Forever chemicals in the food aisle:

PFAS content of UK supermarket and takeaway food packaging

PFAS free

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Summary

PFAS (Per- or poly- fluorinated alkyl substances) are a group of over 4,700 industrial chemicals, many of which are linked to major environmental and human health concerns. PFAS are used in a wide range of consumer products from food packaging to stain-resistant textiles, non-stick cookware and cleaning products, and are now widely reported in drinking water, wildlife and human blood serum. PFAS are persistent and are often referred to as *forever chemicals*. Once they enter the environment, they do not readily degrade. Some PFAS have estimated half-lives of over 1,000 years. PFAS are also extremely mobile, meaning they travel easily throughout our environment and can be found far from their original source. Many PFAS are considered bioaccumulative, they concentrate up food chains and are not easily expelled from the human body. 99% of Americans have PFAS in their blood and numbers are now considered to be similar all over the world.

This report focusses on PFAS-use in UK food packaging, considering whether PFAS is currently used in the UK food sector, and to what extent.

We utilised an innovative 'bead test' method to carry out preliminary screening of a large range (n = 92) of food packaging. This method relies on the opposing polarity between olive oil and fluorinated molecules, with an oil droplet forming a distinct bead in the presence of PFAS. From this we identified that 30% of the tested packaging was 'likely to contain PFAS'.

A total of 20 samples selected from this preliminary screening were sent for further testing. Samples were collected from 9 major UK supermarkets, 6 popular takeaway chains and 4 independent takeaways (these included a café, a cafeteria, chip shop and pizza takeaway). From the independent takeaways, we chose samples that were from suppliers and brands known to serve a wide range of outlets and commercial caterers. Samples included supermarket cookie bags, bakery bags and greaseproof paper, and takeaway bags, pizza boxes and moulded fibre clamshell boxes. Samples were tested for Total Organic Fluorine (TOrF), a widely accepted proxy for total PFAS.

We identified packaging containing significant levels of PFAS in 8 of the 9 major UK supermarkets tested, and 100% of takeaways. PFAS was identified in 95% of the samples sent for TOrF testing, of which 90% are considered to be above the level expected from background contamination. We therefore

conclude that the use of PFAS in UK food packaging is widespread, across retailers and across product types.

Consistently, highest levels of PFAS were found in moulded fibre takeaway boxes. Concentrations in the moulded fibre boxes ranged from 2020 µg dm^{-2} dw to 3480 µg dm^{-2} dw, compared to an average of 246 µg dm^{-2} dw across all other samples combined.

From July 2020, Danish legislation will ban the addition of PFAS to paper and board products coming into contact with food, based on concerns surrounding the health impact of PFAS exposure. Due to widespread environmental contamination, PFAS cannot be eliminated from food packaging completely and an indicator limit of 10 µg dm^{-2} dw will be used to distinguish added PFAS from unavoidable background levels. The results from this study clearly demonstrate that UK food packaging regularly contains concentrations significantly higher than this background contamination.

To ensure the UK public receive the same level of protection as Danish citizens, and to minimise the environmental impact of PFAS pollution, based on this report, we make the following recommendations

- With no information available on PFAS in products at time of purchase, we recommend individuals looking to lower their exposure to PFAS and minimise their environmental impact avoid the unnecessary use of disposable food packaging, favouring reusable containers wherever appropriate.
- We recommend supermarkets and takeaway outlets act towards phasing PFAS out of food packaging and, due to PFAS's persistence and mobility in the environment, this is treated as an immediate priority.
- We recommend compostability standards lower their accepted PFAS content to no more than what can be considered background contamination.
- We recommend stringent, group-based chemical legislation, which prevents the addition of PFAS to UK food packaging, and therefore removes this unnecessary source of harmful chemical pollution.

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Background

What Are PFAS?

PFAS (per- or poly-fluorinated alkyl substances) are a rapidly growing group of industrial chemicals; in 2015 there were estimated to be approximately 3,000 PFAS on the global market for commercial use, by 2018 this number was estimated at over 4,700[1]. They are highly persistent, mobile and some are now considered toxic and subject to global restrictions[2].

