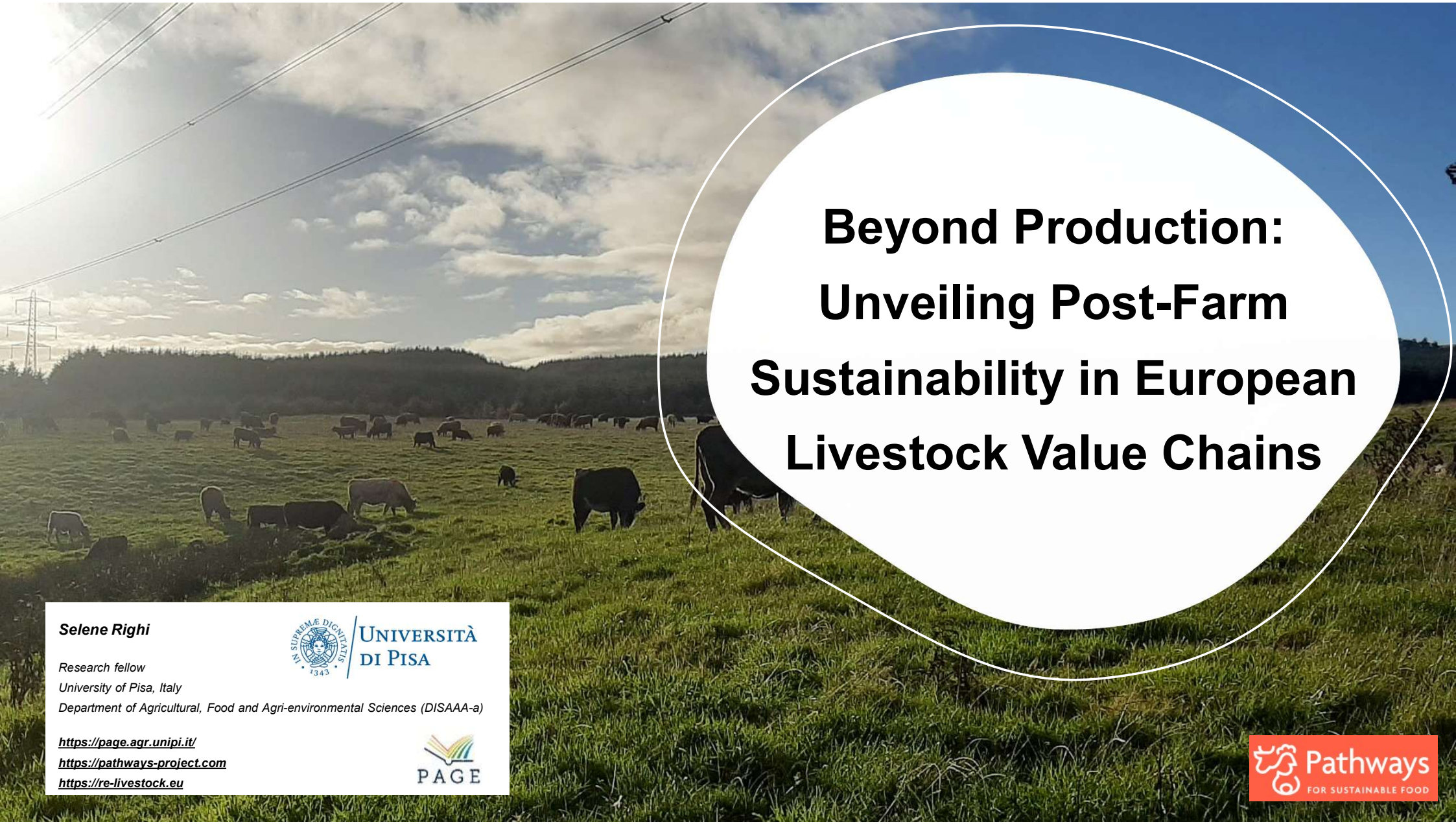

Beyond Production: Unveiling Post-Farm Sustainability in European Livestock Value Chains

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https://re-livestock.eu

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Agenda

1. Introduction
2. Goals
3. Theoretical framework and RQs
4. Methodology
5. Expected results
6. Conclusion

Context

Ensuring **food security** and a **healthy, sustainable diet** is a key global challenge *(IPCC, 2022).*

