JOIN THE JOURNEY WITH US!

2nd ANNUAL SEMINAR

FOOD 2.0 | Valio

AGENDA

STRUCTURE OF THE DAY

10.00-11.45	Ministry of Agriculture and Forestry, Food 2.0-linked R&D-Program kick-off
11.45-13.00	Networking lunch and poster session
13.00-16.00	Food 2.0 Program Annual Seminar

Food 2.0 Annual Seminar 19.3.2026

Morning session:
Ministry of Agriculture and Forestry - Food 2.0 linked R&D-program kick-off

AGENDA - Morning Session

	Program objectives - Elina Nikkola, Ministry of Agriculture and Forestry
10:15	Program focus area 1: Risks for farms in a changing operating environment - Anu Koivisto, Ministry of Agriculture and Forestry
	• Agricultural policy, market, and financial risks and means to manage them - MARHA - Pekka Kinnunen, PTT • Changing world, adaptive farm - SOMA - Jyrki Niemi, LUKE • Water management as a resilience solution in horticultural production - Vesilienssi - Riikka Keskinen, LUKE
10:40	Program focus area 2: Enhancing nutrient cycling at system and farm level - Sanna Tikander, Ministry of Agriculture and Forestry
	• Phosphorus-wise cultivation - FoVi - Kirsi Järvenranta, LUKE • Towards efficient and feasible nutrient cycling in Finland's food system: impacts regionally, in value chains, and at farm level - RavinneVaikutus - Suvi Lehtoranta, Syke • Smart circular economy on livestock farms - SciLF - Matti Pastell, LUKE
11:05	Program focus area 3: Efficient utilization of new technologies in plant breeding - Sanna Viljakainen, Ministry of Agriculture and Forestry
	• Genomics-based solutions for variety breeding - GENOVA - Sirja Viitala, LUKE
11:15	Program focus area 4: Increasing field diversity, soil health, crop security, and biodiversity - Eero Rautiainen, Ministry of Agriculture and Forestry
	• Potential of non-lactating dairy cow grazing for promoting animal welfare and biodiversity in intensive dairy farms - MultipurposeGrazing - Aila Vanhatalo, UH • Farm-level transition to regenerative farming: impacts on economy, biodiversity, and carbon - UUSTILA - Tuomas Mattila, Syke
	Discussion

Background

Food system is challenged by many systemic changes, such as:

- The impacts of climate change on food production,
- Loss of biodiversity, and
- Crises such as wars, which weaken the global food system

=> The food system needs reform

In addition, ecological and societal sustainability is essential; we need solutions to ensure and strengthen the continuity of such production, which ensures security of supply, self-sufficiency, sustainability as well as profitably

Food 2.0 and MMM

- During years 2025-2029, the Ministry of Agriculture and Forestry (MMM) will fund research, development and innovation projects by the sum of €5 million
- Funded themes especially support themes 3 (regenerative production) and 4 (circular economy and resource efficiency) of the Food 2.0 programme
- The selected focus areas are:
    1. Risks to farms in a changing operating environment
    2. Improving nutrient cycling at the system and spatial level
    3. Effective use of new technologies in plant breeding
    4. Increasing the field's diversity, growth potential and crop security, as well as biodiversity
- The projects will last a maximum of 4 years
- Impact and dissemination of results is a key!

Focus area 1.

Risks to farms in a changing operating environment

- MARHA
- SOMA
- Vesilienssi

Program focus area 1: Risks for farms in a changing operating environment

Anu Koivisto

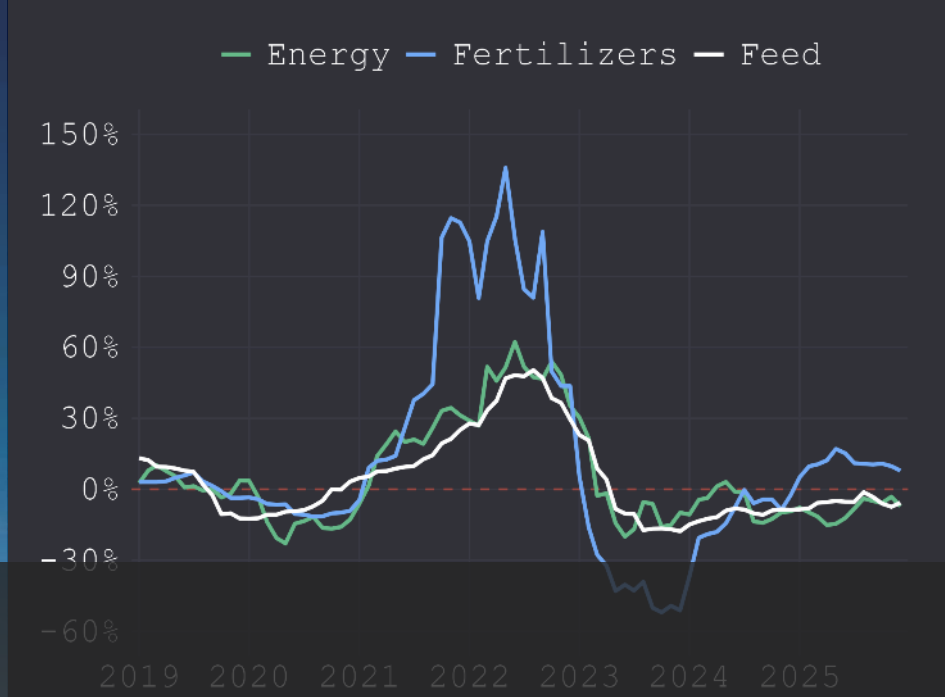
The R&D Need

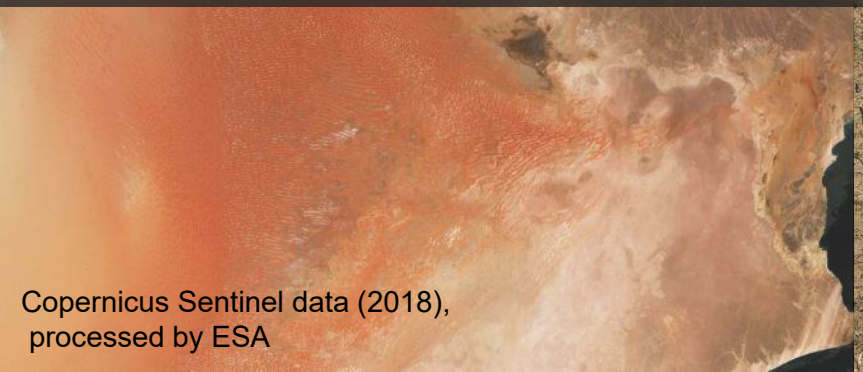
- The operating environment of farms is changing due to for example climate change, geopolitical situation, market instability and social expectations.
- Farm sizes are expected to continue to grow, which brings new challenges to business.
- The operating environment of farms change, which also change the risks faced by the farms.

The Solution

- This focus area calls for answers to, what types of agricultural policy instruments could be used to help entrepreneurs manage future risks.
- The other focus is to identify the methods and practices implemented at farm level, that would increase the resilience of farms.

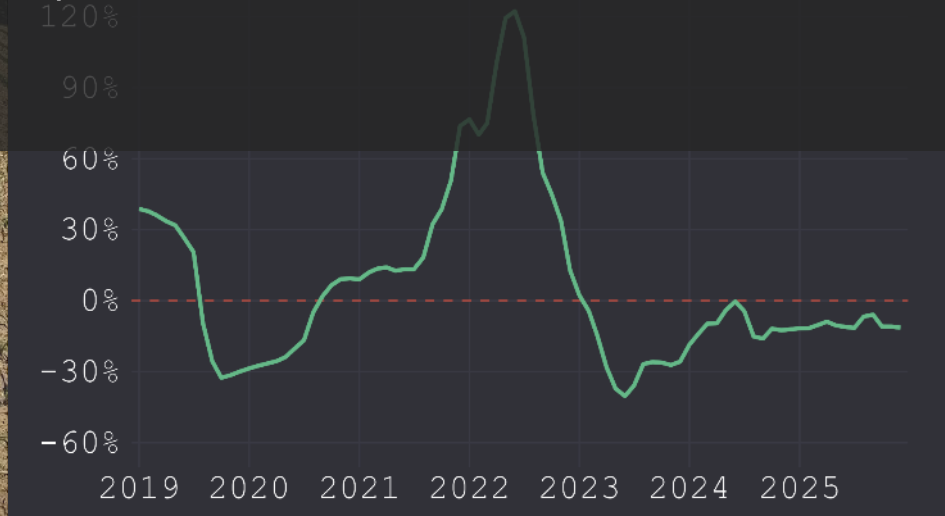
Risks are evolving rapidly across the global agri-food landscape - MARHA





