Minutes of public meeting of the PFAS Scientific Advisory Panel on Teams

10:00 on 4 September 2025

Panel Members present:	Professor Ian Cousins – PFAS and Environment member (temporary chair)
	Dr Tony Fletcher – PFAS and Health member
In attendance:	Standing Observer (Regulation) - Kelly Whitehead - Group Director of Regulation, Infrastructure and Environment Department
	Various Subject Matter Experts
	Programme support team from I&E

Welcome:

Ian Cousins opened the session, noting the absence of the usual chair, Steve Hajioff, who was unwell and unable to attend. Despite Steve's illness, the decision was made to proceed with the meeting, given the presence of invited subject matter experts who had generously allocated their time to present. However, Ian informed attendees that the agenda would be slightly reduced to accommodate the circumstances. Specifically, reviewing the agenda, matters arising and other business would be deferred to the next panel meeting, when it is hoped that Steve will be well enough to resume his role as chair.

Introductions

Dr Tony Fletcher, PFAS and Health Panel Member: Environmental Epidemiologist at the London School of Hygiene and Tropical Medicine, working on PFAS since 2006 and member of the panel with experience of epidemiological studies on the health effects of PFAS in contaminated communities in West Virginia in the United States, in the Veneto region, in Italy, and in Ronneby, and is the health expert on the panel.

Professor Ian Cousins, PFAS and Environment Panel Member: A Professor in Environmental Chemistry at Stockholm University, an expert on PFAS, appointed as the environmental expert on this Panel and whose expertise on PFAS is on the sources, transport, fate, and exposure of PFAS.

Kelly Whitehead, Group Director for Regulation in the in the Infrastructure and Environment Department, leading on the Water Quality and Safety Programme, coordinating Government's response.

Declaration of Interests

- No new interests declared.

Presentation from Subject Matter Expert Thorhallur Halldórsson

Professor Thorhallur Halldórsson, from the Faculty of Food Science and Nutrition at the University of Iceland, opened his presentation by outlining the scope of his talk: the adverse health effects of PFAS (per- and polyfluoroalkyl substances), with a particular focus on the conclusions drawn in the European Food Safety Authority (EFSA) 2020 opinion. To provide context, he offered a historical overview of how public health authorities and regulatory agencies approached PFAS prior to 2020. He clarified that although he contributed to EFSA opinions in 2018 and 2020, the views expressed were his own and not representative of EFSA.

Halldórsson described PFAS as highly persistent environmental pollutants, characterised by their resistance to degradation. He focused on long-chain PFAS, defined by having more than eight carbon atoms (or six for sulfonates), which are particularly concerning due to their long elimination half-lives in humans. These compounds bind to proteins and mimic short-chain fatty acids, leading to reabsorption by the kidneys and slow excretion. Despite being phased out, long-chain PFAS remain detectable in the environment, especially near contaminated sites such as airports, due to their historical use in firefighting foams and industrial processes.

The presentation then shifted to the regulatory journey of PFAS, particularly PFOA and PFOS. Halldórsson highlighted EFSA's evolving stance, beginning with a 2008 tolerable daily intake (TDI) of 1500 ng/kg body weight for PFOA, based on increased liver weight in rats. Over time, other agencies such as the Dutch and Danish environmental authorities drastically reduced these values—sometimes by factors of 100—using the same studies. This discrepancy raised questions about the reliability of animal models, particularly rats, in predicting human toxicity. He suggested that differences in toxicokinetic, especially elimination half-lives, may explain why humans are more vulnerable to PFAS accumulation at lower doses.

Halldórsson detailed EFSA's 2018 opinion, which reviewed 35 PFAS compounds but found sufficient evidence to draw conclusions on only four: PFOS, PFOA, PFHxS, and PFNA. The review encompassed over 200 human studies and numerous animal studies. Key health outcomes identified included increased liver enzymes, reduced oxidative response, elevated cholesterol levels, and lower birth weight. While these associations were consistent across studies, the effect sizes were modest and often within normal biological variation. For example, the reduction in birth weight was comparable to changes seen with variations in maternal nutrition and did not result in clinically significant outcomes like low birth weight or small-for-gestational-age infants.