In 60 years, the population and **meat consumption** have more than quadrupled *(https://ourworldindata.org/meat-production).*

Livestock is responsible for **81–86% of agriculture's** and **14.5% of global GHG emissions**, mainly methane emissions *(Blair et al., 2024; Cheng et al., 2022; FAO, 2017).*

Current **intensive models** lead to deforestation, biodiversity loss, and land degradation *(European Court of Auditors, 2020; Masson-Delmotte et al., 2019).*

The sector contributes to **climate change…**

BUT…

Livestock systems can support **nutrition, rural livelihoods**, and **ecosystem services** *(Page & Witt, 2022).*

"The purpose of sustainability assessment is to provide decision-makers with an evaluation of global to local integrated nature-society systems in short- and long-term perspectives in order to assist them to determine which actions should or should not be taken in an attempt to make society sustainable" (Ness et al., 2007).

Introduction

In a context of growing concern for **the sustainability transition** of the European food system, the sustainability assessment of livestock value chains is a complex exercise that can shed lights of the actions that need to be taken in the next future.

Focusing on multiple dimensions, avoiding a reductionist approach, and involving different expertise along livestock value chains can help to assess the whole sector, in his systemic understanding, contribution to the transition toward sustainability.

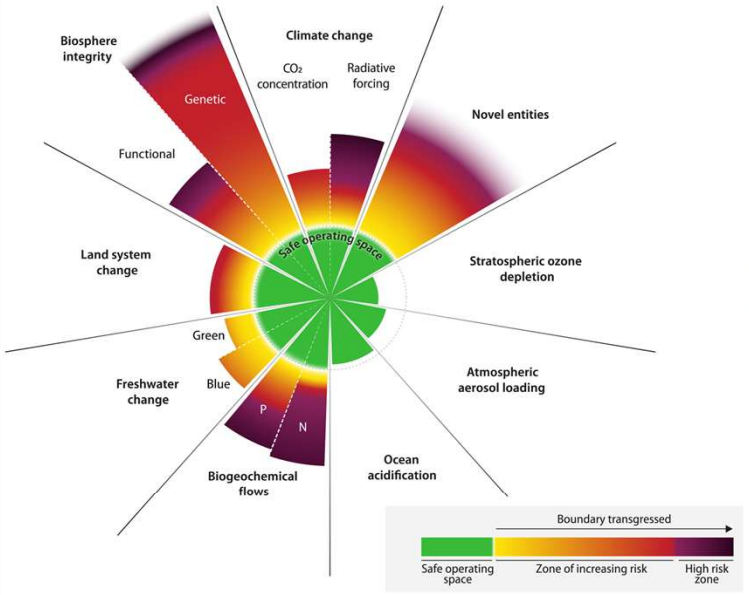
Goals

- To go beyond the farm gate and try to fill the gap of existing evaluations that focus more on primary production and environmental metrics.
- To analyse the sustainability in a broader value chain dynamic and to compare contrasting value chains in Europe.
- To understand the aspects in which every value chain or part of the chain can work to improve their sustainability.
- To give information and more details at the consumers and policymakers.

Theoretical framework and RQs

Are these practice effective to come back to the safe operating space?

Which impacts have these practices on the techno-economic, social and governance spheres?



Current status of control variables for all nine planetary boundaries.
Richardson et al., Sci. Adv. 9, eadh2458 (2023)

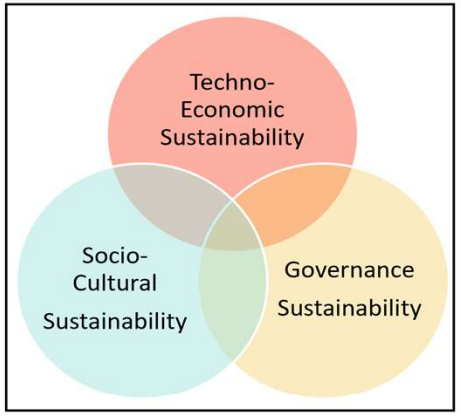
Safe Operating Space for Humanity

Organic

Agro-ecology

....

