



AGROLAB GROUP

Your labs. Your service.

Analisi dei PFAS negli alimenti

18/03/2025

Struttura aziendale attuale



11 paesi con
organizzazione regionale per le vendite, il servizio clienti e la logistica



~ 500.000
Numero di risultati generati giornalmente (parametri individuali)



> 30
Siti in tutta Europa



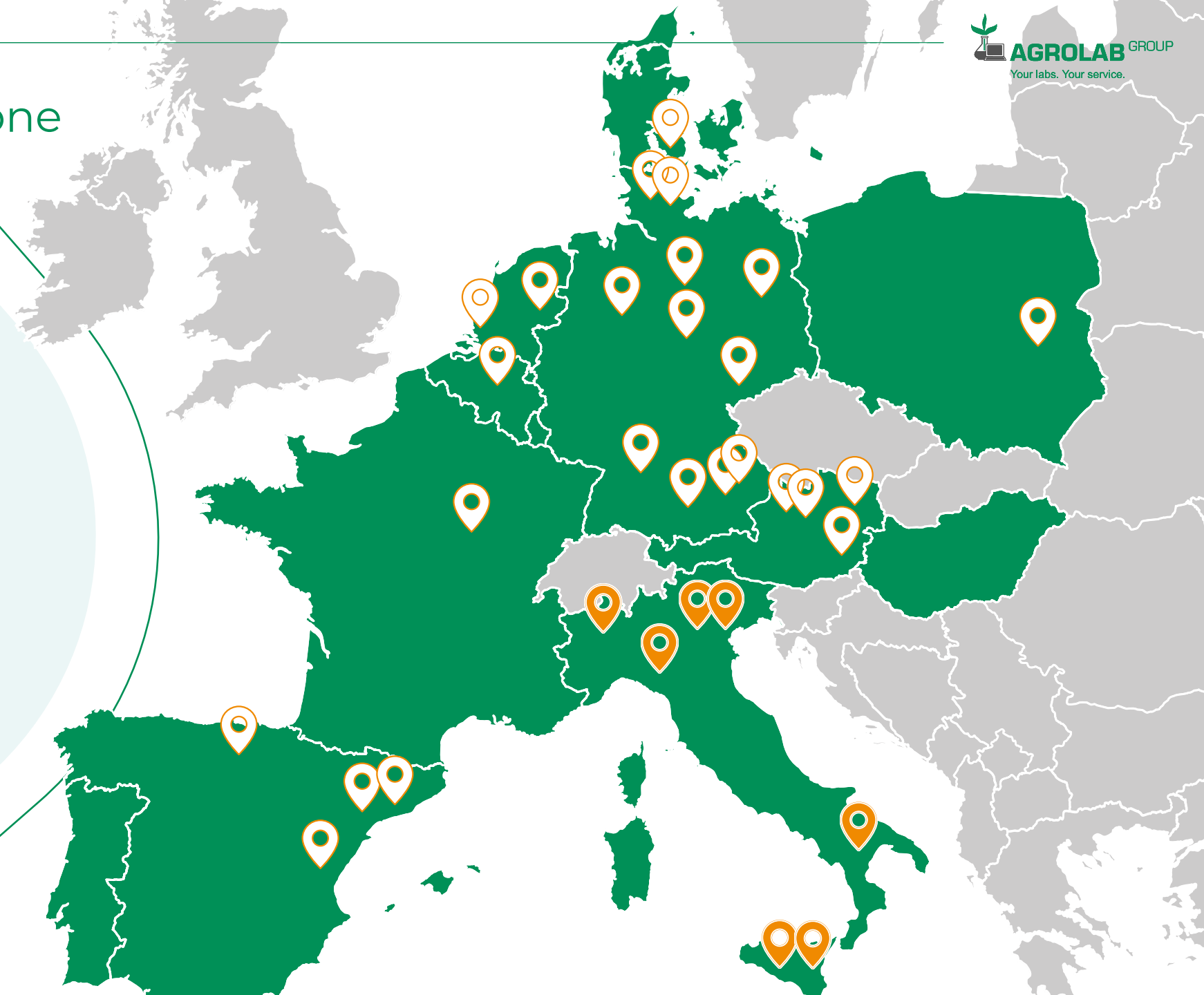
~ 2.600
I dipendenti



Rapid growth
AGROLAB è un gruppo di laboratori in rapida crescita e uno dei leader di mercato nel settore

Internazionalizzazione

AGROLAB lavora per i suoi clienti quasi ovunque in **Europa**



AGROLAB Alimentalia S.R.L.