Copernicus Sentinel data (2018), processed by ESA

Bernd Dittrich / Unsplash



Agricultural policy, market, and financial risks and means to manage them (2025-2027)

Pellervo Economic Research

REINU econ

Understanding Economic Impacts of Risks → Adaptive Food System

Analyze how shocks affect supply, demand and prices
Measure the real impact of shocks
Support more effective agricultural policy

Increasing uncertainties demand effective risk management

Farmers: Better economic risk preparedness
Policy: Efficient evidence-based agricultural policy tools
Food Value Chain: Better understanding of market dynamics

Agricultural policy, market, and financial risks and means to manage them (2025-2027)

Pekka Kinnunen

pekka.kinnunen@ptt.fi

Funded by

Ministry of Agriculture and Forestry of Finland

FOOD2.0

A Changing World, an Adaptive Farm (SOMA)

Luke
LUONNONVARAKESKUS

HELSINGIN YLIOPISTO
MAATALOUS-METSÄTIETEELLINEN TIEDEKUNTA

Identified risks in Finnish livestock production

Economic

Social

Environmental

Price fluctuations and profitability of farms

Shifts in demand for livestock products and global trade policy

Entry of new entrepreneurs into livestock production

Cybersecurity and ownership of farm production data in automated systems

Excessive workload on farms

Complexity and administrative burden of policies and regulations

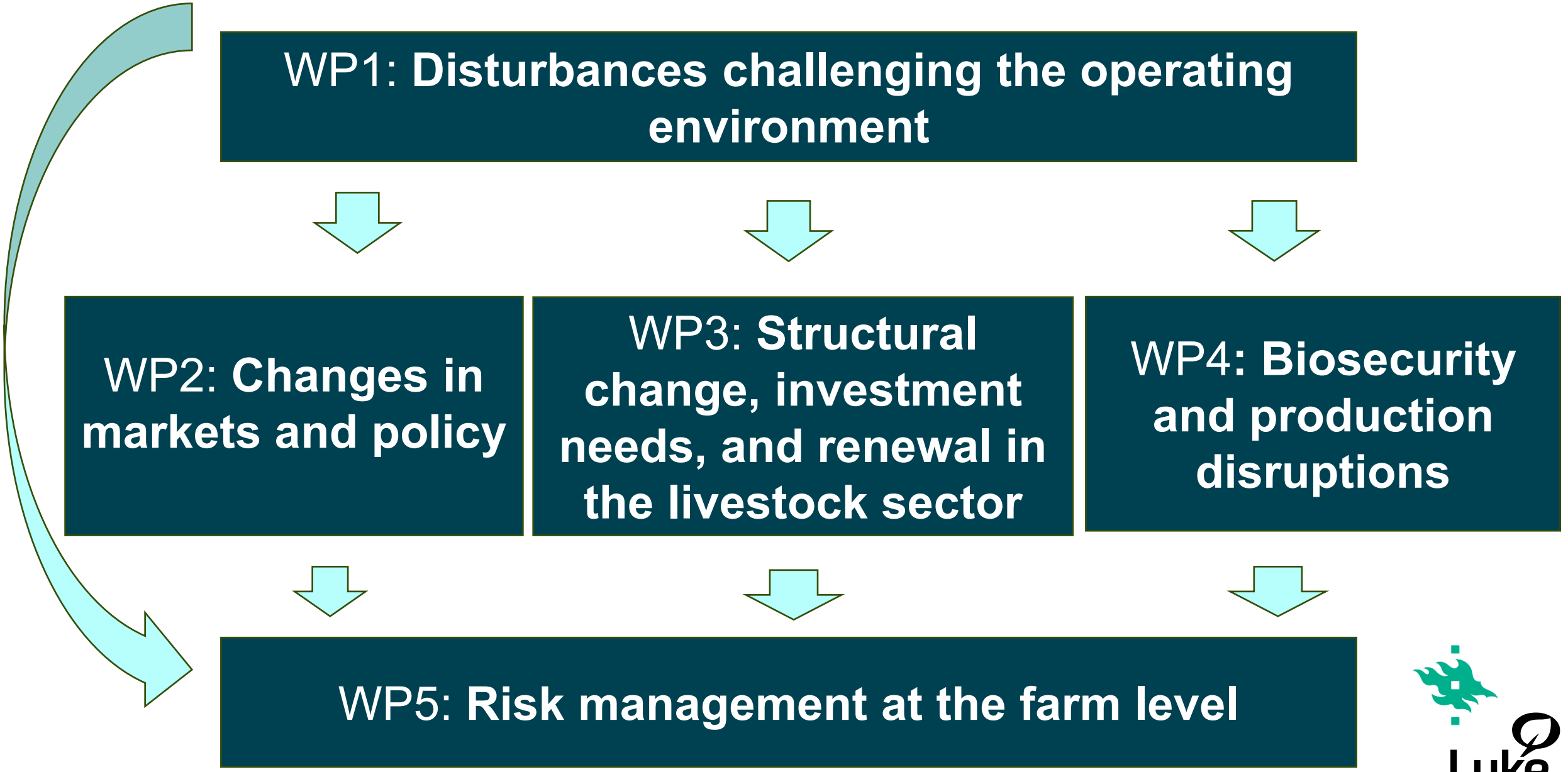
Vulnerability of production to extreme climate and weather events

Animal disease outbreak

Social pressure from the climate debate on livestock farmers

Luke

Our research project focuses



Luke

Research approach

QUANTITATIVE RESEARCH

- sector data
- statistical methods
- simulation models
- cost-benefit analysis

QUALITATIVE RESEARCH

- farmer interviews
- case studies
- stakeholder workshops
- future scenarios

Collaboration with farmers, advisors, policy actors, livestock value chain companies, and the finance and insurance sectors

Luke

Expected outcomes

STRONGER RISK MANAGEMENT ON LIVESTOCK FARMS

- practical knowledge, analytical tools and scenarios that help livestock farms identify risks, assess their economic impacts, and make strategic decisions

EVIDENCE-BASED RECOMMENDATIONS FOR AGRICULTURAL POLICY

- recommendations for developing risk management instruments, biosecurity policies, and market-based tools

SECTOR-WIDE RISK AWARENESS AND RESILIENCE THINKING

- an integrated analysis of ecological, economic, social, and policy risks affecting livestock production

Luke

Thank you!

“Better understanding of risks – stronger resilience for livestock farms.”

SOMA project

Water management as a resilience solution in horticultural production - Vesilienssi

Riikka Keskinen, Petteri Karisto, Terhi Suojala-Ahlfors, Oona Pietiläinen, Jyrki Jauhiainen, Tapio Salo, Karoliina Rimhanen / *Natural Resources Institute Finland*

Katariina Yli-Heikkilä, Jarkko Leka, Sanna Kivimäki / *Valonia*

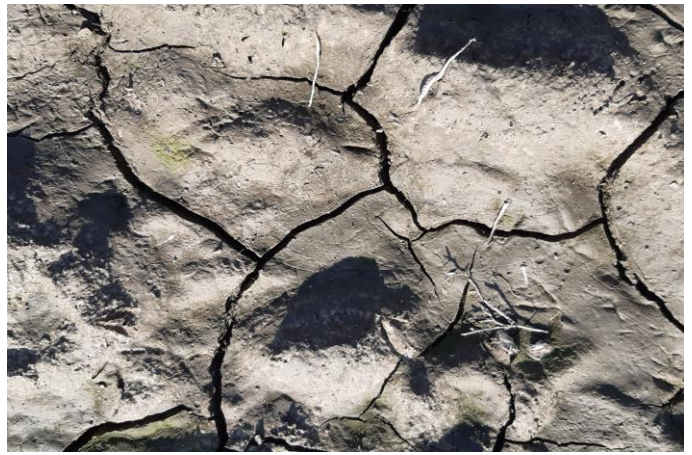
Ville Korpelainen / *Livia College*

Pekka Parkkila / *Economic Development Centre*

Vesilienssi – Enhancing the resilience of horticultural production through promoting water management tools

- Water can limit growth and induce environmental nutrient loading both through scarcity and excess
- Climate change is predicted to increase extreme weather events
- Demand for vegetables and plant-based protein is increasing and the importance of self-sufficiency in food production has been emphasized

→ The project responds to timely needs at different scales



Suspended clay soil cracked during drought. Riikka Keskinen

Waterlogged field soil. Johanna Nikama

Luke ammattiopisto Livia hiilineutraali opisto VALONIA

Field evidence → Farm demos → Policy recommendations

- The project produces practically applicable knowhow on:
  - Irrigation optimization
  - Establishment and operation of farm scale water management structures
  - State and possibilities of policy guidance

→ Easier decision making of farmers on water management

→ Improved control over yield quantity and nutrient use efficiency

Integrated buffer Zone at Tuorla, Kaarina
Jyrki Jauhiainen

Irrigation basin, wetland, and double-level channel at a strawberry farm in Paattistenjoki.
Pekka Parkkila

Luke

ammattiopisto Livia hiilineutraali opisto

VALONIA

Vesilienssi produces multiscale benefits

- The project outcomes serve crop production beyond horticulture
- Increased yield resilience benefits the food industry and consumers through increased supply of domestic vegetables
- Whole society benefits from
  - Enhanced food security
  - Decreased crop and nutrient loss
  - Cleaner air and waterways
- The project complements on-going efforts aiming at climate change adaptation.

