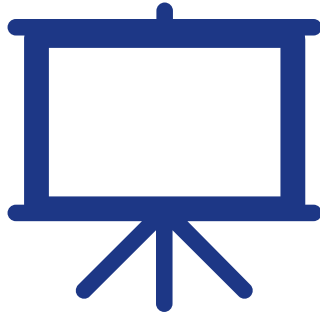# EMERGING CHEMICAL RISKS IDENTIFICATION: THE SCREENER PROJECT

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KNOW Unit

efsa
EUROPEAN FOOD SAFETY AUTHORITY

SCREENER PROJECT

Methodology

Preliminary results

What after?

STARTING POINT

Development of a novel scoring system for identifying emerging chemical risks in the food chain

Check for updates

J. Oltmanns,[a] O. Licht,[b] A. Bitsch,[b] M.-L. Bohlen,[a] S. E. Escher,[b] V. Silano,[c] M. MacLeod,[d] R. Serafimova,[c] G. E. N. Kass [*c] and C. Merten[c]

Potential emerging chemical risks in the food chain associated with substances registered under REACH†

Check for updates

J. Oltmanns, [*a] O. Licht, [b] M.-L. Bohlen, [‡a] M. Schwarz,[a] S. E. Escher,[b] V. Silano,[c] M. MacLeod, [c] H. P. J. M. Noteborn,[c] G. E. N. Kass [d] and C. Merten [*d]

Among the chemicals registered under REACH, 212 "high priority potential emerging risks" in the food chain

Criteria for scoring:

release to the environment

biodegradation

bioaccumulation in food/feed

toxicity (carcinogenicity, mutagenicity, reproductive toxicity and repeated dose toxicity).

the presence of many of those substances in food and feed is unknown, and detection and quantification methods are not developed for most of them.
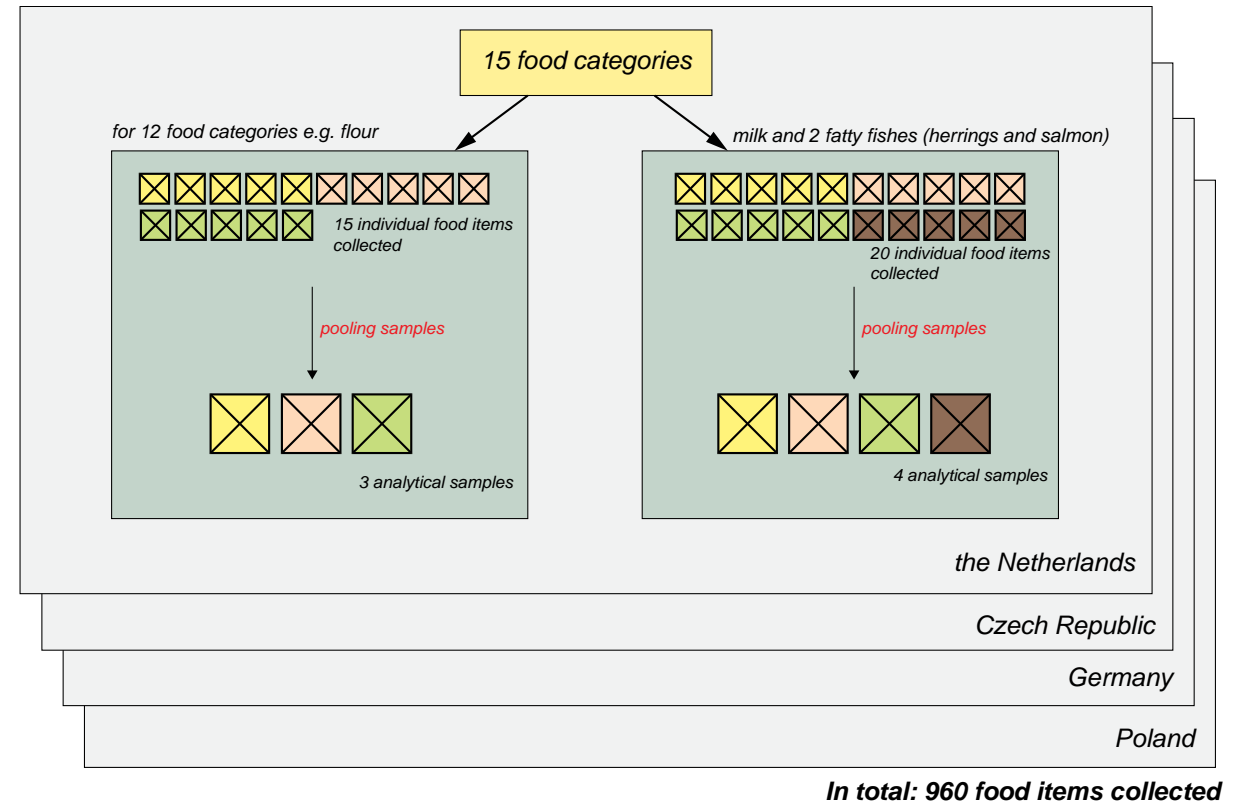
- To analyse food and feed for the *presence* of chemicals that are potential emerging risks