PFAS are used in a wide range of consumer products from food packaging, to stain-resistant textiles, non-stick cookware and cosmetics. Other uses include industrial lubricants and cleaning products, fire-fighting foams and electrical cable insulation. This extensive use has led to widespread environmental contamination. PFAS are now found in air[3], water[4,5], sediment[4,6], plants[7] and wildlife[8]. They are found in rain and snow[9], groundwater[10], tap water[11], rivers[12-14], lakes[15] and seawater[5,16,17]. There are currently estimated to be in the order of 100,000 sites currently emitting PFAS across the EU, resulting in an estimated 3% of the European population being exposed to PFAS in drinking water contaminated above legal limits[1].

Health and Environmental Impacts

The carbon-fluorine bond that typifies PFAS as a group is one of the strongest known in nature. This means that even years after production and release ceases, PFAS remain in our environment. Some PFAS are known to have half-lives under normal soil conditions of over 1,000 years[2], long outliving both the products that originally contained them and the consumers that purchased them. PFAS are also very slow to be expelled by the body, meaning concentrations accumulate over time in both humans and wildlife. 99% of Americans have been found to have PFAS in their blood[18], and numbers are considered to be similar all over the world. PFAS can cross the human placenta; babies are now born with industrial chemicals already in their bodies[19,20].

The most widely studied PFAS have been shown to disrupt the hormone system in animals and are therefore classed as endocrine disruptors[21]. PFAS have been detected in marine mammals, seabirds and predators across the world[22,23], with levels in remote Greenland polar bears high enough to cause potential neurological damage[24]. Animal studies have also shown links to reduced immunity[25], liver damage[26], pancreatic damage[27] and disruption to the growth and development of young, even at low levels[28,29].

Studies have also shown links between PFAS exposure and a wide range of human health concerns, from growth, learning, and behavioural problems, to cancer, immune system disorders, fertility problems and obesity[21,30-32]. One well studied PFAS, PFOA, has been comprehensively linked to six specific diseases including high cholesterol, ulcerative colitis, thyroid disease, testicular cancer, kidney cancer and pregnancy-induced hypertension[33]. Human health impacts across the European Economic Area are estimated to cost between €52 and €84 billion a year[1].

PFAS Uses

There are a number of specific properties that are responsible for the widespread use of PFAS[34], a key one being their stability and chemical resistance. This was first exploited commercially in the production of non-stick cookware under brand name 'Teflon'. However, this same property is what makes them so persistent in the environment and therefore of such high concern. Another property is the ability to change the surface tension of liquids which can be used to promote beading and run-off for water repellency, help liquids mix effectively, 'wet' hard surfaces and improve spreading, levelling and foam control, for example in paints or industrial cleaning products. They are film-forming, making them a key ingredient in many fire-fighting foams. They are also hydro- and lipophobic, giving water and oil repellency that can be applied to textiles, furnishings and paper and board food contact materials.

PFAS in Food Packaging

PFAS have been used in paper and board food packaging since the 1950's, primarily as a coating to prevent fat and water from the food soaking in and reducing the strength of the material[35]. This is a problem particularly associated with fatty foods and those intended to be heated in the packaging or stored for extended periods. Fast food wrappers, microwave popcorn bags, greaseproof cake liners, butter wrappers and paper for dry foods and pet foods are often quoted as examples[35]. Not all packaging needs to be water and greaseproof, and alternatives to PFAS are already available on the market. At the time of writing, we are not aware of any study considering the extent of PFAS use in UK food packaging.

Many different forms of PFAS have been shown to migrate from packaging and food contact materials[35-37] into the food itself. These include Perfluoro Carboxylic Acids (such as PFOA), Perfluoro Sulphonic Acids (such as PFOS), Fluorotelomer Alcohols (FTOH), Polytetrafluoroethylene (PTFE, such as Teflon) and Polyfluorinated Alkyl Phosphate Surfactants (PAPs). Studies have found both the PFAS that was intentionally added to the packaging, as well as breakdown products and unintentionally added PFAS from manufacture, in the foods they contain[35].

It has recently been estimated that approximately 17% of our foods are packaged in paper and board[35]. However, with a growing demand for more sustainable, plastic-free packaging, this proportion is expected to rise. To ensure the significant environmental benefits of paper and board packaging are realised, it is essential that regulations exist to ensure it is safe for both its primary use and subsequent reuse, recycling and/or composting. With the current lack of harmonised rules on paper and board food packaging across the EU[38], understanding and regulating the chemical content of food packaging is of immediate importance.