Giant pumpkin. 📷 Riikka Keskinen

Luke ammattiopisto Livia hiilineutraali opisto VALONIA

Focus area 2.

Improving nutrient cycling at the system and spatial level

- FoVi
- RavinneVaikutus
- SCiLF

Enhancing nutrient cycles at the systemic and farm level

Answers to how to take the next systemic step in nutrient recycling which will support future food systems in improving competitiveness and crisis resilience

- The target is nutrient losses and leakages thorough the food system

- What methods and practices could be used to control leakages? What kind of security of supply impact and cost impact would they have on society?
- Estimates of the impact of the current state of nutrient recycling on fertiliser self-sufficiency and climate emissions, and estimates of improvement methods and their climate and cost impacts
- Views of different farms on the means and profitability of promoting nutrient recycling
- New methods and safety issues for improving the usability of recycled nutrients.
- Regional and supraregional value chain examples of the profitability of nutrient recycling.
- Concrete methods and modelling tools for nutrient management in farms.
- Economic impacts of nutrient recycling on livestock farms

Enhancing nutrient cycles at the systemic and farm level

- We have three inspiring projects which offers several solutions
  - **Fovi examines the amount of legacy phosphorus and identifies its potential for utilisation** in different conditions throughout Finland, and enhance the use of phosphorus in grassland and cereal cultivation while reducing the load on water bodies
  - **SciLF** improves the circulatory and nutrient use efficiency of cattle and pig farms by **providing a comprehensive suite of modeling methods to plan feeding and digital tools to analyze production outcomes.** The project will provide several modeling tools that can be directly exploited by the industry and farmers and build the capacity of the stakeholders in using these concepts.
  - **Ravinnevaikutus:** produces a **situation picture of the nitrogen and phosphorus streams of the food system by modelling and identifies the leakage points of nutrients by sector and region**. Assess the feasibility of nutrient recovery and recycling methods at farm level, in value chains and regionally. Examines the impacts of nutrient recycling measures on nutrient flows, nutrient losses and utilisation rates, and nutrient self-sufficiency.

Phosphorus-smart cultivation
Fosforiviisas viljely
FoVi

Arja Louhisuo
Kirsi Järvenranta (Luke)
MMM Food 2.0
19.3.2026 Helsinki

Tampereen yliopisto
Tampereen ammattikorkeakoulu

ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

Luke

Soil phosphorus

Up to 1000 kg/ha accumulated by fertilization history: Legacy-P

Mostly strongly bound in soil, availability to plants poorly understood

Expensive, globally limited nutrient

Harmful effects on water bodies

Questions to answer:
Where is legacy-P located?
How much?

Which form?
Is it available?

More questions:
How to analyze?

Effect of soil structure?
Soil moisture?
Temperature?
pH?

FoVi's main goal is to measure the amount of legacy-P in Finnish soils and determine how it can be used efficiently in farming. Concretely, we will:

- Analyse soil samples from different fields all over Finland
- Test soil analysis methods for legacy-P determination
- Conduct field experiments to study the effects of liming and soil structure on P
- Use long-term field experiments and farm datasets to evaluate how efficiently crops use soil P and how long legacy-P reserves may last
- Improve the P-model NURMAP for leaching and yield formation
- ~~Develop~~ weather-based drought and moisture indices ~~that could help~~ predict P movements in system

What does FoVi provide to the society?

- Grass-based farming seems to have potential to reduce rock phosphate mining and lower the soluble P in soil thus lowering eutrophication risk
- When legacy-P is used more efficiently, farms can reduce fertilizer use and costs while maintaining yields
- Better base to improve environmental policy and agricultural advisory systems, because improved models and data can guide fertilization recommendations and environmental compensation schemes
- FoVi connects actors across the food system, including farmers, fertilizer companies, agricultural input suppliers and the dairy and food industry.
- Provide better practical tools for farming. “P uptake forecast” will help farmers in timing of the cultivation decisions.
- FoVi develops new ways of research communication, aiming to reduce polarization in discussions about agriculture and water quality

Maa- ja metsätalousministeriö

Knowledge grows

luke.fi

Luke

Towards efficient and feasible nutrient cycling in Finland's food system: impacts regionally, in value chains and at farm level - RavinneVaikutus

Maa- ja metsätalousministeriö

FOOD2.0 | Valio

jamk | Jyväskylän ammattikorkeakoulu

Pyhäjärvi-instituutti
Puhdas vesi, paremmat evät

Suomen ympäristökeskus
Finlands miljöcentral
Finnish Environment Institute


IMAGE: SUVI LEHTORANTA

Core idea

- For the first time, we are building a comprehensive picture of nitrogen and phosphorus flows in the Finnish food system – from the field to the consumer.
- We identify where nutrients are lost and how the cycle can be made more efficient. The goal is a more sustainable and self-sufficient food system.

Suomen ympäristökeskus
Finlands miljöcentral
Finnish Environment Institute

What do we currently know about the Finnish nutrient cycle?

- Finland is heavily dependent on imported fertilizers.
- Nutrients are lost at various points in the system.
- Nutrient cycling can be made more efficient through a variety of measures
- **There is no overall picture of nutrient flows in the Finnish food system, the extent of nutrient loss, or the feasibility and effectiveness of measures to improve nutrient cycling**

There is need for improvement because

- Geopolitical uncertainty and supply chain risks
- Fluctuations in fertilizer prices → pressure on profitability
- Need to reduce climate and water impacts

Suomen ympäristökeskus
Finlands miljöcentral
Finnish Environment Institute

Goal of the project is to

- produce an up-to-date overview of nutrient flows in the Finnish food system
- identify key areas of nutrient loss at the national level and in value chains
- find the most feasible measures to minimize losses and keep nutrients in circulation
- assess the impact of the measures at the national level
- provide proposals for decision-makers for the most effective measures to improve nutrient recycling
- benefit food industry companies by producing better data for decision-making, thereby enabling better risk management and supporting the development of new circular economy solutions

Better understanding leads to more effective measures

IMAGE: SUVI LEHTORANTA

Suomen ympäristökeskus
Finlands miljöcentral
Finnish Environment Institute

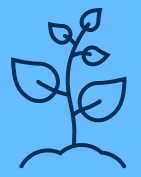
More efficient nutrient cycling supports the economy, the environment, and security of supply

- **Farmers**
  more cost-effective use of nutrients and predictability

Businesses/industry
knowledge base for strategic business decisions, better targeting of investments, better risk management, more stable production inputs, and new solutions

Decision-makers
A sufficient knowledge base supports more effective targeting of control measures

Society
Stronger security of supply and food security as dependence on nutrients imported from Russia decreases, more sustainable food system



- **Environment**
  Lower emissions and cleaner water, as nutrients do not run off and pollute waterways.