- Fondata nel 1990 con il nome di “R&C Scientifica”
- Entrata a far parte del Gruppo AGROLAB nel 2014
- Nasce nel gennaio 2023 dalla suddivisione di AGROLAB in AGROLAB Alimentalia (Food & Feed) e AGROLAB Italia (Ambiente)
- Occupa circa 60 dipendenti



Laboratorio specializzato in analisi food e feed



Analisi Food

- Ready-to-eat
- Alimenti trasformati
- Conserve vegetali
- Cereali e prodotti a base di cereali
- Pasta
- Uova e prodotti a base di uova (liquidi, in polvere)
- Caffè, spezie, erbe secche
- Pesce, crostacei
- E molto altro ancora...



Analisi su Mangimi e Petfood

- Petfood
- Materie prime
- Mangimi completi
- Insilati
- Additivi per mangimi e premiscele
- Mangimi medicati

Valori aziendali



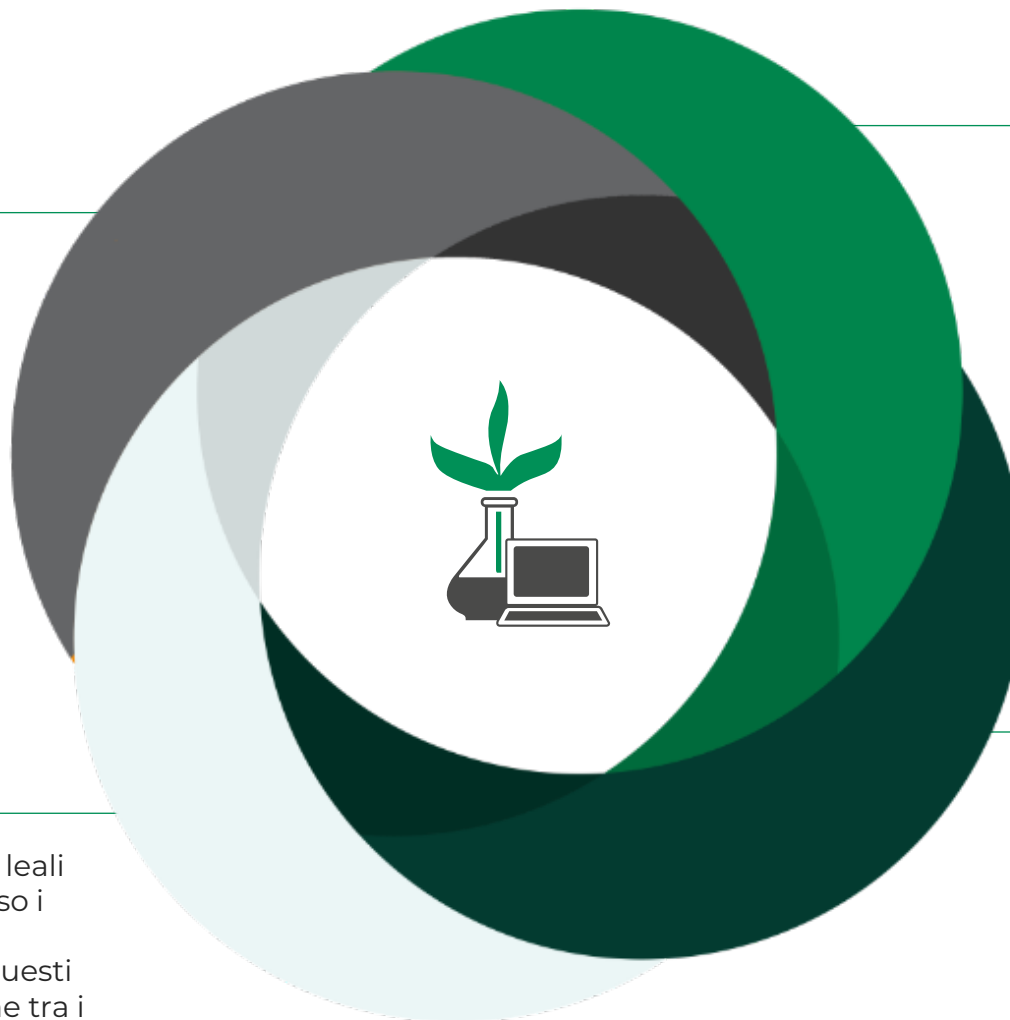
Qualità

Siamo molto qualificati, lavoriamo in modo professionale, strutturato e coscienzioso. Pretendiamo molto da noi stessi e vogliamo migliorare sempre più



Correttezza

Siamo trasparenti, onesti e leali nelle nostre decisioni e verso i clienti. Per noi è importante che questi aspetti siano presenti anche tra i componenti dei team.



Impegno



Perseguiamo in modo unico l'impegno preso con i clienti di fornire risultati precisi, affidabili e nel rispetto dei tempi indicati. In questo, investiamo tutte le nostre risorse

Consapevolezza a dei costi



Siamo modesti ed economici in tutto ciò che non serve direttamente a garantire la migliore qualità del nostro lavoro.

Grazie per l'attenzione



AGROLAB GROUP

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PFAS in food - just another hype or a lasting challenge?

