Exploring the sustainability aspects of innovative livestock systems in Europe

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Pathways FOR SUSTAINABLE FOOD

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EU livestock systems & sustainability

High variability in terms of:

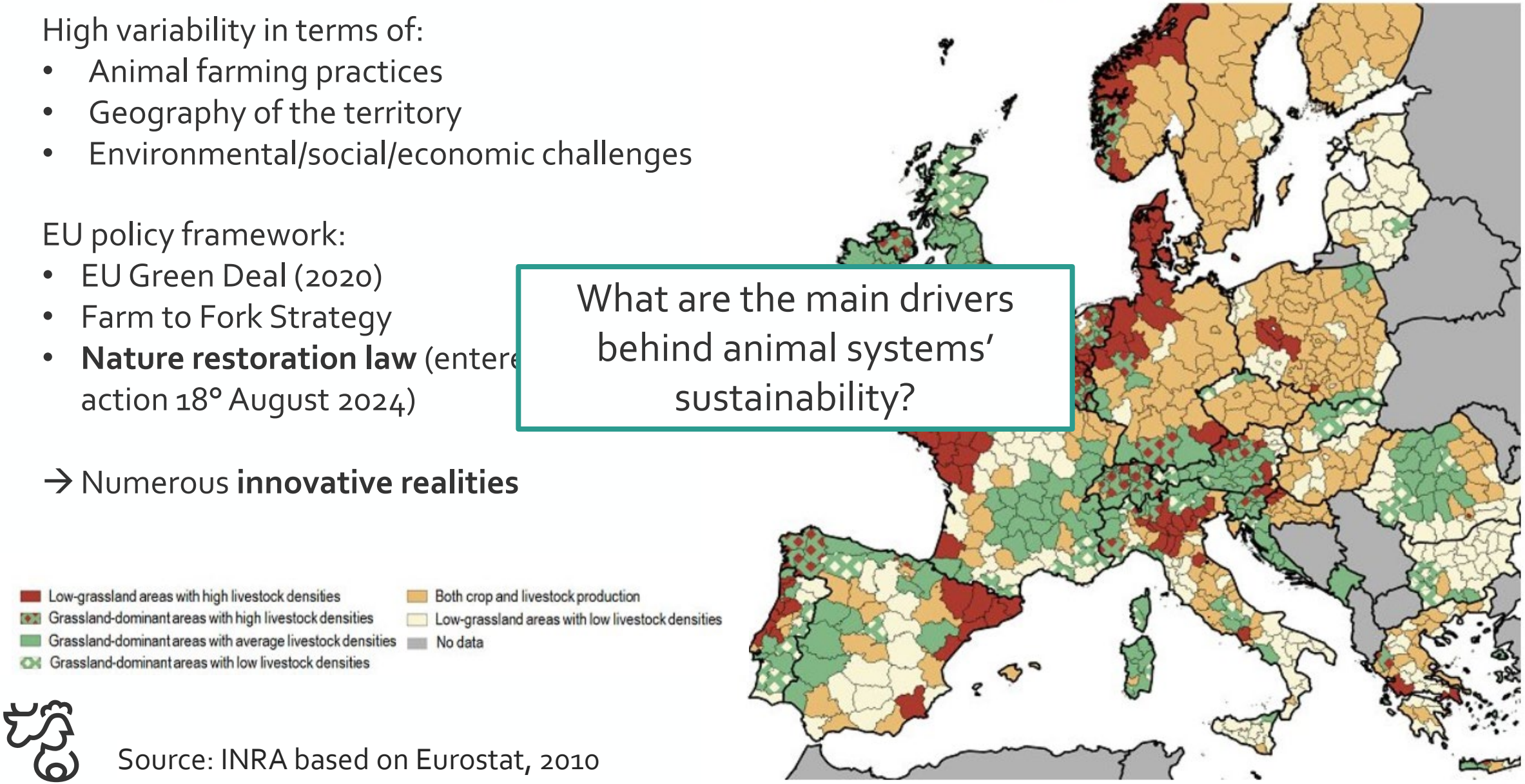
- Animal farming practices
- Geography of the territory
- Environmental/social/economic challenges

EU policy framework:

- EU Green Deal (2020)
- Farm to Fork Strategy
- **Nature restoration law** (entere
  action 18° August 2024)

→ Numerous **innovative realities**

What are the main drivers behind animal systems' sustainability?



