Risk assessment of PFAS and PBDEs in FOGO and GO composts (2020-21)

Department of Planning and Environment

NSW GOVERNMENT

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Contents

List of tables

List of figures

Executive summary

In December 2020 and January 2021, the NSW Environment Protection Authority (EPA) conducted a sampling campaign of 21 facilities producing food organic and garden organic (FOGO) compost, garden organic (GO) compost or dehydrated food waste. The EPA had samples from these facilities analysed for a wide range of contaminants, including per and polyfluoroalkyl substances (PFAS) and polybrominated diphenyl ethers (PBDEs).

The EPA provided the PFAS and PBDE data to the Environment, Energy and Science Group[1], Contaminants and Risk Team (C&R) of the NSW Department of Planning and Environment to undertake a risk assessment considering the following potential land application scenarios:

- Scenario 1 – surface application (no incorporation)
- Scenario 2 – incorporation into the top 2 cm of soil (assumes cattle movements trample material into the surface soil layer)
- Scenario 3 – incorporated into the top 10 cm of soil (assumes mechanical incorporation).

The risk assessment conducted by C&R focused on the following PFAS and PBDEs:

- the sum of perfluorooctane sulfonate (PFOS) and perfluorohexane sulfonate (PFHxS) (**PFOS+PFHxS**)
- the sum of perfluorooctanoic acid (PFOA) and perfluorohexanoic acid (PFHxA) (**PFOA+PFHxA**)
- the sum of PBDEs that are not fully brominated (**Br1–Br9**)
- the fully brominated PBDE, deca-BDE (**Br10**).

For all compounds, there were significant differences in concentrations across the facilities sampled. In addition, in some cases (i.e. PFOA, PFHxA, Br1–Br9 and Br10), the data suggested that the concentrations were different between the FOGO and GO samples. For PBDEs, there was one facility (Facility O) (producing GO) that had considerably elevated concentrations compared to the other facilities.

C&R conducted a risk assessment focusing on key exposure pathways of egg, meat and milk consumption. The assessment used a risk quotient (RQ) approach, where a value above 1 indicates that the estimated daily intake of a contaminant is above a toxicity reference value (i.e. considered the limit of a ‘safe’ dose). Where this is the case there may be an unacceptable risk and further investigation, management requirements or refinement of the risk assessment is recommended.

C&R’s key conclusions and recommendations were:

- Comparison of FOGO and GO data suggests there may be sources of PFOA, PFHxA, Br1–Br9 and Br10 entering the FOGO waste stream that are not present in the GO waste stream.
- Data from some facilities resulted in RQs less than 1 for both PFAS and PBDEs, indicating that a final product that poses a low risk to human health can be achievable.

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[1] now known as the Environment and Heritage Group

- PFAS
  - The assessment for PFOS+PFHxS produced RQs above 1 for some exposure pathways/facilities, indicating that in some cases there may be an unacceptable risk. The highest risk pathway was milk consumption, with RQs up to 4.4.
  - The assessment of PFOA+PFHxA produced all RQs below 1 for all exposure pathway/facilities. However, for some facilities the RQs were only marginally below 1, indicating that further consideration or monitoring may be warranted.
- PBDEs
  - The assessment for Br1–Br9 produced RQs above 1 for some exposure pathways/facilities indicating that in some cases there may be an unacceptable risk. The highest risk pathway was meat consumption, with RQs up to 37. However, this RQ was for a facility with considerably higher concentrations than the other facilities. The highest RQ for the remaining facilities was 5.9.
  - The assessment of Br10 produced all RQs below 1 for all exposure pathways/facilities, indicating the risk is low and acceptable.
- **Recommendation** – based on the elevated RQs for PFAS and PBDEs at some facilities, C&R recommends the EPA undertake further investigation, implement management requirements or collect additional information to refine the risk assessment.
- **Recommendation** – for the facilities where the RQs were above 1, C&R recommends further investigation to identify the source of the contamination in the waste stream.

1. Background and objective

In December 2020 and January 2021, the NSW Environment Protection Authority (EPA) conducted a sampling campaign of 21 facilities producing a treated waste product that contained food and/or garden organics, including:

- 13 facilities producing food organic and garden organic (FOGO) compost
- 5 facilities producing garden organic (GO) compost
- 3 food waste dehydration units.

Three independent replicate samples were collected from each facility. Each replicate was a composite of 5 grab samples. The only exceptions to this sampling design were one FOGO and one GO facility where only one independent composite sample was collected for analysis.

The samples were analysed for a wide range of contaminants, including per and polyfluoroalkyl substances (PFAS) and polybrominated diphenyl ethers (PBDEs). Analysis of these groups of compounds was conducted by laboratories with National Association of Testing Authorities (NATA) accreditation.

In March 2021, the EPA provided the PFAS and PBDE data to the Environment, Energy and Science Group[2] – Contaminants and Risk Team (C&R) of the NSW Department of Planning and Environment to undertake a risk assessment of the data. C&R was asked to focus the assessment on 3 potential land application scenarios of the treated waste product when used as a soil amendment:

- **Scenario 1** – surface application (assumes application to the soil surface with no incorporation)
- **Scenario 2** – incorporated into the top 2 cm of soil (assumes application to the soil surface and cattle movements trample the material into the upper layer of soil)
- **Scenario 3** – incorporation into the top 10 cm of soil (assumes application to the soil surface and is mechanically incorporated).

C&R undertook a similar assessment of FOGO data from samples collected by the EPA in 2019. The report presenting that risk assessment is provided in Appendix A.

1.1 Limitations

- C&R has assumed that the analytical data provided by the EPA are accurate and fit for purpose, and a review of the quality of these data has not been undertaken. C&R notes that analytical quality assurance/quality control data (e.g. recoveries and duplicates) were not provided with the data from the EPA. Therefore, this information is not discussed in this report.
- This is a generic assessment for potential exposure to these compounds from using the treated waste product as a soil amendment. As a result, conservative but realistic assumptions have generally been used throughout.
- Only risks to human health have been assessed and potential risks to ecosystems have not been considered. In addition, this report only presents the risks to children, as they are the most sensitive age group. Adult risks have been calculated by C&R but are not provided in this report.

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[2] now known as the Environment and Heritage Group

- The assessment does not consider exposure pathways that include transport via water as no leachate data were available from the samples. Despite this, the risks via water pathways are not likely to be the key risk-driving pathways based on the following:
  - PFAS – previous desk-based assessments conducted by C&R suggest that risks via water pathways from land applied waste are lower than other direct exposure pathways (leachate testing of FOGO and GO could be undertaken to confirm this). However, C&R notes that these previous assessments have not considered potential risks to human health via bioaccumulation into aquatic biota, as in Australia there are currently no recommended approaches to model this pathway.
  - PBDEs – due to the physico-chemical properties of PBDEs, these compounds will bind strongly to soil and are unlikely to be mobilised with water (except for potential transport bound to solid particles or colloids).
- The risk assessment only considers a single application of compost and repeat applications have not been considered. If repeat applications are considered, the overall risks would increase.
- The assessment assumes that the soil where the compost is applied contains no PFAS or PBDEs. If these contaminants were present in the soil, the overall risk would increase.
- The PFAS risk assessment focused on PFOS, PFOA, PFHxS and PFHxA, and does not include potential risk from other PFAS and precursors. Currently these cannot be included in quantitative risk assessments in Australia due to a lack of endorsed toxicity reference values.
- For PBDEs, the transfer factors for meat, milk and eggs were not available. As a surrogate, transfer factors for polychlorinated biphenyls and polychlorinated dioxins and furans were used. Refer to the human health and ecological risk assessment for mixed waste organic outputs (EnRiskS 2019) for a description of how these were used.

2. Concentrations of PFAS and PBDEs

Prior to conducting the risk assessment, C&R compared the concentrations of PFAS and PBDEs between the waste types and between the facilities. The concentrations of both groups of compounds were below the limit of reporting (LOR) or close to the LOR in all of the samples from the dehydrated food waste units. Due to this, these data are not considered further in this report. C&R notes that this result could provide a line of evidence that contaminants are not entering via the food waste stream (noting however that the sample size is small and the feedstock could vary from that received by the FOGO and GO facilities). The assessment presented below only focuses on data from the FOGO and GO samples (all raw data are provided in Appendix B).

2.1 Summary of PFAS concentrations

Each sample was analysed for 35 individual PFAS compounds. The PFAS compounds that were detected most frequently were perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorohexane sulfonate (PFHxS) and perfluorohexanoic acid (PFHxA). These 4 compounds were included in the risk assessment presented in this report.

The concentrations of PFOS, PFOA, PFHxS and PFHxA varied considerably between compound and facilities (Figure 1 and Figure 2). Overall, concentrations of PFHxA were the highest, with average concentrations across the facilities ranging from <0.1–16 µg/kg. In contrast, the average concentrations of PFOS ranged from <0.1–3.4 µg/kg, PFOA ranged from <0.1–2.2 µg/kg and PFHxS ranged from <0.1–0.7 µg/kg.

In most cases, there was low variability in concentrations between replicates within a facility[3], suggesting that the concentrations of PFAS are reasonably consistent throughout the compost. However, C&R notes that this is based on a very limited number of samples and further sampling would be required to confirm this result. Data analysis showed that for all compounds (i.e. PFOS, PFOA, PFHxS and PFHxA) there were statistically significant differences[4] in concentrations between the facilities (with the exception of PFOS and PFHxS in the GO samples). This analysis was done on the FOGO and GO datasets separately (statistical outputs provided in Appendix C).

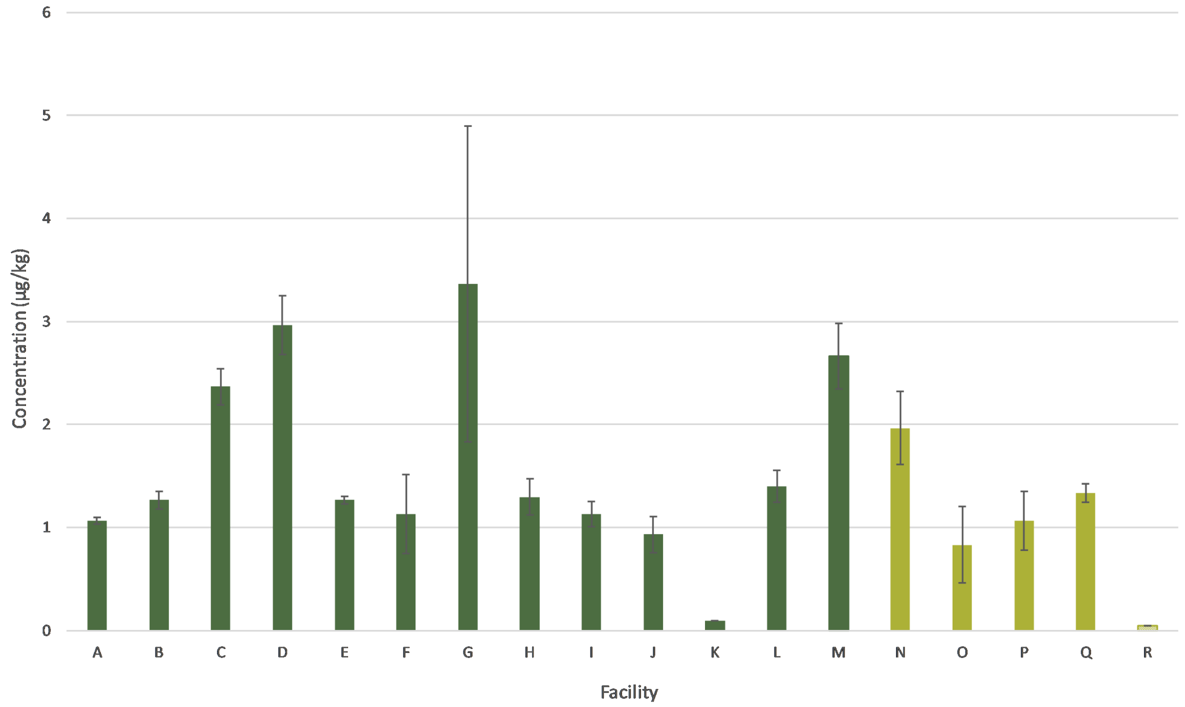
The FOGO data and GO data were combined to determine if overall there was a difference in PFAS concentrations between the 2 waste types. This was done using the average concentration of each compound per facility to calculate an overall FOGO and GO average concentration (Figure 3)[5]. Where concentrations were <LOR, half the LOR was used to calculate the facility averages. Data analysis indicated that there was no statistically significant difference in concentrations of PFOS and PFHxS between the FOGO and GO samples overall, whereas statistically, the concentrations of PFOA and PFHxA were both lower in the GO samples compared to the FOGO samples. This result suggests there may be sources of PFOA and PFHxA entering the FOGO waste stream that are not present in the GO waste stream.

[3] In most cases the relative standard deviation (RSD) across the 3 independent replicates was less than 50%.

[4] Analysed using a one-way analysis of variance at a significance level of $\alpha = 0.05$.

[5] This approach was used to ensure the facilities that only had one replicate were not under-represented in the overall averages.

(a) PFOS



(b) PFOA

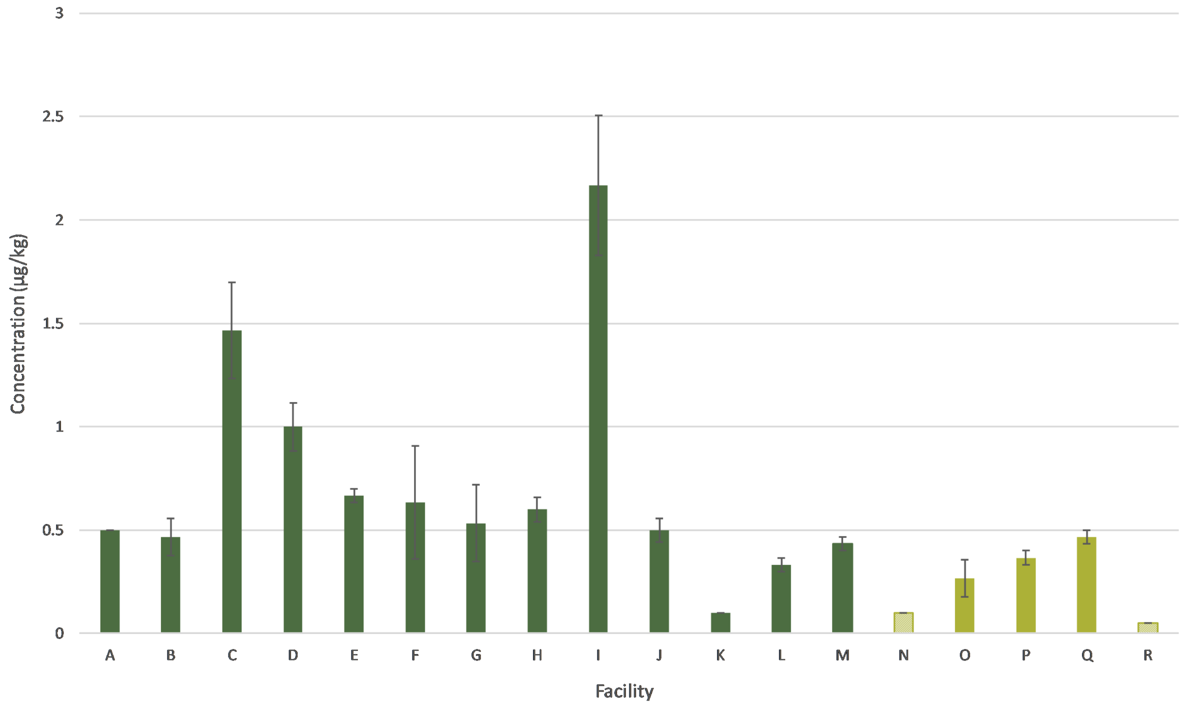
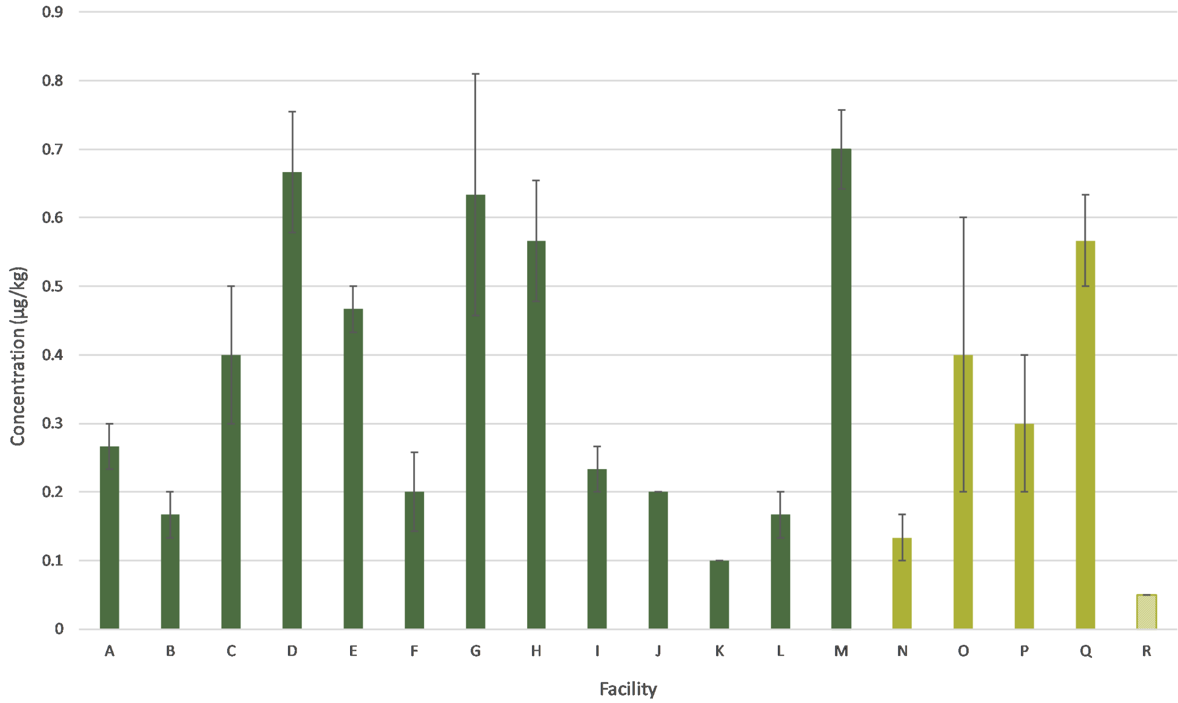


Figure 1 **Average concentrations of PFAS in FOGO (dark green) and GO (light green) from each facility – PFOS and PFOA**

Error bars show standard errors and striped bars indicate facilities where all concentrations were <LOR (half LOR used).

(a) PFHxS



(b) PFHxA

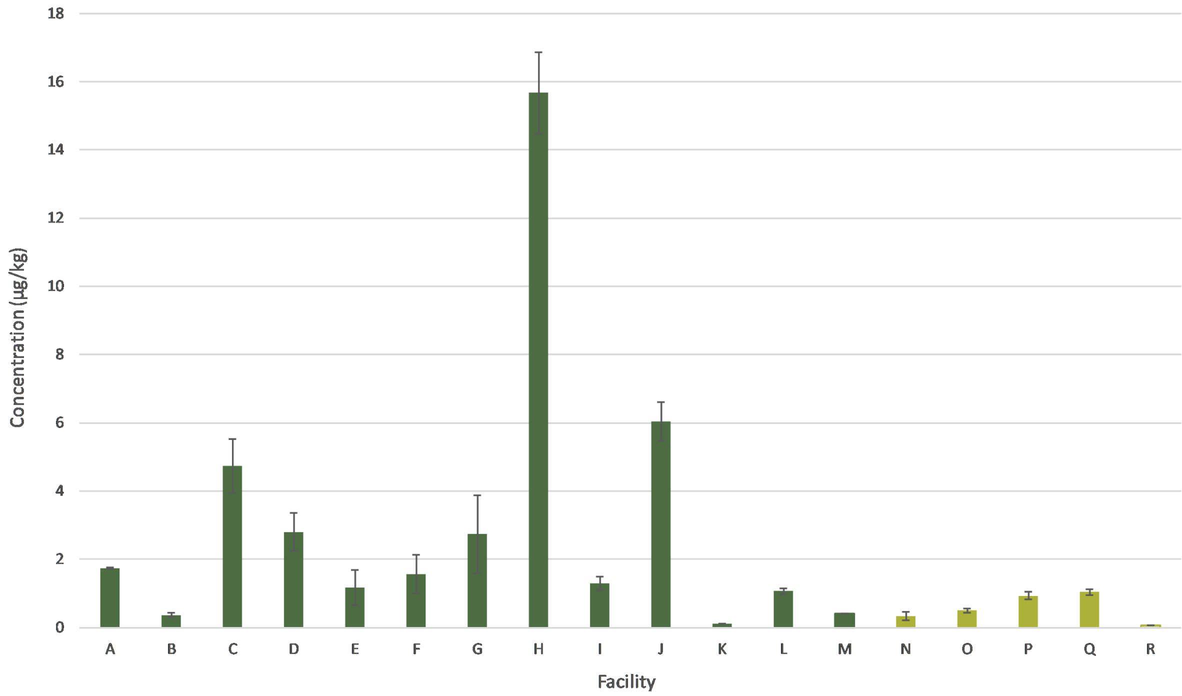


Figure 2 **Average concentrations of PFAS in FOGO (dark green) and GO (light green) from each facility – PFHxS and PFHxA**

Error bars show standard errors and striped bars indicate facilities where all concentrations were <LOR (half LOR used).

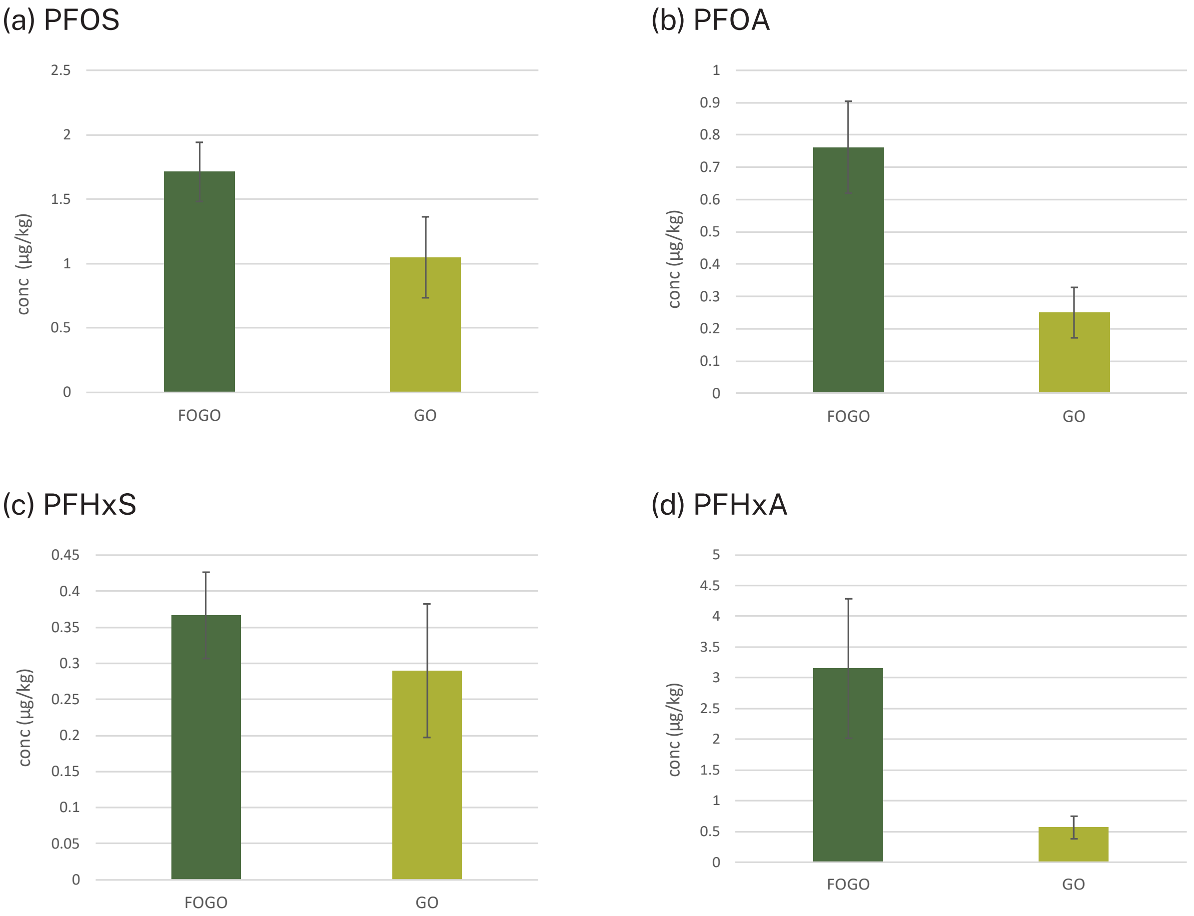


Figure 3 **Average concentrations of PFAS in FOGO and GO samples**
Error bars show standard errors.

2.2 Summary of PBDE concentrations

Each sample was analysed for 34 PBDE compounds. To assess these data, all PBDE compounds that are not fully brominated were summed together (Br1–Br9). Due to the large number of individual compounds in the Br1–Br9 range, when concentrations were reported as <LOR, these data were excluded from the summed concentration (i.e. <LOR was assumed to be zero). This was done because use of half the LOR (as done for other compounds) can lead to unrealistically elevated estimated concentrations due to the large number of compounds in the Br1–Br9 range. However, C&R notes that this creates some uncertainty in the estimated concentrations. The fully brominated compound, deca-BDE (Br10) was assessed separately due to different transfer factors and toxicity reference values for Br1–Br9 and Br10 (see Appendix D). C&R notes that the LORs for the PBDEs were variable between analytical batches. This was done by the laboratory to ensure that the lowest LORs were available for the risk assessment.

The average concentrations of Br1–Br9 were generally less than 20 µg/kg with the exception of Facility O, where the average concentration was 150 µg/kg (Figure 4a). The variability in Br10 concentrations across facilities was not as large but again Facility O showed the most elevated average concentration of 210 µg/kg (Figure 4b). The average concentrations from the remaining facilities were all below 65 µg/kg. Facility O produces GO, and this result suggests that there is a source of PBDE contamination entering the waste stream at this facility.

Similar to the PFAS data, there was relatively low variability in PBDE concentrations between the 3 replicates from each facility. Overall, the variability in Br10 concentrations between replicates was higher than Br1–Br9, with the highest variability observed for Facility O (replicate concentrations of Br10 ranged from 18–460 µg/kg). Data analysis showed that for both Br1–Br9 and Br10 there were statistically significant differences in concentrations between the facilities (with the exception of Br10 for the GO samples). This analysis was done on the FOGO and GO datasets separately (statistical outputs provided in Appendix C).

Comparing the overall concentrations in FOGO and GO showed variable results due to the very elevated concentrations from Facility O (Figure 5) (note that average concentrations in FOGO and GO were calculated using the same approach as used for PFAS). When all data were used, the average concentrations of both Br1–Br9 and Br10 were higher in the GO samples compared to the FOGO. However, statistical analysis indicated that this difference was not significant (due to the large error bars cause by the elevated concentrations from Facility O, Figure 5a and Figure 5b). When Facility O was removed from the dataset, the trend was reversed (Figure 5c and Figure 5d) and the difference between the waste types was statistically significant. This result suggests that overall, there may be sources of PBDEs entering the FOGO waste stream that are not present in the GO waste stream (noting that this does not apply to Facility O).

(a) Br1–Br9

(b) Br10

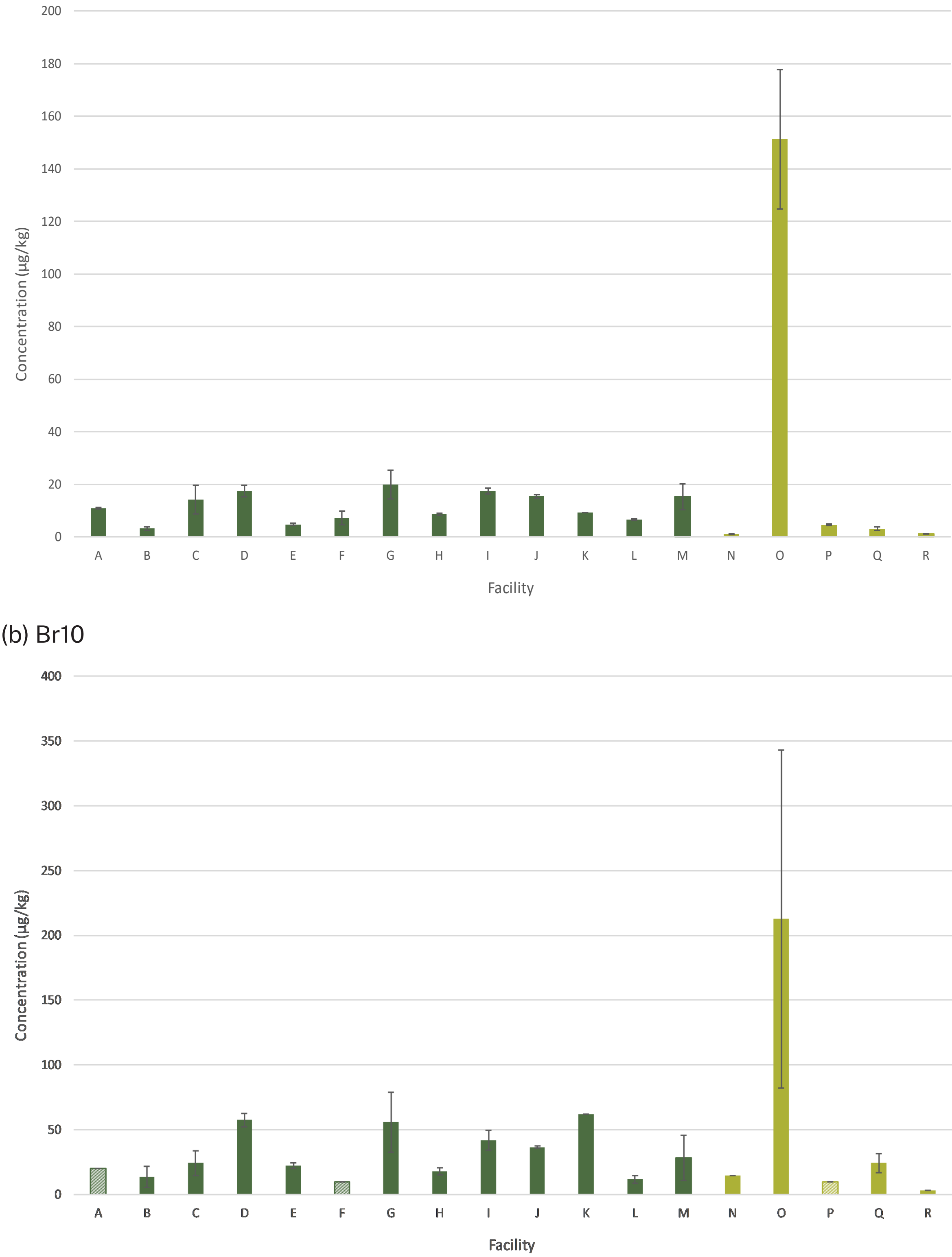


Figure 4 **Average concentrations of PBDEs in FOGO (dark green) and GO (light green) from each facility**

Error bars show standard errors and striped bars indicate facilities where all concentrations were <LOR (half LOR used for Br10).

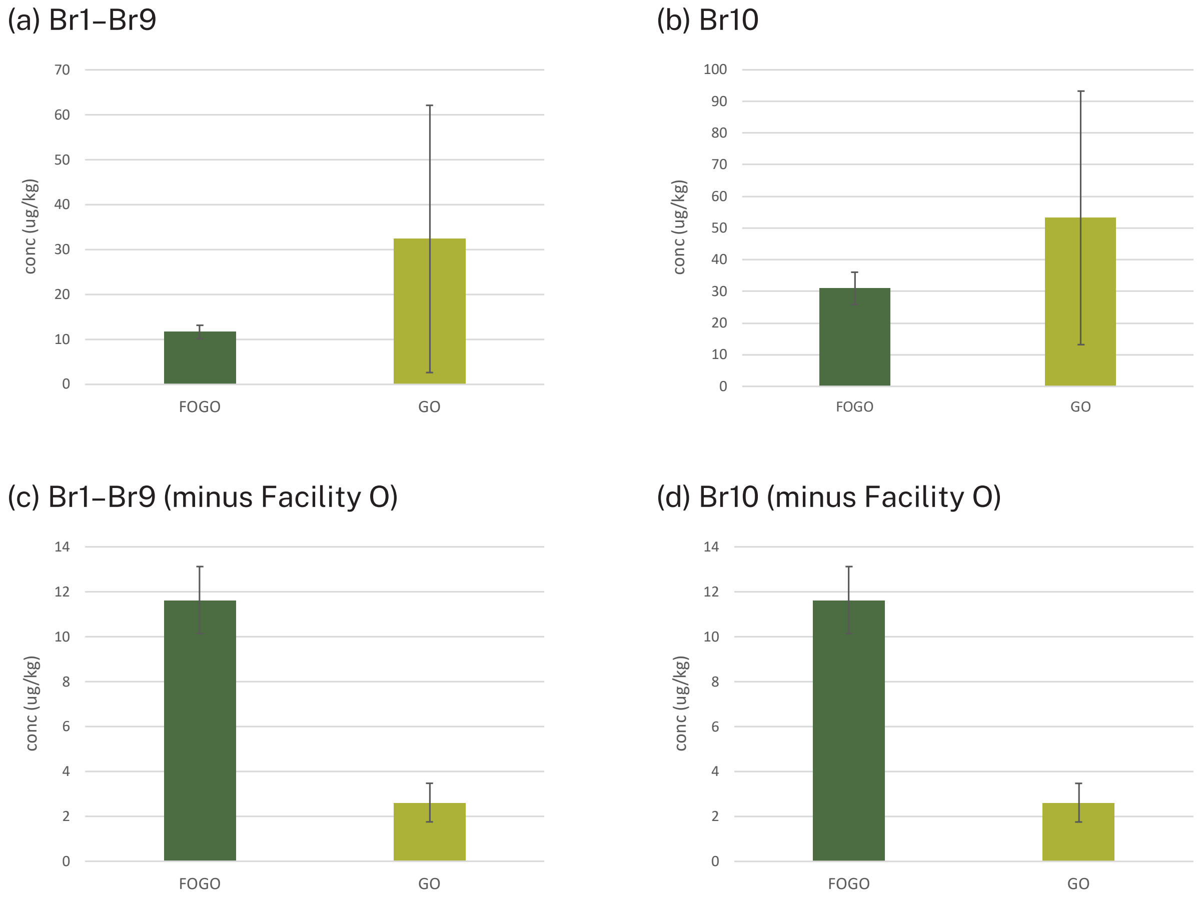


Figure 5 **Average concentrations of PBDEs in FOGO and GO samples, including and excluding Facility O**

For Br10, when concentrations were <LOR, half the LOR was used. Error bars show standard errors.