Dr. Frank Mörsberger
AGROLAB GROUP
Head of Business Development
Food & Feed Analysis

1

What kind of substances are we talking about?

2

What is the current legal framework ?

3

What are typical sources of PFAS contamination ?

What about a general ban of all PFAS as an ideal solution?

4

What analytical tools for PFAS detection and quantification exist??

What challenges/limitations do we currently see for the analysis?

5

What is our current portfolio at AGROLAB GROUP?

Matrices, LOQs and measurement capabilities and turn-around times

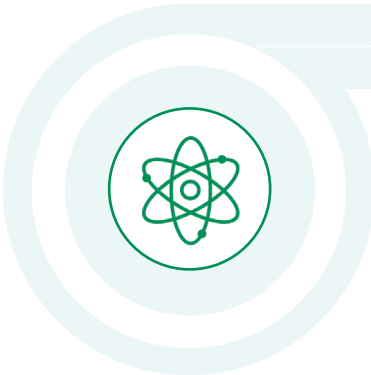
Chemistry

Big group: ca. 14.000 of synthetic organo-fluorine compounds
PFAS: *per- and polyfluoroalkyl substances*



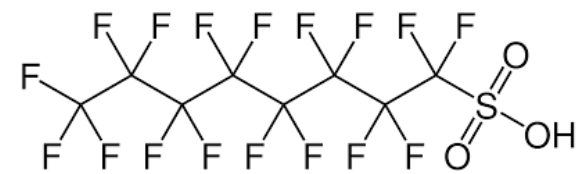
Multiple fluorine atoms attached to an alkyl chain

Acting as surfactant and strong acids

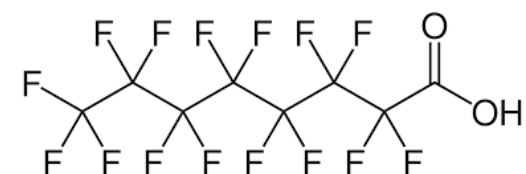


Besides the non-polymers also polymers exist e.g. PTFE, PFA, PFPE

PFOS
(Perfluorooctane sulfonic acid)



PFOA
(perfluorooctanoic acid)



Usage

Mid-20th century: Used widely for water resistance in various products and materials.

PFAS are highly stable and barely react - once considered 'harmless'

Or, just a new business idea for private labs?



... another abbreviation for PFAS

- P**ersistent
- F**orever chemicals
- A**ccumulating and showing a
- S**afety risk



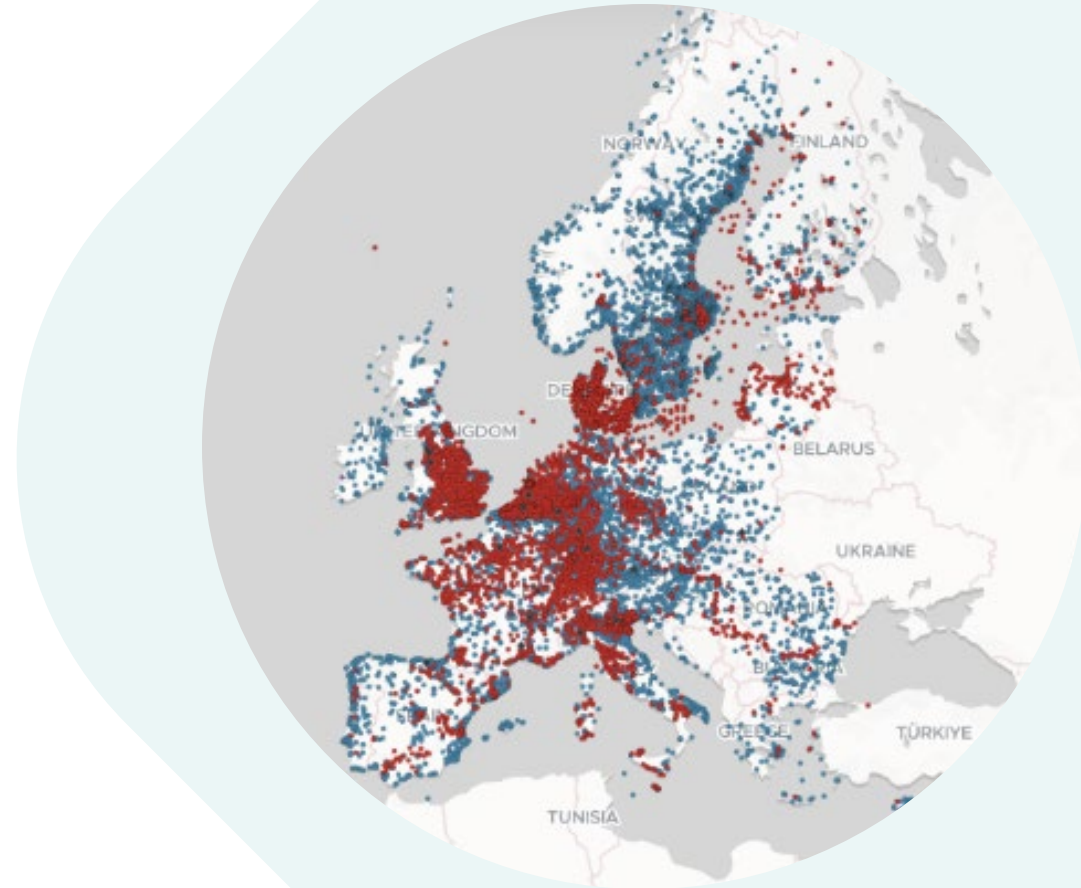
<https://www.oecd.org/chemicalsafety/portal-perfluorinated-chemicals/>

