carrot *z*-Score vs Days in Transit

**Sample S3 Milk Powder Stability**

Stability testing for Sample S3 milk powder samples was performed by the NMIA Australian Ultra Trace Laboratory using the same procedure as described in Section A2.1 Homogeneity Assessment.

The milk powder samples were analysed at an initial time point, prior to sample dispatch. Samples were taken from the freezer and packaged in the same way as the samples dispatched to participants. These samples were stored at ambient conditions for the same amount of time as for the longest participant sample delivery time in this study. Samples were then returned to the freezer before being analysed at the conclusion PT study. Therefore, these samples

reflect both transportation stability and long-term storage stability at a participant's laboratory.

Results were in good agreement with each other and the assigned value (or participant consensus value where no assigned value was set) within their respective uncertainties (Figures 153 to 178; AV = Assigned Value, RA = Robust Average, Md = Median). The samples were also shown to be sufficiently stable when assessed against the criteria specified in ISO 13528.[7]

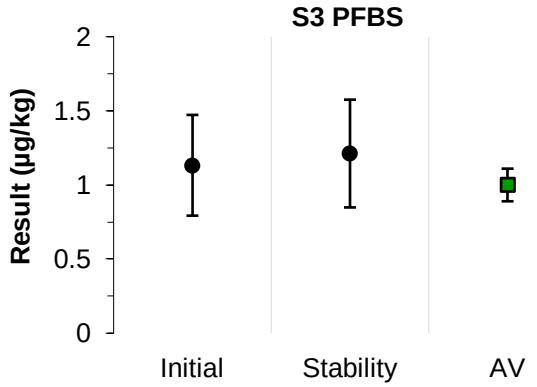



Figure 153 S3 PFBS Stability Testing

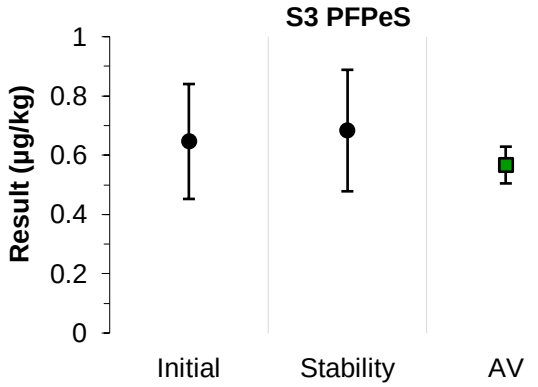



Figure 154 S3 PFPeS Stability Testing

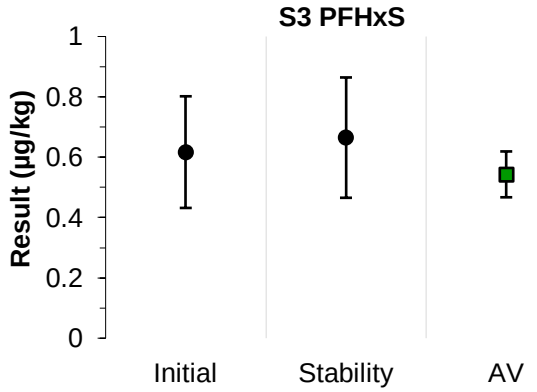



Figure 155 S3 PFHxS Stability Testing

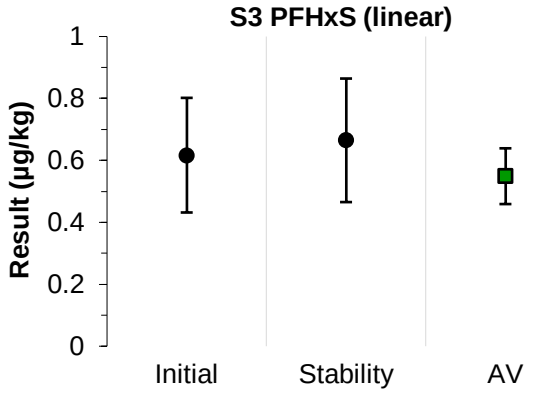



Figure 156 S3 PFHxS (linear) Stability Testing

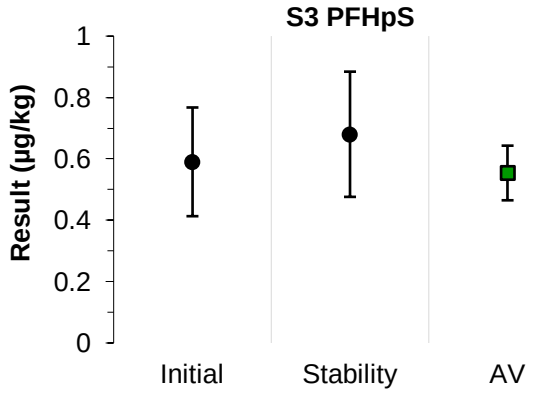



Figure 157 S3 PFHpS Stability Testing

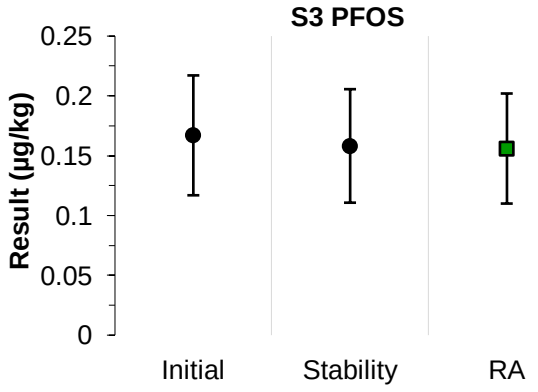



Figure 158 S3 PFOS Stability Testing

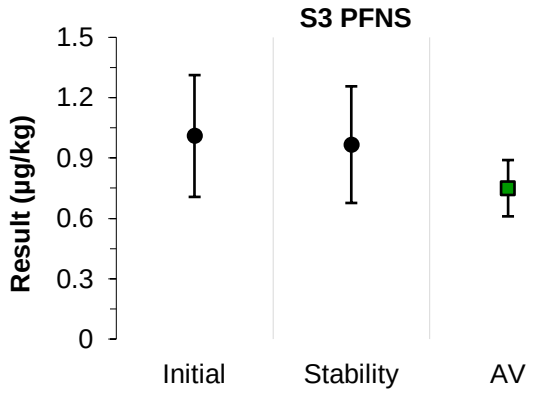



Figure 159 S3 PFNS Stability Testing

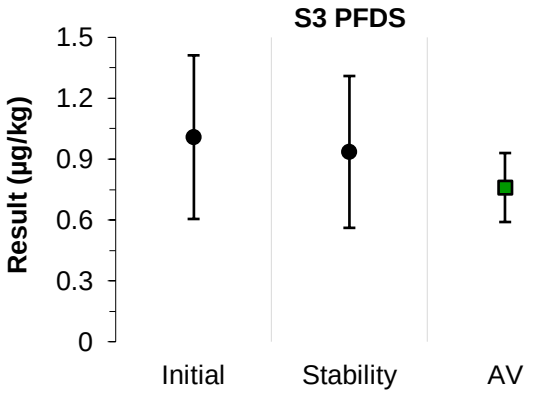



Figure 160 S3 PFDS Stability Testing

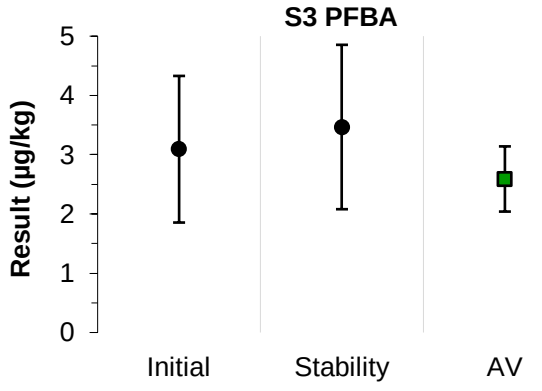



Figure 161 S3 PFBA Stability Testing

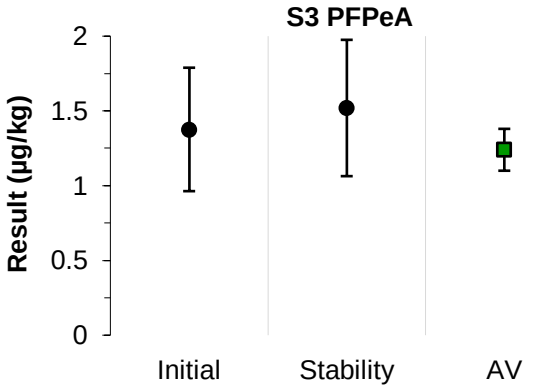



Figure 162 S3 PFPeA Stability Testing

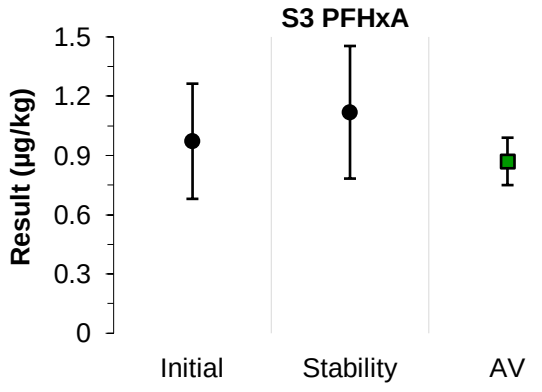



Figure 163 S3 PFHxA Stability Testing

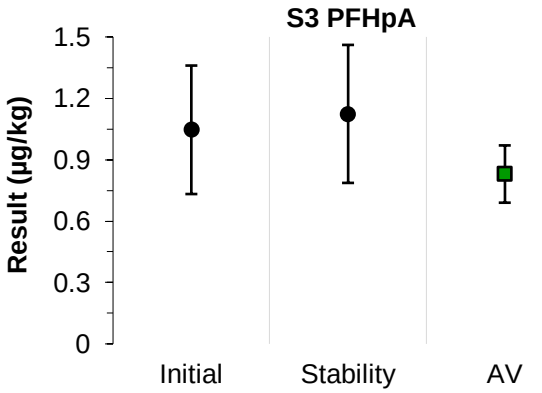



Figure 164 S3 PFHpA Stability Testing

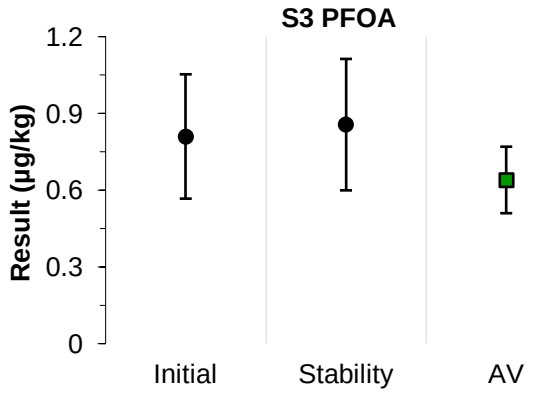



Figure 165 S3 PFOA Stability Testing

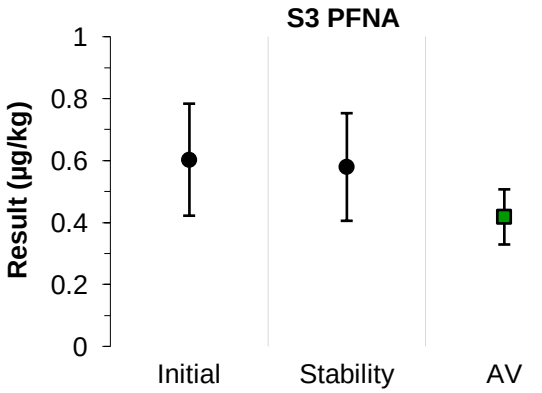



Figure 166 S3 PFNA Stability Testing

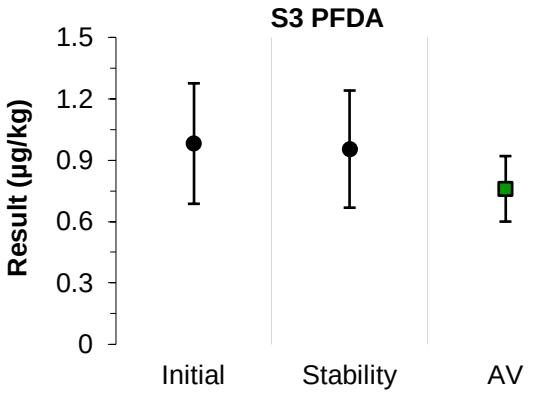


Figure 167 S3 PFDA Stability Testing

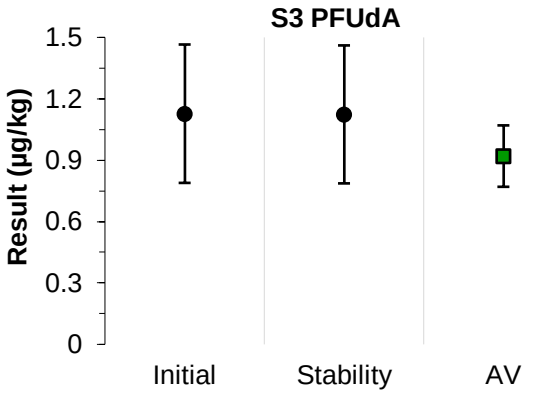


Figure 168 S3 PFUdA Stability Testing

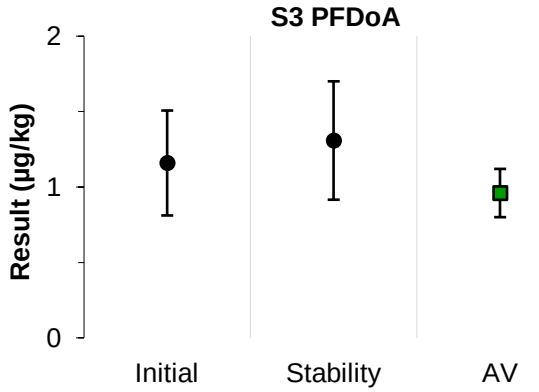


Figure 169 S3 PFDoA Stability Testing

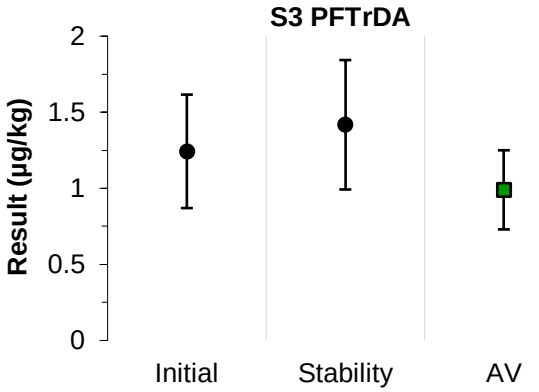


Figure 170 S3 PFTrDA Stability Testing

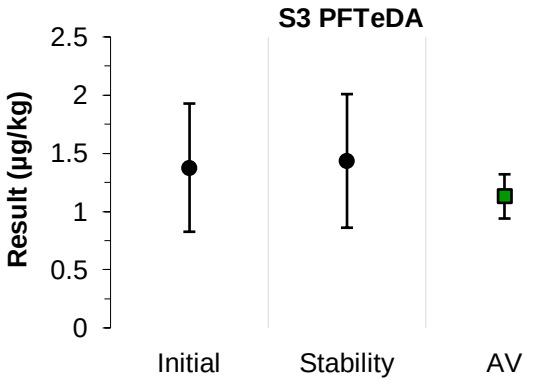


Figure 171 S3 PFTeDA Stability Testing

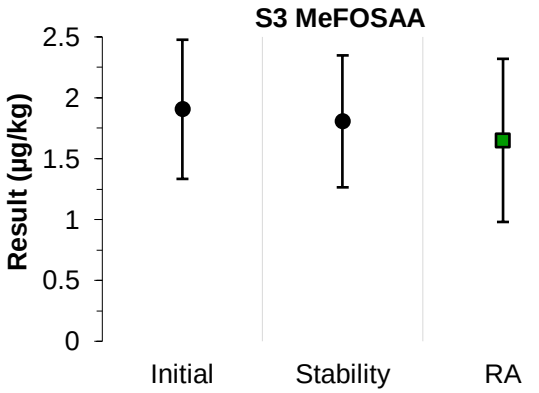


Figure 172 S3 MeFOSAA Stability Testing

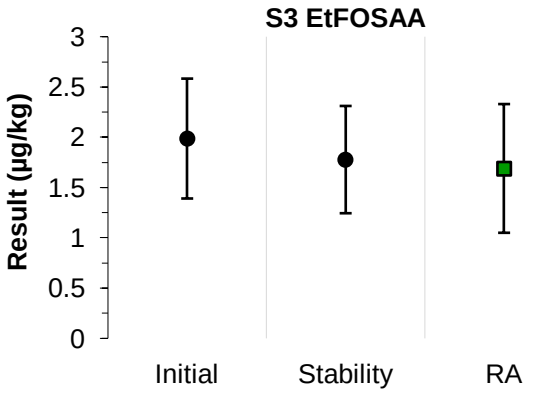


Figure 173 S3 EtFOSAA Stability Testing

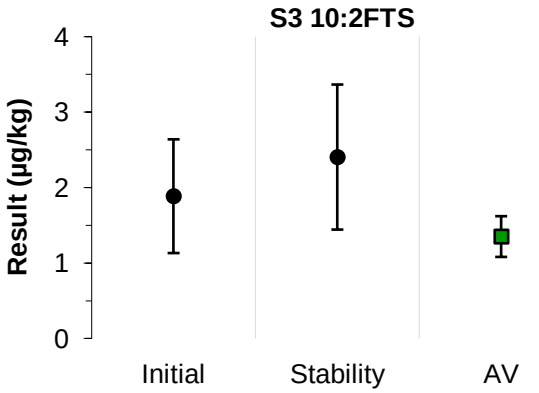


Figure 174 S3 10:2FTS Stability Testing

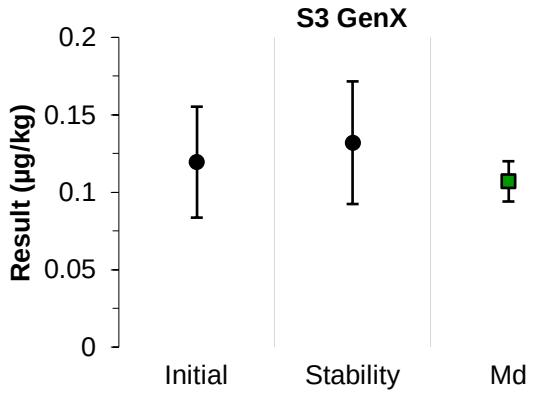



Figure 175 S3 GenX Stability Testing

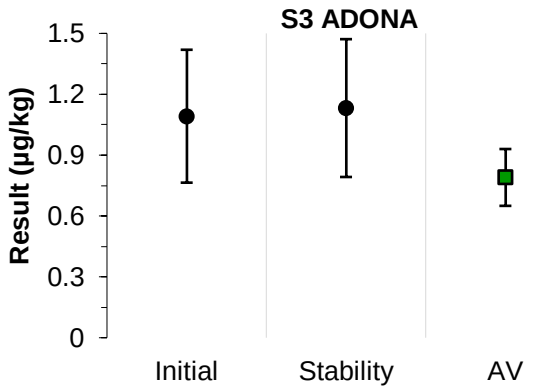



Figure 176 S3 ADONA Stability Testing

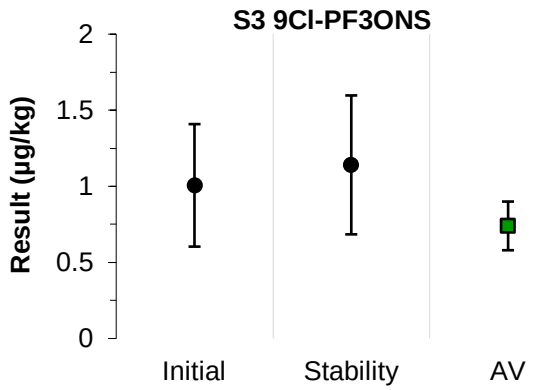



Figure 177 S3 9Cl-PF3ONS Stability Testing

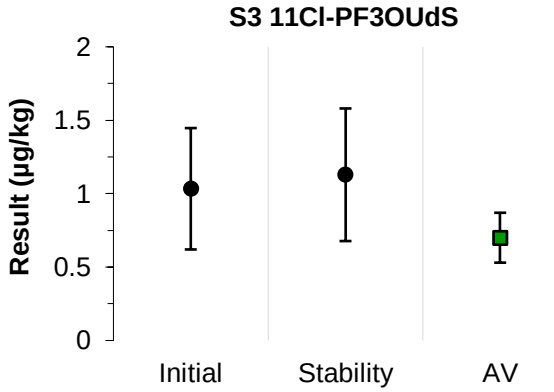



Figure 178 S3 11Cl-PF3OUdS Stability Testing

A comparison of *z*-scores obtained to the number of days the samples spent in transit for all scored analytes is presented in Figure 179. Participants' results in this study gave no reason to question the samples' transportation stability.

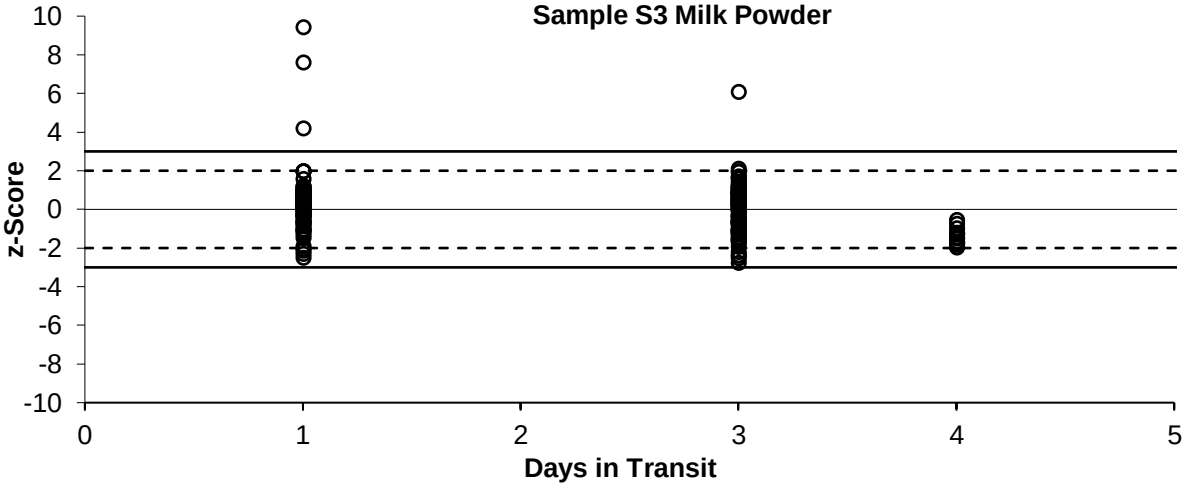



Figure 179 Sample S3 Milk Powder *z*-Score vs Days in Transit

### A2.3 Sample S3 Milk Powder GenX Investigation

Due to the extreme difference in the consensus value as compared to the spiked value for Sample S3 milk powder GenX (recovery of 11%), further internal investigation was conducted. It was noted that while only three participants reported numeric results, these were in good agreement with each other; their results were also in agreement with the NMIA homogeneity value. Additionally, several other participants reported that the level of GenX