3. Risk assessment for PFAS and PBDEs in FOGO and GO

3.1 Approach to the risk assessment

C&R assessed the PFAS and PBDE data using a similar approach to that outlined in the draft C&R report 'Identification of key exposure pathways to assess risks from PFAS in biosolids (DRAFT)' and the *Human health and ecological risk assessment, application of alternative waste technologies material to agricultural land* prepared by EnRiskS (2019). As there were statistical differences between facilities, all facilities were assessed separately. For each facility, risk was assessed for the average, maximum and minimum concentrations.

For the PFAS compounds, PFOS+PFHxS and PFOA+PFHxA were assessed together. Where concentrations were <LOR, half the LOR was used. Human health toxicity reference values are only available in Australia for PFOS+PFHxS and PFOA. C&R notes that the FOGO and GO samples had high proportions of PFHxA. Therefore, to account for this in the assessment, PFHxA concentrations were summed with PFOA concentrations. This should provide a conservative assessment, as PFHxA is thought to be less toxic than PFOA (Luz et al. 2019).

For PBDEs, the assessment was completed for the sum of Br1–Br9 compounds and Br10 separately. This is due to different transfer factors and toxicity reference values for Br10 compared to the other compounds (see Appendix D).

As discussed in Section 1 of this report, 3 land application scenarios were considered in the assessment (based on advice from the EPA):

- **Scenario 1** – surface application
- **Scenario 2** – incorporated into the top 2 cm
- **Scenario 3** – incorporated into the top 10 cm.

For Scenario 1, the concentrations of the compounds in the samples were assumed to be the soil exposure concentrations. This is the most conservative assessment of the data. For Scenarios 2 and 3, a dilution factor was applied to the concentrations to account for the incorporation into the soil. These dilution factors were 0.088 and 0.019 (11-fold and 53-fold), respectively, which assume an application rate of 25 dry t/ha (based on advice from the EPA) and a soil bulk density of 1.3 g/cm^3. The dilution factors were calculated using the following equation:

$$dilution\ factor = \frac{mass\ FOGO\ or\ GO}{mass\ soil + mass\ FOGO\ or\ GO}$$

The assessment focused on key exposure pathways of egg, meat (beef) and milk consumption (assumptions and calculations outlined in Appendix D). Other exposure pathways (e.g. ingestion of crops and incidental ingestion of soil) were considered to pose a lower risk than the key exposure pathways based on previous assessments. For meat and milk, 2 scenarios were assessed: (i) exposure to grazing animals (via soil and pasture) and (ii) fodder (via pasture only). The pathways assessed and the assumptions used in the calculations consider home consumption of produce and therefore identify potential risks to people with the highest exposure. The results are not relevant for the general public, as risks from produce supplied to market were not assessed, noting that dilution of produce is likely to occur in commercial markets, reducing the average exposure to the general public.

For each pathway, daily intakes (µg/kg/day) of PFOS+PFHxS, PFOA+PFHxA, Br1–Br9 and Br10 were estimated. These were then compared to background adjusted toxicity reference values (e.g. tolerable daily intakes, TDIs) to calculate risk quotients (RQs) (Equation 1). For pathways where the resulting RQ is above 1, this indicates that the estimated daily intake exceeds the toxicity reference value and there may be an unacceptable risk. In these cases, further investigation, management requirements or refinement of the risk assessment should be considered. Where the RQ is below 1, the risk is low and acceptable.

$$RQ = \frac{estimated\ daily\ intake\ (\mu g/kg/day)}{toxicity\ reference\ value\ (\mu g/kg/day) - background} \qquad \text{Equation 1}$$

The toxicity reference values used for PFOS+PFHxS and PFOA+PFHxA were 0.02 and 0.16 µg/kg/day, respectively (FSANZ 2017)[6]. The toxicity reference values for Br1–Br9 and Br10 were 0.1 and 7.0 µg/kg/day, respectively[7].

The estimated background exposure for PFOS+PFHxS and PFPA+PFHxA was assumed to be 0.001 µg/kg/day (ToxConsult 2016), whereas the background exposure for Br1–Br9 and Br10 was assumed to be 80% of the toxicity reference values[8], which equates to 0.08 and 5.6 µg/kg/day, respectively.

C&R calculated RQs for both adults and children; however, this report only discusses the RQs for children, which is the more sensitive age group. The adult RQs can be provided to the EPA if required[9].

3.2 Outcomes from the risk assessment

The RQs calculated for this assessment are presented in figures showing the average, maximum and minimum RQ for each facility (Figure 6 to Figure 25). This provides the full range of RQs for each facility under each scenario. All RQs are also provided in Appendix E.

3.2.1 PFOS+PFHxS

The average soil exposure concentrations of PFOS+PFHxS used in the risk assessment ranged from 0.1–4.0, 0.0088–0.35 and 0.0019–0.075 µg/kg for Scenarios 1 to 3, respectively (Table 1).

The key outcomes from the risk assessment for PFOS+PFHxS were (Figure 6 to Figure 10):

- Assessment of the meat (grazing and fodder) and milk (grazing and fodder) exposure pathways produced some RQs above 1 for Scenario 1 (surface applied) (Figure 7 to Figure 10). This indicates that further investigation, management requirements or refinement of the risk assessment is required for these pathways.

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[6] Based on FSANZ (2017) the toxicity reference value of 0.16 µg/kg/day relates to PFOA only. However, as discussed in Section 3.1, PFHxA concentrations were added to the PFOA concentrations in this assessment.

[7] Sourced from the US EPA Information Risk Information System (IRIS) website. The values used for Br1-Br9 was the most sensitive available for lower brominated BDEs and was derived for BDE-99 and BDE-47.

[8] The value used for Br1–Br9 in the National Environment Protection Measure (NEPM) for the Assessment of Site Contamination (NEPC 2013).

[9] The RQs were always lower for adults compared to children. The difference in the values varied depending on the pathway. For egg consumption, adult RQs were 2.8 times lower; for meat consumption adult RQs were 2.4 times lower; and for milk consumption adult RQs were 3.9 times lower.

The highest risk exposure pathway was milk consumption from grazing dairy cows (Figure 9), where the maximum RQ was 4.4 (Facility G)[10]. For this pathway overall, 8 facilities (44%) had average RQs above 1 and 13 facilities (72%) had maximum RQs above 1.

- Assessment of the meat (grazing and fodder) and milk (grazing and fodder) exposure pathways produced RQs below 1 for the incorporated scenarios (Scenarios 2 and 3) (Figure 7 to Figure 10), indicating that the risk is low and acceptable.
- Assessment of the egg exposure pathway for all 3 scenarios produced RQs below 1 (Figure 6), indicating the risk is low and acceptable.

Table 1 Average soil exposure concentrations (µg/kg) for PFOS+PFHxS for each scenario

Waste type	Facility	Scenario 1	Scenario 2	Scenario 3
FOGO	A	1.3	0.12	0.025
	B	1.4	0.13	0.027
	C	2.8	0.24	0.052
	D	3.6	0.32	0.069
	E	1.7	0.15	0.033
	F	1.3	0.12	0.025
	G	4.0	0.35	0.075
	H	1.9	0.16	0.035
	I	1.4	0.12	0.026
	J	1.1	0.099	0.021
	K	1.5	0.13	0.028
	L	1.6	0.14	0.030
	M	3.4	0.30	0.064
GO	N	2.1	0.18	0.040
	O	1.2	0.11	0.023
	P	1.4	0.12	0.026
	Q	1.9	0.17	0.036
	R	0.1	0.0088	0.0019

[10] Relates to home consumption only, as discussed in Section 3.1

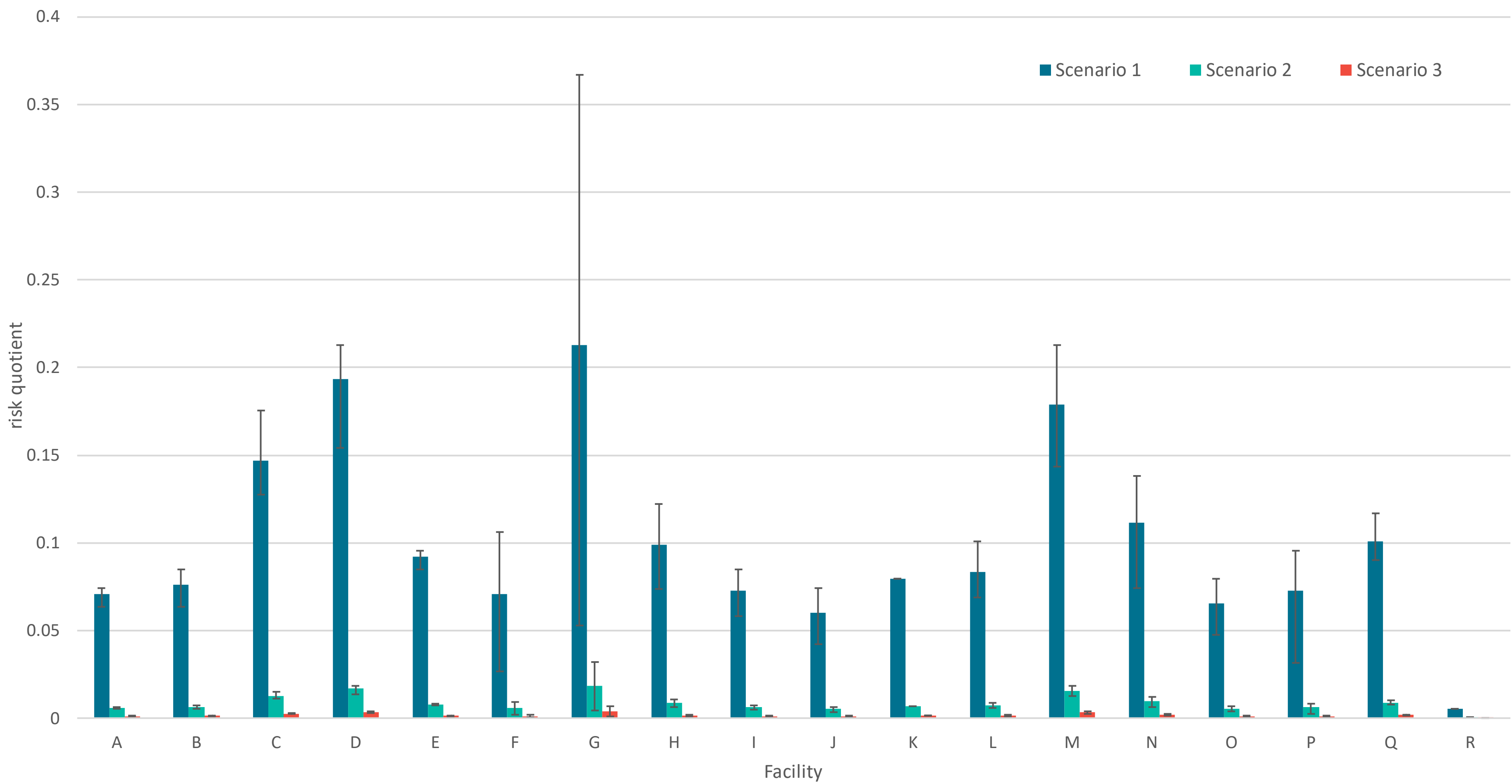

Figure 6 **Summary of PFOS+PFHxS RQs for human exposure via egg consumption from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated.

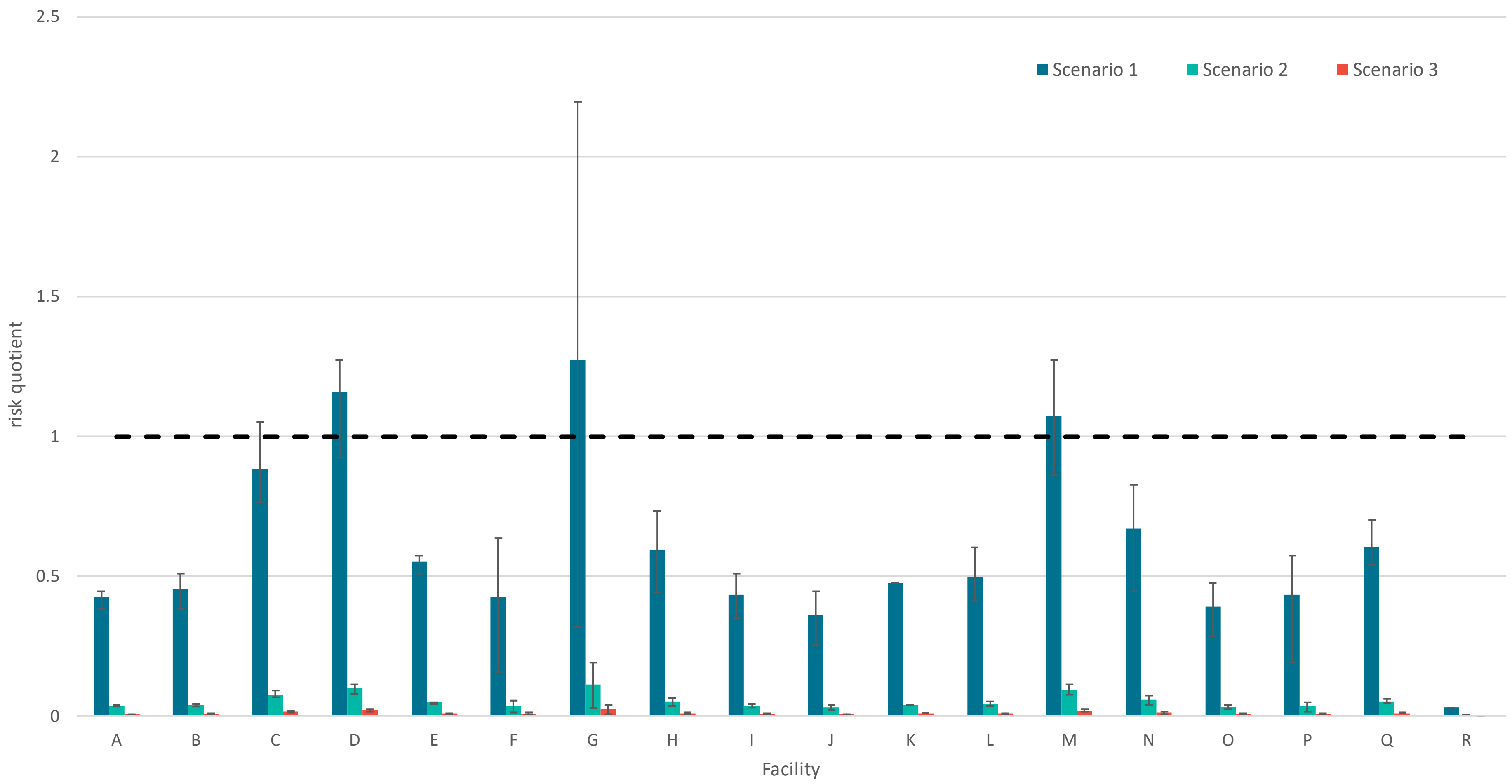

Figure 7 **Summary of PFOS+PFHxS RQs for human exposure via meat consumption (grazing) from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. The dashed line indicates where RQ=1. Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated.

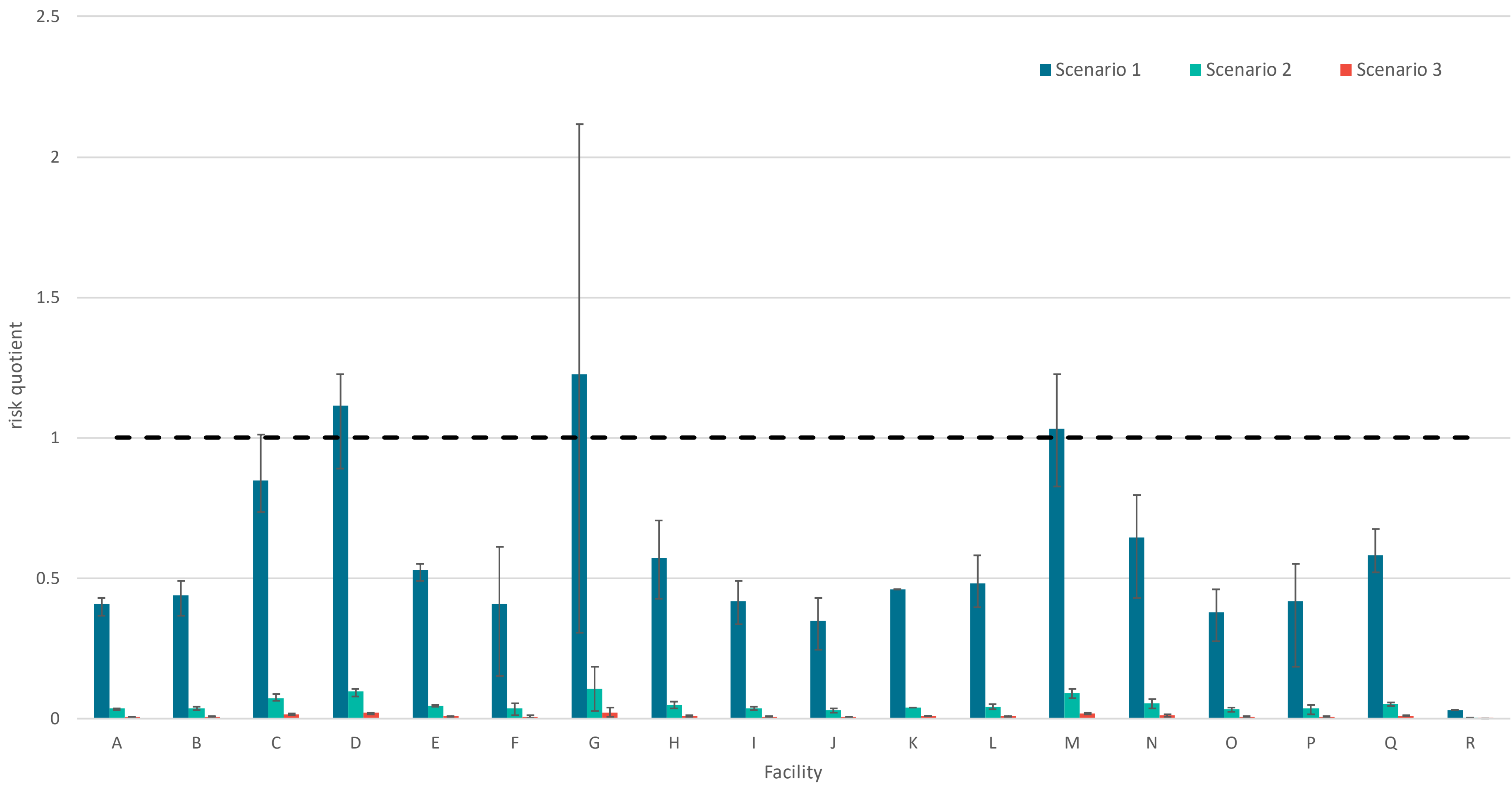

Figure 8 **Summary of PFOS+PFHxS RQs for human exposure via meat consumption (fodder) from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. The dashed line indicates where RQ=1. Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated.

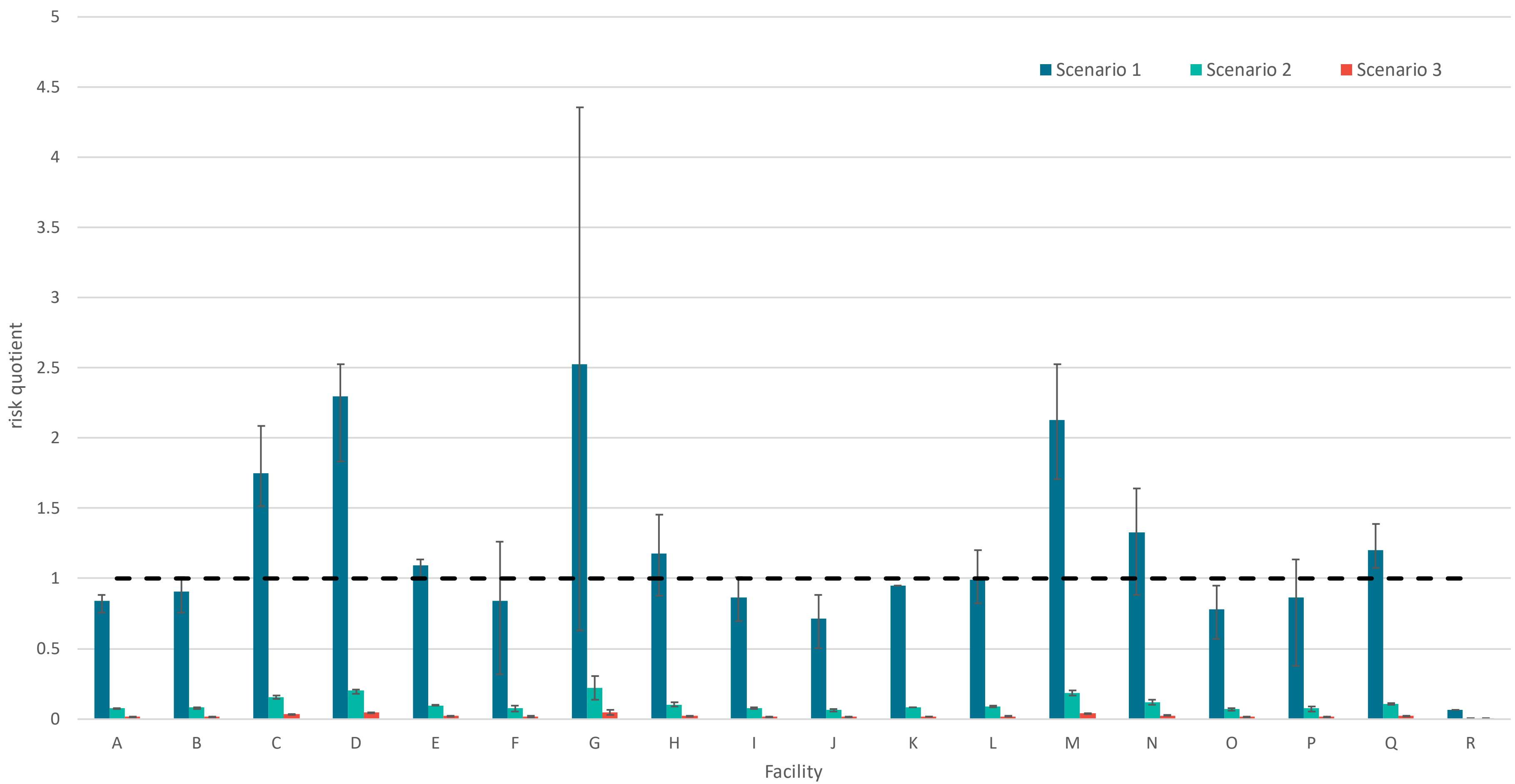

Figure 9 **Summary of PFOS+PFHxS RQs for human exposure via milk consumption (grazing) from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. The dashed line indicates where RQ=1. Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated.

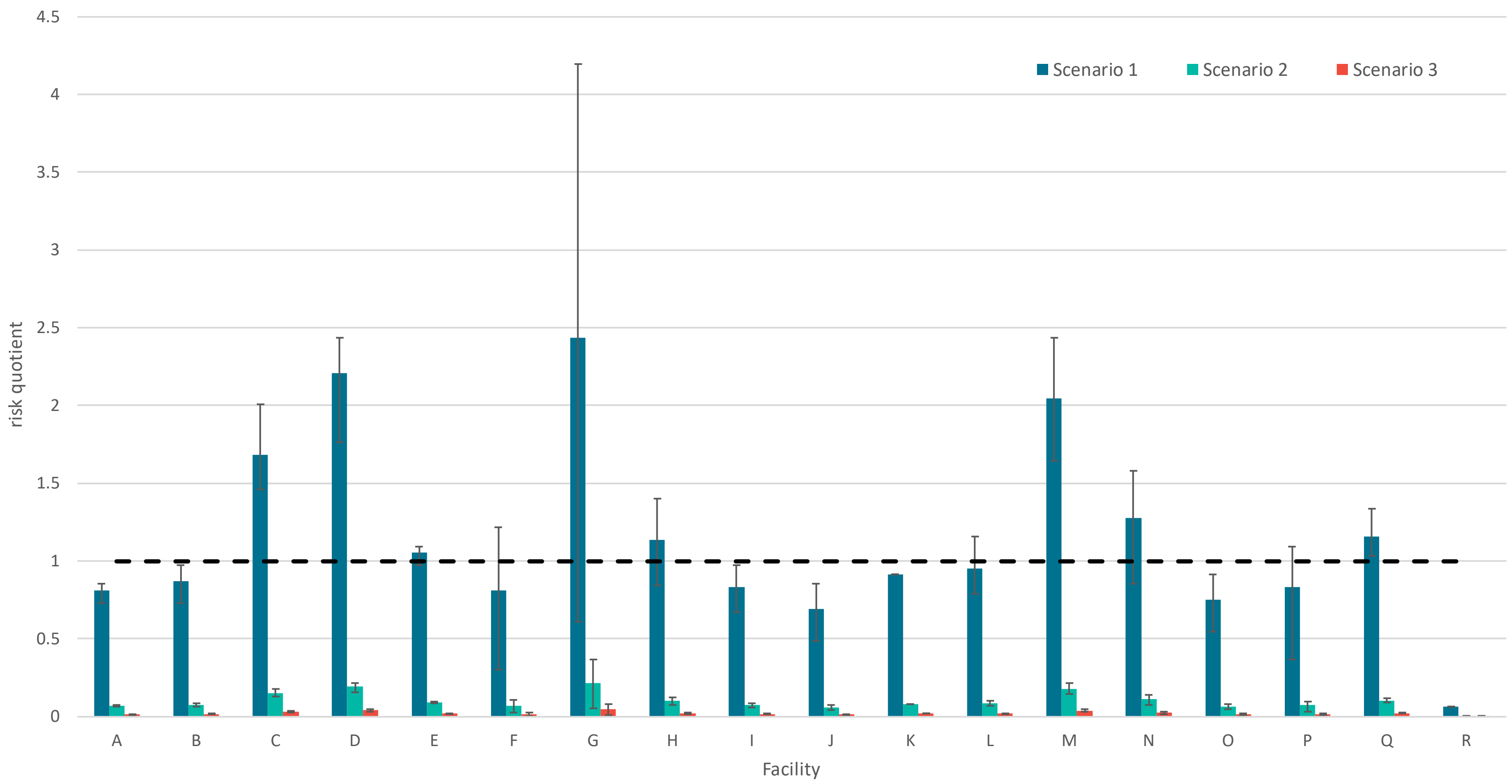

Figure 10 **Summary of PFOS+PFHxS RQs for human exposure via milk consumption (fodder) from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. The dashed line indicates where RQ=1. Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated.

3.2.2 PFOA+PFHxA

The average soil exposure concentrations of PFOA+PFHxA used in the risk assessment ranged from 0.1–16, 0.0088–1.4 and 0.0019–0.31 µg/kg for Scenarios 1 to 3, respectively (Table 2).

All RQs for PFOA+PFHxA for all land application scenarios were below 1 (Figure 11 to Figure 15), indicating that the risk is low and acceptable. However, C&R notes that for Facility H, the RQs for the milk consumption pathways were only marginally below 1 (max = 0.99 and average = 0.86) (Figure 14). Based on this, further consideration and/or monitoring of PFOA+PFHxA may be warranted.

Table 2 Average soil exposure concentrations (µg/kg) for PFOA+PFHxA for each scenario

Waste type	Facility	Scenario 1	Scenario 2	Scenario 3
FOGO	A	2.3	0.20	0.042
	B	0.83	0.073	0.016
	C	6.2	0.54	0.12
	D	3.8	0.33	0.072
	E	1.8	0.16	0.035
	F	2.2	0.19	0.042
	G	3.3	0.29	0.062
	H	16	1.4	0.31
	I	3.5	0.30	0.065
	J	6.5	0.57	0.12
	K	2.0	0.18	0.038
	L	1.4	0.12	0.026
	M	0.83	0.073	0.016
GO	N	0.43	0.038	0.0082
	O	0.77	0.067	0.015
	P	1.3	0.11	0.025
	Q	1.5	0.13	0.028
	R	0.1	0.0088	0.0019

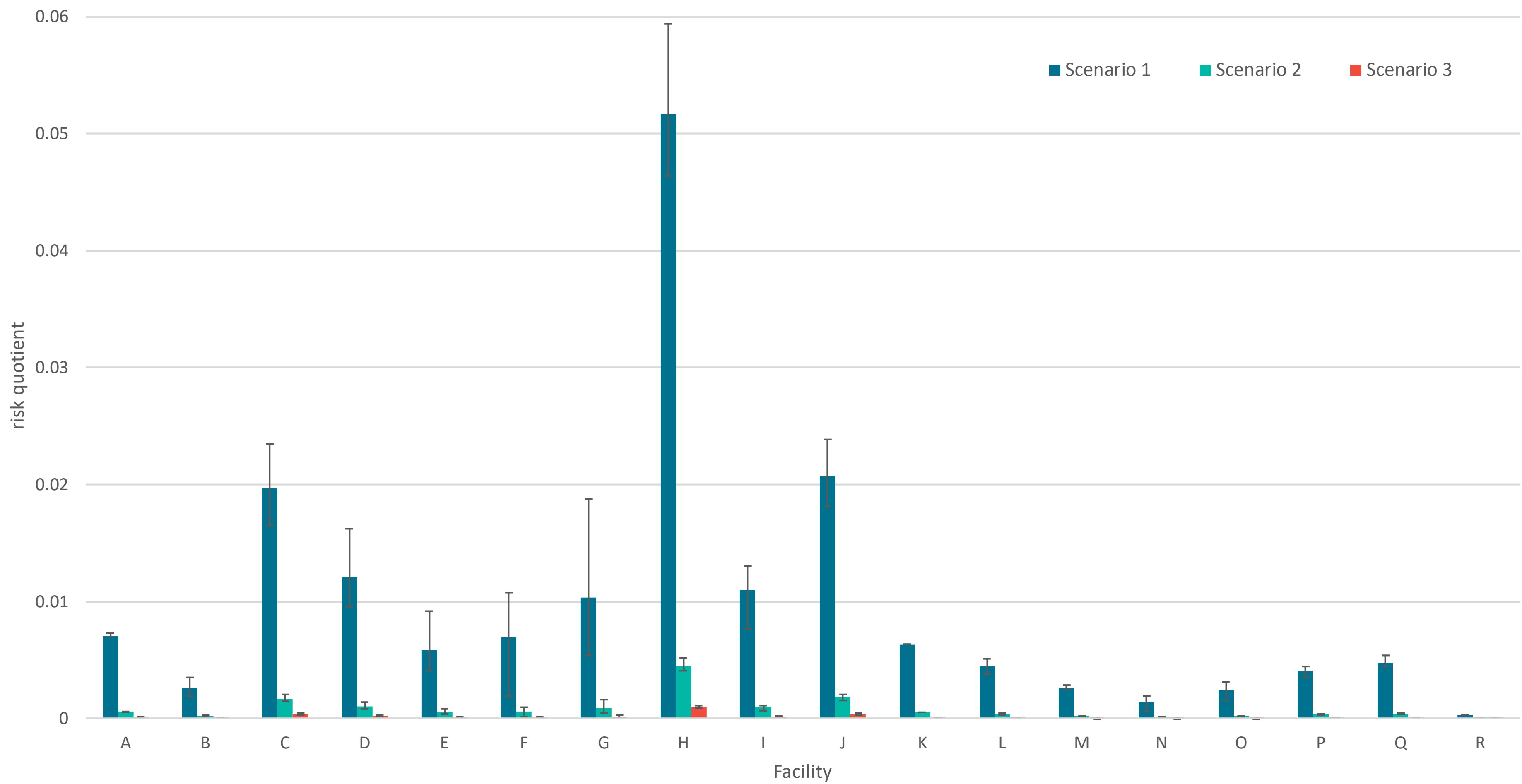

Figure 11 **Summary of PFOA+PFHxA RQs for human exposure via egg consumption from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated.

