RUOKAVIRASTO
Livsmedelsverket • Finnish Food Authority

TULANET Postdoctoral Programme *for* Research Institutes

Integrating Data on Harmful Substances in Foods into the Finnish National Food Composition Database (Fineli)

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Research Webinar

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About me: From Nutrition Science to Food Composition Databases

Education

- MSc in Health Sciences, majoring in Clinical Nutrition, University of Eastern Finland
- Licensed nutritionist (Valvira)

Research background

- Tampere University and Finnish Institute of Health and Welfare
- Professor Suvi Virtanen's research group
  - Type 1 Diabetes Prediction and Prevention (DIPP) study
  - The Environmental Determinants of Diabetes in the Young (TEDDY) study
- Maternal and early-life nutrition and type 1 diabetes risk

About me: From Nutrition Science to Food Composition Databases



PhD research

- Vitamin C, iron, nitrate, and nitrite in the development of type 1 diabetes

Extensive use of Fineli in nutritional epidemiology research

- Dietary intake assessment
- Nutrient calculations
- Exposure-related analyses

Joining the Finnish Food Authority

- Developing approaches for integrating harmful-substance data into Fineli

Why this research?

- **Fineli today**
  - Comprehensive information on nutrients
  - Limited information on harmful substances in foods
- **At the same time**
  - Concentration data already exist in many different sources
- **The challenge**
  - How can these data be transformed into reliable and useful food composition values?

Why include harmful substances in Fineli?

- **Food consumption data × concentration data → dietary exposure**
- Valuable tool for
  - Dietary exposure assessment
  - Risk assessment
  - Research
  - Food safety monitoring
- Fineli is not an exposure assessment tool itself. Its concentration data can be combined with food consumption data to estimate dietary exposure.

What do users actually need?

- Webropol survey for stakeholders who utilize Fineli
  - Finnish universities and universities of applied sciences
  - Clinical and public health nutritionists
  - Nutrition and public health researchers
  - Risk assessment unit at Finnish Food Authority

What do users actually need?

- Observations (n = 33)
  - 87.5 %: aggregated statistics are sufficient
  - 78.8 %: information by food category is useful
  - 63.6 %: mean concentration is useful
  - 60.6 %: source information is very important
- Users need interpretable concentration data with transparent source information, not necessarily raw analytical data.

Where does the data come from?

- Finnish Food Authority analytical data
- Finnish Customs analytical data
- Other food composition / occurrence databases and scientific literature
- European monitoring data

- **Preference is given to data that best represent foods consumed in Finland.**

Not all data are directly comparable

Production & environment

- Geographical origin
- Season and year
- Environmental conditions
- Agricultural practices
- Species / variety

Food & processing

- Food composition / formulation
- Processing and preparation
- Storage
- Part of the food analysed

Measurement

- Sampling strategy: random vs risk assessment
- Sample representativeness
- Analytical method
- LOD / LOQ

An observed or published concentration value is not automatically a suitable Fineli value

The main methodological challenge

- For example, **What is the nitrate concentration of spinach? (mg/100 g)**



8,20
89,00
110,00
150,00
193,90
220,00
250,00
284,70
350,00
440,00

Which value should be stored in Fineli?

- Mean?
- Median?
- Range?
- Percentiles?
- Something else?

Why nitrate and nitrite as the first case study?

- High priority in the stakeholder survey
- Previous work provides a basis for updating the data
- Concentrations vary considerably between foods and samples
- Both naturally occurring and additive-related sources are relevant
- Finnish and European data are available
- A useful test case for developing the Fineli data model

Nitrate and nitrite data compilation: current status

Foods reviewed

- Foods in total: over **1,880**
- Foods assigned a nitrate value: **1,302**
- Foods assigned a nitrite value: **985**