was below their LORs, even though the sample was spiked at higher than most of these reported LORs. Therefore, Sample S3 GenX results were consistently low, even with different methodologies being used (including variation in extraction time and temperature).

Low recoveries of the spiked value for GenX has been also observed in soil samples in previous NMIA PT studies, with the ratios of robust averages of participants' results to the spiked values ranging from 14% to 48%; in all cases, there was also good consensus between participants' results.[14-17] In all other matrices, the consensus of participants' results have been much closer to the spiked value, ranging from 81% to 115% of the spiked value.

As both the milk powder and soil samples were dry matrices, whereas the other NMIA PT study matrices have all been moist, testing was done for this study to determine whether a moistened milk powder sample would affect recovery of the spiked analytes, particularly GenX. Results from this internal investigation is presented in Table 123. It was found there was no significant difference between the moistened sample and dry sample for any analyte.

Table 123 Investigation Results for Dry vs Moist Sample S3 Milk Powder

| Analyte | S3 Milk Powder Spiked Value (µg/kg) | Dry Sample S3 Milk Powder Result (µg/kg) | Moist Sample S3 Milk Powder Result (µg/kg) |
|---|---|---|---|
| PFBS | 1.32 | 1.21 | 1.15 |
| PFPeS | 0.708 | 0.683 | 0.683 |
| PFHxS | 0.664 | 0.665 | 0.610 |
| PFHxS (linear) | 0.664 | 0.665 | 0.637 |
| PFHpS | 0.668 | 0.680 | 0.653 |
| PFOS | 0.277 | 0.158 | 0.150 |
| PFOS (linear) | 0.218 | 0.158 | 0.150 |
| PFNS | 0.954 | 0.967 | 0.969 |
| PFDS | 0.958 | 0.935 | 0.878 |
| PFBA | 3.28 | 3.47 | 3.24 |
| PFPeA | 1.48 | 1.52 | 1.47 |
| PFHxA | 0.996 | 1.12 | 1.07 |
| PFHpA | 0.997 | 1.12 | 1.03 |
| PFOA | 0.695 | 0.856 | 0.768 |
| PFNA | 0.499 | 0.579 | 0.590 |
| PFDA | 0.803 | 0.954 | 0.950 |
| PFUdA | 1.01 | 1.12 | 1.09 |
| PFDoA | 1.10 | 1.31 | 1.14 |
| PFTrDA | 1.19 | 1.42 | 1.22 |
| PFTeDA | 1.49 | 1.43 | 1.46 |
| MeFOSAA | 1.99 | 1.81 | 1.94 |
| EtFOSAA | 1.99 | 1.78 | 1.80 |
| 10:2FTS | 1.92 | 2.40 | 2.12 |
| GenX | 0.994 | 0.132 | 0.127 |
| ADONA | 0.936 | 1.13 | 1.10 |

| Analyte | S3 Milk Powder Spiked Value (µg/kg) | Dry Sample S3 Milk Powder Result (µg/kg) | Moist Sample S3 Milk Powder Result (µg/kg) |
|---|---|---|---|
| 9Cl-PF3ONS | 0.926 | 1.14 | 1.03 |
| 11Cl-PF3OUdS | 0.936 | 1.13 | 1.04 |

Another potential cause of this loss of GenX may be the solvents used during sample preparation. It has been shown that the stability of GenX can be affected by the solvent used, with some solvents causing significant conversion to heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether (Fluoroether E-1) in short time periods.[18] NMIA will perform further investigations to determine if this has affected the GenX levels in these samples.

## APPENDIX 3 ROBUST AVERAGE AND ASSOCIATED UNCERTAINTY, z-SCORE AND $E_n$-SCORE CALCULATIONS

### A3.1 Robust Average and Associated Uncertainty

Robust averages were calculated using the procedure described in ISO 13528.[7] The associated uncertainties were estimated as according to Equation 4.

$$u_{rob\ av} = \frac{1.25 \times S_{rob\ av}}{\sqrt{p}} \qquad \textit{Equation 4}$$

where:

$u_{rob\ av}$ is the standard uncertainty of the robust average

$S_{rob\ av}$ is the standard deviation of the robust average

$p$ is the number of results

The expanded uncertainty ($U_{rob\ av}$) is the standard uncertainty multiplied by a coverage factor of 2 at approximately 95% confidence level.

A worked example is set out below in Table 124.

Table 124 Uncertainty Estimate for Robust Average of Sample S2 PFHpA

| | |
|---|---|
| Number of Results (p) | 15 |
| Robust Average | 1.51 µg/kg |
| $S_{rob\ av}$ | 0.22 µg/kg |
| $u_{rob\ av}$ | 0.07 µg/kg |
| $k$ | 2 |
| $U_{rob\ av}$ | 0.14 µg/kg |

Therefore, the robust average for Sample S2 PFHpA is 1.51 ± 0.14 µg/kg.

### A3.2 z-Score and $E_n$-Score Calculations

For each participant's result, a *z*-score and $E_n$-score are calculated according to Equations 2 and 3 respectively (Section 4).

A worked example is set out below in Table 125.