Source: INRA based on Eurostat, 2010

The PATHWAYS project - WP1

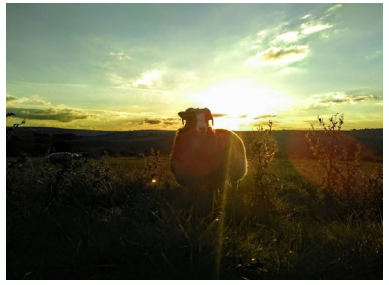
- A 9M EUR project funded by the European Union Horizon 2020 Work programme
- Coordinated by SLU, 31 partners
- 2021-2026

SLU CONSORTIUM PARTNERS

AIM: **identifying** and **promoting** sustainable practices and pathways for **sustainable livestock husbandry** and **food systems** along the whole chain.

Materials and Methods: the Practice Hubs

106 innovative farms, 11 countries



COUNTRY	SPECIES	INNOVATION	FARMS
Germany	Dairy	100% pasture-fed cow-calf dairy systems	10
France	Dairy	Management for maximisation of C sequestration in pasture	5
Romania	Dairy	Dairy with agroforestry aiming for self-sufficiency in protein-based feed	10
Sweden	Dairy	More-from-less dairy systems utilising on-farm advice and carbon footprinting tool	7
United Kingdom	Beef	100% pasture-fed beef systems utilising mob grazing, herbal leys and mobile slaughterhouses and Community Supported Agriculture	19
Italy	Beef	New breeding methodology for "mountain pasture" with own certification/label development	6
Sweden	Beef	Quality assured (IP SIGILL) production system for beef and sheep on HNV semi-natural pastures together with label development	10
France	Pig	Conventional production utilising manure for biogas	5
Denmark	Pig	Organic farmers utilising "green-protein" from grass/clover working with feed company and refinery	3
Netherlands	Pig	Conventional pig production with innovative flooring (solid floor with a layer of material for rooting for all ages) and focus on biodiversity	4
Poland	Poultry	Agri-tech innovation for improved welfare	11
France	Poultry	Farmer co-operative producing and sharing compost from plant-based litter	13
Netherlands	Poultry	Closed-loop egg production feeding food processing waste and recycling manure	3

Gerrard et al. (2012). Public goods and farming. Farming for food and water security.

Materials and Methods: the Public Goods (PG) Tool

Excel-based survey, adapted from Gerrard et al. (2012) → Evaluation of a system's sustainability

12 spurs:

- Agri-environmental management
- Landscape and heritage
- Soil management
- Water management
- Manure and fertilizer
- NPK budget
- Energy and carbon
- Profitability
- Farm business resilience
- System security and diversity
- Animal welfare
- Social well-being