IMAGE: ADOBE STOCK

We create hope through research

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Finlands miljöcentral
Finnish Environment Institute

Smart Circular Livestock Farms - SCiLF

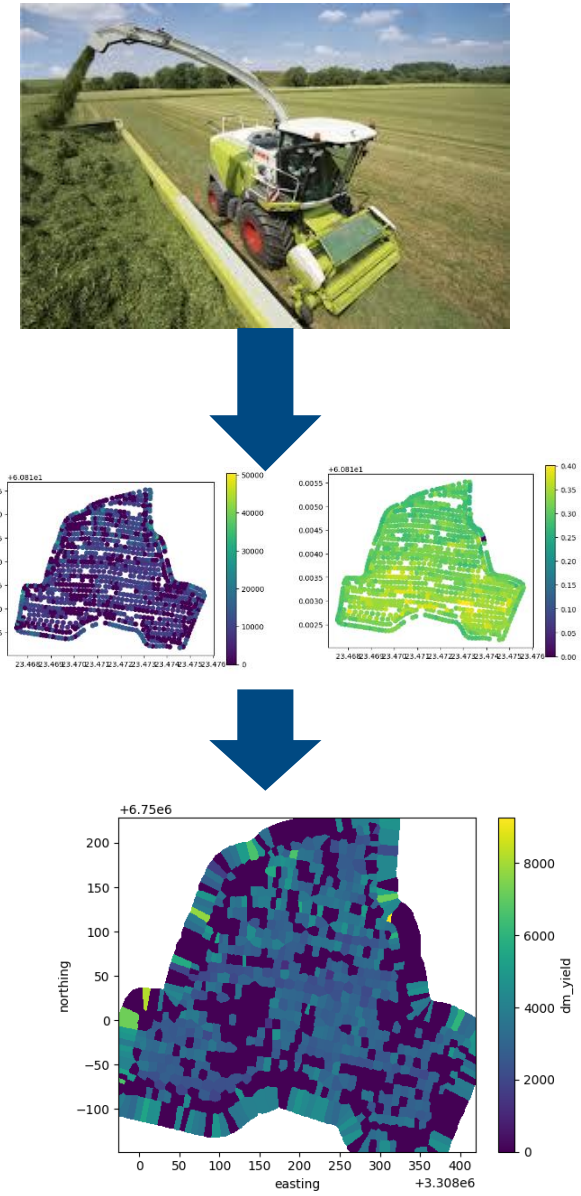
prof. Matti Pastell

Natural Resources Institute Finland (Luke)

Food 2.0 annual seminar

Core idea

- Livestock manure accounts for ~30% of annual N fertilizer used in Finland annually. Imported feeds contribute to 36% of manure N and 15% of P content.
- **Optimal planning of feeding** is the most effective measure to reduce accumulation of nutrients in cattle and pig farms and to reduce the required field area for manure application
- **Mechanistic animal models** are required for efficient planning of animal diets and developing nutrient and greenhouse gas mitigation scenarios
- **Digital technologies** can measure nitrogen yield with high spatial resolution, however farmers lack tools for analyzing the collected data

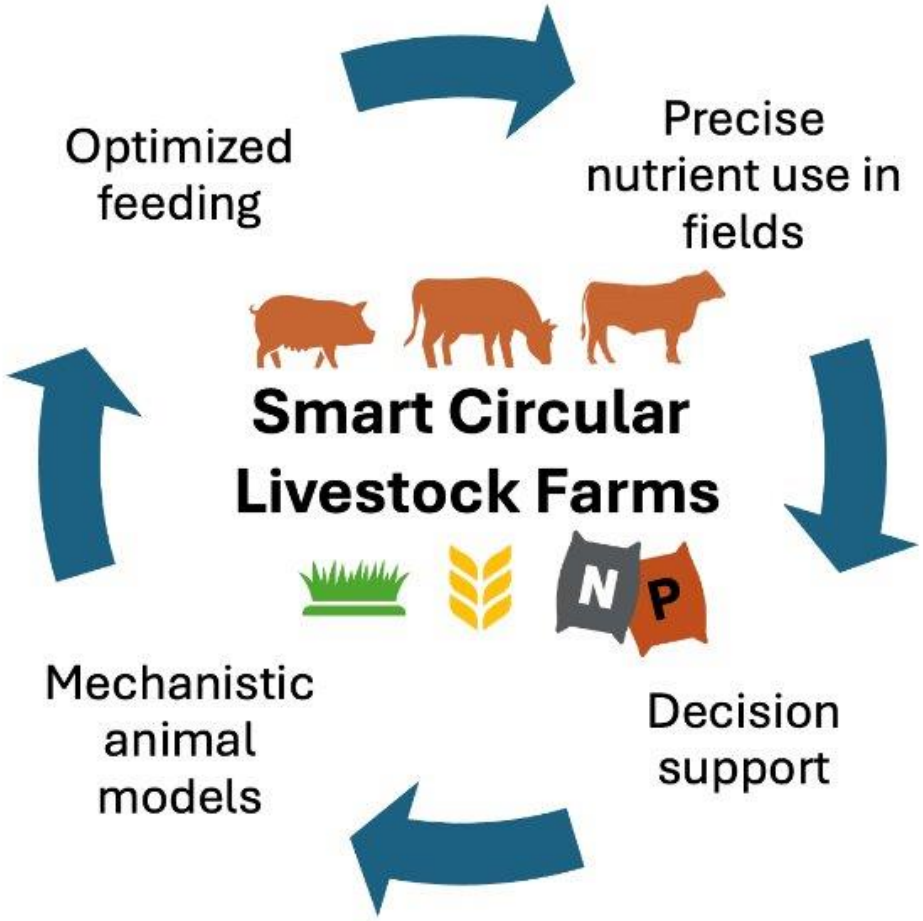


Luke

UNIVERSITY OF HELSINKI

Objectives

- The overall objective of the project is to significantly improve the nutrient use efficiency of cattle and pig farms.
- **Specific objectives:**
  - Develop modelling method and a tool for calculating field N balance based on digital data sources
  - Update modelling tool for optimizing dairy and beef cow diets to reduce nutrient and methane emissions based on mechanistic modelling
  - Develop a modelling tool for optimizing feeding on pig farms
  - Model the economic value of improved nutrient use efficiency for cattle and pig farms
  - Develop a roadmap for updating cattle feeding strategies and planning software together with the industry



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Expected impacts

- Tool and method for analyzing N use from fields using digital data sources allows identification of losses with 10-30% potential for N savings
- Improved models and tools to predict animal production responses, plan rations, mitigate environmental emissions and improve the accuracy of GHG accounting systems
- Efficient incorporation of updated models and tools to commercial farming practices
- Project supports **improving economic outcomes** of dairy, beef and pig farms **while increasing circularity**

Close collaboration with farmers and industry to maximize the adoption of results

Luke

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Valio

Mtech

ProAgria

Focus area3.

Effective use of new technologies in plant breeding

- GENOVA

Focus area 3: Efficient utilization of new technologies in plant breeding

- Climate change requires new types of crop varieties and even new species, creating new demands for plant breeding.
- New techniques and technologies can be applied in multiple ways in plant breeding.
- Research projects in this focus area aim to create new opportunities for crop breeding that consider changing growing conditions.
- The goal is also to produce new knowledge on the application of these techniques and to strengthen related expertise in Finland.
- Selected project: GENomics for Optimized Variety Advancement – GENOVA