Table 125 *z*-Score and $E_n$-Score for Sample S2 PFHpA Result Reported by Laboratory 7

| Participant Result (µg/kg) | Assigned Value (µg/kg) | Target Standard Deviation | *z*-Score | $E_n$-Score |
|---|---|---|---|---|
| 1.67 ± 0.5 | 1.51 ± 0.14 | 20% as PCV, or:<br>0.2 × 1.51<br>= 0.302 µg/kg | $z = \frac{1.67 - 1.51}{0.302}$<br>$= 0.53$ | $E_n = \frac{1.67 - 1.51}{\sqrt{0.5^2 + 0.14^2}}$<br>$= 0.31$ |

## APPENDIX 4 PARTICIPANTS' TEST METHODS

Participants' responses to the methodology questionnaire are presented in Tables 126 to 218. Some responses may have been modified so that the participant cannot be identified.

### A4.1 Sample S1 Prawn Methodology

Table 126 Participant Methodology – Sample S1 Prawn Sample Preparation and Extraction

| Lab. Code | Sample Weight (g) | Labelled Standard(s) Added Before Extraction? | Equilibration Time for Labelled Standard (min) | Sample Pre-treatment, if other | Extraction Technique | Number of Steps (if staggered extraction) | Extraction Solvent(s) | Total Extraction Time (min) |
|---|---|---|---|---|---|---|---|---|
| 1 | 1g | Yes | 10 | Homogenisation | Alkaline Digestion | N/A | Basic Methanol | 60 |
| 2 | 0.25 | Yes | | | Solid-Liquid Extraction (vortexed and centrifuged) | | KOH/MeOH | 16 hours |
| 3 | 0.5 | Yes | | | Ion Pair Extraction with Solid-Liquid Extraction | | MTBE | 90 |
| 4 | | | | | | | | |
| 5 | 5 g | Yes | | | Solid-Liquid Extraction (vortexed and centrifuged) | | MeOH, 0.3% NH3 | 40 |
| 6 | 1 | Yes | 30 | | Alkaline Digestion | 3 | MeOH, 0.3% NH3 | 1020 |
| 7 | 2 | Yes | 30 | N/A | Alkaline Digestion | N/A | KOH/MeOH | 480 |
| 8 | 0.5g | Yes | 30 | | Digestion with 200mM NaOH in methanol, then extraction with acetonitrile | | ACN | 2 x 15 min |
| 9 | | | | | | | | |
| 10 | 5.25 | Yes | 30-60 | 5 mL reagent water acidified with 150µL formic acid added prior to extraction | QuEChERS | | ACN | 15 |
| 12 | 1.0377 | Yes | 30 | homogenize by vortex/stirring | Solid-Liquid Extraction (vortexed and centrifuged) | 3 (sonicate, vortex, centrifuge) | ACN | 90 |

| Lab. Code | Sample Weight (g) | Labelled Standard(s) Added Before Extraction? | Equilibration Time for Labelled Standard (min) | Sample Pre-treatment, if other | Extraction Technique | Number of Steps (if staggered extraction) | Extraction Solvent(s) | Total Extraction Time (min) |
|---|---|---|---|---|---|---|---|---|
| 13 | 5g | Yes | 30 | | QuEChERS | | ACN | 30 |
| 14* | 2 | Yes | 15 | NA | Solid-Liquid Extraction (vortexed and centrifuged) | NA | 2% formic acid in acetonitrile | 8 min |
| 15* | 2g | Yes | 10 min | Add 5 mL of nanopure water | QuEChERS | | ACN | 5 min |
| 16 | 0.3 | Yes | | | Alkaline Digestion | | NaOH/MeOH | 60 |
| 17 | 5 | Yes | | | QuEChERS | | ACN | 15 |
| 18 | NA | NA | NA | NA | NA | NA | NA | NA |
| 19 | | | | | | | | |
| 20* | | | | | | | | |
| 21 | 5 gram | Yes | 5 min | | QuEChERS | | acetonitrile | |

*Additional information in Table 128.

Table 127 Participant Methodology – Sample S1 Prawn Sample Clean-Up and Concentration

| Lab. Code | Carbon Clean-Up? | Extract Concentration Temperature (°C) | Extract Concentration Time (min) | Clean-Up | Elution Solvent | Final pH Adjustment |
|---|---|---|---|---|---|---|
| 1 | Yes | N/A | N/A | Solid-Phase Extraction | Basic Methanol | Yes |
| 2 | No | 23 | 120 | Solid-Phase Extraction | NH4OH/MeOH | Yes |
| 3 | No | 40 | 20 | None | Not Applicable | No |
| 4 | | | | | | |
| 5 | Yes | NA | NA | Filtration | N/A | |
| 6 | Yes | 55 | 180 | Solid-Phase Extraction | NH4OH/MeOH | Yes |
| 7 | Yes | 35 | 90 | Filtration | KOH/MeOH | No |

| Lab. Code | Carbon Clean-Up? | Extract Concentration Temperature (°C) | Extract Concentration Time (min) | Clean-Up | Elution Solvent | Final pH Adjustment |
|---|---|---|---|---|---|---|
| 8 | Yes | Room temperature | | Liquid-liquid extraction with n-hexane, then Bond Elut Carbon SPE | MeOH | No |
| 9 | | | | | | |
| 10 | Yes | 60 | 40-60 | Solid-Phase Extraction | NH4OH/MeOH | No |
| 12 | No | 40 | 60 | Solid-Phase Extraction | MeOH, 1% NH4OH in MeOH | No |
| 13 | Yes | 45 | 30 | Solid-Phase Extraction | Basic ACN and Acetone | No |
| 14 | Yes | 50°C | Variable | Carbon clean up using dSPE (C18, Envicarb, MgSO4) | Not Applicable | No |
| 15* | No | 60 C | unknown | Solid-Phase Extraction | ACN | No |
| 16 | No | 30 | 60 | Solid-Phase Extraction | NH4OH/MeOH | No |
| 17 | No | NA | NA | DILUTION | | |
| 18 | NA | NA | NA | NA | NA | NA |
| 19 | | | | | | |
| 20* | | | | | | |
| 21 | | | | EMR cartridge | | |

*Additional Information in Table 128.

Table 128 Participant Methodology – Sample S1 Prawn Preparation, Extraction, Clean-Up and Concentration Additional Information

| Lab. Code | Additional Information |
|---|---|
| 14 | Extraction using Merris-Minimix shaker |
| 15 | An EMR II cartridge from Agilent is used but it is a flow through cartridge so the analytes come out in the ACN that was with the sample loaded on the cartridge. Concentration step from ~5 mL to ~0.2 mL then brought up to 0.5 mL with MeOH |
| 20 | Used as part of validation, method still in development |

Table 129 Participant Methodology – Sample S1 Prawn Instrumental Technique

| Lab. Code | Instrument | Dilution Before Analysis and Dilution Factor | Blank Correction? | Additional Information |
|---|---|---|---|---|
| 1 | LC-MSMS or LC-QQQ | 5 | No | |
| 2 | LC-MSMS or LC-QQQ | 16 | Yes | |
| 3 | LC-MSMS or LC-QQQ | No | No | |
| 4 | | | | |
| 5 | LC-MSMS or LC-QQQ | No | No | |
| 6 | LC-MSMS or LC-QQQ | 1 | No | |
| 7 | LC-MSMS or LC-QQQ | No | No | N/A |
| 8 | LC-MSMS or LC-QQQ | No | No | |
| 9 | | | | |
| 10 | LC-MSMS or LC-QQQ | | No | C-18 LC column (3µm, 150mm x 2mm) |
| 12 | LC-MSMS or LC-QQQ | | Yes | |
| 13 | LC-MSMS or LC-QQQ | | No | |
| 14 | LC-MSMS or LC-QQQ | No | Yes | NA |
| 15 | LC-MSMS or LC-QQQ | | No | Cholic acids are separated chromatographically from PFOS isomers. A PFP column utilizing 10 mM Am Acetate in water and 10 mM Am Acetate in MeOH was used to chromatographically separate analytes over 20 min. |
| 16 | LC-MSMS or LC-QQQ | | Yes | |
| 17 | LC-Orbitrap | 8 | Yes | |
| 18 | NA | NA | NA | NA |
| 19 | | | | |
| 20 | LC-MSMS or LC-QQQ | No | | Used as part of validation, method still in development |
| 21 | Sciex 7500 | no | Yes | |

Table 130 Participant Methodology – Sample S1 Prawn Labelled Standards

| Lab. Code | Labelled Standard Source | Recovery Correction? | Standard Method Used? | Additional Information |
|---|---|---|---|---|
| 1 | Wellington | Yes | No. In-house | |
| 2 | Wellington Laboratories | No | | |
| 3 | Wellington Laboratories | Yes | | |
| 4 | | | | |
| 5 | Accustandard and Wellington | Yes | USEPA 1633 | |
| 6 | Wellington | No | USEPA 1633 | |
| 7 | Wellington | Yes | No | N/A |
| 8 | Wellington | Yes | Isotopic dilution | |
| 9 | | | | |
| 10 | Cambridge (FTS compounds); Wellington (remainder) | Yes | | |
| 12 | Wellington Laboratories | Yes | No | |
| 13 | Wellington. Cambridge Isotope laboratories | No | | |
| 14 | Wellington Laboratory | Yes | No | NA |
| 15 | Wellington, Cambridge | Yes | Isotope Dilution; Not currently a standard method | If a labelled standard wasn't available for an analyte, then an appropriate one was selected from those analysed for recovery correction purposes. |
| 16 | Wellington | No | | |
| 17 | Wellington Laboratories | Yes | | |
| 18 | NA | NA | NA | NA |
| 19 | Wellington, Cambridge Isotopes | Yes | US FDA Foods Program Compendium of Analytical Laboratory Methods: Method C-010.03 | d5NN EtFOSAA added before instrument analysis |
| 20 | Wellington | No | Yes, SPE | |
| 21 | Wellington, Cambridge Isotopes | Yes | new method in development | M4 PFOA added before instrument analysis |

Table 131 Labelled Standards for Sample S1 Prawn PFBS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C3-PFBS | N/A |
| 2 | PFBS - 13C3 | PFHxS-18O2 |
| 3 | 13C3-PFBS | |
| 4 | | |
| 5 | Yes | No |
| 6 | M3PFBS | |
| 7 | 13C3 PFBS | |
| 8 | 13C3-PFBS | 13C3-PFHxS |
| 9 | | |
| 10 | yes | |
| 12 | 18O2-PFHxS | 18O2-PFOS |
| 13 | 13C3-PFBS | |
| 14 | M3PFBS | NA |
| 15 | x | |
| 16 | 13C3-PFBS | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | M3 PFBS | |
| 20 | | |
| 21 | M3 PFBS | |

Table 132 Labelled Standards for Sample S1 Prawn PFHxS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 18O2-PFHxS | N/A |
| 2 | PFHxS - 13C3 | PFHxS-18O2 |
| 3 | 16O2-PFHxS | |
| 4 | | |
| 5 | Yes | Yes |
| 6 | M3PFHxS | |
| 7 | 13C3 PFHxS | PFHxS18O2 |
| 8 | 18O2-PFHxS | 13C3-PFHxS |
| 9 | | |
| 10 | | |
| 12 | | |
| 13 | 18O2-PFHxS | |
| 14 | M3PFHxS | NA |
| 15 | | |
| 16 | 13C3-PFHxS | |
| 17 | Yes | Yes |
| 18 | NA | NA |
| 19 | M3 PFHxS | |
| 20 | | |
| 21 | M3 PFHxS | |

Table 133 Labelled Standards for Sample S1 Prawn PFHxS (linear)

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 18O2-PFHxS | N/A |
| 2 | PFHxS - 13C3 | PFHxS-18O2 |
| 3 | NT | |
| 4 | | |
| 5 | No | No |
| 6 | M3PFHxS | |
| 7 | 13C3 PFHxS | |
| 8 | 18O2-PFHxS | 13C3-PFHxS |
| 9 | | |
| 10 | yes | |
| 12 | 18O2-PFHxS | 18O2-PFOS |
| 13 | 18O2-PFHxS | |
| 14 | M3PFHxS | NA |
| 15 | x | |
| 16 | 13C3-PFHxS | |
| 17 | | |
| 18 | NA | NA |
| 19 | | |
| 20 | | |
| 21 | | |

Table 134 Labelled Standards for Sample S1 Prawn PFHpS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFOS | N/A |
| 2 | PFHxS - 13C3 | PFHxS-18O2 |
| 3 | 13C8-PFOS | |
| 4 | | |
| 5 | No | No |
| 6 | | |
| 7 | 13C3 PFHxS | |
| 8 | 18O2-PFHxS | 13C3-PFHxS |
| 9 | | |
| 10 | | |
| 12 | 18O2-PFHxS | 18O2-PFOS |
| 13 | N/A | |
| 14 | M3PFHxS | NA |
| 15 | | |
| 16 | 13C3-PFHxS | |
| 17 | | |
| 18 | NA | NA |
| 19 | M3 PFHxS | |
| 20 | | |
| 21 | M3 PFHxS | |

Table 135 Labelled Standards for Sample S1 Prawn PFOS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFOS | N/A |
| 2 | PFOS - 13C8 | PFOS-13C4 |
| 3 | 13C4-PFOS | |
| 4 | | |
| 5 | Yes | Yes |
| 6 | M8PFOS | MPFOS |
| 7 | 13C8 PFOS | 13C4 PFOS |
| 8 | 13C4-PFOS | 13C8-PFOS |
| 9 | | |
| 10 | | |
| 12 | 13C4-PFOS | 18O2-PFOS |
| 13 | 13C8-PFOS | |
| 14 | M8PFOS | NA |
| 15 | | |
| 16 | 13C8-PFOS | |
| 17 | Yes | Yes |
| 18 | NA | NA |
| 19 | 13C PFOS | |
| 20 | | |
| 21 | 13C PFOS | |

Table 136 Labelled Standards for Sample S1 Prawn PFOS (linear)