In 2008, the European Food Safety Authority (EFSA) used available data to assess the risk that PFAS posed to human health. They put forward recommended tolerable daily intake levels for two specific chemicals, PFOA and PFOS, below which the risk to human health was considered negligible. In 2018, EFSA revised their opinion; based on updated scientific evidence, new suggested tolerable intakes are now 80 and 1,750 times lower than the previous 2008 levels for PFOS and PFOA, respectively. Meanwhile, the UK Food Standards Agency still relies on EFSA's outdated 2008 tolerable daily intake level for PFOA and a level twice that of EFSA's 2008 value for PFOS. No such tolerable intake values exist for the vast majority of PFAS currently in use.

In September 2019, the Danish Ministry of Environment and Food announced that Denmark will ban the use of PFAS in paper and card food contact materials from July 2020. Denmark's Food Minister Mogens Jensen is quoted as saying "I do not want to accept the risk of harmful fluorinated substances (PFAS) migrating from the packaging and into our food. These substances represent such a health problem that we can no longer wait for the EU"[39].

With little information publicly available on the extent of PFAS in UK food packaging, and no way for the public to know whether the products they purchase contain PFAS, this study provides an important and timely insight into the presence of these 'forever chemicals' on the UK food market.

Aims of the Research

Fidra carried out this study to address the following questions:

1. Are PFAS present in food packaging on products sold to the UK public?
2. How widespread is the use of PFAS in UK food packaging?

Methodology

We carried out a two-tier sampling strategy with preliminary testing allowing a targeted approach for more rigorous total organic fluorine analysis.

Preliminary testing of a wide variety of UK food packaging samples collected from UK supermarkets and takeaways, was carried out during October and November 2019.

Previous studies, particularly those on PFAS in the textile industry[40], have described the opposing polarity of olive oil and fluorinated finishes. Under expert advice from independent researcher Stefan Posner, we utilised this method to screen potential samples for further testing.

Olive oil, an easy and accessible non-polar liquid, was dropped onto the sample material and the resultant bead subjectively assigned to one of three categories: soaking in, spreading or beading (Figure 1).

In samples where the olive oil soaked into the material, we assumed no water- or grease-proof barrier was present. Spreading of the oil droplet indicated the presence of a grease-proof barrier, however the contact angle suggests no physical repulsion between the oil and the tested surface. We therefore concluded that in these cases the material was most likely sealed with a non-fluorinated finish. The formation of a bead, which produces minimal contact area between surfaces, suggests a physical repulsion between the material and the olive oil. This oleophobic, or oil-repelling, function of PFAS is a key property often considered difficult to replicate in non-fluorinated alternatives. Samples on which the olive oil droplet was seen to bead were therefore identified as very likely to contain PFAS and were considered for further testing.

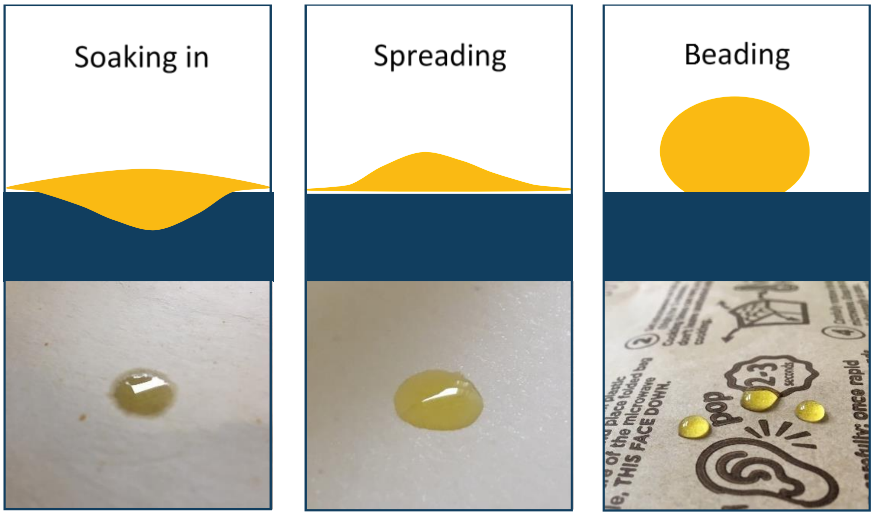

Figure 1. Examples of bead testing result. Olive oil is dropped onto paper or board packaging; the shape of the resulting droplet gives an indication of the likelihood that the material contains PFAS.