GENOVA

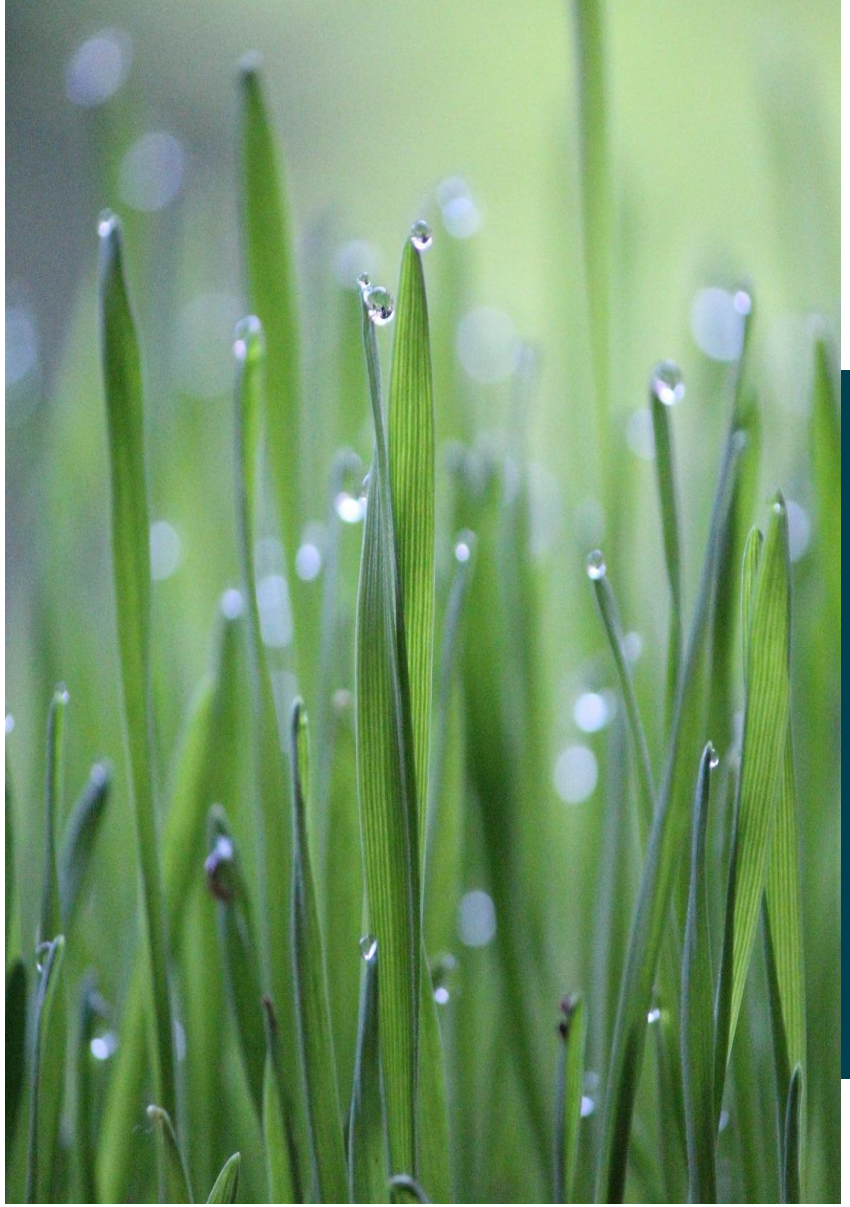
Develops genomic solutions for crop breeding

Genomic selection models for plants

Gene discovery for drought tolerance

Tools for editing plant genomes

Luke



- Rapid change demands resilient crops — and faster innovation
- Breeding can provide lasting solutions, but the process is slow
- Faster, more precise breeding technologies are needed
- With powerful new computing methods and next-generation gene technologies, backed by exploding genomic data, we can now address these challenges much more effectively

Luke

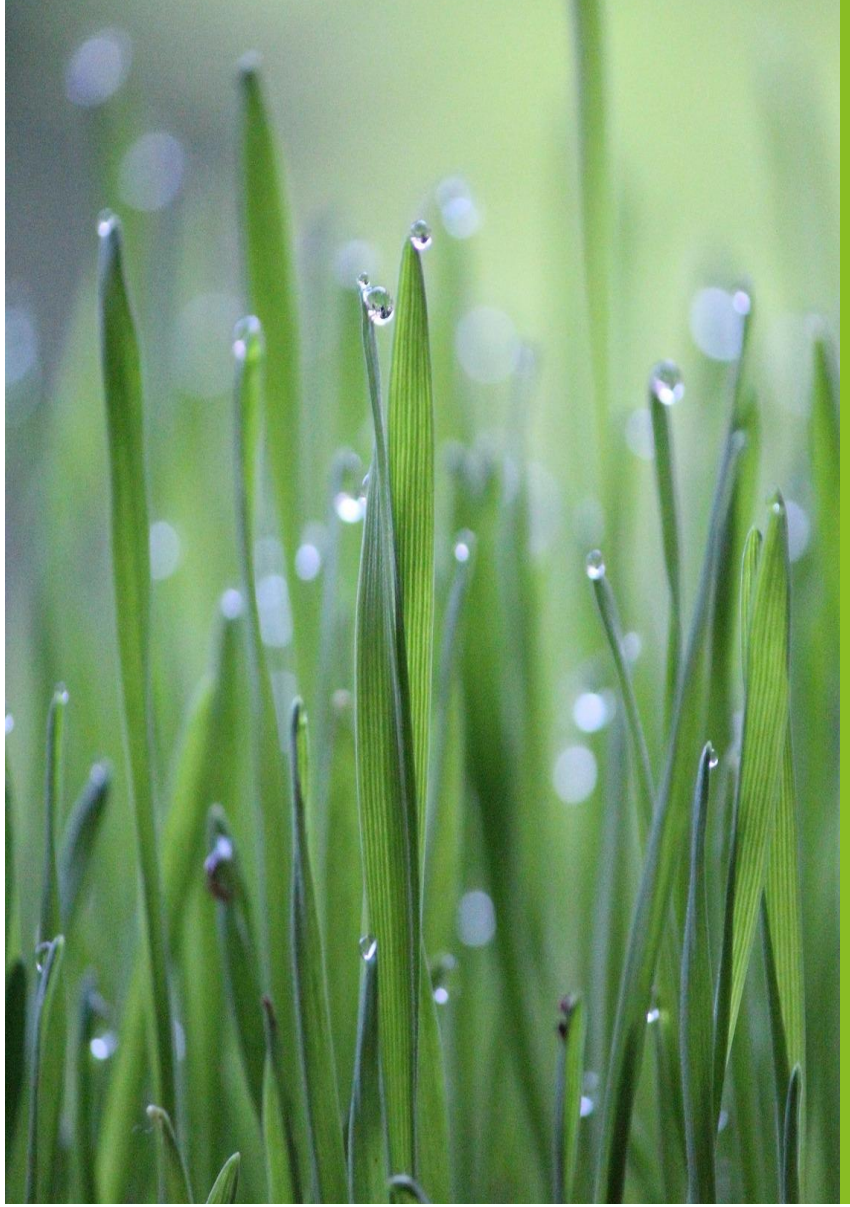
GENOVA enables whole-value-chain crop development by combining gene discovery and method development with co-creation across breeders, farmers, industry and end users.

Improved methods:
new breeding technologies and expanded genomics knowledge accelerate innovation

Practical guidance:
recommendation and strategies for how breeding programs can adopt these technologies

Strengthened capacity:
increased skills, collaboration and shared practices

Luke



GENOVA integrates genomics, new technologies, and breeding expertise in a way that can truly shift how cultivars are developed.

- Supports future-ready raw materials that better match evolving food applications and processing needs.
- Improves reliability in supply chains by enabling breeding programs to target resilience and stability earlier.
- Provides better data and tools to anticipate quality traits relevant for product development.
- Helps the sector adapt to climate variability, changing consumer expectations and new market demands.
- Strengthens collaboration across breeding, research and industry, building pathways for future innovation.

Luke

HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI

MTK

BOREAL

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Valio

Focus area 4.

Increasing the field's diversity, growth potential and crop security, as well as biodiversity

- MultiPurposeGrazing
- UUSTILA

Program focus area 4: Increasing field diversity, soil health, crop security, and biodiversity

(*Eero Rautiainen, Ministry of Agriculture and Forestry (FOOD2.0 seminar, Valio 19.3.2026*)

Soil is the most important part of agriculture. Shifting the focus from crop to **soil health** is no longer a new idea.

However, accelerating climate change and need to slow down biodiversity loss and erosion require faster search for better solutions towards **sustainable food production**.

Focus 4 concentrates on ecological systems that support the soil health; roots, water cycle, mineral cycle, photosynthesis, and not least biodiversity. Grazing animals are an important tool.

In order for a change towards better soil health, measurement, modelling and an overall economic analysis, as regards the common operational picture of a farm, are needed.

The key question is what incentives and solutions should be used in Finland to achieve a change in farming practices in which **regenerative cultivation and grazing methods** would become an important part of primary production.

This requires that the direct economic benefits of improved soil health and farming resilience to farmers as well as **consumers' willingness to pay for sustainable production** can be demonstrated through long-term monitoring.

