

# JOIN THE JOURNEY WITH US!



We continue at 13:00

## 2nd ANNUAL SEMINAR

# FOOD2.0





# AGENDA

## FOOD 2.0 ANNUAL SEMINAR

13.00

**Envisioning tomorrow's food system:** The big-picture perspective – Harri Kallioinen, Valio

13.15

**360 operational environment view and networked foresight**

- Insights from a 360-degree view: combining insights on global food market development, economic indicators, climate change, politics and regulation, consumer behavior and demographic shifts, as well as trade and supply chain dynamics - Sara Reponen and Kevin Deegan, Valio
- From field capacity to food security: Futures paths for Finland's primary production - Csaba Jansik and Anu Kaukovirta, LUKE

14.10

**Coffee break**

14.45

**Highlights of the second year of Valio Food 2.0 program** – Veera Virtanen and Riitta Partanen

15.10

**Leading company ecosystem collaboration:** Harnessing AI and partnerships to drive food industry success - Vilja Hannula, ADM Silo AI

15.30

**Outlook for Future** - National PhD work pitching session - chair: Mari Sandell, UH

- Towards reliable soil carbon balance estimates in agriculture - Johanna Vielmaa, Valio
- Self-supervised training for multispectral remote sensing imagery - Leon-Friedrich Thomas, UH
- Impact of food processing on plant-based protein-rich foods - Jasmin Raita, UTU
- Fibre-rich protein sources for gut-friendly plant-based foods: a nutritional investigation on food fermentation - Finlay Sim, UH
- Whole grain cereals, tryptophan metabolism, and the gut-brain axis - Vilma Liikonen, UEF
- Technologies enabling personalized food production and enhanced eating experiences - Alex Calton, VTT
- Making biodiversity impacts visible: effects of LCA-derived footprint labels on students' meal selection - Aino Tarkkio, UTU

16.00

**Closing remarks**

# ENVISIONING TOMORROW'S FOOD SYSTEM: BIG PICTURE PERSPECTIVE



HARRI KALLIOINEN  
Senior Vice President R&D  
Valio

FOOD2.0

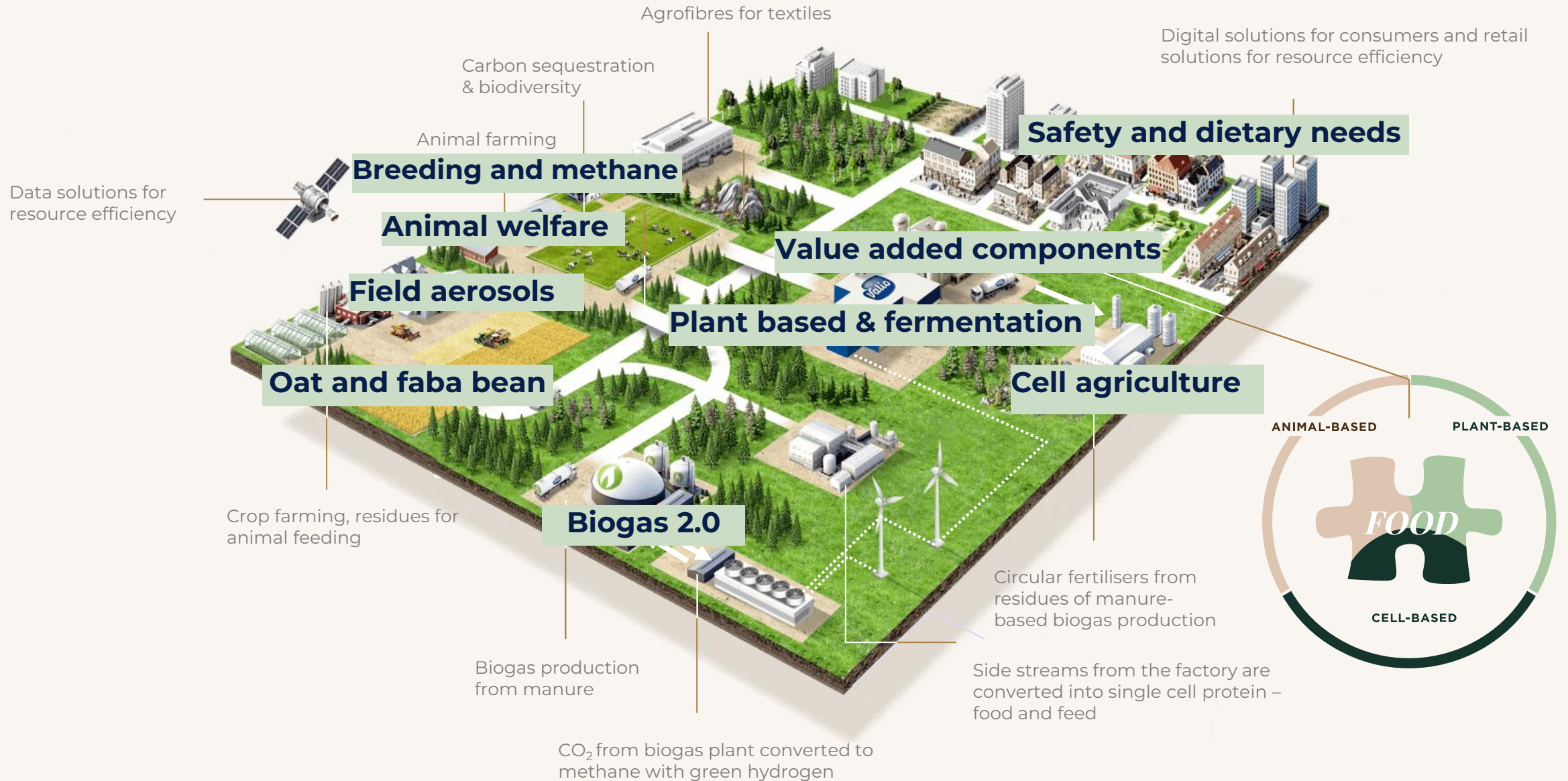


# THE GLOBAL FOOD SYSTEM IS FACING SIGNIFICANT CHALLENGES - HOW DO WE SOLVE THEM?



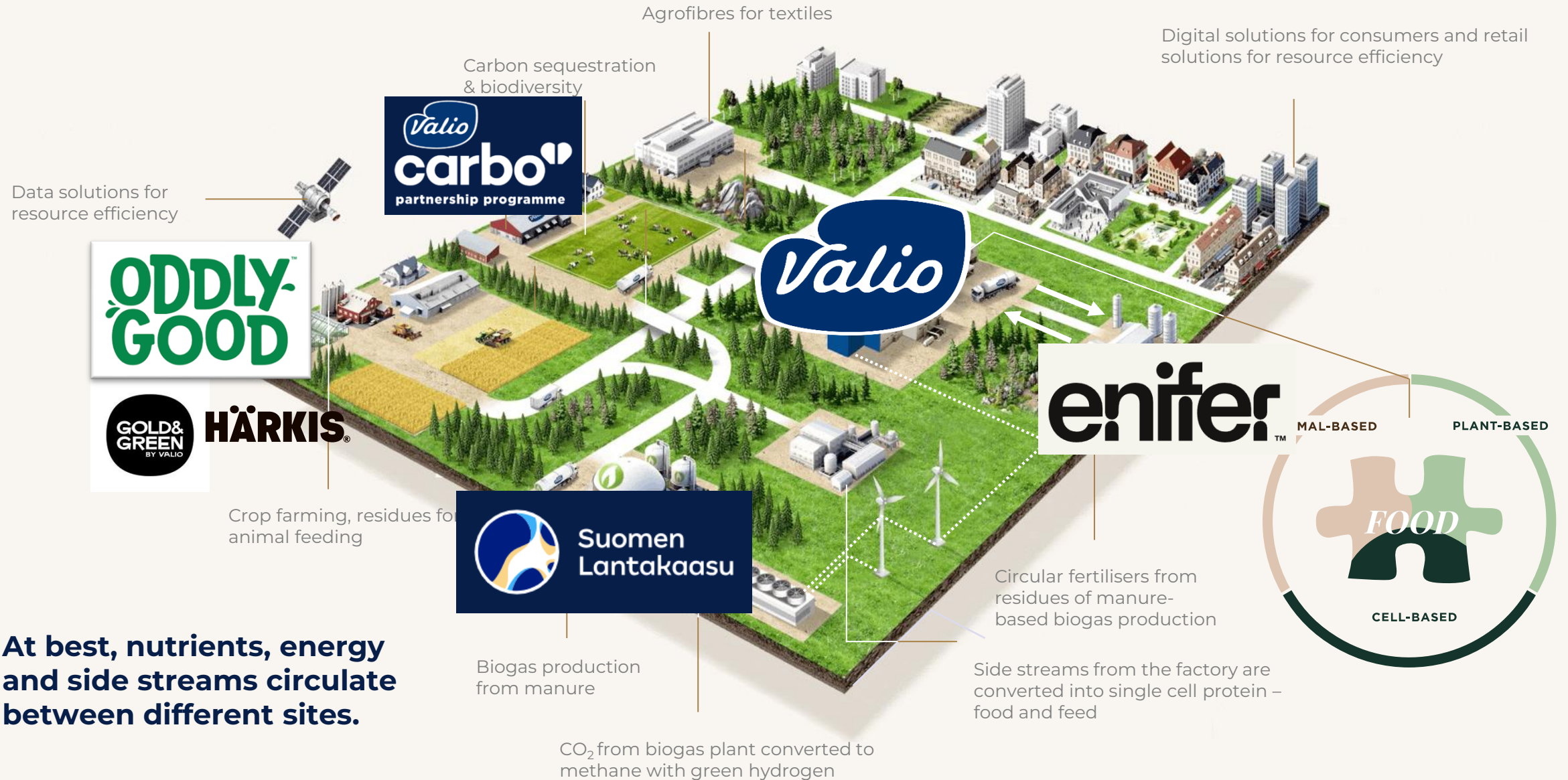


# FOOD 2.0 AND BUSINESS OPPORTUNITIES – EXAMPLES OF THE RESEARCH TOPICS





# THE FUTURE FOOD SYSTEM IS A COMBINATION OF DIFFERENT FOOD PRODUCTION METHODS THAT COMPLEMENT EACH OTHER OUR VIEW OF FOOD 2.0.



**At best, nutrients, energy and side streams circulate between different sites.**

# 360 OPERATIONAL ENVIRONMENT VIEW AND NETWORKED FORESIGHT

COMBINING INSIGTS ON GLOBAL FOOD MARKET DEVELOPMENT, ECONOMIC INDICATORS, CLIMATE CHANGE, POLITICS AND REGULATIONS, CONSUMER BEHAVIOR AND DEMOGRAPHIC SHIFTS, AS WELL AS TRADE AND SUPPLY CHAIN DYNAMICS

SARA REPONEN  
Vice President, Strategy & Market Intelligence  
Valio

KEVIN DEEGAN  
Vice President, Innovation  
Valio



FOOD2.0





# CREATING THE FUTURE

*A 360-degree view and networked insight*

**SARA REPONEN**

*Vice President, Strategy and Market Intelligence*



**KEVIN DEEGAN**

*Vice President, Innovation and Insight*

# THE BEST WAY TO PREDICT THE FUTURE IS TO CREATE IT

*Peter Drucker*

*1909-2005*



*When looking towards the future,  
we are faced with*

# **THREE UNIVERSAL CHALLENGES**

*too much*  
**DATA**  
*too little*  
**CLARITY**

*Relevant signals are buried*

*More data does not automatically  
mean better understanding*

*Increasingly hard to see what  
truly matters*

*Future cannot be measured*

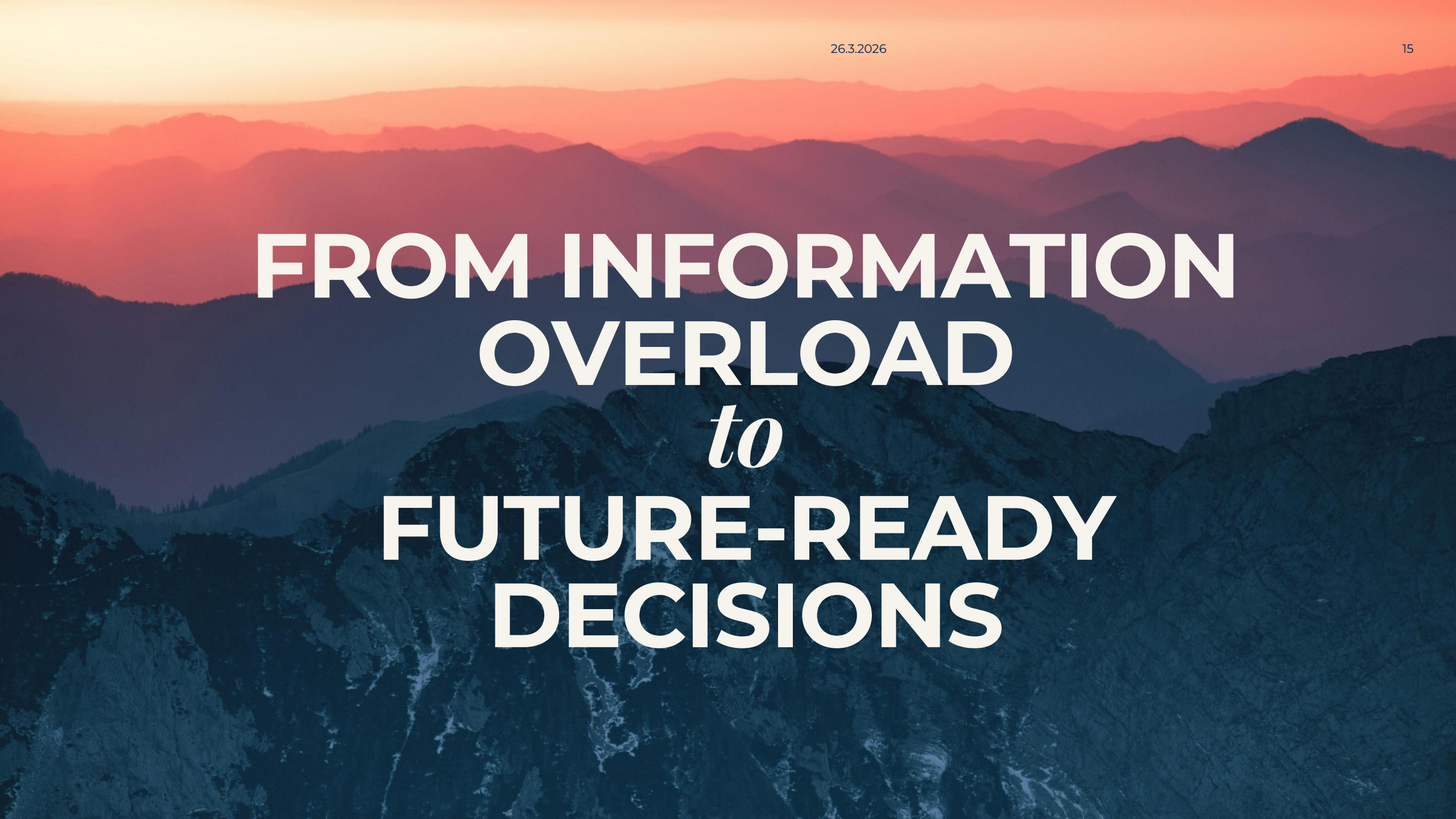
*Uncertainty always remains*

*Scenarios guide thinking*

*no data from*  
**THE  
FUTURE**

*insight*  
*generation*  
**IS TOO SLOW**

*Reports made by humans*  
*Resource intensive*  
*Prone to biases*



**FROM INFORMATION  
OVERLOAD**  
*to*  
**FUTURE-READY  
DECISIONS**

**FROM  
INFORMATION  
OVERLOAD  
*to*  
FUTURE-READY  
DECISIONS**

*enabled by*

- **A 360 DEGREE MARKET ENGINE**
- **ARTIFICIAL INTELLIGENCE**
- **NETWORKED FORESIGHT**
- **WILLPOWER**

The background is a dark, abstract composition of concentric, glowing circles in shades of purple, pink, and blue. A cluster of three bubbles is visible in the upper right quadrant. The overall effect is dynamic and futuristic.

*the enablers:*  
**A 360 DEGREE  
MARKET ENGINE**



**A 360 DEGREE MARKET ENGINE**

**AUTOMATICALLY GENERATED PERSONALISED INSIGHTS**

**NEW PERSPECTIVES FOR FORESIGHT**



A faint, blue-tinted background image of a person's head and shoulders, appearing to be a man with short hair, looking forward. The image is semi-transparent and serves as a backdrop for the text.

*the enablers:*  
**ARTIFICIAL  
INTELLIGENCE**

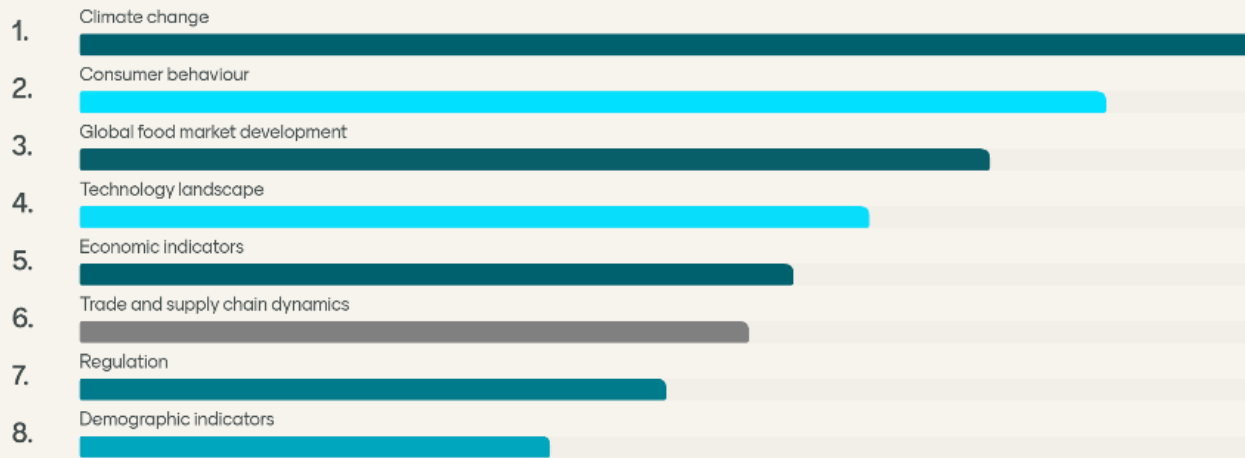


*the enablers:*  
**NETWORKED  
FORESIGHT**

A silhouette of a person standing on a large rock at sunset, with arms raised in a gesture of triumph or achievement. The sky is a gradient of purple, pink, and orange. The person is positioned in the center of the frame, with their arms spread wide. The rock they are standing on is dark and jagged, with other rocks visible in the foreground and background.

*the enablers:*  
**WILLPOWER**

# *In building Food 2.0 together, what is one capability or area of foresight that should be prioritised first?*



→ Start voting



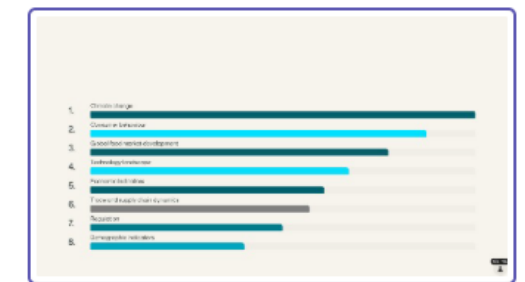
menti.com  
4378 1844

103 of 123 responded



Food 2.0 Annual Seminar

Select which slide to add



Biodiversity loss	Dietary shifts globally	Erosions	Demographic change
Political instability	Viability of rural communities	AI burnout	Disinformation

# *What important signals do you think we are currently missing because we are too focused on today's data and problems?*