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFOS | N/A |
| 2 | PFOS - 13C8 | PFOS-13C4 |
| 3 | 13C8-PFOS | |
| 4 | | |
| 5 | No | No |
| 6 | M8PFOS | MPFOS |
| 7 | 13C8 PFOS | |
| 8 | 13C4-PFOS | 13C8-PFOS |
| 9 | | |
| 10 | yes | yes |
| 12 | 13C4-PFOS | 18O2-PFOS |
| 13 | 13C8-PFOS | |
| 14 | M8PFOS | NA |
| 15 | x | x |
| 16 | 13C8-PFOS | |
| 17 | | |
| 18 | NA | NA |
| 19 | | |
| 20 | | |
| 21 | | |

Table 137 Labelled Standards for Sample S1 Prawn PFNS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFOS | N/A |
| 2 | PFOS - 13C8 | PFOS - 13C4 |
| 3 | 13C8-PFOS | |
| 4 | | |
| 5 | No | No |
| 6 | | |
| 7 | 13C8 PFOS | |
| 8 | 13C4-PFOS | 13C8-PFOS |
| 9 | | |
| 10 | | |
| 12 | 13C4-PFOS | 18O2-PFOS |
| 13 | N/A | |
| 14 | M8PFOS | NA |
| 15 | | |
| 16 | 13C8-PFOS | |
| 17 | | |
| 18 | NA | NA |
| 19 | 13C PFOS | |
| 20 | | |
| 21 | 13C PFOS | |

Table 138 Labelled Standards for Sample S1 Prawn PFDS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFOS | N/A |
| 2 | PFOS - 13C8 | PFOS-13C4 |
| 3 | 13C8-PFOS | |
| 4 | | |
| 5 | No | No |
| 6 | | |
| 7 | 13C8 PFOS | |
| 8 | 13C4-PFOS | 13C8-PFOS |
| 9 | | |
| 10 | | |
| 12 | 13C4-PFOS | 18O2-PFOS |
| 13 | N/A | |
| 14 | M8PFOS | NA |
| 15 | | |
| 16 | 13C8-PFOS | |
| 17 | | |
| 18 | NA | NA |
| 19 | 13C PFOS | |
| 20 | | |
| 21 | 13C PFOS | |

Table 139 Labelled Standards for Sample S1 Prawn PFBA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFBA | N/A |
| 2 | PFBA-13C4 | PFBA-13C3 |
| 3 | 13C4-PFBA | |
| 4 | | |
| 5 | Yes | Yes |
| 6 | MPFBA | M3PFBA |
| 7 | 13C4 PFBA | 13C3 PFBA |
| 8 | 13C4-PFBA | 13C3-PFBA |
| 9 | | |
| 10 | yes | |
| 12 | 13C4-PFBA | 13C8-PFOA |
| 13 | 13C4-PFBA | |
| 14 | M4PFBA | NA |
| 15 | x | |
| 16 | 13C4-PFBA | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | M3 PFBA | |
| 20 | | |
| 21 | M3 PFBA | |

Table 140 Labelled Standards for Sample S1 Prawn PFPeA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C3-PFPeA | N/A |
| 2 | PFPeA - 13C5 | PFBA-13C3 |
| 3 | 13C5-PFPeA | |
| 4 | | |
| 5 | Yes | No |
| 6 | M5PFPeA | |
| 7 | 13C5 PFPeA | |
| 8 | 13C4-PFPeA | 13C5 -PFPeA |
| 9 | | |
| 10 | yes | |
| 12 | 13C5-PFPeA | 13C8-PFOA |
| 13 | 13C5-PFPeA | |
| 14 | M5PFPeA | NA |
| 15 | x | |
| 16 | 13C5-PFPeA | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | M3 PFPeA | |
| 20 | | |
| 21 | M3 PFPeA | |

Table 141 Labelled Standards for Sample S1 Prawn PFHxA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C2-PFHxA | N/A |
| 2 | PFHxA - 13C5 | PFOA-13C2 |
| 3 | 13C5-PFHxA | |
| 4 | | |
| 5 | Yes | Yes |
| 6 | M5PFHxA | |
| 7 | 13C5 PFHxA | 13C2 PFHxA |
| 8 | 13C2-PFHxA | 13C5 -PFPeA |
| 9 | | |
| 10 | yes | |
| 12 | 13C5-PFHxA | 13C8-PFOA |
| 13 | 13C2-PFHxA | |
| 14 | M5PFHxA | NA |
| 15 | x | |
| 16 | 13C5-PFHxA | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | M5 PFHxA | |
| 20 | | |
| 21 | M5 PFHxA | |

Table 142 Labelled Standards for Sample S1 Prawn PFHpA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFHpA | N/A |
| 2 | PFHpA - 13C4 | PFOA-13C2 |
| 3 | 13C4-PFHpA | |
| 4 | | |
| 5 | Yes | No |
| 6 | M4PFHpA | |
| 7 | 13C4 PFHpA | |
| 8 | 13C3-PFHpA | 13C8-PFOA |
| 9 | | |
| 10 | | |
| 12 | 13C4-PFHpA | 13C8-PFOA |
| 13 | 13C4-PFHpA | |
| 14 | MPFHpA | NA |
| 15 | x | |
| 16 | 13C4-PFHpA | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | M5 PFHxA | |
| 20 | | |
| 21 | M4 PFHpA | |

Table 143 Labelled Standards for Sample S1 Prawn PFOA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFOA | N/A |
| 2 | PFOA - 13C4 | PFOA-13C2 |
| 3 | 13C8-PFOA | |
| 4 | | |
| 5 | Yes | Yes |
| 6 | M8PFOA | M2PFOA |
| 7 | 13C8 PFOA | 13C4 PFOA |
| 8 | 13C4-PFOA | 13C8-PFOA |
| 9 | | |
| 10 | yes | yes |
| 12 | 13C4-PFOA | 13C8-PFOA |
| 13 | 13C8-PFOA | |
| 14 | M8PFOA | NA |
| 15 | x | x |
| 16 | 13C8-PFOA | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | 13C PFOA | |
| 20 | | |
| 21 | 13C PFOA | |

Table 144 Labelled Standards for Sample S1 Prawn PFNA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C5-PFNA | N/A |
| 2 | PFNA - 13C9 | PFNA-13C5 |
| 3 | 13C5-PFNA | |
| 4 | | |
| 5 | Yes | No |
| 6 | M9PFNA | |
| 7 | 13C9 PFNA | 13C5 PFNA |
| 8 | 13C5-PFNA | 13C8-PFOA |
| 9 | | |
| 10 | | |
| 12 | 13C9-PFNA | 13C5-PFNA |
| 13 | 13C5-PFNA | |
| 14 | M9PFNA | NA |
| 15 | x | |
| 16 | 13C9-PFNA | |
| 17 | Yes | Yes |
| 18 | NA | NA |
| 19 | 13C PFOA | |
| 20 | | |
| 21 | M5 PFNA | |

Table 145 Labelled Standards for Sample S1 Prawn PFDA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C2-PFDA | N/A |
| 2 | PFDA - 13C6 | PFDA-13C2 |
| 3 | 13C6-PFDA | |
| 4 | | |
| 5 | Yes | Yes |
| 6 | M6PFDA | MPFDA |
| 7 | 13C6 PFDA | 13C2 PFDA |
| 8 | 13C2-PFDA | 13C8-PFOA |
| 9 | | |
| 10 | | |
| 12 | 13C2-PFDA | 13C5-PFNA |
| 13 | 13C6-PFDA | |
| 14 | M6PFDA | NA |
| 15 | x | |
| 16 | 13C6-PFDA | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | 13C PFOA | |
| 20 | | |
| 21 | M2 PFDA | |

Table 146 Labelled Standards for Sample S1 Prawn PFUdA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C2-PFUdA | N/A |
| 2 | PFUdA - 13C7 | PFDA-13C2 |
| 3 | 13C2-PFUnDA | |
| 4 | | |
| 5 | Yes | No |
| 6 | M7PFUdA | |
| 7 | 13C7 PFUnA | |
| 8 | 13C2-PFUdA | 13C8-PFOA |
| 9 | | |
| 10 | yes | yes |
| 12 | 13C2-PFUdA | 13C5-PFNA |
| 13 | 13C2-PFUnA | |
| 14 | M7PFUnDA | NA |
| 15 | x | |
| 16 | 13C7-PFUnA | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | MPFUdA | |
| 20 | | |
| 21 | MPFUdA | |

Table 147 Labelled Standards for Sample S1 Prawn PFTrDA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C2-PFTeDA | N/A |
| 2 | PFTeDA - 13C2 | PFDA-13C2 |
| 3 | 13C2-PFTeDA | |
| 4 | | |
| 5 | No | No |
| 6 | | |
| 7 | 13C2 PFDoA | |
| 8 | 13C2-PFDoA | 13C8-PFOA |
| 9 | | |
| 10 | | |
| 12 | 13C2-PFHxDA | 13C2-PFTeDA |
| 13 | N/A | |
| 14 | MPFDoDA | NA |
| 15 | | |
| 16 | 13C2-PFDoA | |
| 17 | | |
| 18 | NA | NA |
| 19 | MPFDoA | |
| 20 | | |
| 21 | MPFDoA | |

Table 148 Labelled Standards for Sample S1 Prawn PFTeDA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C2-PFTeDA | N/A |
| 2 | PFTeDA - 13C2 | PFDA-13C2 |
| 3 | 13C2-PFTeDA | |
| 4 | | |
| 5 | Yes | No |
| 6 | M2PFTeDA | |
| 7 | 13C2 PFTeDA | |
| 8 | 13C2-PFTeDA | 13C8-PFOA |
| 9 | | |
| 10 | yes | |
| 12 | 13C2-PFHxDA | 13C2-PFTeDA |
| 13 | 13C2-PFTeDA | |
| 14 | MPFTeDA | NA |
| 15 | x | |
| 16 | 13C2-PFTeDA | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | MPFTeDA | |
| 20 | | |
| 21 | MPFTeDA | |

Table 149 Labelled Standards for Sample S1 Prawn PFOSA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C8-FOSA | N/A |
| 2 | PFOSA - 13C8 | PFOS-13C4 |
| 3 | 13C8-FOSA | |
| 4 | | |
| 5 | Yes | No |
| 6 | M8-FOSA | |
| 7 | 13C8 PFOSA | |
| 8 | 13C8-FOSA | |
| 9 | | |
| 10 | yes | |
| 12 | 13C8-PFOSA | 13C2-PFTeDA |
| 13 | 13C8-FOSA | |
| 14 | MPFOSA | NA |
| 15 | x | |
| 16 | | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | M8 FOSA | |
| 20 | | |
| 21 | M8 FOSA | |

Table 150 Labelled Standards for Sample S1 Prawn MeFOSA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | D3-M PFOSA | N/A |
| 2 | N-MeFOSA - 2H3 | PFOS-13C4 |
| 3 | d3-MeFOSA | |
| 4 | | |
| 5 | Yes | No |
| 6 | d-N-MeFOSA | |
| 7 | d3-N-MeFOSA | |
| 8 | D3-N-Me FOSA | |
| 9 | | |
| 10 | | |
| 12 | 13C8-PFOSA | 13C2-PFTeDA |
| 13 | d3-N-MeFOSA | |
| 14 | d-NMeFOSA-M | NA |
| 15 | | |
| 16 | | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | | |
| 20 | | |
| 21 | | |

Table 151 Labelled Standards for Sample S1 Prawn EtFOSA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | D5-E PFOSA | N/A |
| 2 | N-EtFOSA - D5 | PFOS-13C4 |
| 3 | d5-EtFOSA | |
| 4 | | |
| 5 | Yes | No |
| 6 | d-N-EtFOSA | |
| 7 | d5-N-EtFOSA | |
| 8 | D5-N-Et FOSA | |
| 9 | | |
| 10 | | |
| 12 | 13C8-PFOSA | 13C2-PFTeDA |
| 13 | d5-N-EtFOSA | |
| 14 | d-NEtFOSA-M | NA |
| 15 | | |
| 16 | | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | | |
| 20 | | |
| 21 | | |

Table 152 Labelled Standards for Sample S1 Prawn MeFOSAA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | D3-Me-FOSAA | N/A |
| 2 | N-MeFOSAA - 2H3 | PFOS-13C4 |
| 3 | d3-MeFOSAA | |
| 4 | | |
| 5 | Yes | No |
| 6 | d3-N-MeFOSAA | |
| 7 | d3-N-MeFOSAA | |
| 8 | D3-N-Me FOSAA | |
| 9 | | |
| 10 | | |
| 12 | d3-MeFOSAA | d5-EtFOSAA |
| 13 | d3-N-MeFOSAA | |
| 14 | d3-NMeFOSAA | NA |
| 15 | | |
| 16 | | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | | |
| 20 | | |
| 21 | | |

Table 153 Labelled Standards for Sample S1 Prawn EtFOSE

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | D9-Et-FOSE | N/A |
| 2 | N-EtFOSE - 2H9 | PFOS-13C4 |
| 3 | d3-EtFOSE | |
| 4 | | |
| 5 | Yes | No |
| 6 | d9-N-EtFOSE | |
| 7 | d9-N-EtFOSE | |
| 8 | D9-N-Et FOSE | |
| 9 | | |
| 10 | | |
| 12 | NT | NT |
| 13 | d9-N-EtFOSE | |
| 14 | d9-NEtFOSE-M | NA |
| 15 | | |
| 16 | | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | | |
| 20 | | |
| 21 | | |

Table 154 Labelled Standards for Sample S1 Prawn 6:2FTS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C2,12C6 6:2-FTS | N/A |
| 2 | 6:2 FTS - 13C2 | PFHxS-18O2 |
| 3 | 13C2-6:2 FTS | |
| 4 | | |
| 5 | Yes | No |
| 6 | M2-6:2FTS | |
| 7 | 13C2 6:2 FTS | |
| 8 | 13C2-6:2 FTS | |
| 9 | | |
| 10 | | |
| 12 | 13C2-6:2 FTS | 13C2-8:2 FTS |
| 13 | 13C2-6-2 FTS | |
| 14 | M6:2 FTS | NA |
| 15 | x | |
| 16 | | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | 13C2D4 6:2 FTS | |
| 20 | | |
| 21 | 13C2D4 6:2 FTS | |