(Source: Maaseutuverkosto & Eläintieto.fi)

Potential of non-lactating dairy cow grazing for promoting animal welfare and biodiversity in intensive dairy farms - **Multipurpose grazing**

Livestock grazing improves animal welfare and is the main contributor to farm biodiversity, but

- dairy cow grazing has declined due to
  - rapidly increasing herd size
  - transfer to free-stall barns and automatic milking
  - 27% of cows do not graze

➢ **is it possible to gain any welfare and biodiversity benefits from grazing in intensive dairy production?**

In large dairy herds, dry cows and heifers serve as excellent target groups of animals who can graze throughout the season

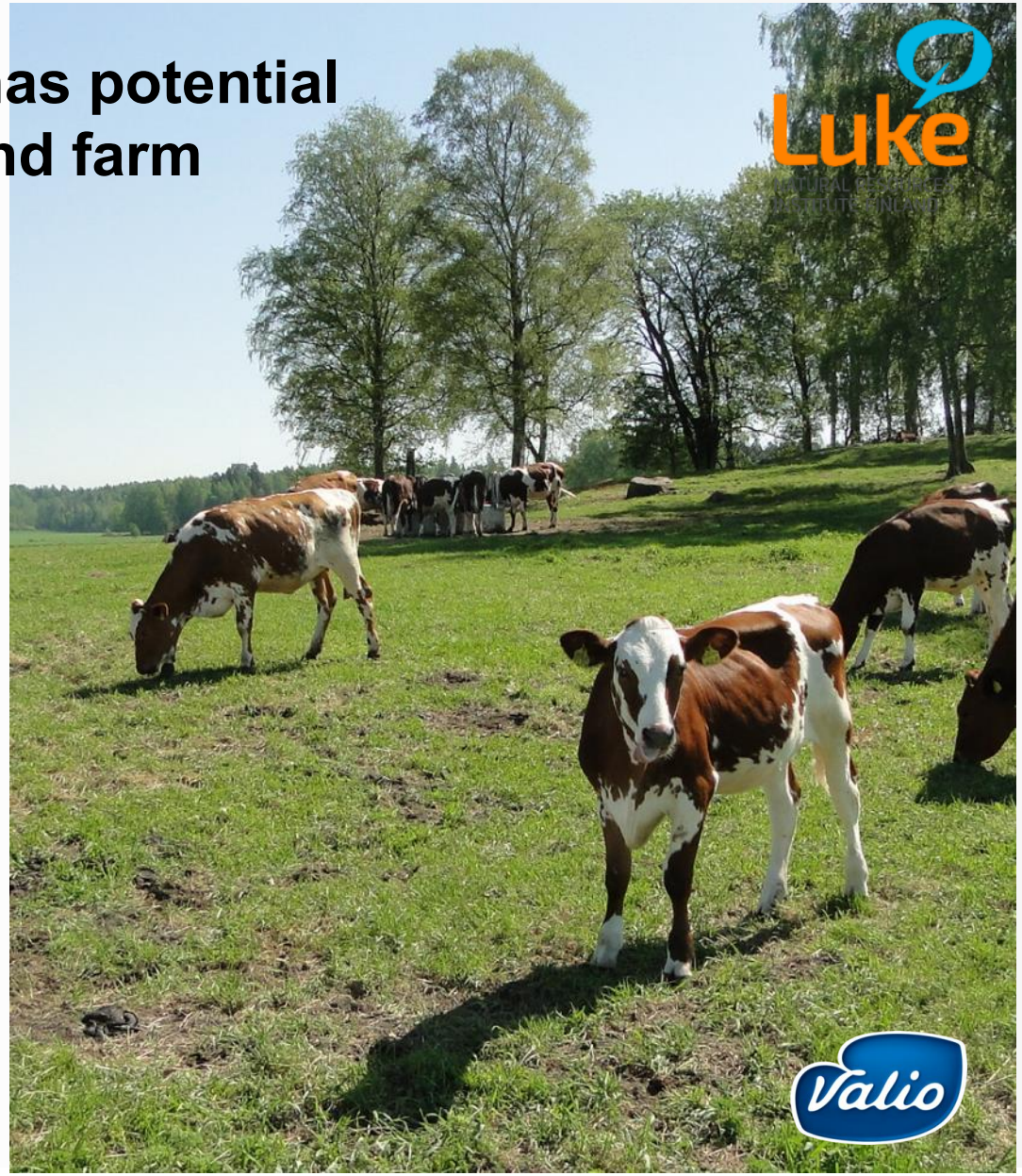
- their nutrient requirements are much less than those of lactating cows
  - ➢ even use of forest pasture can be considered
- Integration of grazing **on semi-natural pastures and field pastures** may enhance animal welfare and biodiversity simultaneously

Aila Vanhatalo and Katriina Heinola

Food 2.0 Kick-off 19.3.2026

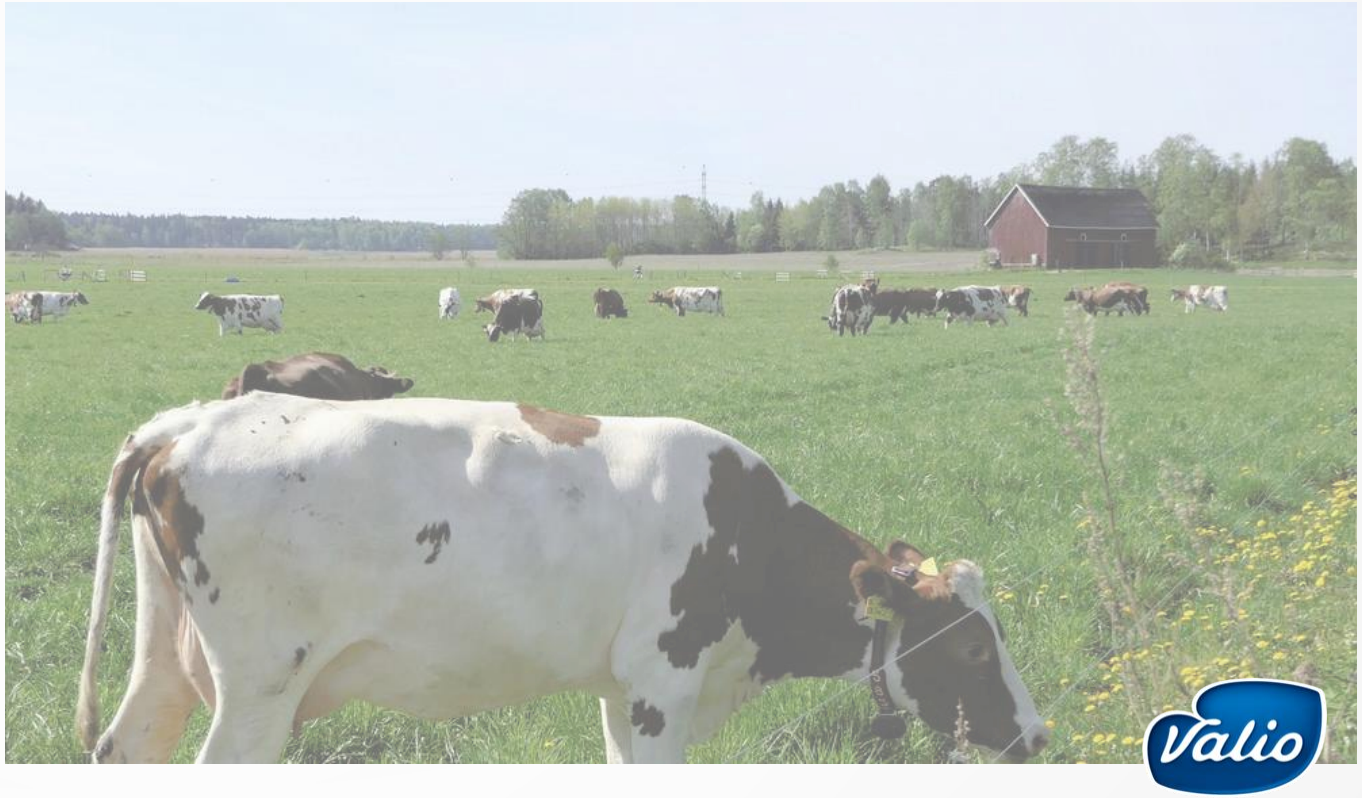
Grazing of dry cows and heifers has potential to promote both animal welfare and farm biodiversity

- Grazing of dry cows and heifers **throughout the grazing season** is expected to
  - improve access to pasture forage
  - improve animal health (e.g. legs)
  - lead to more diversified pastures and create more varied resources for farmland wild species
  - lead to benefits in farm economics
- Integrating grazing on **multispecies semi-natural wooded and field pastures** is expected to gain more benefits than field grazing alone, and
  - serve as a shade against heat waves
  - increase considerably biodiversity value of pasture



Developing multipurpose grazing creates added value for dairy farms and multiple stakeholder groups

- **Findings valuable for**
  - **dairy farmers** to gain insight into cost structure and grazing benefits for animals, use of land resources and biodiversity
  - **policymakers** to shape sustainable agricultural policies for developing
    - future subsidies
    - national policies e.g. biodiversity strategy
  - **consumers** to make more informed purchasing decisions
  - **business** to leverage insights for product development and premium market opportunities




