



**RUOKAVIRASTO**  
Livsmedelsverket • Finnish Food Authority

---

# Fishmeal from wild fish in organic egg production – PFAS findings in Finland, a risk management case

---

**Riitta Rannikko**

**Senior Specialist, Feed Control Section**

**Finnish Food Authority**

**Webinar on PFAS in Nordic Region**

**18 September 2023**



# EU food monitoring of PFAS substances started

- The European Commission was introducing EU maximum levels for perfluoroalkyl substances (PFAS) for different foods.
- Therefore since 2016 the Finnish Food Authority has monitored PFAS in different foodstuffs: bovine meat and milk, poultry meat, pork meat and fat, farmed rainbow trout and freshwater fishes + latest -22/23: reindeer meat and liver.
  - PFAS levels in all these monitored foodstuffs have been mostly below limit of quantification (< LOQ) or very low.
- Then, in **2021 PFAS were analyzed for the first time in eggs**: free range eggs (5 farms) and organic eggs (5 organic farms) produced in Finland.
  - **Surprisingly, analyses showed that the organic eggs had elevated levels of PFAS residues compared to the free range eggs.**

# Why PFAS levels could be higher in organic eggs?



- Difference was that in organic production use of amino acids as feed additives is not allowed and therefore fishmeal of natural fishes is generally used to provide essential amino acids for laying hens.
- Previous studies on environmental contaminants in Baltic Sea have shown that residues of PFAS in natural fishes e.g. in Baltic herring and smelt are common.
- But there was only few information about PFAS levels in fishmeal and no information about fishmeal especially intended for organic production. There was no information available about safe PFAS levels in fishmeal or in compound feeds for laying hens containing fishmeal.
- **Conclusions: Use of fishmeal made of natural fishes in feed for laying hens could be reason for higher PFAS levels in organic eggs → But more analytical data about PFAS levels in organic eggs and in fishmeal and compound feeds for laying hens was essential to have.**

# Re-monitoring of PFAS in organic eggs and also feeds



- PFAS levels in organic eggs (15 organic farms) were monitored again 2022
  - During sampling information was collected at the farm level on feeding of laying hens, drinking water used for hens and possible local environmental sources nearby farms e.g. fire fighting related areas or airports.
  - No indication of environmental sources was found.
- During 2022 targeted sampling and analyses for feeds was also done: PFAS levels were analyzed from feeds for laying hens covering all feed mills and in fishmeal covering different suppliers.
- **Based on all results of analysis of organic eggs, surveys on farms and analyses of feeds, it could be concluded that the use of fishmeal from natural fish in the feeding of laying hens was significantly associating with elevated PFAS levels in organic eggs.**
  - **It was also noted that there were significant differences between two farm groups in the amount of fishmeal used:**  
**Farms using fishmeal 2 – 3 % vs. farms using fishmeal 4 – 6 % in complete feed.**

# Risk communication to FBOs and organic egg producers about PFAS risk



Following the completion of official analyses 2022 it was concluded that a comprehensive risk communication to feed business operators and to organic egg producers was necessary to manage the potential risk of PFAS residues in organic egg production chain.

- EU MRLs of PFAS for chicken eggs were coming into force on 1 January 2023  
→ FBOs and organic egg producers would therefore need information and guidance to take **preventive measures beforehand**.

## **Finnish Food Authority arranged in autumn 2022 tailored meetings for feed business operators and egg producers about PFAS risk in organic egg production**

- Background information about PFAS substances and their biological accumulation in the eggs was given.
- Detailed data on the results of the PFAS analysis in eggs and feeds related to specific feed business operator and egg producers was shown.
- The relation between fish species, fishing areas and fishing seasons to potential PFAS risk in natural fish raw materials for fishmeal was explained.

# Preventive measures to be done for entire organic egg production chain



## Important for all in organic production chain:

- the PFAS residue levels should be **analyzed in every batch of fishmeal** intended for organic production.

## Important for compound feed manufacturers, suppliers and organic egg farms:

- To **use as little fishmeal as possible** in the feed ratio of organic laying hens.
- Fishmeal should be preferable **replaced by other feed materials**.

## Important for fishmeal production chain:

- To **avoid certain fish species** e.g. smelt (*Osmerus eperlanus*) and Baltic herring (*Clupea harengus membras*) or **from certain areas** or to **avoid using fish from winter season** in fishmeal production **intended for organic egg production**.
- To **develop new process stages and techniques for removing PFAS residues in fishmeal manufacturing process** - especially when using in process small fishes as a whole: including blood, digestive tract and inner organs.



# PFAS risk in feeds is challenging for feed sector

- There are **no EU maximum residue levels for PFAS in feeds yet**, but information of safe levels of PFAS in different feed materials and compound feeds are needed because EU limits for foodstuffs are already in force. Especially information on safe levels of PFAS in fishmeal is needed at the moment.
- Therefore Finland decided to inform the Commission and also other Member States in the EU WG of Undesirable substances for feeds (10 January 2023) about this potential PFAS risk associated with the use of fishmeal from wild fish in organic egg production. **Commission has now plans that there will be EU level monitoring for PFAS in feeds in future.**
- The residue levels of PFAS compounds, if analyzed from complete feeds, can be very low or practically below the limit of quantification (< LOQ). Analysis of different **feed matrices need method development work** which will then **need laboratory resources and funding.**

# Summary



- When the connection between PFAS residue levels in fishmeal of natural fishes and in organic eggs was discovered and ensured - it was then understood that quick measures had to be taken because of this PFAS risk.
- However, there was enough time for risk management: to react, communicate and give guidance and information so that feed business operators and organic egg farms could have possibility for preventive measures before PFAS MRLs in egg were in force.
- The challenge at the moment is still that there are no EU maximum residue levels of PFAS for feeds yet - although information of safety levels in feeds materials and compound feeds is already needed.



# Useful links



## Additional data is coming available on PFAS and other POPs in Baltic fish and freshwater fish project EU-Fish IV:

- Domestic fish for more versatile and safer consumption (EU-Fish IV) [Domestic fish for more versatile and safer consumption \(EU-Fish IV\) - Finnish Food Authority \(ruokavirasto.fi\)](#)
- More information Johanna Suomi, Finnish Food Authority / Risk assessment unit ([johanna.suomi@ruokavirasto.fi](mailto:johanna.suomi@ruokavirasto.fi))

## Scientific studies valuable in this risk management case:

- Occurrence of PCDD/Fs, PCBs and PBDEs in fish meal, fish oil and fish feed in Northern Europe. <http://dx.doi.org/10.13140/2.1.1606.1445>
- Distribution of perfluoroalkyl acids in fish species from the Baltic Sea and freshwaters in Finland. <https://doi.org/10.1016/j.chemosphere.2021.132688>
- Transfer of Per- and Polyfluoroalkyl Substances (PFAS) from Feed into the Eggs of Laying Hens. Part 2: Toxicokinetic Results Including the Role of Precursors. <http://dx.doi.org/10.1021/acs.jafc.0c04485>