Livestock Structural changes (Regulations and Practices)



Content of the research

Research questions

Which elements have a greater impact on the transformation of the livestock supply chain toward sustainability?

But what is a Value Chain?

- A Livestock Value chain?

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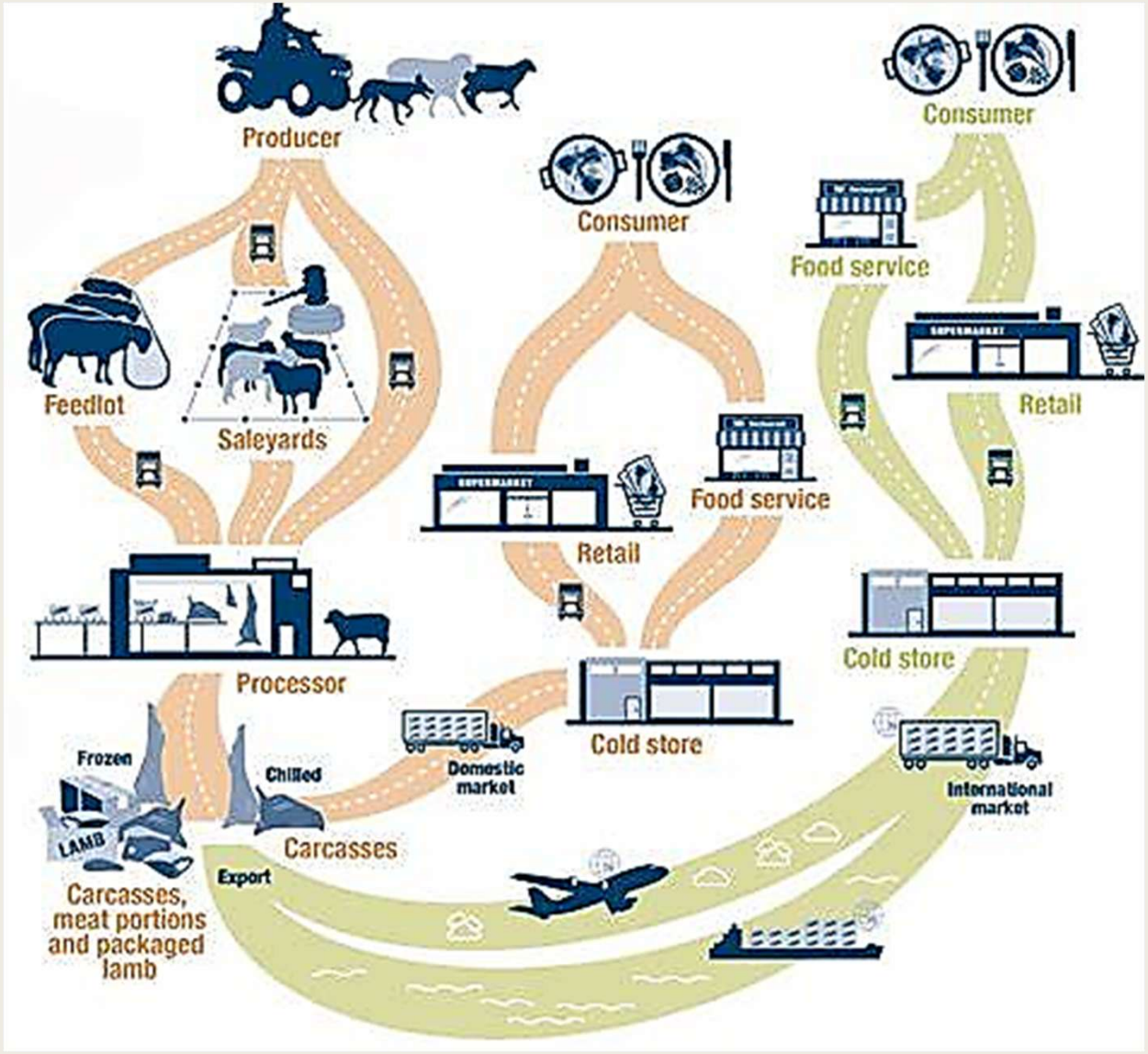


If we could first know where we are, and whither we are tending, we could better judge what to do, and how to do it...