The most critical and sensitive endpoint identified was the impact of PFAS on the immune system, particularly reduced antibody response following vaccination. Halldórsson explained that PFAS, due to their structural similarity to fatty acids, may interfere with immune modulation. Multiple human observational studies showed a consistent association between PFAS blood concentrations and reduced antibody titres post-vaccination. Supporting evidence from animal studies, including a 2005 mouse study on PFOS, confirmed this effect at low doses. Although variability exists in experimental setups and species used, the overall weight of evidence supported a causal relationship between PFAS exposure and immune suppression.

To establish the current TWI of 4.4 ng/kg body weight for the sum of PFOS, PFOA, PFHxS, and PFNA, EFSA used a modelling approach based on data from one-year-old German infants. These infants had both PFAS and antibody concentrations measured, allowing researchers to estimate the PFAS level associated with a 20% reduction in antibody response—a conservative threshold. The model back-calculated maternal PFAS concentrations that would result in this infant exposure level after one year of breastfeeding. This led to the derivation of the intake value that is now used as the health-based guidance level.

In closing, Halldórsson emphasised that the immune system endpoint is both sensitive and scientifically justified for regulatory purposes. He acknowledged that other endpoints—such as cholesterol, liver enzymes, mammary gland development, and birth weight—are also relevant but less critical. He cautioned against overinterpreting associations with severe disease outcomes, which typically occur at much higher PFAS concentrations. Halldórsson reflected on the challenges of PFAS risk assessment, noting that discrepancies between rodent and human data are not uncommon in toxicology. He expressed confidence in the robustness of human observational studies, which have been instrumental in shaping current regulatory standards.

Panel Discussion and Clarifications

Tony Fletcher opened the discussion by asking whether the tolerable weekly intake (TWI) set by EFSA for PFAS was also protective against other health endpoints such as cholesterol and birth weight. Professor Halldórsson confirmed that while the TWI was primarily based on immune system effects, it would likely be protective against other endpoints as well. However, if the TWI had been based on cholesterol or birth weight alone, the values would have been slightly higher, indicating those effects occur at higher exposure levels.

Tony then raised the issue of the relative potency factor (RPF) approach used by RIVM, which assigns different potencies to PFAS compounds like PFNA. Halldórsson explained that EFSA did not adopt this method because it was developed later and remains problematic. He noted that potency estimates vary significantly depending on whether they are based on intake or circulating concentrations, due to differences in elimination half-lives between rodents and humans. He emphasised that EFSA assumed equal potency among the four PFAS due to lack of robust comparative data and expressed scepticism about the scientific reliability of the RPF approach in its current form.

Ian Cousins asked about criticisms of EFSA's reliance on human epidemiological studies, referencing Australia's decision to disregard such data and set much higher PFAS limits. Halldórsson acknowledged that historically, epidemiological data were underutilised in setting health guidelines. However, he argued that the toxicological community in Europe has increasingly recognised the limitations of rodent models, especially due to differences in elimination half-lives. He defended EFSA's approach, stating that human data provide better predictions of relevant exposure levels, even if uncertainty factors are not strictly scientific. He criticised the dismissal of human studies without offering scientifically sound alternatives, especially when setting higher thresholds.

Ian asked why cancer was not considered a regulatory endpoint in EFSA's opinion. Halldórsson responded that while cancer was reviewed, the rodent studies were inconclusive, and human data—such as those from the C8 study—were not robust enough to support regulation. He acknowledged that PFAS may have immune-related mechanisms that could theoretically link to cancer, but the evidence was insufficient. He contrasted EFSA's cautious approach with the U.S. stance, which assumes no safe level and bases drinking water guidelines on what is technically achievable. Halldórsson disagreed with the "no safe level" concept, suggesting that some safe threshold likely exists, though he admitted this was a personal view.