The Map of PFAS contamination in European environment.

In February 2023, the **Forever Pollution Project** revealed the extent of PFAS contamination across Europe,


locating nearly 23,000 sites contaminated by PFAS and 21,500 sites of presumptive contamination on an interactive map.


<https://foreverpollution.eu/>




Toxicity

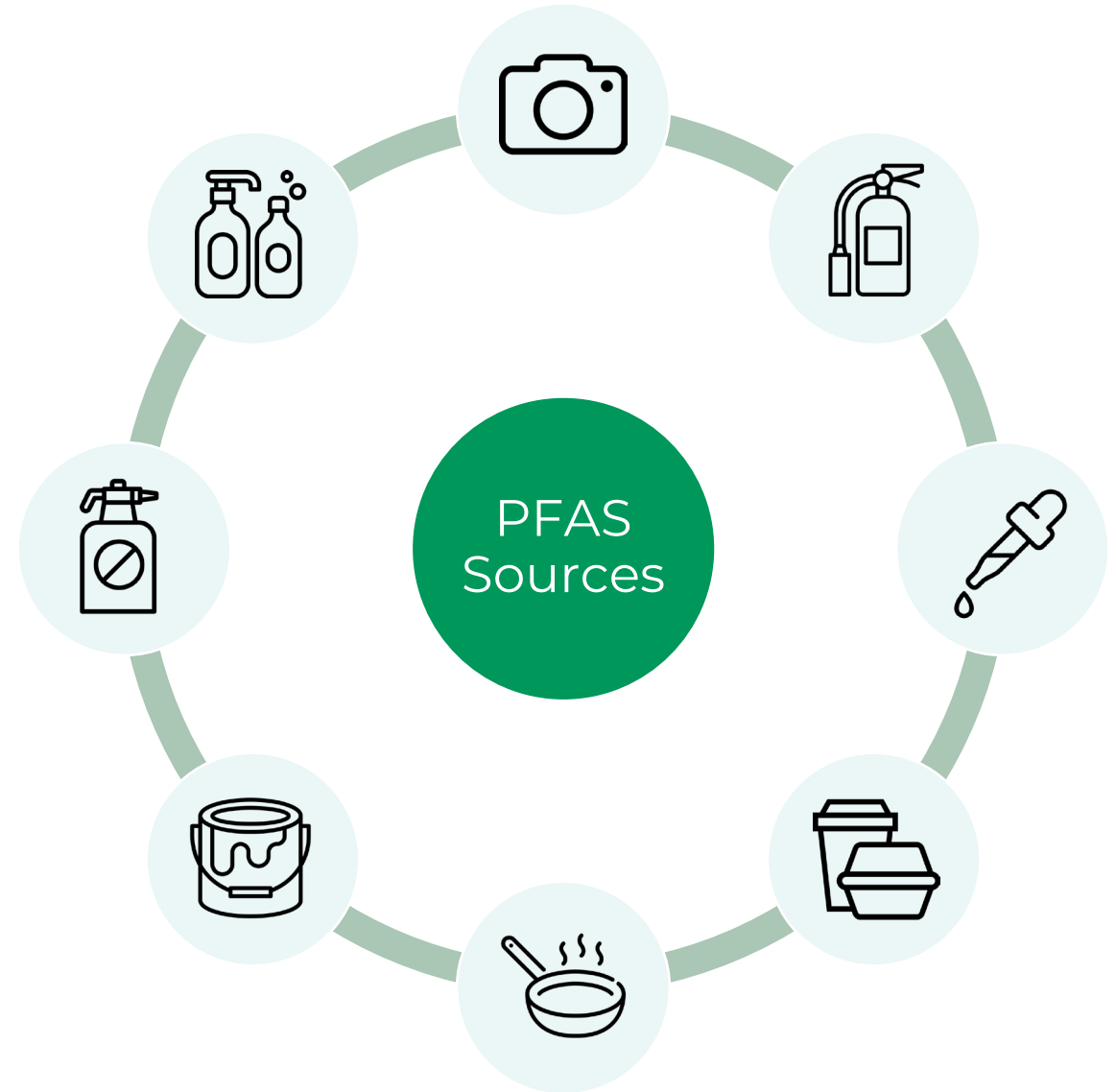
Since start of 21st century studies on environmental impact and toxicity to humans were initiated

- 

Persistent organic pollutants („forever chemicals“) found in soil, sediments and all over in our biosphere.
- 

Bioaccumulation observed in the food chain
- 

Adverse effects on human (and animal) health (e.g. on liver and immune response)



Would a total ban help?