- Biodiversity loss
- Demographic change
- Ai burnout
- Young people's attitudes
- Dietary shifts globally
- Political instability
- Disinformation
- Food availability
- Emotions
- Viability of rural communities
- Complexity of biodiversity
- Role of developing countries (markets)

menti.com  
4378 1844

62 of 123 responded

Menti  
Food 2026 Annual Seminar

Select which slide to add

→ Start voting

**THE FUTURE DOES NOT  
JUST HAPPEN**

*we can make it*

**TOGETHER**





# WATCH THIS SPACE...

**SARA REPONEN**

VP, Strategy & Market Intelligence  
Sara.reponen@valio.fi

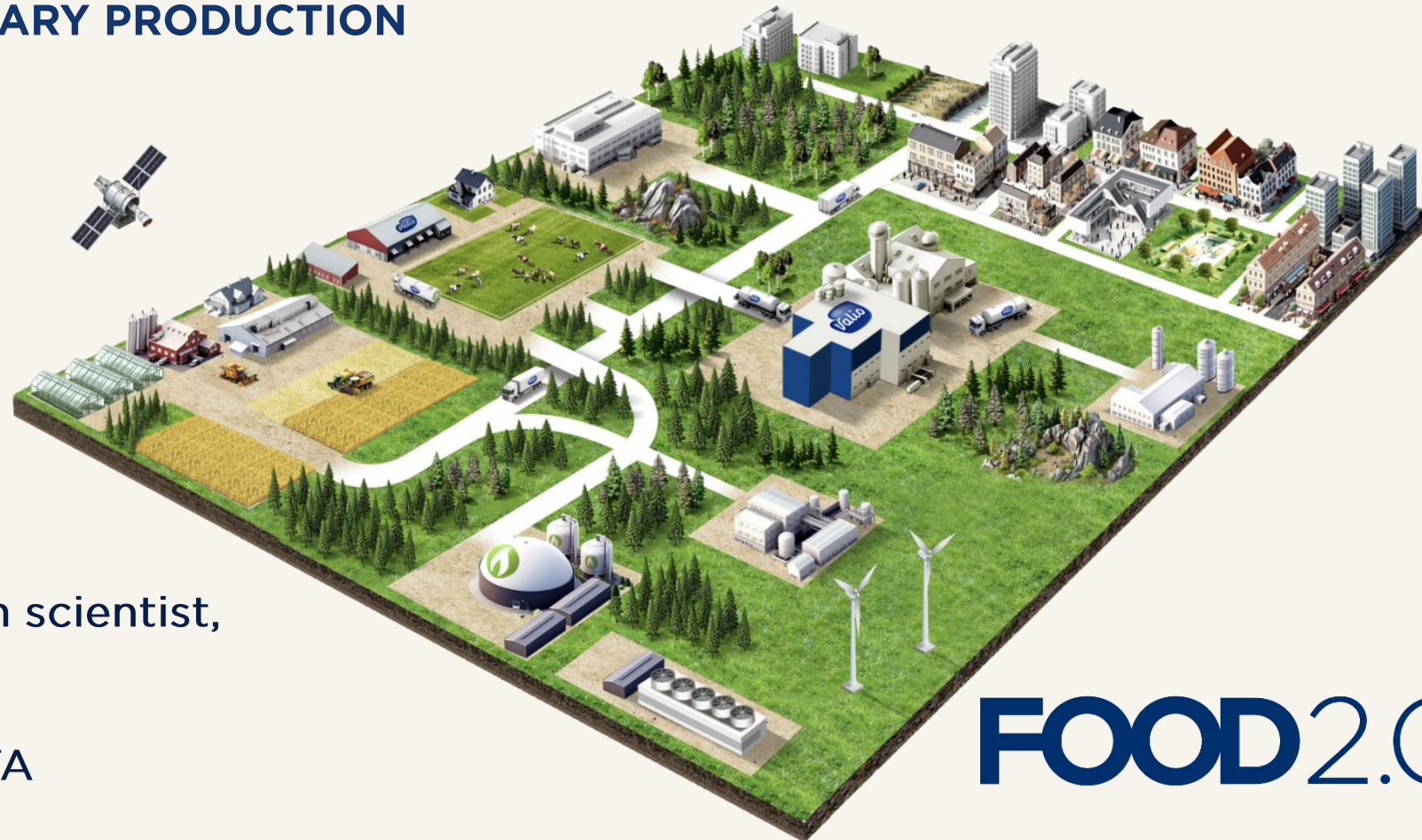
**KEVIN DEEGAN**

VP, Innovation & Insight  
Kevin.Deegan@valio.fi



# 360 OPERATIONAL ENVIRONMENT VIEW

FROM FIELD CAPACITY TO FOOD  
SECURITY: FUTURES PATHS FOR  
FINLAND'S PRIMARY PRODUCTION



CSABA JANSIK  
Principal research scientist,  
LUKE

ANU KAUKOVIRTA  
Director, LUKE

FOOD2.0



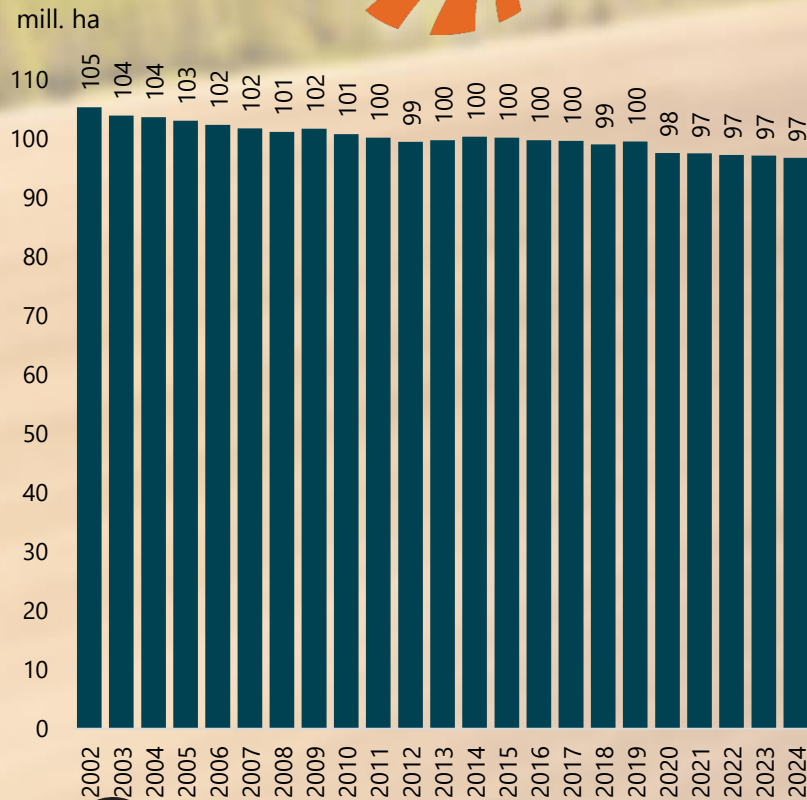
# From field capacity to growth and food security

Csaba Jansik & Anu Kaukovirta



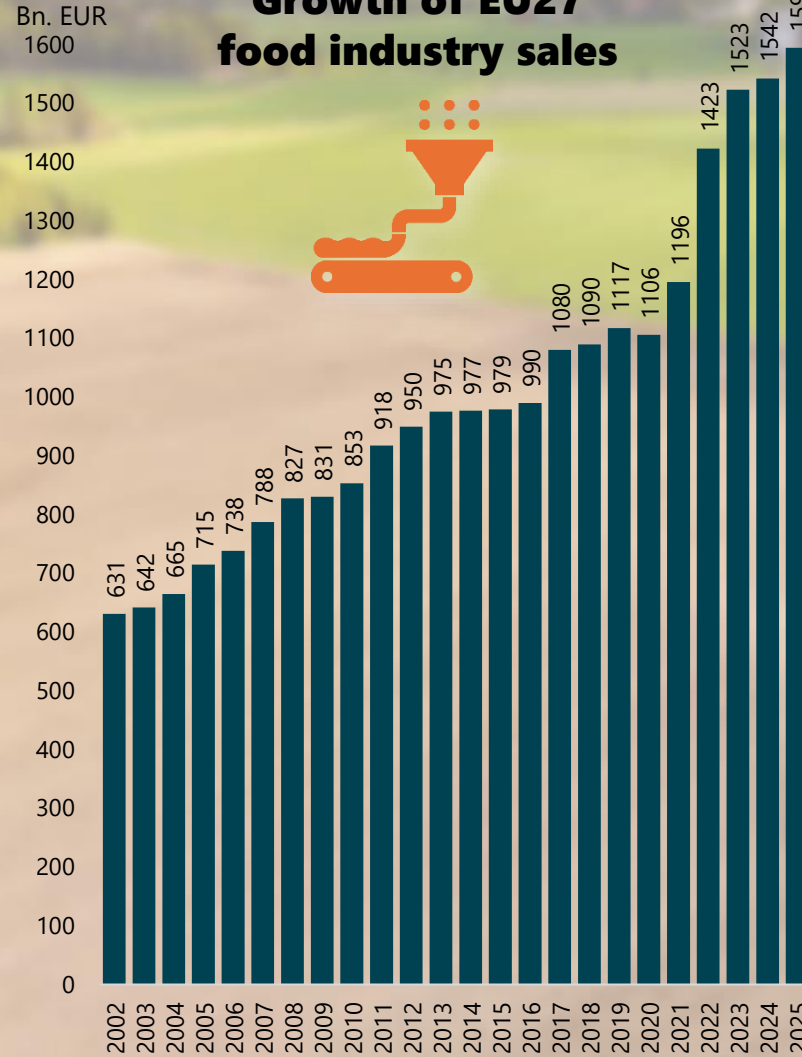
# Field capacity, food industry sales and export value

## Growth of EU27 utilised agricultural area



Source: Eurostatin apro\_cpsh1 dataset.

## Growth of EU27 food industry sales

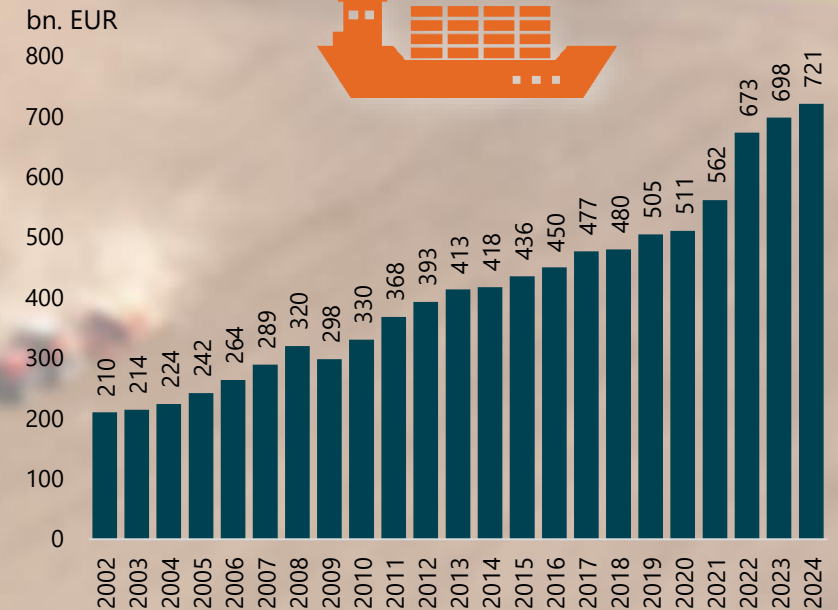


Source: Eurostat, SBS dataset, CIAA and FoodDrink Europe.

The value of EU food exports has increased 2.5-fold while agricultural land has shrunk by a few percent between 2002 and 2024.

The value of EU food exports has increased 3.5 times over the same period.

## Growth of EU27 food exports



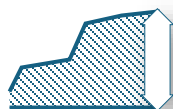
Source: Eurostat, Comext dataset. Note: Figures include EU intra and extra trade CN groups 01-04, 07-12 and 15-24.

# Growth indices

## Legend

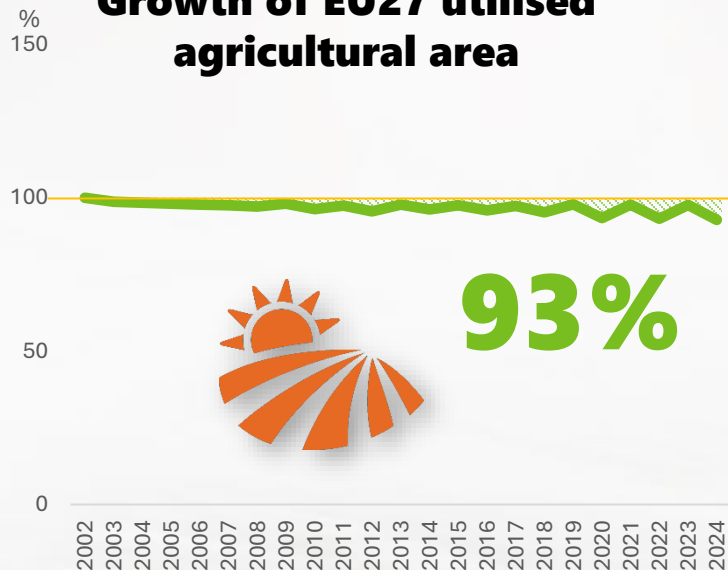


Price effect –  
consumer price change

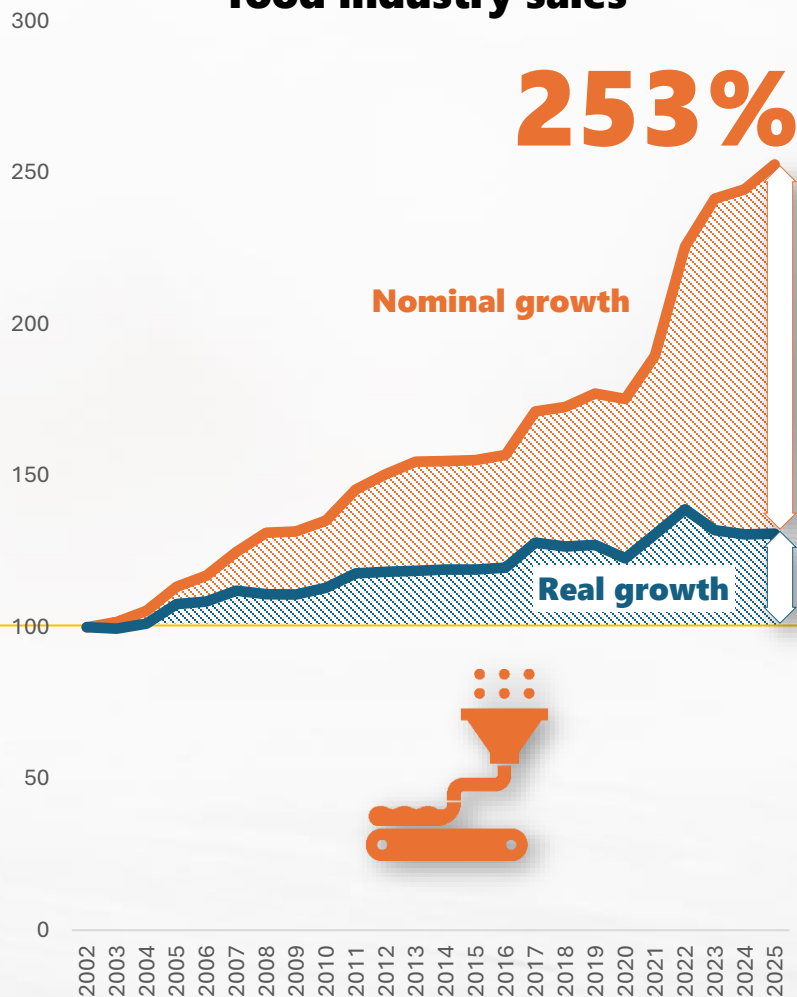


Volume effect –  
Productivity, product  
portfolio changes

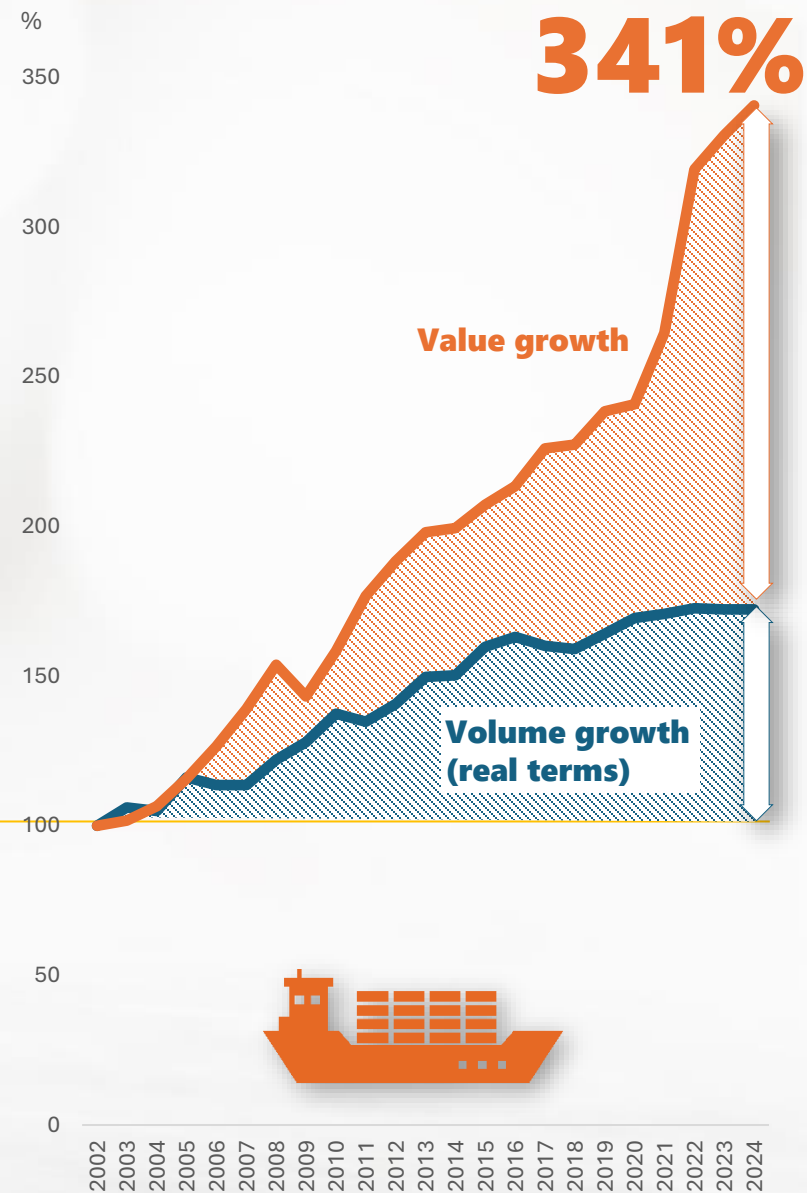
### Growth of EU27 utilised agricultural area



### Growth of EU27 food industry sales



### Growth of EU27 food exports





**What is our field capacity?  
How much is it changing?  
Is there a risk for security?**

# **Arable land in Finland: 2,264,800 ha**

**Share of arable land: Finland and Sweden 7%, Norway 3%, Denmark ~70%**

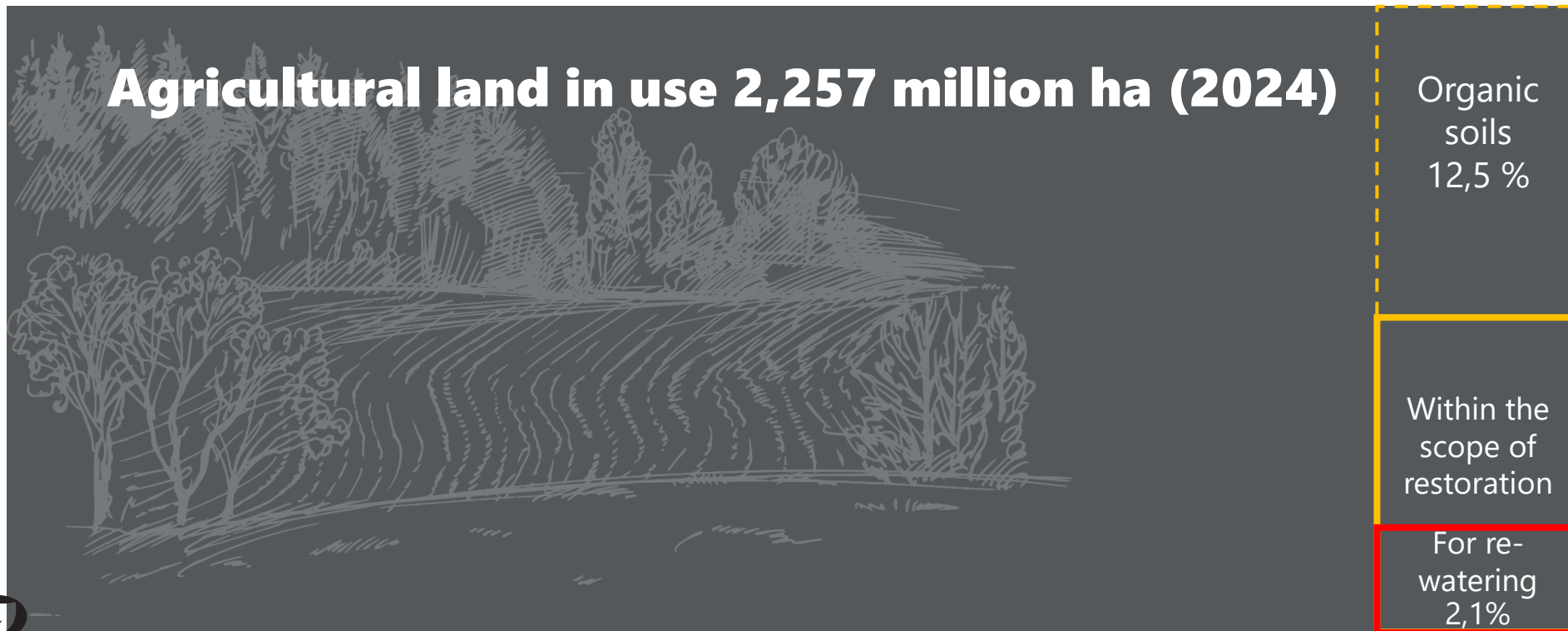
# Three aspects related to the sufficiency of the arable land

1. Restoration
2. Harvest gap, quality gap & harvest potential
3. Future structure of our agriculture



# Estimated impact of the Nature Restoration Regulation on Finland's arable land area

- Restoration actions are voluntary
- Regional differences in the occurrence of peatlands are large
- The structural development of farms provides an opportunity to remove peatlands from active production

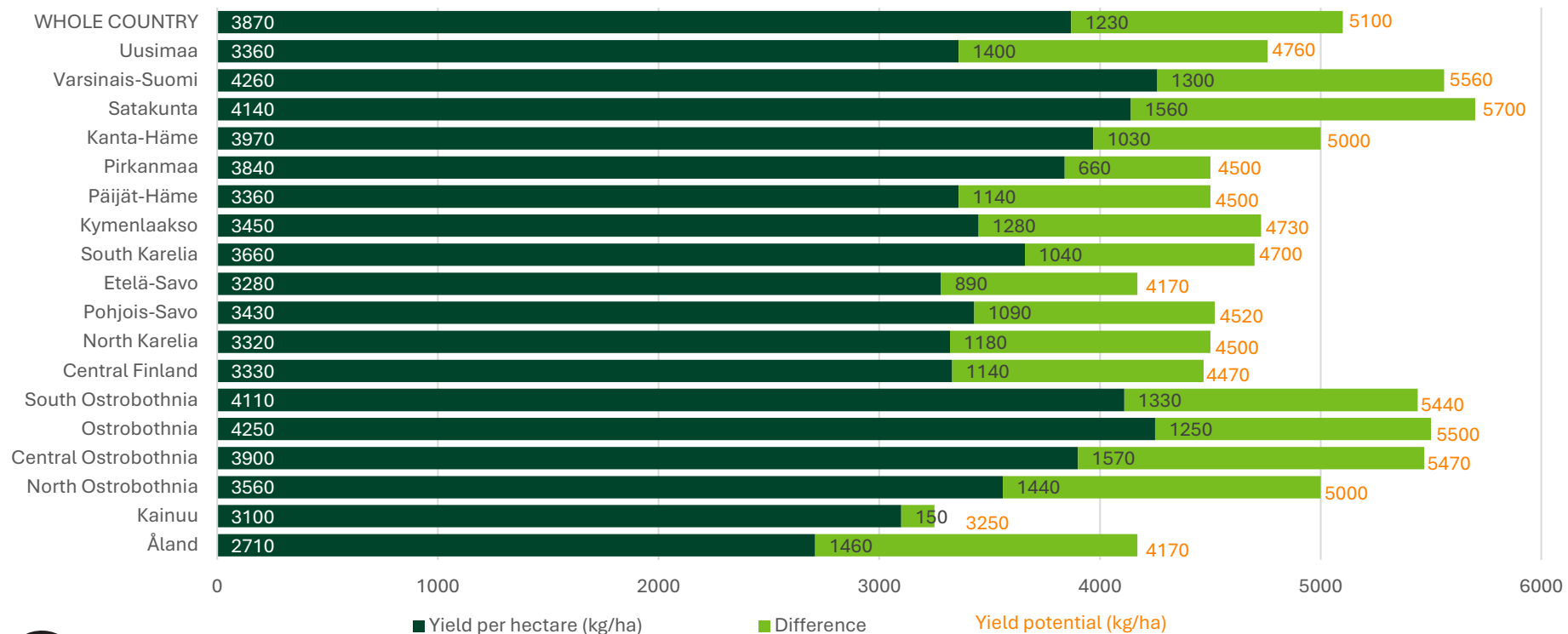


If the re-watering of swamp forests and peat extraction areas is included, the share will decrease to well below one per cent.