Targeting packaging that had shown olive oil beading in our preliminary testing, we chose 14 samples for more rigorous analysis. Samples were chosen to include a range of UK supermarkets and takeaways. Within this we aimed to gather a range of product types, ensuring a minimum of two samples were included within each product category. Additionally, we identified a further six samples that had not displayed beading during preliminary testing to allow an initial assessment of the olive oil 'bead test' method. In total, 20 packaging samples collected from a range of UK supermarkets and takeaways were sent for additional testing.

Total Organic Fluorine (TOrF) analysis was carried out on the 20 chosen samples by Eurofins Product Testing Laboratory, Denmark, utilising test method DIN 51723#. This method uses combustion to degrade perfluorinated substances (alongside other organic fluorinated substances) to hydrogen fluoride, concentrations of which are then determined via ion chromatography. Limit of detection for TOrF is quoted as 0.33 mg kg^{-1} dw.

Total organic fluorine is a widely accepted proxy for total PFAS content, allowing a single test method to identify all PFAS species without the need for prior knowledge on specific product chemistry. This is the commercial test method specifically developed for, and recognised by, the Danish authorities, with respect to their upcoming 2020 legislation. We subsequently utilised the Danish guided indicator value of 10 µg dm^{-2} dw to decipher between background contamination and PFAS addition.

Results

Preliminary Bead Testing

Using the bead test method described above, we tested a total of 92 samples, 41 from UK takeaways and 51 from supermarkets. Packaging was categorised into the 14 different classes shown in Figure 2.

30% of tested products produced a distinct olive oil bead, indicating the likely presence of PFAS, with similar distributions across both takeaway and food retailer samples (takeaways 32%; food retailers 29%). Key product categories that arose from this preliminary testing included paper bags from supermarkets, specifically bakery and cookie bags. We also found strong indications of PFAS content in takeaway paper bags and moulded fibre takeaway boxes. We found no sign of beading in any of the five pizza boxes tested, despite this being a much-cited example.

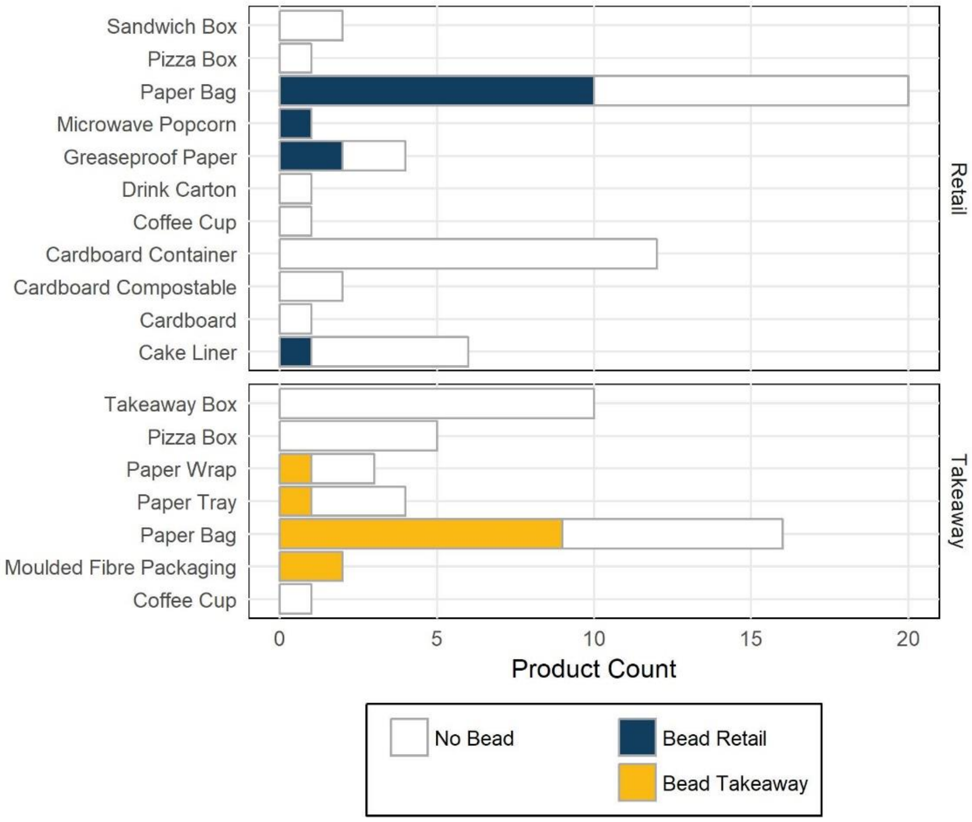

Figure 2. Graph illustrating results from bead testing, with filled bars representing positive bead result and likely presence of PFAS.