2011 &
2012

EFSA Scientific reports

2020

EFSA Scientific opinion
TWI set for PFOS, PFOA, PFNA & PFHxS

2021

BfR Opinion & US FDA LC MS-method for 16 PFAS

2022

EURL MRLs & POPs (Stockholm Convention)
Guidance document for sampling and methods

2023

REACH* ban of first 200 PFAS - will be continued

[Per- and polyfluoroalkyl substances \(PFAS\) - ECHA \(europa.eu\)](https://echa.europa.eu)

TWI = tolerable weekly intake

[REGULATION \(EC\) No 1907/2006](#) about
Registration, Evaluation, Authorisation and
Restriction of Chemicals

Helsinki, 7 February 2023

- ECHA proposes a ban on 10,000+ PFAS under REACH.
- Proposal drafted by experts from Germany, Netherlands, Denmark, Norway & Sweden.
- March 2023: Scientific evaluation by ECHA's RAC & SEAC published.

March 2024

- **Consumer products:**
Mixtures, cosmetics, ski wax
- **Hazard properties:**
Assessed by RAC
- **General approach:**
Evaluated by SEAC

June 2024

- **Metal applications:**
Coating & manufacturing
- **Hazard properties:**
Further discussion by RAC

September 2024

- **TULAC:**
Textiles, upholstery, leather, apparel, carpets
- **Food contact:**
Materials & packaging
- **Industries:**
Petroleum & mining

November 2024

- batteries;
- fuel cells; and
- electrolysers

PFAS contamination in food

- mainly due to **bioaccumulation** in aquatic and terrestrial food chains (four lead substances)
- **Migration** from use of food contact materials containing PFAS



Aquatic and terrestrial animals for human consumption



(Drinking water)



Crops



Fruits and vegetables

EU Regulation (EU) 2022/2388

amending Regulation (EC) No 1881/2006 as regards maximum levels of PFAS in food

Regulated substances*

- PFOS Perfluorooctane sulfonic acid
- PFOA perfluorooctanoic acid
- PFNA perfluorononanoic acid
- PFHxS perfluorohexane sulfonic acid
- Sum of the four substances**