# Yield gap, crop potential – what are they?

- The difference between the yield and yield potential of an individual farm is the yield gap. The potential is defined as a yield per hectare, which is achieved by the best 10 per cent of the farms in the area during the growing season.
- The yield gap of an average farm is usually 30-35%, and in grass production it is about 50%.

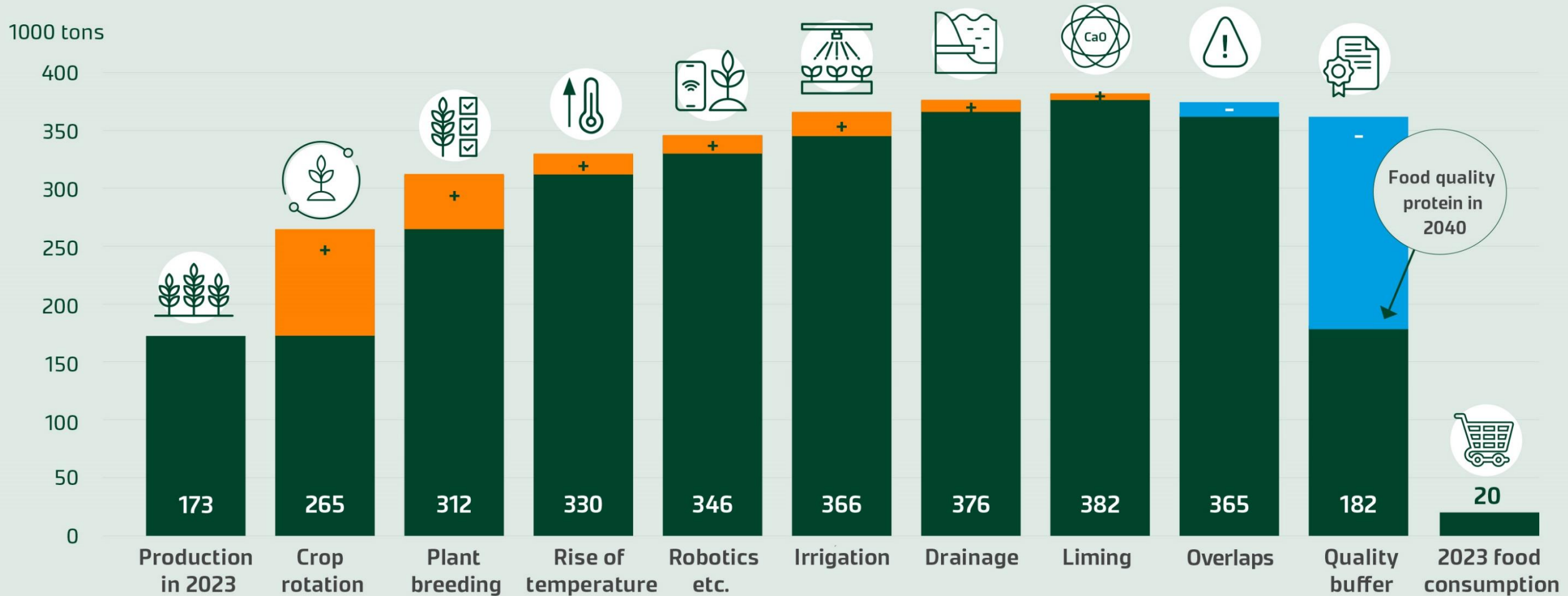
Crop potential of oats in different regions 2024



Source: <https://www.luke.fi/fi/blogit/satopotentialin-voi-nyt-tarkastaa-satotilastosta>

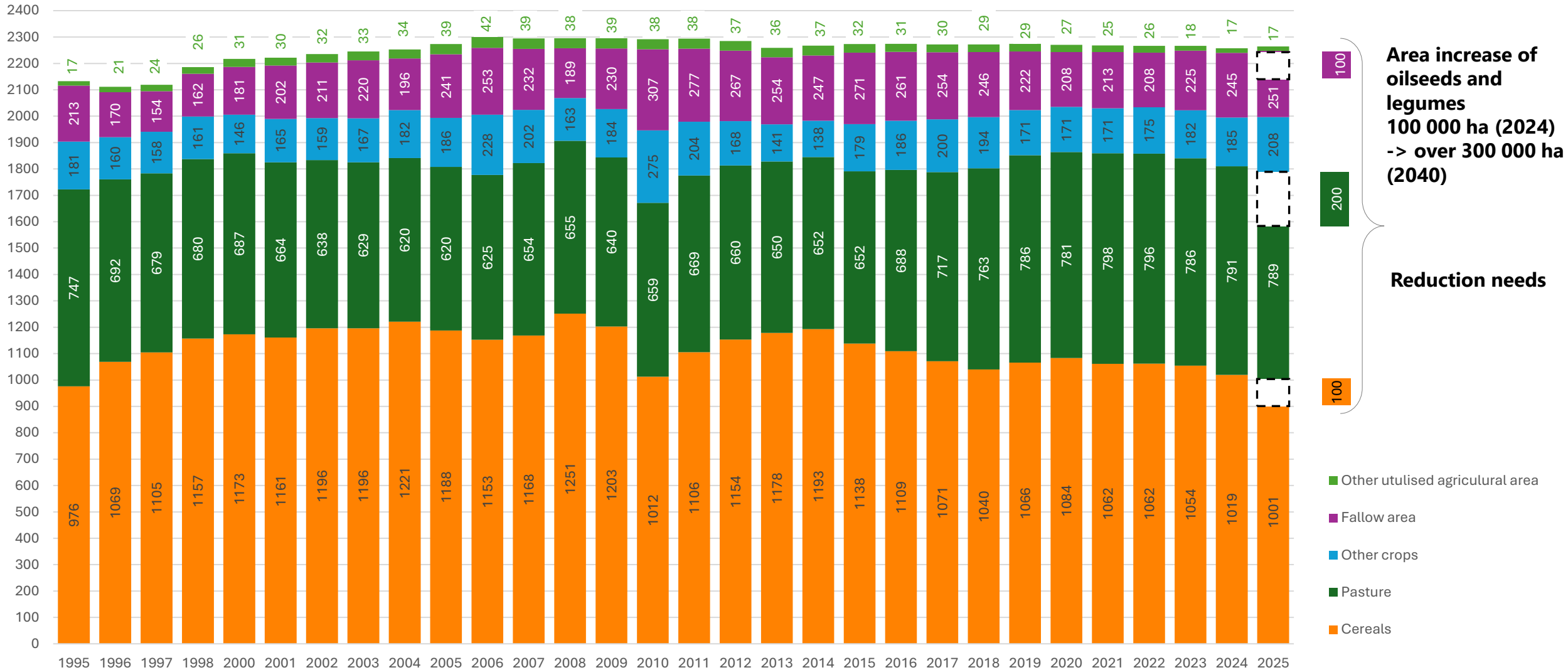
# Potential development of plant protein production from the current situation to 2040

The calculations include the most important protein crops (legumes, oilseeds, oats, specialty crops)



# Impact of structural change

## Utilised agricultural area in Finland by major crops and use



**Area increase of oilseeds and legumes 100 000 ha (2024) -> over 300 000 ha (2040)**

**Reduction needs**

Source: Luke, Utilised agricultural area, UAA

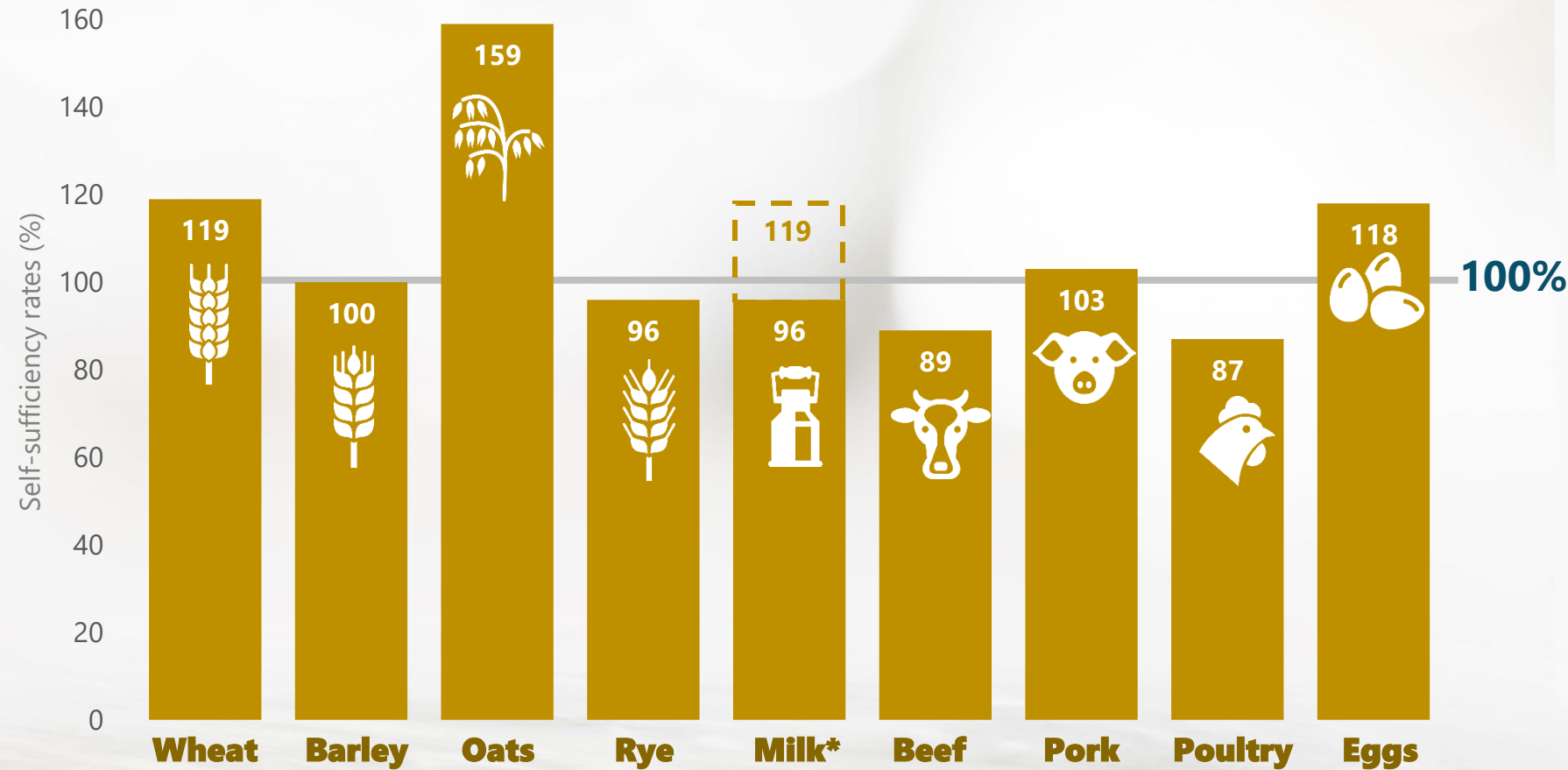
[https://statdb.luke.fi/PxWeb/pxweb/fi/LUKE/LUKE\\_02%20Maatalous\\_04%20Tuotanto\\_22%20Kaytossa%20oleva%20maatalousmaa/01\\_Kaytossa\\_oleva\\_maatalousmaa\\_mkunta.px/](https://statdb.luke.fi/PxWeb/pxweb/fi/LUKE/LUKE_02%20Maatalous_04%20Tuotanto_22%20Kaytossa%20oleva%20maatalousmaa/01_Kaytossa_oleva_maatalousmaa_mkunta.px/)

**Does field capacity limit  
growth or food security?**

# Self-sufficiency of agricultural products in Finland

## Self sufficiency rates of major agricultural products (three-year average)

- Total average self-sufficiency for Finnish food is 78% by euro terms (2024) and 80 % by protein terms (2023).
- Self-sufficiency for wheat was achieved in the early 2000s and for rye in the 2010s.
- There is good potential to increase the self-sufficiency of oilseeds, pulses and horticultural products.



Source: own calculations from data of Natural Resources Research Finland (Luke) and Kantar TNS Agri. Note: calculation formula of SSR = production/(production + imports - exports). Changes in stock is part of the formula for cereals. Rates indicate the average of recent three years available. \* The self-sufficiency rate (SSR) of milk is 96% calculated by milk equivalents 2022-2024 and 119% calculated for milk fat and protein, 2024.

# Self sufficiency of agricultural inputs

**under 20%**

nitrogen 0%,  
kalium below 15%,  
fosphorus over 100%



Fertilisers

**35%**  
of primary energy



Energy



Seed

**0-99%**

Vegetables 0%; grass 60-65%; special crops 92%, grains 99%



Plant protection agents

**0%**

**20%-110%**

Complementary protein feed 20%, feed grain ~110%



Feed



Equipment and spare parts



Labour

**45%-98%**

Field vegetable farms 45%; greenhouse farms 65%; pig farms 85%; poultry farms 93%; milk farms 97%; grain farms 98%

Self-sufficiency rates of agricultural inputs

# A steady growth of export value per hectare UAA

## Driving factors

- Price increase of production inputs and food
- Value added growth of food and drinks
- Cross border trade within the value chains
- The significance of livestock-based products
- The growth of industries with indirect land use
- Distribution hubs of foreign trade

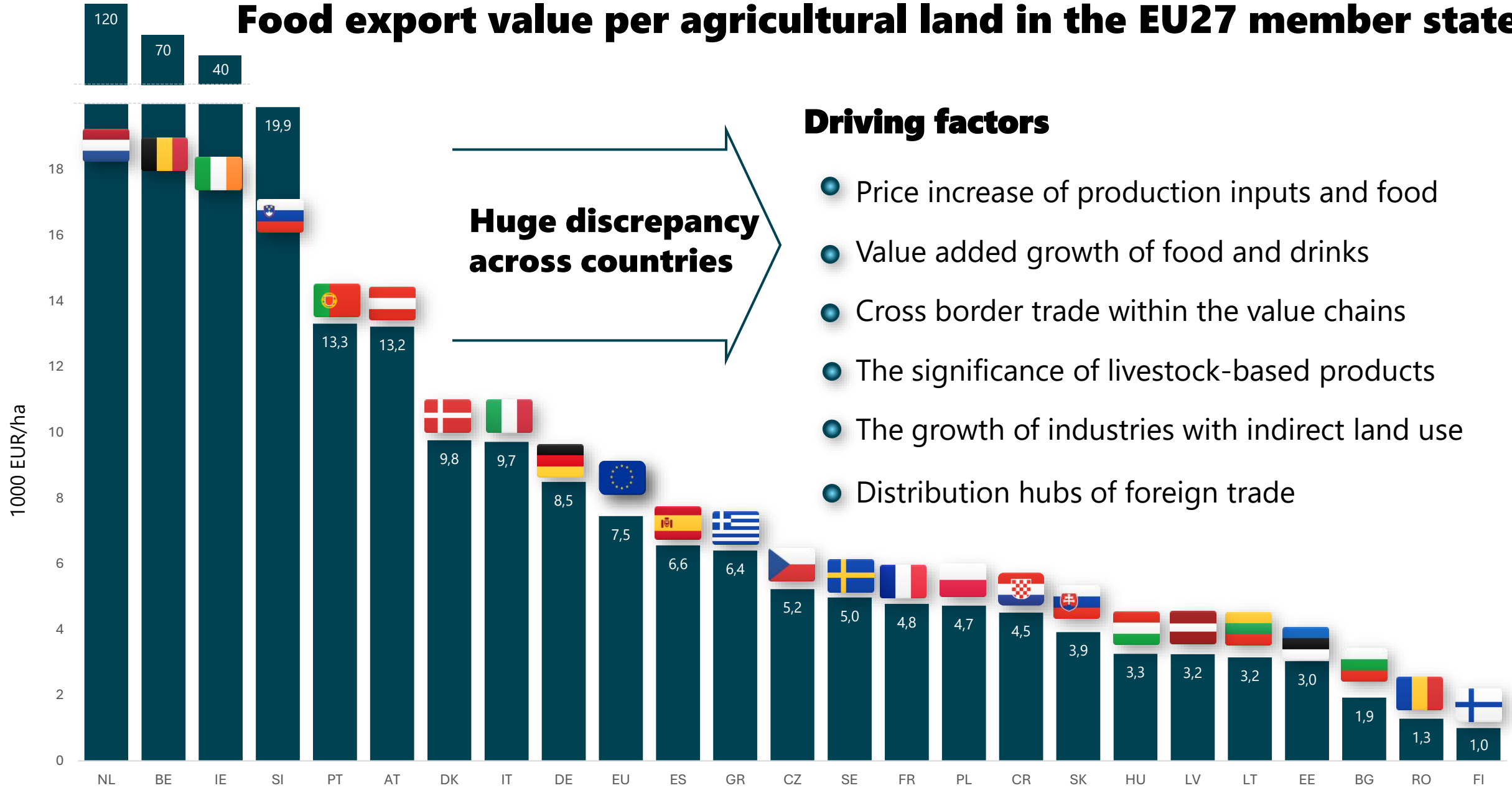
## EU27 food export value per utilised agricultural land



Source: own calculations based on Eurostat Comext and apro\_cpsh1 datasets.



# Food export value per agricultural land in the EU27 member states



## Driving factors

- Price increase of production inputs and food
- Value added growth of food and drinks
- Cross border trade within the value chains
- The significance of livestock-based products
- The growth of industries with indirect land use
- Distribution hubs of foreign trade

Source: own calculations based on Eurostat Comext and apro\_cpsh1 datasets.

2/2024

# HOPE-scenario



Luonnonvara- ja biotalouden tutkimus 7/2024

## Ruoka-ala kasvuun viennin ja ruokainnovaatioiden vetämänä

Keskustelunavaus ruokasektorin arvonlisän kasvattamiseen

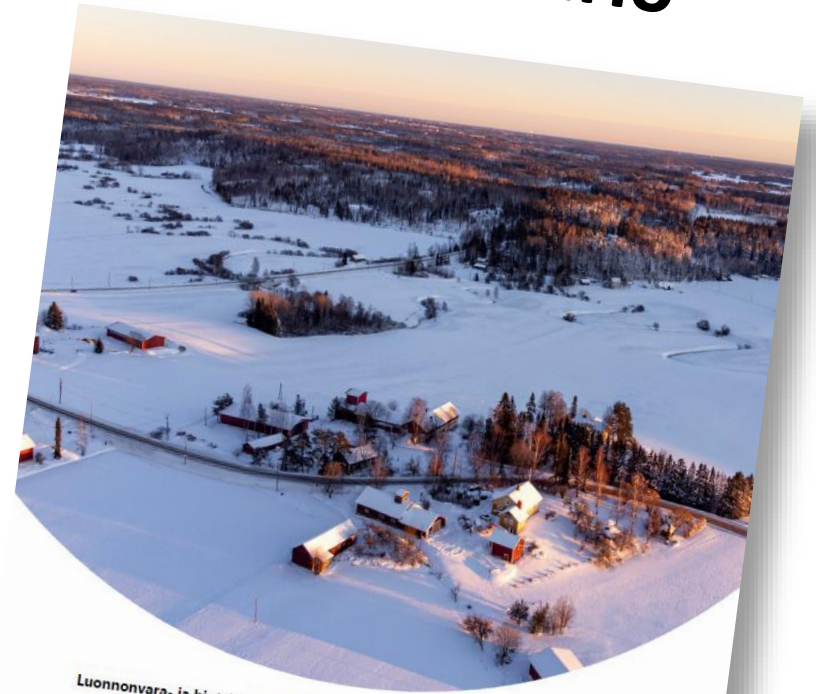
Csaba Jansik, Anu Kaukovirta, Marja Knuuttila, Johanna Kohl, Anu Koivisto, Heikki Lehtonen, Jyrki Niemi, Liisa Pesonen, Pasi Rikkonen, Kaija Saarni, Jari Setälä ja Henrik Wejberg



<https://jukuri.luke.fi/handle/10024/554653>

3/2025

# BASELINE-scenario



Luonnonvara- ja biotalouden tutkimus 22/2025

## Ruokasektorin kasvunäkymät nykyisellä toimintamallilla

Perusskenaario sektorin kasvusta vuoteen 2035

Csaba Jansik, Jyrki Niemi, Kaija Saarni ja Jukka Tauriainen



<https://jukuri.luke.fi/handle/10024/556186>

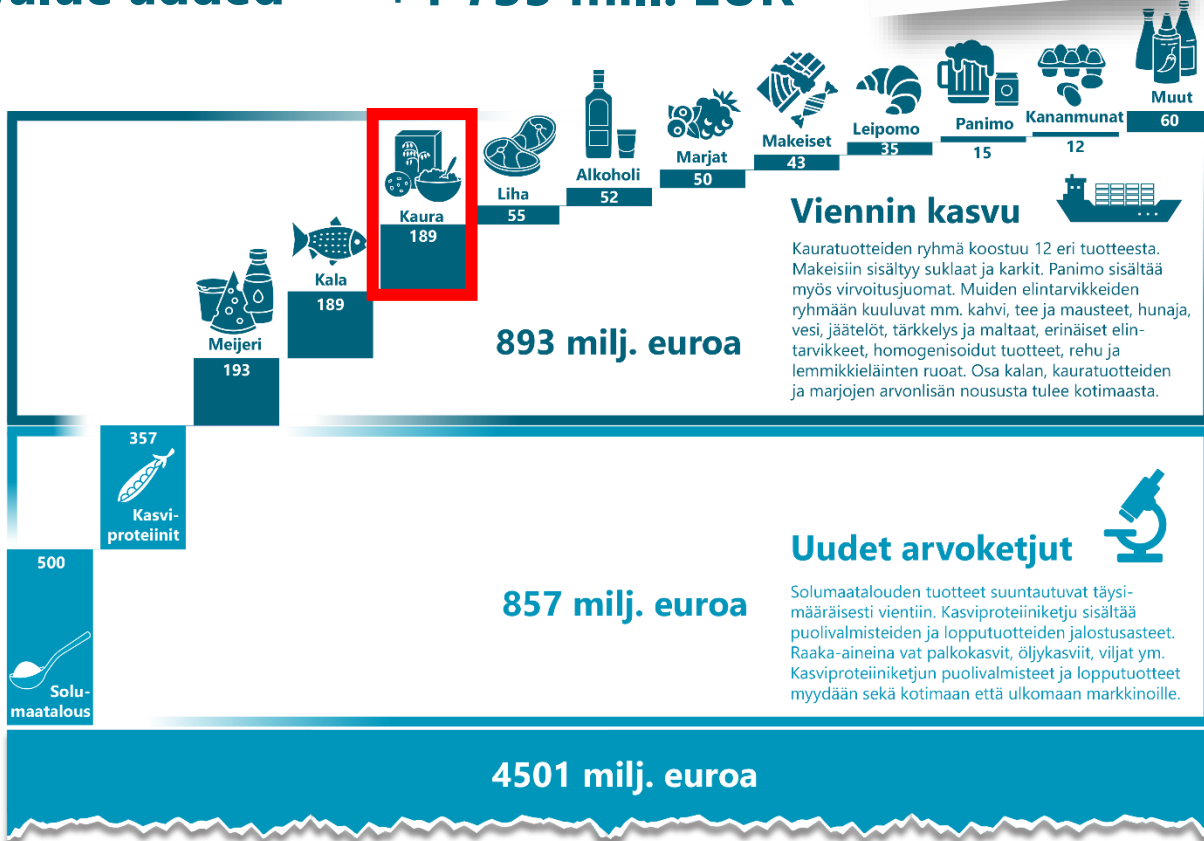


# HOPE-scenario

Sales revenues +4 819 mill. EUR

EUR 3.8 billion would come from exports and EUR 1.0 billion from the domestic market.