- Abraham Lincoln, speech to the Illinois Republican state convention, June 16, 1858

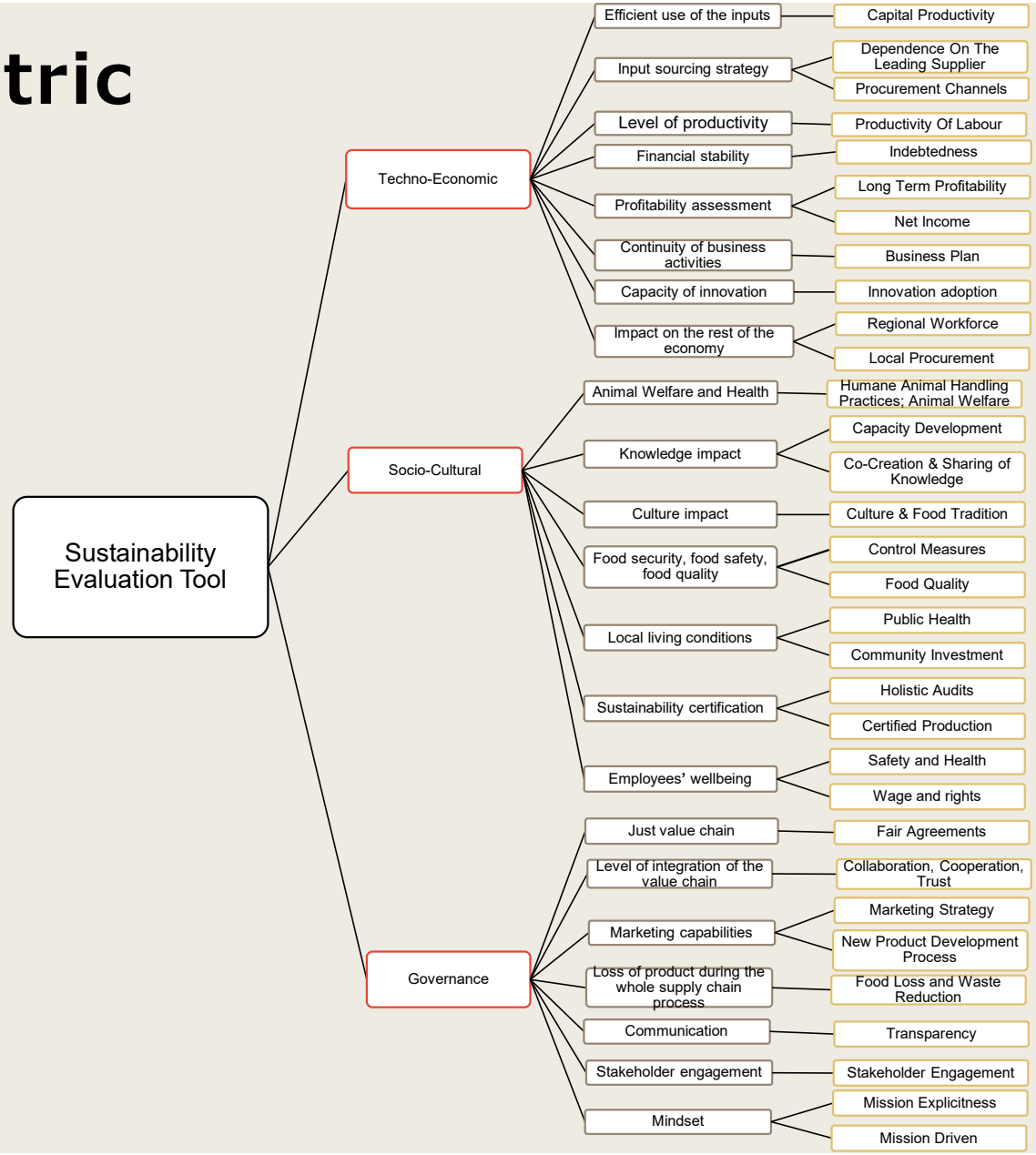
Contrasting livestock system in Europe

- **Intensive livestock system** (Mpofu, 2020; Organisation des Nations Unies pour l'alimentation et l'agriculture & International livestock research institute, 2011) → the basic features are that:
  - It coincides with high livestock densities.
  - It can result from the use of highly productive breeds.
  - Animals' environment in total is provided for them to maximize the profit out of their rearing.
- **Sustainable Intensive (SI) livestock system** (Garnett, 2009; Poux & Aubert, 2018; Sijpestijn et al., 2022) → comprehends:
  - Technical solutions that lead to an increased use of capital and to farm expansion and specialization.
  - Apply traditional and modern breeding techniques to improve yields of neglected crop and livestock species.
  - acceptable standards of animal welfare.
- **Extensive livestock system** (Horsin et al., 2018) → the main features are:
  - Low intensity of inputs, low productivity, low stocking rate.
  - Ecosystem services provision while valorising grassland plant diversity.
  - Grazing management using specific rotations.
  - Use of hardy breeds adapted to the local specificities.
- **Organic livestock system** (REGULATION (EU) 2018/848 on Organic Production and Labelling of Organic Products and Repealing Council Regulation (EC) No 834/2007, 2018) → combines:
  - best environmental and climate change mitigation practices,
  - a high level of biodiversity,
  - the preservation of natural resources,
  - the application of high animal welfare standards,
  - high production standards in line with the demand of a growing number of consumers for products produced using natural substances and processes, and
  - avoiding or largely excluding the use of synthetically compounded fertilizers, pesticides, growth regulators and livestock feed additives.

Methodology

- A qualitative in-depth interview with key stakeholder to understand the different value chain.
- A semi-quantitative questionnaire to assess the socio-economic sustainability and compare different Livestock Value Chains (LVC) follow the metric developed and the weight.
- The choice of LVC was driven by the project:
  - milk value chain in Italy and France
  - beef value chains in UK and France/Italy
  - pig value chain in Spain and Italy

Metric


Sustainability Evaluation Tool
Techno-Economic
Efficient use of the inputs
Capital Productivity
Input sourcing strategy
Dependence On The Leading Supplier
Procurement Channels
Level of productivity
Productivity Of Labour
Financial stability
Indebtedness
Profitability assessment
Long Term Profitability