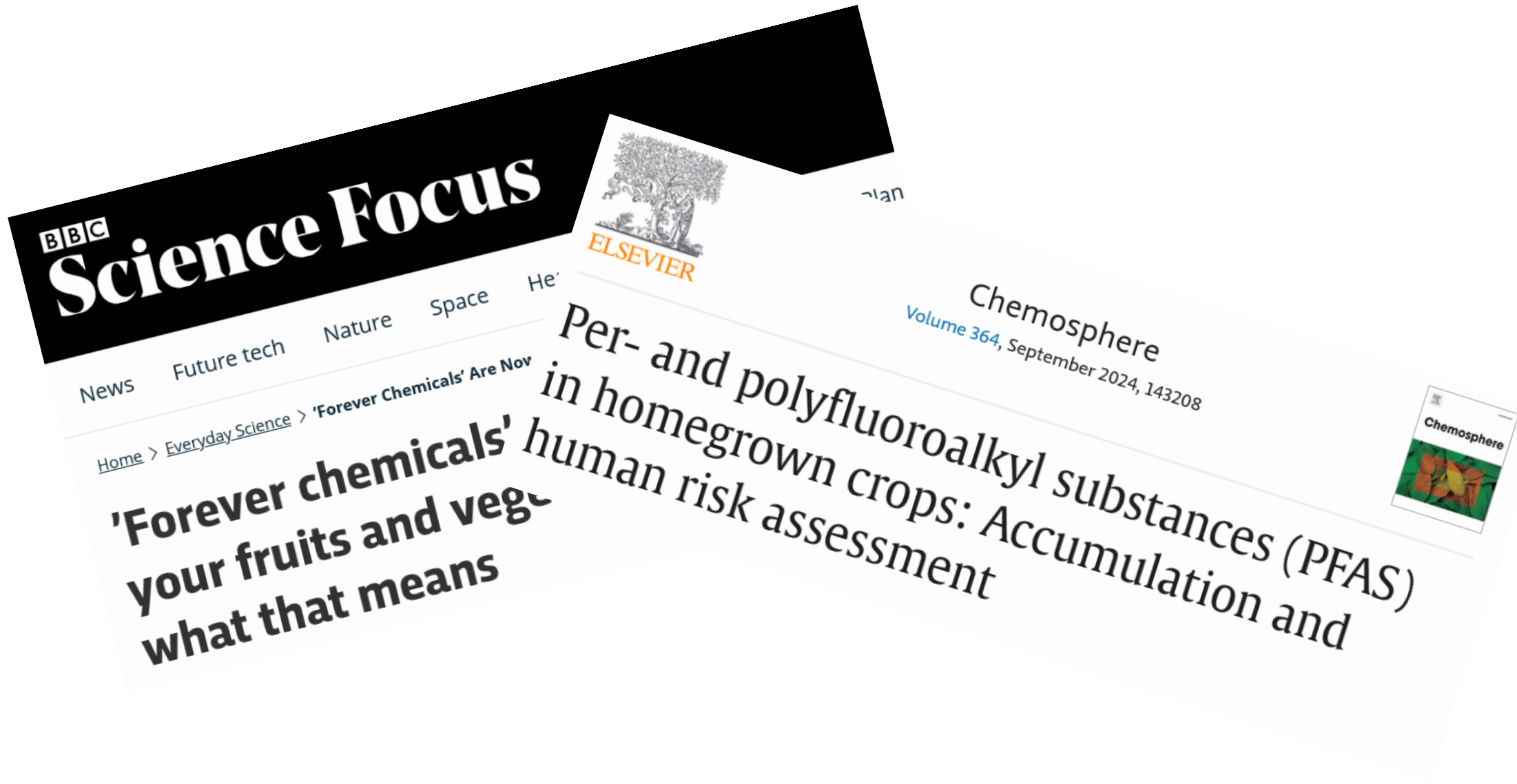
Regulated foodstuffs ¹⁾

- Eggs
- Fish meat (species dependent), crustaceae and bivalve molluscs
- Meat and edible offals

* Measurement standard: Includes all stereoisomers, separated or not.

** PFAS sum rule: Values below LOQ are treated as zero, like PAHs.

¹⁾ COMMISSION REGULATION (EU) 2023/915 of 25 April 2023 <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32023R0915>



BBC Science Focus

News Future tech Nature Space He


Home > [Everyday Science](#) > 'Forever Chemicals' Are Now

'Forever chemicals' your fruits and veg what that means

ELSEVIER

Per- and polyfluoroalkyl substances (PFAS) in homegrown crops: Accumulation and human risk assessment

Chemosphere
Volume 364, September 2024, 143208



EU monitoring recommendation



very low LOQ down to 0,001 µg/kg for fruits and vegetables

new monitoring 2022 - 2025

a lot more substances: 18 additional substances + six "emerging" PFAS

indicative values Limits for 4 substances (PFNA: 0.005 µg/kg) in **fruit & vegetable, mushrooms, milk & infant food**

more stuff for further regulation seaweed, cereals, nuts, oilseeds, infant food, animal products, drinks, wine & beer

Method harmonized: Regulation (EU) 2022/1428: Sampling & analysis methods for PFAS control, based on EURL-POPs guideline Point B.

Regulation around the world

Canada:

For some food MRLs for PFOS & PFOA

USA:

Focus on food contact materials & water, but regulations vary by state.
No MRLs for PFAS in food

Australia:

From February 2024 PFAS regulation for certain foods

[Australian Government PFAS Taskforce | PFAS](#)



United Kingdom

No MRLs for PFAS for food yet, but recommendations

[Initial paper on further work on PFAS \(food.gov.uk\)](#)

Russia , India, China

No PFAS regulations for food

What kind of methods are used for PFAS analysis today?

Screening Methods (non-targeted)



Fluorine

Environmental
samples

Quantitative Methods (targeted)



HPLC

GC

What kind of methods are used for PFAS analysis today?

SCREENING Methods (non-targeted)

- Total fluorine (total PFAS equivalent)
 - CIC (AOF, EOF)
 - TOPA (indirect)
 - Calux® Bioassay (TTR-TRβ)

• [PFAS – Methoden für die aquatische Umwelt \(umweltbundesamt.at\)](https://www.umweltbundesamt.at)

Quantitative Methods (targeted)

- Standard: HPLC MS/MS
- Also described: GC MS/MS
- **Challenge:** Avoiding background contamination

[Analytical approaches for screening of per- and poly fluoroalkyl substances in food items: A review of recent advances and improvements - ScienceDirect](#)

Flow chart of analysis

Test portion with isotopically labeled internal standards

Extraction using acidified acetonitrile/water

Partitioning by addition of buffering salt and centrifugation

Dilute by water, transfer supernatant to SPE tube

Elute and transfer eluate to autosampler vial

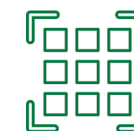
LC-MS/MS analysis

Overview AGROLAB GROUP Screening Packages (4 substances)