Environmental

Economic

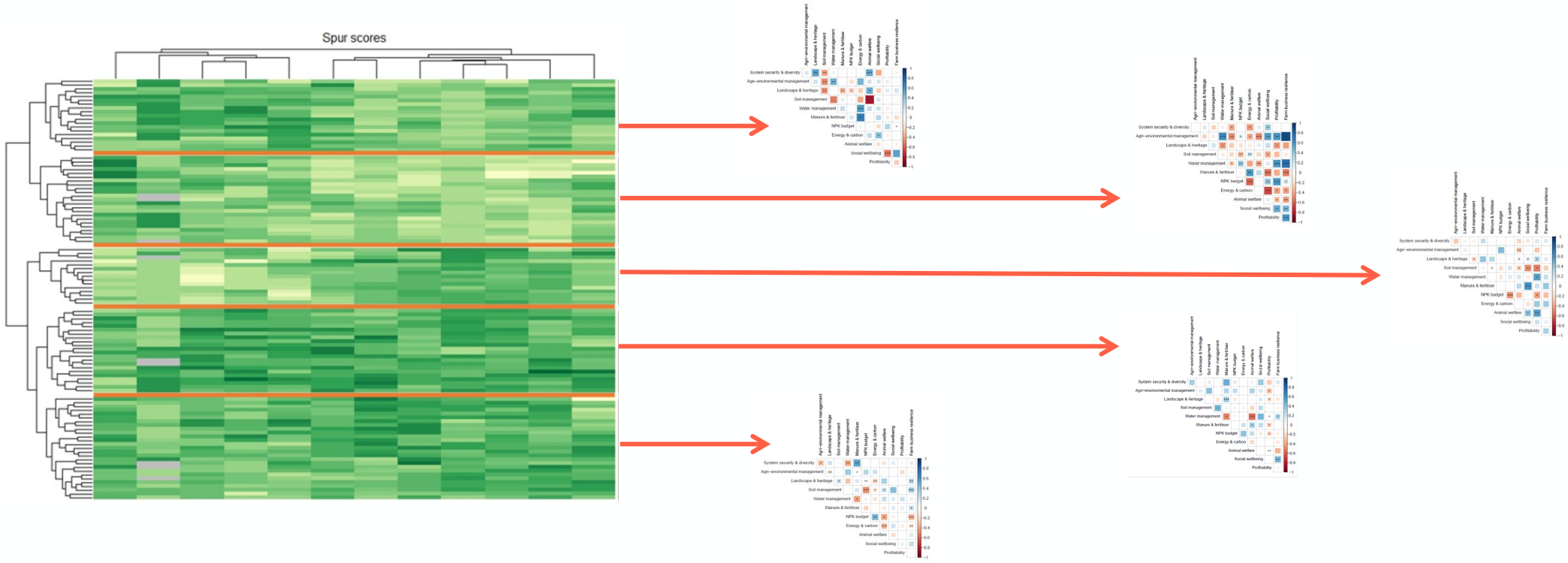
Social

Spurs > **Activities** > **Questions**

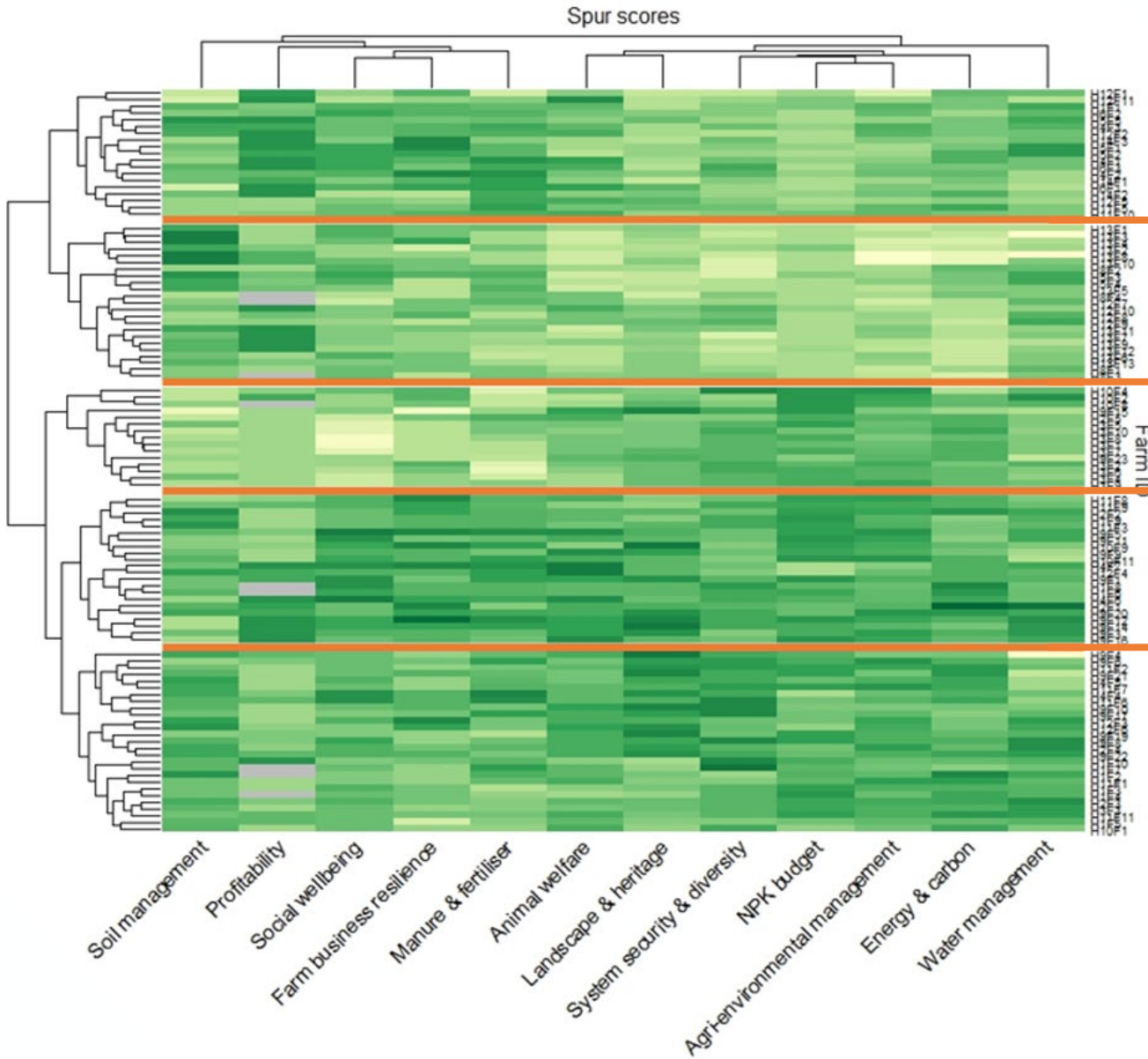
Scoring system: 1-5

Materials and Methods: data analysis