Net Income
Continuity of business activities
Business Plan
Capacity of innovation
Innovation adoption
Impact on the rest of the economy
Regional Workforce
Local Procurement
Socio-Cultural
Animal Welfare and Health
Humane Animal Handling Practices; Animal Welfare
Knowledge impact
Capacity Development
Co-Creation & Sharing of Knowledge
Culture impact
Culture & Food Tradition
Food security, food safety, food quality
Control Measures
Food Quality
Local living conditions
Public Health
Community Investment
Sustainability certification
Holistic Audits
Certified Production
Employees' wellbeing
Safety and Health
Wage and rights
Governance
Just value chain
Fair Agreements
Level of integration of the value chain
Collaboration, Cooperation, Trust
Marketing capabilities
Marketing Strategy
New Product Development Process
Loss of product during the whole supply chain process
Food Loss and Waste Reduction
Communication
Transparency
Stakeholder engagement
Stakeholder Engagement
Mindset
Mission Explicitness
Mission Driven

Expected results

- Comparison of the level of sustainability between contrasting livestock value chains (LVC) in Europe.
- Understand the structure and relationships between the different actors in LVC to be able to identify which aspects they should work on to improve their sustainability and these relationships.
- Provide useful information to guide supporting policies and consumer choices.

Conclusion

This analysis:

- will highlight critical **leverage points** to support the **transition** of livestock farming.

- will allow the identification of **more sustainable, resilient and efficient pathways** from a social, economic and governance perspectives.

*An **"ecosystem"** where there are exchanges of information between all stakeholders through collaboration, transparency and trust, is able to bring multiple positive effects to all those involved in the system and to the environment in which they operate, maximising their well-being and that of the population in which they operate.*

Final remarks

- The livestock sector is undergoing profound **structural, regulatory, and market changes**, requiring a redefinition of its narrative and strategies.
- Ensuring **sustainability** demands **innovative, transformative policies** that align with **planetary boundaries**, balancing environmental, economic, and social goals.
- Current EU agricultural policies must evolve to support **competitiveness**, **social acceptance**, and **resilience**.
- The **Pathways Project** proposes a **participatory, scenario-based methodology** to co-design fair and effective transition pathways.
- Future strategies must reflect the **interconnectedness of society, animals, and the environment**.