Tony noted that EFSA's 2018 review concluded that only PFOS and PFOA had sufficient data to set health-based guidance values. He asked whether PFHxS, which is of particular concern due to its use in firefighting foams, showed any distinct effects in the 2020 assessment. Halldórsson replied that PFHxS appeared to have similar immune effects to PFOS, though possibly with slightly lower potency. However, he cautioned that the available human studies often involved co-exposure to multiple PFAS, making it difficult to isolate PFHxS effects. Rodent studies suggested that higher

concentrations of PFHxS were needed to produce liver effects, but the data were not strong enough to draw firm conclusions.

Presentation from Subject Matter Expert Leo Yeung

Dr. Leo Yeung began by introducing his academic background and long-standing research on PFAS, which spans his master's, PhD, postdoctoral work, and current collaborations with Swedish government agencies. His focus is on analytical techniques for characterising PFAS in food and environmental samples. He aimed to provide an academic perspective on PFAS in food.

Yeung explained the chemical structure of PFAS, particularly PFOS, noting its similarity to fatty acids but with hydrogen atoms replaced by fluorine. This substitution results in a highly stable molecule due to the strength of the carbon-fluorine bond, making PFAS resistant to degradation. He distinguished between fully fluorinated and partially fluorinated compounds; the former being referred to as perfluoroalkyl substances. PFAS are widely used in consumer products for their ability to repel water and oil, and their persistence in harsh environments such as firefighting applications.

Unlike other persistent organic pollutants (POPs), PFAS do not accumulate in fatty tissues but bind to proteins, concentrating in blood and liver. Yeung cited studies from 2006 and beyond that confirmed this pattern in chickens and fish. He emphasised the importance of chain length: long-chain PFAS (e.g., more than seven fluorinated carbons for carboxylic acids or six for sulfonates) tend to bioaccumulate and persist in the body, while short-chain PFAS are more mobile and are excreted more rapidly. This also affects their environmental mobility, with long-chain PFAS remaining near the source and short-chain PFAS traveling further.

Yeung outlined the various pathways through which humans are exposed to PFAS, including industrial emissions, consumer product use, environmental contamination, and wastewater treatment. He emphasised that food and drinking water are the primary exposure routes, with breast milk and placental transfer contributing to early-life exposure. He referenced studies showing that 40% of PFAS exposure research focuses on food and 30% on water, highlighting the significance of dietary intake.

He presented findings from studies that identified dietary ingestion as the predominant exposure pathway, followed by indoor dust and air. One study showed that detectable PFAS concentrations in drinking water were directly associated with serum levels of PFOA, PFHxS, and PFOS. Seafood consumption was linked to elevated levels of PFNA and other PFAS. These findings underscore the importance of monitoring food and water sources for PFAS contamination.

Using a case study from Japan, Yeung illustrated how PFAS from firefighting foams can disperse regionally and globally. He described how compounds released near Tokyo travelled over 60 kilometres to Tsukuba, where he conducted postdoctoral research. These compounds can undergo transformation through oxidation or rainwater transport, reaching distant ecosystems such as the Arctic. Long-chain PFAS tend to remain nearer the source, while short-chain PFAS can travel extensively depending on environmental conditions.

Yeung explained the shift from legacy PFAS like PFOS and PFHxS to newer compounds such as 6:2 fluorotelomer-based substances. These newer compounds share structural similarities but differ in functional groups and environmental behaviour. He noted that these compounds are increasingly detected in firefighting foams and other applications, raising concerns about their relevance to human exposure and environmental persistence.

He described how PFAS accumulate in various food sources, including fish, livestock, and crops. Long-chain PFAS bind to soil particles and are ingested by animals through grazing or feeding on

contaminated soil and worms. These compounds are then transferred to meat, milk, and eggs. Short-chain PFAS, on the other hand, are more likely to be taken up by plants. Studies in Japan showed that rice and vegetables like lettuce, tomatoes, cucumbers, and potatoes absorb short-chain PFAS through root systems. Notably, PFAS contamination was found on potato skins even after washing, indicating persistent surface binding.