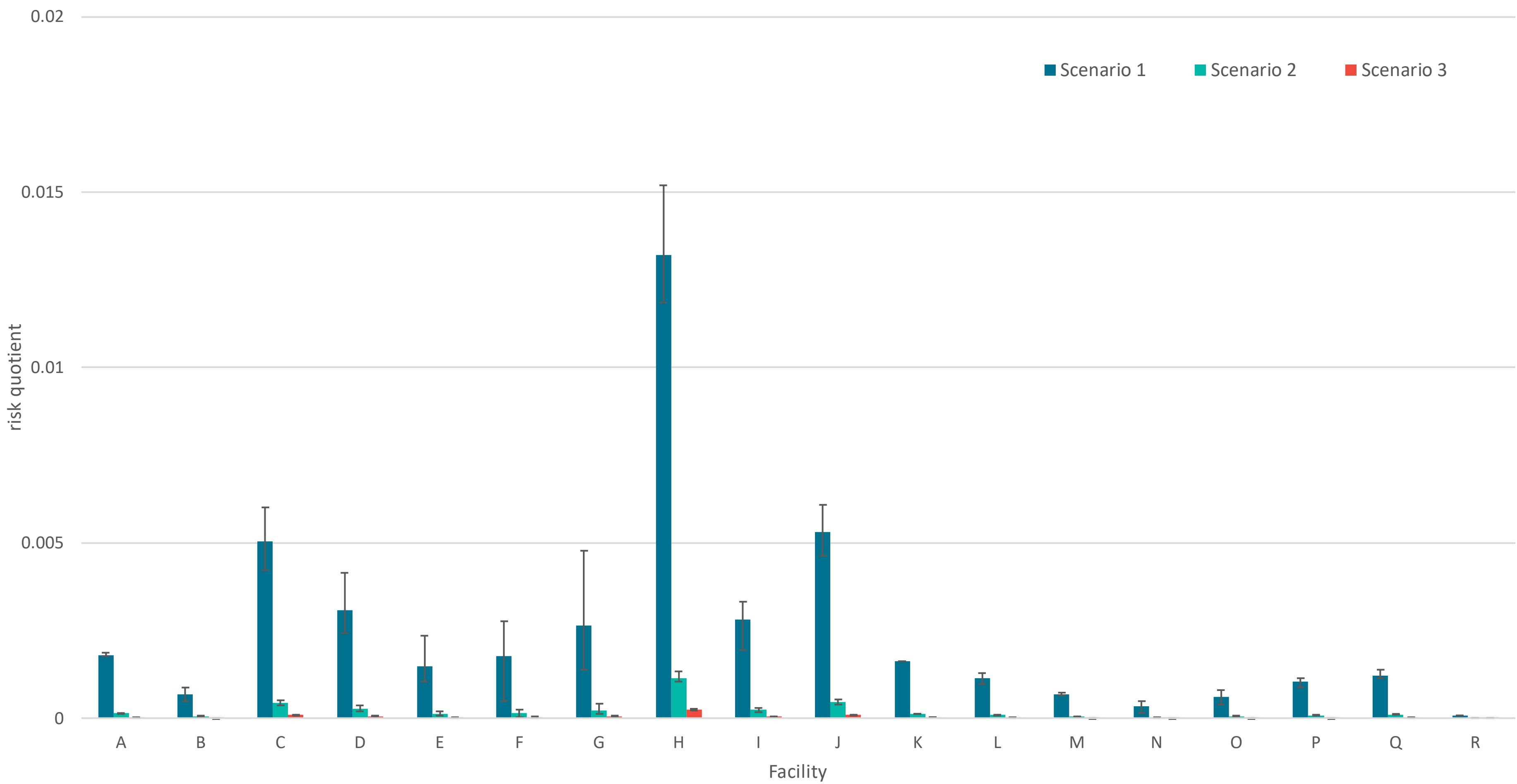

Figure 12 **Summary of PFOA+PFHxA RQs for human exposure via meat consumption (grazing) from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated.

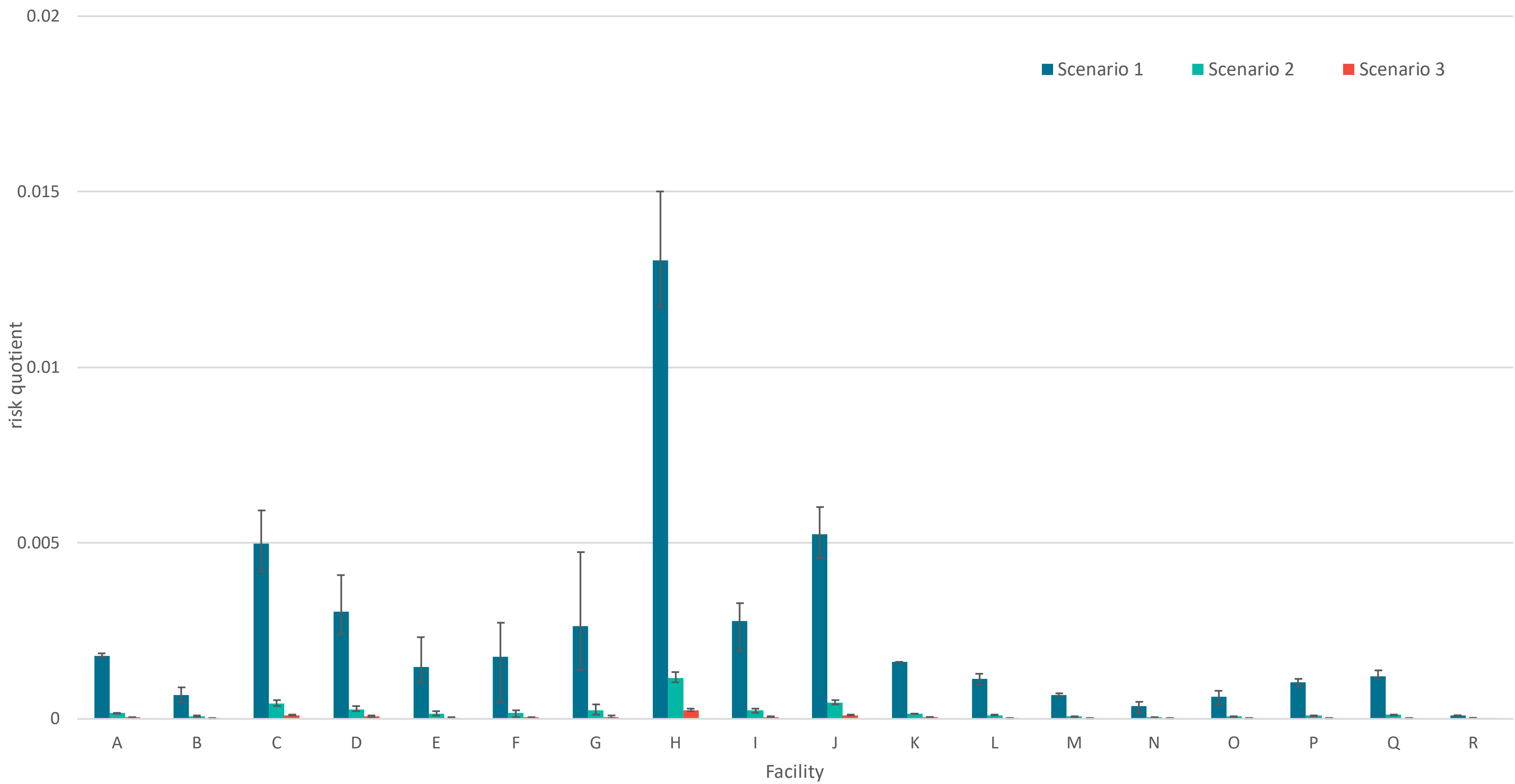

Figure 13 **Summary of PFOA+PFHxA RQs for human exposure via meat consumption (fodder) from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated.

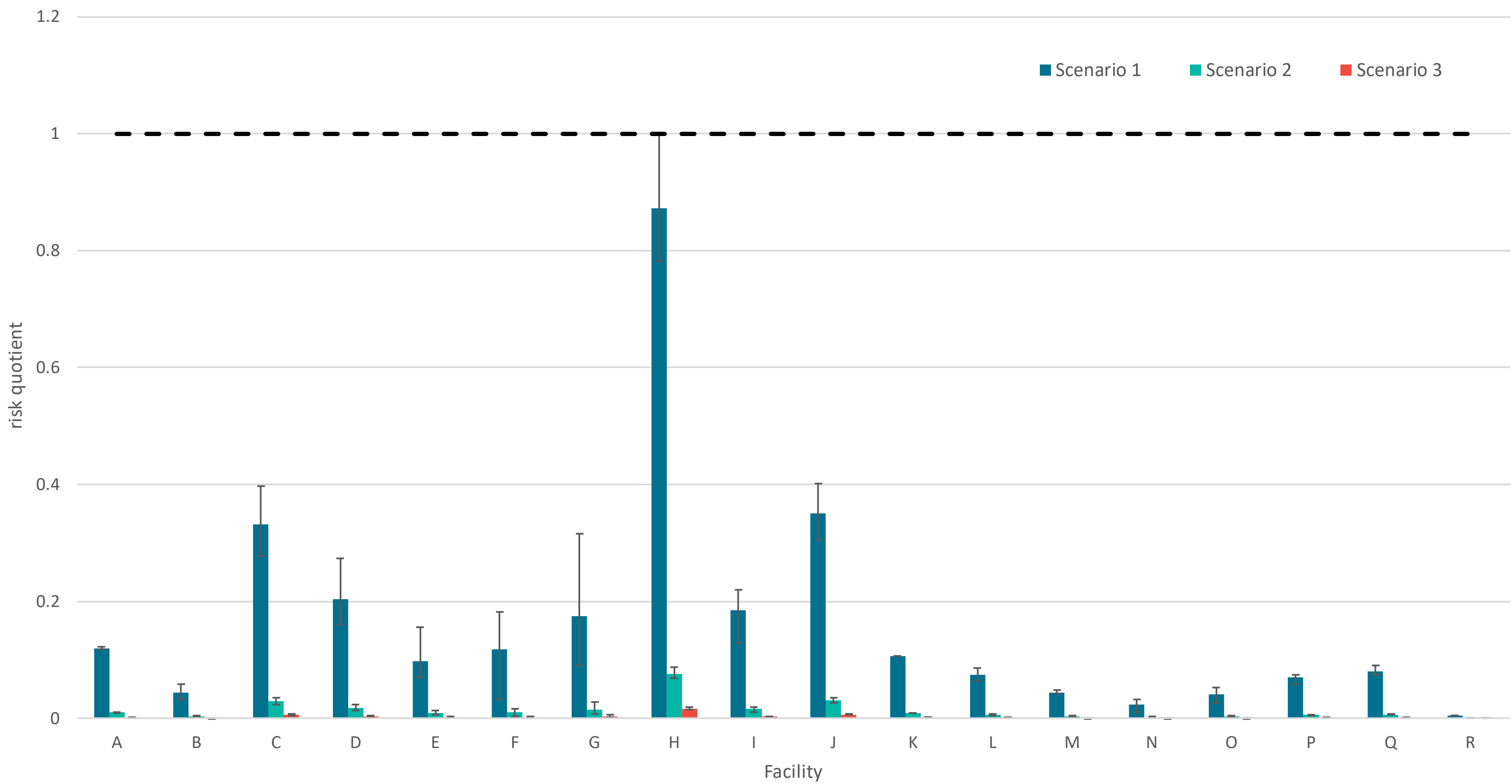

Figure 14 **Summary of PFOA+PFHxA RQs for human exposure via milk consumption (grazing) from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. The dashed line indicates where RQ=1.
Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated.

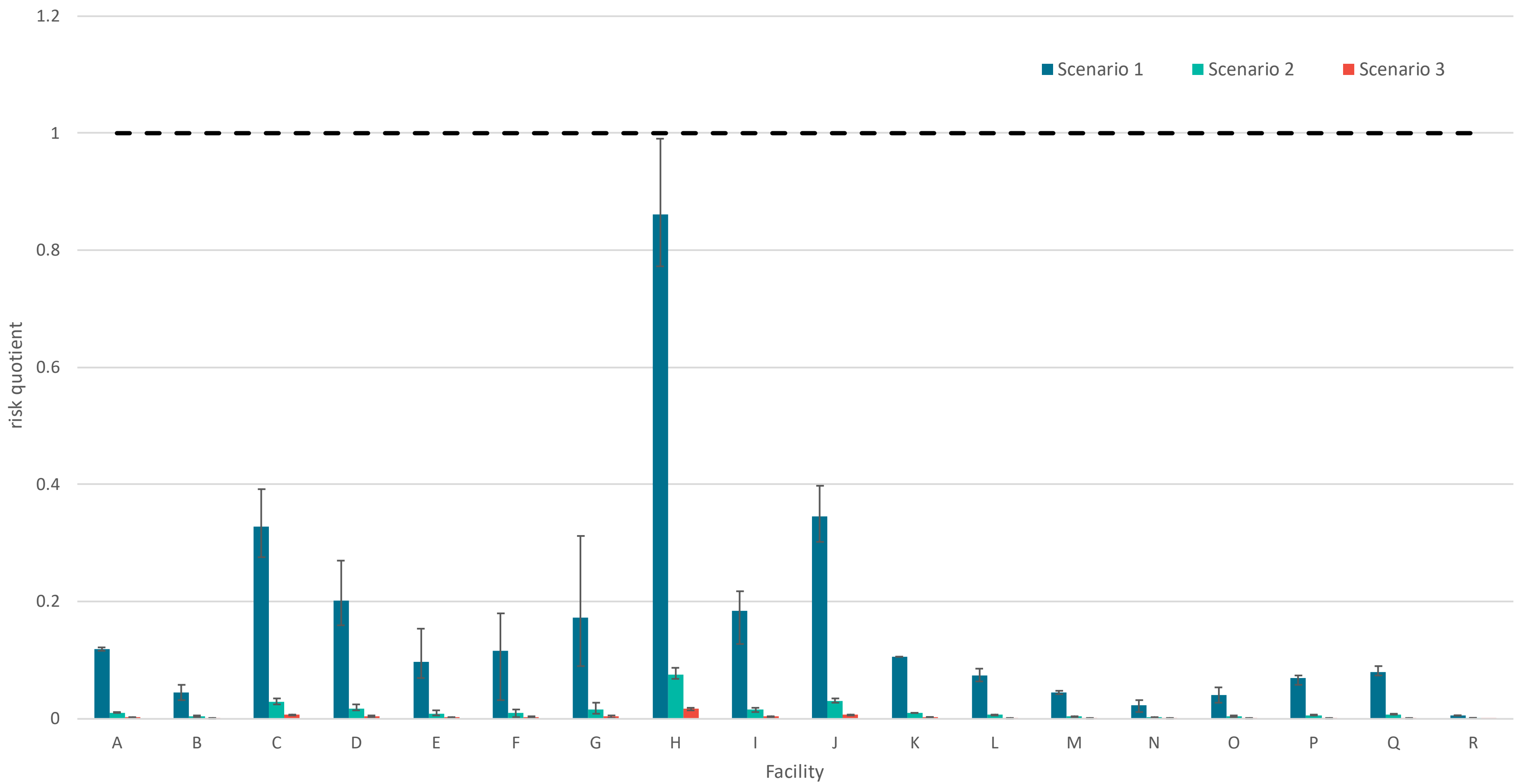

Figure 15 **Summary of PFOA+PFHxA RQs for human exposure via milk consumption (fodder) from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. The dashed line indicates where RQ=1.
Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated.

3.2.3 Br1–Br9

The average soil exposure concentrations of Br1–Br9 used in the risk assessment ranged from 1.2–150, 0.1–13 and 0.022–2.9 µg/kg for Scenarios 1 to 3, respectively (Table 3).

The key outcomes from the risk assessment for Br1–Br9 were (Figure 16 to Figure 20):

- Assessment of all exposure pathways (eggs, meat (grazing and fodder) and milk (grazing and fodder)) produced some RQs above 1 for Scenario 1 (surface applied). This indicates that further investigation, management requirements or refinement of the risk assessment is required for these pathways. The highest risk exposure pathway was meat consumption from grazing livestock (Figure 17), where the maximum RQ was 37 (Facility O). For this pathway overall, 12 facilities (67%) had average RQs above 1 and 14 facilities (78%) had maximum RQs above 1.
- Except for Facility O, assessment of all pathways (eggs, meat (grazing and fodder) and milk (grazing and fodder)) produced RQs below 1 for the incorporated scenarios (Scenarios 2 and 3), indicating the risk is low and acceptable. For Facility O, the RQ for Scenario 2 was greater than 1 for the meat (grazing) exposure pathway (average RQ = 2.6).

Table 3 Average soil exposure concentrations (µg/kg) for Br1–Br9 for each scenario

Waste type	Facility	Scenario 1	Scenario 2	Scenario 3
FOGO	A	11	0.97	0.21
	B	3.3	0.29	0.062
	C	14	1.3	0.27
	D	18	1.5	0.33
	E	4.8	0.42	0.091
	F	7.2	0.63	0.14
	G	20	1.7	0.37
	H	8.7	0.77	0.17
	I	18	1.5	0.33
	J	15	1.4	0.29
	K	9.5	0.83	0.18
	L	6.6	0.58	0.13
	M	15	1.3	0.29
GO	N	1.2	0.10	0.022
	O	150	13	2.9
	P	4.8	0.42	0.090
	Q	3.2	0.28	0.061
	R	1.3	0.11	0.024

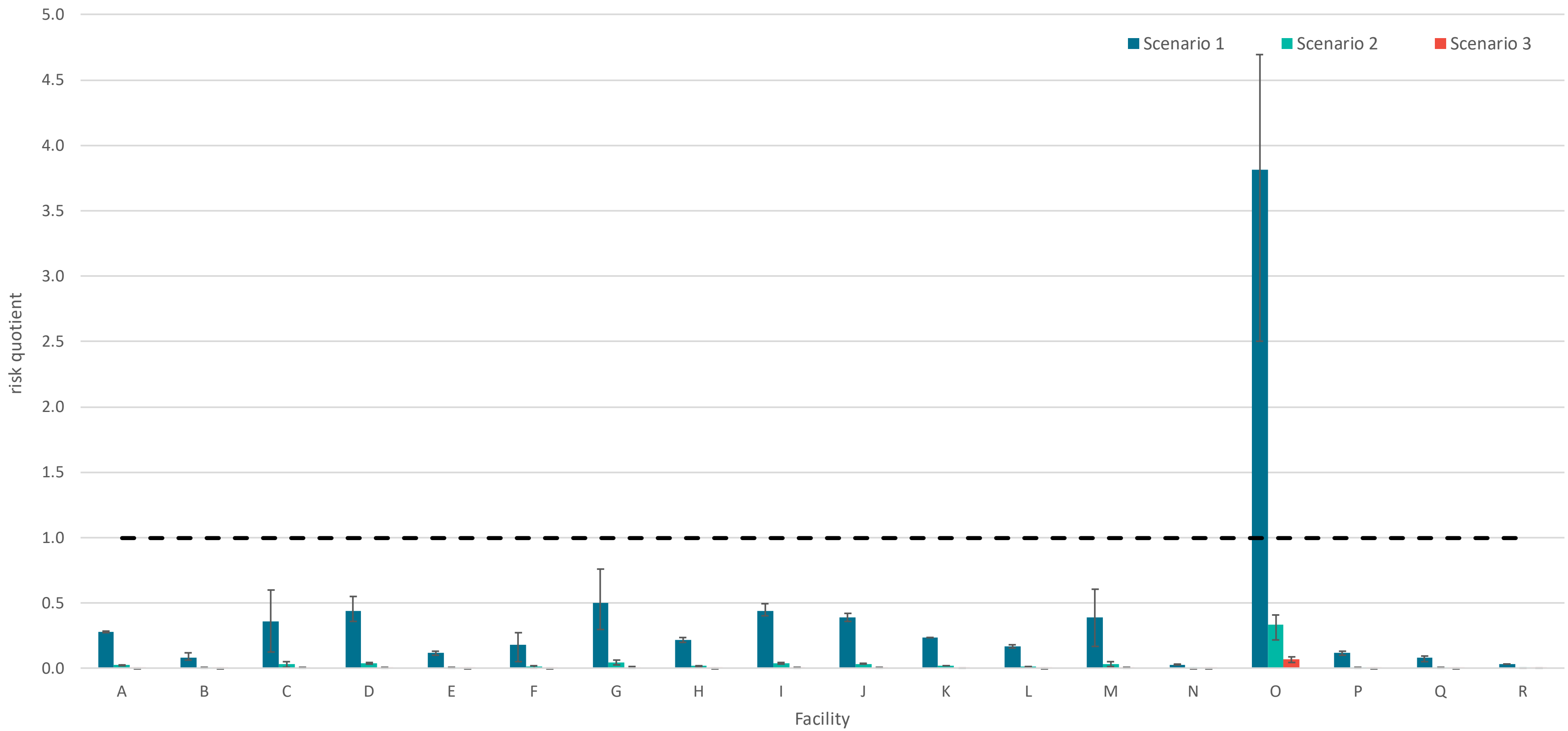

Figure 16 **Summary of Br1–Br9 RQs for human exposure via egg consumption from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. The dashed line indicates where RQ=1.
Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated

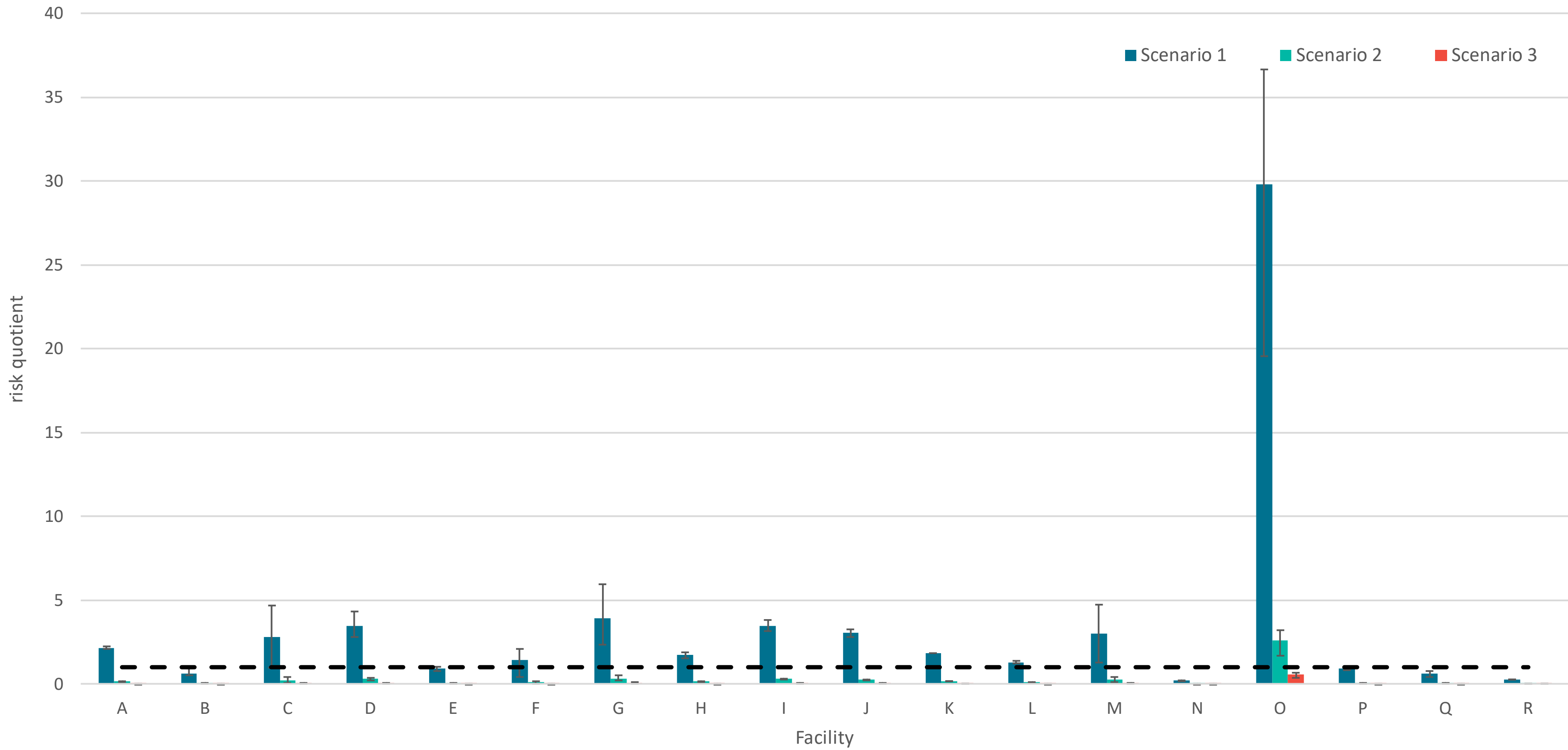

Figure 17 **Summary of Br1–Br9 RQs for human exposure via meat consumption (grazing) from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. The dashed line indicates where RQ=1.
Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated.

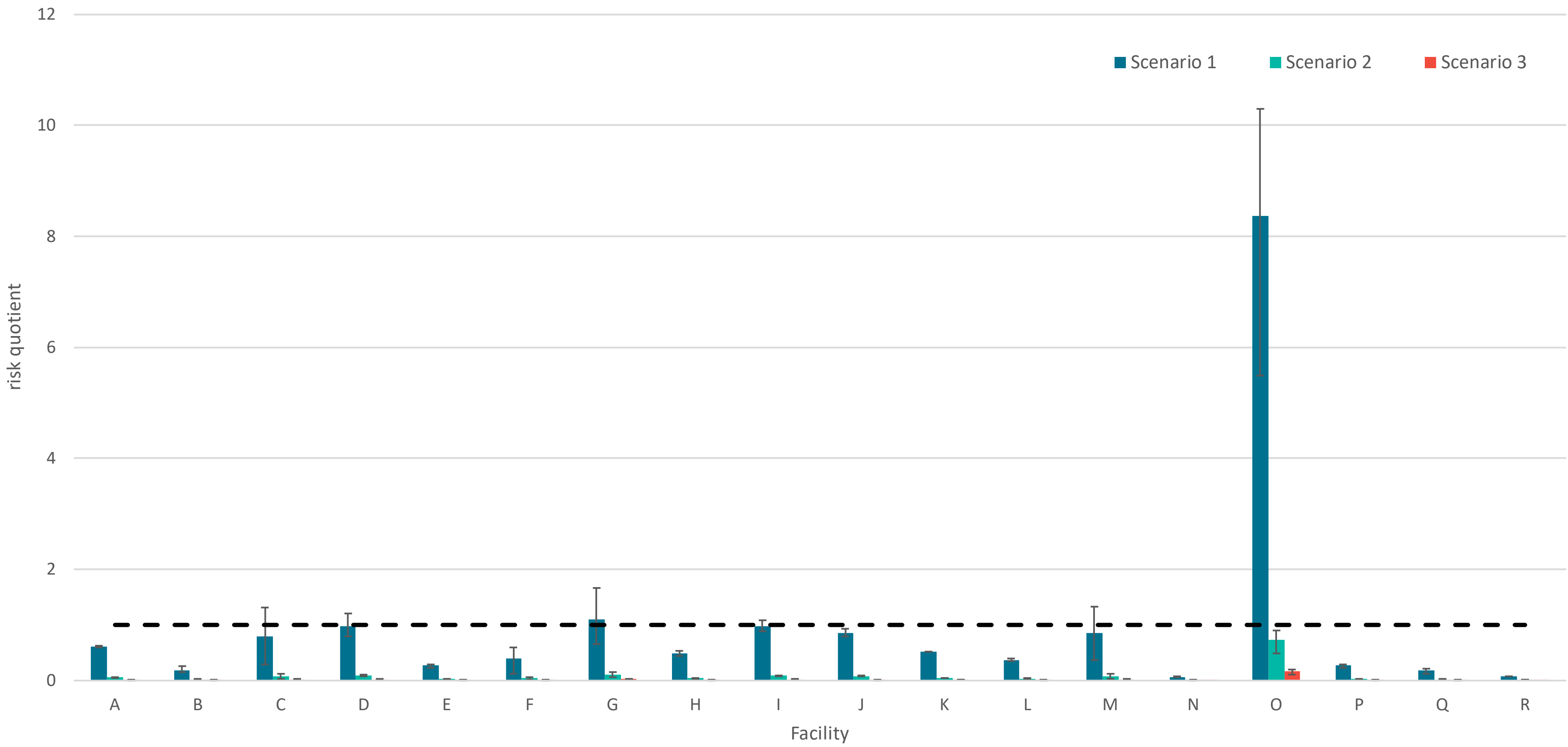

Figure 18 **Summary of Br1–Br9 RQs for human exposure via meat consumption (fodder) from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. The dashed line indicates where RQ=1.
Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated.

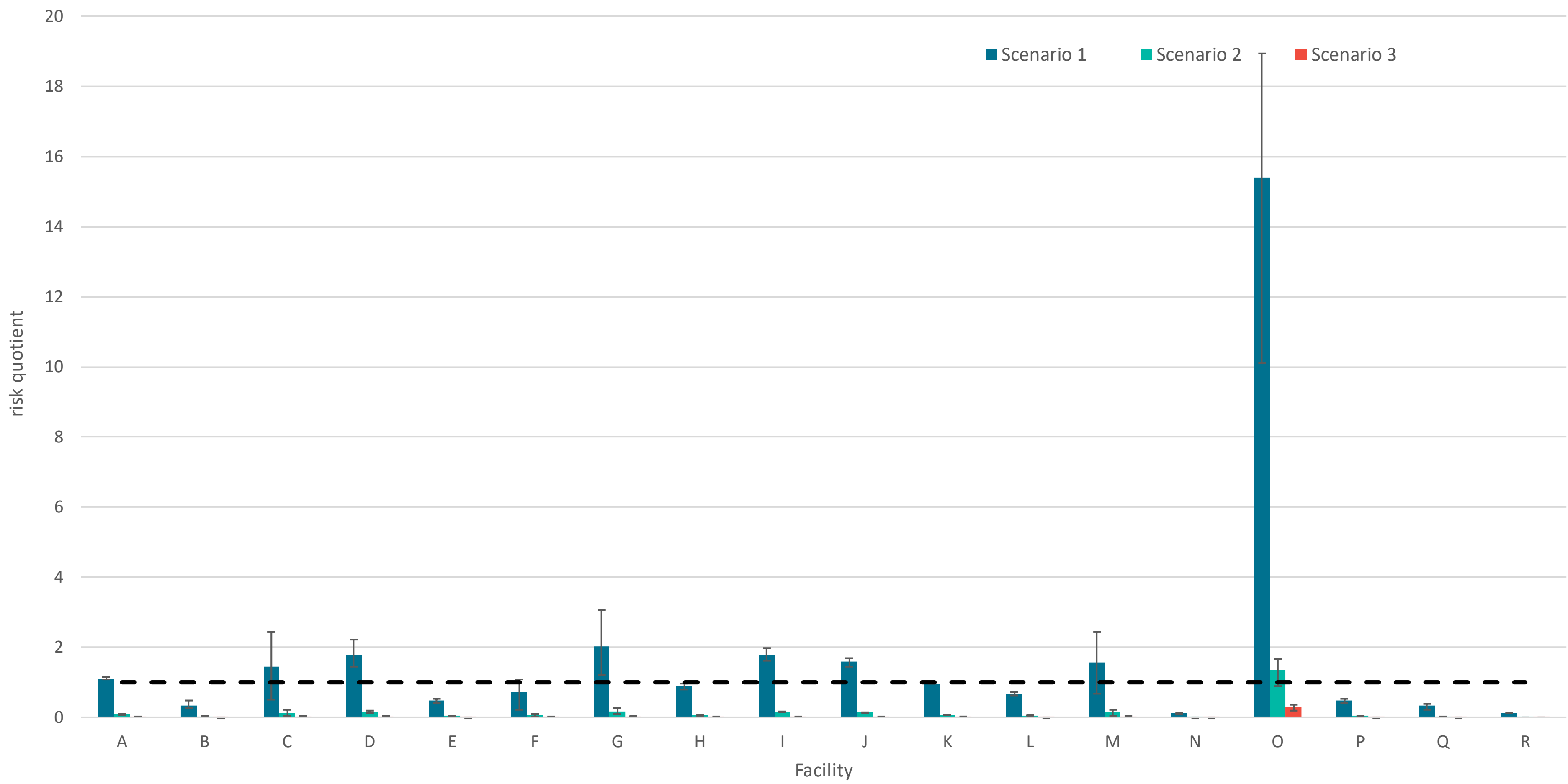

Figure 19 **Summary of Br1–Br9 RQs for human exposure via milk consumption (grazing) from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. The dashed line indicates where RQ=1.
Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated.

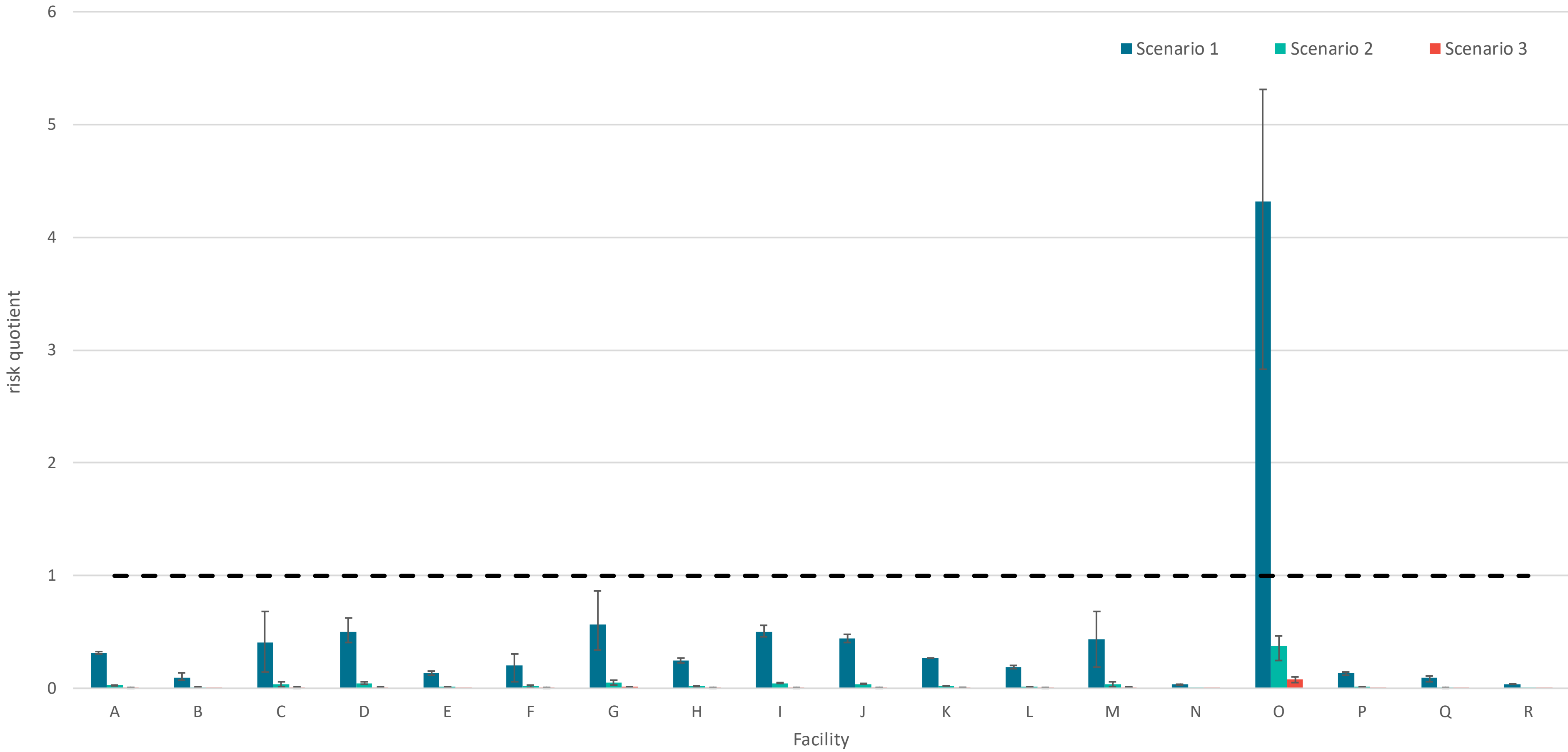

Figure 20 **Summary of Br1–Br9 RQs for human exposure via milk consumption (fodder) from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. The dashed line indicates where RQ=1.
Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated.