Substances

- PFOS
- PFOA
- PFNA
- PFHxS
- Sum



Matrices (LOQ)

- 0.1 µg/kg: Eggs, fishery products, crustaceans, mollusks, meat, cereals feed (@LUFA, @VERW)
- 0.01–0.02 µg/kg: Fish oil, veg. oils, milk, dairy products (@LUFA, @VERW)
- In preparation: Fruit & vegetables (@LUFA)

AGROLAB LUFA Monitoring package Food

PNR	Name	Unit	LOQ
125379	Perfluorooctane sulfonate (PFOS)	µg/kg	0,1
125380	Perfluorooctanoic acid (PFOA)	µg/kg	0,1
125381	Perfluorononanoic acid (PFNA)	µg/kg	0,1
125382	Perfluorohexane sulfonic acid (PFHxS)	µg/kg	0,1
127308	Perfluoropentanoic acid (PFPeA)*	µg/kg	0,25
127309	Perfluorohexanoic acid (PFHxA)	µg/kg	0,1
127310	Perfluoroheptanoic acid (PFHpA)	µg/kg	0,1
127311	Perfluorodecane acid (PFDA)	µg/kg	0,1
127312	Perfluorundecanoic acid (PFUnDA)	µg/kg	0,1
127313	Perfluordodecanoic acid (PFDoDA)	µg/kg	0,1
127314	Perfluorotridecanoic acid (PFTrDA)*	µg/kg	0,1
127315	Perfluorotetradecanoic acid PFTeDA*	µg/kg	0,1
127316	Perfluorobutanoic sulfonic acid (PFBS)	µg/kg	0,1
127317	Perfluoropentanoic sulfonic acid (PFPeS)	µg/kg	0,1
127318	Perfluoroheptanoic sulfonic acid (PFHpS)	µg/kg	0,1
127319	Perfluorononane sulfonic acid (PFNS)	µg/kg	0,1
127320	Perfluorodecanoic sulfonic acid (PFDS)	µg/kg	0,1
127321	Perfluorundecanoic sulfonic acid (PFUnDS)*	µg/kg	0,1
127322	Perfluordodecanoic sulfonic acid (PFDoDS)*	µg/kg	0,1
127323	Perfluorotridecane sulfonic acid (PFTrDS)*	µg/kg	0,1
127324	Perfluorooctane sulfonamide (PFOSA)	µg/kg	0,25
127325	9CI-PF3ONS (F-53B Major)	µg/kg	0,1
127326	11CI-PF3OUdS (F-53B Minor)	µg/kg	0,1
127327	Perfluoro-4,8-dioxa-3H-nonanoic acid (DONA)	µg/kg	0,1

* Not in feed; LOQ of the other substances could be higher in feed

Included

4 regulated

17 „similar“ out of 18 substances

3 „emerging“ out of 7 substances

Σ 24

to be supplemented

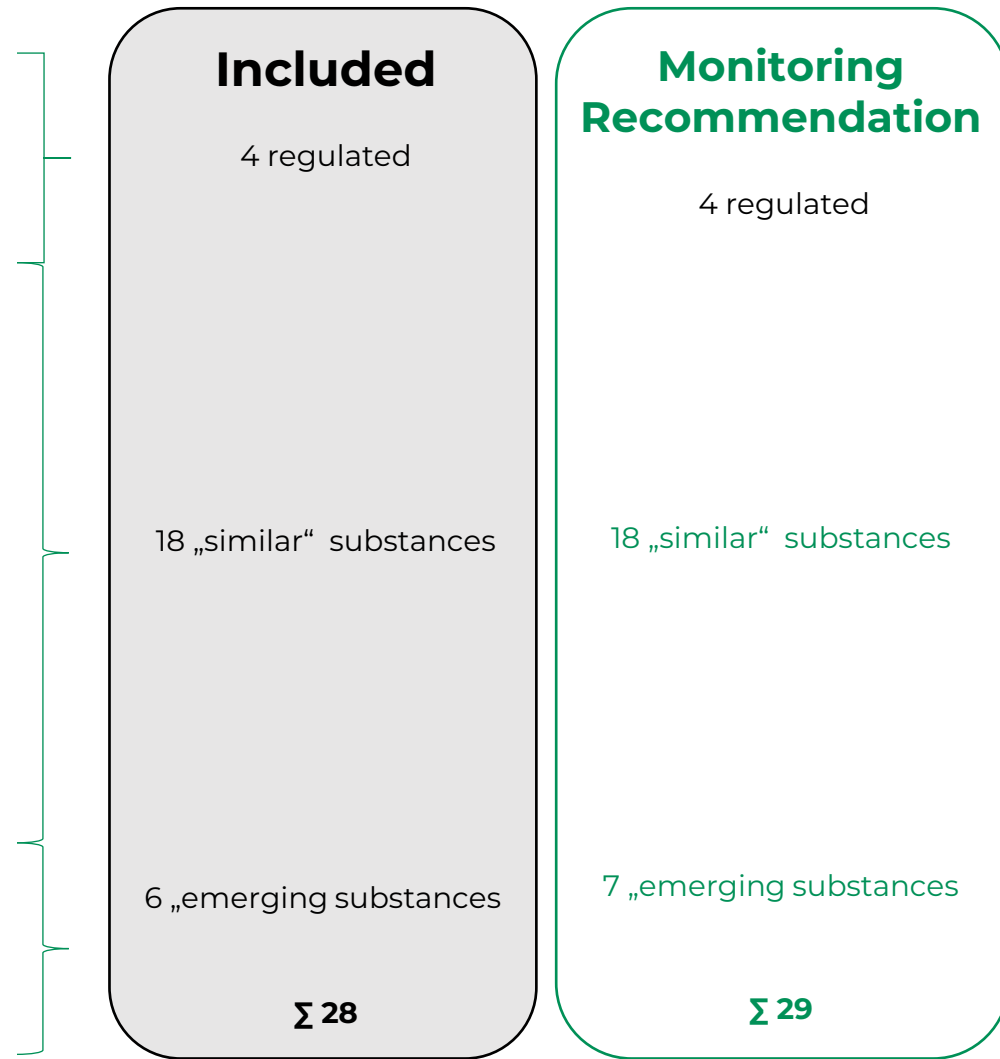
Perfluorbutanoic acid (PFBA)