Yeung addressed the role of food packaging materials in PFAS exposure. He explained that PFAS can migrate from packaging into food, especially when heated in microwaves. While long-chain PFAS have been phased out due to regulatory bans, short-chain compounds and side-chain fluorinated polymers are still used. These materials can hydrolyse and release PFAS into food, contributing to overall exposure. He emphasised the importance of considering packaging materials in exposure assessments and noted that recycled packaging may retain residual PFAS.

Yeung reviewed the evolution of PFAS analytical methods over the past 25 years. Early studies faced challenges due to instrument contamination, lack of standards, and poor sensitivity. He showed examples of chromatographic interference and contamination from instrument components and sample vials. Over time, improvements in instrumentation, standardisation, and quality control have enabled detection limits to drop from nanograms to picograms per gram. He stressed the importance of rigorous contamination control during sample collection and preparation.

He cited a 2006 study that revealed significant variability in PFAS measurements across laboratories, with relative standard deviations reaching up to 250%. This was attributed to inconsistent methods and lack of standards. A 2008 publication was withdrawn due to misidentification of PFAS compounds, highlighting the need for accurate transitions and separation techniques. Today, standardised methods and internal controls help mitigate ion suppression and signal enhancement, improving data reliability.

Yeung referenced technical guidance documents from the FDA and EFSA, which outline detection requirements for PFAS in food and feed. While current regulations focus on four main compounds, he advocated for broader monitoring of emerging short-chain PFAS. In Sweden, his team analyses up to 20 PFAS compounds, facing challenges with chromatographic interference and lack of standards for newer substances. He emphasised the need for methods to quantify total PFAS exposure, including unknown compounds.

Following the presentation, panel members raised questions about analytical methods, food packaging, and PFAS migration in plants Yeung clarified that while long-chain PFAS are generally less mobile, they can still travel several kilometres in groundwater. He also explained that short-chain PFAS are more efficiently transported within plants, though long-chain compounds can occasionally be detected in above-ground parts. The panel discussed the importance of accurate data, the role of blanks in analysis, and the need for robust quality assurance to avoid contamination and misreporting.

Panel Discussion and Clarifications

Ian Cousins opened the discussion by commending Yeung for the depth of his analytical overview, particularly the historical evolution of PFAS detection methods. He emphasised the importance of blanks in analytical procedures to prevent contamination and noted that early PFAS studies often suffered from false positives due to inadequate detection limits and poor control measures. Yeung agreed and added that early data were often skewed due to the lack of mass-labelled standards, which led to both over- and underestimation of PFAS levels. He stressed that with the availability of better standards and techniques, current data are far more reliable.

Ian then shared an example from Germany, where a study had significantly overreported PFAS levels due to intermittent blank contamination. Upon reanalysis, the actual concentrations were

found to be 50 to 100 times lower than initially reported. This highlighted the critical need for stringent quality control and the importance of interpreting literature data cautiously.

Tony Fletcher raised a question about food packaging, asking whether it still posed a risk for long-chain PFAS exposure given recent regulatory changes. Yeung responded that long-chain PFAS have largely been phased out due to international conventions like the Stockholm Convention. However, he cautioned that short-chain PFAS and side-chain fluorinated substances are still used in packaging materials and may migrate into food, especially when heated. He also noted that recycled packaging materials could retain residual PFAS, posing an additional exposure risk.

The panel discussed the broader industry trend toward eliminating PFAS from food contact materials, with Ian citing Denmark's complete ban on all PFAS in food packaging. However, he and Yeung agreed that while long-chain PFAS are mostly phased out, short-chain variants and precursors remain a concern due to their potential to degrade into harmful substances.

Tony then asked about the European Union's delay in implementing a total fluorine standard for drinking water, questioning whether consensus had been reached on analytical methods. Yeung explained that the EU Drinking Water Directive sets a limit of 500 ng/L for total PFAS and offers three recommended methods for compliance. He noted that labs are also required to report trifluoroacetic acid (TFA) recovery, although how TFA data will be used remains under discussion.