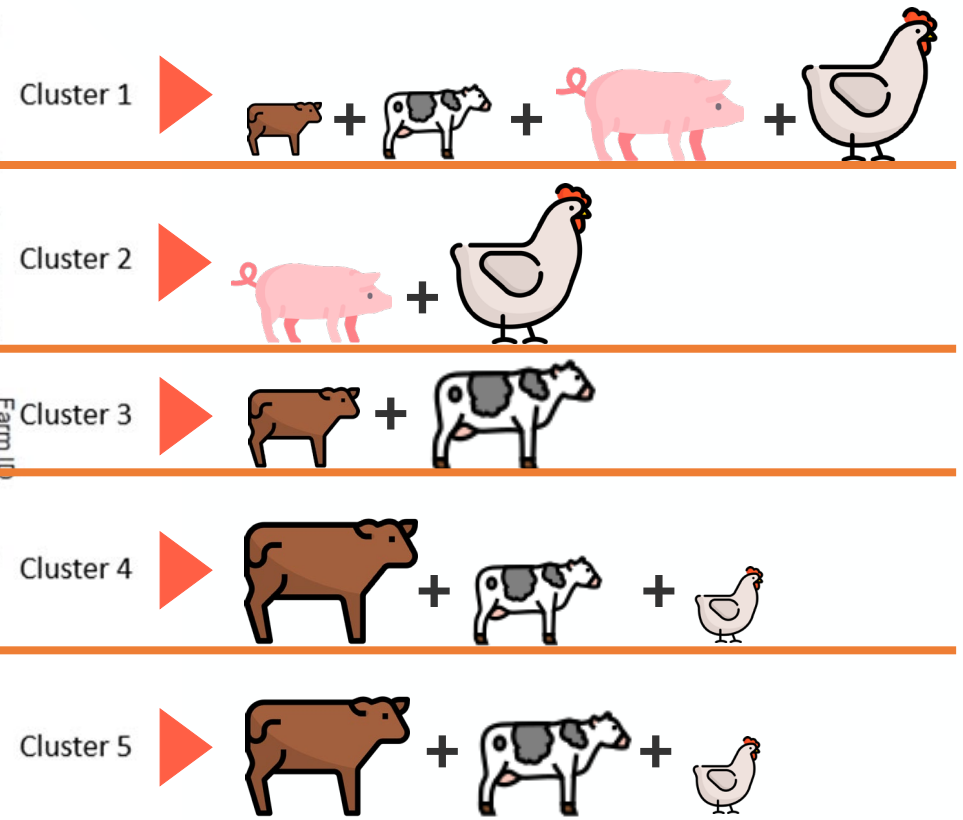
- R Statistical Software (v4.3.0; R Core Team, 2023):
- Heatmap cluster analysis (after data scaling)
- Correlation analysis (Spearman's R test)