Total Organic Fluorine testing

Based on preliminary sampling and prior knowledge of likely PFAS containing products (i.e. pizza boxes) we chose to focus further analysis on the seven categories listed in Table 1. Whilst the greaseproof paper collected in this study was sold for home cooking and baking, and therefore not a food packaging, it is an important food contact material and a much-cited source of PFAS.

Table 1. Table detailing samples chosen for further analysis

	Total
Bakery Bag	2
Cookie Bag	4
Greaseproof Paper	2
Microwave Popcorn	2
Pizza Box	2
Takeaway Bag	5
Moulded Fibre Takeaway Box	3
Total	**20**

Products containing PFAS were identified from 8 of the 9 major UK supermarkets and 100% of takeaway outlets tested, indicating widespread use of PFAS across the UK food industry. Our sampling focussed on own-brand supermarket products, with the primary aim of identifying PFAS use in the UK market. However, previous studies from the US and EU[41,42] have also shown PFAS in major branded items, suggesting the results here are likely to be replicated across a much wider product range. Within the takeaway sector, samples in this study focussed on the major café chains, building on previous evidence of PFAS in US chains such as McDonalds, KFC and Burger King[43]. Samples tested from independent takeaways and workplace cafeterias were primarily recognisable brands that supply many independent caterers. For example, we tested three brands of moulded fibre takeaway boxes, which are increasingly used by businesses looking for more sustainable packaging choices.

PFAS was found in 8 out of 9 major UK supermarkets and 100% of takeaways

Detectable levels of total organic fluorine were found in 95% of samples tested (19 out of 20), with 90% (18 out of 20) displaying levels above that expected from background contamination (based on the 10 µg dm^2 dw Danish indicator value). The two samples containing PFAS below the indicator value were both own-brand greaseproof baking papers (Table 2). Levels of TOrF in the remaining supermarket samples ranged from 115 to 760 µg dm^{-2} dw with lowest concentrations in the bakery bags and highest in the microwave popcorn packets (Figure 2).

Total organic fluorine in the samples collected from takeaways ranged from 19.3 µg dm^{-2} dw in one of the takeaway bags, to 3,480 µg dm^{-2} dw in a moulded fibre takeaway box. Despite a negative result in the preliminary testing, we also found significant levels of TOrF in both pizza box samples (70.3 and 55.1 µg dm^{-2} dw), indicating the presence of PFAS.

Table 2. Full results from total organic fluorine (TOrF) analysis

Retailer/Takeaway	Product	Bead test result	TOrF (mg kg^{-1} dw)	TOrF (µg dm^{-2} dw)
Aldi	Popcorn	Bead	760	518
Asda	Cookie Bag	Bead	290	152
Co-op	Cookie Bag	Bead	670	312
Lidl	Popcorn	Bead	1000	760
Morrisons	Grease Proof Paper	No Bead	10	3.7
Morrisons	Cookie Bag	No Bead	640	457
Sainsbury's	Bakery Bag	Bead	340	115
Tesco	Cookie Bag	Bead	850	437
Marks and Spencer	Bakery Bag	Bead	800	266
Waitrose	Greaseproof Paper	No Bead	0	0
Caffè Nero	Takeaway Bag	Bead	470	165
Costa	Takeaway Bag	Bead	990	356
Greggs	Takeaway Bag	Bead	470	220
Pret a Manger	Takeaway Bag	Bead	710	271
Starbucks	Takeaway Bag	No Bead	42	19.3
Dominos	Takeaway Pizza Box	No Bead	26	70.3
Independent Pizza Shop	Takeaway Pizza Box	No Bead	18	55.1
Independent Chip Shop	Moulded Fibre Takeaway Box	Bead	750	2290
Independent Cafe	Moulded Fibre Takeaway Box	Bead	1200	3480
Workplace Cafeteria	Moulded Fibre Takeaway Box	Bead	700	2020