Ian offered a clarification regarding PFAS mobility, noting that long-chain compounds can travel several kilometres in groundwater, contrary to the assumption that they remain localised. He cited the example of Jersey, where PFAS from a fire training ground migrated through groundwater, demonstrating that even long-chain PFAS can pose regional contamination risks. Yeung acknowledged the correction and agreed that environmental transport mechanisms must be considered carefully.

The discussion then turned to PFAS migration in plants. Tony asked whether long-chain PFAS could migrate beyond plant roots, referencing data on leafy vegetables. Yeung explained that short-chain PFAS are more efficiently transported within plants due to their mobility and potential for active transport mechanisms. While long-chain PFAS are generally retained in soil or root tissues, they can occasionally be detected in above-ground parts like stems and leaves. Ian confirmed this, noting that although long-chain PFAS are less mobile, they are not entirely immobile and can appear in plant tissues under certain conditions.

The panel concluded with consensus on the importance of continued research into PFAS transport, exposure pathways, and analytical improvements. There was strong agreement that high-quality data, robust standards, and careful interpretation are essential for effective regulation and public health protection.

Presentation from Subject Matter Expert Irina Gyllenhammar

Dr. Irina Gyllenhammar, a toxicologist at the Swedish Food Agency, presented an overview of PFAS exposure through food, with a focus on Sweden's national monitoring and risk assessment efforts. She began by outlining the regulatory context, noting that both food and drinking water are the primary sources of PFAS exposure. Sweden has had action limits for PFAS in drinking water since 2014, and from 2026, these will become legally binding. She also referenced the 2020 EFSA risk assessment, which established a tolerable weekly intake (TWI) for four PFAS compounds, and the 2023 EU regulation that introduced maximum levels for PFAS in meat, fish, and eggs.

Gyllenhammar described the Swedish Market Basket Study (MB), a long-term surveillance programme designed to estimate the average dietary intake of nutrients and contaminants. The study involves purchasing food from supermarkets based on national consumption statistics, homogenising it into food groups, and analysing it for various substances. Since 1999, five MB studies have been conducted (1999, 2005, 2010, 2015, and 2022), allowing for temporal trend analysis.

In the 2022 study, with additional funding from the Swedish Environmental Protection Agency, the agency expanded PFAS testing to include more specific food samples. Analysis was conducted by Dr. Leo Yeung's team at Örebro University, covering 14 PFAS compounds. Among 17 food groups, only three—lean fish, fatty fish, and eggs—had detectable PFAS levels. Other food groups, including fruits, vegetables, beef, pork, lamb, and chicken, showed no detectable PFAS. Notably, PFAS was found in organic eggs but not in conventional eggs, a pattern also confirmed by the agency's food control programme.

The highest PFAS concentrations were found in fish from the Baltic Sea and Swedish lakes, with lower levels in farmed salmon and oceanic fish like tuna. Swedish crayfish had higher PFAS levels than imported crayfish from Spain. PFAS was also detected in shellfish and wild boar meat, with low levels in reindeer and moose liver pâté. However, all levels were below EU maximum limits. The agency found no PFAS in fruits, vegetables, or common meats, and confirmed these findings through additional food control sampling.

Gyllenhammar presented data showing a clear downward trend in PFAS exposure from food over time. The per capita intake of PFAS has decreased steadily since 1999, with an estimated annual reduction of 8%. Concentrations in fish have also declined by approximately 5% per year, suggesting a broader environmental reduction in PFAS contamination. These trends were mirrored in human biomonitoring data from first-time mothers in Uppsala, where serum PFAS levels have also declined since 1996.

Using national dietary surveys and PFAS concentration data from the 2022 MB study, the agency calculated PFAS intake across different age groups. Most of the population had intake levels below the EFSA TWI, but some young children (1.5 and 4 years old) exceeded the threshold. When drinking water was included in the exposure model—assuming a concentration of 4 ng/L (the upcoming Swedish limit)—the contribution from water was roughly equal to that from food in adults. A separate model using a higher drinking water limit of 100 ng/L for 21 PFAS compounds showed that water could become the dominant exposure source under such conditions.