Data sources

- Analytical results evaluated: **1,042**
- Other databases consulted: **2**

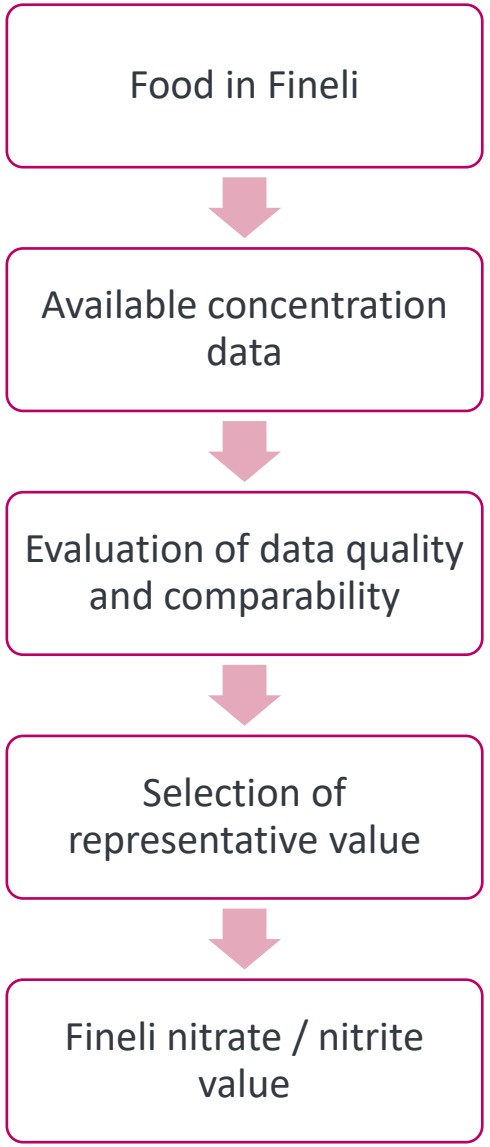
Current outcome

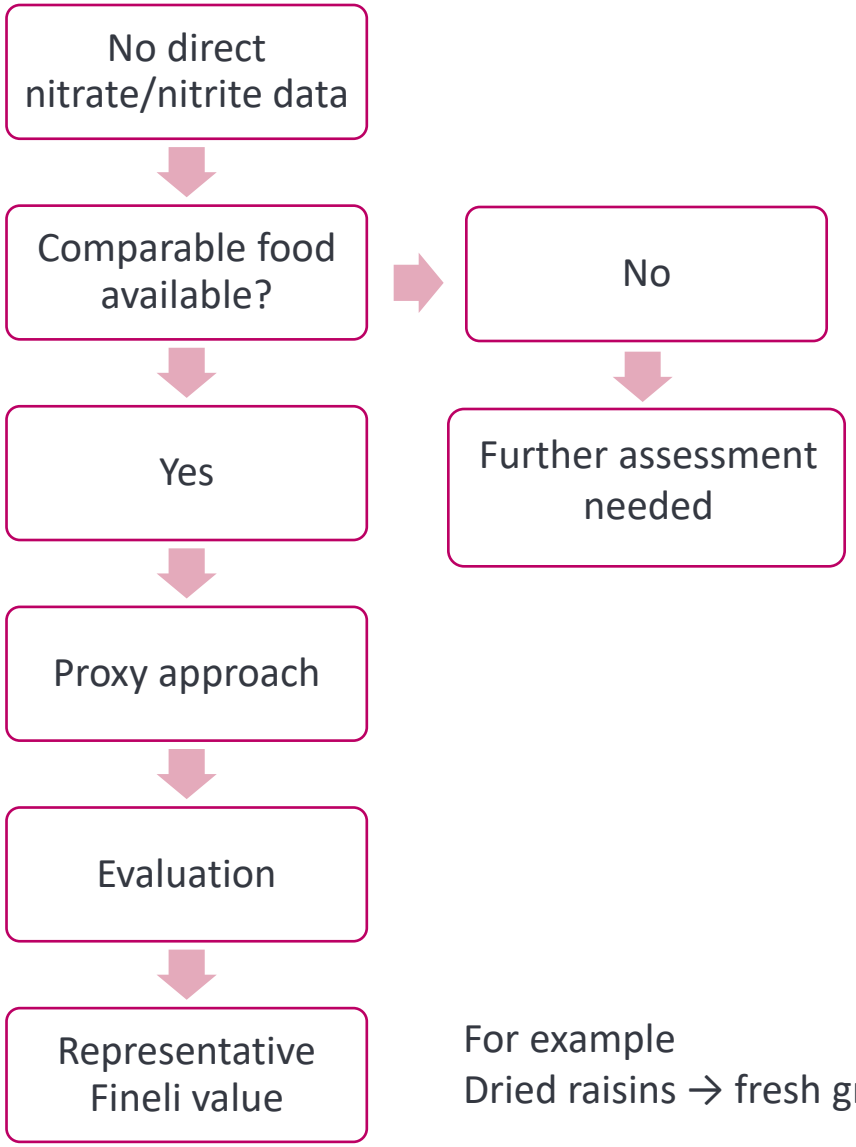
- Direct values available: **298 (22.8 %)** for nitrate and **135 (13.6 %)** for nitrite
- Values estimated using comparable foods (proxies): **1,004** (**77.2 %)** for nitrate and **850 (86.4 %)** for nitrite
- Additional Fineli foods still requiring assessment: **536** for nitrate and **844** for nitrite

Key message

A large proportion of foods require evaluation rather than direct adoption of published concentration values.

From source data to a representative Fineli value





For example
Dried raisins → fresh grapes

Research timeline

2026




Nitrate & nitrite

- Compile and evaluate national and European data
- Develop summary statistics and data model
- First data integrated into Fineli

↓

Heavy metals

Pb	Cd	As	Ni
Lead	Cadmium	Arsenic	Nickel

- Start compiling and harmonising data
- Focus on major dietary sources

2027





Heavy metals

- Finalise and integrate heavy metals data into Fineli
- Ensure data quality and comparability
- Work partly conducted in collaboration with a PhD researcher

↓

Potentially PFAS & dioxins




- Compile and evaluate data
- Develop data model and integrate

2027–2028




Potentially PAHs, acrylamide & other relevant substances

- Identify key sources and available data
- Compile data from analytical results and literature
- Integrate into Fineli



Overall goal: Develop a consistent and scalable approach for compiling, evaluating and presenting harmful substances data in Fineli – supporting dietary exposure and risk assessment.

thl Fineli

What will the project deliver?

1. DATA
   - Reliable concentration data on harmful substances in foods
2. METHOD
   - A harmonised approach for evaluating and integrating data
3. INFRASTRUCTURE
   - A basis for maintaining and expanding harmful-substance data in Fineli

→ Better data for dietary exposure and risk assessment

Take-home messages

1. Data on harmful substances in foods already exist, but they are scattered across multiple sources.
2. The key challenge is not simply collecting data but determining how heterogeneous data can be transformed into reliable and representative food composition values.
3. The project will provide both reliable concentration data and a systematic approach for integrating harmful substances into Fineli.

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Thank you