Consistently, the highest TOrF concentrations, and therefore the greatest PFAS content, were found in the moulded fibre takeaway boxes (Figure 2). These ranged from 2,020 to 3,480 µg dm^{-2} dw (n=3), an order of magnitude higher than all other samples combined, and two orders of magnitude higher than the Danish indicator value. All three of the moulded fibre boxes, labelled as sugarcane or begasse, claimed to be compostable at the time of sampling. However, changes to the Biodegradable Products Institute's certification criteria (requiring total fluorine <100 ppm as of January 2020) means that these compostable certifications are likely no longer valid (this has been confirmed by one of the three suppliers). From January 2020 the BPI will require total fluorine levels to be less than 100 ppm, matching that of the European OK Compost certification centre and providing greater consistency across standards. The presence of PFAS in moulded fibre products is widely recognised within the food packaging industry. A 2018 report by the Centre for Environmental Health advised purchasers to avoid moulded fibre foodware, and urged manufacturers to prioritise the removal of PFAS from their products[44]. This study did not test TOrF content in any other certified compostable materials, focussing only on moulded fibre. However, testing carried out by a leading supplier of compostable packaging, suggests that the issue is isolated to moulded fibre products and is not a representation of 'compostable' products as a whole (personal communication, January 2020).

Highest PFAS concentrations were consistently found in moulded fibre packaging

Whilst mean TOrF levels were higher in the takeaway samples than those collected from supermarkets (supermarkets 302 ± 244 µg dm^{-2} dw; takeaways 895 ± 1234 µg dm^{-2} dw), median values showed a reversal of this trend (supermarkets 289 µg dm^{-2} dw; takeaways 246 µg dm^{-2} dw), indicative of the heavy skew from the moulded fibre products. Furthermore, our targeted collection method means our results are not representative of full product ranges and are therefore not intended for extrapolation to market sector.

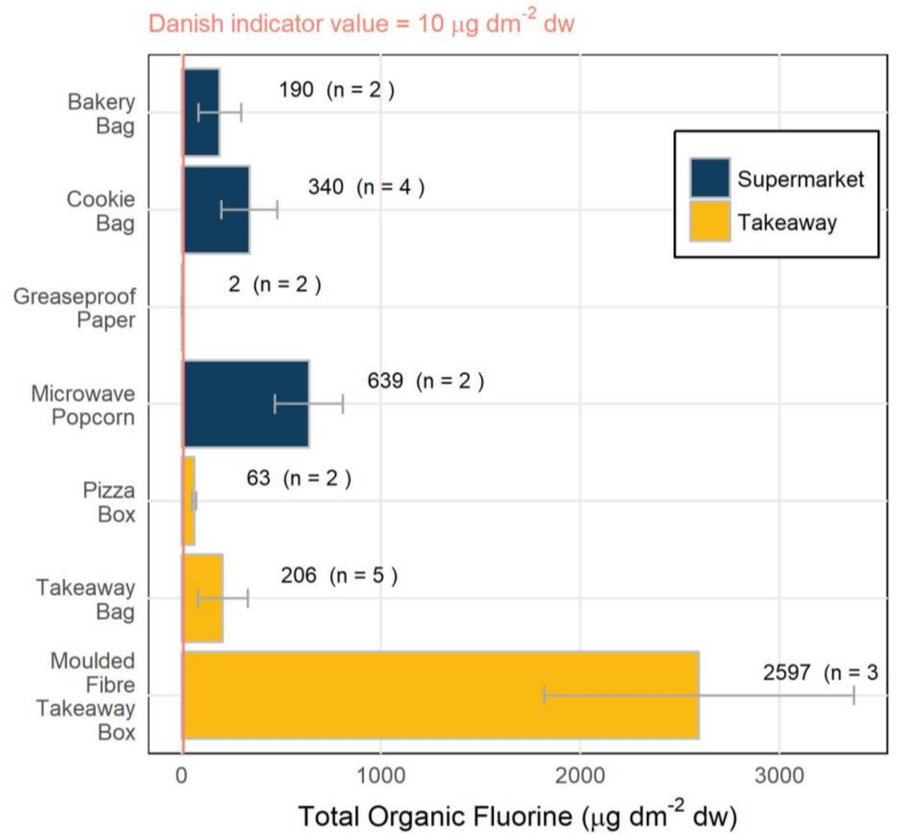

Figure 3. Results from Total Organic Fluorine (TOrF) testing. Values indicate category mean and sample size. Bars represent mean concentrations ± standard error of the mean. The value of 10 µg dm^{-2} dw is designated by the Danish authorities as background contamination.