Panel Discussion and Clarifications

Ian Cousins praised the clarity of the presentation and confirmed that the most recent Market Basket report is available in English. Tony Fletcher raised two questions: first, whether the observed decline in PFAS levels in sea fish was surprising, given the persistence of PFAS in oceans. Gyllenhammar acknowledged the complexity of oceanic trends and noted that fish included in the MB study may not fully represent open ocean species. Ian added that trends in ocean PFAS levels are inconsistent, with clearer declines observed in coastal regions and human serum data.

Tony's second question concerned the representativeness of the Swedish MB study for other countries. Gyllenhammar noted that while few countries conduct full MB studies, many monitor individual food items. She emphasised that sampling time is critical for comparisons, as PFAS levels have declined over time. Ian agreed and highlighted the importance of considering food origin and supply chains.

The panel also discussed the unexpected presence of PFAS in organic eggs. Gyllenhammar attributed this to the use of fish meal in organic poultry feed, a hypothesis supported by Danish studies. Tony suggested that free-range behaviour and worm and soil ingestion might also contribute, as seen in Dutch data, but Gyllenhammar maintained that feed was the more likely source.

Tony then referenced the UK's 2012 Total Diet Study, which showed much higher PFAS levels in fish than current Swedish data. He questioned whether Sweden's observed 5% annual decline could be applied retrospectively to UK data. Ian and Gyllenhammar agreed that analytical comparability and methodological differences must be considered. Gyllenhammar confirmed that Sweden has archived samples from past MB studies and that PFAS analysis began in 2015, allowing for retrospective validation using modern methods.

Finally, Tony questioned whether this data fitted the assumption that food is the dominant PFAS exposure source, noting that in Sweden, drinking water at the 4 ng/L limit contributed about half of adult intake. Gyllenhammar explained that this varies by region and water source, and that Sweden uses a lower-bound approach (setting non-detects to zero), which may underestimate total intake. She acknowledged that using a middle-bound approach would yield higher estimates but could overstate risk.

Presentation from Subject Matter Expert Ida Hallberg

Dr. Ida Hallberg, a veterinarian and researcher, opened her presentation by introducing the scope of her work on PFAS contamination in animal-sourced food products near known contaminated sites in Sweden. The project was funded by the Swedish Environmental Protection Agency and involved collaboration with the Swedish Food Agency and Örebro University. The primary aim was to assess the risk of PFAS exposure through food produced in proximity to contaminated areas, focusing on beef, dairy cattle, and small-scale egg production. The study concentrated on the four PFAS compounds regulated by EU maximum levels, allowing for direct comparison with established thresholds.

Hallberg provided a schematic overview of PFAS circulation in the environment, emphasising that even in countries without PFAS manufacturing industries, contamination can occur through legacy uses—particularly firefighting foams. She explained that livestock exposure differs from human exposure, with feed, drinking water, and soil ingestion being the primary routes. Soil plays a dual role: animals may ingest it directly (especially hens), and PFAS can transfer from soil to crops consumed by livestock. She noted that while other exposure routes exist, they are less relevant due to controlled animal husbandry practices.

To contextualise the Swedish situation, Hallberg presented three international case studies:

1. **Maine, USA** – A dairy farm used biosolids from a nearby PFAS-producing industry as fertiliser for decades, resulting in milk contamination. The case led to severe consequences for the farmer and prompted the Maine government to develop PFAS monitoring strategies and food safety regulations.
2. **Belgium** – Eggs from backyard hens near PFAS industries showed elevated PFAS levels, with concentrations decreasing with distance from the source. Further sampling revealed additional hotspots and raised concerns about small-scale production near industrial zones.

3. **Denmark** – Beef cattle grazing downstream from a fire training site were exposed via contaminated grass and water. The meat was consumed by members of a cattle association, highlighting the risk of concentrated exposure in specific populations.

These cases underscored the importance of monitoring food production near contaminated sites and informed the design of the Swedish study.