    1. using the 212 REACH substances as a suspect list - *suspect screening*

    2. using *non-target analysis* for halogenated organic chemicals

- For a subset of the identified substances

    3. to fully quantify the *occurrence* in food and feed and - *target analysis*

    4. to evaluate the significance of the occurrence levels and *characterise the risks*

- Feb 2021 – Feb 2024

WAGENINGEN UNIVERSITY & RESEARCH

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Fraunhofer ITEM

Raw food

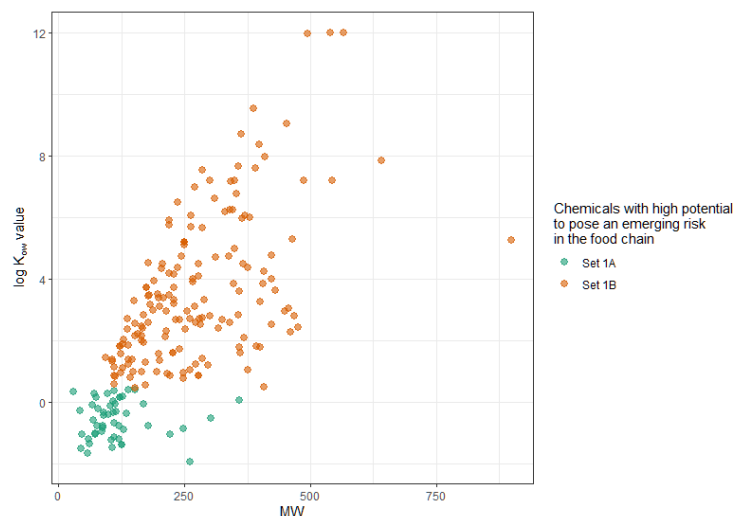| Nr	Food category (FoodEx 2 system Level 1)	
1.	Grains and grain-based products	Wheat flour
2.	Vegetables and vegetable products	Carrots Kale (leaf cabbage)
3.	Starchy roots or tubers and products thereof, sugar plants	Potatoes
4.	Legumes, nuts, oilseeds and spices	Peas
5.	Fruit and fruit products	Strawberries Oranges
6.	Meat and meat products	Pork meat – pork chops Beef meat – entrecôte Chicken meat – chicken legs
7.	Fish, seafood, amphibians, reptiles and invertebrates	Trout Herrings Salmon
8.	Milk and dairy products	Cow milk
9.	Eggs and egg products	Hen eggs

15 food categories

for 12 food categories e.g. flour

15 individual food items collected

pooling samples

3 analytical samples

milk and 2 fatty fishes (herrings and salmon)

20 individual food items collected

pooling samples

4 analytical samples

the Netherlands

Czech Republic

Germany

Poland

In total: 960 food items collected

960 food items → pooling → 200 analytical samples

Chemicals with high potential to pose an emerging risk in the food chain
- Set 1A
- Set 1B