GenX, Capstone A and B, Fluorotelomers

Σ 29

VERW Monitoring package Food

PNR	Name	Unit	LOQ
148054	Perfluoro-1-octanesulfonate (L-PFOS)	µg/kg	0,01
148053	Perfluorooctansulfonate (br-PFOS), branched	µg/kg	0,005
148057	Perfluoro-n-octanoic acid (L-PFOA)	µg/kg	0,01
148056	Perfluorooctanoic acid (br-PFOA), branched	µg/kg	0,005
148055	Perfluorononanoic acid (PFNA)	µg/kg	0,01
148052	Perfluoro-1-hexanesulfonate (L-PFHxS)	µg/kg	0,01
148051	Perfluorohexanesulfonic acid (br-PFHxS), branched	µg/kg	0,005
149390	Perfluorobutanoic acid (PFBA)	µg/kg	0,1
149394	Perfluoropentanoic acid (PFPeA)	µg/kg	0,05
149395	Perfluorohexanoic acid (PFHxA)	µg/kg	0,01
149396	Perfluoro-n-heptanoic acid (PFHpA)	µg/kg	0,01
149391	Perfluorodecane acid (PFDA)	µg/kg	0,01
149400	Perfluor-n-undecansäure (FPUnda)	µg/kg	0,01
149392	Perfluoro-n-dodecanoic acid (PFDoDA)	µg/kg	0,01
149393	Perfluorotridecanoic acid (PFTrDA)	µg/kg	0,01
149399	Perfluorotetradecanoic acid (PFTeDA)	µg/kg	0,01
149381	Perfluor-1-butansulfonat (PFBS)	µg/kg	0,01
149382	Perfluor-1-pentansulfonat (PFPeS)	µg/kg	0,01
149383	Perfluor-1-heptansulfonat (PFHpS)	µg/kg	0,01
149385	Perfluor-1-nonansulfonat (PFNS)	µg/kg	0,01
149386	Perfluor-1-decansulfonat (PFDS)	µg/kg	0,01
149387	Perfluor-1-undecansulfonat (PFUnDS)	µg/kg	0,01
149388	Perfluor-1-dodecansulfonat (PFDoS)	µg/kg	0,01
149389	Perfluor-1-tridecansulfonat (PFTrDS)	µg/kg	0,01
149406	Perfluor-1-octansulfonamid (L-FOSA)	µg/kg	0,01
149405	Perfluorooctansulfonamid (br-FOSA), verzweigt	µg/kg	0,01
150323	Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate (F-53B)	µg/kg	0,01
150324	Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate (F-53B minor)	µg/kg	0,01
149410	Perfluor(2-methyl-3-oxahexan)säure (HFPO-DA), (GENX)	µg/kg	0,01
149411	3H-Perfluor-4,8-dioxanonansäure (DONA)	µg/kg	0,01
150326	Capstone product A (DPOSA)	µg/kg	0,05
150325	Capstone product B (CDPOS)	µg/kg	0,05



FAQ'S



Rosa Torre
Head of Sales Food
Feed Italy



Dr. Frank
Mörsberger
Head of Business
Development Food
& Feed Testing

Special thanks to my AGROLAB colleagues

Dr. Katja Fuchs, *Operational Product Manager Food*

Ulla Kehlenbach, *Application Developer*

Radesh Ghiraw, *Technical Specialist*

The discussion is open!