Hallberg explained that in Sweden, PFAS hotspots are primarily linked to firefighting foam use rather than industrial production. She emphasised the difficulty of estimating safe PFAS levels in feed and water due to species-specific physiology, exposure routes, and compound properties. Milk and beef were identified as particularly sensitive due to high feed and water intake—lactating cows, for example, may consume over 100 litres of water daily. While PFOS transfer data are relatively robust, data for other PFAS remain uncertain, complicating risk assessments.

The team attempted to calculate theoretical maximum PFAS levels in feed and water that would not result in food exceeding EU thresholds. These calculations were based on published literature and transfer rates from feed to food products. For PFOS, estimates aligned with studies from Germany, but for other PFAS, data were sparse and uncertain. The team concluded that cattle grazing on contaminated land could produce food exceeding EU thresholds, especially when exposed to both contaminated feed and water. They also noted that real-world exposure is often a combination of sources, making single-pathway estimates insufficient.

The team conducted a screening study involving farms within close proximity of known PFAS hotspots, focusing on milk, beef, and eggs. Farms were selected regardless of water plume direction to maintain anonymity. Analysis was conducted by Dr. Leo Yeung's lab at Örebro University. Samples included blood and muscle tissue from cattle, milk from dairy cows, and eggs from backyard hens. The study aimed to identify PFAS levels in food products and assess whether they exceeded EU thresholds.

PFAS was detected in most milk samples but at low levels, below EU action limits. No clear evidence of contamination from local hotspots was found, and drinking water samples from dairy farms also showed no elevated PFAS levels. The team concluded that milk contamination was minimal and likely reflected background environmental levels rather than localised exposure.

Blood and muscle tissue were sampled from cattle within 5 km of hotspots. PFOS was the only compound detected in meat, with some samples exceeding EU thresholds. Blood PFAS levels varied widely, and no consistent reduction was observed after cattle were moved indoors. The team is planning further studies to better understand blood-to-muscle transfer dynamics. They noted that PFAS half-lives in cattle are relatively short (months or days), suggesting that switching to clean feed and water could reduce contamination over time, though practical implementation may be challenging.

Backyard flocks near contaminated and urban areas were sampled. Over half of the flocks had PFAS levels above EU thresholds. Eggs from rural areas without known contamination had lower PFAS levels, similar to those found in commercial organic eggs. The team concluded that backyard egg production near contaminated sites poses a significant exposure risk, especially for individuals who consume large quantities of their own eggs.

Using the same intake estimation model as Dr. Irina Gyllenhammar, the team assessed consumer risk based on PFAS levels found in beef and eggs. They concluded that individuals consuming large quantities of these products—such as backyard hen owners or farmers consuming their own meat—may exceed EFSA's tolerable weekly intake. This highlights the need for targeted monitoring, public awareness, and risk communication in affected communities.

Panel Discussion and Clarifications

Ian Cousins praised the clarity and relevance of the presentation, especially for regions like Jersey, where firefighting foam use has raised similar concerns. He acknowledged the importance of understanding food contamination pathways and the implications for local populations.

Tony Fletcher asked whether contamination was confirmed through environmental sampling or inferred from proximity to hotspots. Hallberg clarified that while drinking water samples were available for dairy farms, full environmental data for other sites were still being processed. She noted that surface water access during grazing may be a significant exposure route for cattle.

Tony also queried the variation in detection limits for PFOS and PFOA in milk. Dr. Leo Yeung explained that contamination during sample handling can affect detection limits, and different compounds pose different analytical challenges. Ian added that academic labs often achieve lower detection limits than commercial labs, though commercial capabilities are improving.

Further discussion explored the role of biosolids, irrigation practices, and surface water in livestock exposure. Ian clarified that while PFOA is present in firefighting foam, it is typically at lower levels than PFOS and PFHxS. Tony emphasised the value of individual sample data for triangulating between background levels, contaminated sites, and historical datasets. He expressed interest in collaborating on future analyses and projections, particularly in comparing trends across regions and time periods.