Table 155 Labelled Standards for Sample S1 Prawn 5:3FTCA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFOA | N/A |
| 2 | | |
| 3 | 13C2-5:3FTCA | |
| 4 | | |
| 5 | No | No |
| 6 | | |
| 7 | 13C5 PFPeA | |
| 8 | 13C2-PFHxA | 13C5 -PFPeA |
| 9 | | |
| 10 | | |
| 12 | NT | NT |
| 13 | N/A | |
| 14 | NA | NA |
| 15 | | |
| 16 | | |
| 17 | | |
| 18 | NA | NA |
| 19 | | |
| 20 | | |
| 21 | | |

Table 156 Labelled Standards for Sample S1 Prawn GenX

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C312C3HF11O3 | N/A |
| 2 | | |
| 3 | M3HFPO-DA | |
| 4 | | |
| 5 | No | No |
| 6 | | |
| 7 | 13C3 HFPO-DA | |
| 8 | 13C3-GenX | |
| 9 | | |
| 10 | yes | |
| 12 | 13C2-GenX | 13C8-PFOA |
| 13 | 13C3-GenX | |
| 14 | M3HFPO-DA | NA |
| 15 | x | |
| 16 | 13C3-HFPODA | |
| 17 | | |
| 18 | NA | NA |
| 19 | M3 HFPO | |
| 20 | | |
| 21 | M3 HFPO | |

Table 157 Labelled Standards for Sample S1 Prawn ADONA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFHpA | N/A |
| 2 | | |
| 3 | 13C4-PFHpA | |
| 4 | | |
| 5 | No | No |
| 6 | | |
| 7 | 13C3 HFPO-DA | |
| 8 | 13C3-PFHpA | 13C8-PFOA |
| 9 | | |
| 10 | | |
| 12 | NT | NT |
| 13 | N/A | |
| 14 | MPFHpA | NA |
| 15 | | |
| 16 | 13C8-PFOA | |
| 17 | | |
| 18 | NA | NA |
| 19 | 13C PFOA | |
| 20 | | |
| 21 | 13C PFOA | |

Table 158 Labelled Standards for Sample S1 Prawn 9Cl-PF3ONS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFOS | N/A |
| 2 | | |
| 3 | 13C8-PFOS | |
| 4 | | |
| 5 | No | No |
| 6 | | |
| 7 | 13C3 HFPO-DA | |
| 8 | 13C4-PFOS | 13C8-PFOS |
| 9 | | |
| 10 | | |
| 12 | NT | NT |
| 13 | N/A | |
| 14 | M8PFOS | NA |
| 15 | | |
| 16 | 13C8-PFOS | |
| 17 | | |
| 18 | NA | NA |
| 19 | 13C PFOS | |
| 20 | | |
| 21 | 13C PFOS | |

Table 159 Labelled Standards for Sample S1 Prawn 11Cl-PF3OUdS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFOS | N/A |
| 2 | | |
| 3 | 13C8-PFOS | |
| 4 | | |
| 5 | No | No |
| 6 | | |
| 7 | 13C3 HFPO-DA | |
| 8 | 13C4-PFOS | 13C8-PFOS |
| 9 | | |
| 10 | | |
| 12 | NT | NT |
| 13 | N/A | |
| 14 | MPFDoDA | NA |
| 15 | | |
| 16 | 13C8-PFOS | |
| 17 | | |
| 18 | NA | NA |
| 19 | 13C PFOS | |
| 20 | | |
| 21 | 13C PFOS | |

### A4.2 Sample S2 Carrot Methodology

Table 160 Participant Methodology – Sample S2 Carrot Sample Preparation and Extraction

| Lab. Code | Sample Weight (g) | Labelled Standard(s) Added Before Extraction? | Equilibration Time for Labelled Standard (min) | Sample Pre-treatment, if other | Extraction Technique | Number of Steps (if staggered extraction) | Extraction Solvent(s) | Total Extraction Time (min) |
|---|---|---|---|---|---|---|---|---|
| 1 | 2g | Yes | 10 | Homogenisation | Alkaline Digestion | N/A | Basic Methanol | 60 |
| 2 | NA | NA | NA | NA | NA | NA | NA | NA |
| 3 | 0.5 | Yes | | | Ion Pair Extraction with Solid-Liquid Extraction | | MTBE | 90 |
| 4 | | | | | | | | |
| 5 | 5 g | Yes | NA | NA | Solid-Liquid Extraction (vortexed and centrifuged) | | MeOH, 0.3% NH3 | 40 |
| 6 | 1 | Yes | 30 | | Alkaline Digestion | 3 | MeOH, 0.3% NH3 | 1020 |
| 7 | 3 | Yes | 30 | N/A | Alkaline Digestion | N/A | KOH/MeOH | 480 |
| 8 | 1 g | Yes | 30 | | 200mM NaOH in methanol, then extraction with acetonitrile. | | ACN | 2 x 15 min |
| 9 | | | | | | | | |
| 10 | 5.51 | Yes | 30-60 | 15 mL reagent water acidified with 150µL formic acid added prior to extraction | QuEChERS | | ACN | 15 |
| 12 | 1.0631 | Yes | 30 | homogenize by vortex/stirring | Solid-Liquid Extraction (vortexed and centrifuged) | 3 (sonicate, vortex, centrifuge) | ACN | 90 |
| 13 | 5g | Yes | 30 | | QuEChERS | | ACN | 30 |

| Lab. Code | Sample Weight (g) | Labelled Standard(s) Added Before Extraction? | Equilibration Time for Labelled Standard (min) | Sample Pre-treatment, if other | Extraction Technique | Number of Steps (if staggered extraction) | Extraction Solvent(s) | Total Extraction Time (min) |
|---|---|---|---|---|---|---|---|---|
| 14* | 2 | Yes | 15 | NA | Solid-Liquid Extraction (vortexed and centrifuged) | NA | 2% formic acid in acetonitrile | 8 min |
| 15 | NA | NA | NA | NA | NA | NA | NA | NA |
| 16 | 1 | Yes | | | Alkaline Digestion | | NaOH/MeOH | 60 |
| 17 | 5 | Yes | | | QuEChERS | | ACN | 15 |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | NA | NA | NA | NA | NA | NA | NA | NA |
| 21 | | | | | | | | |

*Additional Information in Table 162.

Table 161 Participant Methodology – Sample S2 Carrot Sample Clean-Up and Concentration

| Lab. Code | Carbon Clean-Up? | Extract Concentration Temperature (°C) | Extract Concentration Time (min) | Clean-Up | Elution Solvent | Final pH Adjustment |
|---|---|---|---|---|---|---|
| 1 | Yes | N/A | N/A | Solid-Phase Extraction | Basic Methanol | Yes |
| 2 | NA | NA | NA | NA | NA | NA |
| 3 | No | 40 | 20 | None | Not Applicable | No |
| 4 | | | | | | |
| 5 | Yes | NA | NA | Filtration | N/A | |
| 6 | Yes | 55 | 180 | Solid-Phase Extraction | MeOH, 0.3% NH3 | Yes |
| 7 | Yes | 35 | 90 | Filtration | KOH/MeOH | No |
| 8 | Yes | Room temperature | | Liquid-liquid extraction with n-hexane, then Bond Elut Carbon SPE | MeOH | No |
| 9 | | | | | | |

| Lab. Code | Carbon Clean-Up? | Extract Concentration Temperature (°C) | Extract Concentration Time (min) | Clean-Up | Elution Solvent | Final pH Adjustment |
|---|---|---|---|---|---|---|
| 10 | Yes | 60 | 40-60 | Solid-Phase Extraction | NH4OH/MeOH | No |
| 12 | No | 40 | 60 | Solid-Phase Extraction | MeOH, 1% NH4OH in MeOH | No |
| 13 | Yes | 45 | 30 | Solid-Phase Extraction | Basic ACN and Acetone | No |
| 14 | Yes | 50°C | Variable | Carbon clean up using dSPE (C18, Envicarb, MgSO4) | Not Applicable | No |
| 15 | NA | NA | NA | NA | NA | NA |
| 16 | No | 30 | 60 | Solid-Phase Extraction | NH4OH/MeOH | No |
| 17 | No | NA | NA | DILUTION | | |
| 18 | | | | | | |
| 19 | | | | | | |
| 20 | NA | NA | NA | NA | NA | NA |
| 21 | | | | | | |

Table 162 Participant Methodology – Sample S2 Carrot Preparation, Extraction, Clean-Up and Concentration Additional Information

| Lab. Code | Additional Information |
|---|---|
| 14 | Extraction using Merris-Minimix shaker |

Table 163 Participant Methodology – Sample S2 Carrot Instrumental Technique

| Lab. Code | Instrument | Dilution Before Analysis and Dilution Factor | Blank Correction? | Additional Information |
|---|---|---|---|---|
| 1 | LC-MSMS or LC-QQQ | 5 | No | |
| 2 | NA | NA | NA | NA |
| 3 | LC-MSMS or LC-QQQ | No | No | |
| 4 | | | | |
| 5 | LC-MSMS or LC-QQQ | No | No | |

| Lab. Code | Instrument | Dilution Before Analysis and Dilution Factor | Blank Correction? | Additional Information |
|---|---|---|---|---|
| 6 | LC-MSMS or LC-QQQ | 1 | No | |
| 7 | LC-MSMS or LC-QQQ | No | No | N/A |
| 8 | LC-MSMS or LC-QQQ | No | No | |
| 9 | | | | |
| 10 | LC-MSMS or LC-QQQ | | No | C-18 LC column (3µm, 150mm x 2mm) |
| 12 | LC-MSMS or LC-QQQ | | Yes | |
| 13 | LC-MSMS or LC-QQQ | | No | |
| 14 | LC-MSMS or LC-QQQ | No | Yes | NA |
| 15 | NA | NA | NA | NA |
| 16 | LC-MSMS or LC-QQQ | | Yes | |
| 17 | LC-Orbitrap | 8 | Yes | |
| 18 | | | | |
| 19 | | | | |
| 20 | NA | NA | NA | NA |
| 21 | | | | |

Table 164 Participant Methodology – Sample S2 Carrot Labelled Standards

| Lab. Code | Labelled Standard Source | Recovery Correction? | Standard Method Used? | Additional Information |
|---|---|---|---|---|
| 1 | Wellington | Yes | No. In-house | |
| 2 | NA | NA | NA | NA |
| 3 | Wellington Laboratories | Yes | | |
| 4 | | | | |
| 5 | Accustandard and Wellington | Yes | USEPA 1633 | |
| 6 | Wellington | No | USEPA 1633 | |

| Lab. Code | Labelled Standard Source | Recovery Correction? | Standard Method Used? | Additional Information |
|---|---|---|---|---|
| 7 | Wellington | Yes | No | N/A |
| 8 | Wellington | Yes | Isotopic dilution | |
| 9 | | | | |
| 10 | Cambridge (FTS compounds); Wellington (remainder) | Yes | | |
| 12 | Wellington Laboratories | Yes | No | |
| 13 | Wellington. Cambridge Isotope laboratories | No | | |
| 14 | Wellington Laboratory | Yes | No | NA |
| 15 | NA | NA | NA | NA |
| 16 | Wellington | No | | |
| 17 | Wellington Laboratories | Yes | | |
| 18 | | | | |
| 19 | Wellington, Cambridge Isotopes | Yes | US FDA Foods Program Compendium of Analytical Laboratory Methods: Method C-010.03 | d5NN EtFOSAA added before instrument analysis |
| 20 | NA | NA | NA | NA |
| 21 | | Yes | | |

Table 165 Labelled Standards for Sample S2 Carrot PFBS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C3-PFBS | N/A |
| 2 | NA | NA |
| 3 | 13C3-PFBS | |
| 4 | | |
| 5 | Yes | No |
| 6 | M3PFBS | |
| 7 | 13C3 PFBS | |
| 8 | 13C3-PFBS | 13C3-PFHxS |
| 9 | | |
| 10 | yes | |
| 12 | 18O2-PFHxS | 18O2-PFOS |
| 13 | 13C3-PFBS | |
| 14 | M3PFBS | NA |
| 15 | NA | NA |
| 16 | 13C3-PFBS | |
| 17 | | Yes |
| 18 | | |
| 19 | M3 PFBS | |
| 20 | NA | NA |
| 21 | | |

Table 166 Labelled Standards for Sample S2 Carrot PFPeS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 18O2-PFHxS | N/A |
| 2 | NA | NA |
| 3 | 16O2-PFHxS | |
| 4 | | |
| 5 | No | No |
| 6 | | |
| 7 | 13C3 PFBS | |
| 8 | 18O2-PFHxS | 13C3-PFHxS |
| 9 | | |
| 10 | | |
| 12 | 18O2-PFHxS | 18O2-PFOS |
| 13 | N/A | |
| 14 | M5PFHxA | NA |
| 15 | NA | NA |
| 16 | 13C3-PFBS | |
| 17 | | |
| 18 | | |
| 19 | M3 PFHxS | |
| 20 | NA | NA |
| 21 | | |

Table 167 Labelled Standards for Sample S2 Carrot PFHxS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 18O2-PFHxS | N/A |
| 2 | NA | NA |
| 3 | 16O2-PFHxS | |
| 4 | | |
| 5 | Yes | Yes |
| 6 | M3PFHxS | |
| 7 | 13C3 PFHxS | PFHxS18O2 |
| 8 | 18O2-PFHxS | 13C3-PFHxS |
| 9 | | |
| 10 | | |
| 12 | | |
| 13 | 18O2-PFHxS | |
| 14 | M3PFHxS | NA |
| 15 | NA | NA |
| 16 | 13C3-PFHxS | |
| 17 | Yes | Yes |
| 18 | | |
| 19 | M3 PFHxS | |
| 20 | NA | NA |
| 21 | | |

Table 168 Labelled Standards for Sample S2 Carrot PFHxS (linear)

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 18O2-PFHxS | N/A |
| 2 | NA | NA |
| 3 | NT | |
| 4 | | |
| 5 | No | No |
| 6 | M3PFHxS | |
| 7 | 13C3 PFHxS | |
| 8 | 18O2-PFHxS | 13C3-PFHxS |
| 9 | | |
| 10 | yes | |
| 12 | 18O2-PFHxS | 18O2-PFOS |
| 13 | 18O2-PFHxS | |
| 14 | M3PFHxS | NA |
| 15 | NA | NA |
| 16 | 13C3-PFHxS | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | NA | NA |
| 21 | | |