Reliability of 'Bead Test' method

Six of the 20 samples sent for TOrF testing displayed a negative bead test result. Of these only two, the greaseproof papers, came back with TOrF levels below the indicator value for background concentrations. Therefore, whilst the bead test provided no false positive results, we did get four false negatives. Despite these false negatives, there remained significant differences between the 'bead' and 'no bead' sample groups, providing a good indication of the test's validity (Figure 4).

Recycled material is recognised as a source of PFAS in paper and board food packaging. In fact, exemptions have been included in the upcoming Danish legislation recognising this and allowing its use with the addition of a barrier material to avoid migration into food[45]. With the pizza box collected from major takeaway pizza chain, Dominos, made from 80% recycled material[46], it is difficult to determine whether this is the sole source of PFAS. Whilst the combustion based TOrF method tests the full depth of the packaging, the bead test reacts solely with the material surface and may therefore not be sensitive to recycled PFAS spread throughout the material. No information is available on the recycled content of the pizza box collected from the independent retailer, however as a widely used and recognised brand of box, it is an important addition to our dataset.

Whilst further study is needed to fully verify and understand the applicability of the bead test method, the absence of false positives gives credibility to its use as a preliminary test method and as a cheap and effective method to identify potential products for further analysis.

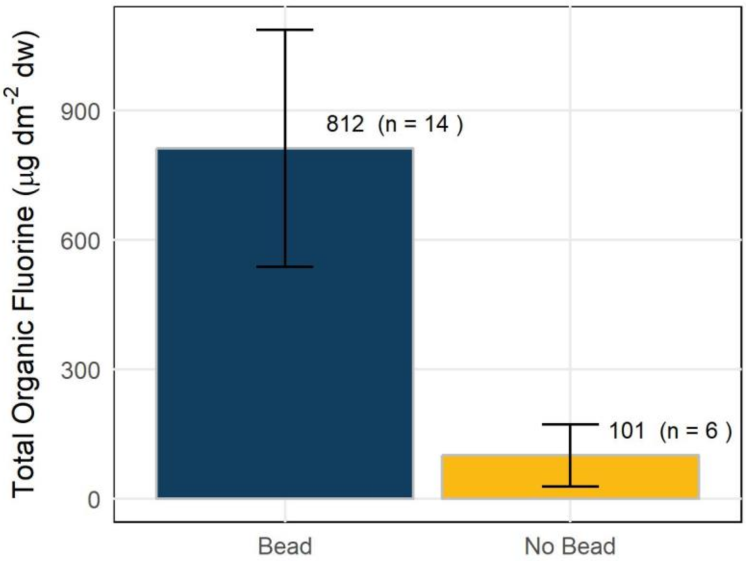

Figure 4. TOrF content of packaging samples grouped by bead test result carried out in preliminary analysis. Bars represent mean concentrations ± standard error of the mean.

Wider Implications

To fully understand the direct health implications of PFAS in food packaging, more information is needed on the chemical migration levels, i.e. how much of the PFAS from food packaging is transferred to the food itself. This has not been addressed in this study and requires further resource to quantify. However, due to the persistence and mobility of PFAS as a chemical group, their presence in food packaging ultimately leads to their presence in our environment. Once in the environment, we are less able to control our indirect exposure. For example, high levels of PFAS have been identified in seafood due to bioaccumulation[47,48], and in crops grown in contaminated soil[49].

Many of the products tested in this study are considered to be widely recyclable and some, such as pizza boxes, are made from recycled materials. The current lack of effective regulation on harmful chemicals such as PFAS, means that we are locking these contaminants into a circular economy and putting ourselves at risk of repeated exposure. In compostable materials, the principle of compostability is to produce a useful end-product of a suitable quality to sustain plant growth. We need to ensure that we are not applying PFAS-contaminated compost directly into our environment and locking it into further circularity in food production. Given the accumulation potential of PFAS and the direct application of compost to the environment, it should be questioned whether the current 100 ppm total fluorine limit offers sufficient protection to environmental and human health.