Final Discussion with Subject Matter Experts

Ian Cousins invited general reflections on the day's presentations and discussions. He explained that the team in Jersey is collecting samples from a range of locally significant food items, including potatoes, vegetables, milk, eggs, and milk products. These commodities are both consumed locally and exported, making them important for public health and economic reasons. Halldórsson asked whether seafood had been sampled, given the proximity of contaminated sites to coastal areas. Ian confirmed that seafood sampling is planned, likely to occur in autumn when wave action may stir up PFAS-containing sea foam, which is known to be a problematic matrix for analysis.

Halldórsson referenced a case from Denmark where cattle grazing near the coast were exposed to PFAS coming from sea foam, which had settled inland from the shoreline. Ian acknowledged the relevance of this example and noted that while Jersey's cattle may not graze directly on the coast, sea foam contamination is a concern. He explained that sampling sea foam is technically challenging due to its unstable nature and lack of standardised protocols, but efforts are underway to develop suitable methods.

Ian raised the issue of backyard egg production, noting that while eggs are being sampled in Jersey, it is unclear how much attention is being given to non-commercial sources. He emphasised that individuals who use borehole water for irrigation or poultry drinking water, and who also keep hens, could be at risk of elevated PFAS exposure. Hallberg agreed, adding that in her research, soil and feed appeared to be more significant exposure pathways for hens than water. She noted that even in urban areas with clean municipal water, eggs from backyard hens had elevated PFAS levels, despite owners reporting no use of fish-based feed.

Hallberg elaborated on the differences between commercial and backyard egg production. Commercial operations are highly standardised, with controlled feed and water sources. In contrast, beef cattle farms—particularly in Sweden—tend to use locally grown feed, which may be more susceptible to environmental contamination. This distinction is important when assessing PFAS exposure risks across different types of food production.

Ian noted that Jersey's approach differs from Sweden's Market Basket Study, as Jersey is sampling individual food items rather than compiling a representative dietary profile. He asked whether this assumption—that supermarket food in Jersey is comparable to that in Sweden or the UK—is valid. Tony responded by pointing out that the Swedish Market Basket identified only three food groups with detectable PFAS: lean fish, fatty fish, and eggs. Jersey is sampling all three, but Tony cautioned against assuming zero PFAS in all other food groups without further data.

Tony emphasised the importance of accessing recent food basket data from other countries to validate assumptions and ensure comprehensive exposure assessments. He mentioned that EFSA has a programme for collecting food sampling data from member states and that he is in the process of requesting access to these datasets. He noted that many of the studies cited in EFSA's 2020 report are outdated, and newer data would be essential for accurate comparisons.

Halldórsson added that Germany contributes a significant proportion of food sampling data to EFSA—up to 70–80%—due to regulatory requirements mandating annual testing. He suggested contacting the German Federal Institute for Risk Assessment (BfR), which may have recent data. He also noted that chicken and pork production is relatively standardised across Europe due to the widespread use of soy-based feed, whereas cattle feed tends to be more locally sourced and variable.

Ian concluded the discussion by thanking all participants for their contributions and presentations. He expressed interest in maintaining contact with the panel members for future advice and collaboration as the Jersey PFAS investigation progresses. Tony reiterated the importance of triangulating data from background levels, contaminated sites, and historical datasets to ensure robust conclusions. The discussion ended with a shared understanding of the complexity of PFAS exposure and the need for continued research and data sharing.

Any other business

No other business was raised by the panel.

Date of next meeting

Thursday 25th September 2025. It will be held 10am - 1pm online.

The Chair thanked everyone for their contributions, those watching the meeting and those offering support throughout the whole process.

A reminder to the public that this meeting has been recorded, and the video will be available online on request by emailing the Regulation Enquiries mailbox on RegulationEnquiries@gov.je. This will take a couple of days to make sure the observers are anonymised.

There being no further business, the meeting was closed.

To note that the Panel can be emailed via PFASpanel@gov.je.

Details of meeting dates and times can be found at PFAS in Jersey (gov.je)