212 −

reactive or insoluble in common extraction solvents −

analytical standard not available −
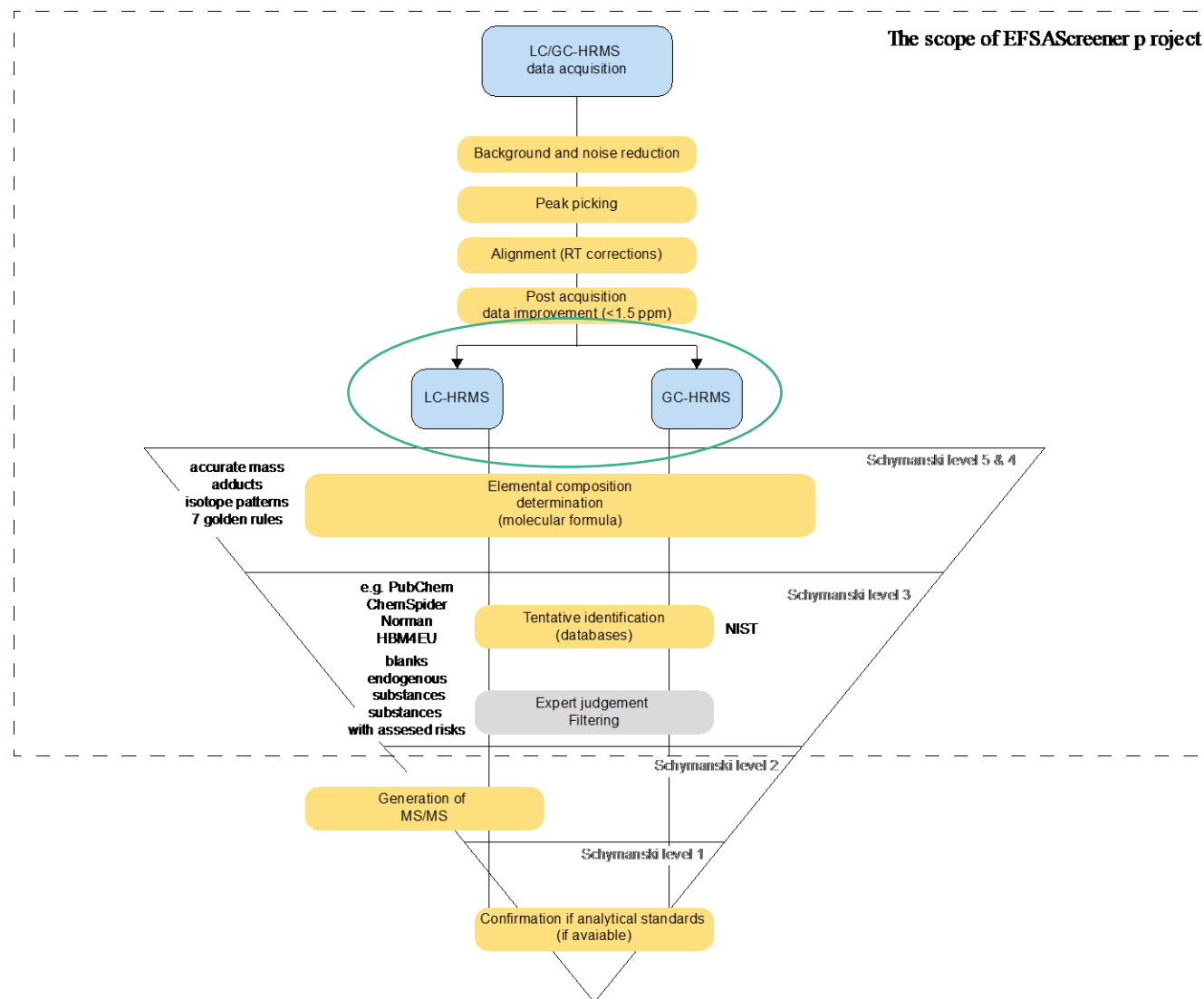
= 192
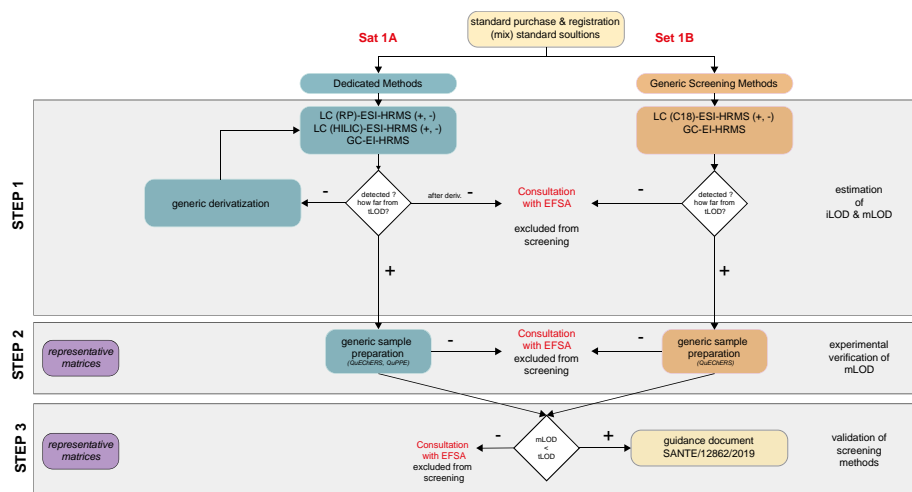
$$tLOD \ [mg \ / \ kg \ food] = \frac{\text{LEL [mg/kg bw/day]}}{\text{consumption} \frac{\text{[g food/kg bw/day]}}{1000}} /10$$