3.2.4 Br10

The average soil exposure concentrations of Br10 used in the risk assessment ranged from 3.5–210, 0.31–19 and 0.066–4 µg/kg for Scenarios 1 to 3, respectively (Table 4). All RQs for all land application scenarios were below 1, indicating that the risk is low and acceptable (Figure 21 to Figure 25).

Table 4 Average soil exposure concentrations (µg/kg) for Br10 for each scenario

Waste type	Facility	Scenario 1	Scenario 2	Scenario 3
FOGO	A*	20	1.8	0.38
	B	14	1.2	0.26
	C	24	2.1	0.46
	D	58	5.1	1.1
	E	22	2.0	0.42
	F*	10	0.88	0.19
	G	56	4.9	1.1
	H	18	1.6	0.34
	I	42	3.7	0.79
	J	37	3.2	0.69
	K	62	5.4	1.2
	L	12	1.0	0.22
	M	28	2.5	0.53
GO	N*	15	1.3	0.28
	O	210	19	4.0
	P	10	0.88	0.19
	Q	24	2.1	0.46
	R*	3.5	0.31	0.066

* indicates facilities where all replicates had Br10 concentrations <LOR. In these cases, half LOR was used to calculate the soil exposure concentrations.

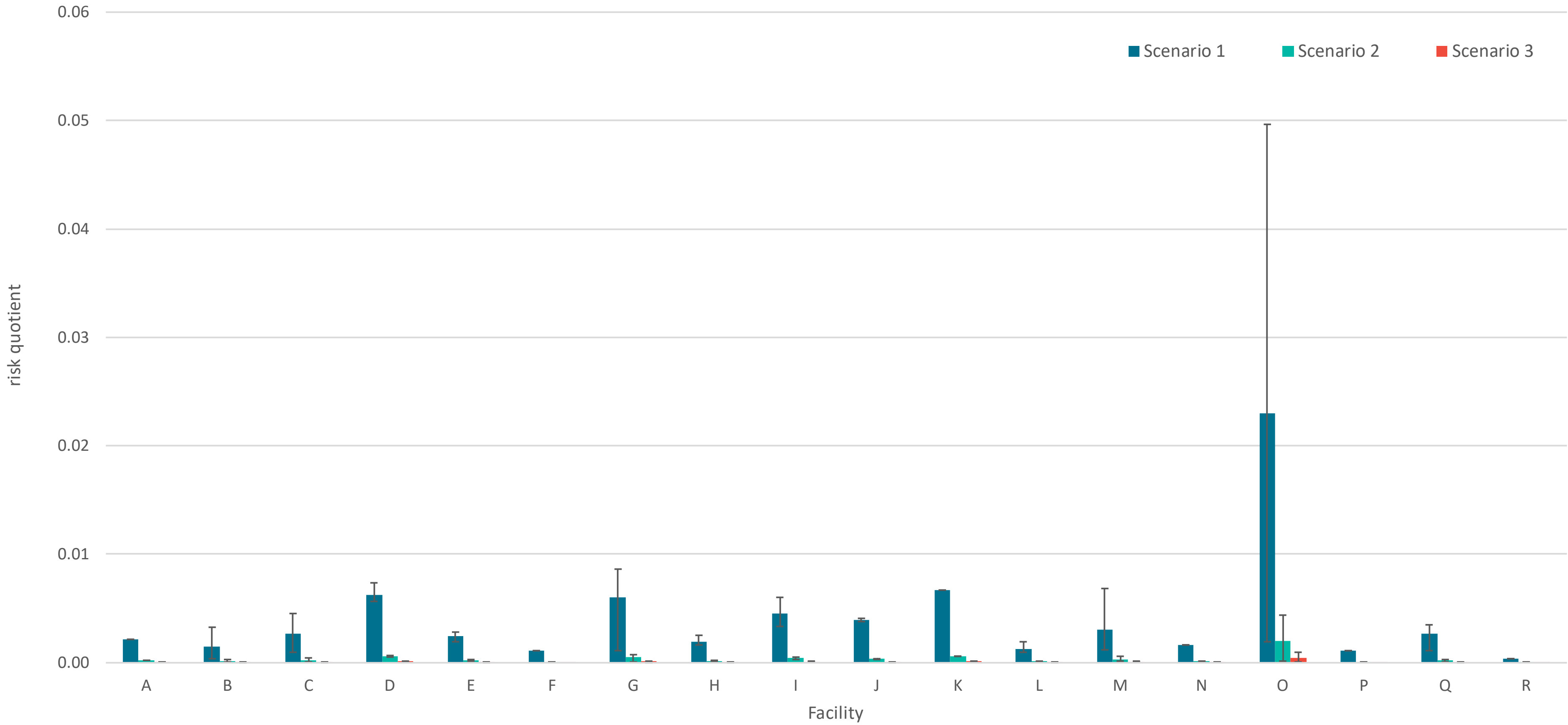

Figure 21 **Summary of Br10 RQs for human exposure via egg consumption from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated

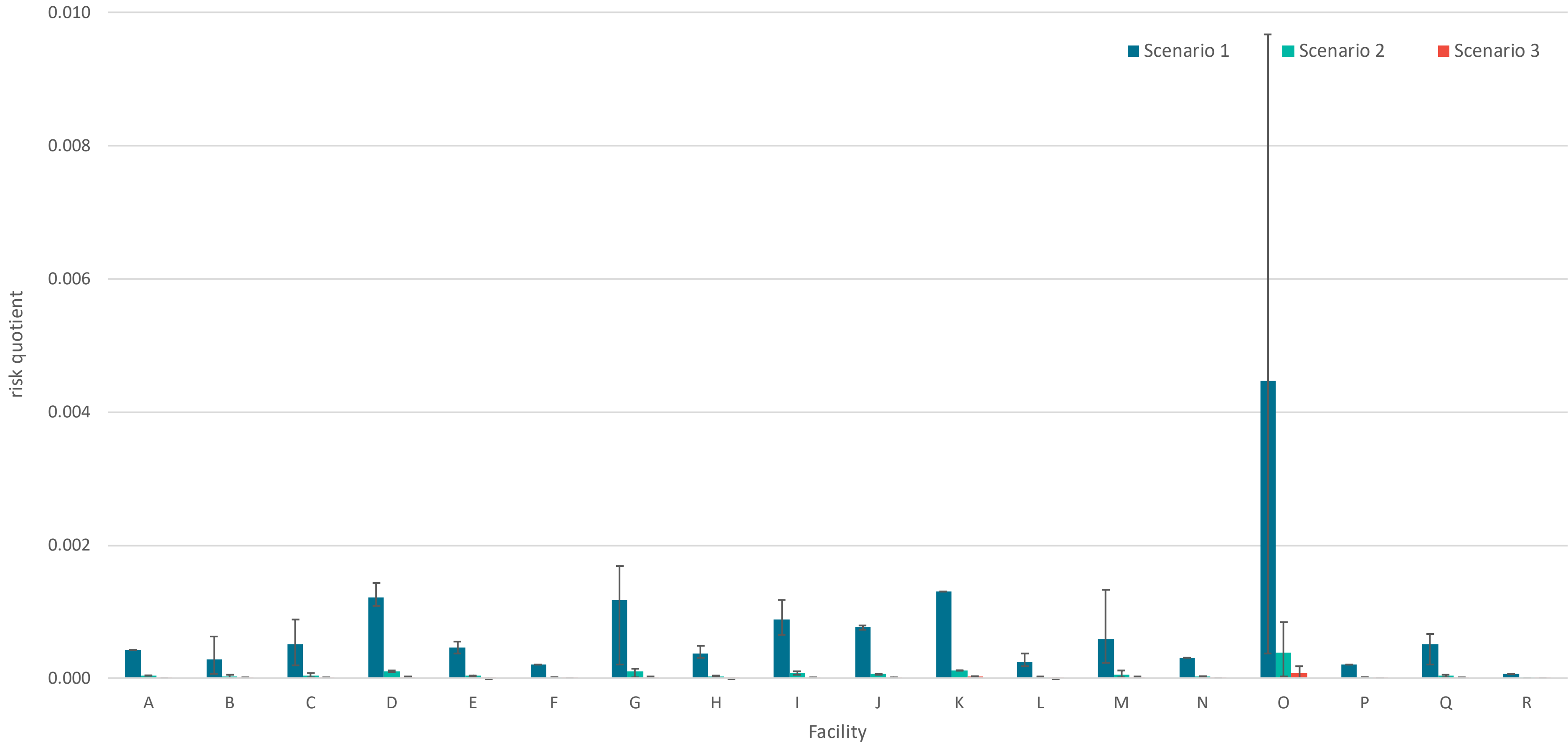

Figure 22 **Summary of Br10 RQs for human exposure via meat consumption (grazing) from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated.

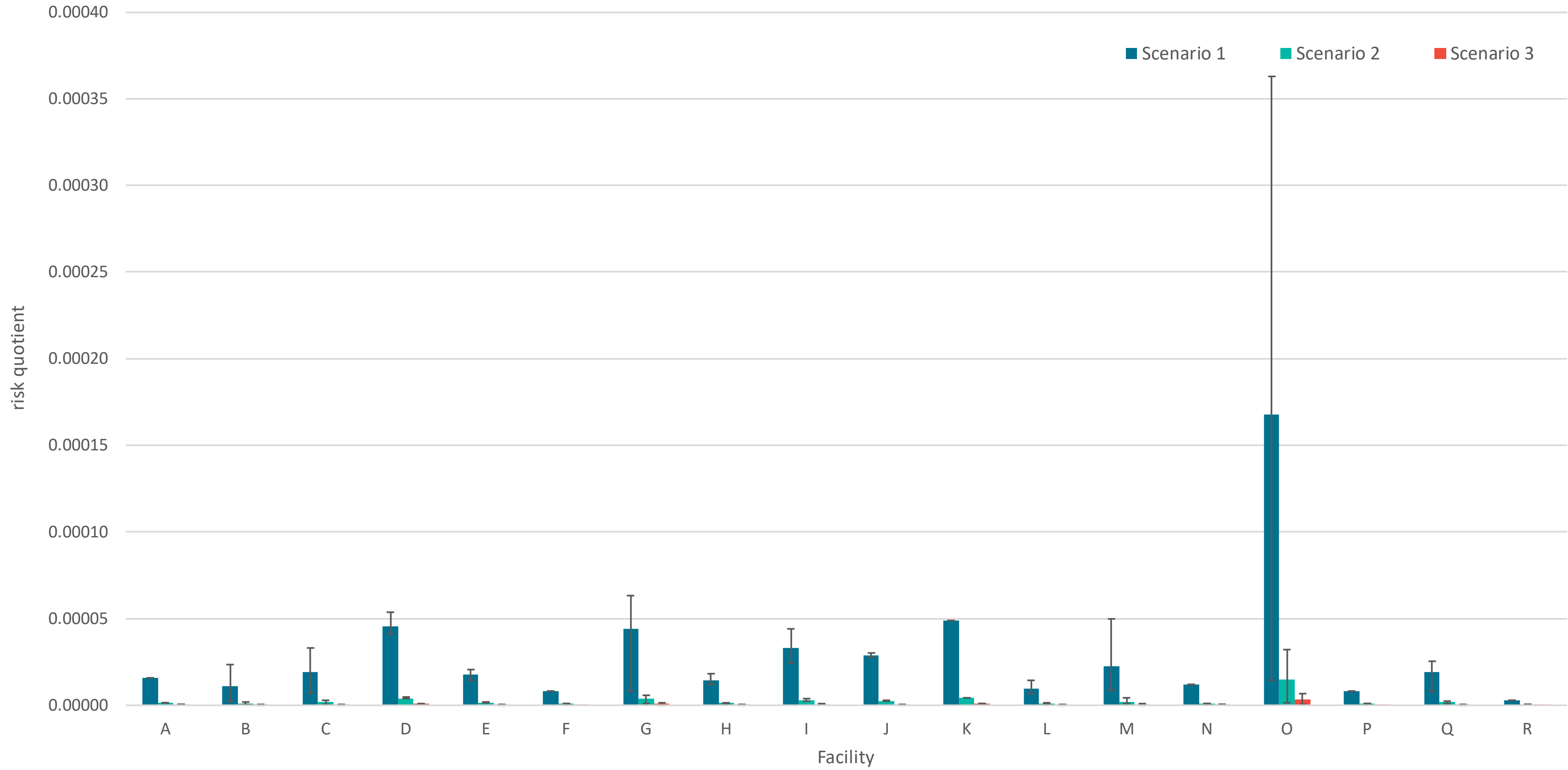

Figure 23 **Summary of Br10 RQs for human exposure via meat consumption (fodder) from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated.

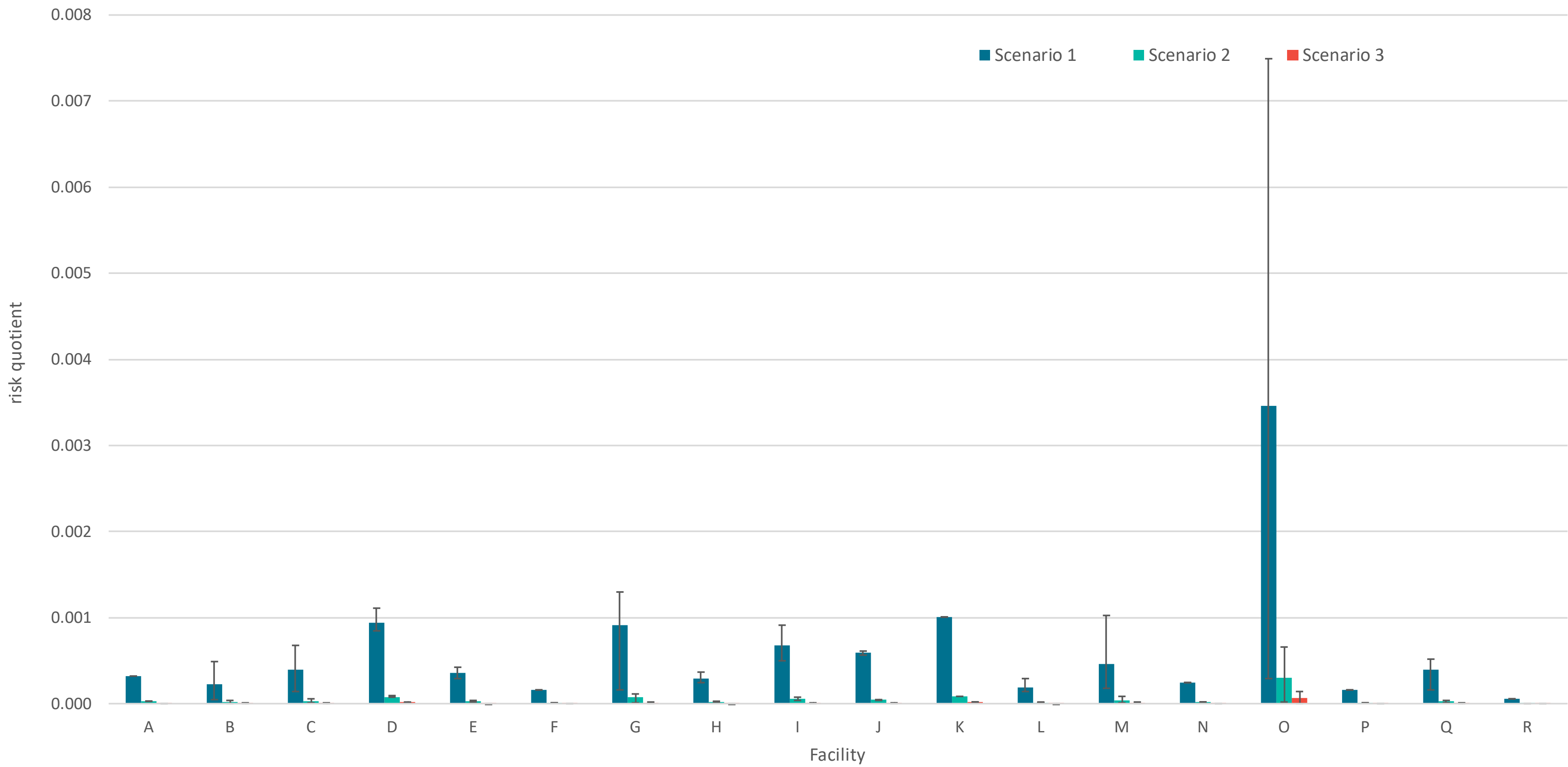

Figure 24 **Summary of Br10 RQs for human exposure via milk consumption (grazing) from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated.

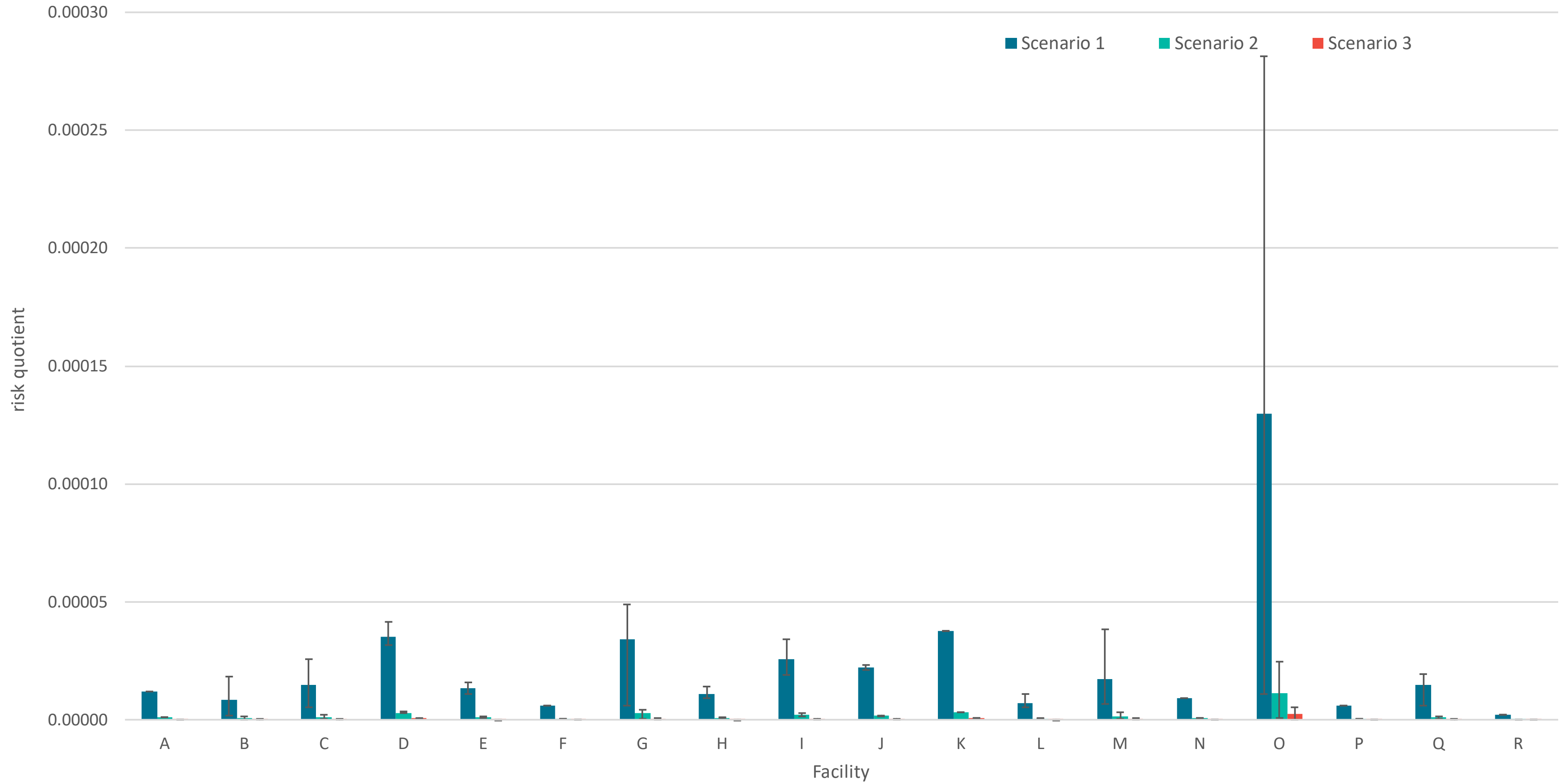

Figure 25 **Summary of Br10 RQs for human exposure via milk consumption (fodder) from land application of FOGO (A–M) and GO (N–R) compost**

Bars represent average RQs and error bars represent maximum and minimum RQs. Scenario 1 = surface; Scenario 2 = 2 cm incorporated; Scenario 3 = 10 cm incorporated.

4. References

EnRiskS (2019) *Human health and ecological risk assessment, application of alternative waste technologies materials to agricultural land*, prepared for the NSW Environment Protection Authority, 30 August 2019, available at www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/recycling/mwoo/hhera-mwoo-september-2019.pdf?la=en&hash=5380355A34311784084E347CC3DB303B4EF04C85

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NEPC (National Environment Protection Council) (2013) *National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended, Schedule B7: Guideline on derivation of health-based investigation levels*, National Environment Protection Council.

ToxConsult (2016) *Toxicity profiles for the perfluorinated compounds PFOS, PFOA, 6:2FTS and 8:2FTS*, prepared for AECOM Australia Pty Ltd, 22 July 2016, ToxCr011115-RTF. 'Appendix E' in AECOM Australia Pty Ltd, *Offsite Human Health Risk Assessment July 2016, RAAF Base Williamtown, Williamtown NSW*, Prepared for the Australian Department of Defence, August 2016, 60459079 Revision 1.

Appendix A – Risk assessment of 2019 data (without appendices)

DOC20/258927

Assessment of per- and polyfluoroalkyl substances (PFAS) and polybrominated diphenyl ethers (PBDEs) in food organics and garden organics (FOGO)

Prepared by: [redacted] Contaminants and Risk Team - Environment, Energy & Science (EES-C&R), Department of Planning, Industry & Environment (DPIE)

Reviewed by: [redacted] EES-C&R

31 March 2020 (revised 6 April 2020)

Project scope and objective

In 2019, the NSW EPA conducted a sampling campaign of compost derived from food organics and garden organics (FOGO) from 10 facilities across NSW. These samples were analysed for a range of contaminants, including metals, organic chemicals, nutrients, physical contaminants and microorganisms. In March 2020, the EPA provided a sub-set of these data (PFAS and PBDE data) to C&R and asked for advice on the likely risks from the concentrations of these groups of compounds in FOGO.

Limitations

C&R assumes the analytical data provided by the EPA are accurate and fit for purpose, and a detailed review of the quality of these data has not been undertaken.

Due to the limited timeframe available to conduct and report on this assessment, C&R has not outlined all of the equations, calculations and assumptions in this document (some key assumptions are listed below). If EPA requires these details, they can be provided.

This is a generic assessment for use of FOGO and is not site-specific. As a result, conservative assumptions have generally been used throughout.

Only risks to human receptors have been considered in this assessment.

The assessment does not consider exposure pathways that include transport via water as no leachate data were available from the FOGO samples. Despite this, the risks via water pathways are likely to be low based on the following reasons:

- PFAS – previous desk-based assessments conducted by C&R suggest risks via these pathways following land application of waste are low. However, C&R notes that these previous assessments have not considered potential risks to human health via bioaccumulation into fish as there is no agreed way in Australia to model this pathway.
- PBDEs – due to the physico-chemical properties of PBDEs, they will bind strongly to soil and are unlikely to be mobilised with water (except for potential transport bound to solid particles or colloids).

C&R key conclusions and recommendations

- The estimated daily intakes of PFOS+PFHxS and PBDEs (Br1-Br9) for some of the exposure pathways assessed exceeded the toxicity reference values, indicating that there may be an unacceptable risk from these contaminants in FOGO.
- The estimated daily intakes of PFOA+PFHxA and PBDEs (Br10) did not exceed the toxicity reference values for any of the exposure pathways assessed. This indicates that the risks from these contaminants in FOGO is low and acceptable

1

- **Recommendation** – based on the assessment of PFOS+PFHxS and PBDEs (Br1-9), the EPA should consider management options or further refinement of the risk assessment.

Approach to the assessment

- C&R assessed the FOGO PFAS and PBDE data using a similar approach to that outlined in the draft C&R report '*Identification of key exposure pathways to assess risks from PFAS in biosolids*' and the '*Human health and ecological risk assessment, application of alternative waste technologies material to agricultural land*' prepared by EnRiskS.
- Three land application scenarios were considered in the assessment based on advice from the EPA:
  - **Scenario 1** – surface application – assumed that FOGO was applied to the surface of the soil with no dilution
  - **Scenario 2** – trampled into the top 2 cm – assumed that cattle movements over the soil surface will incorporate FOGO into the top 2 cm of soil (based on advice from NSW DPI)
  - **Scenario 3** – full incorporation into the top 10 cm – assumed FOGO is mechanically incorporated into the top 10 cm of soil.
- For Scenarios 2 and 3, the amended soil concentrations were calculated based on an application rate of 25 t/ha (based on advice from NSW EPA), assuming a soil bulk density of 1.3 g/cm^3.
- C&R focused the assessment on key exposure pathways, egg consumption, meat (beef) consumption and milk consumption. For meat and milk consumption, two scenarios were assessed: (i) exposure to grazing animals (via soil and pasture); and fodder (via pasture only). Other exposure pathways (e.g. ingestion of crops and incidental ingestion of soil) were considered low risk.
- The pathways and assumption only consider home consumption of produce and do not consider risks from produce going to the market. NSW DPI (2018)[1] notes that dilution of produce is likely to occur in the commercial markets reducing the average exposure to the general public.
- For PFAS compounds, PFOS+PFHxS and PFOA+PFHxA were assessed. There are currently only human health toxicity reference values available in Australia for PFOS+PFHxS and PFOA. C&R notes that on review of the analytical data, some FOGO samples had high proportions of PFHxA. To account for this, PFHxA was summed with PFOA for the assessment. This should provide a conservative assessment as PFHxA is thought to be less toxic than PFOA[2].
- For PBDEs, the assessment was completed for BR1-9 compounds and Br10 separately. This is due to varying transfer factors and toxicity reference values for BR10 compared to the other PBDEs.
- For each pathway assessed, daily intakes (µg/kg/day) of PFAS and PBDEs were calculated. These were then compared to background adjusted toxicity reference values (e.g. tolerable daily intakes, TDIs) to calculate risk quotients (RQs) (equation 1). Where the RQ is above 1, this indicates that the estimated daily intakes exceed the toxicity reference values. In these cases, management options or further refinement to the risk assessment should be considered. Where the RQ is below 1, the risk is low and acceptable.

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[1] NSW DPI (2018). PFAS contamination and animal health. Primefact 1611. June 2018.
[2] Luz et al. (2019). Perfluorohexanoic acid toxicity part 1: Development of a chronic human health toxicity value for use in risk assessment. Regulatory Toxicology and Pharmacology. 103: 41-55.

2

$$RQ = \frac{estimated\ daily\ intake\ (\mu g/kg/day)}{toxicity\ reference\ value\ (\mu g/kg/day) - background} \qquad \text{Equation 1}$$

- These calculations were conducted for the maximum concentrations of compounds in FOGO (Tables 1 and 2) and the 95% upper confidence limit of the mean (95UCL) concentrations (Table 1 and 3). The RQs shown are for children only (<6 years) as they are the most sensitive age group (RQs corresponding to adults can be provided to the EPA if required).

Table 1: Maximum and 95UCL concentrations (µg/kg) used to calculate the risk quotients presented in Tables 2 and 3

Compound(s)	**Maximum**	**95UCL**
PFOS+PFHxS	3.9	1.77
PFOA+PFHxA	9.5	3.94
PBDEs Br1-9	123	33.6
PBDEs Br10	1010	172

- The RQs were also calculated using the maximum concentrations from each facility. These values for children are shown in Appendix A.

Outcomes from the assessment

- The risks based on the maximum concentrations represent the worst-case scenario (Table 2) and are summarised below. The results based on the 95UCLs (Table 3) are provided for comparison.
- PFOS+PFHxS
    - The meat (grazing and fodder) and milk (grazing and fodder) exposure pathways produced RQs above 1 for the surface applied scenario. This indicates that management options or further refinement of the risk assessment should be considered.
    - For the incorporated scenarios (2 cm and 10 cm) all RQs were below 1, indicating the risk is low and acceptable.
- PFOA+PFHxA
    - All RQs for all land application scenarios were below 1, indicating that the risk is low and acceptable.
- PBDEs (Br1-9)
    - The egg, meat (grazing and fodder) and milk (grazing and fodder) exposure pathways produced RQs above 1 for the surface applied scenario. In addition, for the 2 cm incorporation scenario the meat (grazing) and milk (grazing) also produced RQs above 1. This indicates that management options or further refinement of the risk assessment should be considered.
    - For the 10 cm incorporation scenario, all RQs were below 1, indicating that the risk is low and acceptable.
- PBDEs (Br10)

- All RQs for all land application scenarios were below 1, indicating that the risk is low and acceptable.