Understanding disposal mechanisms of packaging containing PFAS are important in defining routes to the environment and whether potential for intervention exists. Ultimately, however, the mobility combined with their persistence means that regardless of disposal method, the PFAS used in our food packaging can find a way to our wider environment. PFAS is difficult to contain within landfill and the effectiveness of waste incineration as a safe disposal method is still incomplete[50]. With production sites also recognised as sources of PFAS to the environment[51], the only way we can confidently avoid PFAS used in food packaging contaminating our environment and potentially affecting our health, is to eliminate it at source.

PFAS was found in 95% of products tested

The environmental and human health consequences of PFAS in food packaging should not be considered in isolation. To move towards truly sustainable solutions, it is important to take a holistic approach to packaging choices. Plastic waste is increasingly recognised as a cause for global concern, both as a physical threat to wildlife and a source of chemical pollution. Similarly, materials such as expanded polystyrene (EPS) and extruded polystyrene (XPS) have also been linked to a wide variety of environmental and human health concerns[52]. Given the complexities of packaging materials and their chemical content, we suggest a hierarchical approach to making sustainable choices[53]. We recommend avoiding all unnecessary packaging and utilising reusable or refillable materials where appropriate. Where single-use packaging is unavoidable, we recommend materials that can be safely and successfully recycled or composted.

However, we caution that more stringent chemical regulation is needed to ensure these represent safe and environmentally beneficial options, which can be successfully incorporated into a circular economy.

Conclusions

This study was carried out to understand the extent to which PFAS are currently used in UK food packaging. Fidra's results indicated the presence of PFAS in 95% of samples tested in our targeted analysis; 90% were above the level considered representative of background contamination. We have further evidence to suggest that over 30% of food packaging is highly likely to contain PFAS (n = 92, bead testing).

PFAS was found in samples collected from 8 out of 9 major UK supermarkets, and 100% of tested takeaways.

The evidence collected in this study clearly shows that PFAS are present on the UK market. It also indicates that its use is widespread among different outlets and across a range of product types.

Moulded fibre packaging consistently showed the highest levels of PFAS. Whilst these samples were all considered compostable at the time of sampling, it is important to highlight that the problem is likely to be a consequence of the moulded fibre material and is not indicative of an issue with compostable packaging as a wider group.

There is currently no requirement to label packaging or products containing PFAS. Consumers therefore have no means to know whether PFAS are present in the products they buy. The successful application of the 'bead test' in this study has the potential to provide a useful means for public awareness. However, further, more rigorous testing should be carried out to provide confidence in the methodology and understand the limits of its application.

Key Findings and Recommendations

The key findings relating to our research aims are listed below.

- PFAS use across the UK food sector is widespread. We found PFAS in food packaging collected from 8 out of 9 major UK supermarkets and 100% of takeaways tested in this study.

- PFAS are used in a wide range of packaging types. We found significant levels of PFAS in 90% of our targeted samples.
- PFAS was identified in supermarket cookie bags and bakery bags, microwave popcorn packaging, pizza boxes, takeaway bags, and moulded fibre takeaway boxes.
- Further work is needed to establish the validity and limitations of the bead test for PFAS identification; however, our results show its potential as a cheap and easy method to identify PFAS where no other information exists.

Recommendations linked to the above findings are as follows.

- With no information available on PFAS in products at time of purchase, we recommend individuals looking to lower their exposure to PFAS and minimise their environmental impact avoid the unnecessary use of disposable food packaging, favouring reusable containers wherever appropriate.
- We recommend supermarkets and takeaway outlets act towards phasing PFAS out of food packaging and, due to PFAS's persistence and mobility in the environment, this is treated as an immediate priority.
- We recommend compostability standards lower their accepted PFAS content to no more than what can be considered background contamination.
- We recommend stringent, group-based chemical legislation, which prevents the addition of PFAS to UK food packaging, and therefore removes this unnecessary source of harmful chemical pollution.

PFAS free

About Fidra

This report is published by Fidra as part our PFASfree project. Fidra is an environmental charity working to reduce chemical and plastic pollution in our seas, on our beaches and in the wider environment. Fidra shines a light on environmental issues, working with the public, industry and governments to deliver solutions which support sustainable societies and healthy ecosystems. We use the best available science to identify and understand environmental issues, developing pragmatic solutions through inclusive dialogue. Find out more at www.fidra.org.uk

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