*Strictly speaking, "multiple element screening" method (each analysed compound confirmed with a standard).

6

compounds with **log Kow ≤ 0.4** detected in the food samples: 8

compounds with **log Kow > 0.4** detected in the food samples (**GC-HRMS**): 9

compounds with **log Kow > 0.4** detected in the food samples (**LC-HRMS**): 24

Tot = 41

16 **Acaricides** and **insecticides** (strawberries, oranges, carrots, kale, potatoes, peas and wheat flour, beef and eggs)

7 **Herbicides** and **anti-sprouting** (strawberries, oranges, carrots, kale, potatoes, and peas)

19 **Fungicides** (strawberries, oranges, carrots, kale, potatoes, peas, wheat flour).

6 **Fungicides** (trout, beef, chicken, and eggs)

12 **Antibiotics**, **antiseptics** and **POPs**

10 **Natural compounds** produced by marine organisms (trout, salmon and herring)

Many **natural compounds** in peas related to chlorotryptophan metabolism

chlorpropham (herbicide) in trout samples: soybean meal replacement of fish meal?
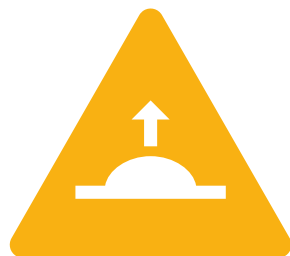
antibiotics (enrofloxacin and perfloxacin) + fungicides (fluxapyrad, imazalil, pyraclostrobin, tebuconazole) in trout

Chloroxylenol (antiseptic) in trout, salmon, herring, pork, beef and chicken.

CRITERIA FOR SELECTION OF CHEMICALS

in

- high potential hazard (ratio of the indicative level found relative to the tLOD)

- occurrence in several food matrices

out

- chemicals that might result from system contamination or background artefact

- chemicals already covered in the regular monitoring programmes

- chemicals without available standard

THE 20 CHEMICALS SELECTED FOR TARGET ANALYSIS

- **Suspect screening**:
  1. N-isopropylmethacrylamide
  2. methylpyrrolidone, n-
  3. p-Toluidine
  4. o-Toluidine
  5. Diethyltoluenediamine
  6. n-methylacetamide
  7. Quinoline
  8. TDCPP
  9. Methyl-2-benzoylbenzoate
  10. IPPP – technical
  11. Piperonylbutoxide
  12. 3,4-Dimethylaniline

- **Non Target Analysis**:
  1. Chloroxylenol*
  2. 2,4,6- trichlorophenol
  3. Anisole, 2,3,4,5,6-pentachloro
  4. Pentachlorostyrene**
  5. Dibromoanisole
  6. Tribromoanisole
  7. Bromoindole*
  8. Dibromoindole*

*excluded – endogenous
** standard not immediately available (8-10 weeks)

SPECULATIONS ON POSSIBLE ROUTES OF CONTAMINATION

Environment

Packaging

Processing (e.g. disinfectants in cutting fillets)

Sample preparation

Legacy pesticides

WHAT'S NEXT IN 2024?

Workshop/conference/colloquium on "Emerging chemical risks for public health and the environment" by mid-2024

present the project and its results, and discuss possible collaborative options for a permanent emerging chemical risks identification system

DG-SANTE, DG-ENV, EEA, EMA, ECHA, JRC ...

best format?

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