Table 2: Risk quotients using maximum PFAS and PBDE concentrations in FOGO for children only. Values in red indicate when the estimated daily intakes exceed the background-adjusted toxicity reference value (i.e. RQ > 1)

Compound(s)	Pathway	Surface application	2 cm incorporation	10 cm incorporation
PFOS+PFHxS	Eggs	0.21	0.018	0.0039
	Meat (grazing)	**1.2**	0.11	0.023
	Meat (fodder)	**1.2**	0.10	0.023
	Milk (grazing)	**2.5**	0.22	0.046
	Milk (fodder)	**2.4**	0.21	0.045
PFOA+PFHxA	Eggs	0.030	0.0026	5.7×10^{-4}
	Meat (grazing)	0.0077	6.8×10^{-4}	1.5×10^{-4}
	Meat (fodder)	0.0076	6.7×10^{-4}	1.4×10^{-4}
	Milk (grazing)	0.51	0.045	0.0096
	Milk (fodder)	0.50	0.044	0.0095
PBDEs Br1-Br9	Eggs	**3.1**	0.27	0.059
	Meat (grazing)	**24**	**2.1**	0.46
	Meat (fodder)	**6.8**	0.60	0.13
	Milk (grazing)	**13**	**1.1**	0.24

Compound(s)	Pathway	Surface application	2 cm incorporation	10 cm incorporation
	Milk (fodder)	**3.5**	0.31	0.066
PBDEs Br10	Eggs	0.11	0.010	0.0021
	Meat (grazing)	0.021	0.0019	4.0×10^{-4}
	Meat (fodder)	8.0×10^{-4}	7.0×10^{-5}	1.5×10^{-5}
	Milk (grazing)	0.016	0.0014	3.1×10^{-4}
	Milk (fodder)	6.2×10^{-4}	5.4 × 10-5	1.2×10^{-5}

6

Table 3: Risk quotients using 95UCL PFAS and PBDE concentrations in FOGO for children only. Values in red indicate when the estimated daily intakes exceed the background-adjusted toxicity reference value (i.e. RQ > 1)

Compound(s)	Pathway	Surface application	2 cm incorporation	10 cm incorporation
PFOS+PFHxS	Eggs	0.094	0.0083	0.0018
	Meat (grazing)	0.56	0.049	0.011
	Meat (fodder)	0.54	0.048	0.010
	Milk (grazing)	**1.1**	0.098	0.021
	Milk (fodder)	**1.1**	0.094	0.020
PFOA+PFHxA	Eggs	0.013	0.0011	2.4×10^{-4}
	Meat (grazing)	0.0032	2.8×10^{-4}	6.0×10^{-5}
	Meat (fodder)	0.0032	2.8×10^{-4}	6.0×10^{-5}
	Milk (grazing)	0.21	0.019	0.0040
	Milk (fodder)	0.21	0.018	0.0039
PBDEs Br1-Br9	Eggs	0.847	0.074	0.016
	Meat (grazing)	**6.6**	0.58	0.13
	Meat (fodder)	**1.9**	0.16	0.035
	Milk (grazing)	**3.4**	0.30	0.064

Compound(s)	Pathway	Surface application	2 cm incorporation	10 cm incorporation
	Milk (fodder)	0.96	0.084	0.018
PBDEs Br10	Eggs	0.019	0.0016	3.5×10^{-4}
	Meat (grazing)	0.0036	3.2×10^{-4}	6.8×10^{-5}
	Meat (fodder)	1.4×10^{-4}	1.2×10^{-5}	2.6×10^{-6}
	Milk (grazing)	0.0028	2.5×10^{-4}	5.3×10^{-5}
	Milk (fodder)	1.1×10^{-4}	9.2×10^{-6}	2.0×10^{-6}

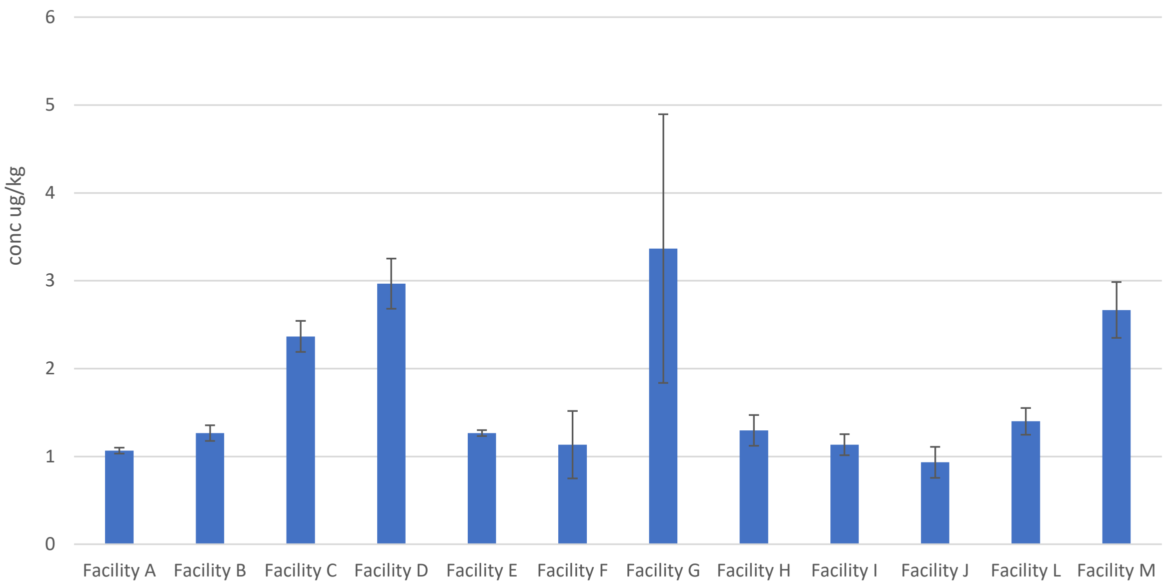
Appendix B – Raw PFAS and PBDE data

Sampling round	Organic waste group	De-identified facility / unit code	De-identified sample code	Group 14 - PFAS																																							
				Perfluoropropanesulfonic acid	Perfluorobutanesulfonic acid	Perfluoropentanesulfonic acid	Perfluorohexanesulfonic acid - PFHxS	Perfluoroheptanesulfonic acid	Perfluorooctanesulfonic acid - PFOS	Perfluorononanesulfonic acid (PFNS)	Perfluorodecanesulfonic acid	Perfluorobutanoic acid	Perfluoropentanoic acid	Perfluorohexanoic acid - PFHxA	Perfluoroheptanoic acid	Perfluorooctanoic acid - PFOA	Perfluorononanoic acid	Perfluorodecanoic acid	Perfluoroundecanoic acid	Perfluorododecanoic acid	Perfluorotridecanoic acid	Perfluorotetradecanoic acid	4:2 FTS	6:2 FTS	8:2 FTS	10:2 FTS	Perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamide	N-Ethyl perfluorooctanesulfonamide	N-Me perfluorooctanesulfonamidoethanol	N-Et perfluorooctanesulfonamidoethanol	MePerfluorooctanesulfamid oacetic acid	EtPerfluorooctanesulfamid oacetic acid	Perfluoro(2-ethoxyethane)sulfonic acid	Nonafluoro-3,6-dioxaheptanoic acid	Perfluoro-4-methoxybutanoic acid	Perfluoro-3-methoxypropanoic acid	ADONA	9Cl-PF3ONS	11Cl-PF3OUdS	HFPO DA (GenX)	Total (detected) PFHxS & PFOS	Total (detected) PFAS
				µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
2020/21	FOGO	A	FOGO-2020/21-A-1	<0.1	0.3	<0.1	0.3	<0.1	2.3	<0.1	<0.2	0.8	2.9	4.9	0.4	1.1	0.2	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	2.6	13
2020/21	FOGO	A	FOGO-2020/21-A-2	<0.1	0.3	<0.1	0.3	<0.1	2.1	<0.1	<0.2	1	8	6	0.6	1.4	0.2	0.8	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<2	<1	<1	<5	<0.2	0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	2.4	21
2020/21	FOGO	A	FOGO-2020/21-A-3	<0.1	0.3	<0.1	0.6	<0.1	2.7	<0.1	<0.2	0.6	0.9	3.3	0.5	1.9	0.2	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	<0.2	0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	3.3	11
2020/21	FOGO	B	FOGO-2020/21-B-1	<0.1	0.3	<0.1	0.2	<0.1	1.3	<0.1	<0.2	0.3	0.4	1.2	0.1	0.4	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.5	4.2
2020/21	FOGO	B	FOGO-2020/21-B-2	<0.1	0.3	<0.1	0.1	<0.1	1.2	<0.1	<0.2	0.4	0.4	1.1	<0.1	0.3	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.3	3.9
2020/21	FOGO	B	FOGO-2020/21-B-3	<0.1	0.3	<0.1	0.2	<0.1	1.7	<0.1	<0.2	0.4	0.3	0.9	<0.1	0.3	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.9	4.1
2020/21	FOGO	C	FOGO-2020/21-C-1	<0.1	0.2	<0.1	0.1	<0.1	1.4	<0.1	<0.2	0.2	0.4	1.4	0.1	0.6	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.5	4.5
2020/21	FOGO	C	FOGO-2020/21-C-2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2020/21	FOGO	C	FOGO-2020/21-C-3	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2020/21	FOGO	E	FOGO-2020/21-E-1	<0.1	2.3	<0.1	0.3	<0.1	1.3	<0.1	<0.2	0.9	<0.2	1.5	0.5	2.6	0.9	2	<0.5	1	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	0.6	0.5	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.6	15
2020/21	FOGO	E	FOGO-2020/21-E-2	<0.1	1.5	<0.1	0.2	<0.1	0.9	<0.1	<0.2	0.7	<0.2	0.9	0.3	1.5	0.5	1	<0.5	0.8	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	<0.2	0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.1	8.7
2020/21	FOGO	E	FOGO-2020/21-E-3	<0.1	2.5	<0.1	0.2	<0.1	1.2	<0.1	<0.2	1	<0.2	1.5	0.5	2.4	1	2	<0.5	1	<0.5	<5	<0.1	0.1	<0.2	<0.2	<1	<1	<1	<1	<5	0.4	0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.4	15
2020/21	FOGO	F	FOGO-2020/21-F-1	<0.2	<0.2	<0.2	0.5	<0.2	1.3	<0.2	<0.4	<0.4	<0.4	0.7	<0.2	0.6	<0.2	<1	<1	<1	<1	<10	<0.2	<0.2	<0.4	<0.4	<2	<2	<2	<2	<10	<0.4	<0.4	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<10	1.8	3
2020/21	FOGO	F	FOGO-2020/21-F-2	<0.2	<0.2	<0.2	0.5	<0.2	1.3	<0.2	<0.4	<0.4	<0.4	2.2	<0.2	0.7	<0.2	<1	<1	<1	<1	<10	<0.2	<0.2	<0.4	<0.4	<2	<2	<4	<4	<10	<0.4	<0.4	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<10	1.8	4.7
2020/21	FOGO	F	FOGO-2020/21-F-3	<0.2	<0.2	<0.2	0.4	<0.2	1.2	<0.2	<0.4	<0.4	<0.4	0.6	<0.2	0.7	<0.2	<1	<1	<1	<1	<10	<0.2	<0.2	<0.4	<0.4	<2	<2	<4	<4	<10	<0.4	<0.4	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<10	1.6	2.9
2020/21	FOGO	G	FOGO-2020/21-G-1	<0.1	0.9	<0.1	0.2	<0.1	1.3	<0.1	<0.2	1	0.6	1.8	0.2	0.8	0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<2	<2	<1	<5	0.3	0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.5	7.5
2020/21	FOGO	G	FOGO-2020/21-G-2	<0.1	0.3	<0.1	0.1	<0.1	0.4	<0.1	<0.2	1	<0.2	0.5	0.1	0.1	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<2	<2	<1	<5	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	0.5	2.7
2020/21	FOGO	G	FOGO-2020/21-G-3	<0.1	1.2	<0.1	0.3	<0.1	1.7	<0.1	<0.2	1	0.8	2.4	0.3	1	0.2	0.6	<0.5	<0.5	<0.5	<5	<0.1	0.1	<0.2	<0.2	<1	<2	<2	<1	<5	0.2	0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	2.0	10
2020/21	FOGO	H	FOGO-2020/21-H-1	<0.1	0.1	<0.1	0.3	<0.1	0.7	<0.1	<0.2	0.4	0.4	1.4	0.1	0.3	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	0.2	<0.2	<0.2	<1	<10	<10	<10	<10	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.0	3.9
2020/21	FOGO	H	FOGO-2020/21-H-2	<0.1	0.9	<0.1	0.7	<0.1	3.4	<0.1	<0.2	1	2	5	0.3	0.9	0.2	<0.5	<0.5	<0.5	<0.5	<5	<0.1	0.2	<0.2	<0.2	<1	<10	<10	<5	<5	<0.2	0.4	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	4.1	15
2020/21	FOGO	H	FOGO-2020/21-H-3	<0.1	0.2	<0.1	0.9	0.1	6.0	<0.1	<0.2	0.5	0.6	1.8	0.2	0.4	0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	3.5	<0.2	<0.2	<1	<2	<2	<2	<5	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	6.9	14
2020/21	FOGO	I	FOGO-2020/21-I-1	<0.1	0.2	<0.1	0.7	<0.1	3.3	<0.1	<0.2	0.4	0.9	2.3	0.2	1	0.2	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	4.0	9.2
2020/21	FOGO	I	FOGO-2020/21-I-2	<0.1	0.5	0.1	0.8	<0.1	3.2	<0.1	<0.2	1	1	3.9	0.3	1.2	0.2	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	<0.2	0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	4.0	13
2020/21	FOGO	I	FOGO-2020/21-I-3	<0.1	0.3	<0.1	0.5	<0.1	2.4	<0.1	<0.2	1	0.8	2.2	0.2	0.8	0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	<0.2	0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	2.9	8.9
2020/21	FOGO	J	FOGO-2020/21-J-1	<0.1	0.4	<0.1	0.2	<0.1	0.6	<0.1	<0.2	1	<0.2	7.1	<0.1	0.4	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	<0.2	0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	0.8	9.8
2020/21	FOGO	J	FOGO-2020/21-J-2	<0.1	0.4	<0.1	0.2	<0.1	1.2	<0.1	<0.2	1	0.4	5.8	0.2	0.6	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	<0.2	0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.4	10
2020/21	FOGO	J	FOGO-2020/21-J-3	<0.1	0.4	<0.1	0.2	<0.1	1	<0.1	<0.2	1	0.3	5.2	0.1	0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	<0.2	0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.2	9.3
2020/21	FOGO	K	FOGO-2020/21-K-1	<0.1	0.4	<0.1	0.3	<0.1	1.1	<0.1	<0.2	0.8	0.4	1.8	0.1	0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	0.3	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.4	5.8
2020/21	FOGO	K	FOGO-2020/21-K-2	<0.1	0.4	<0.1	0.2	<0.1	1	<0.1	<0.2	0.7	0.4	1.7	0.1	0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	0.3	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.2	5.4
2020/21	FOGO	K	FOGO-2020/21-K-3	<0.1	0.4	<0.1	0.3	<0.1	1.1	<0.1	<0.2	0.7	0.4	1.7	0.1	0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	0.3	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.4	5.5
2020/21	FOGO	L	FOGO-2020/21-L-1	<0.1	0.1	<0.1	0.2	<0.1	1.3	<0.1	<0.2	0.5	0.2	0.5	0.1	0.6	0.2	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<2	<2	<1	<5	<0.2	0.5	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.5	4.3
2020/21	FOGO	L	FOGO-2020/21-L-2	<0.1	0.1	<0.1	0.2	<0.1	1.4	<0.1	<0.2	0.4	0.3	0.3	0.1	0.5	0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<2	<2	<1	<5	<0.2	0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.6	3.6
2020/21	FOGO	L	FOGO-2020/21-L-3	<0.1	0.1	<0.1	0.1	<0.1	1.1	<0.1	<0.2	0.3	<0.2	0.3	<0.1	0.3	0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<2	<2	<1	<5	<0.2	0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.2	2.6
2020/21	FOGO	M	FOGO-2020/21-M-1	<0.1	0.5	<0.1	0.7	<0.1	1.6	<0.1	<0.2	1	1	18	0.2	0.7	0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	0.2	<0.2	<0.2	<1	<2	<1	<1	<5	0.3	0.3	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	2.3	24
2020/21	FOGO	M	FOGO-2020/21-M-2	<0.1	0.4	<0.1	0.4	<0.1	0.99	<0.1	<0.2	0.9	0.9	15	0.2	0.5	0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<2	<1	<2	<5	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.4	19
2020/21	FOGO	M	FOGO-2020/21-M-3	<0.1	0.4	<0.1	0.6	<0.1	1.3	<0.1	<0.2	1	0.9	14	0.2	0.6	0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<2	<2	<2	<5	0.3	0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.9	20
2020/21	FOGO	N	FOGO-2020/21-N-1	<0.1	0.1	<0.1	0.7	<0.1	2.7	<0.1	<0.2	0.3	0.2	0.4	0.1	0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<2	<1	<5	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	3.4	5.1
2020/21	FOGO	N	FOGO-2020/21-N-2	<0.1	0.1	<0.1	0.6	<0.1	2.1	<0.1	<0.2	0.3	0.2	0.4	0.1	0.4	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<2	<1	<5	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	2.7	4.2
2020/21	FOGO	N	FOGO-2020/21-N-3	<0.1	0.1	<0.1	0.8	<0.1	3.2	<0.1	<0.2	0.3	0.2	0.4	0.1	0.4	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<2	<2	<1	<5	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	4.0	5.6
2020/21	GO	O	GO-2020/21-O-1	<0.2	<0.2	<0.2	0.2	<0.2	2.1	<0.2	<0.4	0.4	0.3	0.5	<0.2	<0.2	<0.2	<1	<1	<1	<1	<10	<0.2	<0.2	<0.4	<0.4	<4	<4	<4	<4	<10	<0.4	<0.4	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<10	2.3	3.4
2020/21	GO	O	GO-2020/21-O-2	<0.2	<0.2	<0.2	<0.2	<0.2	1.3	<0.2	<0.4	0.4	0.2	0.4	<0.2	<0.2	<0.2	<1	<1	<1	<1	<10	<0.2	<0.2	<0.4	<0.4	<2	<2	<2	<2	<10	<0.4	<0.4	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<10	1.3	2.3
2020/21	GO	O	GO-2020/21-O-3	<0.2	<0.2	<0.2	<0.2	<0.2	2.5	<0.2	<0.4	<0.4	<0.4	<0.2	<0.2	<0.2	<0.2	<1	<1	<1	<1	<10	<0.2	<0.2	<0.4	<0.4	<2	<2	<4	<2	<10	<0.4	<0.4	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<10	2.5	2.5
2020/21	GO	P	GO-2020/21-P-1	<0.2	0.2	<0.2	0.2	<0.2	1.1	<0.2	<0.4	0.4	<0.4	0.6	<0.2	0.4	<0.2	<1	<1	<1	<1	<10	<0.2	<0.2	<0.4	<0.4	<2	<2	<2	<2	<10	<0.4	<0.4	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<10	1.3	2.9
2020/21	GO	P	GO-2020/21-P-2	<0.2	1.1	0.6	0.8	<0.2	<0.2	<0.2	0.5	<0.4	2.4	0.4	0.6	<0.2	<0.2	<1	<1	<1	<1	<10	<0.2	<0.2	<0.4	<0.4	<2	<4	<4	<2	<10	<0.4	<0.4	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<10	0.8	6.3
2020/21	GO	P	GO-2020/21-P-3	<0.1	0.2	<0.1	0.2	<0.1	1.3	<0.1	<0.2	0.4	<0.2	0.5	<0.1	0.3	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<2	<2	<1	<5	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	1.5	2.9
2020/21	GO	Q	GO-2020/21-Q-1	<0.2	8.2	<0.2	0.4	<0.2	1.4	<0.2	<0.4	2.5	0.8	1	<0.2	0.4	<0.2	<1	<1	<1	<1	<10	<0.2	<0.2	<0.4	<0.4	<2	<4	<4	<4	<10	<0.4	<0.4	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<10	1.8	15
2020/21	GO	Q	GO-2020/21-Q-2	<0.2	8.2	<0.2	0.4	<0.2	1.3	<0.2	<0.4	2.6	0.6	0.7	<0.2	0.4	<0.2	<1	<1	<1	<1	<10	<0.2	<0.2	<0.4	<0.4	<2	<4	<4	<2	<10	<0.4	<0.4	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<10	1.7	14
2020/21	GO	Q	GO-2020/21-Q-3	<0.1	9.3	<0.1	0.1	<0.1	0.5	<0.1	<0.2	2.7	0.7	1.1	<0.1	0.3	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<2	<1	<5	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	0.6	15
2020/21	GO	R	GO-2020/21-R-1	<0.2	<0.2	<0.2	0.5	<0.2	1.3	<0.2	<0.4	<0.4	1	1	0.3	0.4	<0.2	0.5	<1	<1	<1	<10	<0.2	<0.2	<0.4	<0.4	<2	<4	<2	<2	<10	<0.4	<0.4	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<10	1.8	5.2
2020/21	GO	R	GO-2020/21-R-2	<0.2	0.2	<0.2	0.7	<0.2	1.5	<0.2	<0.4	1	1	1.2	0.4	0.5	<0.2	<1	<1	<1	<1	<10	<0.2	<0.2	<0.4	<0.4	<2	<4	<4	<2	<10	<0.4	<0.4	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<10	2.2	7
2020/21	GO	R	GO-2020/21-R-3	<0.2	<0.2	<0.2	0.5	<0.2	1.2	<0.2	<0.4	1	1	0.9	<0.2	0.5	<0.2	<1	<1	<1	<1	<10	<0.2	<0.2	<0.4	<0.4	<2	<4	<2	<2	<10	<0.4	<0.4	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<10	1.7	5.3
2020/21	GO	S	GO-2020/21-S-1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<5	<0.1	<0.1
2020/21	GO	S	GO-2020/21-S-2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2020/21	GO	S	GO-2020/21-S-3	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

Sampling round	Organic waste group	De-identified facility / unit code	De-identified sample code	Group 15 - PBDEs																																				
				Tri BDE 17	Tri BDE 28 + 33	Tri BDE 30	Tetra BDE 47	Tetra BDE 49	Tetra BDE 66	Tetra BDE 71	Tetra BDE 77	Penta BDE 85	Penta BDE 99	Penta BDE 100	Penta BDE 119	Penta BDE 126	Hexa BDE 138 + 166	Hexa BDE 139	Hexa BDE 140	Hexa BDE 153	Hexa BDE 154	Hexa BDE 156 + 169	Hepta BDE 171	Hepta BDE 180	Hepta BDE 183	Hepta BDE 184	Hepta BDE 191	Octa BDE 196	Octa BDE 197	Octa BDE 201	Octa BDE 203	Octa BDE 204	Octa BDE 205	Nona BDE 206	Nona BDE 207	Nona BDE 208	Deca BDE 209	Hexa BB 153	Total (detected) PBDE Br 1-9	Total (detected) PBDEs
				ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
2020/21	FOGO	A	FOGO-2020/21-A-1	0.053	0.13	<0.03	5.8	1.4	0.17	<0.09	<0.02	<0.05	7.5	1.9	<0.05	<0.03	0.077	0.092	<0.04	0.94	0.86	<0.05	<0.05	<0.05	0.54	<0.05	<0.05	0.15	0.29	0.13	0.15	<0.1	<0.1	2.2	1.5	<1	42	0.057	23.9	65.9
2020/21	FOGO	A	FOGO-2020/21-A-2	0.04	0.1	<0.02	3.7	0.84	0.13	<0.02	<0.01	0.14	4.8	1.2	<0.05	<0.02	0.06	0.06	0.02	0.51	0.45	<0.05	<0.05	<0.05	0.16	<0.05	<0.05	0.11	0.1	0.09	0.12	<0.1	<0.1	1.2	<1	<1	22	0.07	13.8	35.8
2020/21	FOGO	A	FOGO-2020/21-A-3	0.04	0.05	<0.02	1.6	0.61	0.069	<0.02	<0.01	0.05	1.4	0.47	<0.05	<0.02	<0.05	0.01	<0.02	0.18	0.18	<0.05	<0.05	<0.05	0.09	<0.05	<0.05	0.07	0.08	0.11	0.09	<0.1	<0.1	<1	<1	<1	9.1	<0.04	5.1	14.2
2020/21	FOGO	B	FOGO-2020/21-B-1	0.029	<0.06	<0.05	1	0.53	0.041	<0.02	<0.01	<0.05	0.97	0.32	<0.02	<0.02	<0.05	<0.02	<0.02	0.18	0.14	<0.05	<0.04	0.026	0.24	<0.02	<0.02	0.086	0.14	<0.05	0.094	<0.1	<0.06	1.3	1.1	<1	18	0.039	6.2	24.2
2020/21	FOGO	B	FOGO-2020/21-B-2	0.13	0.24	<0.05	2.7	0.94	0.13	<0.03	<0.02	<0.06	1.6	0.58	<0.03	<0.02	<0.05	<0.03	<0.03	0.22	0.18	<0.05	<0.04	<0.04	0.2	<0.03	<0.04	0.054	0.099	<0.05	<0.06	<0.1	<0.05	<1	<1	<1	8.7	<0.03	7.1	15.8
2020/21	FOGO	B	FOGO-2020/21-B-3	0.11	0.25	<0.05	2.5	0.94	0.09	<0.02	<0.01	<0.05	1.6	0.55	<0.02	<0.02	<0.05	<0.03	<0.03	0.21	0.19	<0.05	<0.04	<0.04	0.14	<0.03	<0.03	<0.05	0.054	<0.05	<0.05	<0.1	<0.06	<1	<1	<1	8.9	0.026	6.6	15.5
2020/21	FOGO	C	FOGO-2020/21-C-1	<0.02	0.084	<0.05	1.9	0.43	<0.02	<0.01	<0.01	0.055	2	0.58	<0.02	<0.02	<0.05	<0.02	<0.02	0.22	0.22	<0.05	<0.04	<0.03	0.097	<0.02	<0.02	0.073	0.1	0.093	0.11	<0.1	<0.07	2.4	1.1	<1	62	<0.01	9.5	71.5
2020/21	FOGO	C	FOGO-2020/21-C-2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2020/21	FOGO	C	FOGO-2020/21-C-3	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2020/21	FOGO	E	FOGO-2020/21-E-1	0.055	0.14	<0.01	4.3	0.66	0.2	<0.02	<0.01	0.22	4.7	1.2	<0.02	<0.01	0.052	0.048	<0.02	0.47	0.42	<0.02	<0.03	0.032	0.17	<0.02	<0.03	0.17	0.13	0.13	0.2	<0.1	<0.05	1.9	1.9	<1	56	0.17	17.1	73.1
2020/21	FOGO	E	FOGO-2020/21-E-2	0.048	0.13	<0.01	4.1	0.43	0.18	<0.02	<0.01	0.19	4.7	1.1	<0.02	<0.01	0.044	0.041	<0.02	0.41	0.39	<0.02	<0.03	0.024	0.18	<0.02	<0.03	0.18	0.14	0.15	0.23	<0.1	<0.05	1.6	1.7	<1	39	0.12	16.0	55.0
2020/21	FOGO	E	FOGO-2020/21-E-3	0.065	0.18	<0.01	5.5	0.81	0.25	<0.02	<0.01	0.22	6	1.5	0.023	<0.01	0.041	0.063	<0.02	0.59	0.54	<0.02	<0.03	0.04	0.34	<0.02	<0.03	0.19	0.19	0.17	0.22	<0.1	<0.05	1.2	1.4	<1	31	0.29	19.5	50.5
2020/21	FOGO	F	FOGO-2020/21-F-1	<0.01	0.066	<0.05	1.5	0.09	<0.02	<0.01	<0.01	0.1	2.2	0.51	<0.02	<0.02	<0.05	0.02	<0.02	0.24	0.21	<0.02	<0.04	<0.02	0.12	<0.02	<0.02	0.05	0.056	<0.05	0.061	<0.1	<0.05	<1	<1	<1	23	<0.02	5.2	28.2
2020/21	FOGO	F	FOGO-2020/21-F-2	<0.04	0.08	<0.05	1.3	0.081	<0.02	<0.01	<0.01	0.055	1.6	0.37	<0.02	<0.02	<0.05	0.019	<0.02	0.18	0.16	<0.02	<0.04	<0.02	0.1	<0.02	<0.02	<0.05	0.068	<0.05	<0.05	<0.1	<0.05	1.1	<1	<1	26	<0.01	5.1	31.1
2020/21	FOGO	F	FOGO-2020/21-F-3	<0.01	0.058	<0.05	1.3	0.087	<0.04	<0.01	<0.01	0.062	1.6	0.38	<0.02	<0.02	<0.05	<0.02	<0.02	0.18	0.16	<0.02	<0.04	<0.02	0.17	<0.02	<0.02	<0.05	0.075	<0.05	<0.05	<0.1	<0.05	<1	<1	<1	18	<0.01	4.1	22.1
2020/21	FOGO	G	FOGO-2020/21-G-1	<0.01	0.091	<0.01	2.7	<0.02	<0.01	<0.02	<0.01	0.16	3.6	0.78	<0.02	<0.02	0.027	0.038	<0.01	0.37	0.34	<0.01	<0.02	0.022	0.15	<0.02	<0.02	0.11	0.1	0.15	0.16	<0.1	<0.05	<2	<2	<1	<20	0.051	8.8	8.8
2020/21	FOGO	G	FOGO-2020/21-G-2	<0.01	0.056	<0.01	0.73	0.057	<0.01	<0.02	<0.01	0.032	0.81	0.18	<0.02	<0.02	<0.02	<0.01	<0.01	0.079	0.072	<0.01	<0.02	<0.01	<0.05	<0.02	<0.02	<0.05	<0.05	0.052	0.06	<0.1	<0.05	<2	<2	<1	<20	<0.01	2.1	2.1
2020/21	FOGO	G	FOGO-2020/21-G-3	0.02	0.1	<0.01	3.2	0.26	<0.01	<0.02	<0.01	0.19	4.3	0.95	<0.02	<0.02	0.034	0.043	0.011	0.4	0.36	<0.01	<0.02	0.029	0.21	<0.02	<0.02	0.14	0.14	0.17	0.22	<0.1	<0.05	<2	<2	<1	<20	0.087	10.8	10.8
2020/21	FOGO	H	FOGO-2020/21-H-1	0.012	0.072	<0.02	1.9	0.21	0.066	<0.02	<0.01	0.13	2.7	0.64	0.02	<0.01	0.034	0.039	<0.01	0.41	0.3	<0.01	0.029	0.067	0.77	<0.02	<0.02	0.24	0.36	0.14	0.32	<0.1	<0.05	<2	2.2	1.2	<20	0.046	11.9	11.9
2020/21	FOGO	H	FOGO-2020/21-H-2	0.1	0.22	<0.02	3.6	0.99	0.22	<0.05	0.04	0.19	4.6	1.1	0.2	<0.02	0.11	0.096	0.058	1.5	0.91	<0.03	0.058	0.29	0.87	0.074	<0.02	0.75	0.57	0.66	1.1	<0.1	<0.05	4.3	4.8	2.8	78	0.15	30.2	108.2
2020/21	FOGO	H	FOGO-2020/21-H-3	0.014	0.092	<0.02	2.1	0.24	0.068	<0.02	<0.01	0.13	2.9	0.68	<0.02	<0.01	0.037	0.047	<0.01	0.41	0.33	<0.01	<0.02	0.05	0.28	<0.02	<0.02	0.17	0.19	0.15	0.26	<0.1	<0.05	3.2	3.9	2.3	80	0.029	17.5	97.5
2020/21	FOGO	I	FOGO-2020/21-I-1	0.037	0.097	<0.02	4.1	1	<0.02	<0.02	<0.01	0.17	4.4	1.2	<0.05	<0.02	0.05	0.046	<0.02	0.6	0.47	<0.05	<0.05	0.13	0.61	<0.05	0.055	0.52	0.6	1	0.82	<0.1	<0.1	2.7	2.1	1.2	68	0.045	21.9	89.9
2020/21	FOGO	I	FOGO-2020/21-I-2	<0.02	0.065	<0.03	2.7	0.53	<0.03	<0.03	<0.02	0.13	3.7	0.88	<0.05	<0.03	<0.05	0.06	<0.04	0.48	0.41	<0.05	<0.06	0.096	0.28	<0.05	0.052	0.52	0.48	1	0.98	<0.1	<0.1	2.3	1.7	<1	53	<0.04	16.4	69.4
2020/21	FOGO	I	FOGO-2020/21-I-3	<0.02	0.097	<0.02	2.1	0.47	<0.02	<0.02	<0.01	0.082	2.4	0.59	<0.05	<0.03	<0.05	0.037	<0.03	0.32	0.27	<0.05	<0.07	0.088	0.51	<0.05	0.054	0.63	0.54	1.3	1.1	<0.1	<0.1	2	1.7	<1	52	<0.04	14.3	66.3
2020/21	FOGO	J	FOGO-2020/21-J-1	0.023	0.073	<0.01	2.5	0.33	<0.01	<0.02	<0.01	0.14	3.4	0.9	<0.02	<0.01	<0.02	0.046	<0.02	0.49	0.5	<0.02	<0.03	0.11	0.5	0.044	<0.03	0.58	0.46	0.8	0.91	<0.1	<0.05	1.8	1.9	1.2	37	0.038	16.7	53.7
2020/21	FOGO	J	FOGO-2020/21-J-2	0.014	0.065	<0.01	2.6	0.29	<0.01	<0.02	<0.01	0.11	2.8	0.72	<0.02	<0.01	0.039	0.036	<0.02	0.38	0.33	<0.02	<0.03	0.092	0.3	0.033	0.06	0.58	0.44	0.85	0.99	<0.1	<0.05	1.9	1.9	1.2	38	<0.03	15.7	53.7
2020/21	FOGO	J	FOGO-2020/21-J-3	0.019	0.072	<0.01	2.3	0.24	<0.01	<0.02	<0.01	0.1	2.5	0.64	<0.02	<0.01	0.03	0.028	<0.02	0.28	0.26	<0.02	<0.03	0.079	0.45	0.035	0.051	0.52	0.42	0.7	0.85	<0.1	<0.05	1.8	1.8	1.1	35	0.032	14.3	49.3
2020/21	FOGO	K	FOGO-2020/21-K-1	0.062	0.12	<0.01	3.4	0.82	0.12	<0.02	<0.01	0.17	3.7	0.95	<0.01	<0.01	0.034	0.036	0.015	0.42	0.39	<0.01	<0.02	0.018	0.11	0.011	0.011	0.1	0.11	0.16	0.14	<0.1	<0.05	<1	<2	<1	<40	0.022	10.9	10.9
2020/21	FOGO	K	FOGO-2020/21-K-2	0.078	0.11	<0.01	3.4	0.84	0.11	<0.02	<0.01	0.17	3.6	0.93	<0.01	<0.01	0.035	0.042	<0.01	0.41	0.38	<0.01	<0.02	0.022	0.12	<0.01	<0.01	0.1	0.11	0.16	0.13	<0.1	<0.05	<1	<2	<1	<40	<0.02	10.7	10.7
2020/21	FOGO	K	FOGO-2020/21-K-3	0.068	0.13	<0.01	3.6	0.98	0.12	<0.02	<0.01	0.17	3.7	1	<0.01	<0.01	0.032	0.04	0.017	0.43	0.39	<0.01	<0.02	0.023	0.13	0.011	0.012	0.11	0.12	0.17	0.15	<0.1	<0.05	<1	<2	<1	<40	0.02	11.4	11.4
2020/21	FOGO	L	FOGO-2020/21-L-1	<0.02	0.07	<0.02	1.4	0.44	<0.02	<0.02	<0.01	0.046	1.5	0.43	<0.02	<0.01	<0.02	<0.01	<0.01	0.21	0.19	<0.01	<0.02	0.02	0.29	<0.02	<0.01	<0.05	0.13	<0.05	<0.05	<0.1	<0.05	<1	<1	<1	8.4	0.022	4.7	13.1
2020/21	FOGO	L	FOGO-2020/21-L-2	<0.02	0.04	<0.02	0.81	0.15	0.033	<0.02	<0.01	0.033	0.98	0.25	<0.02	<0.01	<0.02	<0.01	<0.01	0.12	0.11	<0.01	<0.02	<0.02	0.092	<0.02	<0.01	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<1	<1	<1	<6	0.017	2.6	2.6
2020/21	FOGO	L	FOGO-2020/21-L-3	<0.02	0.052	<0.02	0.8	0.22	<0.02	<0.02	<0.01	<0.03	0.84	0.24	<0.02	<0.01	<0.02	<0.02	<0.02	0.12	0.1	<0.02	<0.03	<0.03	0.15	<0.02	<0.02	<0.05	0.067	<0.05	<0.05	<0.1	<0.05	<1	<1	<1	30	0.028	2.6	32.6
2020/21	FOGO	M	FOGO-2020/21-M-1	<0.02	0.05	<0.02	1.3	0.19	<0.02	0.01	<0.01	0.06	1.6	0.38	<0.05	<0.02	<0.05	0.02	<0.02	0.19	0.16	<0.05	<0.05	<0.05	0.25	<0.05	<0.05	0.23	0.17	0.23	0.3	<0.1	<0.2	1.7	1.1	<1	16	0.04	7.9	23.9
2020/21	FOGO	M	FOGO-2020/21-M-2	<0.02	0.07	<0.02	1.5	0.22	0.05	0.01	<0.01	0.07	1.9	0.47	<0.05	<0.02	<0.05	<0.1	<0.1	0.22	0.21	<0.05	<0.05	0.05	0.27	<0.05	<0.05	0.49	0.21	0.26	0.61	<0.1	<0.2	1.6	1.3	<1	15	0.04	9.5	24.5
2020/21	FOGO	M	FOGO-2020/21-M-3	0.02	0.06	<0.02	1.4	0.22	<0.02	<0.01	<0.01	0.07	1.9	0.45	<0.05	<0.02	<0.05	<0.05	<0.04	0.22	0.18	<0.05	<0.05	0.07	0.28	<0.05	<0.05	0.26	0.18	0.21	0.37	<0.1	<0.2	1.6	1.3	<1	23	0.04	8.8	31.8
2020/21	FOGO	N	FOGO-2020/21-N-1	<0.02	0.12	<0.02	1.4	0.13	<0.01	<0.01	<0.01	0.1	2.5	0.57	<0.02	<0.01	0.028	0.032	0.011	0.31	0.27	<0.01	<0.02	<0.02	0.1	<0.02	<0.01	0.099	0.1	0.089	0.15	<0.1	<0.05	3.7	3.5	2.3	63	0.037	15.5	78.5
2020/21	FOGO	N	FOGO-2020/21-N-2	<0.02	0.049	<0.02	3.2	0.2	<0.01	<0.01	<0.01	0.89	13	2.7	0.026	<0.01	0.2	0.26	0.068	1.7	1.4	<0.01	<0.02	<0.02	0.16	<0.02	<0.01	<0.05	0.056	<0.05	0.067	<0.1	<0.05	<1	<1	<1	11	<0.03	24.0	35.0
2020/21	FOGO	N	FOGO-2020/21-N-3	<0.02	0.043	<0.02	1.6	0.13	<0.01	<0.01	<0.01	0.13	3.1	0.71	<0.02	<0.01	0.043	0.05	0.013	0.4	0.33	<0.01	<0.02	<0.02	0.11	<0.02	<0.01	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<1	<1	<1	11	0.038	6.7	17.7
2020/21	GO	O	GO-2020/21-O-1	<0.01	0.065	<0.01	0.51	0.029	0.012	<0.01	<0.01	0.015	0.35	0.095	<0.01	<0.01	<0.01	<0.01	<0.01	0.036	0.037	<0.01	<0.02	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<1	<2	<1	<30	0.013	1.1	1.1
2020/21	GO	O	GO-2020/21-O-2	<0.01	0.091	<0.01	0.56	0.027	<0.01	<0.01	<0.01	0.014	0.35	0.095	<0.01	<0.01	<0.01	<0.01	<0.01	0.036	0.037	<0.01	<0.02	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<1	<2	<1	<30	0.017	1.2	1.2
2020/21	GO	O	GO-2020/21-O-3	<0.01	0.079	<0.01	0.51	0.032	<0.01	<0.01	<0.01	<0.01	0.31	0.085	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	0.027	<0.01	<0.02	<0.01	0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<1	<2	<1	<30	0.017	1.1	1.1
2020/21	GO	P	GO-2020/21-P-1	0.86	1.6	<0.02	40	14	1.1	<0.2	<0.02	1.1	29	9.9	0.09	<0.02	0.36	0.31	0.12	3.4	2.9	<0.03	0.22	0.56	3.6	0.078	0.15	1.9	2.1	1	2.2	<0.1	<0.07	25	17	10	460	0.017	168.5	628.5
2020/21	GO	P	GO-2020/21-P-2	1.5	2.8	<0.02	68	25	1.9	<0.2	<0.01	2	53	18	0.11	<0.02	0.4	0.51	0.16	4.6	5.2	<0.03	<0.03	<0.02	0.17	0.026	<0.02	0.06	0.073	0.059	0.081	<0.1	<0.05	1.1	1.5	<1	18	<0.01	186.2	204.2
2020/21	GO	P	GO-2020/21-P-3	0.59	1.1	<0.02	30	9.8	0.81	<0.2	<0.01	1	26	8.3	0.045	<0.02	0.2	0.27	0.087	2.4	2.5	<0.02	<0.03	<0.03	0.15	0.03	<0.02	0.13	0.16	0.15	0.2	<0.1	<0.05	6.1	5.7	3.6	160	<0.01	99.3	259.3
2020/21	GO	Q	GO-2020/21-Q-1	<0.01	0.044	<0.01	1.1	0.14	0.028	<0.01	<0.01	0.057	1.3	0.32	<0.01	<0.01	0.02	0.02	0.012	0.21	0.15	<0.01	<0.02	0.031	<0.3	0.016	<0.01	0.14	0.2	0.16	0.18	<0.1	<0.05	<1	<2	<1	<20	0.21	4.1	4.1
2020/21	GO	Q	GO-2020/21-Q-2	<0.01	0.043	<0.01	1.2	0.17	0.041	<0.01	<0.01	0.063	1.5	0.35	<0.01	<0.01	0.024	0.02	<0.01	0.25	0.19	<0.01	<0.02	0.05	0.38	0.02	0.023	0.17	0.25	0.21	0.22	<0.1	<0.05	<1	<2	<1	<20	0.016	5.2	5.2
2020/21	GO	Q	GO-2020/21-Q-3	<0.01	0.038	<0.01	1.1	0.24	0.033	<0.01	<0.01	0.047	1.2	0.33	<0.01	<0.01	0.025	0.016	<0.01	0.26	0.19	<0.01	0.02	0.041	0.49	0.027	0.017	0.19	0.32	0.22	0.22	<0.1	<0.05	<1	<2	<1	<20	0.1	5.0	5.0
2020/21	GO	R	GO-2020/21-R-1	<0.01	0.045	<0.01	0.7	0.046	0.021	<0.01	<0.01	0.035	0.74	0.19	<0.01	<0.01	<0.01	0.01	<0.01	0.11	0.084	<0.01	<0.02	0.015	<0.3	<0.01	<0.01	<0.1	<0.2	0.06	<0.1	<0.1	<0.05	<1	<2	<1	<20	0.03	2.1	2.1
2020/21	GO	R	GO-2020/21-R-2	<0.01	0.047	<0.01	0.72	0.047	0.023	<0.01	<0.01	0.042	0.89	0.21	<0.01	<0.01	<0.01	0.013	<0.01	0.11	0.084	<0.01	<0.02	0.014	<0.3	<0.01	<0.01	<0.1	<0.2	0.071	<0.1	<0.1	<0.05	1.5	<2	<1	31	0.014	3.8	34.8
2020/21	GO	R	GO-2020/21-R-3	<0.01	0.068	<0.01	0.77	0.061	0.026	<0.01	<0.01	0.033	0.8	0.2	<0.01	<0.01	0.011	0.01	<0.01	0.11	0.085	<0.01	<0.02	0.021	<0.3	<0.01	<0.01	<0.1	<0.2	0.076	<0.1	<0.1	<0.05	1.6	<2	<1	32	0.026	3.9	35.9
2020/21	GO	S	GO-2020/21-S-1	<0.01	<0.06	<0.05	0.5	0.036	<0.02	<0.01	<0.01	<0.05	0.54	0.13	<0.02	<0.02	<0.05	<0.02	<0.02	0.037	0.047	<0.05	<0.04	<0.02	<0.05	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<1	<1	<1	<7	<0.02	1.3	1.3
2020/21	GO	S	GO-2020/21-S-2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2020/21	GO	S	GO-2020/21-S-3	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