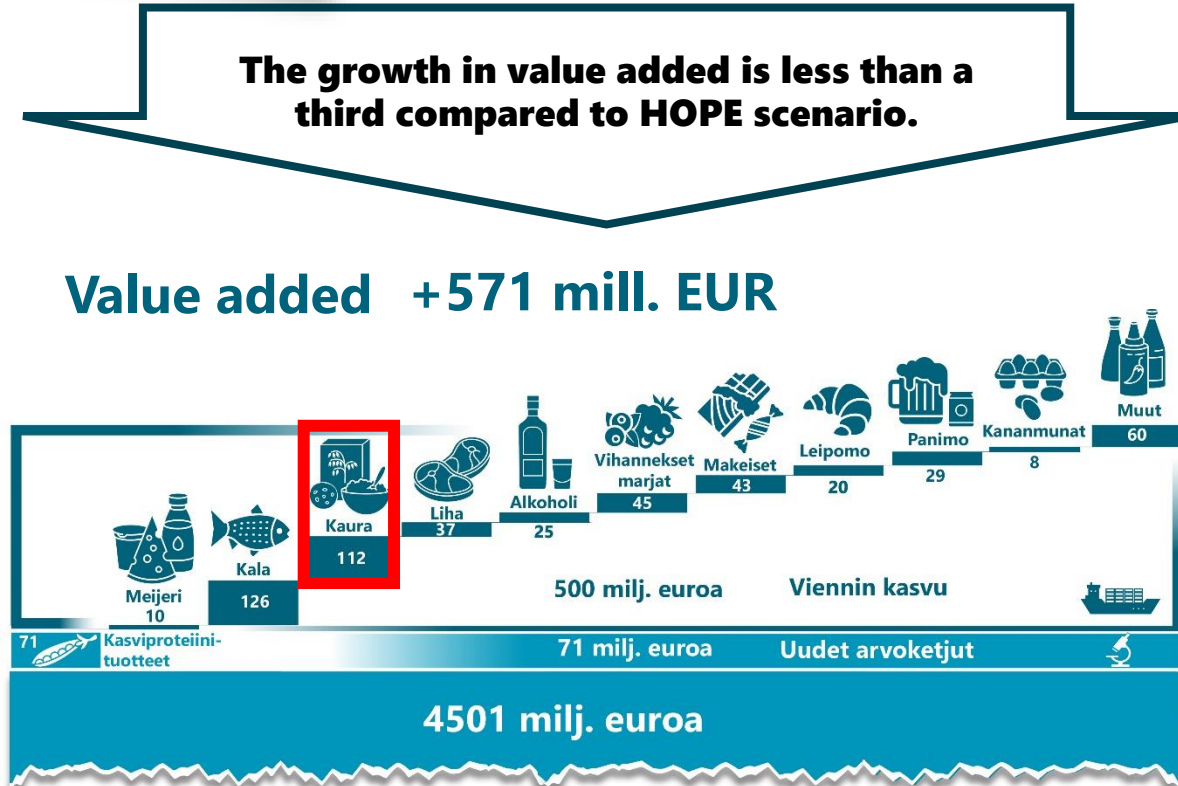
Value added +1 735 mill. EUR



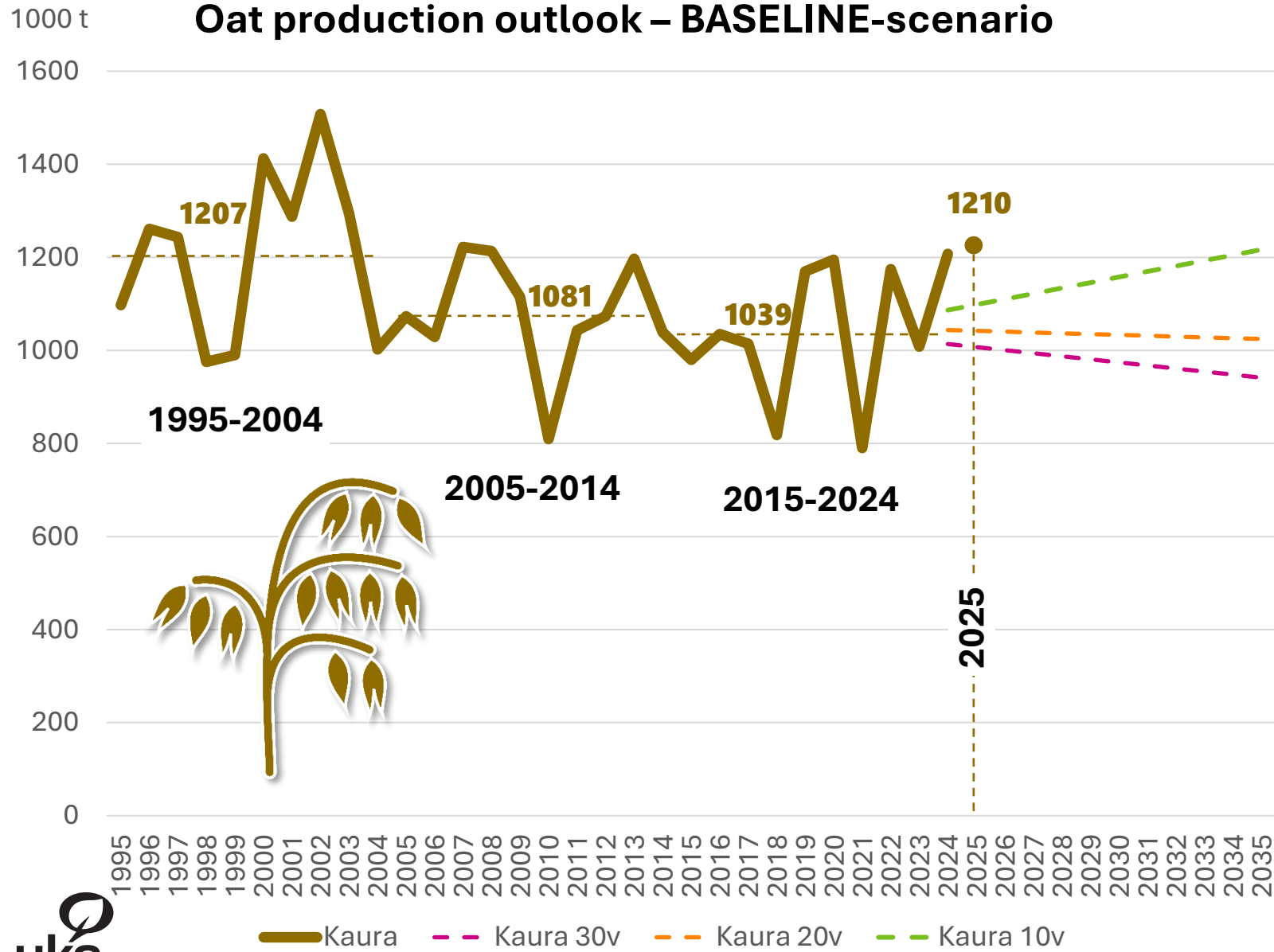
# BASELINE-scenario

Sales revenues +2 046 mill. EUR

EUR 1.1 billion would come from exports and EUR 0.9 billion from the domestic market.



# Oats



Production in 2035	Change 2035/2024
1217	+17 %
1025	-1 %
941	-9 %



# Why is value-added important in food export?

The export volumes of oats, milled oat products and muesli & granola, 2001-2025



**Finland**



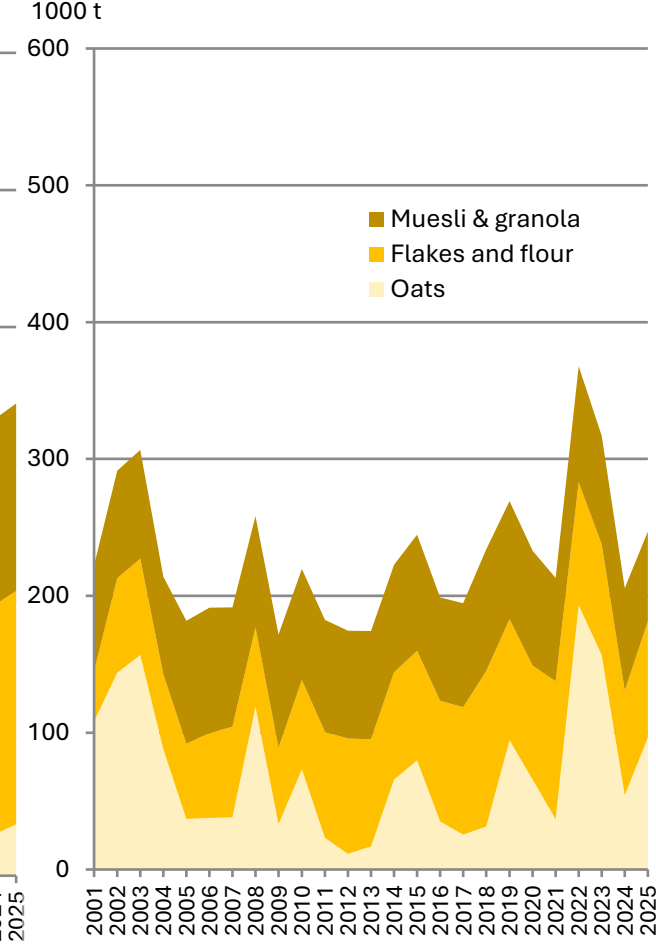
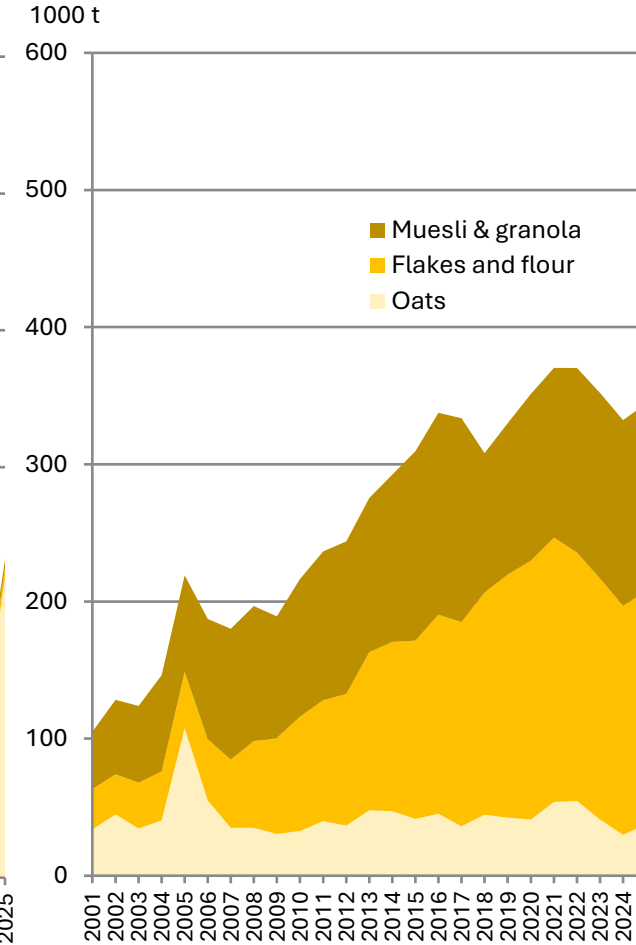
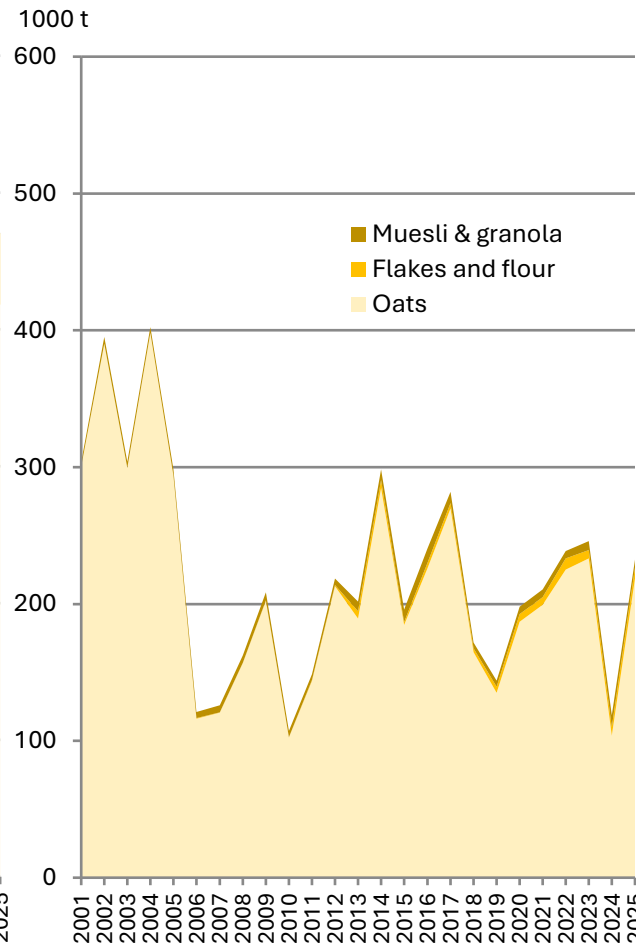
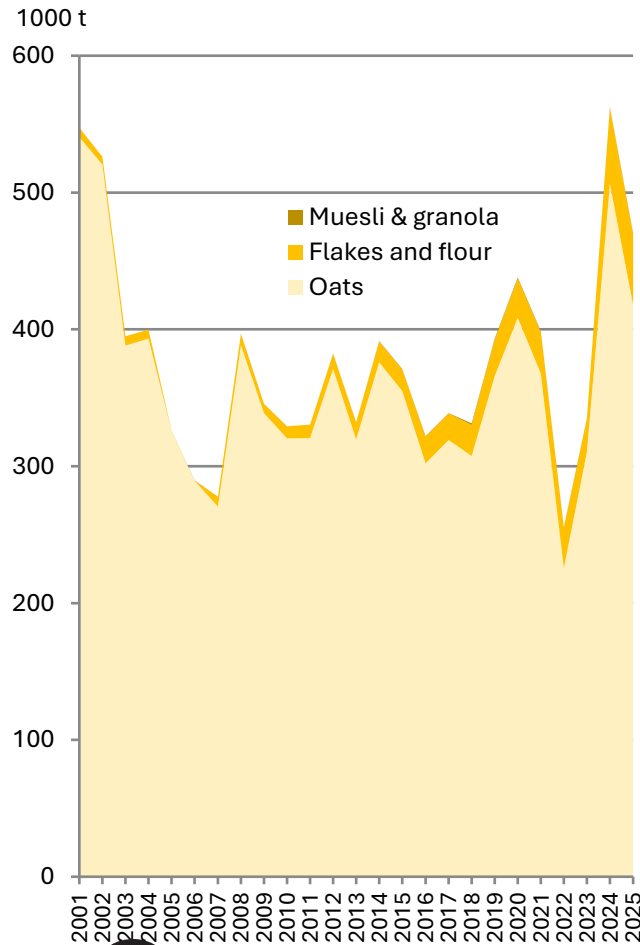
**Sweden**



**Germany**



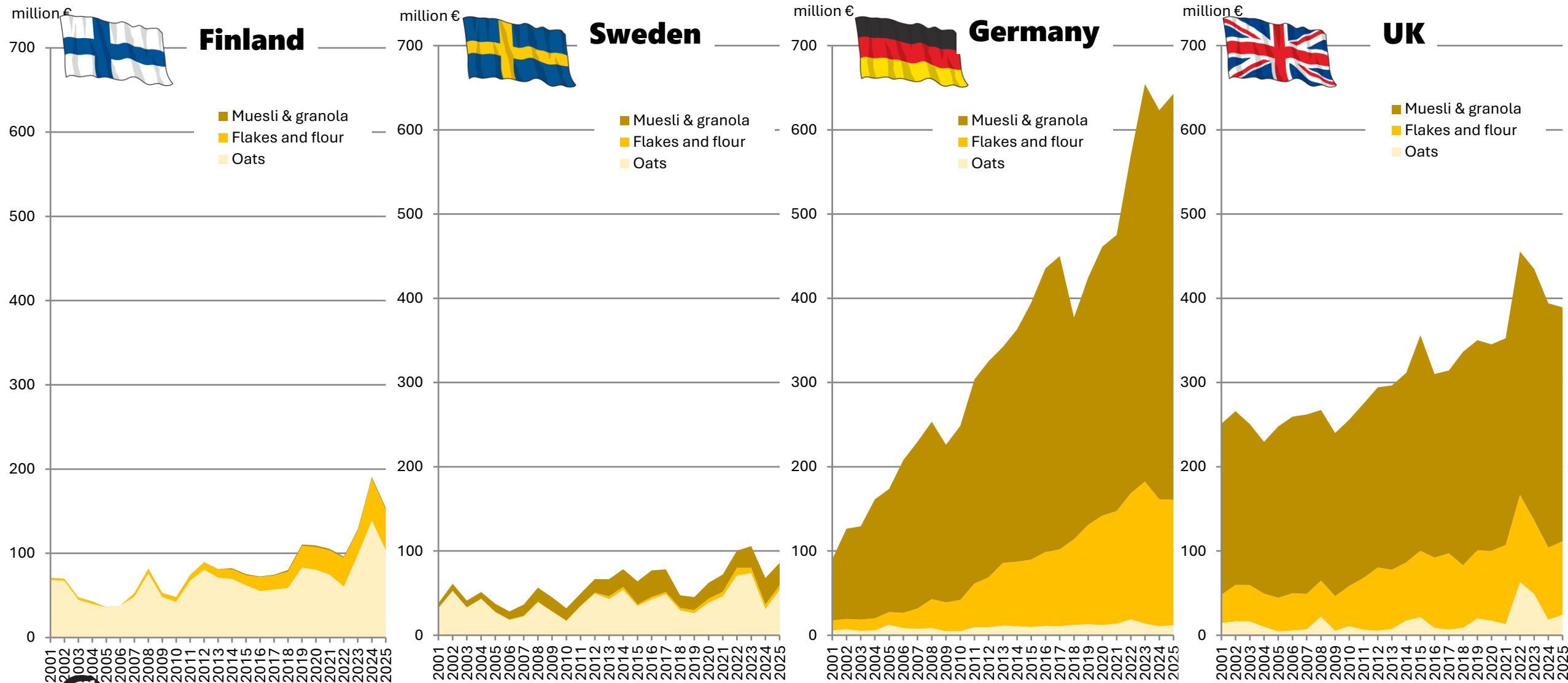
**UK**



Source: Csaba Jansik/Luke. Own calculations based on Eurostat Comext dataset. Note: 2025 figures are preliminary. Source for UK of years 2021-2025 is International Trade Center.

# Why is value-added important in food export?

The export value of oats, milled oat products and muesli & granola, 2001-2025



Source: Csaba Jansik/Luke. Own calculations based on Eurostat Comext dataset. Note: 2025 figures are preliminary. Source for UK of years 2021-2025 is International Trade Center.