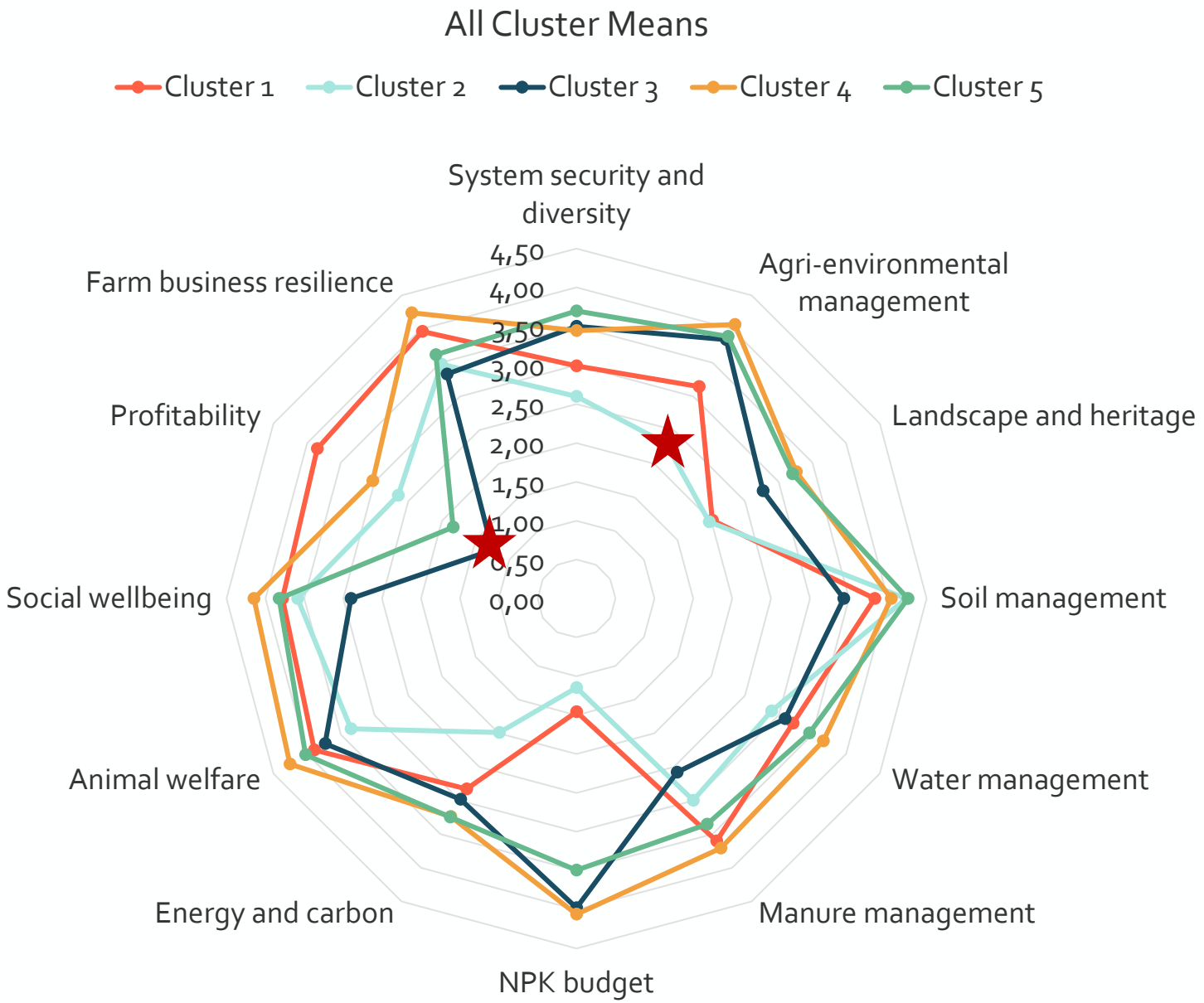
Results and discussion: the heatmap



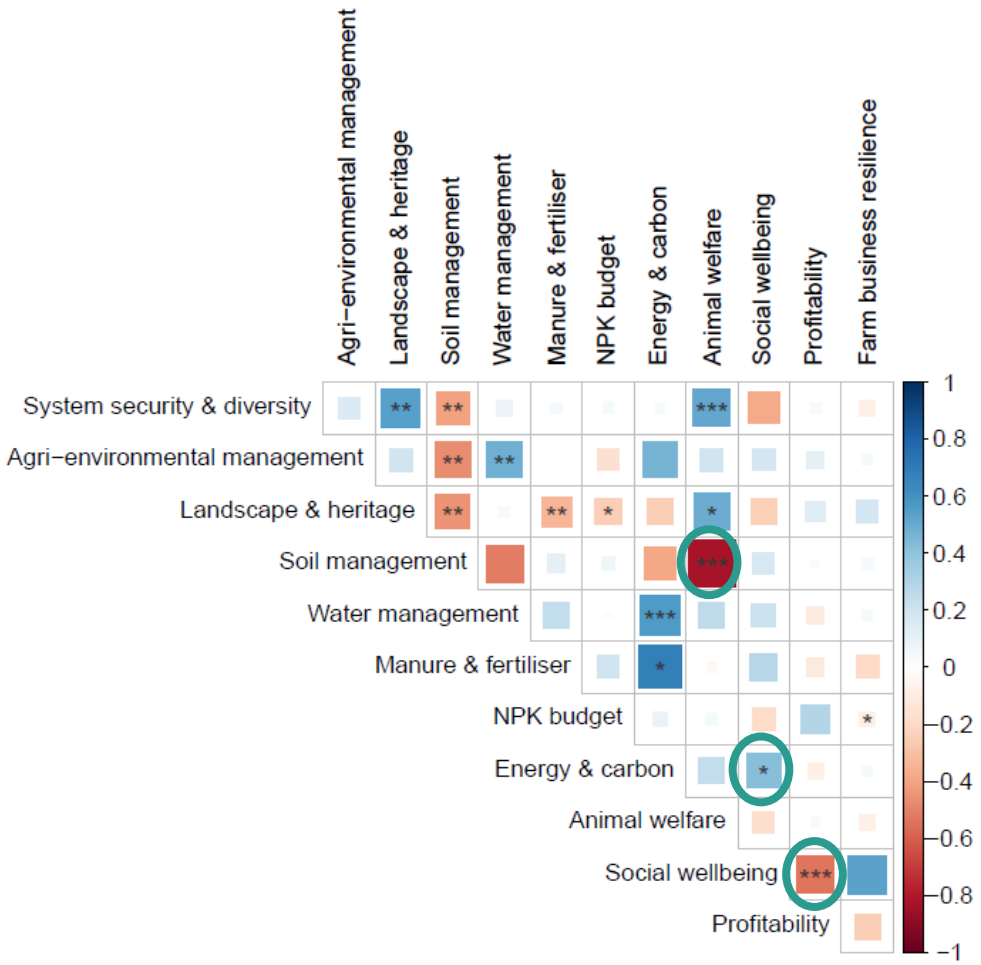
Clusters' composition



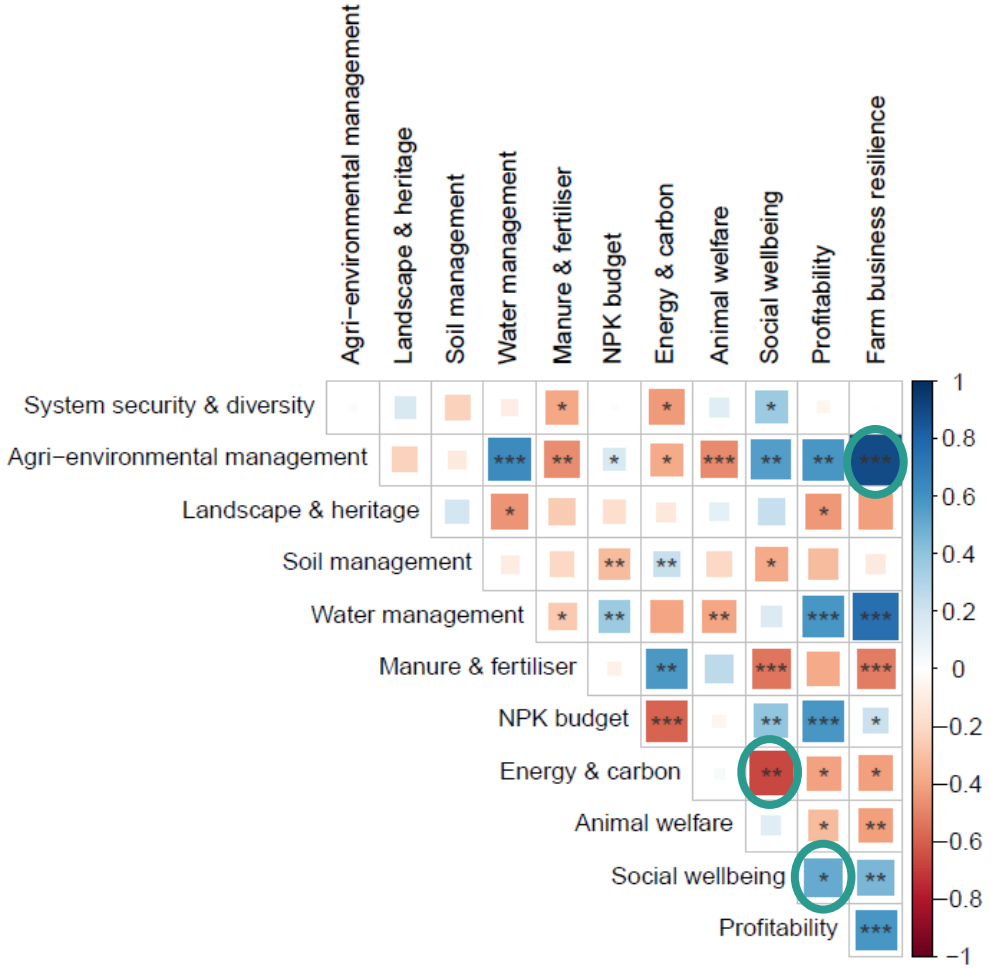
Results and discussion: clusters' performance



Results and discussion: clusters' spurs correlations



Cluster 2 (26% pork; 74% poultry)



Cluster 3 (33% beef; 76% dairy)

Positive correlations are displayed in blue and negative correlations in red color.
Color intensity and the size of the square are proportional to the correlation coefficients. Pch symbols within the square identify significant correlations and their number is directly proportional to the significance of the p-value (1 for p-values between 0.01 and 0.05; 2 for p-values between 0.001 and 0.01; 3 for p-values inferior to 0.001).