Thank you

KUVA: ADOBE STOCK

Farm level transition to regenerative farming: impacts on economy, biodiversity and carbon - UUSTILA

Tuomas J. Mattila,

Principal scientist, Climate solutions unit

Suomen ympäristökeskus
Finlands miljöcentral
Finnish Environment Institute

HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI

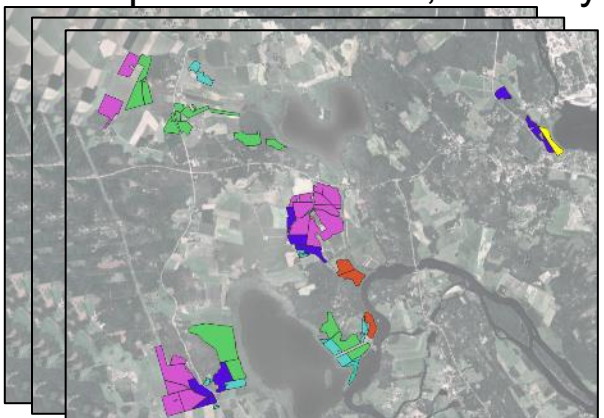
ILMATIETEEN LAITOS

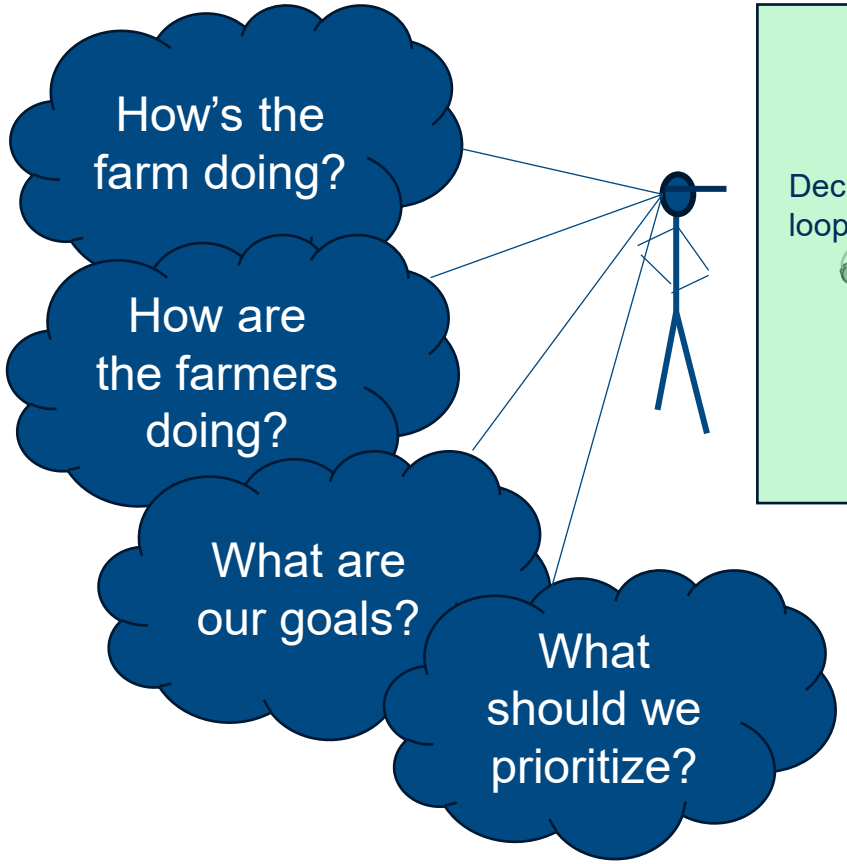
BSAG
Baltic Sea Action Group

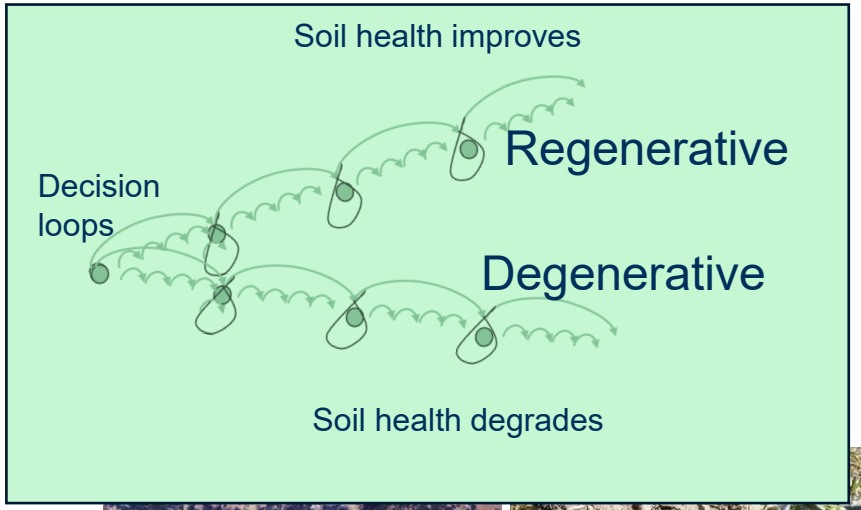
Everybody wants their future to be regenerative… but the path there is a series of complex(!) decisions

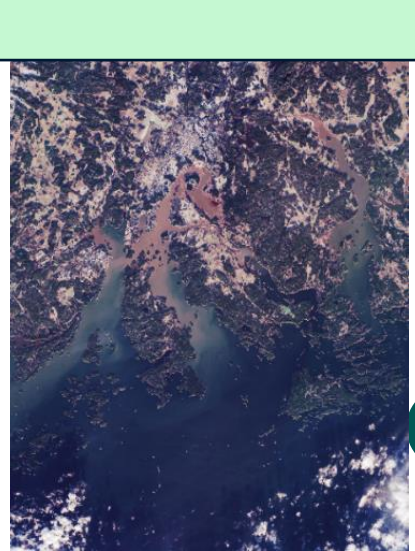
Go game (weiqi, baduk): 200 moves, 361 options, single dimension, pieces not alive, 0,5-2 h game.

Farming season: >200 moves, 70 field units, multi-dimension, most pieces are alive, 160 day game.



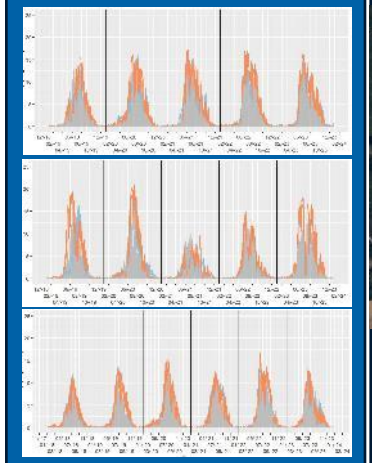






We're from the government and we want to help… by providing a common operational picture

Field EKG



CT scan

- Erosion
- Productivity
- Biodiversity

What should we prioritize?

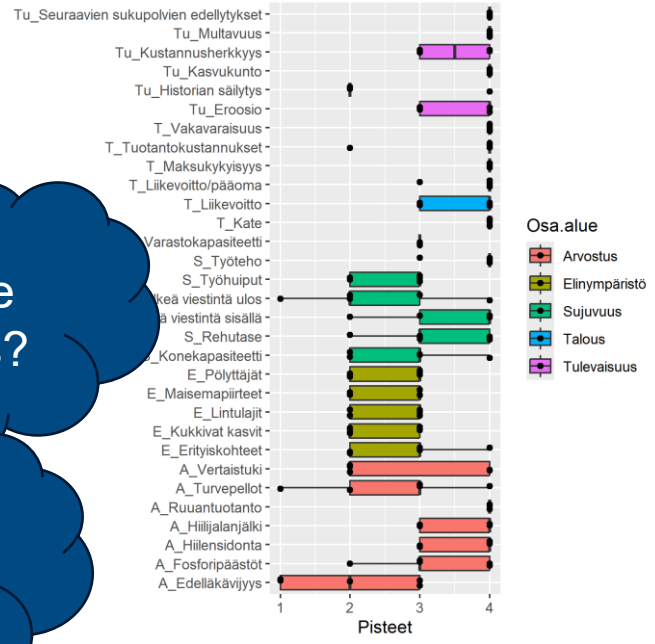
Who can I learn with?