# Oat supply chain

## Ingredients

**Flakes and flour**



**Fractionating**



Second stage processing

## Consumer products

**Oat drinks**



**Oatgurts**



**Plant-based cheese**



**Sport concentrates**



**Porridge**



**Muesli & granola**



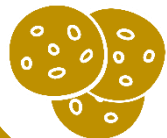
**Cereal bars**



**Side dishes**



**Biscuits**



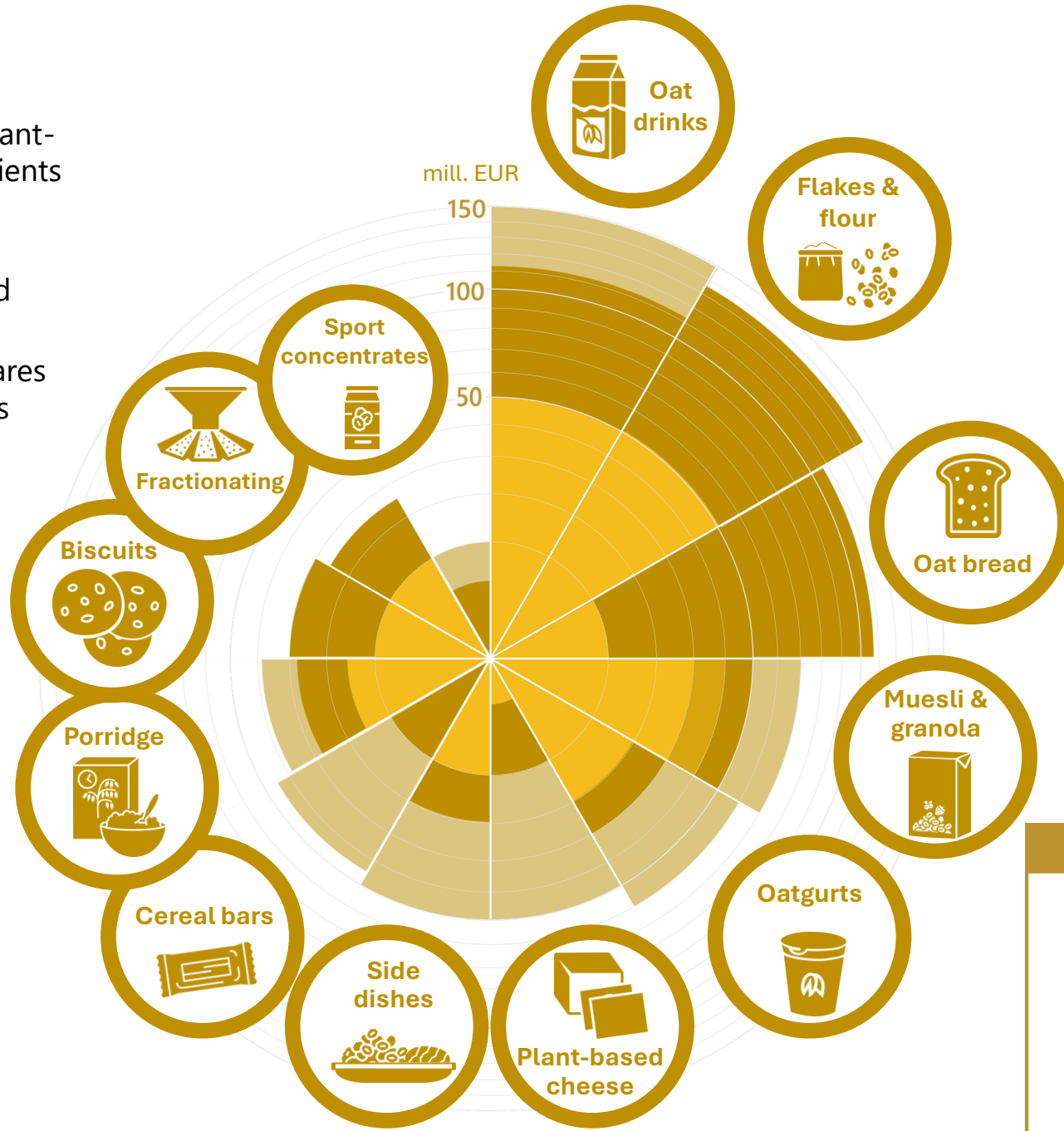
**Oat bread**



# Oat supply chain



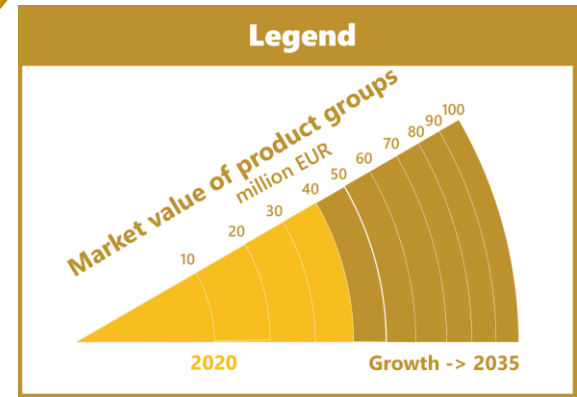
- Oat drinks are being challenged by plant-based drinks made from other ingredients and their growing imports
- Part of the capacity transferred abroad
- Oatgurts have been losing market shares to imported and domestic alternatives made from other raw materials.
- Imported products continue to dominate the muesli segment
- Some of the domestic brands are already manufactured abroad.
- Granolas come almost entirely from abroad
- Exports of muesli and cereal bars have grown moderately



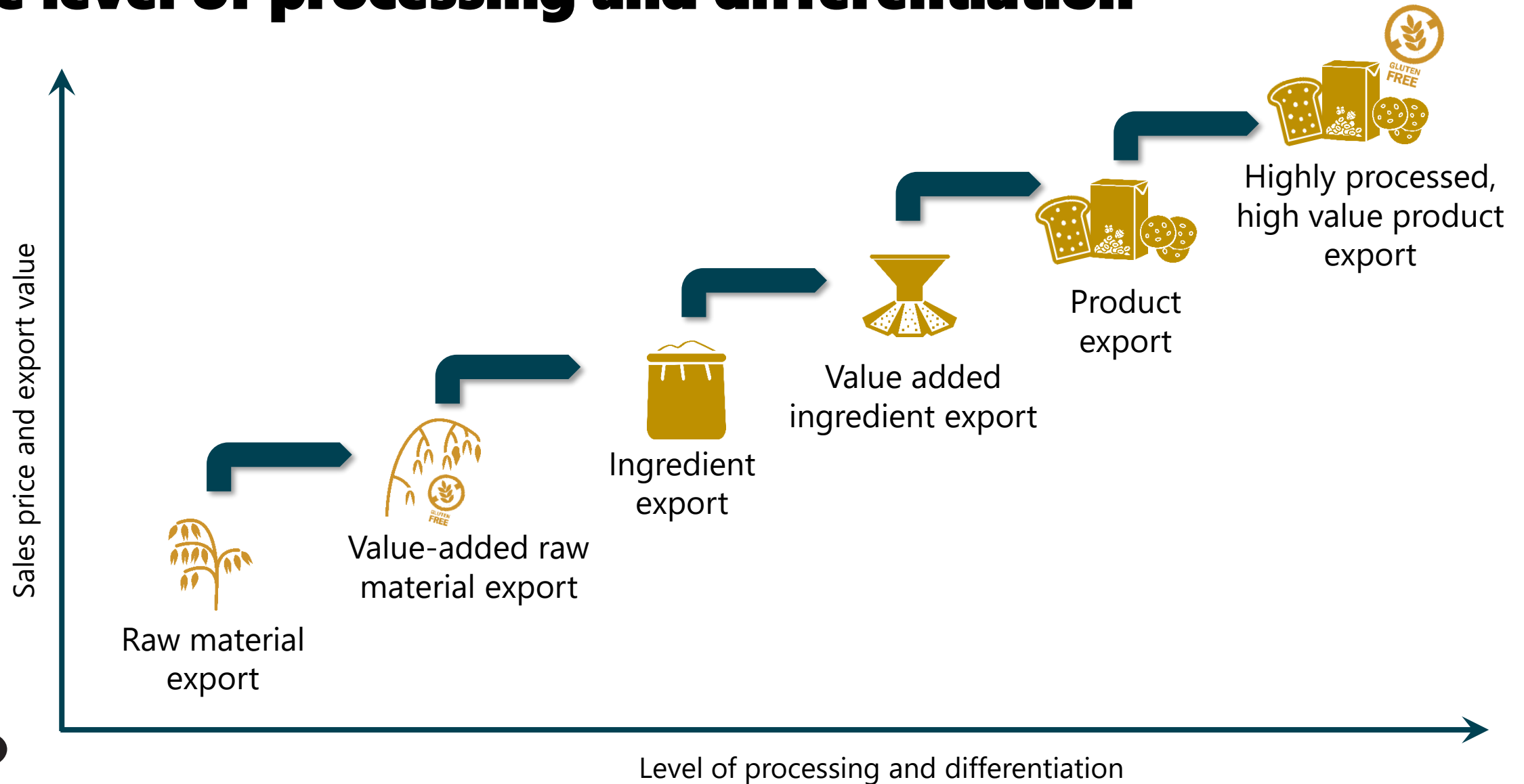
**HOPE**

↓

**BASELINE**



# Sales price and export value increase hand in hand with the level of processing and differentiation



**The availability of  
agricultural land does not  
endanger food security or  
limit growth.**

# Thank you!

[anu.kaukovirta@luke.fi](mailto:anu.kaukovirta@luke.fi)

[csaba.jansik@luke.fi](mailto:csaba.jansik@luke.fi)



luke.fi

# HIGHLIGHTS OF THE SECOND YEAR OF FOOD 2.0



VEERA VIRTANEN  
Ecosystem lead, Valio  
[veera.virtanen@valio.fi](mailto:veera.virtanen@valio.fi)

RIITTA PARTANEN  
Head of research, Valio  
[riitta.partanen@valio.fi](mailto:riitta.partanen@valio.fi)

FOOD2.0





# FOOD 2.0 ECOSYSTEM – MARCH 2026

212 MEMBERS

## AND LINKS TO THE OTHER VETURI COMPANIES

### ENERGY AND TRANSPORT

KEMPOWER HETE  
Patria eALLIANCE  
Kuljetusteike Järvimäki Oy  
Suomen Lantakaasu  
XYLO GAS  
CarbonReUse  
WÄRTSILÄ ZERO EMISSION MARINE 2030  
nokia TYRES  
NESTE  
Novel sustainable & scalable solutions for transportation and chemicals

### FOOD AND FEED, PROCESS TECHNOLOGY

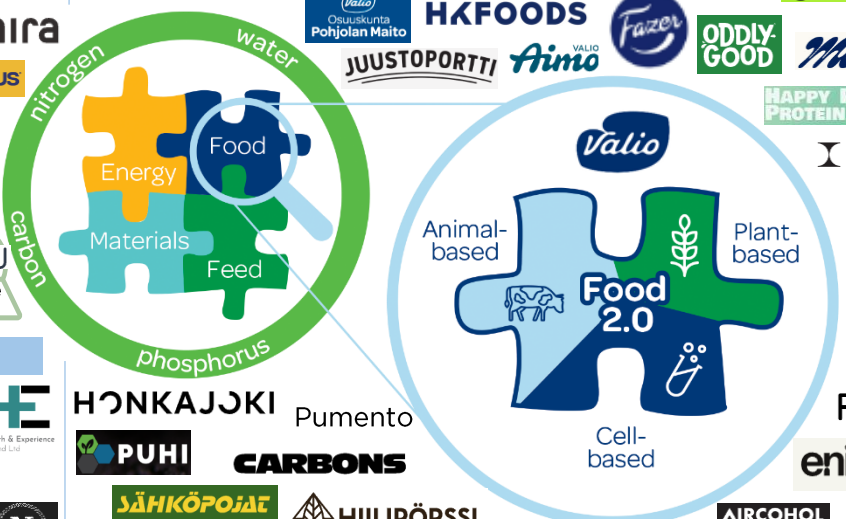
BERNER  
YARA MAANVAALIIJA  
BOR  
BIO KASVU  
Luonnosta  
Kinnarin Tila  
ROSTEN  
Porotalon  
mäsi  
Kekkilä BVB  
KIERTORAVINNE  
Vöner  
DAVA Foods  
Banne  
HEINO  
ARCTIC EYVIA  
FILTSON  
faba  
linseed  
Lantmännen  
Sinebruchhoff  
SENSEON  
EKO3  
DTS  
VIKING GENETICS  
JEPRO  
Apetit  
Vihreä Keiju  
SuperGround  
Atria  
RAISIO  
GOVA  
Halal FoodTech  
Locusia  
NPHARVEST  
Osuuskaunta Pohjolan Maito  
HKFOODS  
Fazer  
ODDLY GOOD  
MB  
FERM FOODS  
THREE  
JUUSTOPORTTI  
Aimo  
HAPPY PLANT PROTEIN CO.  
FrostDry  
ORIGIN OCEAN

### DIGITAL, DATA, AI

YIELD SYSTEMS  
Semantum  
SIEMENS  
AIR  
codev  
ORION  
digia  
MONAD  
IBM  
CENSE ANALYTICS  
POLAR  
GOFOR  
emblica  
DIGITALIX  
BARN  
Bittium  
Biomensio  
SECOND  
brilliant  
avoin  
THOUGHT  
Amazon  
GS1  
NaturAI  
Data Space Europe  
datasense  
AKVAMARIINI  
LIITOS SOLUTIONS  
UPPILOG  
VIHERLINKKI  
Optimized greenhouse growth

### MATERIALS AND CHEMICALS

WOODGROW  
KAPASITY  
kemira  
Valmet  
Beyond Circularity  
MEYER TURKU  
NEOLEAP  
NORDIC BIOPRODUCTS GROUP  
GRANULOUS  
AB Enzymes  
BOREALIS  
MIRKA  
CANATU  
CarbonAge



### CONSULTANCY

ULTRA LEAN BUSINESS  
medfiles  
INVENIRE  
AFRY  
SWECO  
BIOSAFE  
Deloitte  
gaia  
RAVISTAMO  
toDD  
ideascout  
KPMG  
Ihan parasta!  
viexpo  
VISINTUM  
OPEN CO.NET  
DataBites  
Young Finnish Design®  
ELAP  
CLANED  
blic

HONKAJOKI  
Pumento  
PUHI  
CARBONS  
SÄHKÖPOJAT  
HIILIPÖRSSI  
ALUKE  
AISTILA  
innolact  
BioName  
afekta  
eurofins  
KeinoX  
inmec  
NANO  
Volare  
Planet Amino  
LYOGIX  
Bennerg  
POCSOLA  
Powdea  
VAISALA  
ORFER GROUP  
TM SYSTEMS  
AQUAMONI  
3D STEP  
Probitat  
METABAR  
enifer  
GEA  
LIQUM  
AIRCOHOL  
ALIMEFRICS  
LAPELA  
SUUVILUMI  
FIELD LINE AUTOMATION

### RESEARCH AND EDUCATION

UNIVERSITY OF EASTERN FINLAND  
LUKE  
VTT  
A  
TURUN YLIOPISTO  
OULUN YLIOPISTO  
ysao  
Vaasan yliopisto  
ILMATIETEEN LAITOS  
LUT University  
JYVÄSKYLÄN YLIOPISTO  
XAMK  
Metropolia  
LAB University of Applied Sciences  
LAU REA  
NOVIA  
SYKLI  
Haaga-Helia  
kbedu  
jankk  
University of Applied Sciences  
SeAMK  
TURKU AMK  
SAVONIA  
SOKERIJUURIKKAAN TUTKIMUSKESKUS  
Sven Hallinin tutkimussäätiö  
TF TAK  
OAMK  
PTT  
HAMK - Hämeen ammattikorkeakoulu  
RUOKAVIRASTO  
Livonaliiverit • Finnish Food Authority

### ORGANIZATIONS

BSAG  
MAA akademia  
ETT  
MTK  
ETL  
KEHITTYVÄ ELINTARVIKE  
SLC  
ProAgria

ETELÄ-POHJANMAAN LIITTO  
Regional Council of South Ostrobothnia  
DYNAMO  
Agri Food  
PIETARSAAREN SEUTU  
JAKOBSTADSREGIONEN  
into  
BUSINESS VANTAA  
ETS  
ELINTARVIKETEHTÄVIEN SUURA  
SALAOJITUKSEN TUTKIMUSYHDISTYS RY  
Pyhäjärvi-instituutti  
Satafood  
Posintra  
ROVANIEMI

BUSINESS FINLAND  
Maa- ja metsätalousministeriö  
SITRA  
JOHN HURMISEN SAATIO  
VAIKUTTAVUUS SÄATIO  
eit Food  
INNOVESTOR

# FOOD 2.0 PROGRAM IN NUMBERS – MARCH 2026

Ecosystem partners  
**212**

Participating entities in ecosystem projects  
**91**  
15 research institutes,  
76 companies/organizations

On-going Business Finland projects  
**5** co-innovation  
**5** co-research

Connections with European food ecosystems  
**7**  
Sweden, Norway, Denmark, Estonia,  
Netherlands, France, Switzerland

Total volume of ecosystem projects  
**54 M€**

On-going MMM funded projects  
**2** Makera projects  
**9** R&D projects

Ecosystem events live or webinars  
**11**

International funding  
**2 M€**

On-going other R&D projects  
**1** EU project  
**1** RCF project  
**2** FRIF projects

Tot. Number of projects: 25

# ROADMAP

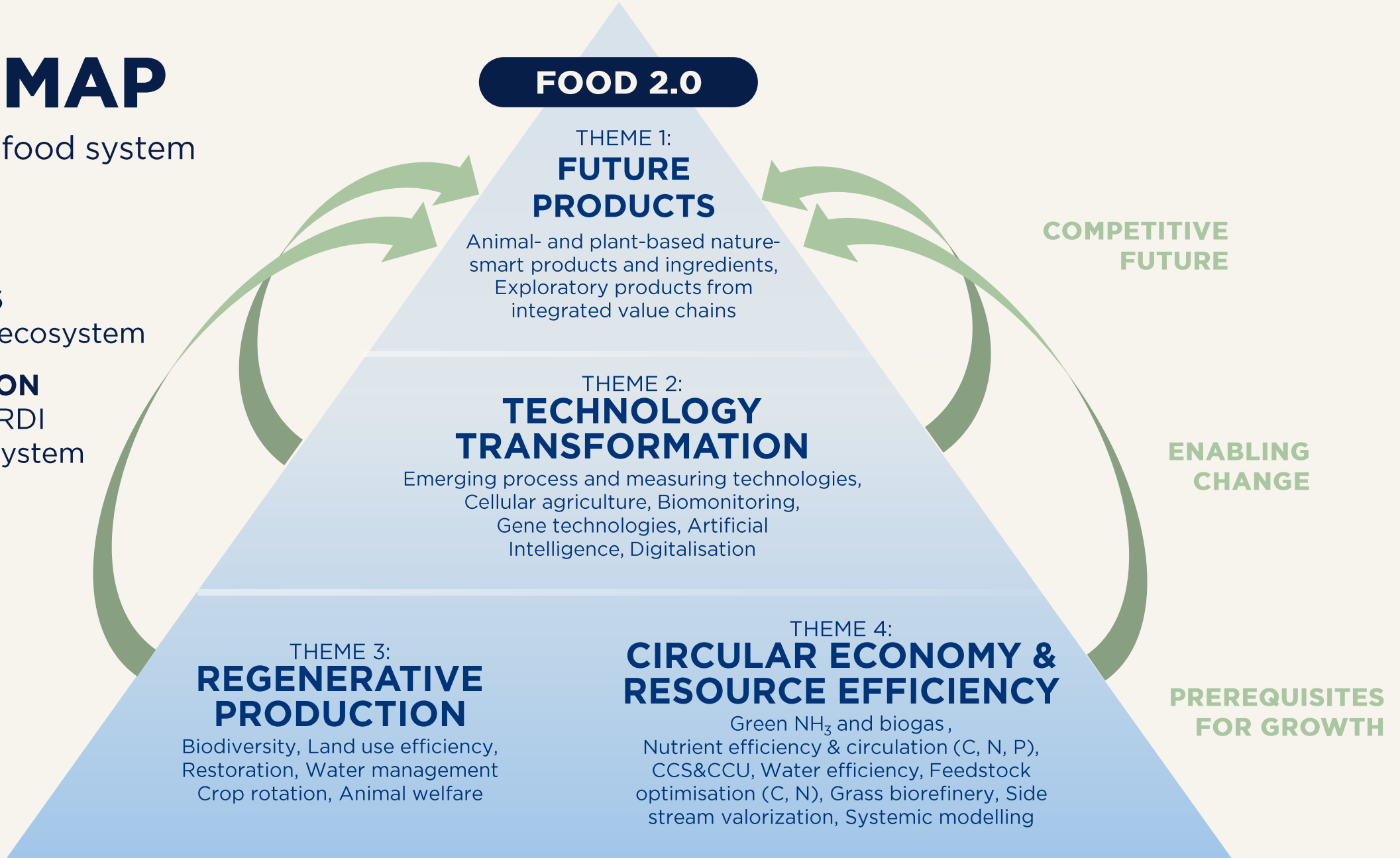
Nature-smart food system

## TARGETS:

**100 PARTNERS**  
involved in the ecosystem

**EUR 100 MILLION**  
investments in RDI  
across the ecosystem

**EUR 1 BILLION  
GROWTH**  
in food exports  
by 2032



# FOOD2.0



Nature-smart food system



## THEME 1: FUTURE PRODUCTS

# 6

## Ecosystem projects

- BF Co-innovation: **FoodID** (VTT)
  - Hybrid food & cellular agriculture
- BF Co-research: **FABuIOATS** (LUKE)
  - Production of uniform and high-quality oats and faba beans
- BF Co-innovation: **MetaFerm** (UTU)
  - Plant based-material fermentation and metabolomics

# 23

## Partners in the projects

FRIF: (UTU)

- Milk Membrane Lipids** for Enhancing Elderly Nutrition

MMM Makera: **FINNUTRI** (LUKE)

- Domestic food production and dietary needs

MMM Makera: **PROTETURVA** (Finnish Food Authority)

- Safety of plant-based meat analogues



Mikko



## Second year highlights

# FOOD2.0 | Valio

Nature-smart food system



## THEME 2: TECHNOLOGY TRANSFORMATION

# 2

## Ecosystem projects

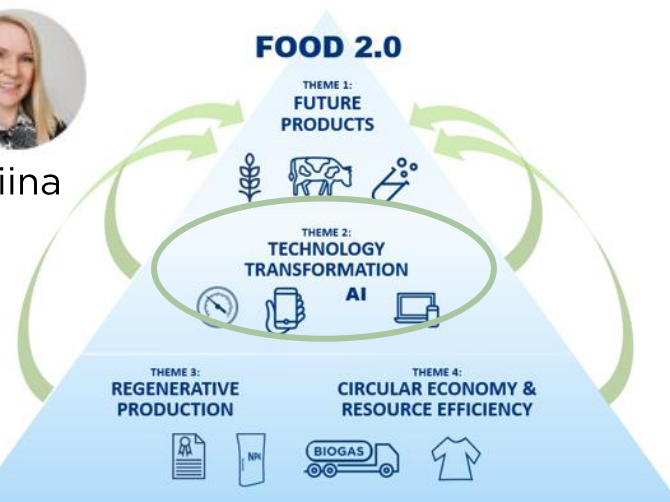
- RCF: [AI in food R&D](#) (VTT)
- Linked to FoodID: Hybrid food & cellular agriculture
- FRIF: (LUKE)
- [Methane mitigation](#) by animal breeding

# 10

## Partners in the projects



Niina



## Second year highlights

# FOOD 2.0



Nature-smart food system



THEME 3:

## REGENERATIVE PRODUCTION

# 9

## Ecosystem projects

- BF Co-innovation: **AWVS** (LUKE)
- Animal welfare verification system
- BF Co-innovation: **AGCLIMATE** (FMI)
- Field plot-based climate impacts
- BF Co-research: **CARBON+** (UH)
- Agricultural aerosols
- MMM: **SOMA** (LUKE)
- Changing world, adaptable farm
- MMM: **MARHA** (PTT)
- Agricultural policy, market and financial risks and means to manage them

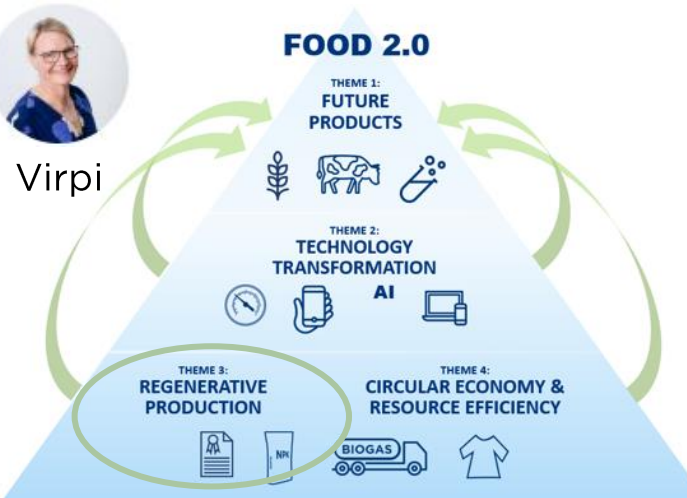
# 27

## Partners in the projects

- MMM: **Vesilienssi** (LUKE)
- Water management as a resilience solution for garden production
- MMM: **GENOVA** (LUKE)
- Genome-based solutions for variety breeding
- MMM: **Multipurpose Grazing** (UH)
- Effects of dry cow grazing on animal welfare and biodiversity
- MMM: **UUSTILA** (Syke)
- Farm level transition to regenerative farming



Virpi



## Second year highlights

# FOOD2.0



Nature-smart food system



THEME 4:

## CIRCULAR ECONOMY & RESOURCE EFFICIENCY

# 8

## Ecosystem projects

- BF Co-innovation: **Bio2Max** (LUKE)
  - Advanced biogas plant
- BF Co-research: **AlgaCircle** (UTU)
  - Microalgae & circular economy
- BF Co-research: **Meri-News** (VTT)
  - Conversion of NOx emissions to nitrogen fertilizers
- BF Co-research: **HELO** (VTT)
  - Hydrogen economy: green urea and ammonia fertilizers, e-SAF, e-CH4

# 55

## Partners in the projects

- MMM: **FoVi** (TAU)
  - Phosphorus smart farming
- MMM: **SCiLF** (LUKE)
  - Smart circular economy on livestock farms
- MMM: **NutrientEffect** (Syke)
  - Effects of nutrient cycle at regional, value chain and farm level
- EU: **PRIMARY** (VTT)
  - New business from agricultural sidestreams



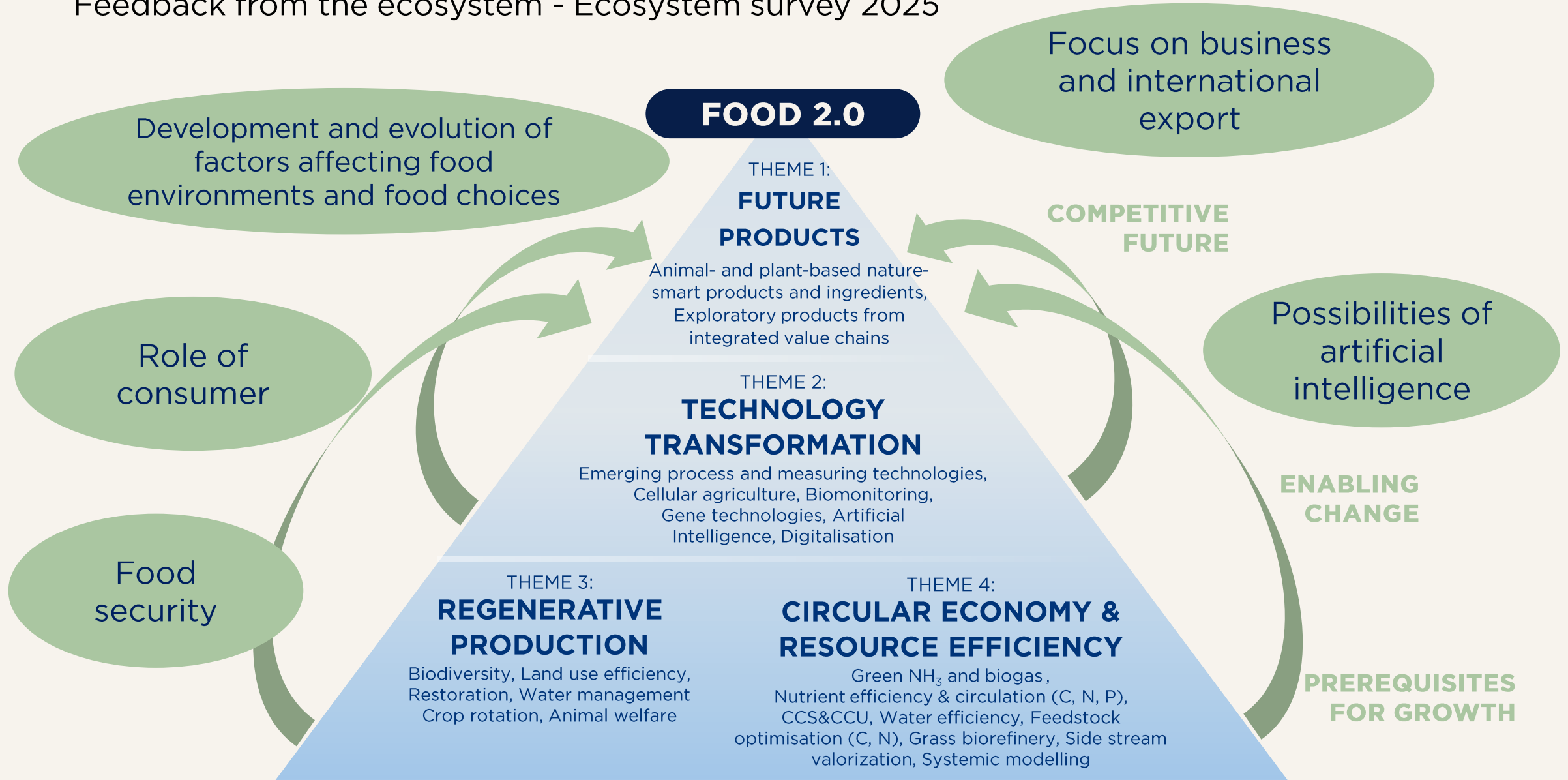
Ehsan



## Second year highlights

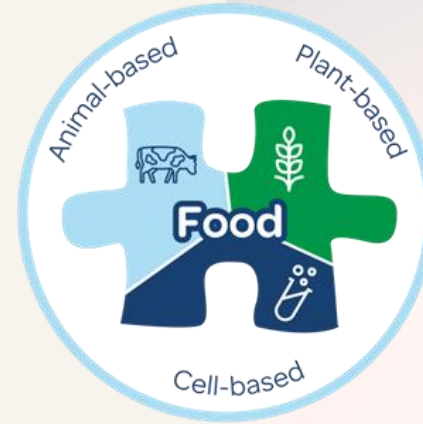
# ROADMAP UP-DATE IS UNDERWAY

Feedback from the ecosystem - Ecosystem survey 2025



# SUPPORT FOR EXPORT ACTIVITIES - CONTACT PERSONS

- ✦ Ruokatieto
  - Jyrki Karlsson, [jyrki.karlsson@ruokatieto.fi](mailto:jyrki.karlsson@ruokatieto.fi)
- ✦ SUVI ry
  - Jarmo Talasrinne, [jarmo.talasrinne@su-vi.fi](mailto:jarmo.talasrinne@su-vi.fi)
- ✦ Foreign ministry, Global food and food tech. Team
  - Lili Lehtovuori, [lili.lehtovuori@gov.fi](mailto:lili.lehtovuori@gov.fi)
- ✦ Business Finland
  - Eeva Salminen, [eeva.salminen@businessfinland.fi](mailto:eeva.salminen@businessfinland.fi)
- ✦ Ruokavirasto / Finnish food authority
  - [vienti@ruokavirasto.fi](mailto:vienti@ruokavirasto.fi)



# UP-COMING LIVE EVENTS – SAVE THE DATE



## Elintarvikepäivä



Tuesday, 5.5.2026



Finlandia hall



## Luonnon monimuotoisuustapahtuma



Wednesday, 27.5.2026



University of Helsinki, Viikki campus



## The 2<sup>nd</sup> Finnish Food RDI Forum

Wednesday, 28.10.2026



Visitor and Innovation Centre Joki, Kupittaa, Turku

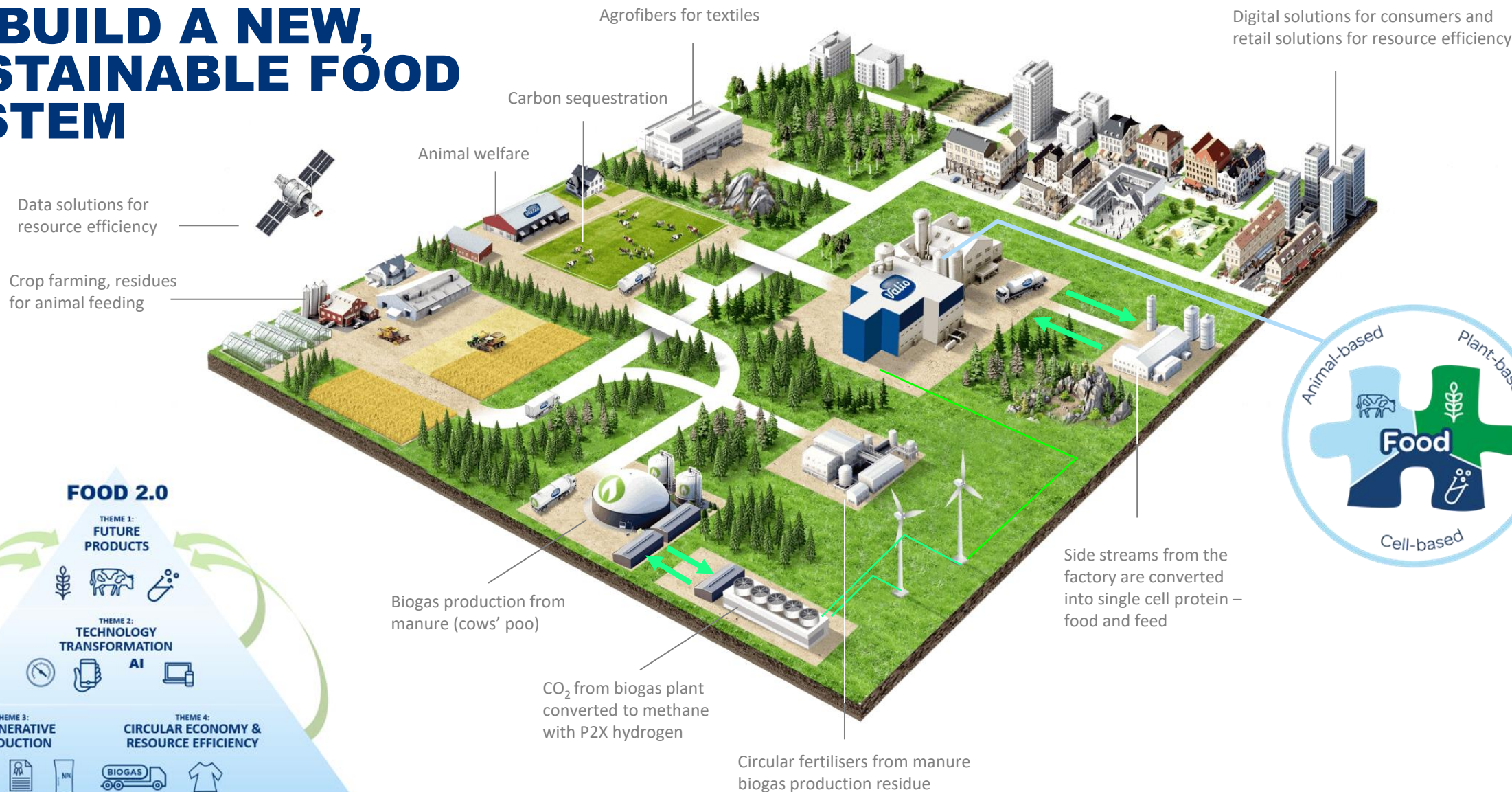
Organizing:



Supported by:



# WORKING TOGETHER TO BUILD A NEW, SUSTAINABLE FOOD SYSTEM



# LEADING COMPANY ECOSYSTEM COLLABORATION: HARNESSING AI AND PARTNERSHIPS TO DRIVE FOOD INDUSTRY SUCCESS



VILJA HANNULA  
Senior Project Manager  
AMD Silo AI

FOOD2.0





# Compute to Impact: Finland as a World-Leading AI Hub

AMD Silo AI  
Vilja Hannula

Mission

# Making Finland the world- leading AI hub



Building an ecosystem where the next generation AI solutions are developed and commercialized through open collaboration between computing infrastructure, industry partners and research institutions.

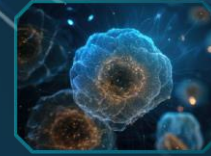
# COMPUTE TO IMPACT

Making Finland The World-Leading

**AMD**  
together we advance\_

## AI Hub

- ✓ DEMANDING COMPUTE
- ✓ HIGH COMPLEXITY
- ✓ OPEN SOURCE



Life Sciences



Robotics & Autonomous Systems



Scientific AI, HPC & Quantum



Visual Media and Gaming

### WORKSTREAM 1: FROM COMPUTE TO APPS

Developing step-changing tools that unlock tangible breakthroughs in our strategic verticals.

### WORKSTREAM 2: AGENTIC & FOUNDATIONAL AI

Breaking the limitations by rethinking how AI is built, trained and used in the future.

### WORKSTREAM 3: EFFICIENT AI

Ensuring radically more scalable, sustainable and affordable compute globally.



Stay in the loop

## JOIN ECOSYSTEM

Sign up for future events,  
communication, thematic  
deep dives and  
matchmaking.



# Compute to Impact: Finland as a World-Leading AI Hub

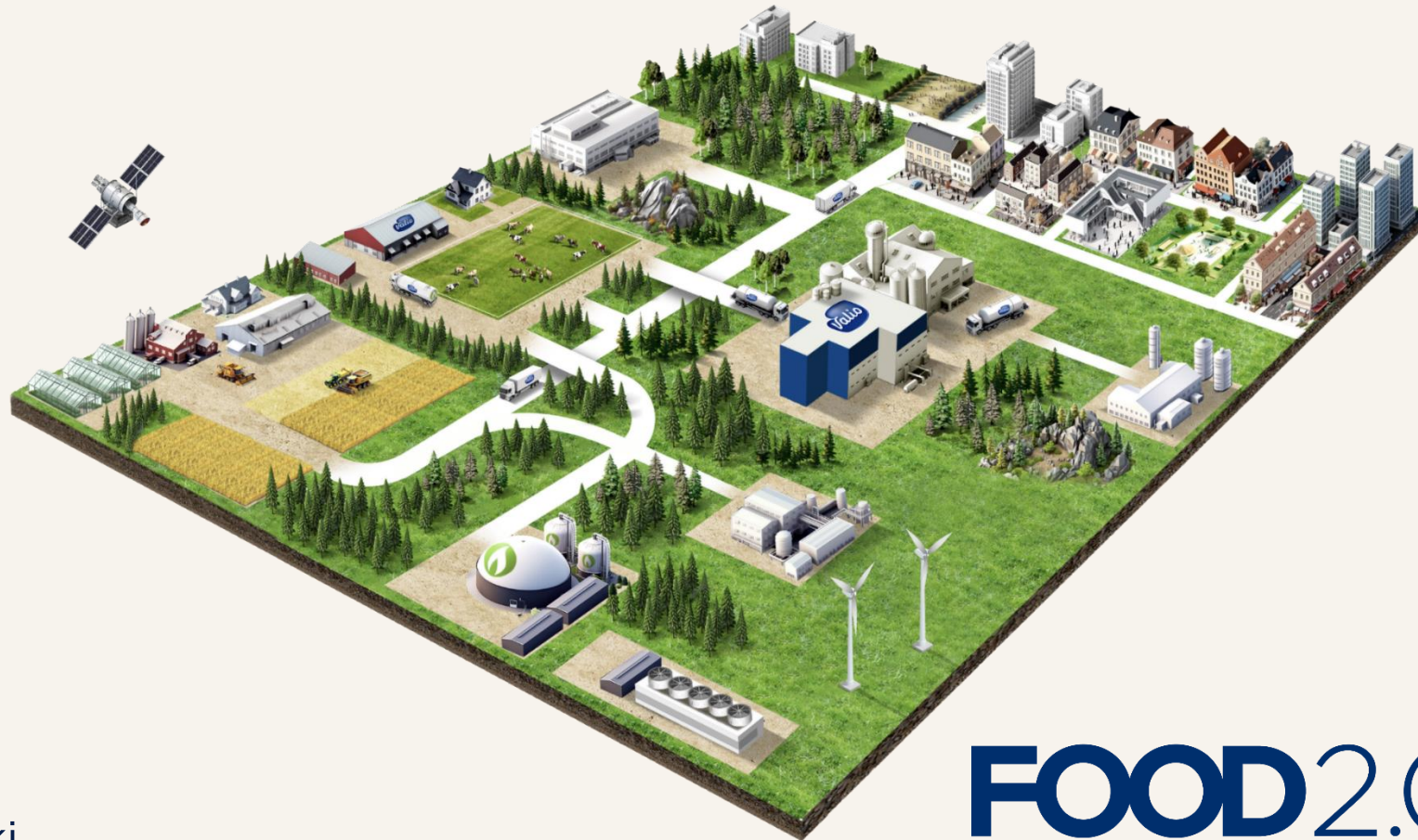
AMD Silo AI  
Vilja Hannula  
Senior Program Manager



# Compute to Impact: Finland as a World-Leading AI Hub

AMD Silo AI  
Vilja Hannula

# OUTLOOK FOR FUTURE - NATIONAL PhD WORK PITCHING SESSION



Chair  
MARI SANDELL  
Dean  
University of Helsinki

**FOOD2.0**





# OUTLOOK FOR FUTURE –

National PhD work pitching session

- Towards reliable soil carbon balance estimates in agriculture
  - **Johanna Vielmaa, Valio**
- Self-supervised training for multispectral remote sensing imagery
  - **Leon-Friedrich Thomas, UH**
- Impact of food processing on plant-based protein-rich foods
  - **Jasmin Raita, UTU**
- Fibre-rich protein sources for gut-friendly plant-based foods: a nutritional investigation on food fermentation
  - **Finlay Sim, UH**
- Whole grain cereals, tryptophan metabolism, and the gut-brain axis
  - **Vilma Liikonen, UEF**
- Technologies enabling personalized food production and enhanced eating experiences
  - **Alex Calton, VTT**
- Making biodiversity impacts visible: effects of LCA-derived footprint labels on students' meal selection
  - **Aino Tarkkio, UTU**

# TOWARDS RELIABLE SOIL CARBON BALANCE ESTIMATES IN AGRICULTURE

Boosted by  
**BUSINESS  
FINLAND**

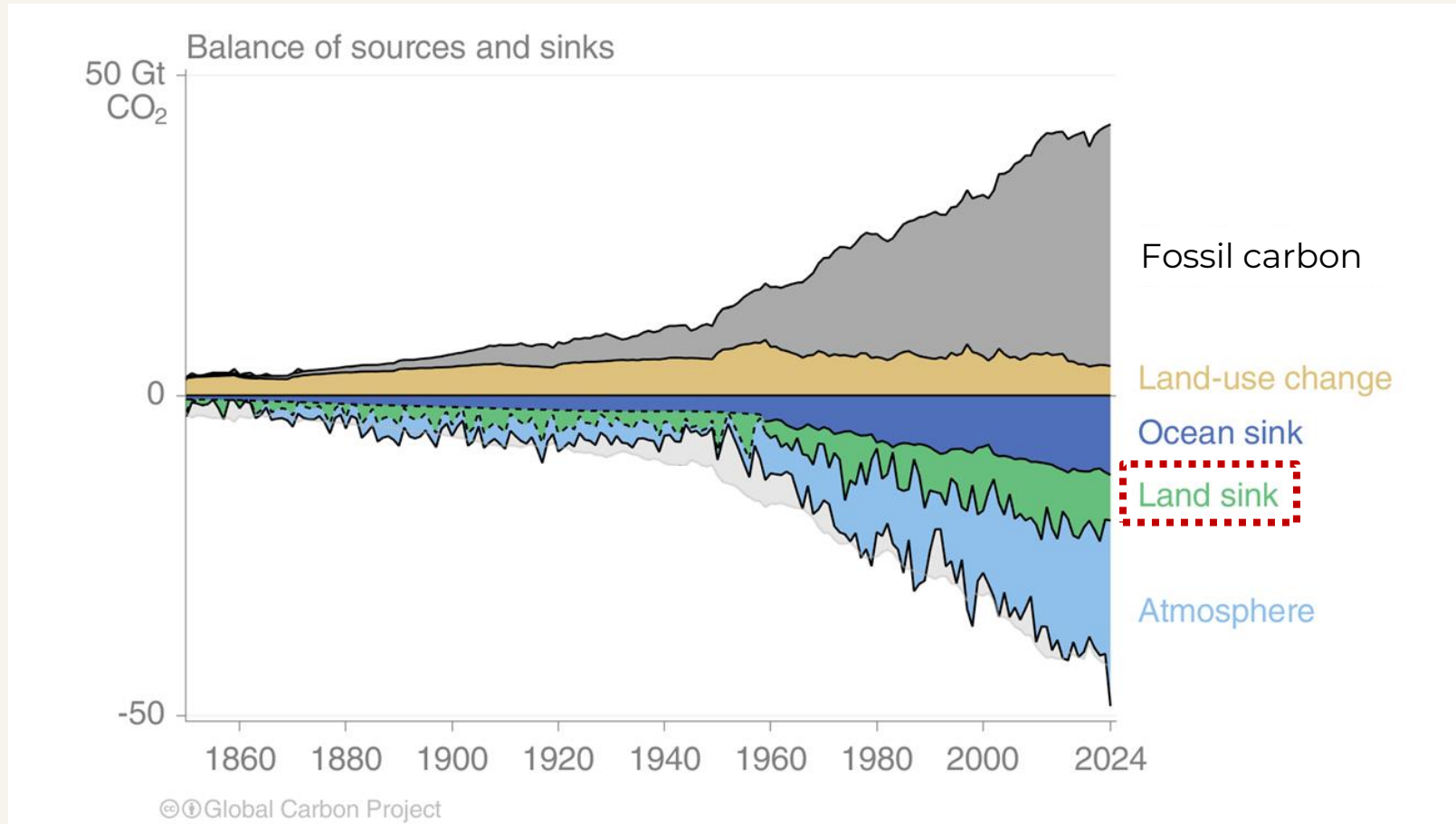
*Johanna Vielmaa*

*Food 2.0 Seminar 19.3.2026*



**ILMATIETEEN LAITOS**

# SOIL CARBON PLAYS A CRUCIAL ROLE IN CLIMATE CHANGE MITIGATION



## Carbon stocks: (gigatons of carbon)

Atmospheric CO<sub>2</sub>

885 GtC

Vegetation

450 GtC

Soils

1700 GtC

Permafrost

1400 GtC

# SATELLITE-BASED PLANT PRODUCTIVITY MODEL ENABLES RELIABLE SOIL CARBON INPUT MONITORING IN FIELD-SCALE

- ✦ Satellite-based estimates are validated against field measurements



# FROM RELIABLE DATA

→ to sustainable agriculture



→ and reduced carbon footprints and GHG emissions



GREENHOUSE GAS EMISSIONS IN FINLAND  
1990 to 2023

National Inventory Document  
under the UNFCCC and Paris Agreement

Boosted by  
**BUSINESS  
FINLAND**

# TOWARDS RELIABLE SOIL CARBON BALANCE ESTIMATES IN AGRICULTURE



*Johanna Vielmaa*

*Supervisors: Juha Nousiainen (Valio), Mari Pihlatie (HY), Jari Liski (FMI)*

*Organization: Valio Ltd; University of Helsinki, Faculty of Agriculture and Forestry*