Table 169 Labelled Standards for Sample S2 Carrot PFHpS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFOS | N/A |
| 2 | NA | NA |
| 3 | 13C8-PFOS | |
| 4 | | |
| 5 | No | No |
| 6 | | |
| 7 | 13C3 PFHxS | |
| 8 | 18O2-PFHxS | 13C3-PFHxS |
| 9 | | |
| 10 | | |
| 12 | 18O2-PFHxS | 18O2-PFOS |
| 13 | N/A | |
| 14 | M3PFHxS | NA |
| 15 | NA | NA |
| 16 | 13C3-PFHxS | |
| 17 | | |
| 18 | | |
| 19 | M3 PFHxS | |
| 20 | NA | NA |
| 21 | | |

Table 170 Labelled Standards for Sample S2 Carrot PFOS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFOS | N/A |
| 2 | NA | NA |
| 3 | 13C4-PFOS | |
| 4 | | |
| 5 | Yes | Yes |
| 6 | M8PFOS | MPFOS |
| 7 | 13C8 PFOS | 13C4 PFOS |
| 8 | 13C4-PFOS | 13C8-PFOS |
| 9 | | |
| 10 | | |
| 12 | 13C4-PFOS | 18O2-PFOS |
| 13 | 13C8-PFOS | |
| 14 | M8PFOS | NA |
| 15 | NA | NA |
| 16 | 13C8-PFOS | |
| 17 | Yes | Yes |
| 18 | | |
| 19 | 13C PFOS | |
| 20 | NA | NA |
| 21 | | |

Table 171 Labelled Standards for Sample S2 Carrot PFOS (linear)

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFOS | N/A |
| 2 | NA | NA |
| 3 | 13C8-PFOS | |
| 4 | | |
| 5 | No | No |
| 6 | M8PFOS | MPFOS |
| 7 | 13C8 PFOS | |
| 8 | 13C4-PFOS | 13C8-PFOS |
| 9 | | |
| 10 | yes | yes |
| 12 | 13C4-PFOS | 18O2-PFOS |
| 13 | 13C8-PFOS | |
| 14 | M8PFOS | NA |
| 15 | NA | NA |
| 16 | 13C8-PFOS | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | NA | NA |
| 21 | | |

Table 172 Labelled Standards for Sample S2 Carrot PFNS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFOS | N/A |
| 2 | NA | NA |
| 3 | 13C8-PFOS | |
| 4 | | |
| 5 | No | No |
| 6 | | |
| 7 | 13C8 PFOS | |
| 8 | 13C4-PFOS | 13C8-PFOS |
| 9 | | |
| 10 | | |
| 12 | 13C4-PFOS | 18O2-PFOS |
| 13 | N/A | |
| 14 | M8PFOS | NA |
| 15 | NA | NA |
| 16 | 13C8-PFOS | |
| 17 | | |
| 18 | | |
| 19 | 13C PFOS | |
| 20 | NA | NA |
| 21 | | |

Table 173 Labelled Standards for Sample S2 Carrot PFDS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFOS | N/A |
| 2 | NA | NA |
| 3 | 13C8-PFOS | |
| 4 | | |
| 5 | No | No |
| 6 | | |
| 7 | 13C8 PFOS | |
| 8 | 13C4-PFOS | 13C8-PFOS |
| 9 | | |
| 10 | | |
| 12 | 13C4-PFOS | 18O2-PFOS |
| 13 | N/A | |
| 14 | M8PFOS | NA |
| 15 | NA | NA |
| 16 | 13C8-PFOS | |
| 17 | | |
| 18 | | |
| 19 | 13C PFOS | |
| 20 | NA | NA |
| 21 | | |

Table 174 Labelled Standards for Sample S2 Carrot PFBA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFBA | N/A |
| 2 | NA | NA |
| 3 | 13C4-PFBA | |
| 4 | | |
| 5 | Yes | Yes |
| 6 | MPFBA | M3PFBA |
| 7 | 13C4 PFBA | 13C3 PFBA |
| 8 | 13C4-PFBA | 13C3-PFBA |
| 9 | | |
| 10 | yes | |
| 12 | 13C4-PFBA | 13C8-PFOA |
| 13 | 13C4-PFBA | |
| 14 | M4PFBA | NA |
| 15 | NA | NA |
| 16 | 13C4-PFBA | |
| 17 | | Yes |
| 18 | | |
| 19 | M3 PFBA | |
| 20 | NA | NA |
| 21 | | |

Table 175 Labelled Standards for Sample S2 Carrot PFPeA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C3-PFPeA | N/A |
| 2 | NA | NA |
| 3 | 13C5-PFPeA | |
| 4 | | |
| 5 | Yes | No |
| 6 | M5PFPeA | |
| 7 | 13C5 PFPeA | |
| 8 | 13C4-PFPeA | 13C5 -PFPeA |
| 9 | | |
| 10 | yes | |
| 12 | 13C5-PFPeA | 13C8-PFOA |
| 13 | 13C5-PFPeA | |
| 14 | M5PFPeA | NA |
| 15 | NA | NA |
| 16 | 13C5-PFPeA | |
| 17 | | Yes |
| 18 | | |
| 19 | M3 PFPeA | |
| 20 | NA | NA |
| 21 | | |

Table 176 Labelled Standards for Sample S2 Carrot PFHxA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C2-PFHxA | N/A |
| 2 | NA | NA |
| 3 | 13C5-PFHxA | |
| 4 | | |
| 5 | Yes | Yes |
| 6 | M5PFHxA | |
| 7 | 13C5 PFHxA | 13C2 PFHxA |
| 8 | 13C2-PFHxA | 13C5 -PFPeA |
| 9 | | |
| 10 | yes | |
| 12 | 13C5-PFHxA | 13C8-PFOA |
| 13 | 13C2-PFHxA | |
| 14 | M5PFHxA | NA |
| 15 | NA | NA |
| 16 | 13C5-PFHxA | |
| 17 | | Yes |
| 18 | | |
| 19 | M5 PFHxA | |
| 20 | NA | NA |
| 21 | | |

Table 177 Labelled Standards for Sample S2 Carrot PFHpA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFHpA | N/A |
| 2 | NA | NA |
| 3 | 13C4-PFHpA | |
| 4 | | |
| 5 | Yes | No |
| 6 | M4PFHpA | |
| 7 | 13C4 PFHpA | |
| 8 | 13C3-PFHpA | 13C8-PFOA |
| 9 | | |
| 10 | | |
| 12 | 13C4-PFHpA | 13C8-PFOA |
| 13 | 13C4-PFHpA | |
| 14 | MPFHpA | NA |
| 15 | NA | NA |
| 16 | 13C4-PFHpA | |
| 17 | | Yes |
| 18 | | |
| 19 | M5 PFHxA | |
| 20 | NA | NA |
| 21 | | |

Table 178 Labelled Standards for Sample S2 Carrot PFOA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFOA | N/A |
| 2 | NA | NA |
| 3 | 13C8-PFOA | |
| 4 | | |
| 5 | Yes | Yes |
| 6 | M8PFOA | M2PFOA |
| 7 | 13C8 PFOA | 13C4 PFOA |
| 8 | 13C4-PFOA | 13C8-PFOA |
| 9 | | |
| 10 | yes | yes |
| 12 | 13C4-PFOA | 13C8-PFOA |
| 13 | 13C8-PFOA | |
| 14 | M8PFOA | NA |
| 15 | NA | NA |
| 16 | 13C8-PFOA | |
| 17 | | Yes |
| 18 | | |
| 19 | 13C PFOA | |
| 20 | NA | NA |
| 21 | | |

Table 179 Labelled Standards for Sample S2 Carrot PFNA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C5-PFNA | N/A |
| 2 | NA | NA |
| 3 | 13C5-PFNA | |
| 4 | | |
| 5 | Yes | No |
| 6 | M9PFNA | |
| 7 | 13C9 PFNA | 13C5 PFNA |
| 8 | 13C5-PFNA | 13C8-PFOA |
| 9 | | |
| 10 | | |
| 12 | 13C9-PFNA | 13C5-PFNA |
| 13 | 13C5-PFNA | |
| 14 | M9PFNA | NA |
| 15 | NA | NA |
| 16 | 13C9-PFNA | |
| 17 | Yes | Yes |
| 18 | | |
| 19 | 13C PFOA | |
| 20 | NA | NA |
| 21 | | |

Table 180 Labelled Standards for Sample S2 Carrot PFDA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C2-PFDA | N/A |
| 2 | NA | NA |
| 3 | 13C6-PFDA | |
| 4 | | |
| 5 | Yes | Yes |
| 6 | M6PFDA | MPFDA |
| 7 | 13C6 PFDA | 13C2 PFDA |
| 8 | 13C2-PFDA | 13C8-PFOA |
| 9 | | |
| 10 | | |
| 12 | 13C2-PFDA | 13C5-PFNA |
| 13 | 13C6-PFDA | |
| 14 | M6PFDA | NA |
| 15 | NA | NA |
| 16 | 13C6-PFDA | |
| 17 | | Yes |
| 18 | | |
| 19 | 13C PFOA | |
| 20 | NA | NA |
| 21 | | |

Table 181 Labelled Standards for Sample S2 Carrot PFOSA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C8-FOSA | N/A |
| 2 | NA | NA |
| 3 | 13C8-FOSA | |
| 4 | | |
| 5 | Yes | No |
| 6 | M8-FOSA | |
| 7 | 13C8 PFOSA | |
| 8 | 13C8-FOSA | |
| 9 | | |
| 10 | yes | |
| 12 | 13C8-PFOSA | 13C2-PFTeDA |
| 13 | 13C8-FOSA | |
| 14 | MPFOSA | NA |
| 15 | NA | NA |
| 16 | | |
| 17 | | Yes |
| 18 | | |
| 19 | M8 FOSA | |
| 20 | NA | NA |
| 21 | | |

Table 182 Labelled Standards for Sample S2 Carrot MeFOSA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | D3-M PFOSA | N/A |
| 2 | NA | NA |
| 3 | d3-MeFOSA | |
| 4 | | |
| 5 | Yes | No |
| 6 | d-N-MeFOSA | |
| 7 | d3-N-MeFOSA | |
| 8 | D3-N-Me FOSA | |
| 9 | | |
| 10 | | |
| 12 | 13C8-PFOSA | 13C2-PFTeDA |
| 13 | d3-N-MeFOSA | |
| 14 | d-NMeFOSA-M | NA |
| 15 | NA | NA |
| 16 | | |
| 17 | | Yes |
| 18 | | |
| 19 | | |
| 20 | NA | NA |
| 21 | | |

Table 183 Labelled Standards for Sample S2 Carrot EtFOSA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | D5-E PFOSA | N/A |
| 2 | NA | NA |
| 3 | d5-EtFOSA | |
| 4 | | |
| 5 | Yes | No |
| 6 | d-N-EtFOSA | |
| 7 | d5-N-EtFOSA | |
| 8 | D5-N-Et FOSA | |
| 9 | | |
| 10 | | |
| 12 | 13C8-PFOSA | 13C2-PFTeDA |
| 13 | d5-N-EtFOSA | |
| 14 | d-NEtFOSA-M | NA |
| 15 | NA | NA |
| 16 | | |
| 17 | | Yes |
| 18 | | |
| 19 | | |
| 20 | NA | NA |
| 21 | | |

Table 184 Labelled Standards for Sample S2 Carrot 6:2FTS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C2,12C6 6:2-FTS | N/A |
| 2 | NA | NA |
| 3 | 13C2-6:2 FTS | |
| 4 | | |
| 5 | Yes | No |
| 6 | M2-6:2FTS | |
| 7 | 13C2 6:2 FTS | |
| 8 | 13C2-6:2 FTS | |
| 9 | | |
| 10 | | |
| 12 | 13C2-6:2 FTS | 13C2-8:2 FTS |
| 13 | 13C2-6-2 FTS | |
| 14 | M6:2 FTS | NA |
| 15 | NA | NA |
| 16 | | |
| 17 | | Yes |
| 18 | | |
| 19 | 13C2D4 6:2 FTS | |
| 20 | NA | NA |
| 21 | | |

Table 185 Labelled Standards for Sample S2 Carrot GenX

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C312C3HF11O3 | N/A |
| 2 | NA | NA |
| 3 | M3HFPO-DA | |
| 4 | | |
| 5 | No | No |
| 6 | | |
| 7 | 13C3 HFPO-DA | |
| 8 | 13C3-GenX | |
| 9 | | |
| 10 | yes | |
| 12 | 13C2-GenX | 13C8-PFOA |
| 13 | 13C3-GenX | |
| 14 | M3HFPO-DA | NA |
| 15 | NA | NA |
| 16 | 13C3-HFPODA | |
| 17 | | |
| 18 | | |
| 19 | M3 HFPO | |
| 20 | NA | NA |
| 21 | | |

Table 186 Labelled Standards for Sample S2 Carrot ADONA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | 13C4-PFHpA | N/A |
| 2 | NA | NA |
| 3 | 13C4-PFHpA | |
| 4 | | |
| 5 | No | No |
| 6 | | |
| 7 | 13C3 HFPO-DA | |
| 8 | 13C3-PFHpA | 13C8-PFOA |
| 9 | | |
| 10 | | |
| 12 | NT | NT |
| 13 | N/A | |
| 14 | MPFHpA | NA |
| 15 | NA | NA |
| 16 | 13C8-PFOA | |
| 17 | | |
| 18 | | |
| 19 | 13C PFOA | |
| 20 | NA | NA |
| 21 | | |

### A4.3 Sample S3 Milk Powder Methodology

Table 187 Participant Methodology – Sample S3 Milk Powder Sample Preparation and Extraction

| Lab. Code | Sample Weight (g) | Labelled Standard(s) Added Before Extraction? | Equilibration Time for Labelled Standard (min) | Sample Pre-treatment, if other | Extraction Technique | Number of Steps (if staggered extraction) | Extraction Solvent(s) | Total Extraction Time (min) |
|---|---|---|---|---|---|---|---|---|
| 1 | NA | NA | NA | NA | NA | NA | NA | NA |
| 2 | NA | NA | NA | NA | NA | NA | NA | NA |
| 3 | NA | NA | NA | NA | NA | NA | NA | NA |
| 4 | NA | NA | NA | NA | NA | NA | NA | NA |
| 5 | NA | NA | NA | NA | NA | NA | NA | NA |
| 6 | NA | NA | NA | NA | NA | NA | NA | NA |
| 7 | 3 | Yes | 30 | N/A | Alkaline Digestion | N/A | KOH/MeOH | 480 |
| 8 | 0.5 g | Yes | 30 | | Digestion with 200mM NaOH in methanol, then extraction with acetonitrile. | | ACN | 2 x 15 min |
| 9 | NA | NA | NA | NA | NA | NA | NA | NA |
| 10 | 1.07 | Yes | 30-60 | 15 mL reagent water acidified with 150µL formic acid added prior to extraction | QuEChERS | | ACN | 15 |
| 12 | 1.0441 | Yes | 30 | homogenize by vortex/stirring | Solid-Liquid Extraction (vortexed and centrifuged) | 3 (sonicate, vortex, centrifuge) | ACN | 90 |
| 13 | 5g | Yes | 30 | | QuEChERS | | ACN | 30 |
| 14* | 1 | Yes | 15 | NA | Solid-Liquid Extraction (vortexed and centrifuged) | 2 | ACN | 8 min |
| 15* | 2 g | Yes | 10 min | Add 10 mL of nanopure water | QuEChERS | | ACN | 5 min |

| Lab. Code | Sample Weight (g) | Labelled Standard(s) Added Before Extraction? | Equilibration Time for Labelled Standard (min) | Sample Pre-treatment, if other | Extraction Technique | Number of Steps (if staggered extraction) | Extraction Solvent(s) | Total Extraction Time (min) |
|---|---|---|---|---|---|---|---|---|
| 16 | 0.3 | Yes | | | Alkaline Digestion | | NaOH/MeOH | 60 |
| 17 | 5 | Yes | | | QuEChERS | | ACN | 15 |
| 18 | NA | NA | NA | NA | NA | NA | NA | NA |
| 19 | | | | | | | | |
| 20 | NA | NA | NA | NA | NA | NA | NA | NA |
| 21 | 5 gram | Yes | 5 min | | QuEChERS | | acetonitrile | |

*Additional Information in Table 189.