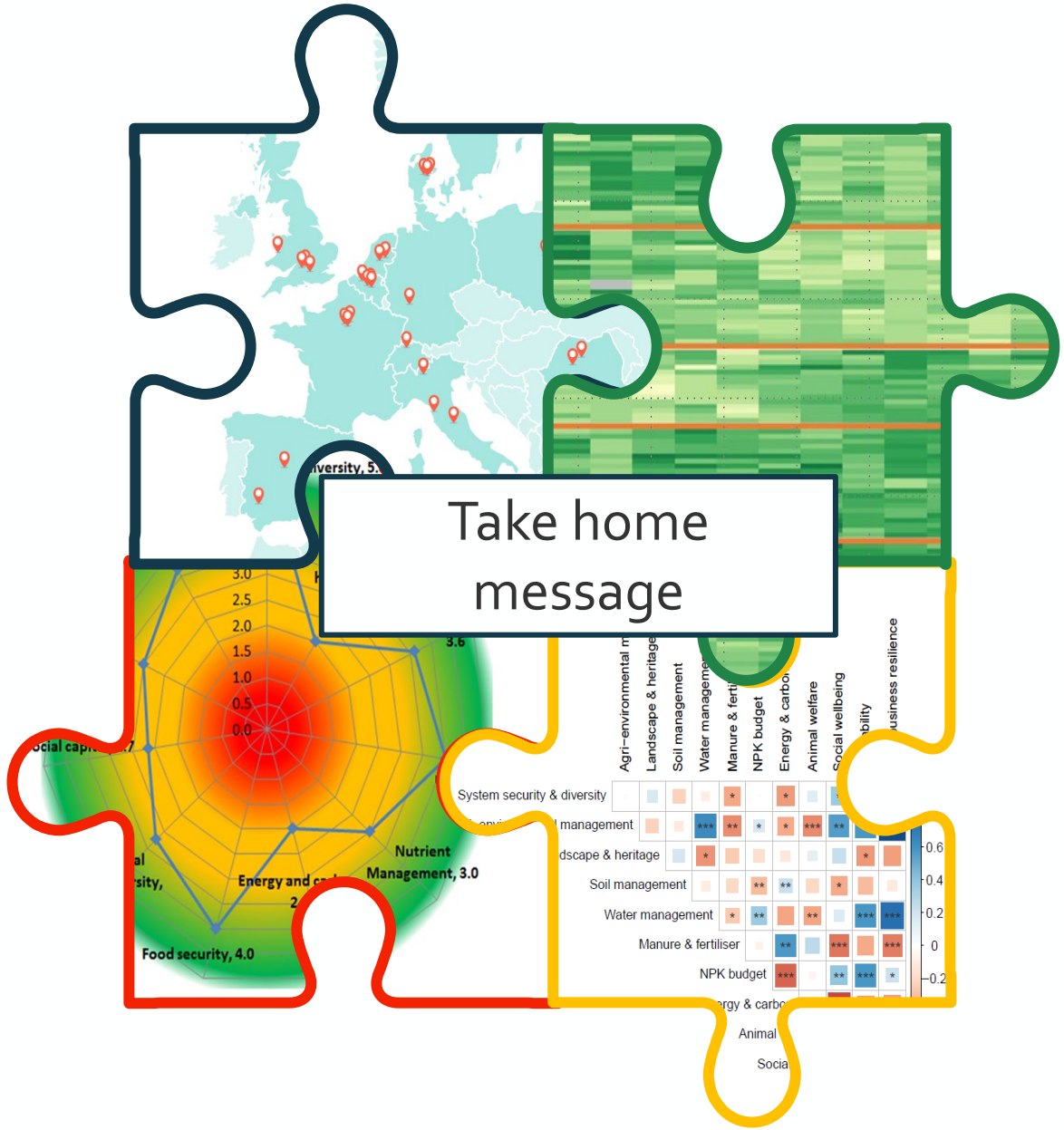
Conclusions

Pros

Innovative livestock systems

Cons

Study limitations



5 clusters

Correlations

THANKS FOR THE ATTENTION!

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