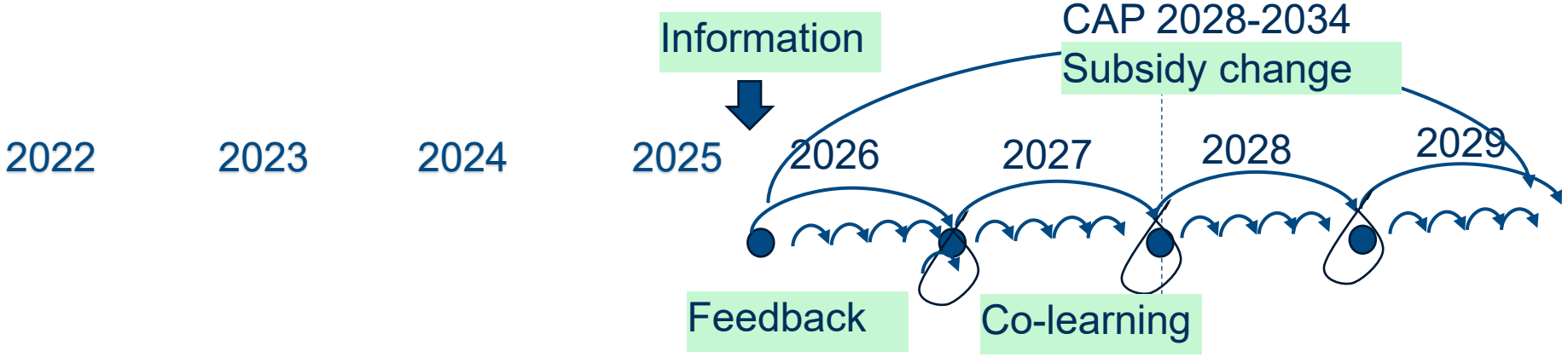
How's the farm doing?

What are our goals?

What should I improve?

How are the farmers doing?





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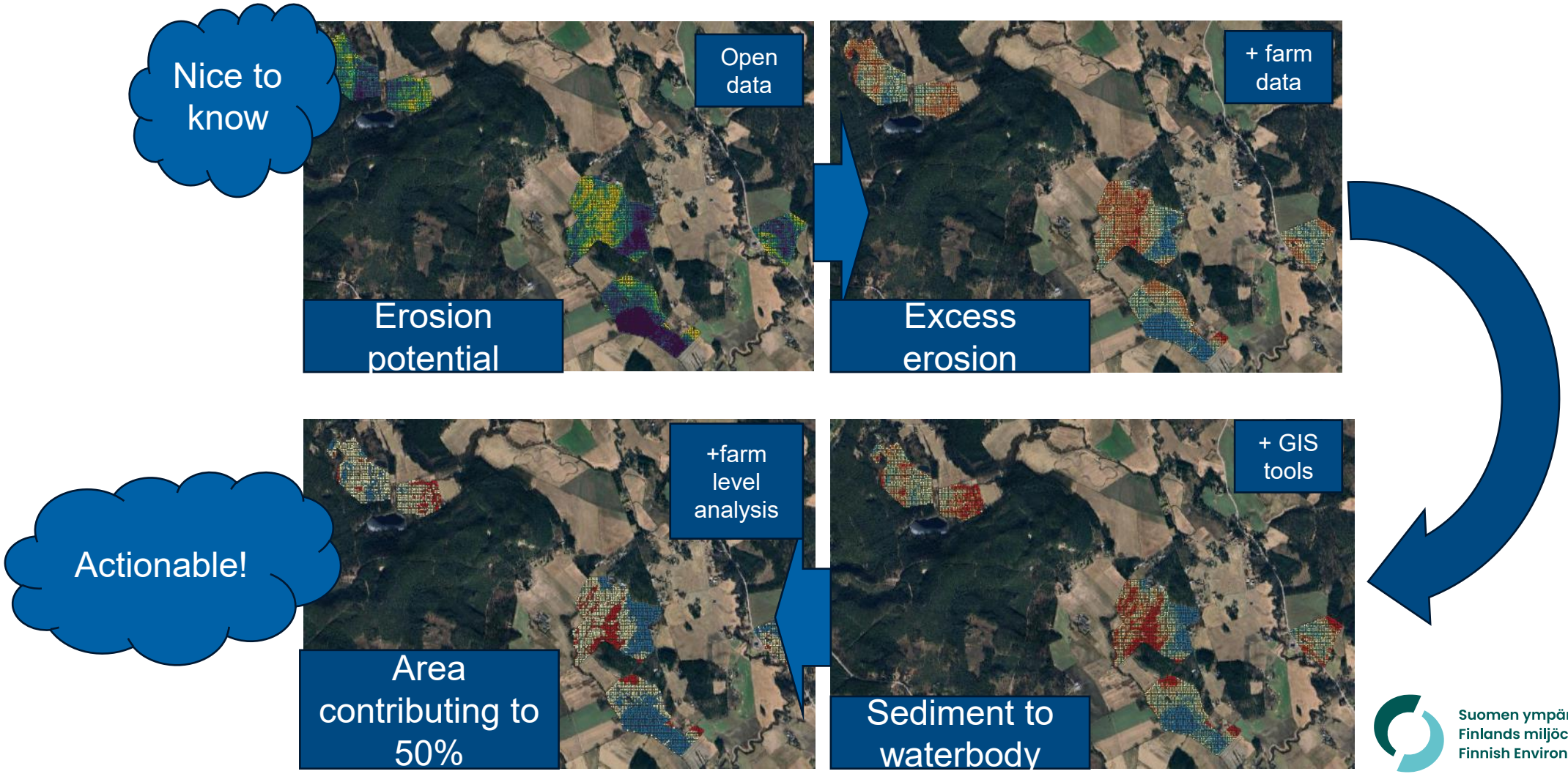
Example of decision support data flow



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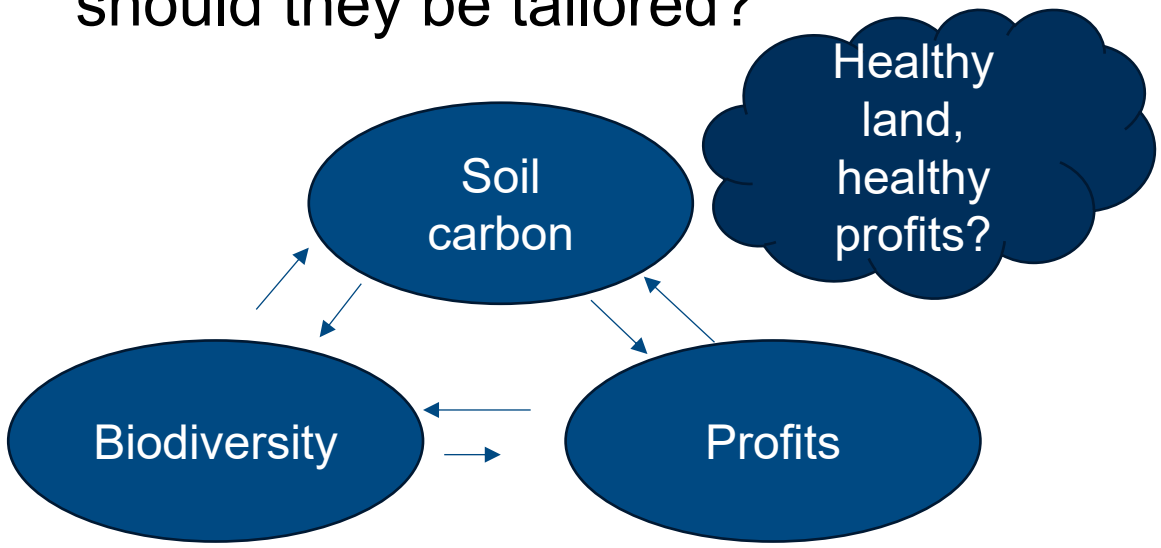
A decision support living lab

- What is the journey to regenerative agriculture like? For different farms?

- Which indicators matter? How should they be tailored?



- 10 farms, 4 years
- 4 milk (2 organic)
- 6 grain (3 organic)

- Indicators and data flows:
  - Plant productivity
  - Soil health & resilience
  - Soil C balance
  - Biodiversity
  - Profitability
  - Decision support

Turning knowledge into hope.

One farm at a time.

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JOIN THE JOURNEY WITH US!

2nd ANNUAL SEMINAR

FOOD2.0 | Valio

We continue at 13:00