Table 188 Participant Methodology – Sample S3 Milk Powder Sample Clean-Up and Concentration

| Lab. Code | Carbon Clean-Up? | Extract Concentration Temperature (°C) | Extract Concentration Time (min) | Clean-Up | Elution Solvent | Final pH Adjustment |
|---|---|---|---|---|---|---|
| 1 | NA | NA | NA | NA | NA | NA |
| 2 | NA | NA | NA | NA | NA | NA |
| 3 | NA | NA | NA | NA | NA | NA |
| 4 | NA | NA | NA | NA | NA | NA |
| 5 | NA | NA | NA | NA | NA | NA |
| 6 | NA | NA | NA | NA | NA | NA |
| 7 | Yes | 35 | 90 | Filtration | KOH/MeOH | No |
| 8 | Yes | Room temperature | | Liquid-liquid extraction with n-hexane, then Bond Elut Carbon SPE | MeOH | No |
| 9 | NA | NA | NA | NA | NA | NA |
| 10 | Yes | 60 | 40-60 | Solid-Phase Extraction | NH4OH/MeOH | No |
| 12 | No | 40 | 60 | Solid-Phase Extraction | MeOH, 1% NH4OH in MeOH | No |

| Lab. Code | Carbon Clean-Up? | Extract Concentration Temperature (°C) | Extract Concentration Time (min) | Clean-Up | Elution Solvent | Final pH Adjustment |
|---|---|---|---|---|---|---|
| 13 | Yes | 45 | 30 | Solid-Phase Extraction | Basic ACN and Acetone | No |
| 14 | No | 50°C | Variable | None | Not Applicable | No |
| 15* | No | 60 C | unknown | Solid-Phase Extraction | ACN | No |
| 16 | No | 30 | 60 | Solid-Phase Extraction | NH4OH/MeOH | No |
| 17 | No | NA | NA | DILUTION | | |
| 18 | NA | NA | NA | NA | NA | NA |
| 19 | | | | | | |
| 20 | NA | NA | NA | NA | NA | NA |
| 21 | | | | EMR cartridge | | |

*Additional Information in Table 189.

Table 189 Participant Methodology – Sample S3 Milk Powder Preparation, Extraction, Clean-Up and Concentration Additional Information

| Lab. Code | Additional Information |
|---|---|
| 14 | Extraction using horizontal shaker; hexane wash for fat removal |
| 15 | An EMR II cartridge from Agilent is used but it is a flow through cartridge so the analytes come out in the ACN that was with the sample loaded on the cartridge. Concentration step from ~5 mL to ~0.2 mL then brought up to 1 mL with MeOH |

Table 190 Participant Methodology – Sample S3 Milk Powder Instrumental Technique

| Lab. Code | Instrument | Dilution Before Analysis and Dilution Factor | Blank Correction? | Additional Information |
|---|---|---|---|---|
| 1 | NA | NA | NA | NA |
| 2 | NA | NA | NA | NA |
| 3 | NA | NA | NA | NA |
| 4 | NA | NA | NA | NA |

| Lab. Code | Instrument | Dilution Before Analysis and Dilution Factor | Blank Correction? | Additional Information |
|---|---|---|---|---|
| 5 | NA | NA | NA | NA |
| 6 | NA | NA | NA | NA |
| 7 | LC-MSMS or LC-QQQ | No | No | N/A |
| 8 | LC-MSMS or LC-QQQ | No | No | |
| 9 | NA | NA | NA | NA |
| 10 | LC-MSMS or LC-QQQ | | No | C-18 LC column (3µm, 150mm x 2mm) |
| 12 | LC-MSMS or LC-QQQ | | Yes | |
| 13 | LC-MSMS or LC-QQQ | | No | |
| 14 | LC-MSMS or LC-QQQ | No | Yes | NA |
| 15 | LC-MSMS or LC-QQQ | | No | Cholic acids are separated chromatographically from PFOS isomers. A PFP column utilizing 10 mM Am Acetate in water and 10 mM Am Acetate in MeOH was used to chromatographically separate analytes over 20 min. |
| 16 | LC-MSMS or LC-QQQ | | Yes | |
| 17 | LC-Orbitrap | 8 | Yes | |
| 18 | NA | NA | NA | NA |
| 19 | | | | |
| 20 | NA | NA | NA | NA |
| 21 | Sciex 7500 | no | Yes | |

Table 191 Participant Methodology – Sample S3 Milk Powder Labelled Standards

| Lab. Code | Labelled Standard Source | Recovery Correction? | Standard Method Used? | Additional Information |
|---|---|---|---|---|
| 1 | NA | NA | NA | NA |
| 2 | NA | | NA | NA |
| 3 | NA | NA | NA | NA |

| Lab. Code | Labelled Standard Source | Recovery Correction? | Standard Method Used? | Additional Information |
|---|---|---|---|---|
| 4 | NA | NA | NA | NA |
| 5 | NA | NA | NA | NA |
| 6 | NA | NA | NA | NA |
| 7 | Wellington | Yes | No | N/A |
| 8 | Wellington | Yes | Isotopic dilution | |
| 9 | NA | NA | NA | NA |
| 10 | Cambridge (FTS compounds); Wellington (remainder) | Yes | | |
| 12 | Wellington Laboratories | Yes | No | |
| 13 | Wellington. Cambridge Isotope laboratories | No | | |
| 14 | Wellington Laboratory | Yes | No | NA |
| 15 | Wellington, Cambridge Isotope | Yes | Isotope Dilution; Not currently a standard method | If a labelled standard wasn't available for an analyte, then an appropriate one was selected from those analysed for recovery correction purposes. |
| 16 | Wellington | No | | |
| 17 | Wellington Laboratories | Yes | | |
| 18 | NA | NA | NA | NA |
| 19 | Wellington, Cambridge Isotopes | Yes | US FDA Foods Program Compendium of Analytical Laboratory Methods: Method C-010.03 | d5NN EtFOSAA added before instrument analysis |
| 20 | NA | | NA | NA |
| 21 | Wellington, Cambridge Isotopes | Yes | New method in development | M4 PFOA added before instrument analysis |

Table 192 Labelled Standards for Sample S3 Milk Powder PFBS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C3 PFBS | |
| 8 | 13C3-PFBS | 13C3-PFHxS |
| 9 | NA | NA |
| 10 | yes | |
| 12 | 18O2-PFHxS | 18O2-PFOS |
| 13 | 13C3-PFBS | |
| 14 | M3PFBS | NA |
| 15 | x | |
| 16 | 13C3-PFBS | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | M3 PFBS | |
| 20 | NA | NA |
| 21 | M3 PFBS | |

Table 193 Labelled Standards for Sample S3 Milk Powder PFPeS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C3 PFBS | |
| 8 | 18O2-PFHxS | 13C3-PFHxS |
| 9 | NA | NA |
| 10 | | |
| 12 | 18O2-PFHxS | 18O2-PFOS |
| 13 | N/A | |
| 14 | M5PFHxA | NA |
| 15 | | |
| 16 | 13C3-PFBS | |
| 17 | | |
| 18 | NA | NA |
| 19 | M3 PFHxS | |
| 20 | NA | NA |
| 21 | M3 PFHxS | |

Table 194 Labelled Standards for Sample S3 Milk Powder PFHxS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C3 PFHxS | PFHxS18O2 |
| 8 | 18O2-PFHxS | 13C3-PFHxS |
| 9 | NA | NA |
| 10 | | |
| 12 | | |
| 13 | 18O2-PFHxS | |
| 14 | M3PFHxS | NA |
| 15 | | |
| 16 | 13C3-PFHxS | |
| 17 | Yes | Yes |
| 18 | NA | NA |
| 19 | M3 PFHxS | |
| 20 | NA | NA |
| 21 | M3 PFHxS | |

Table 195 Labelled Standards for Sample S3 Milk Powder PFHxS (linear)

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C3 PFHxS | |
| 8 | 18O2-PFHxS | 13C3-PFHxS |
| 9 | NA | NA |
| 10 | yes | |
| 12 | 18O2-PFHxS | 18O2-PFOS |
| 13 | 18O2-PFHxS | |
| 14 | M3PFHxS | NA |
| 15 | x | |
| 16 | 13C3-PFHxS | |
| 17 | | |
| 18 | NA | NA |
| 19 | | |
| 20 | NA | NA |
| 21 | | |

Table 196 Labelled Standards for Sample S3 Milk Powder PFHpS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C3 PFHxS | |
| 8 | 18O2-PFHxS | 13C3-PFHxS |
| 9 | NA | NA |
| 10 | | |
| 12 | 18O2-PFHxS | 18O2-PFOS |
| 13 | N/A | |
| 14 | M3PFHxS | NA |
| 15 | | |
| 16 | 13C3-PFHxS | |
| 17 | | |
| 18 | NA | NA |
| 19 | M3 PFHxS | |
| 20 | NA | NA |
| 21 | M3 PFHxS | |

Table 197 Labelled Standards for Sample S3 Milk Powder PFOS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C8 PFOS | 13C4 PFOS |
| 8 | 13C4-PFOS | 13C8-PFOS |
| 9 | NA | NA |
| 10 | | |
| 12 | 13C4-PFOS | 18O2-PFOS |
| 13 | 13C8-PFOS | |
| 14 | M8PFOS | NA |
| 15 | | |
| 16 | 13C8-PFOS | |
| 17 | Yes | Yes |
| 18 | NA | NA |
| 19 | 13C PFOS | |
| 20 | NA | NA |
| 21 | 13C PFOS | |

Table 198 Labelled Standards for Sample S3 Milk Powder PFOS (linear)

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C8 PFOS | |
| 8 | 13C4-PFOS | 13C8-PFOS |
| 9 | NA | NA |
| 10 | yes | yes |
| 12 | 13C4-PFOS | 18O2-PFOS |
| 13 | 13C8-PFOS | |
| 14 | M8PFOS | NA |
| 15 | x | x |
| 16 | 13C8-PFOS | |
| 17 | | |
| 18 | NA | NA |
| 19 | | |
| 20 | NA | NA |
| 21 | | |

Table 199 Labelled Standards for Sample S3 Milk Powder PFNS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C8 PFOS | |
| 8 | 13C4-PFOS | 13C8-PFOS |
| 9 | NA | NA |
| 10 | | |
| 12 | 13C4-PFOS | 18O2-PFOS |
| 13 | N/A | |
| 14 | M8PFOS | NA |
| 15 | | |
| 16 | 13C8-PFOS | |
| 17 | | |
| 18 | NA | NA |
| 19 | 13C PFOS | |
| 20 | NA | NA |
| 21 | 13C PFOS | |

Table 200 Labelled Standards for Sample S3 Milk Powder PFDS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C8 PFOS | |
| 8 | 13C4-PFOS | 13C8-PFOS |
| 9 | NA | NA |
| 10 | | |
| 12 | 13C4-PFOS | 18O2-PFOS |
| 13 | N/A | |
| 14 | M8PFOS | NA |
| 15 | | |
| 16 | 13C8-PFOS | |
| 17 | | |
| 18 | NA | NA |
| 19 | 13C PFOS | |
| 20 | NA | NA |
| 21 | 13C PFOS | |

Table 201 Labelled Standards for Sample S3 Milk Powder PFBA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C4 PFBA | 13C3 PFBA |
| 8 | 13C4-PFBA | 13C3-PFBA |
| 9 | NA | NA |
| 10 | yes | |
| 12 | 13C4-PFBA | 13C8-PFOA |
| 13 | 13C4-PFBA | |
| 14 | M4PFBA | NA |
| 15 | x | |
| 16 | 13C4-PFBA | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | M3 PFBA | |
| 20 | NA | NA |
| 21 | M3 PFBA | |

Table 202 Labelled Standards for Sample S3 Milk Powder PFPeA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C5 PFPeA | |
| 8 | 13C4-PFPeA | 13C5 -PFPeA |
| 9 | NA | NA |
| 10 | yes | |
| 12 | 13C5-PFPeA | 13C8-PFOA |
| 13 | 13C5-PFPeA | |
| 14 | M5PFPeA | NA |
| 15 | x | |
| 16 | 13C5-PFPeA | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | M3 PFPeA | |
| 20 | NA | NA |
| 21 | M3 PFPeA | |