"To reduce environmental impacts and improve socio-economic sustainability and address the current global challenges, **transformative change** is required" (Brunori, 2022).

"We need to have the courage to change what must be changed"

(Bartolini, 2012)

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Thank you for your attention!

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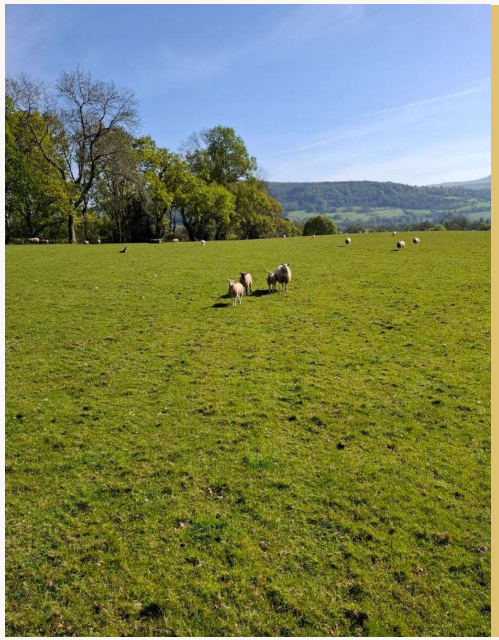

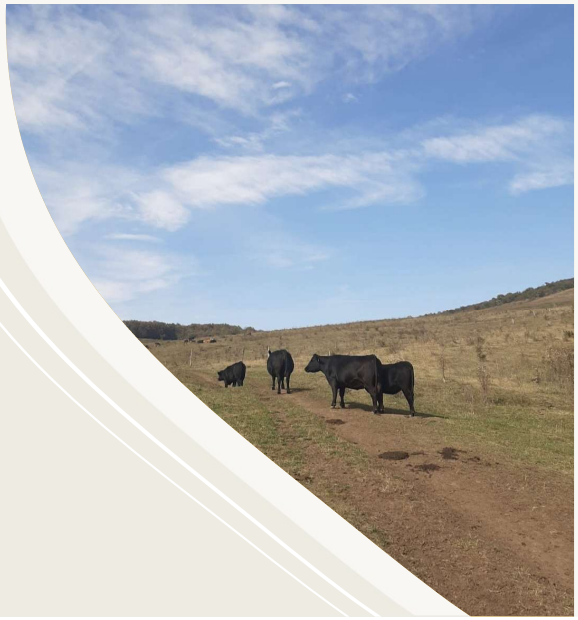

References

Bartolini, S. (2012). *Manifesto per la felicità: Come passare dalla società del nen-avere a quella del ben-essere* (Feltrinelli, Ed.).

Blair, K. J., Moran, D., & Alexander, P. (2024). Worldviews, values and perspectives towards the future of the livestock sector. *Agriculture and Human Values*, *41*(1), 91–108. https://doi.org/10.1007/s10460-023-10469-9

Brunori, G. (2022). Agriculture and rural areas facing the “twin transition”: Principles for a sustainable rural digitalisation. *Italian Review of Agricultural Economics*, *77*(3), 3–14. https://doi.org/doi.org/10.36253/rea-13983

Cheng, M., McCarl, B., & Fei, C. (2022). Climate Change and Livestock Production: A Literature Review. *Atmosphere*, *13*(1). https://doi.org/10.3390/atmos13010140

European Court Of Auditors. (2020). *Sustainable use of plant protection products: Limited progress in measuring and reducing risks.* 49. https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=53001

FAO. (2017). Livestock solutions for climate change. *Fao*.

IPCC. (2022). *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. https://www.ipcc.ch/report/ar6/wg2/

Masson-Delmotte, V., Pörtner, H., Skea, J., Buendía, E., Zhai, P., & Roberts, D. (2019). Climate change and land. *IPCC Report*.

Page, C., & Witt, B. (2022). A Leap of Faith: Regenerative Agriculture as a Contested Worldview Rather Than as a Practice Change Issue. *Sustainability*, *14*(22). https://doi.org/10.3390/su142214803