*Funding: Business Finland, Valio Ltd*

*2025-2028*

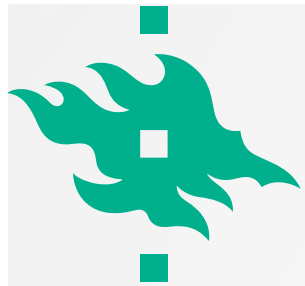


**ILMATIETEEN LAITOS**



# SELF-SUPERVISED TRAINING FOR MULTISPECTRAL REMOTE SENSING IMAGERY

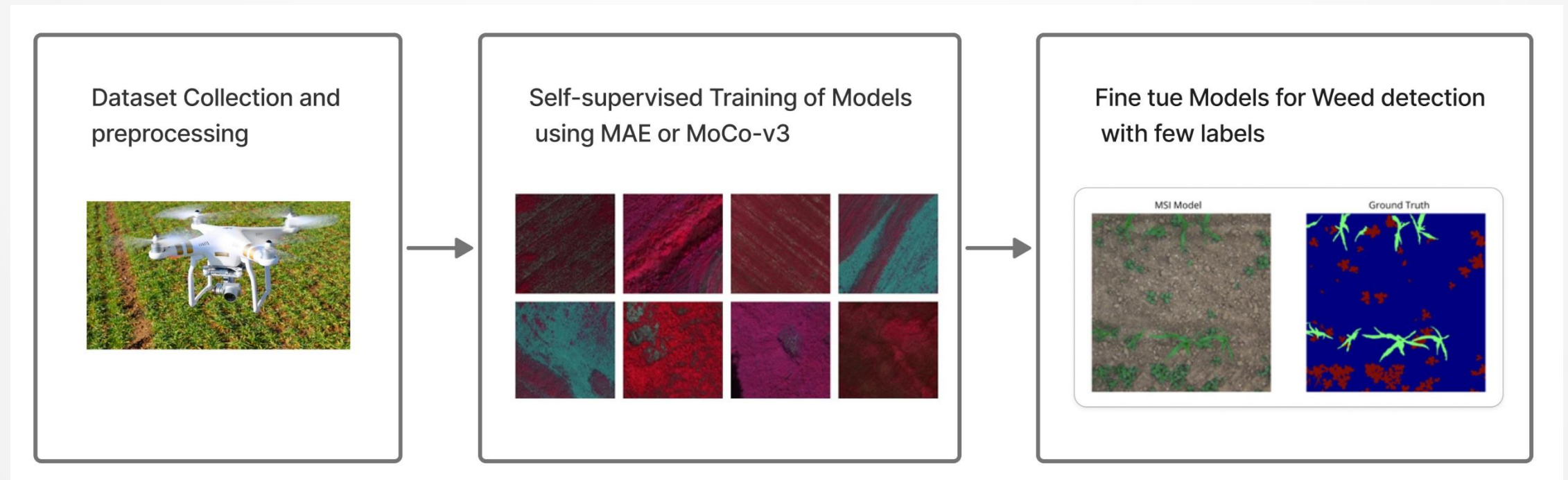
By Leon-Friedrich Thomas

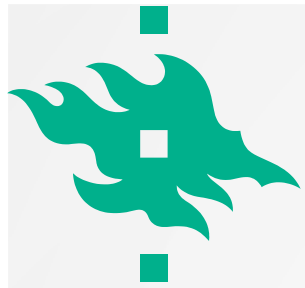


# GOAL & APPROACH

- Main Goal:

Develop robust weed detection models with minimal labeled data





# CONTRIBUTION & BENEFITS

- **Scientific Contribution**  
Advancement of computer vision models for plant detection in UAV imagery.
- **Industry Application**  
Enables development of precision weeding robotics and selective spraying UAV systems.
- **Societal Benefit**  
Reduces herbicide and pesticide use through site-specific weed treatment within crop fields.





# CONTACT & DETAILS

- Title: Self-supervised training for multispectral remote sensing imagery
- Name: Leon-Friedrich Thomas
- E-mail: [leon-friedrich.thomas@helsinki.fi](mailto:leon-friedrich.thomas@helsinki.fi)
- Organisation: University of Helsinki, Faculty of Agriculture and Forestry, Department of Agricultural Sciences
- Supervisor: Associate Professor Antti Lajunen
- PhD schedule: 2021-2026
- Funding: Maatalouskoneiden tutkimussäätiö (Agricultural Machinery Research Foundation)

# Impact of food processing on plant-based protein-rich foods

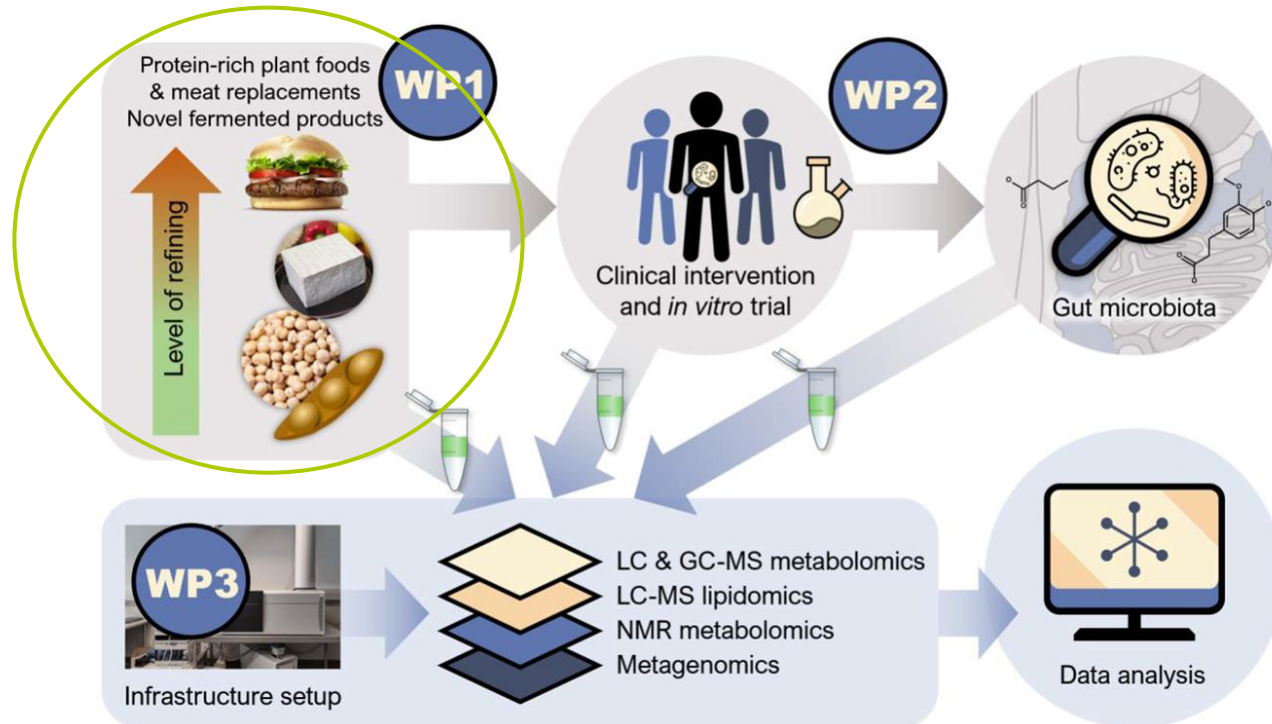
Valio Food 2.0 – Annual seminar 2026

Jasmin Raita



# Main goal of the research

- Part of a larger research entity focusing on plant-based protein-rich foods
- Biochemical composition of commercial plant-based foods
- Impact of fermentation on lupin-based beverages
- Non-targeted LC-MS metabolomics approach



NEWPLANT

# Main findings

- Fermentation can increase the abundances of bioactive phytochemicals in plant-based protein-rich foods
- More processed foods made from refined plant-based materials had lower abundances of these bioactive compounds


## nature food

[Explore content](#) ▾ [About the journal](#) ▾ [Publish with us](#) ▾

[nature](#) > [nature food](#) > [articles](#) > article

Article | [Open access](#) | Published: 24 March 2025

### **Existing food processing classifications overlook the phytochemical composition of processed plant-based protein-rich foods**

[Jasmin Raita](#), [Hany Ahmed](#), [Kang Chen](#), [Veera Houttu](#), [Retu Haikonen](#), [Anna Kårlund](#), [Maaria Kortnesniemi](#), [Baoru Yang](#), [Ville Koistinen](#) & [Kati Hanhineva](#) 

[Nature Food](#) **6**, 503–512 (2025) | [Cite this article](#)



# Societal importance of the study

- Impact of processing on the biochemical composition of plant-based foods
  - Some processing techniques result in loss of possibly beneficial compounds
- Provide information to the discussion related to food processing classification systems and “ultra-processed” foods
- Selection of beneficial processing techniques
  - Fermentation
- Use locally grown protein-rich sources to produce sustainable plant-based foods
  - Lupin

# Impact of food processing on plant-based protein-rich foods



Jasmin Raita

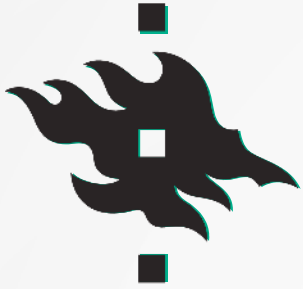


University of Turku, Faculty of Technology, Department of Life Technologies,  
Food Sciences

Supervisors: Prof. Kati Hanhineva, Dos. Ville Koistinen, Prof. Baoru Yang

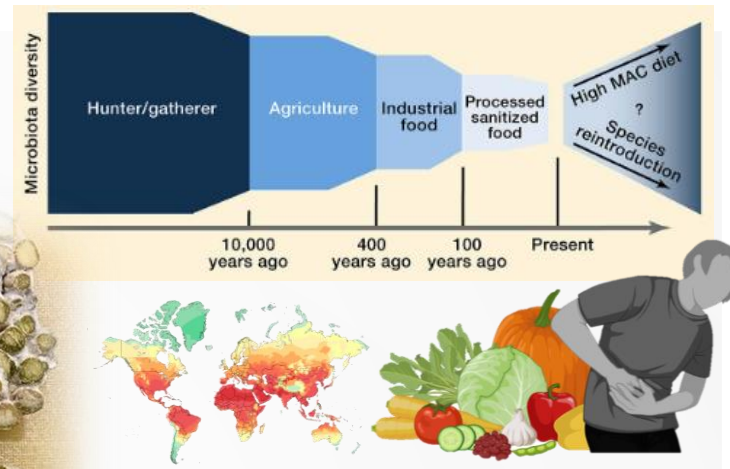
Thesis defense in June 2026





# Valio Food 2.0 PhD Pitch – Finlay Sim

## Fibre-rich protein sources for promoting gut-friendly plant-based



### Background

- Raffinose-family **oligosaccharides** (RFOs) are dietary **fibres** in legume foods that can cause **gut symptoms**.
- **Food fermentation**, such as tempeh production, can lower RFOs and enhance legume digestibility.
- Cross-utilisation of different food fermentation practices can enhance **RFO-degradation**.

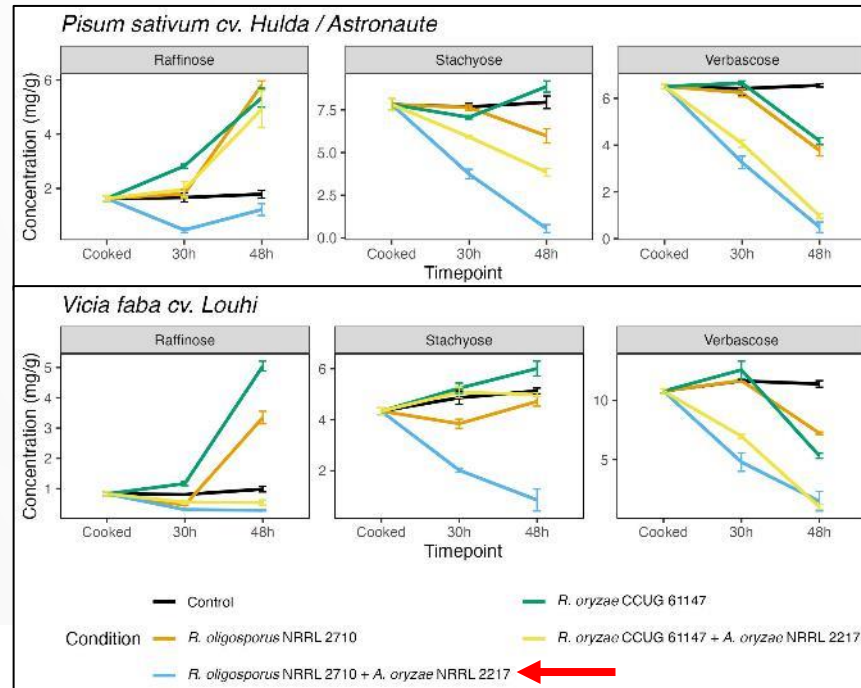
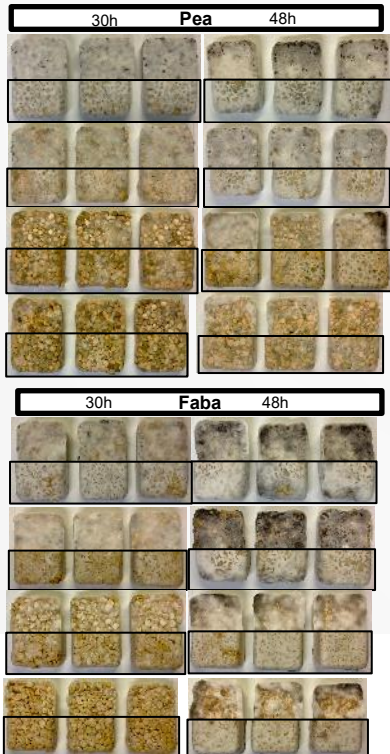
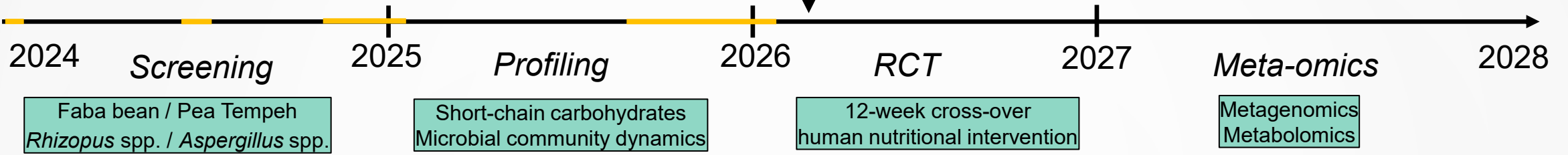
### Aims

1. Cross-utilisation of tempeh and koji fermentation practices for **enhanced degradation of anti-nutritional factors** in Finnish-grown faba bean and pea legume crops
2. Effects of Nordic-legume tempeh consumption on the molecular mechanisms behind **gut sensitivity to plant foods** through human gut microbiome and metabolome interchanges.

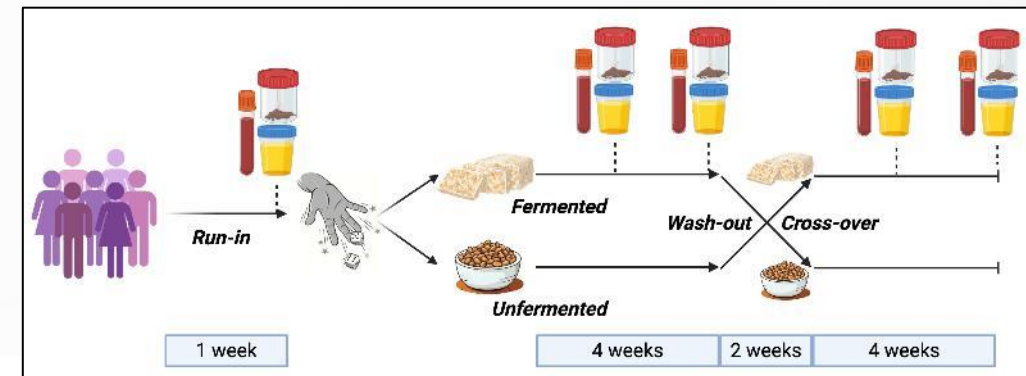


# Progress

~45% project completion



Manuscript in writing:  
 Short-chain carbohydrate profiles and microbial community dynamics of tempeh and koji-tempeh with faba bean (*Vicia faba* L.) and pea (*Pisum sativum* L.)





# Potential



## ➤ Societal impact:

- **Interdisciplinarity** along the **field-to-fork-to-faeces** axis, combining molecular nutrition, food science and microbiology
- Promotes **sustainable use** of natural resources, in particular food security & food supply for population health.
- Enhances **areas of strength** in research of resilient food systems, and health & wellbeing, in addition to emerging research themes in new foods.