Table 203 Labelled Standards for Sample S3 Milk Powder PFHxA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C5 PFHxA | 13C2 PFHxA |
| 8 | 13C2-PFHxA | 13C5 -PFPeA |
| 9 | NA | NA |
| 10 | yes | |
| 12 | 13C5-PFHxA | 13C8-PFOA |
| 13 | 13C2-PFHxA | |
| 14 | M5PFHxA | NA |
| 15 | x | |
| 16 | 13C5-PFHxA | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | M5 PFHxA | |
| 20 | NA | NA |
| 21 | M5 PFHxA | |

Table 204 Labelled Standards for Sample S3 Milk Powder PFHpA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C4 PFHpA | |
| 8 | 13C3-PFHpA | 13C8-PFOA |
| 9 | NA | NA |
| 10 | | |
| 12 | 13C4-PFHpA | 13C8-PFOA |
| 13 | 13C4-PFHpA | |
| 14 | MPFHpA | NA |
| 15 | x | |
| 16 | 13C4-PFHpA | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | M5 PFHxA | |
| 20 | NA | NA |
| 21 | M4 PFHpA | |

Table 205 Labelled Standards for Sample S3 Milk Powder PFOA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C8 PFOA | 13C4 PFOA |
| 8 | 13C4-PFOA | 13C8-PFOA |
| 9 | NA | NA |
| 10 | yes | yes |
| 12 | 13C4-PFOA | 13C8-PFOA |
| 13 | 13C8-PFOA | |
| 14 | M8PFOA | NA |
| 15 | x | x |
| 16 | 13C8-PFOA | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | 13C PFOA | |
| 20 | NA | NA |
| 21 | 13C PFOA | |

Table 206 Labelled Standards for Sample S3 Milk Powder PFNA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C9 PFNA | 13C5 PFNA |
| 8 | 13C5-PFNA | 13C8-PFOA |
| 9 | NA | NA |
| 10 | | |
| 12 | 13C9-PFNA | 13C5-PFNA |
| 13 | 13C5-PFNA | |
| 14 | M9PFNA | NA |
| 15 | x | |
| 16 | 13C9-PFNA | |
| 17 | Yes | Yes |
| 18 | NA | NA |
| 19 | 13C PFOA | |
| 20 | NA | NA |
| 21 | M5 PFNA | |

Table 207 Labelled Standards for Sample S3 Milk Powder PFDA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C6 PFDA | 13C2 PFDA |
| 8 | 13C2-PFDA | 13C8-PFOA |
| 9 | NA | NA |
| 10 | | |
| 12 | 13C2-PFDA | 13C5-PFNA |
| 13 | 13C6-PFDA | |
| 14 | M6PFDA | NA |
| 15 | x | |
| 16 | 13C6-PFDA | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | 13C PFOA | |
| 20 | NA | NA |
| 21 | M2 PFDA | |

Table 208 Labelled Standards for Sample S3 Milk Powder PFUdA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C7 PFUnA | |
| 8 | 13C2-PFUdA | 13C8-PFOA |
| 9 | NA | NA |
| 10 | yes | yes |
| 12 | 13C2-PFUdA | 13C5-PFNA |
| 13 | 13C2-PFUnA | |
| 14 | M7PFUnDA | NA |
| 15 | x | |
| 16 | 13C7-PFUnA | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | MPFUdA | |
| 20 | NA | NA |
| 21 | MPFUdA | |

Table 209 Labelled Standards for Sample S3 Milk Powder PFDoA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C2 PFDoA | |
| 8 | 13C2-PFDoA | 13C8-PFOA |
| 9 | NA | NA |
| 10 | yes | |
| 12 | 13C2-PFDoA | 13C5-PFNA |
| 13 | 13C2-PFDoA | |
| 14 | MPFDoDA | NA |
| 15 | x | |
| 16 | 13C2-PFDoA | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | MPFDoA | |
| 20 | NA | NA |
| 21 | MPFDoA | |

Table 210 Labelled Standards for Sample S3 Milk Powder PFTrDA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C2 PFDoA | |
| 8 | 13C2-PFDoA | 13C8-PFOA |
| 9 | NA | NA |
| 10 | | |
| 12 | 13C2-PFHxDA | 13C2-PFTeDA |
| 13 | N/A | |
| 14 | MPFDoDA | NA |
| 15 | | |
| 16 | 13C2-PFDoA | |
| 17 | | |
| 18 | NA | NA |
| 19 | MPFDoA | |
| 20 | NA | NA |
| 21 | MPFDoA | |

Table 211 Labelled Standards for Sample S3 Milk Powder PFTeDA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C2 PFTeDA | |
| 8 | 13C2-PFTeDA | 13C8-PFOA |
| 9 | NA | NA |
| 10 | yes | |
| 12 | 13C2-PFHxDA | 13C2-PFTeDA |
| 13 | 13C2-PFTeDA | |
| 14 | MPFTeDA | NA |
| 15 | x | |
| 16 | 13C2-PFTeDA | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | MPFTeDA | |
| 20 | NA | NA |
| 21 | MPFTeDA | |

Table 212 Labelled Standards for Sample S3 Milk Powder MeFOSAA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | d3-N-MeFOSAA | |
| 8 | D3-N-Me FOSAA | |
| 9 | NA | NA |
| 10 | | |
| 12 | d3-MeFOSAA | d5-EtFOSAA |
| 13 | d3-N-MeFOSAA | |
| 14 | d3-NMeFOSAA | NA |
| 15 | | |
| 16 | | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | | |
| 20 | NA | NA |
| 21 | | |

Table 213 Labelled Standards for Sample S3 Milk Powder EtFOSAA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | d5-N-EtFOSAA | |
| 8 | D5-N-Et FOSAA | |
| 9 | NA | NA |
| 10 | | yes |
| 12 | d3-MeFOSAA | d5-EtFOSAA |
| 13 | d5-NEtFOSAA | |
| 14 | d5-NEtFOSAA | NA |
| 15 | | |
| 16 | | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | | |
| 20 | NA | NA |
| 21 | | |

Table 214 Labelled Standards for Sample S3 Milk Powder 10:2FTS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C2 8:2 FTS | |
| 8 | 13C2-8:2 FTS | |
| 9 | NA | NA |
| 10 | yes | |
| 12 | NT | NT |
| 13 | 13C2-10-2 FTS | |
| 14 | MPFDoDA | NA |
| 15 | x | |
| 16 | | |
| 17 | | Yes |
| 18 | NA | NA |
| 19 | 13C2D4 10:2 FTS | |
| 20 | NA | NA |
| 21 | 13C2D4 10:2 FTS | |

Table 215 Labelled Standards for Sample S3 Milk Powder GenX

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C3 HFPO-DA | |
| 8 | 13C3-GenX | |
| 9 | NA | NA |
| 10 | yes | |
| 12 | 13C2-GenX | 13C8-PFOA |
| 13 | 13C3-GenX | |
| 14 | M3HFPO-DA | NA |
| 15 | x | |
| 16 | 13C3-HFPODA | |
| 17 | | |
| 18 | NA | NA |
| 19 | M3 HFPO | |
| 20 | NA | NA |
| 21 | M3 HFPO | |

Table 216 Labelled Standards for Sample S3 Milk Powder ADONA

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C3 HFPO-DA | |
| 8 | 13C3-PFHpA | 13C8-PFOA |
| 9 | NA | NA |
| 10 | | |
| 12 | NT | NT |
| 13 | N/A | |
| 14 | MPFHpA | NA |
| 15 | | |
| 16 | 13C8-PFOA | |
| 17 | | |
| 18 | NA | NA |
| 19 | 13C PFOA | |
| 20 | NA | NA |
| 21 | 13C PFOA | |

Table 217 Labelled Standards for Sample S3 Milk Powder 9Cl-PF3ONS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C3 HFPO-DA | |
| 8 | 13C4-PFOS | 13C8-PFOS |
| 9 | NA | NA |
| 10 | | |
| 12 | NT | NT |
| 13 | N/A | |
| 14 | M8PFOS | NA |
| 15 | | |
| 16 | 13C8-PFOS | |
| 17 | | |
| 18 | NA | NA |
| 19 | 13C PFOS | |
| 20 | NA | NA |
| 21 | 13C PFOS | |

Table 218 Labelled Standards for Sample S3 Milk Powder 11Cl-PF3OUdS

| Lab. Code | Before Extraction | Before Instrument Analysis |
|---|---|---|
| 1 | NA | NA |
| 2 | NA | NA |
| 3 | NA | NA |
| 4 | NA | NA |
| 5 | NA | NA |
| 6 | NA | NA |
| 7 | 13C3 HFPO-DA | |
| 8 | 13C4-PFOS | 13C8-PFOS |
| 9 | NA | NA |
| 10 | | |
| 12 | NT | NT |
| 13 | N/A | |
| 14 | MPFDoDA | NA |
| 15 | | |
| 16 | 13C8-PFOS | |
| 17 | | |
| 18 | NA | NA |
| 19 | 13C PFOS | |
| 20 | NA | NA |
| 21 | 13C PFOS | |

## APPENDIX 5 ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| 3:3FTCA | 3-Perfluoropropyl propanoic acid |
| 4:2FTS | 4:2 Fluorotelomer sulfonate |
| 5:3FTCA | 2H,2H,3H,3H-Perfluorooctanoic acid |
| 6:2FTS | 6:2 Fluorotelomer sulfonate |
| 7:3FTCA | 3-Perfluoroheptyl propanoic acid |
| 8:2diPAP | Bis[2-(perfluorooctyl)ethyl] phosphate |
| 8:2FTS | 8:2 Fluorotelomer sulfonate |
| 9Cl-PF3ONS | 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate |
| 10:2FTS | 10:2 Fluorotelomer sulfonate |
| 11Cl-PF3OUdS | 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate |
| ACE | Acetone |
| ACN | Acetonitrile |
| ADONA | 4,8-dioxa-3H-perfluorononanoate |
| AV | Assigned Value |
| CITAC | Cooperation on International Traceability in Analytical Chemistry |
| CRM | Certified Reference Material |
| CV | Coefficient of Variation |
| dSPE | Dispersive SPE |
| EtFOSA | N-Ethyl perfluorooctane sulfonamide |
| EtFOSAA | N-Ethyl perfluorooctane sulfonamido acetic acid |
| EtFOSE | N-Ethyl perfluorooctane sulfonamido ethanol |
| Fluoroether E-1 | Heptafluoropropyl 1,2,2,2-tetrafluoroethyl ether |
| FOUEA | 2H-Perfluoro-2-decenoic acid |
| FSANZ | Food Standards Australia New Zealand |
| GAG | General Accreditation Guidance (NATA) |
| GenX | 2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid |
| GUM | Guide to the Expression of Uncertainty in Measurement |
| HV | Homogeneity Value |
| IEC | International Electrotechnical Commission |
| ISO | International Organization for Standardization |
| k | Coverage factor |
| LC | Liquid Chromatography |
| LOR | Limit of Reporting |
| Max | Maximum |

| | |
|---|---|
| Md | Median |
| MeFOSA | N-Methyl perfluorooctane sulfonamide |
| MeFOSAA | N-Methyl perfluorooctane sulfonamido acetic acid |
| MeFOSE | N-Methyl perfluorooctane sulfonamido ethanol |
| MeOH | Methanol |
| Min | Minimum |
| MS | Mass Spectrometry |
| MS/MS | Tandem MS |
| MTBE | Methyl tert-butyl ether |
| MU | Measurement Uncertainty |
| N | Number of numeric results |
| NA | Not Applicable |
| NATA | National Association of Testing Authorities, Australia |
| NFDHA | Nonafluoro-3,6-dioxaheptanoic acid |
| NMIA | National Measurement Institute, Australia |
| NR | Not Reported |
| NS | Not Supplied |
| NT | Not Tested |
| PCV | Performance Coefficient of Variation |
| PFAA | Perfluoroalkyl acid |
| PFAS | Per- and polyfluoroalkyl Substances |
| PFBA | Perfluorobutanoic acid |
| PFBS | Perfluorobutane sulfonate |
| PFCA | Perfluoroalkyl carboxylic acid |
| PFDA | Perfluorodecanoic acid |
| PFDoA | Perfluorododecanoic acid |
| PFDoS | Perfluorododecane sulfonate |
| PFDS | Perfluorodecane sulfonate |
| PFECA | Per- and polyfluoroether carboxylic acid |
| PFEESA | Perfluoro(2-ethoxyethane) sulfonic acid |
| PFESA | Per- and polyfluoroether sulfonate |
| PFHpA | Perfluoroheptanoic acid |
| PFHpS | Perfluoroheptane sulfonate |
| PFHxA | Perfluorohexanoic acid |
| PFHxDA | Perfluorohexadecanoic acid |

| | |
|---|---|
| PFHxS | Perfluorohexane sulfonate |
| PFMBA | Perfluoro-4-methoxybutanoic acid |
| PFMPA | Perfluoro-3-methoxypropanoic acid |
| PFNA | Perfluorononanoic acid |
| PFNS | Perfluorononane sulfonate |
| PFOA | Perfluorooctanoic acid |
| PFODA | Perfluorooctadecanoic acid |
| PFOS | Perfluorooctane sulfonate |
| PFOSA | Perfluorooctane sulfonamide |
| PFPeA | Perfluoropentanoic acid |
| PFPeS | Perfluoropentane sulfonate |
| PFSA | Perfluoroalkane sulfonate |
| PFTeDA | Perfluorotetradecanoic acid |
| PFTrDA | Perfluorotridecanoic acid |
| PFTrDS | Perfluorotridecane sulfonate |
| PFUdA | Perfluoroundecanoic acid |
| PFUdS | Perfluoroundecane sulfonate |
| PT | Proficiency Testing |
| QQQ | Triple Quadrupole MS |
| QuEChERS | Quick, Easy, Cheap, Effective, Rugged and Safe extraction method |
| RA | Robust Average |
| Rec | Recovery |
| RM | Reference Material |
| $s_{an}$ | Analytical standard deviation |
| SD | Standard Deviation |
| SI | International System of Units |
| SLE | Solid-Liquid Extraction |
| SPE | Solid-Phase Extraction |
| SS | Spiked Samples |
| $s_{sam}$ | Between-sample standard deviation |
| SV | Spiked Value (or formulated concentration of a PT sample) |
| UPLC | Ultra Performance Liquid Chromatography |
| USEPA | United States Environmental Protection Agency |

**END OF REPORT**