Appendix C – Statistical comparisons between facilities

PFOS – FOGO



Anova: Single Factor

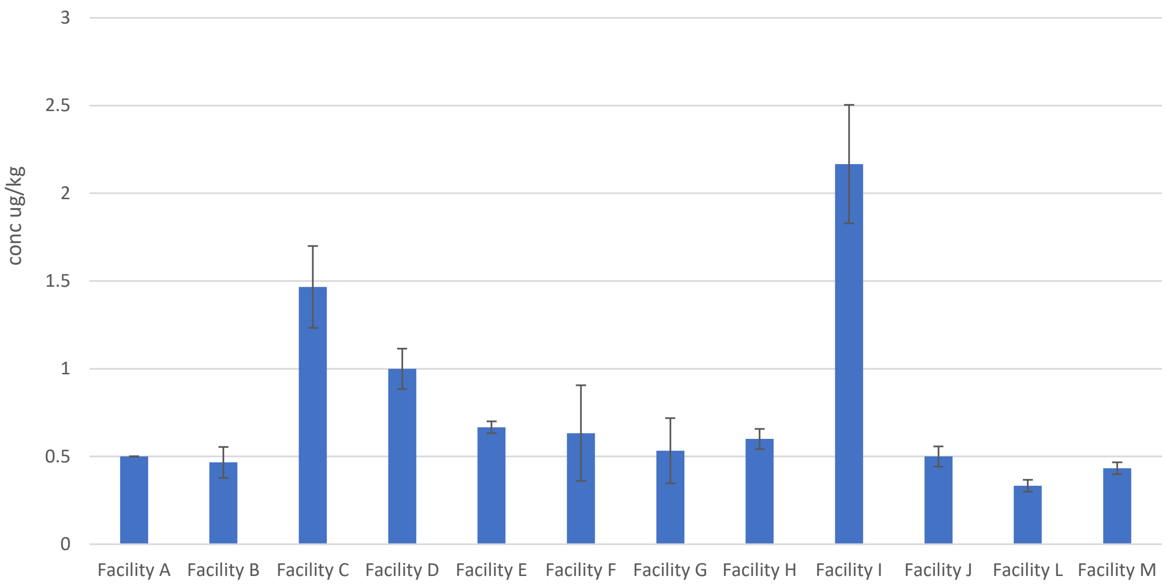
SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Facility A	3	3.2	1.06667	0.00333
Facility B	3	3.8	1.26667	0.02333
Facility C	3	7.1	2.36667	0.09333
Facility D	3	8.9	2.96667	0.24333
Facility E	3	3.8	1.26667	0.00333
Facility F	3	3.4	1.13333	0.44333
Facility G	3	10.1	3.36667	7.02333
Facility H	3	3.89	1.29667	0.09303
Facility I	3	3.4	1.13333	0.04333
Facility J	3	2.8	0.93333	0.09333
Facility L	3	4.2	1.4	0.07
Facility M	3	8	2.66667	0.30333

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	24.0077	11	2.18252	3.10444	0.00982	2.21631
Within Groups	16.8727	24	0.70303			
Total	40.8804	35				

PFOA – FOGO



Anova: Single Factor

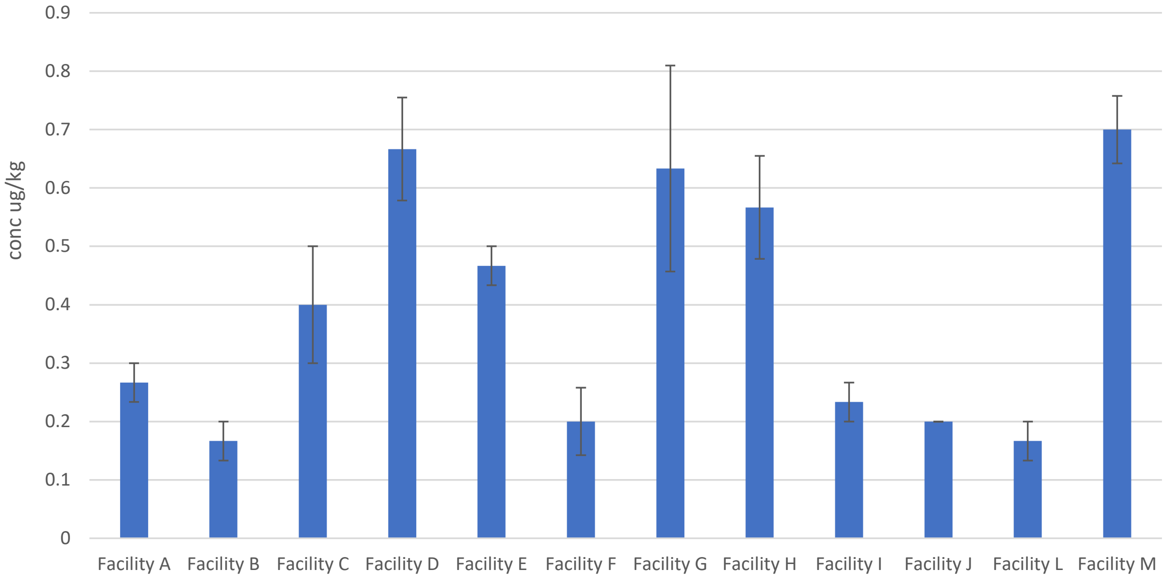
SUMMARY

Groups	Count	Sum	Average	Variance
Facility A	3	1.5	0.5	0
Facility B	3	1.4	0.46667	0.02333
Facility C	3	4.4	1.46667	0.16333
Facility D	3	3	1	0.04
Facility E	3	2	0.66667	0.00333
Facility F	3	1.9	0.63333	0.22333
Facility G	3	1.6	0.53333	0.10333
Facility H	3	1.8	0.6	0.01
Facility I	3	6.5	2.16667	0.34333
Facility J	3	1.5	0.5	0.01
Facility L	3	1	0.33333	0.00333
Facility M	3	1.3	0.43333	0.00333

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	9.43417	11	0.85765	11.1063	**6.3E-07**	2.21631
Within Groups	1.85333	24	0.07722			
Total	11.2875	35				

PFHxS – FOGO



Anova: Single Factor

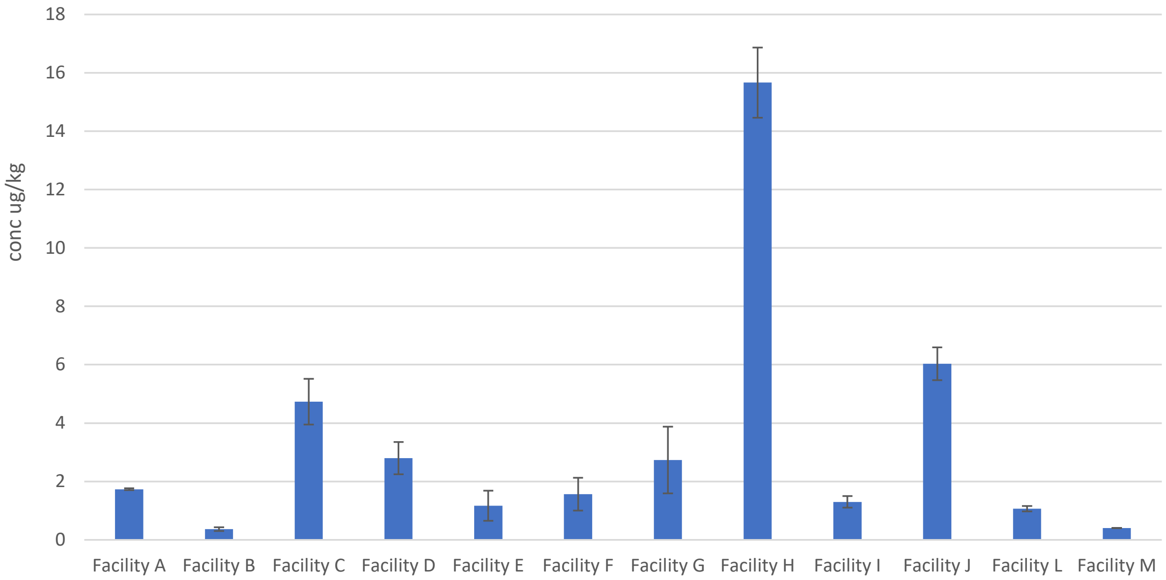
SUMMARY

Groups	Count	Sum	Average	Variance
Facility A	3	0.8	0.26667	0.00333
Facility B	3	0.5	0.16667	0.00333
Facility C	3	1.2	0.4	0.03
Facility D	3	2	0.66667	0.02333
Facility E	3	1.4	0.46667	0.00333
Facility F	3	0.6	0.2	0.01
Facility G	3	1.9	0.63333	0.09333
Facility H	3	1.7	0.56667	0.02333
Facility I	3	0.7	0.23333	0.00333
Facility J	3	0.6	0.2	1.2E-33
Facility L	3	0.5	0.16667	0.00333
Facility M	3	2.1	0.7	0.01

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1.44222	11	0.13111	7.6129	1.8E-05	2.21631
Within Groups	0.41333	24	0.01722			
Total	1.85556	35				

PFHxA – FOGO



Anova: Single Factor

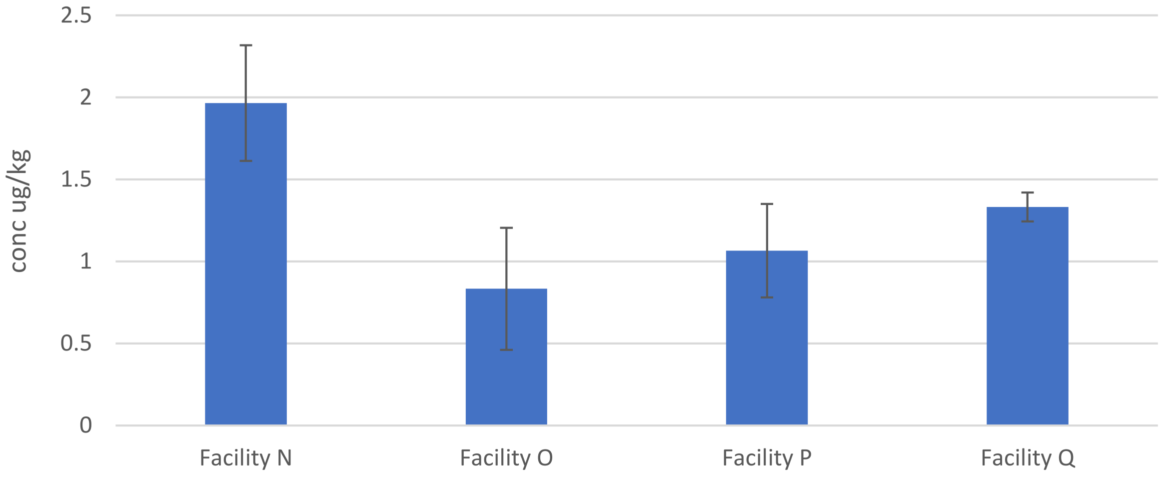
SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Facility A	3	5.2	1.73333	0.00333
Facility B	3	1.1	0.36667	0.01333
Facility C	3	14.2	4.73333	1.84333
Facility D	3	8.4	2.8	0.91
Facility E	3	3.5	1.16667	0.80333
Facility F	3	4.7	1.56667	0.94333
Facility G	3	8.2	2.73333	3.89333
Facility H	3	47	15.6667	4.33333
Facility I	3	3.9	1.3	0.12
Facility J	3	18.1	6.03333	0.94333
Facility L	3	3.2	1.06667	0.02333
Facility M	3	1.2	0.4	4.6E-33

ANOVA

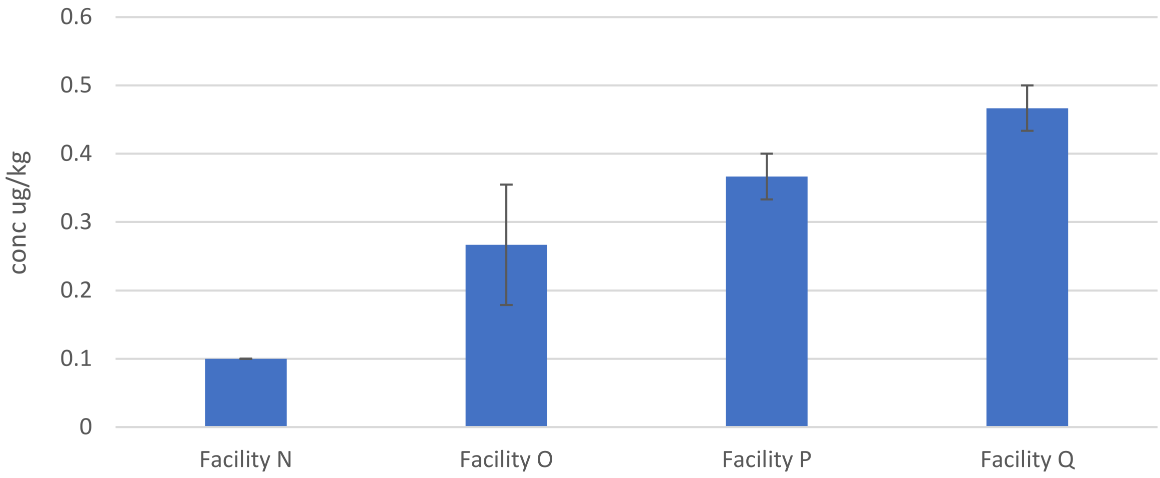
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	597.13	11	54.2845	47.1015	**1.6E-13**	2.21631
Within Groups	27.66	24	1.1525			
Total	624.79	35				

PFOS – GO



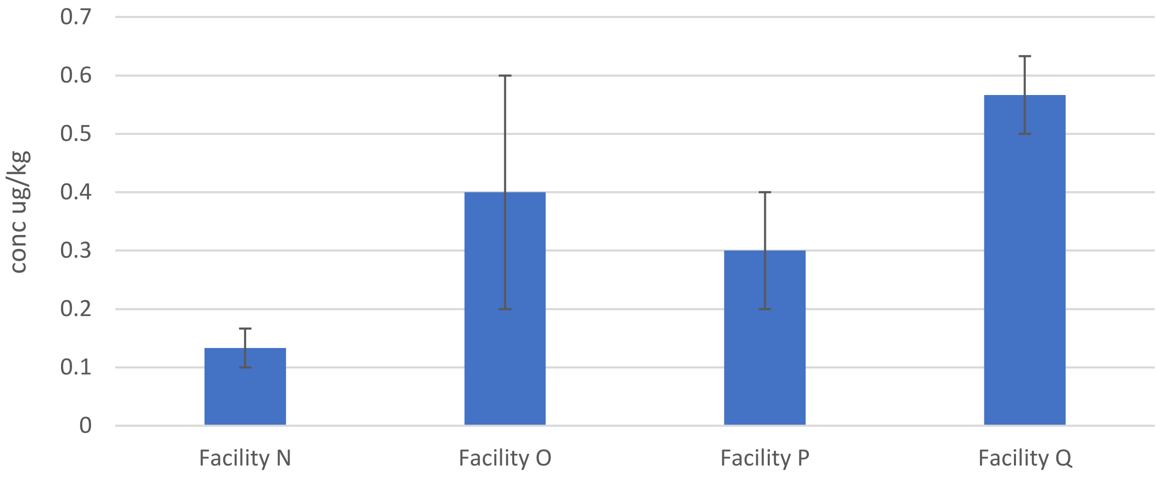
Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Facility N	3	5.9	1.966667	0.373333		
Facility O	3	2.5	0.833333	0.413333		
Facility P	3	3.2	1.066667	0.243333		
Facility Q	3	4	1.333333	0.023333		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	2.153333	3	0.717778	2.725738	**0.114178**	4.066181
Within Groups	2.106667	8	0.263333			
Total	4.26	11				

PFOA – GO



Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Facility N	3	0.3	0.1	2.89E-34		
Facility O	3	0.8	0.266667	0.023333		
Facility P	3	1.1	0.366667	0.003333		
Facility Q	3	1.4	0.466667	0.003333		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.22	3	0.073333	9.777778	**0.004722**	4.066181
Within Groups	0.06	8	0.0075			
Total	0.28	11				

PFHxS – GO



Anova: Single Factor

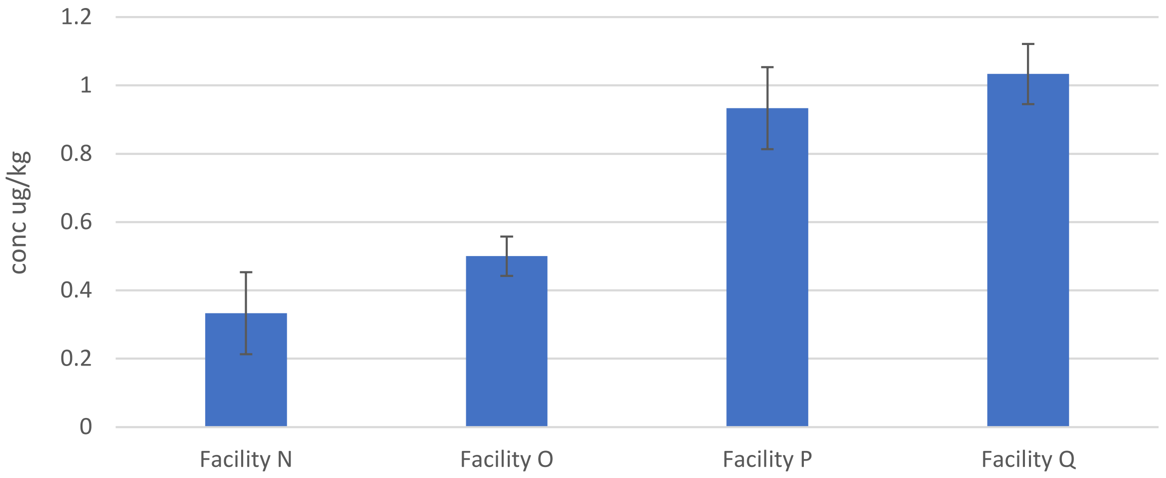
SUMMARY

Groups	Count	Sum	Average	Variance
Facility N	3	0.4	0.133333	0.003333
Facility O	3	1.2	0.4	0.12
Facility P	3	0.9	0.3	0.03
Facility Q	3	1.7	0.566667	0.013333

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.296667	3	0.098889	2.373333	**0.146078**	4.066181
Within Groups	0.333333	8	0.041667			
Total	0.63	11				

PFHxA – GO



Anova: Single Factor

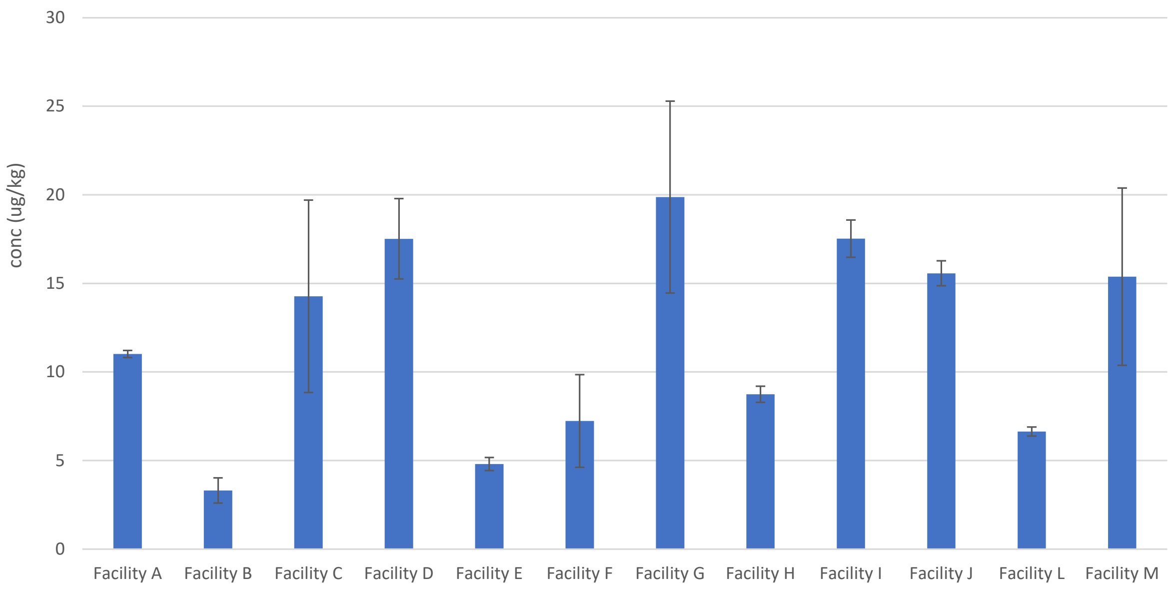
SUMMARY

Groups	Count	Sum	Average	Variance
Facility N	3	1	0.333333	0.043333
Facility O	3	1.5	0.5	0.01
Facility P	3	2.8	0.933333	0.043333
Facility Q	3	3.1	1.033333	0.023333

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1.02	3	0.34	11.33333	0.002982	4.066181
Within Groups	0.24	8	0.03			
Total	1.26	11				

Br1–Br9 – FOGO



Anova: Single Factor

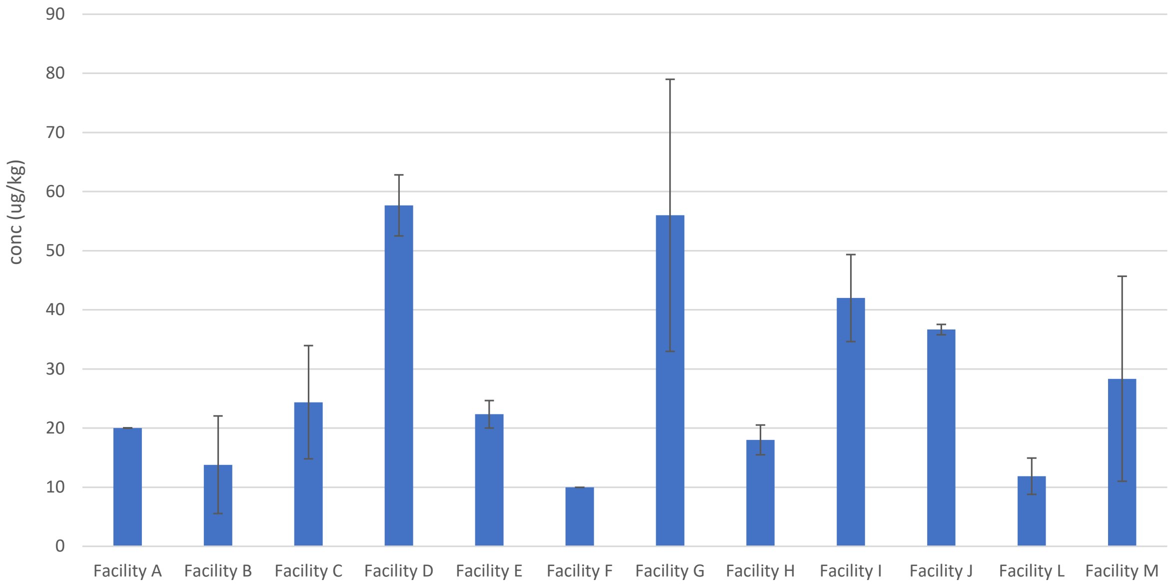
SUMMARY

Groups	Count	Sum	Average	Variance
Facility A	3	33.047	11.0157	0.11815
Facility B	3	9.933	3.311	1.50188
Facility C	3	42.811	14.2703	88.3457
Facility D	3	52.556	17.5187	15.5063
Facility E	3	14.408	4.80267	0.40343
Facility F	3	21.703	7.23433	20.5351
Facility G	3	59.613	19.871	88.2003
Facility H	3	26.24	8.74667	0.61763
Facility I	3	52.596	17.532	3.31923
Facility J	3	46.709	15.5697	1.4977
Facility L	3	19.903	6.63433	0.19228
Facility M	3	46.144	15.3813	74.9818

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1026.98	11	93.3614	3.79493	**0.00305**	2.21631
Within Groups	590.439	24	24.6016			
Total	1617.41	35				

Br10 – FOGO



Anova: Single Factor

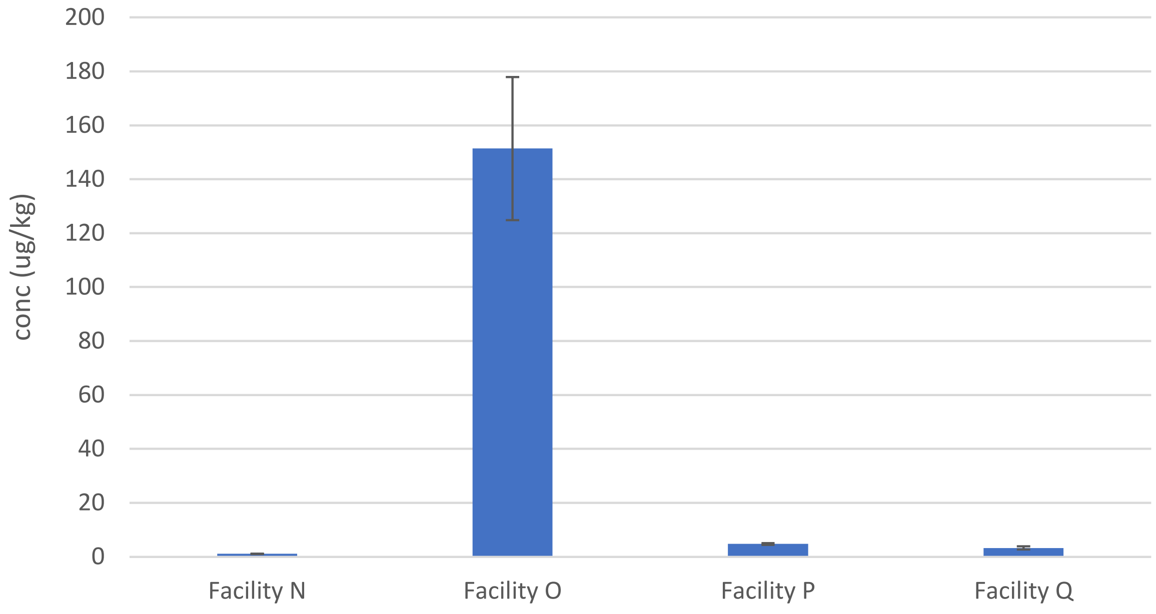
SUMMARY

Groups	Count	Sum	Average	Variance
Facility A	3	60	20	0
Facility B	3	41.4	13.8	204.12
Facility C	3	73.1	24.3667	274.803
Facility D	3	173	57.6667	80.3333
Facility E	3	67	22.3333	16.3333
Facility F	3	30	10	0
Facility G	3	168	56	1588
Facility H	3	54	18	19
Facility I	3	126	42	163
Facility J	3	110	36.6667	2.33333
Facility L	3	35.6	11.8667	28.2233
Facility M	3	85	28.3333	901.333

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	8785.38	11	798.671	2.92421	**0.01353**	2.21631
Within Groups	6554.96	24	273.123			
Total	15340.3	35				

Br1–Br9 – GO



Anova: Single Factor

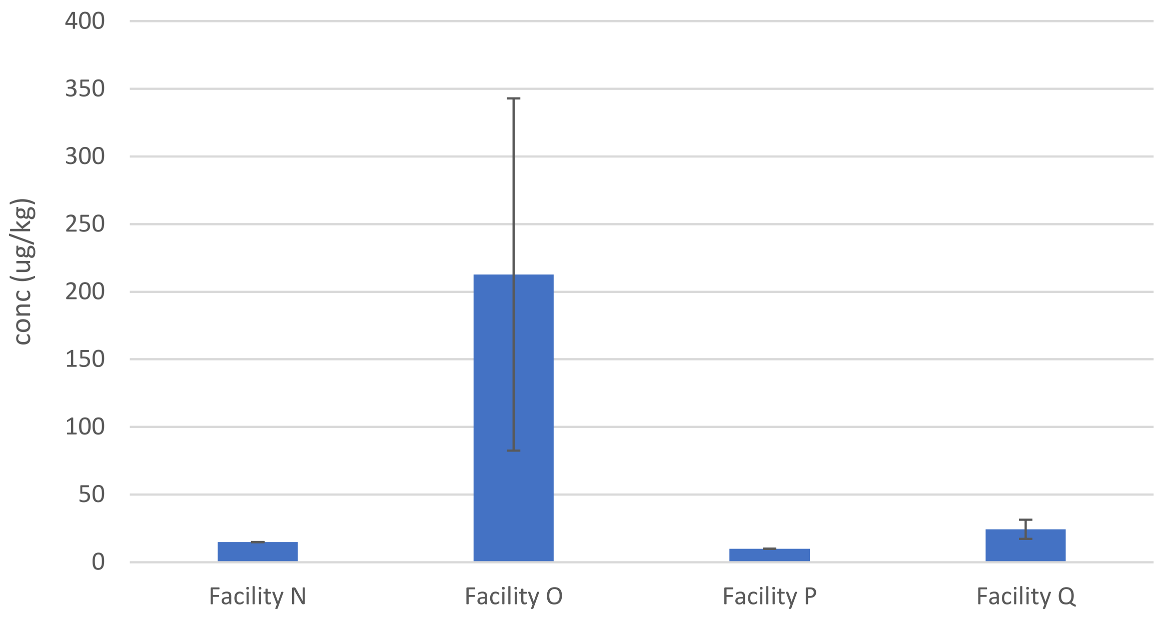
SUMMARY

Groups	Count	Sum	Average	Variance
Facility N	3	3.492	1.164	0.001651
Facility O	3	454.119	151.373	2110.311
Facility P	3	14.326	4.775333	0.319905
Facility Q	3	9.698	3.232667	1.040908

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	49514.16	3	16504.72	31.26377	**9.09E-05**	4.066181
Within Groups	4223.348	8	527.9184			
Total	53737.51	11				

Br10 – GO



Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Facility N	3	45	15	0		
Facility O	3	638	212.6667	50921.33		
Facility P	3	30	10	0		
Facility Q	3	73	24.33333	154.3333		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	86949.67	3	28983.22	2.269826	**0.157464**	4.066181
Within Groups	102151.3	8	12768.92			
Total	189101	11				

Appendix D – Daily intake calculations and assumptions

Egg consumption pathway

To calculate daily intakes (children) for this pathway, initially concentrations in eggs (C_E) (µg/kg) were calculated. This was done slightly differently for PFAS (Equation C1) and PBDEs (Equation C2) due to differences in the derivation of the transfer factors (for additional information refer to EnRiskS 2019). All parameters used in the calculations are summarised in Table C1. Equations C1 and C2 assume that the only source of each contaminant for chickens is soil and that they get no input from water or food they ingest.

$$C_E = \frac{(C_S \times IR_S \times FI \times Bio_S) \times TF_{egg}}{LR \times E_W} \quad \text{Equation C1}$$

$$C_E = (C_S \times IR_S \times FI \times Bio_S) \times TF_{egg} \quad \text{Equation C2}$$

Table C1 Summary of assumptions used to calculate contaminant concentrations in eggs

Parameter	Value	Units	Description
C_S	variable	µg/kg	Soil exposure concentration (Tables 1–4)
IR_S	0.0105	kg/day	Chicken soil ingestion rate (AECOM 2017)
FI	1	unitless	Fraction ingested from the contaminated source
Bio_S	1	unitless	Soil bioavailability factor. Assumes all PFAS and PBDEs are bioavailable
TF_{egg} (for Eq. C1)	PFOS+PFHxS = 1 PFOA+PFHxA = 0.5	unitless	Transfer factor into egg (AECOM 2017) (measured TF based on a study where PFAS was fed to chickens via water in a controlled study)
TF_{egg} (for Eq. C2)	Br1–Br9 = 10 Br10 = 3	day/kg	Based on transfer factors for dioxins and PCBs from OEHHA 2012 (see EnRiskS 2019 for details)
LR	0.86	day	Laying rate, assuming a chicken lays 6 eggs per week, 52 weeks per year
E_W	0.058	kg	Edible weight of egg (AECOM 2017)

Egg concentrations were then used to calculate predicted daily intakes (µg/kg/day) for children who may eat eggs from home chickens, using Equation C3 (parameters summarised in Table C2).

$$Daily\ intake = \frac{(C_E \times IR_{egg} \times AoF \times FI \times EF \times ED)}{BW \times AT} \quad \text{Equation C3}$$

Table C2 **Summary of assumptions used to calculate predicted daily intakes of PFAS and PBDEs from egg consumption for children (Equation C3)**

Parameter	Value	Units	Description
C_E	variable	µg/kg	Concentration in egg (from Eq. C1 or Eq. C2)
IR_{egg}	0.072	kg/day	Ingestion of eggs – 2-times 90th percentile egg consumption rate from FSANZ (2017).
AoF	1	unitless	Oral absorption factor – assumes all PFAS and PBDE compounds are bioavailable
FI	1	unitless	Fraction ingested from the contaminated source – assumes all eggs are consumed from home chickens ingesting amended soil
EF	365	days/year	Exposure frequency
ED	6	years	Exposure duration (NEPC 2013)
BW	15	kg	Body weight (NEPC 2013)
AT	2,190	days	Averaging time = *EF* × *ED*

Meat consumption pathways

Two pathways were assessed that considered consumption of meat:

1. Grazing livestock – assumes livestock consume soil and plants while grazing on FOGO and GO amended soil
2. Fodder – assumes livestock consume plants grown in FOGO or GO amended soil.