## ➤ Industrial applications:

- Exhibit **food processing techniques** that can promote a **gut-friendly plant-based diet**.
- Provide Finnish food industry **new business opportunities** giving renewed value to local crop varieties





**THANK YOU!**

**Fibre-rich protein sources for promoting gut-friendly plant-based foods: a nutritional investigation on food fermentation**

Finlay Sim, Doctoral researcher

Department of Food & Nutrition

Department of Microbiology

Faculty of Agriculture & Forestry, University of Helsinki

Supervisors

Anne-Maria Pajari, Professor

Susanna Kariluoto, Docent

Antti Karkman, Docent

Timeline → 2024 – 2028

Funding →

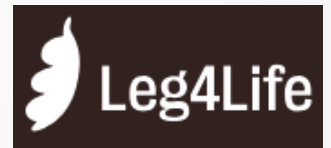


VIIKKI MOLECULAR NUTRITION GROUP

Finnish Food and Drink Industries' Federation



**UNIVERSITY OF HELSINKI**



**FACULTY OF AGRICULTURE AND FORESTRY**



**Vilma Liikonen**

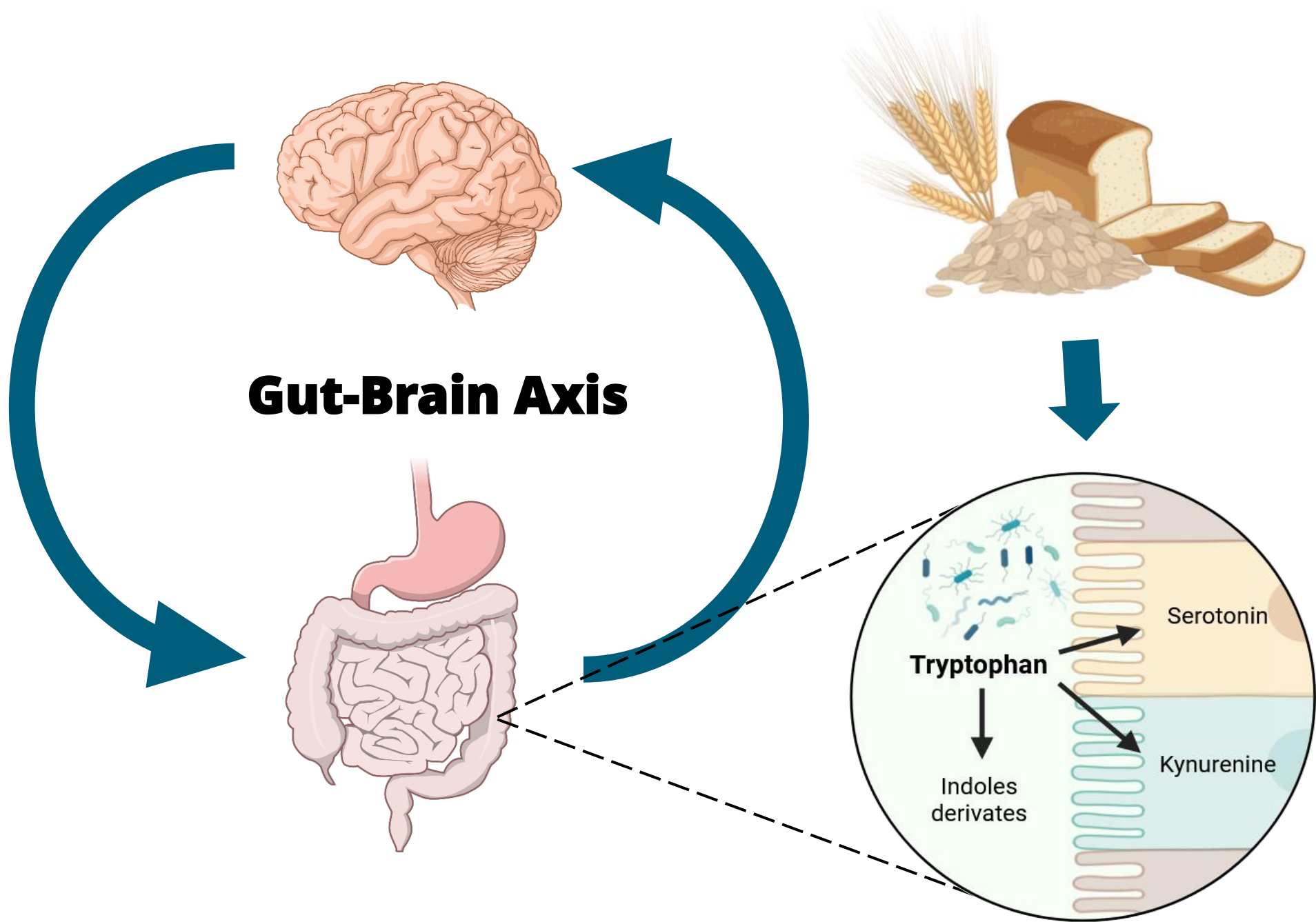
# **Whole grain cereals, tryptophan metabolism, and the gut-brain axis**

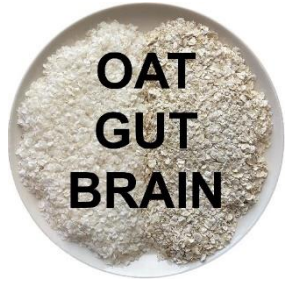
**2023-2027**

University of Eastern Finland, Institute of Public Health and Clinical Nutrition

Supervisors: **Prof. Marjukka Kolehmainen, Dr. Carlos Gómez-Gallego, Dr. Anu Ruusunen**

Main funder: the European Union under the Horizon Europe grant agreement (No. 101060247)





Oat

**Bioprocessing**

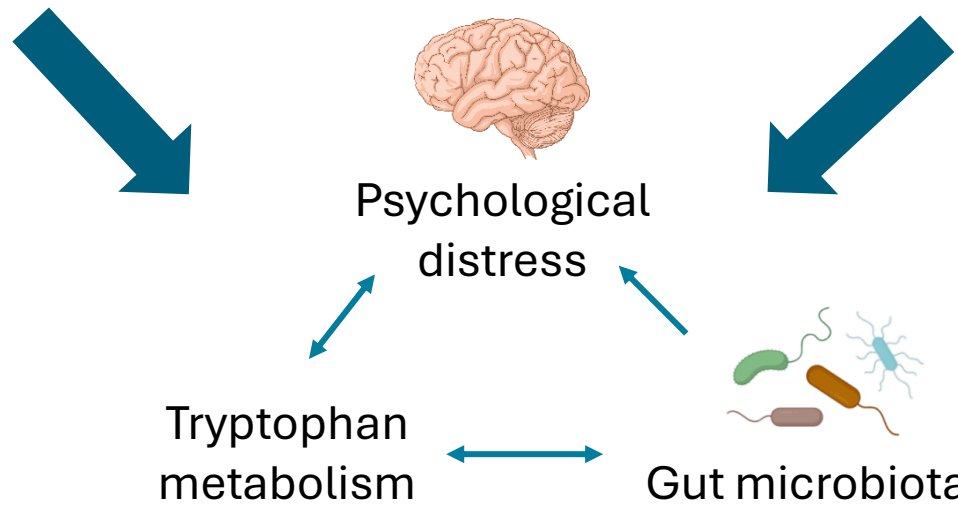


Novel fermented oat-based "gurt"



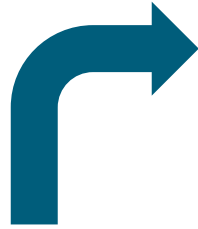
**Characterisation of the products**

- Protein-fibre complex
- Cell structures
- Fibre profile
- ...





n = 56  
with mild  
metabolic  
deterioration

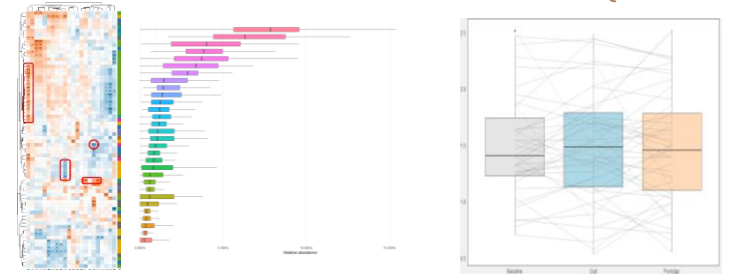
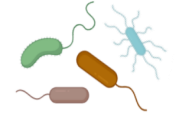


### First results

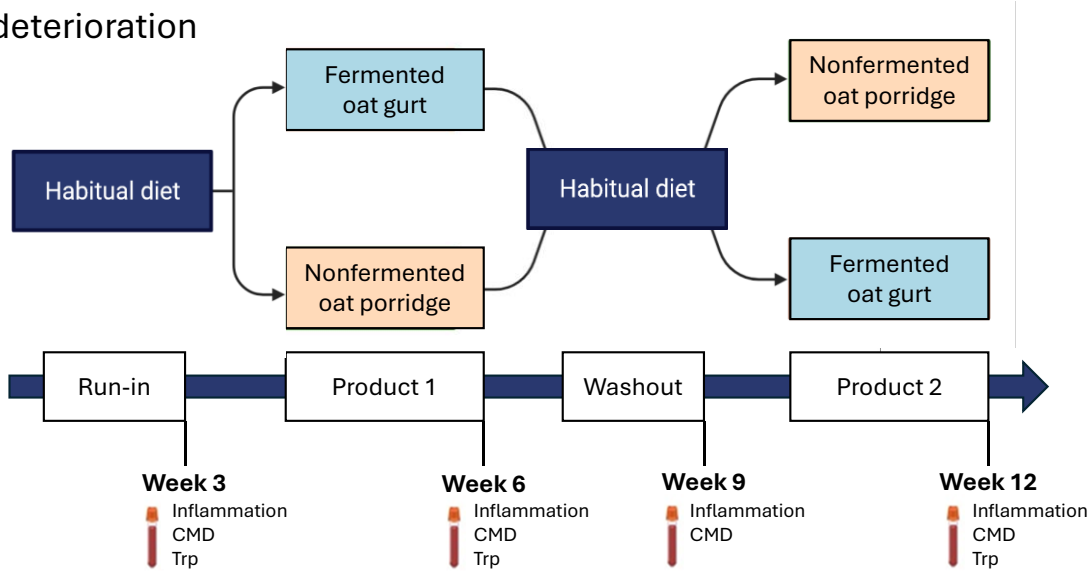
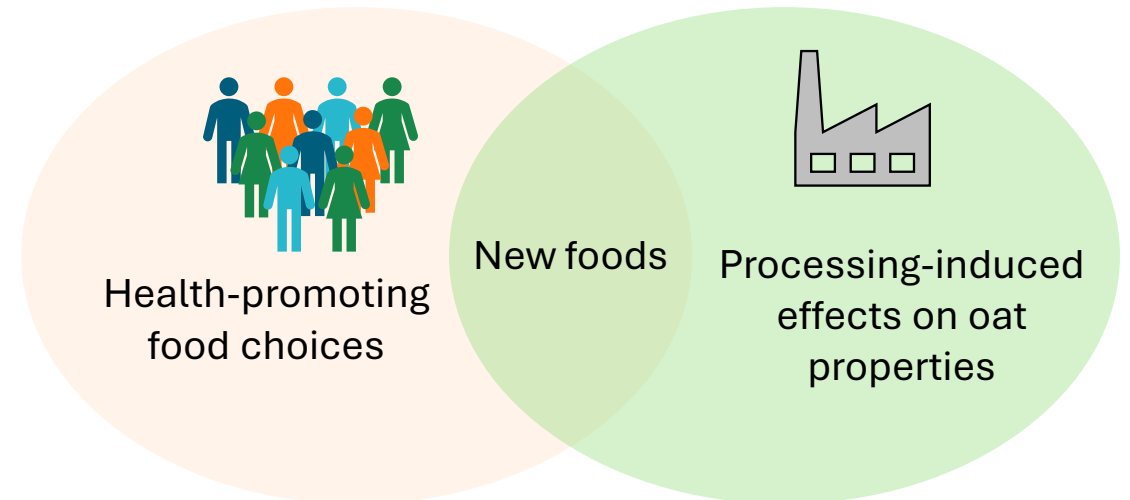
Tryptophan metabolism:  
*IAA* ↑ (porridge)  
*IAld gurt* < porridge  
*Kynurine* ↓ (both)

Psychological distress ↓ (gurt)

### Ongoing analyses



### Societal impacts



Co-funded by  
the European Union

Project funded by



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra



**Vilma Liikonen**

# **Whole grain cereals, tryptophan metabolism, and the gut-brain axis**

**2023-2027**

University of Eastern Finland, Institute of Public Health and Clinical Nutrition

Supervisors: **Prof. Marjukka Kolehmainen, Dr. Carlos Gómez-Gallego, Dr. Anu Ruusunen**

Main funder: the European Union under the Horizon Europe grant agreement (No. 101060247)

# Why do healthier snacks still lose out?

Snack choices are fast and reward-driven

# What governs preparation and texture

## 1: On-demand production

Powder properties → mixing behaviour → rheology

Outcome: Drinks and spoonables (vending context)

## 2: Structured alternative proteins

Formulation + 3D printing paths → mechanical properties

Outcome: anisotropic, whole-muscle-like structure

# Shaping sensory reward without formulation change

## 3: Sweetness perception

**Intrinsic** → aeration

**Extrinsic** → externally delivered aroma

**Outcome** → altered temporal sweetness perception

# Why this matters

**Industry**

**Society**

**To me**

# Technologies enabling personalized food production and enhanced eating experiences

## Alex Calton

Research Scientist, Grain Processing Technologies, VTT

University of Helsinki, Faculty of Agriculture and Forestry, Department of Food and Nutrition  
Doctoral Programme in Food Chain and Health

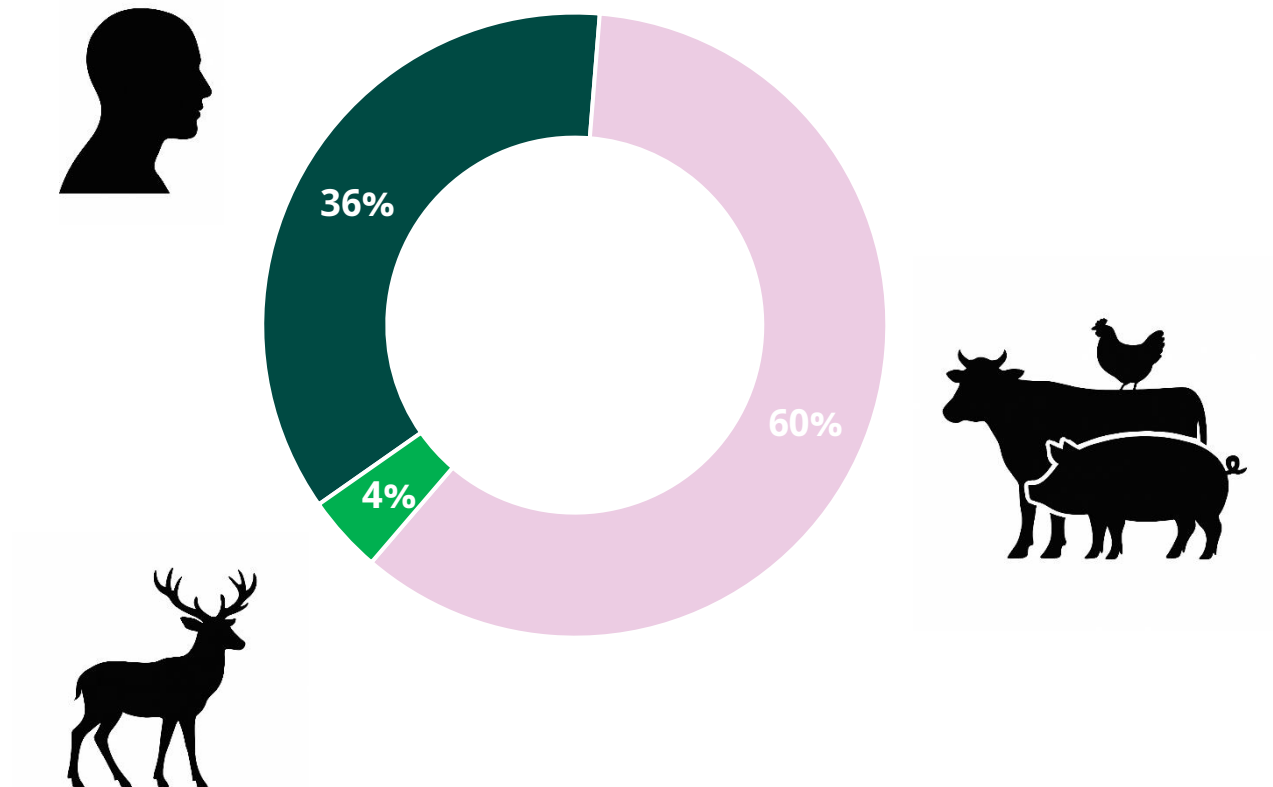
Responsible professor: Kirsi Mikkonen

Primary supervisors: Nesli Sözer (VTT), Roope Raisamo (Tampere University)

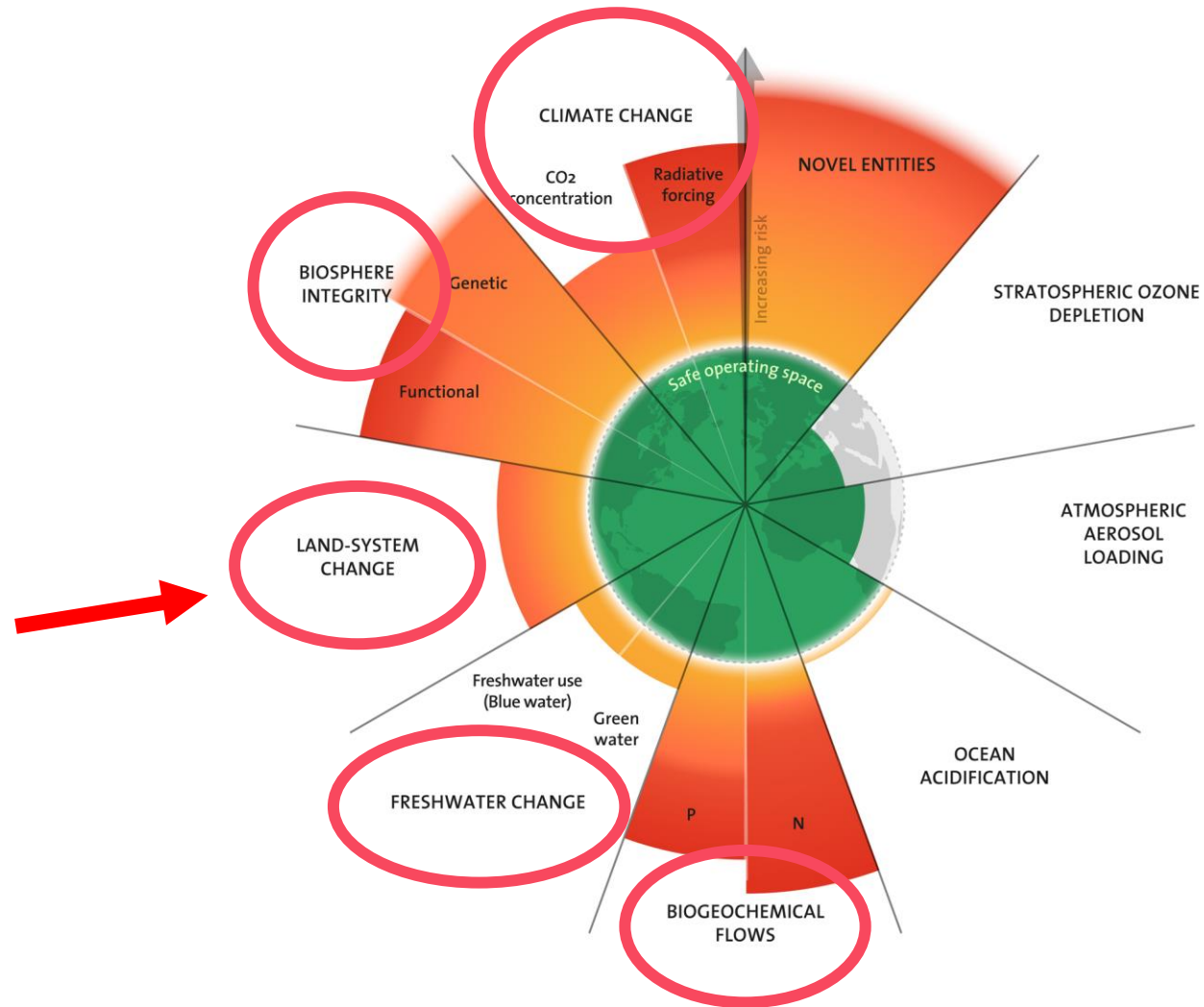
PhD Schedule: 2021 – 2026

Funding: VTT, Business Finland, Research Council of Finland

# What proportion of animals are still wild?



# Planetary boundaries



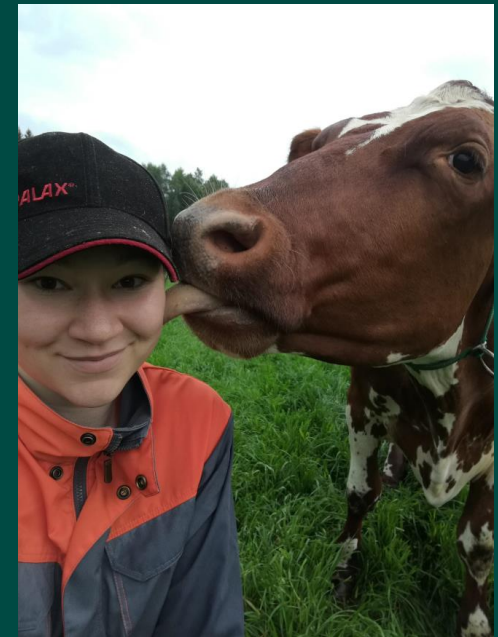
# Making Biodiversity Impacts Visible: Effects of LCA-Derived Footprint Labels on Students' Meal Selection

Aino Tarkkio

Doctoral researcher

Nutrition and Food Research Center

University of Turku



# Making Impact of LCA-Driven Students

Aino Tarkkio

Doctoral researcher

Nutrition and Food Res

University of Turku



## KESTÄVÄÄ TERVEYTTÄ RUOASTA

– kansalliset ravitsemussuositukset 2024

VALTION RAVITSEMUSNEUVOTTELUKUNTA • TERVEYDEN JA HYVINVOINNIN LAITOS

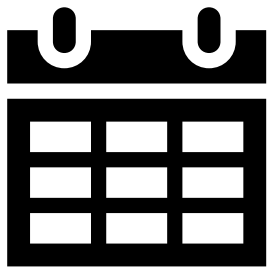


TURUN  
YLIOPISTO

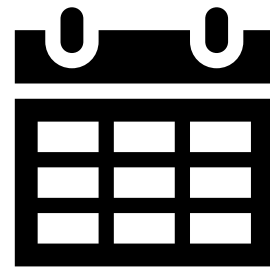


# Effects

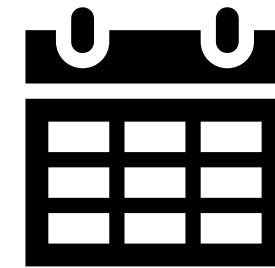
# The Study Design



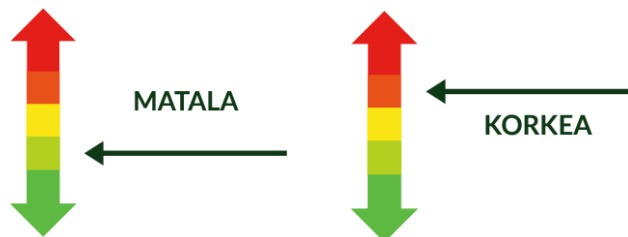
Intervention  
week



Wash-out



Control week



# Making Biodiversity Impacts Visible: Effects of LCA-Derived Footprint Labels on Students' Meal Selection

Aino Tarkkio – [aaktar@utu.fi](mailto:aaktar@utu.fi)

- > University of Turku, Faculty of Medicine
- > Nutrition and Food Research Center
- > Doctoral Programme in Clinical Research (DPCR)

Schedule for PhD: 2024-2028

Main funding resources:

- >Maj and Tor Nessling Foundation
- >Biodiful
- >Biodiversity on the plate (LuLa) -project

Supervisors:

Anu Hopia, research professor, Ph.D. [anuhop@utu.fi](mailto:anuhop@utu.fi)

Saska Tuomasjukka, senior researcher, Ph.D. [sastuoma@utu.fi](mailto:sastuoma@utu.fi)





# OUTLOOK FOR FUTURE –

National PhD work pitching session

- Towards reliable soil carbon balance estimates in agriculture
  - **Johanna Vielmaa, Valio**
- Self-supervised training for multispectral remote sensing imagery
  - **Leon-Friedrich Thomas, UH**
- Impact of food processing on plant-based protein-rich foods
  - **Jasmin Raita, UTU**
- Fibre-rich protein sources for gut-friendly plant-based foods: a nutritional investigation on food fermentation
  - **Finlay Sim, UH**
- Whole grain cereals, tryptophan metabolism, and the gut-brain axis
  - **Vilma Liikonen, UEF**
- Technologies enabling personalized food production and enhanced eating experiences
  - **Alex Calton, VTT**
- Making biodiversity impacts visible: effects of LCA-derived footprint labels on students' meal selection
  - **Aino Tarkkio, UTU**

**THANK YOU!  
HAVE A GREAT SPRING!**



**2nd ANNUAL SEMINAR**

**FOOD2.0**