The calculations to estimate meat concentrations of PFAS and PBDEs varied due to differences in some parameters.

Meat concentration calculations for PFAS

The concentrations of PFAS in meat were calculated by first estimating the livestock daily intakes (µg/kg/day) using Equations C4 and C5 for the grazing and fodder pathways, respectively (description of parameters provided in Table C3).

$$Livestock\ daily\ intake = \frac{(C_S \times IR_S \times FI) + (C_P \times IR_P \times FI)}{BW} \qquad \text{Equation C4}$$

$$Livestock\ daily\ intake = \frac{(C_P \times IR_P \times FI)}{BW} \qquad \text{Equation C5}$$

Table C3 **Summary of assumptions used to calculate grazing livestock intakes for PFOS+PFHxS and PFOA+PFHxA (Equations C4 and C5)**

Parameter	Value	Units	Description
C_S	variable	µg/kg	Soil exposure concentration (Tables 1–4)
IR_S	0.5	kg/day	Livestock soil ingestion rate – based on soil intake of 0.00484 kg/day/kg for a 500 kg cow (API 2004)
C_P	variable	µg/kg	Concentration in plant/grass (explained in text below and Equation C6)
IR_P	13	kg/day	Livestock plant ingestion rate based on API (2004) (wet weight)
FI	1	unitless	Fraction ingested from the contaminated source
BW	500	kg	Livestock body weight (API 2004)

The concentrations in plants (C_P) were calculated using Equation C6.

$$C_P = (C_S \times TF_S) \qquad \text{Equation C6}$$

Where C_S is the soil exposure concentration (Table 1–4) and TF_S is a transfer factor (unitless) from soil to plant. The transfer factors used for this were sourced from Stahl et al. (2009) and were experimentally derived. That study presented plant concentrations for ryegrass grown in soil with increasing concentrations of PFOS and PFOA. Stahl et al. (2009) presented a range of transfer factors and for this assessment, the 95% upper confidence limit of the mean (95UCL) was used in the plant calculations. These values were 1.01 for PFOS and 3.17 for PFOA. The PFOS value was also used for PFHxS and the PFOA value was used for PFHxA. C&R notes that the plant concentrations in Stahl et al. (2009) were presented on a dry weight basis and the plant ingestion rates in Equations C4 and C5 are on a wet weight basis. The estimated plant concentrations have not been converted to a dry weight basis for PFAS due to the uncertainty of using PFOS and PFOA as surrogates for PFHxS and PFHxA, which are known to accumulate more readily into plants (e.g. Blaine et al. 2013; Lasee et al. 2019).

The livestock daily intakes were then used to calculate the livestock serum concentrations (C_{serum}) (µg/L) using Equation C7.

$$C_{serum} = \frac{livestock\ daily\ intake \times t1/2}{0.693 \times Vd} \qquad \text{Equation C7}$$

Where *t1/2* is the elimination half-life, which is chemical specific. The value for beef steer was 114 days for PFOS (Lupton et al. 2014) and 0.8 days for PFOA (Lupton et al. 2012). The value of 0.693 in Equation C7 is based on pharmacokinetic models and *Vd* is the volume of distribution where 0.21 L/kg is assumed to be the extracellular fluid volume (ToxConsult 2016).

C_{serum} was then converted to a meat concentration (C_{meat}) (µg/kg) using Equation C8.

$$C_{meat} = TSR \times C_{serum} \qquad \text{Equation C8}$$

Where TSR is the tissue serum ratio, which was 0.1 (AECOM 2017).

Meat concentration calculations for PBDEs

The concentrations of PBDEs in meat (C_{meat}) (µg/kg) were calculated by multiplying the livestock daily intake by a transfer factor. This was done for the grazing and fodder pathways using Equations C9 and C10, respectively.

$$C_{meat} = [(C_S \times IR_S \times FI) + (C_P \times IR_P \times FI)] \times TF_{beef} \qquad \text{Equation C9}$$

$$C_{meat} = (C_P \times IR_P \times FI) \times TF_{beef} \qquad \text{Equation C10}$$

The descriptions for most parameters are provided in Table C3. The TF_{beef} values (days/kg) used were 2 and 0.02 for Br1–Br9 and Br10, respectively. These values are based on transfer factors for dioxins and PCBs from OEHHA (2012) (see EnRiskS 2019 for more detail).

The concentrations in the plants were calculated using Equation C6 with transfer factors (unitless) of 0.1 and 0.01 for Br1–Br9 and Br10, respectively (Yang et al. 2018) (see EnRiskS 2019 for more detail). A dry weight to wet weight conversion factor (*CF*) of 0.15 (Table C3) was applied to Equation C6 to estimate the Br1–Br9 and Br10 concentrations in plants ($i.e. C_P = C_S \times TF_S \times CF$).

Daily intakes from meat for children

The daily intakes (µg/kg/day) for children from consumption of meat were calculated using Equation C11 (descriptions of parameters provided in Table C4).

$$Daily\ intake = \frac{C_{meat} \times IR_M \times AoF \times FI \times EF \times ED}{BW \times AT} \qquad \text{Equation C11}$$

Table C4 Summary of assumptions used to calculate daily intakes of PFAS and PBDEs for a child consuming meat

Parameter	Value	Units	Description
C_{meat}	variable	µg/kg	Concentration in meat
IR_M	0.085	kg/day	Meat ingestion rate – high consumers of cattle (90th percentile) from FSANZ (2017)
AoF	1	unitless	Oral absorption factor – assumes 100% bioavailability
FI	0.5	unitless	Fraction ingested from the source – assumes 50% of meat consumed comes from livestock grazing on or consuming fodder from areas where FOGO or GO have been used
EF	365	days/year	Exposure frequency
ED	6	years	Exposure duration (NEPC 2013)
BW	15	kg	Body weight (NEPC 2013)
AT	2,190	days	Averaging time = *ED* × *EF*

Milk consumption pathways

Two pathways were assessed that considered consumption of milk:

1. Grazing livestock – assumes dairy cows consume soil and plants while grazing on FOGO and GO amended soil
2. Fodder – assumes dairy cows consume plants grown in FOGO or GO amended soil.

The calculations to estimate milk concentrations of PFAS and PBDEs varied due to differences in some parameters.

Milk concentration calculations for PFAS

The concentrations of PFOS+PFHxS and PFOA+PFHxA were estimated by first calculating the daily intakes for dairy cows. This was done using the same calculations as outlined for livestock (Equations C4 and C5). The calculations for serum concentrations (C_{serum}) were also the same as those for livestock (Equation C7). However, for dairy cows, the serum elimination half-lives (*t1/2*) for PFOS and PFOA were 56 and 1.3 days, respectively (van Asselt et al. 2013; Vestergren et al. 2013). These values were also used for PFHxS and PFHxA, respectively. The volume distribution was 0.26 L/kg (Maksiri et al. 2005; Chaiyabutr et al. 2008) Following this, concentrations in milk were calculated using Equation C12.

$$C_{milk} = MSR \times C_{serum}$$ Equation C12

where *MSR* is the milk serum ratio, which was assumed to be 0.02 for PFOS+PFHxS and 0.2 for PFOA (ToxConsult 2016).

Milk concentration calculations for PBDEs

The concentrations of PBDEs in milk were calculated using Equations C9 and C10; however, transfer factors into milk (TF_{milk}) (days/kg) were used. These values were 0.04 and 0.0006 for Br1–Br9 and Br10, respectively, which are based on transfer factors for dioxins and PCBs from OEHHA (2012) (see EnRiskS 2019 for more detail).

Daily intakes from milk for children

The estimated daily intakes (μg/kg/day) for children of PFAS and PBDEs from milk consumption were calculated using Equation C13 (descriptions of parameters provided in Table C5).

$$Daily\ intake = \frac{C_{milk} \times IR_{MK} \times SG \times AoF \times FI \times EF \times ED}{BW \times AT}$$ Equation C13

Table C5 Summary of assumptions used to calculate daily intakes of PFAS and PBDEs for a child consuming milk

Parameter	Value	Units	Description
C_{milk}	variable	µg/L	Concentration in milk
IR_{MK}	1.1	kg/day	Milk ingestion rate – high consumers of milk (90th percentile) (FSANZ 2017)
SG	0.968	L/kg	Specific gravity of cow milk (ratio of density of milk to density of water) at 20°C is 1.0033; therefore, 0.968 is the inverse (Sherbon 1988)
AoF	1	unitless	Oral absorption factor – assumes 100% bioavailability
FI	1	unitless	Fraction ingested from the source – assumes 100% of milk is consumed from dairy cows grazing on or consuming fodder from areas where FOGO or GO have been used
EF	365	days/year	Exposure frequency
ED	6	years	Exposure duration (NEPC 2013)
BW	15	kg	Body weight (NEPC 2013)
AT	2,190	days	Averaging time = $EF \times ED$

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Appendix E – All risk quotients (children)

PFOS+PFHxS

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
A	Eggs	0.071	0.064	0.074	0.0062	0.0056	0.0065	0.0013	0.0012	0.0014
	Meat (grazing)	0.43	0.38	0.45	0.037	0.033	0.0399	0.0080	0.0072	0.0084
	Meat (fodder)	0.41	0.37	0.43	0.036	0.032	0.038	0.0077	0.007	0.0081
	Milk (grazing)	0.84	0.76	0.88	0.074	0.067	0.078	0.016	0.014	0.017
	Milk (fodder)	0.81	0.73	0.85	0.071	0.064	0.075	0.015	0014	0.016
B	Eggs	0.076	0.064	0.085	0.0067	0.0056	0.0075	0.0014	0.0012	0.0016
	Meat (grazing)	0.46	0.38	0.51	0.04	0.034	0.045	0.0086	0.0072	0.0096
	Meat (fodder)	0.44	0.37	0.49	0.039	0.032	0.043	0.0083	0.007	0.0093
	Milk (grazing)	0.90	0.76	1.0	0.079	0.067	0.089	0.017	0.014	0.019
	Milk (fodder)	0.87	0.73	0.97	0.077	0.064	0.085	0.016	0.014	0.018
C	Eggs	0.15	0.13	0.18	0.013	0.011	0.015	0.0028	0.0024	0.0033
	Meat (grazing)	0.88	0.76	**1.1**	0.077	0.067	0.092	0.017	0.014	0.02
	Meat (fodder)	0.85	0.74	**1.0**	0.074	0.065	0.089	0.016	0.014	0.019
	Milk (grazing)	**1.7**	**1.5**	**2.1**	0.15	0.13	0.18	0.033	0.029	0.039
	Milk (fodder)	**1.7**	**1.5**	**2.0**	0.15	0.13	0.18	0.032	0.028	0.038

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
D	Eggs	0.19	0.15	0.21	0.017	0.014	0.019	0.0037	0.0029	0.004
	Meat (grazing)	**1.2**	0.92	**1.3**	0.10	0.081	0.11	0.022	0.017	0.024
	Meat (fodder)	**1.1**	0.89	**1.2**	0.098	0.078	0.11	0.021	0.017	0.023
	Milk (grazing)	**2.3**	**1.8**	**2.5**	0.20	0.16	0.22	0.043	0.035	0.048
	Milk (fodder)	**2.2**	**1.8**	**2.4**	0.19	0.15	0.21	0.042	0.033	0.046
E	Eggs	0.092	0.085	0.096	0.0081	0.0075	0.0084	0.0017	0.0016	0.0018
	Meat (grazing)	0.55	0.51	0.57	0.048	0.045	0.05	0.01	0.0096	0.011
	Meat (fodder)	0.53	0.49	0.55	0.047	0.043	0.048	0.01	0.0093	0.01
	Milk (grazing)	**1.1**	**1.0**	**1.1**	0.096	0.089	0.10	0.021	0.019	0.021
	Milk (fodder)	**1.1**	0.97	**1.1**	0.093	0.085	0.096	0.02	0.018	0.021
F	Eggs	0.071	0.027	0.11	0.0062	0.0023	0.0093	0.0013	0.0005	0.002
	Meat (grazing)	0.43	0.16	0.64	0.037	0.014	0.056	0.008	0.003	0.012
	Meat (fodder)	0.41	0.15	0.61	0.036	0.014	0.054	0.0077	0.0029	0.012
	Milk (grazing)	0.84	0.32	**1.3**	0.074	0.028	0.11	0.016	0.006	0.024
	Milk (fodder)	0.81	0.30	**1.2**	0.071	0.027	0.11	0.015	0.0057	0.023
G	Eggs	0.21	0.053	0.37	0.019	0.0047	0.032	0.004	0.001	0.0069
	Meat (grazing)	**1.3**	0.32	**2.2**	0.11	0.028	0.19	0.024	0.006	0.041
	Meat (fodder)	**1.2**	0.31	**2.1**	0.11	0.027	0.19	0.023	0.0058	0.04
	Milk (grazing)	**2.5**	0.63	**4.4**	0.22	0.056	0.38	0.048	0.012	0.082
	Milk (fodder)	**2.4**	0.61	**4.2**	0.21	0.053	0.37	0.046	0.012	0.079

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
H	Eggs	0.099	0.074	0.12	0.0087	0.0065	0.011	0.0019	0.0014	0.0023
	Meat (grazing)	0.59	0.44	0.73	0.052	0.039	0.064	0.011	0.0084	0.013
	Meat (fodder)	0.57	0.43	0.71	0.050	0.037	0.062	0.011	0.0081	0.013
	Milk (grazing)	**1.2**	0.88	**1.5**	0.10	0.077	0.13	0.022	0.017	0.027
	Milk (fodder)	**1.1**	0.85	**1.4**	0.099	0.074	0.12	0.021	0.016	0.026
I	Eggs	0.073	0.058	0.085	0.0064	0.0051	0.0075	0.0013	0.0011	0.0016
	Meat (grazing)	0.44	0.35	0.51	0.038	0.031	0.045	0.0082	0.0066	0.0096
	Meat (fodder)	0.42	0.34	0.49	0.037	0.03	0.043	0.0079	0.0064	0.0093
	Milk (grazing)	0.86	0.69	**1.0**	0.076	0.061	0.089	0.016	0.013	0.019
	Milk (fodder)	0.83	0.67	0.97	0.073	0.059	0.085	0.016	0.013	0.018
J	Eggs	0.06	0.043	0.074	0.0053	0.0037	0.0065	0.0011	0.0008	0.0014
	Meat (grazing)	0.36	0.26	0.45	0.032	0.022	0.039	0.0068	0.0048	0.0084
	Meat (fodder)	0.35	0.25	0.43	0.031	0.022	0.038	0.0066	0.0046	0.0081
	Milk (grazing)	0.72	0.51	0.88	0.063	0.044	0.078	0.014	0.0095	0.017
	Milk (fodder)	0.69	0.49	0.85	0.061	0.043	0.075	0.013	0.0092	0.016
K	Eggs	0.08	0.08	0.08	0.007	0.007	0.007	0.0015	0.0015	0.0015
	Meat (grazing)	0.48	0.48	0.48	0.042	0.042	0.042	0.009	0.009	0.009
	Meat (fodder)	0.46	0.46	0.46	0.04	0.04	0.04	0.0087	0.0087	0.0087
	Milk (grazing)	0.95	0.95	0.95	0.083	0.083	0.083	0.018	0.018	0.018
	Milk (fodder)	0.91	0.91	0.91	0.08	0.08	0.08	0.017	0.017	0.017

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
L	Eggs	0.083	0.069	0.10	0.0073	0.0061	0.0089	0.0016	0.0013	0.0019
	Meat (grazing)	0.50	0.41	0.61	0.044	0.036	0.053	0.0094	0.0078	0.011
	Meat (fodder)	0.48	0.40	0.58	0.042	0.035	0.051	0.0091	0.0075	0.011
	Milk (grazing)	0.99	0.82	**1.2**	0.087	0.072	0.11	0.019	0.016	0.023
	Milk (fodder)	0.95	0.79	**1.2**	0.084	0.069	0.10	0.018	0.015	0.022
M	Eggs	0.18	0.14	0.21	0.016	0.013	0.019	0.0034	0.0027	0.004
	Meat (grazing)	**1.1**	0.86	**1.3**	0.094	0.075	0.11	0.02	0.016	0.024
	Meat (fodder)	**1.0**	0.83	**1.2**	0.091	0.073	0.11	0.019	0.016	0.023
	Milk (grazing)	**2.1**	**1.7**	**2.5**	0.19	0.15	0.22	0.04	0.032	0.048
	Milk (fodder)	**2.0**	**1.6**	**2.4**	0.18	0.14	0.21	0.039	0.031	0.046
N	Eggs	0.11	0.074	0.14	0.0098	0.0065	0.012	0.0021	0.0014	0.0026
	Meat (grazing)	0.67	0.45	0.83	0.059	0.039	0.073	0.013	0.0084	0.016
	Meat (fodder)	0.64	0.43	0.80	0.057	0.038	0.07	0.012	0.0081	0.015
	Milk (grazing)	**1.3**	0.88	**1.6**	0.12	0.078	0.14	0.025	0.017	0.031
	Milk (fodder)	**1.3**	0.85	**1.6**	0.11	0.074	0.14	0.024	0.016	0.03
O	Eggs	0.066	0.048	0.080	0.0058	0.0042	0.007	0.0012	0.0009	0.0015
	Meat (grazing)	0.39	0.29	0.48	0.035	0.025	0.042	0.0074	0.0054	0.009
	Meat (fodder)	0.38	0.28	0.46	0.033	0.024	0.04	0.0071	0.0052	0.0087
	Milk (grazing)	0.78	0.57	0.95	0.068	0.05	0.083	0.015	0.011	0.018
	Milk (fodder)	0.75	0.55	0.91	0.066	0.048	0.08	0.014	0.01	0.017

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
P	Eggs	0.073	0.032	0.096	0.0064	0.0028	0.0084	0.0014	0.0006	0.0018
	Meat (grazing)	0.44	0.19	0.57	0.038	0.017	0.05	0.0082	0.0036	0.01
	Meat (fodder)	0.42	0.18	0.55	0.037	0.016	0.048	0.0079	0.0035	0.01
	Milk (grazing)	0.86	0.38	**1.1**	0.076	0.033	0.10	0.016	0.0071	0.021
	Milk (fodder)	0.83	0.37	**1.1**	0.073	0.032	0.096	0016	0.0069	0.021
Q	Eggs	0.10	0.090	0.12	0.0089	0.0079	0.01	0.0019	0.0017	0.0022
	Meat (grazing)	0.61	0.54	0.70	0.053	0.048	0.062	0.011	0.01	0.013
	Meat (fodder)	0.58	0.52	0.68	0.051	0.046	0.059	0.011	0.0098	0.013
	Milk (grazing)	**1.2**	**1.1**	**1.4**	0.11	0.094	0.12	0.023	0.02	0.027
	Milk (fodder)	**1.2**	**1.0**	**1.3**	0.10	0.091	0.12	0.022	0.02	0.025
R	Eggs	0.005	0.005	0.005	0.00047	0.00047	0.00047	0.0001	0.0001	0.0001
	Meat (grazing)	0.032	0.032	0.032	0.0028	0.0028	0.0028	0.0006	0.0006	0.0006
	Meat (fodder)	0.031	0.031	0.031	0.0027	0.0027	0.0027	0.00058	0.00058	0.00058
	Milk (grazing)	0.063	0.063	0.063	0.0055	0.0055	0.0055	0.0012	0.0012	0.0012
	Milk (fodder)	0.061	0.061	0.061	0.0053	0.0053	0.00532	0.0011	0.0011	0.0011

PFOA+PFHxA

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
A	Eggs	0.0071	0.0070	0.0073	0.00062	0.00061	0.00064	0.00013	0.00013	0.00014
	Meat (grazing)	0.0018	0.0018	0.0019	0.00016	0.00016	0.00016	3.4×10^{-5}	3.4×10^{-5}	3.5×10^{-5}
	Meat (fodder)	0.0018	0.0018	0.0019	0.00016	0.00015	0.00016	3.4×10^{-5}	3.3×10^{-5}	3.5×10^{-5}
	Milk (grazing)	0.12	0.12	0.12	0.011	0.01	0.011	0.0023	0.0022	0.0023
	Milk (fodder)	0.12	0.12	0.12	0.01	0.01	0.011	0.0022	0.0022	0.0023
B	Eggs	0.0026	0.0019	0.0035	0.00023	0.00017	0.00031	5.0×10^{-5}	3.6×10^{-5}	6.6×10^{-5}
	Meat (grazing)	0.00068	0.00049	0.00089	5.9×10^{-5}	4.3×10^{-5}	7.8×10^{-5}	1.3×10^{-5}	9.2×10^{-6}	1.7×10^{-5}
	Meat (fodder)	0.00067	0.00048	0.00088	5.9×10^{-5}	4.2×10^{-5}	7.7×10^{-5}	1.3×10^{-5}	9.1×10^{-6}	1.7×10^{-5}
	Milk (grazing)	0.045	0.032	0.059	0.0039	0.0028	0.0052	0.00084	0.00061	0.0011
	Milk (fodder)	0.044	0.032	0.058	0.0039	0.0028	0.0051	0.00083	0.0006	0.0011
C	Eggs	0.02	0.017	0.024	0.0017	0.0015	0.0021	0.00037	0.00031	0.00044
	Meat (grazing)	0.005	0.0042	0.006	0.00044	0.00037	0.00054	9.5×10^{-5}	8.0×10^{-5}	0.00011
	Meat (fodder)	0.005	0.0042	0.0059	0.00044	0.00037	0.00052	9.4×10^{-5}	7.9×10^{-5}	0.00011
	Milk (grazing)	0.33	0.28	0.40	0.029	0.024	0.035	0.0063	0.0053	0.0075
	Milk (fodder)	0.33	0.28	0.39	0.029	0.024	0.034	0.0062	0.0052	0.0074
D	Eggs	0.012	0.0095	0.016	0.0011	0.00084	0.0014	0.00023	0.00018	0.00031
	Meat (grazing)	0.0031	0.0024	0.0041	0.00027	0.00021	0.00036	5.8×10^{-5}	4.6×10^{-5}	7.8×10^{-5}
	Meat (fodder)	0.0031	0.0024	0.0041	0.00027	0.00021	0.00036	5.8×10^{-5}	4.5×10^{-5}	7.7×10^{-5}
	Milk (grazing)	0.20	0.16	0.27	0.018	0.014	0.024	0.0038	0.003	0.0052
	Milk (fodder)	0.20	0.16	0.27	0.018	0.014	0.024	0.0038	0.003	0.0051

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
E	Eggs	0.0058	0.0041	0.0092	0.00051	0.00036	0.00081	0.00011	7.8×10^{-5}	0.00017
	Meat (grazing)	0.0015	0.0011	0.0024	0.00013	9.3×10^{-5}	0.00021	2.8×10^{-5}	2.0×10^{-5}	4.4×10^{-5}
	Meat (fodder)	0.0015	0.001	0.0023	0.00013	9.1×10^{-5}	0.0002	2.8×10^{-5}	2.0×10^{-5}	4.4×10^{-5}
	Milk (grazing)	0.098	0.07	0.16	0.0086	0.0061	0.014	0.0019	0.0013	0.0029
	Milk (fodder)	0.097	0.069	0.15	0.0085	0.006	0.013	0.0018	0.0013	0.0029
F	Eggs	0.007	0.0019	0.011	0.00061	0.00017	0.00095	0.00013	3.6×10^{-5}	0.0002
	Meat (grazing)	0.0018	0.00049	0.0028	0.00016	4.3×10^{-5}	0.00024	3.4×10^{-5}	9.2×10^{-6}	5.2×10^{-5}
	Meat (fodder)	0.0018	0.00048	0.0027	0.00015	4.2×10^{-5}	0.00024	3.3×10^{-5}	9.1×10^{-6}	5.1×10^{-5}
	Milk (grazing)	0.12	0.032	0.18	0.01	0.0028	0.016	0.0022	0.00061	0.0034
	Milk (fodder)	0.12	0.032	0.18	0.01	0.0028	0.016	0.0022	0.0006	0.0034
G	Eggs	0.01	0.0054	0.019	0.00091	0.00047	0.0016	0.0002	0.0001	0.00035
	Meat (grazing)	0.0027	0.0014	0.0048	0.00023	0.00012	0.00042	5.0×10^{-5}	2.6×10^{-5}	9.0×10^{-5}
	Meat (fodder)	0.0026	0.0014	0.0047	0.00023	0.00012	0.00042	4.9×10^{-5}	2.6×10^{-5}	8.9×10^{-5}
	Milk (grazing)	0.18	0.091	0.32	0.015	0.008	0.028	0.0033	0.0017	0.006
	Milk (fodder)	0.17	0.09	0.31	0.015	0.0079	0.027	0.0033	0.0017	0.0059
H	Eggs	0.052	0.046	0.059	0.0045	0.0041	0.0052	0.00098	0.00088	0.0011
	Meat (grazing)	0.013	0.012	0.015	0.0012	0.001	0.0013	0.00025	0.00022	0.00029
	Meat (fodder)	0.013	0.012	0.015	0.0011	0.001	0.0013	0.00025	0.00028	0.00022
	Milk (grazing)	0.87	0.78	1.0	0.076	0.068	0.088	0.016	0.015	0.019
	Milk (fodder)	0.86	0.77	0.99	0.076	0.068	0.087	0.016	0.015	0.019

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
I	Eggs	0.011	0.0076	0.013	0.00097	0.00067	0.0011	0.00021	0.00014	0.00025
	Meat (grazing)	0.0028	0.002	0.0033	0.00025	0.00017	0.00029	5.3×10^{-5}	3.7×10^{-5}	6.3×10^{-5}
	Meat (fodder)	0.0028	0.0019	0.0033	0.00024	0.00017	0.00029	5.2×10^{-5}	3.6×10^{-5}	6.2×10^{-5}
	Milk (grazing)	0.19	0.13	0.22	0.016	0.011	0.019	0.0035	0.0024	0.0042
	Milk (fodder)	0.18	0.13	0.22	0.016	0.011	0.019	0.0035	0.0024	0.0041
J	Eggs	0.021	0.018	0.024	0.0018	0.0016	0.0021	0.00039	0.00034	0.00045
	Meat (grazing)	0.0053	0.0046	0.0061	0.00047	0.00041	0.00053	0.0001	8.7×10^{-5}	0.00011
	Meat (fodder)	0.0052	0.0046	0.006	0.00046	0.0004	0.00053	9.9×10^{-5}	8.6×10^{-5}	0.00011
	Milk (grazing)	0.35	0.31	0.40	0.031	0.027	0.035	0.0066	0.0058	0.0076
	Milk (fodder)	0.35	0.30	0.40	0.03	0.026	0.035	0.0065	0.0057	0.0075
K	Eggs	0.0064	0.0064	0.0064	0.00056	0.00056	0.00056	0.00012	0.00012	0.00012
	Meat (grazing)	0.0016	0.0016	0.0016	0.00014	0.00014	0.00014	3.1×10^{-5}	3.1×10^{-5}	3.1×10^{-5}
	Meat (fodder)	0.0016	0.0016	0.0016	0.00014	0.00014	0.00014	3.0×10^{-5}	3.0×10^{-5}	3.0×10^{-5}
	Milk (grazing)	0.11	0.11	0.11	0.0094	0.0094	0.0094	0.002	0.002	0.002
	Milk (fodder)	0.11	0.11	0.11	0.0093	0.0093	0.0093	0.002	0.002	0.002
L	Eggs	0.0044	0.0038	0.0051	0.00039	0.00033	0.00045	8.4×10^{-5}	7.2×10^{-5}	9.6×10^{-5}
	Meat (grazing)	0.0011	0.00097	0.0013	0.0001	8.5×10^{-5}	0.00011	2.1×10^{-5}	1.8×10^{-5}	2.5×10^{-5}
	Meat (fodder)	0.0011	0.00096	0.0013	9.9×10^{-5}	8.4×10^{-5}	0.00011	2.1×10^{-5}	1.8×10^{-5}	2.4×10^{-5}
	Milk (grazing)	0.075	0.064	0.086	0.0066	0.0056	0.0075	0.0014	0.0012	0.0016
	Milk (fodder)	0.074	0.064	0.085	0.0065	0.0056	0.0074	0.0014	0.0012	0.0016

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
M	Eggs	0.0026	0.0025	0.0029	0.00023	0.00022	0.00025	5.0×10^{-5}	4.8×10^{-5}	5.4×10^{-5}
	Meat (grazing)	0.00068	0.00065	0.00073	5.9×10^{-5}	5.7×10^{-5}	6.4×10^{-5}	1.3×10^{-5}	1.2×10^{-5}	1.4×10^{-5}
	Meat (fodder)	0.00067	0.00064	0.00072	5.9×10^{-5}	5.6×10^{-5}	6.3×10^{-5}	1.3×10^{-5}	1.2×10^{-5}	1.4×10^{-5}
	Milk (grazing)	0.045	0.043	0.048	0.0039	0.0038	0.0042	0.00084	0.00081	0.00091
	Milk (fodder)	0.044	0.042	0.048	0.0039	0.0037	0.0042	0.00083	0.0008	0.0009
N	Eggs	0.0014	0.00064	0.0019	0.00012	5.6×10^{-5}	0.00017	2.6×10^{-5}	1.2×10^{-5}	3.6×10^{-5}
	Meat (grazing)	0.00035	0.00016	0.00049	3.1×10^{-5}	1.4×10^{-5}	4.3×10^{-5}	6.6×10^{-6}	3.1×10^{-6}	9.2×10^{-6}
	Meat (fodder)	0.00035	0.00016	0.00048	3.0×10^{-5}	1.4×10^{-5}	4.2×10^{-5}	6.6×10^{-6}	3.0×10^{-6}	9.1×10^{-6}
	Milk (grazing)	0.023	0.011	0.032	0.002	0.00094	0.0029	0.00044	0.0002	0.00061
	Milk (fodder)	0.023	0.011	0.032	0.002	0.00093	0.0028	0.00043	0.0002	0.0006
O	Eggs	0.0024	0.0016	0.0032	0.00021	0.00014	0.00028	4.6×10^{-5}	3.0×10^{-5}	6.0×10^{-5}
	Meat (grazing)	0.00062	0.00041	0.00081	5.5×10^{-5}	3.6×10^{-5}	7.1×10^{-5}	1.2×10^{-5}	7.7×10^{-6}	1.5×10^{-5}
	Meat (fodder)	0.00062	0.0004	0.0008	5.4×10^{-5}	3.5×10^{-5}	7.0×10^{-5}	1.2×10^{-5}	7.6×10^{-6}	1.5×10^{-6}
	Milk (grazing)	0.041	0.027	0.054	0.0036	0.0024	0.0047	0.00078	0.00051	0.001
	Milk (fodder)	0.041	0.027	0.053	0.0036	0.0023	0.0047	0.00077	0.0005	0.001
P	Eggs	0.0041	0.0035	0.0044	0.00036	0.00031	0.00039	7.8×10^{-5}	6.6×10^{-5}	8.4×10^{-5}
	Meat (grazing)	0.0011	0.00089	0.0011	9.3×10^{-5}	7.8×10^{-5}	0.0001	2.0×10^{-5}	1.7×10^{-5}	2.1×10^{-5}
	Meat (fodder)	0.001	0.00088	0.0011	9.1×10^{-5}	7.7×10^{-5}	9.9×10^{-5}	2.0×10^{-5}	1.7×10^{-5}	2.1×10^{-5}
	Milk (grazing)	0.07	0.059	0.075	0.0061	0.0052	0.0066	0.0013	0.0011	0.0014
	Milk (fodder)	0.069	0.058	0.074	0.006	0.0051	0.0065	0.0013	0.0011	0.0014

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
Q	Eggs	0.0048	0.0044	0.0054	0.00042	0.00039	0.00047	9.0×10^{-5}	8.4×10^{-5}	0.0001
	Meat (grazing)	0.0012	0.0011	0.0014	0.00011	0.0001	0.00012	2.3×10^{-5}	2.1×10^{-5}	2.6×10^{-5}
	Meat (fodder)	0.0012	0.0011	0.0014	0.00011	9.9×10^{-5}	0.00012	2.3×10^{-5}	2.1×10^{-5}	2.6×10^{-5}
	Milk (grazing)	0.08	0.075	0.091	0.0071	0.0066	0.008	0.0015	0.0014	0.0017
	Milk (fodder)	0.079	0.074	0.09	0.007	0.0065	0.0079	0.0015	0.0014	0.0017
R	Eggs	0.00032	0.00032	0.00032	2.8×10^{-5}	2.8×10^{-5}	2.8×10^{-5}	6.0×10^{-6}	6.0×10^{-6}	6.0×10^{-6}
	Meat (grazing)	8.1×10^{-5}	8.1×10^{-5}	8.1×10^{-5}	7.1×10^{-6}	7.1×10^{-6}	7.1×10^{-6}	1.5×10^{-6}	1.5×10^{-6}	1.5×10^{-6}
	Meat (fodder)	8.0×10^{-5}	8.0×10^{-5}	8.0×10^{-5}	7.0×10^{-6}	7.0×10^{-6}	7.0×10^{-6}	1.5×10^{-6}	1.5×10^{-6}	1.5×10^{-6}
	Milk (grazing)	0.0054	0.0054	0.0054	0.00047	0.00047	0.00047	0.0001	0.0001	0.0001
	Milk (fodder)	0.0053	0.0053	0.0053	0.00046	0.00046	0.00046	0.0001	0.0001	0.0001

Br1–Br9

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
A	Eggs	0.28	0.27	0.29	0.024	0.024	0.025	0.0052	0.0051	0.0054
	Meat (grazing)	**2.2**	**2.1**	**2.2**	0.19	0.19	0.20	0.041	0.04	0.042
	Meat (fodder)	0.61	0.59	0.63	0.053	0.052	0.055	0.012	0.011	0.012
	Milk (grazing)	**1.1**	**1.1**	**1.2**	0.098	0.096	0.10	0.021	0.021	0.022
	Milk (fodder)	0.31	0.31	0.33	0.028	0.027	0.029	0.0059	0.0058	0.0061
B	Eggs	0.083	0.065	0.12	0.0073	0.0057	0.01	0.0016	0.0012	0.0023
	Meat (grazing)	0.65	0.51	0.93	0.057	0.045	0.082	0.012	0.0096	0.018
	Meat (fodder)	0.18	0.14	0.26	0.016	0.013	0.023	0.0035	0.0027	0.0049
	Milk (grazing)	0.34	0.26	0.48	0.03	0.023	0.042	0.0064	0.05	0.0091
	Milk (fodder)	0.094	0.074	0.14	0.0083	0.0065	0.012	0.0018	0.0014	0.0025
C	Eggs	0.36	0.13	0.60	0.032	0.011	0.053	0.0068	0.0024	0.011
	Meat (grazing)	**2.8**	**1.0**	**4.7**	0.25	0.088	0.41	0.053	0.019	0.089
	Meat (fodder)	0.79	0.28	**1.3**	0.069	0.025	0.12	0.015	0.0053	0.025
	Milk (grazing)	**1.5**	**0.52**	**2.4**	0.13	0.045	0.21	0.027	0.0098	0.046
	Milk (fodder)	0.41	0.15	0.68	0.036	0.013	0.06	0.0077	0.0027	0.013
D	Eggs	0.44	0.36	0.55	0.039	0.032	0.048	0.0083	0.0068	0.01
	Meat (grazing)	**3.4**	**2.8**	**4.3**	0.30	0.25	0.38	0.065	0.053	0.081
	Meat (fodder)	0.97	0.79	**1.2**	0.085	0.069	0.11	0.018	0.015	0.023
	Milk (grazing)	**1.8**	**1.5**	**2.2**	0.16	0.13	0.20	0.034	0.027	0.042
	Milk (fodder)	0.50	0.41	0.63	0.044	0.036	0.055	0.0094	0.0077	0.012

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
E	Eggs	0.12	0.10	0.13	0.011	0.009	0.012	0.0023	0.0019	0.0025
	Meat (grazing)	0.95	0.80	1.0	0.083	0.07	0.09	0.018	0.015	0.019
	Meat (fodder)	0.27	0.23	0.29	0.023	0.02	0.025	0.005	0.0042	0.0054
	Milk (grazing)	0.49	0.41	0.53	0.043	0.036	0.047	0.0092	0.0078	0.01
	Milk (fodder)	0.14	0.12	0.15	0.012	0.01	0.013	0.0026	0.0022	0.0028
F	Eggs	0.18	0.054	0.27	0.016	0.0047	0.024	0.0034	0.001	0.0051
	Meat (grazing)	**1.4**	**2.1**	0.42	0.13	0.037	0.19	0.027	0.0079	0.04
	Meat (fodder)	0.40	0.12	0.60	0.035	0.01	0.052	0.0075	0.0022	0.011
	Milk (grazing)	0.74	0.22	**1.1**	0.065	0.019	0.096	0.014	0.0041	0.021
	Milk (fodder)	0.21	0.061	0.31	0.018	0.0053	0.027	0.0039	0.0012	0.0058
G	Eggs	0.50	0.30	0.76	0.044	0.026	0.067	0.0095	0.0056	0.014
	Meat (grazing)	**3.9**	**2.3**	**5.9**	0.34	0.21	0.52	0.074	0.044	0.11
	Meat (fodder)	**1.1**	0.66	**1.7**	0.096	0.058	0.15	0.0021	0.012	0.032
	Milk (grazing)	**2.0**	**1.2**	**3.1**	0.18	0.11	0.27	0.038	0.023	0.058
	Milk (fodder)	0.57	0.34	0.86	0.05	0.03	0.076	0.011	0.0064	0.016
H	Eggs	0.22	0.20	0.24	0.019	0.018	0.021	0.0042	0.0038	0.0045
	Meat (grazing)	**1.7**	**1.6**	**1.9**	0.15	0.14	0.16	0.033	0.03	0.035
	Meat (fodder)	0.48	0.44	0.53	0.042	0.039	0.046	0.0091	0.0083	0.0099
	Milk (grazing)	0.89	0.81	0.97	0.078	0.071	0.085	0.017	0.015	0.018
	Milk (fodder)	0.25	0.23	0.27	0.022	0.02	0.024	0.0047	0.0043	0.0051

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
I	Eggs	0.44	0.40	0.49	0.039	0.035	0.043	0.0083	0.0076	0.0093
	Meat (grazing)	**3.5**	**3.1**	**3.8**	0.30	0.28	0.34	0.065	0.059	0.073
	Meat (fodder)	0.97	0.88	**1.1**	0.085	0.077	0.095	0.018	0.017	0.02
	Milk (grazing)	**1.8**	**1.6**	**2.0**	0.16	0.14	0.17	0.034	0.031	0.038
	Milk (fodder)	0.50	0.46	0.56	0.044	0.04	0.049	0.0094	0.0086	0.011
J	Eggs	0.39	0.36	0.42	0.034	0.032	0.037	0.0074	0.0068	0.0079
	Meat (grazing)	**3.1**	**2.8**	**3.3**	0.27	0.25	0.29	0.058	0.053	0.062
	Meat (fodder)	0.86	0.79	0.92	0.076	0.069	0.081	0.016	0.015	0.017
	Milk (grazing)	**1.6**	**1.5**	**1.7**	0.14	0.13	0.15	0.03	0.027	0.032
	Milk (fodder)	0.44	0.41	0.48	0.039	0.036	0.042	0.0084	0.0077	0.009
K	Eggs	0.24	0.24	0.24	0.021	0.021	0.021	0.0045	0.0045	0.0045
	Meat (grazing)	**1.9**	**1.9**	**1.9**	0.16	0.16	0.16	0.035	0.035	0.035
	Meat (fodder)	0.52	0.52	0.52	0.046	0.046	0.046	0.0099	0.0099	0.0099
	Milk (grazing)	0.96	0.96	0.96	0.084	0.084	0.084	0.018	0.018	0.018
	Milk (fodder)	0.27	0.27	0.27	0.024	0.024	0.024	0.0051	0.0051	0.0051
L	Eggs	0.17	0.16	0.18	0.015	0.014	0.016	0.0032	0.003	0.0034
	Meat (grazing)	**1.3**	**1.2**	**1.4**	0.12	0.11	0.12	0.025	0.023	0.026
	Meat (fodder)	0.37	0.34	0.39	0.032	0.03	0.034	0.0069	0.0065	0.0074
	Milk (grazing)	0.67	0.63	0.72	0.059	0.055	0.063	0.013	0.012	0.014
	Milk (fodder)	0.19	0.18	0.20	0.017	0.016	0.018	0.0036	0.0033	0.0038

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
M	Eggs	0.39	0.17	0.60	0.034	0.015	0.053	0.0073	0.0032	0.011
	Meat (grazing)	**3.0**	**1.3**	**4.7**	0.27	0.12	0.41	0.057	0.025	0.089
	Meat (fodder)	0.85	0.37	**1.3**	0.075	0.032	0.12	0.016	0.0069	0.025
	Milk (grazing)	**1.6**	0.68	**2.4**	0.14	0.059	0.21	0.03	0.013	0.046
	Milk (fodder)	0.44	0.19	0.68	0.039	0.017	0.06	0.0083	0.0036	0.013
N	Eggs	0.029	0.029	0.03	0.0026	0.0025	0.0027	0.00055	0.00054	0.00058
	Meat (grazing)	0.23	0.22	0.24	0.02	0.02	0.02	0.0043	0.0042	0.0045
	Meat (fodder)	0.064	0.063	0.067	0.0056	0.0055	0.0059	0.0012	0.0012	0.0013
	Milk (grazing)	0.12	0.12	0.12	0.01	0.01	0.011	0.0022	0.0022	0.0023
	Milk (fodder)	0.033	0.032	0.035	0.0029	0.0028	0.003	0.00063	0.00061	0.00065
O	Eggs	**3.8**	**2.5**	**4.7**	0.33	0.22	0.41	0.072	0.047	0.089
	Meat (grazing)	**30**	**20**	**37**	**2.6**	**1.7**	**3.2**	0.56	0.36	0.69
	Meat (fodder)	**8.3**	**5.5**	**10**	0.73	0.48	0.90	0.16	0.10	0.19
	Milk (grazing)	**15**	**10**	**19**	**1.4**	0.89	**1.7**	0.29	0.19	0.36
	Milk (fodder)	**4.3**	**2.8**	**5.3**	0.38	0.25	0.47	0.081	0.053	0.10
P	Eggs	0.12	0.10	0.13	0.011	0.0091	0.011	0.0023	0.002	0.0025
	Meat (grazing)	0.94	0.81	**1.0**	0.082	0.071	0089	0.018	0.015	0.019
	Meat (fodder)	0.26	0.23	0.29	0.023	0.02	0.025	0.005	0.0043	0.0054
	Milk (grazing)	0.49	0.42	0.53	0.043	0.037	0.046	0.0092	0.0079	0.0099
	Milk (fodder)	0.14	0.12	1.5	0.012	0.01	0.013	0.0026	0.0022	0.0028

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
Q	Eggs	0.081	0.052	0.098	0.0071	0.0045	0.0086	0.0015	0.00098	0.0018
	Meat (grazing)	0.64	0.40	0.76	0.056	0.036	0.067	0.012	0.0076	0.014
	Meat (fodder)	0.18	0.11	0.21	0.016	0.01	0.019	0.0034	0.0021	0.004
	Milk (grazing)	0.33	0.21	0.39	0.029	0.018	0.035	0.0062	0.0039	0.0074
	Milk (fodder)	0.092	0.059	0.11	0.0081	0.0051	0.0097	0.0017	0.0011	0.0021
R	Eggs	0.033	0.033	0.033	0.0029	0.0029	0.0029	0.00061	0.00061	0.00061
	Meat (grazing)	0.25	0.25	0.25	0.022	0.022	0.022	0.0048	0.0048	0.0048
	Meat (fodder)	0.071	0.071	0.071	0.0063	0.0063	0.0063	0.0013	0.0013	0.0013
	Milk (grazing)	0.13	0.13	0.13	0.012	0.012	0.012	0.0025	0.0025	0.0025
	Milk (fodder)	0.037	0.037	0.037	0.0032	0.0032	0.0032	0.00069	0.00069	0.00069

Br10

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
A	Eggs	0.0022	0.0022	0.0022	0.00019	0.00019	0.00019	4.1×10^{-5}	4.1×10^{-5}	4.1×10^{-5}
	Meat (grazing)	0.00042	0.00042	0.00042	3.7×10^{-5}	3.7×10^{-5}	3.7×10^{-5}	7.9×10^{-6}	7.9×10^{-6}	7.9×10^{-6}
	Meat (fodder)	1.6×10^{-6}	1.6×10^{-5}	1.6×10^{-5}	1.4×10^{-6}	1.4×10^{-6}	1.4×10^{-6}	3.0×10^{-7}	3.0×10^{-7}	3.0×10^{-7}
	Milk (grazing)	0.00033	0.00033	0.00033	2.9×10^{-5}	2.9×10^{-5}	2.9×10^{-5}	6.1×10^{-6}	6.1×10^{-6}	6.1×10^{-6}
	Milk (fodder)	1.2×10^{-5}	1.2×10^{-5}	1.2×10^{-5}	1.1×10^{-6}	1.1×10^{-6}	1.1×10^{-6}	2.3×10^{-7}	2.3×10^{-7}	2.3×10^{-7}
B	Eggs	0.0015	0.00032	0.0032	0.00013	2.8×10^{-5}	0.00028	2.8×10^{-5}	6.1×10^{-6}	6.1×10^{-5}
	Meat (grazing)	0.00029	6.3×10^{-5}	0.00063	2.5×10^{-5}	5.5×10^{-6}	5.5×10^{-5}	5.5×10^{-6}	1.2×10^{-6}	1.2×10^{-5}
	Meat (fodder)	1.1×10^{-5}	2.4×10^{-6}	2.4×10^{-5}	9.6×10^{-7}	2.1×10^{-7}	2.1×10^{-6}	2.1×10^{-7}	4.5×10^{-8}	4.5×10^{-7}
	Milk (grazing)	0.00022	4.9×10^{-5}	0.00049	2.0×10^{-5}	4.3×10^{-6}	4.3×10^{-5}	4.2×10^{-6}	9.2×10^{-7}	9.2×10^{-6}
	Milk (fodder)	8.4×10^{-6}	1.8×10^{-6}	1.8×10^{-5}	7.4×10^{-7}	1.6×10^{-7}	1.6×10^{-6}	1.6×10^{-7}	3.5×10^{-8}	3.5×10^{-7}
C	Eggs	0.0026	0.00098	0.0045	0.00023	8.6×10^{-5}	0.0004	5.0×10^{-5}	1.9×10^{-5}	8.6×10^{-5}
	Meat (grazing)	0.00051	0.00019	0.00088	4.5×10^{-5}	1.7×10^{-5}	7.7×10^{-5}	9.7×10^{-6}	3.6×10^{-6}	1.7×10^{-5}
	Meat (fodder)	1.9×10^{-5}	7.2×10^{-6}	3.3×10^{-5}	1.7×10^{-6}	6.3×10^{-7}	2.9×10^{-6}	3.6×10^{-7}	1.4×10^{-7}	6.3×10^{-7}
	Milk (grazing)	0.0004	0.00015	0.00068	3.5×10^{-5}	1.3×10^{-5}	6.0×10^{-5}	7.5×10^{-6}	2.8×10^{-6}	1.3×10^{-5}
	Milk (fodder)	1.5×10^{-5}	5.6×10^{-6}	2.6×10^{-5}	1.3×10^{-6}	4.9×10^{-7}	2.3×10^{-6}	2.8×10^{-7}	1.0×10^{-7}	4.8×10^{-7}
D	Eggs	0.0062	0.0056	0.0073	0.00055	0.00049	0.00064	0.00012	0.00011	0.00014
	Meat (grazing)	0.0012	0.0011	0.0014	0.00011	9.6×10^{-5}	0.00013	2.3×10^{-5}	2.1×10^{-5}	2.7×10^{-5}
	Meat (fodder)	4.6×10^{-5}	4.1×10^{-5}	5.4×10^{-5}	4.0×10^{-6}	3.6×10^{-6}	4.7×10^{-6}	8.6×10^{-7}	7.7×10^{-7}	1.0×10^{-6}
	Milk (grazing)	0.00094	0.00085	0.0011	8.2×10^{-5}	7.4×10^{-5}	9.7×10^{-5}	1.8×10^{-5}	1.6×10^{-5}	2.1×10^{-5}
	Milk (fodder)	3.5×10^{-5}	3.2×10^{-5}	4.2×10^{-5}	3.1×10^{-6}	2.8×10^{-6}	3.6×10^{-6}	6.7×10^{-7}	6.0×10^{-7}	7.8×10^{-7}

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
E	Eggs	0.0024	0.0019	0.0028	0.00021	0.00017	0.00025	4.6×10^{-5}	3.7×10^{-5}	5.3×10^{-5}
	Meat (grazing)	0.00047	0.00038	0.00055	4.1×10^{-5}	3.3×10^{-5}	4.8×10^{-5}	8.9×10^{-6}	7.1×10^{-6}	1.0×10^{-5}
	Meat (fodder)	1.8×10^{-5}	1.4×10^{-5}	2.1×10^{-5}	1.5×10^{-6}	1.2×10^{-6}	1.8×10^{-6}	3.3×10^{-7}	2.7×10^{-7}	3.9×10^{-7}
	Milk (grazing)	0.00036	0.00029	0.00042	3.2×10^{-5}	2.6×10^{-5}	3.7×10^{-5}	6.9×10^{-6}	5.5×10^{-6}	8.0×10^{-6}
	Milk (fodder)	1.4×10^{-5}	1.1×10^{-5}	1.6×10^{-5}	1.2×10^{-6}	9.7×10^{-7}	1.4×10^{-6}	2.6×10^{-7}	2.1×10^{-7}	3.0×10^{-7}
F	Eggs	0.0011	0.0011	0.0011	9.5×10^{-5}	9.5×10^{-5}	9.5×10^{-5}	2.0×10^{-5}	2.0×10^{-5}	2.0×10^{-5}
	Meat (grazing)	0.00021	0.00021	0.00021	1.8×10^{-5}	1.8×10^{-5}	1.8×10^{-5}	4.0×10^{-6}	4.0×10^{-6}	4.0×10^{-6}
	Meat (fodder)	7.9×10^{-6}	7.9×10^{-6}	7.9×10^{-6}	6.9×10^{-7}	6.9×10^{-7}	6.9×10^{-7}	1.5×10^{-7}	1.5×10^{-7}	1.5×10^{-7}
	Milk (grazing)	0.00016	0.00016	0.00016	1.4×10^{-5}	1.4×10^{-5}	1.4×10^{-5}	3.1×10^{-6}	3.1×10^{-6}	3.1×10^{-6}
	Milk (fodder)	6.1×10^{-6}	6.1×10^{-6}	6.1×10^{-6}	5.4×10^{-7}	5.4×10^{-7}	5.4×10^{-7}	1.2×10^{-7}	1.2×10^{-7}	1.2×10^{-7}
G	Eggs	0.0061	0.0011	0.0086	0.00053	9.5×10^{-5}	0.00076	0.00011	2.0×10^{-5}	0.00016
	Meat (grazing)	0.0012	0.00021	0.0017	0.0001	1.8×10^{-5}	0.00015	2.2×10^{-5}	4.0×10^{-6}	3.2×10^{-5}
	Meat (fodder)	4.4×10^{-5}	7.9×10^{-6}	6.3×10^{-5}	3.9×10^{-6}	6.9×10^{-7}	5.5×10^{-6}	8.3×10^{-7}	1.5×10^{-7}	1.2×10^{-6}
	Milk (grazing)	0.00091	0.00016	0.0013	8.0×10^{-5}	1.4×10^{-5}	0.00011	1.7×10^{-5}	3.1×10^{-6}	2.5×10^{-5}
	Milk (fodder)	3.4×10^{-5}	6.1×10^{-6}	4.9×10^{-5}	3.0×10^{-6}	5.4×10^{-7}	4.3×10^{-6}	6.5×10^{-7}	1.2×10^{-7}	9.2×10^{-7}
H	Eggs	0.0019	0.0016	0.0025	0.00017	0.00014	0.00022	3.7×10^{-5}	3.1×10^{-5}	4.7×10^{-5}
	Meat (grazing)	0.00038	0.00032	0.00048	3.3×10^{-5}	2.8×10^{-5}	4.2×10^{-5}	7.1×10^{-6}	6.0×10^{-6}	9.1×10^{-6}
	Meat (fodder)	1.4×10^{-5}	1.2×10^{-5}	1.8×10^{-5}	1.2×10^{-6}	1.0×10^{-6}	1.6×10^{-6}	2.7×10^{-7}	2.2×10^{-7}	3.4×10^{-7}
	Milk (grazing)	0.00029	0.00024	0.00037	2.6×10^{-5}	2.1×10^{-5}	3.3×10^{-5}	5.5×10^{-6}	4.6×10^{-6}	7.1×10^{-6}
	Milk (fodder)	1.1×10^{-5}	9.2×10^{-6}	1.4×10^{-5}	9.7×10^{-7}	8.0×10^{-7}	1.2×10^{-6}	2.1×10^{-7}	1.7×10^{-7}	2.7×10^{-7}

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
I	Eggs	0.0045	0.0034	0.0061	0.0004	0.00029	0.00053	8.6×10^{-5}	6.3×10^{-5}	0.00011
	Meat (grazing)	0.00088	0.00065	0.0012	7.7×10^{-5}	5.7×10^{-5}	0.0001	1.7×10^{-5}	1.2×10^{-5}	2.2×10^{-5}
	Meat (fodder)	3.3×10^{-5}	2.4×10^{-5}	4.4×10^{-5}	2.9×10^{-6}	2.1×10^{-6}	3.9×10^{-6}	6.3×10^{-7}	4.6×10^{-7}	8.3×10^{-7}
	Milk (grazing)	0.00068	0.0005	0.00091	6.0×10^{-5}	4.4×10^{-5}	8.0×10^{-5}	1.3×10^{-5}	9.5×10^{-6}	1.7×10^{-5}
	Milk (fodder)	2.6×10^{-5}	1.9×10^{-5}	3.4×10^{-5}	2.3×10^{-6}	1.7×10^{-6}	3.0×10^{-6}	4.8×10^{-7}	3.6×10^{-7}	6.5×10^{-7}
J	Eggs	0.004	0.0038	0.0041	0.00035	0.00033	0.00036	7.5×10^{-5}	7.1×10^{-5}	7.7×10^{-5}
	Meat (grazing)	0.00077	0.00074	0.0008	6.8×10^{-5}	6.5×10^{-5}	7.0×10^{-5}	1.5×10^{-5}	1.4×10^{-5}	1.5×10^{-5}
	Meat (fodder)	2.9×10^{-5}	2.8×10^{-5}	3.0×10^{-5}	2.5×10^{-6}	2.4×10^{-6}	2.6×10^{-6}	5.5×10^{-7}	5.2×10^{-7}	5.7×10^{-7}
	Milk (grazing)	0.0006	0.00057	0.00062	5.2×10^{-5}	5.0×10^{-5}	5.4×10^{-5}	1.1×10^{-5}	1.1×10^{-5}	1.2×10^{-5}
	Milk (fodder)	2.2×10^{-5}	2.1×10^{-5}	2.3×10^{-5}	2.0×10^{-6}	1.9×10^{-6}	2.0×10^{-6}	4.2×10^{-7}	4.0×10^{-7}	4.4×10^{-7}
K	Eggs	0.0067	0.0067	0.0067	0.00059	0.00059	0.00059	0.00013	0.00013	0.00013
	Meat (grazing)	0.0013	0.0013	0.0013	0.00011	0.00011	0.00011	2.5×10^{-5}	2.5×10^{-5}	2.5×10^{-5}
	Meat (fodder)	4.9×10^{-5}	4.9×10^{-5}	4.9×10^{-5}	4.3×10^{-6}	4.3×10^{-6}	4.3×10^{-6}	9.2×10^{-7}	9.2×10^{-7}	9.2×10^{-7}
	Milk (grazing)	0.001	0.001	0.001	8.9×10^{-5}	8.9×10^{-5}	8.9×10^{-5}	1.9×10^{-5}	1.9×10^{-5}	1.9×10^{-5}
	Milk (fodder)	3.8×10^{-5}	3.8×10^{-5}	3.8×10^{-5}	3.3×10^{-6}	3.3×10^{-6}	3.3×10^{-6}	7.1×10^{-7}	7.1×10^{-7}	7.1×10^{-7}
L	Eggs	0.0013	0.00094	0.0019	0.00011	8.2×10^{-5}	0.00017	2.4×10^{-5}	1.8×10^{-5}	3.7×10^{-5}
	Meat (grazing)	0.00025	0.00018	0.00038	2.2×10^{-5}	1.6×10^{-5}	3.3×10^{-5}	4.7×10^{-6}	3.5×10^{-6}	7.1×10^{-6}
	Meat (fodder)	9.4×10^{-6}	6.9×10^{-6}	1.4×10^{-5}	8.2×10^{-7}	6.0×10^{-7}	1.2×10^{-6}	1.8×10^{-7}	1.3×10^{-7}	2.7×10^{-7}
	Milk (grazing)	0.00019	0.00014	0.00029	1.7×10^{-5}	1.2×10^{-5}	2.6×10^{-5}	3.6×10^{-6}	2.7×10^{-6}	5.5×10^{-6}
	Milk (fodder)	7.3×10^{-6}	5.3×10^{-6}	1.1×10^{-5}	6.4×10^{-7}	4.7×10^{-7}	9.7×10^{-7}	1.4×10^{-7}	1.0×10^{-7}	2.1×10^{-7}

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
M	Eggs	0.0031	0.0012	0.0068	0.00027	0.0001	0.0006	5.8×10^{-5}	2.2×10^{-5}	0.00013
	Meat (grazing)	0.0006	0.00023	0.0013	5.2×10^{-5}	2.0×10^{-5}	0.00012	1.1×10^{-5}	4.4×10^{-6}	2.5×10^{-5}
	Meat (fodder)	2.2×10^{-5}	8.7×10^{-6}	5.0×10^{-5}	2.0×10^{-6}	7.6×10^{-7}	4.4×10^{-6}	4.2×10^{-7}	1.6×10^{-7}	9.4×10^{-7}
	Milk (grazing)	0.00046	0.00018	0.001	4.0×10^{-5}	1.6×10^{-5}	9.0×10^{-5}	8.7×10^{-6}	3.4×10^{-6}	1.9×10^{-5}
	Milk (fodder)	1.7×10^{-5}	6.7×10^{-6}	3.9×10^{-5}	1.5×10^{-6}	5.9×10^{-7}	3.4×10^{-6}	3.3×10^{-7}	1.3×10^{-7}	7.3×10^{-7}
N	Eggs	0.0016	0.0016	0.0016	0.00014	0.00014	0.00014	3.1×10^{-5}	3.1×10^{-5}	3.1×10^{-5}
	Meat (grazing)	0.00032	0.00032	0.00032	2.8×10^{-5}	2.8×10^{-5}	2.8×10^{-5}	6.0×10^{-6}	6.0×10^{-6}	6.0×10^{-6}
	Meat (fodder)	1.2×10^{-5}	1.2×10^{-5}	1.2×10^{-5}	1.0×10^{-6}	1.0×10^{-6}	1.0×10^{-6}	2.2×10^{-7}	2.2×10^{-7}	2.2×10^{-7}
	Milk (grazing)	0.00024	0.00024	0.00024	2.1×10^{-5}	2.1×10^{-5}	2.1×10^{-5}	4.6×10^{-6}	4.6×10^{-6}	4.6×10^{-6}
	Milk (fodder)	9.2×10^{-6}	9.2×10^{-6}	9.2×10^{-6}	8.0×10^{-7}	8.0×10^{-7}	8.0×10^{-7}	1.7×10^{-7}	1.7×10^{-7}	1.7×10^{-7}
O	Eggs	0.023	0.0019	0.05	0.002	0.00017	0.0044	0.00043	3.7×10^{-5}	0.00094
	Meat (grazing)	0.0045	0.00038	0.0097	0.00039	3.3×10^{-5}	0.00085	8.4×10^{-5}	7.1×10^{-6}	0.00018
	Meat (fodder)	0.00017	1.4×10^{-5}	0.00036	1.5×10^{-5}	1.2×10^{-6}	3.2×10^{-5}	3.2×10^{-6}	2.7×10^{-7}	6.9×10^{-6}
	Milk (grazing)	0.0035	0.00029	0.0075	0.0003	2.6×10^{-5}	0.00066	6.5×10^{-5}	5.5×10^{-6}	0.00014
	Milk (fodder)	0.00013	1.1×10^{-5}	0.00028	1.1×10^{-5}	9.7×10^{-7}	2.5×10^{-5}	2.5×10^{-6}	2.1×10^{-7}	5.3×10^{-6}
P	Eggs	0.0011	0.0011	0.0011	9.5×10^{-5}	9.5×10^{-5}	9.5×10^{-5}	2.0×10^{-5}	2.0×10^{-5}	2.0×10^{-5}
	Meat (grazing)	0.00021	0.00021	0.00021	1.8×10^{-5}	1.8×10^{-5}	1.8×10^{-5}	4.0×10^{-6}	4.0×10^{-6}	4.0×10^{-6}
	Meat (fodder)	7.9×10^{-6}	7.9×10^{-6}	7.9×10^{-6}	6.9×10^{-7}	6.9×10^{-7}	6.9×10^{-7}	1.5×10^{-7}	1.5×10^{-7}	1.5×10^{-7}
	Milk (grazing)	0.00016	0.00016	0.00016	1.4×10^{-5}	1.4×10^{-5}	1.4×10^{-5}	3.1×10^{-6}	3.1×10^{-6}	3.1×10^{-6}
	Milk (fodder)	6.1×10^{-6}	6.1×10^{-6}	6.1×10^{-6}	5.4×10^{-7}	5.4×10^{-7}	5.4×10^{-7}	1.2×10^{-7}	1.2×10^{-7}	1.2×10^{-7}

Facility	Pathway	Scenario 1			Scenario 2			Scenario 3		
		average	min	max	average	min	max	average	min	max
Q	Eggs	0.0026	0.0011	0.0035	0.00023	9.5×10^{-5}	0.0003	5.0×10^{-5}	2.0×10^{-5}	6.5×10^{-5}
	Meat (grazing)	0.00051	0.00021	0.00067	4.5×10^{-5}	1.8×10^{-5}	5.9×10^{-5}	9.7×10^{-6}	4.0×10^{-6}	1.3×10^{-5}
	Meat (fodder)	1.9×10^{-5}	7.9×10^{-6}	2.5×10^{-5}	1.7×10^{-6}	6.9×10^{-7}	2.2×10^{-6}	3.6×10^{-7}	1.5×10^{-7}	4.8×10^{-7}
	Milk (grazing)	0.0004	0.00016	0.00052	3.5×10^{-5}	1.4×10^{-5}	4.6×10^{-5}	7.5×10^{-6}	3.1×10^{-6}	9.8×10^{-6}
	Milk (fodder)	1.5×10^{-5}	6.1×10^{-6}	2.0×10^{-5}	1.3×10^{-6}	5.4×10^{-7}	1.7×10^{-6}	2.8×10^{-7}	1.2×10^{-7}	3.7×10^{-7}
R	Eggs	0.00038	0.00038	0.00038	3.3×10^{-5}	3.3×10^{-5}	3.3×10^{-5}	7.1×10^{-6}	7.1×10^{-6}	7.1×10^{-6}
	Meat (grazing)	7.4×10^{-5}	7.4×10^{-5}	7.4×10^{-5}	6.5×10^{-6}	6.5×10^{-6}	6.5×10^{-6}	1.4×10^{-6}	1.4×10^{-6}	1.4×10^{-6}
	Meat (fodder)	2.8×10^{-6}	2.8×10^{-6}	2.8×10^{-6}	2.4×10^{-7}	2.4×10^{-7}	2.4×10^{-7}	5.2×10^{-8}	5.2×10^{-8}	5.2×10^{-8}
	Milk (grazing)	5.7×10^{-5}	5.7×10^{-5}	5.7×10^{-5}	5.0×10^{-6}	5.0×10^{-6}	5.0×10^{-6}	1.1×10^{-6}	1.1×10^{-6}	1.1×10^{-6}
	Milk (fodder)	2.1×10^{-6}	2.1×10^{-6}	2.1×10^{-6}	1.9×10^{-7}	1.9×10^{-7}	1.9×10^{-7}	4.0×10^{-8}	4.0×10^{-8}	4.0×10^{-8}