Creating a Shared Framework for Standardising Life Cycle Assessments in Livestock Production Systems

3rd one-day symposium of the ATF and EAAP Commission on Livestock Farming Systems

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28th August 2023

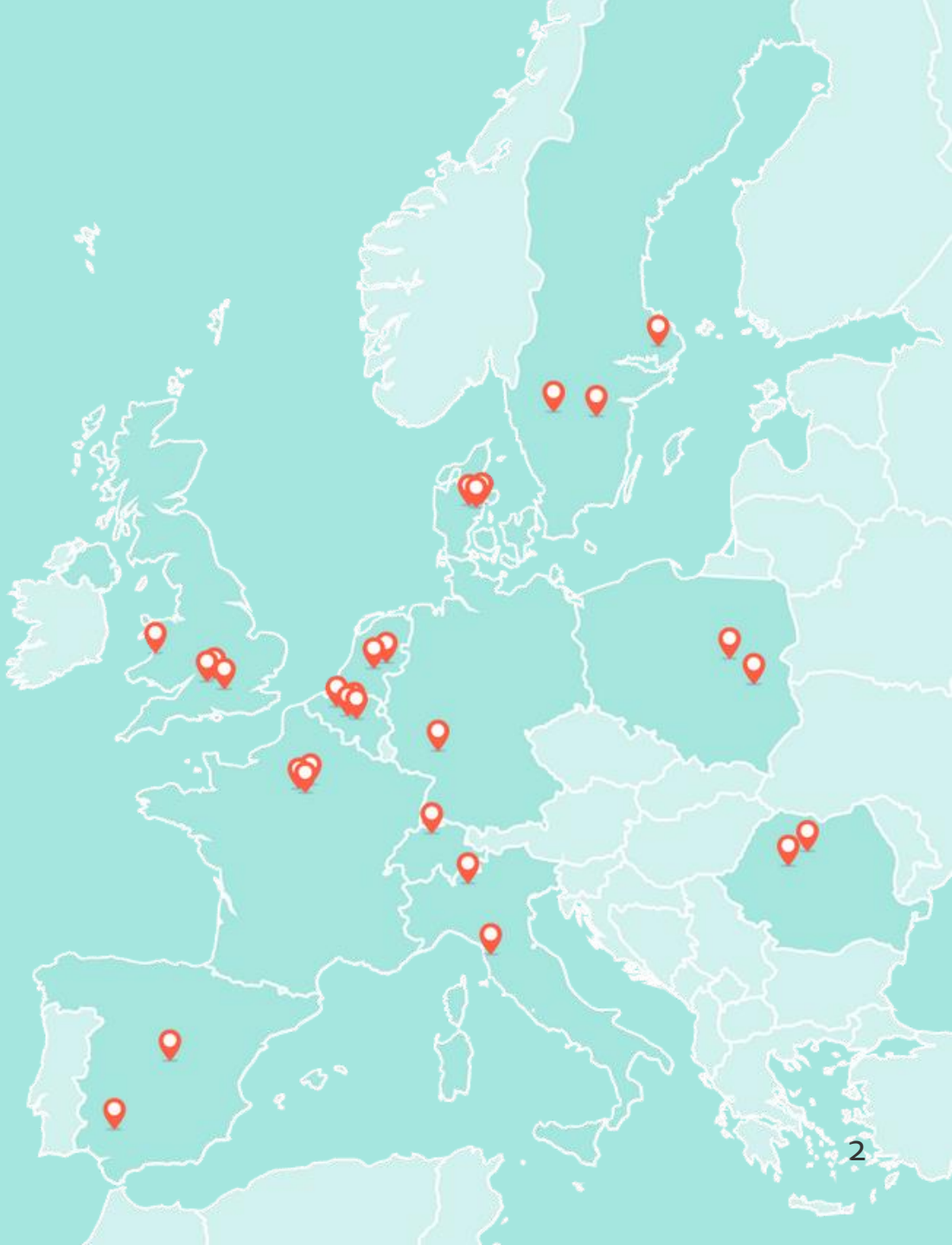
Pathways FOR SUSTAINABLE FOOD

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 101000395.

What is PATHWAYS?

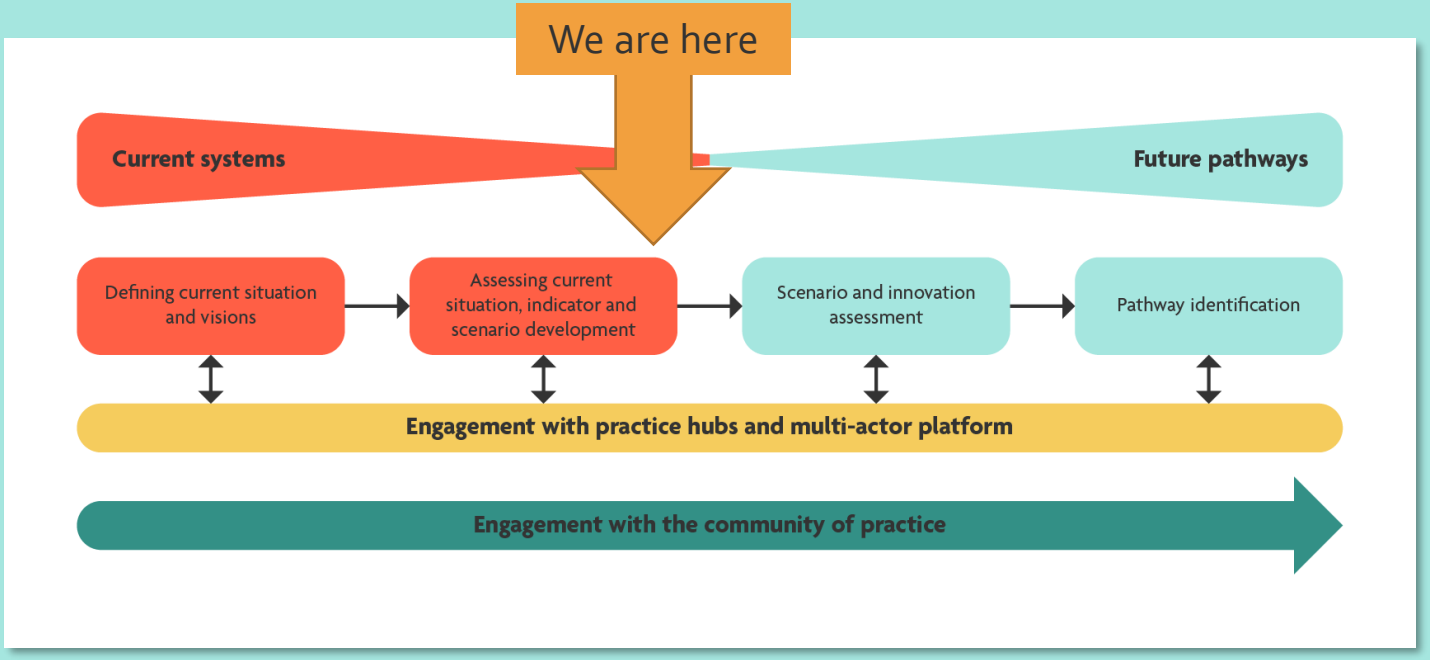
- A five-year 9M EUR project funded by the European Union Horizon 2020 Work programme
- Coordinated by SLU, 31 partners
- Overarching aim is to “inform policy, research and business strategies in support of a transition to more sustainable livestock production and consumption”
- Project start date 1 September 2021
- https://pathways-project.com/

CONSORTIUM PARTNERS

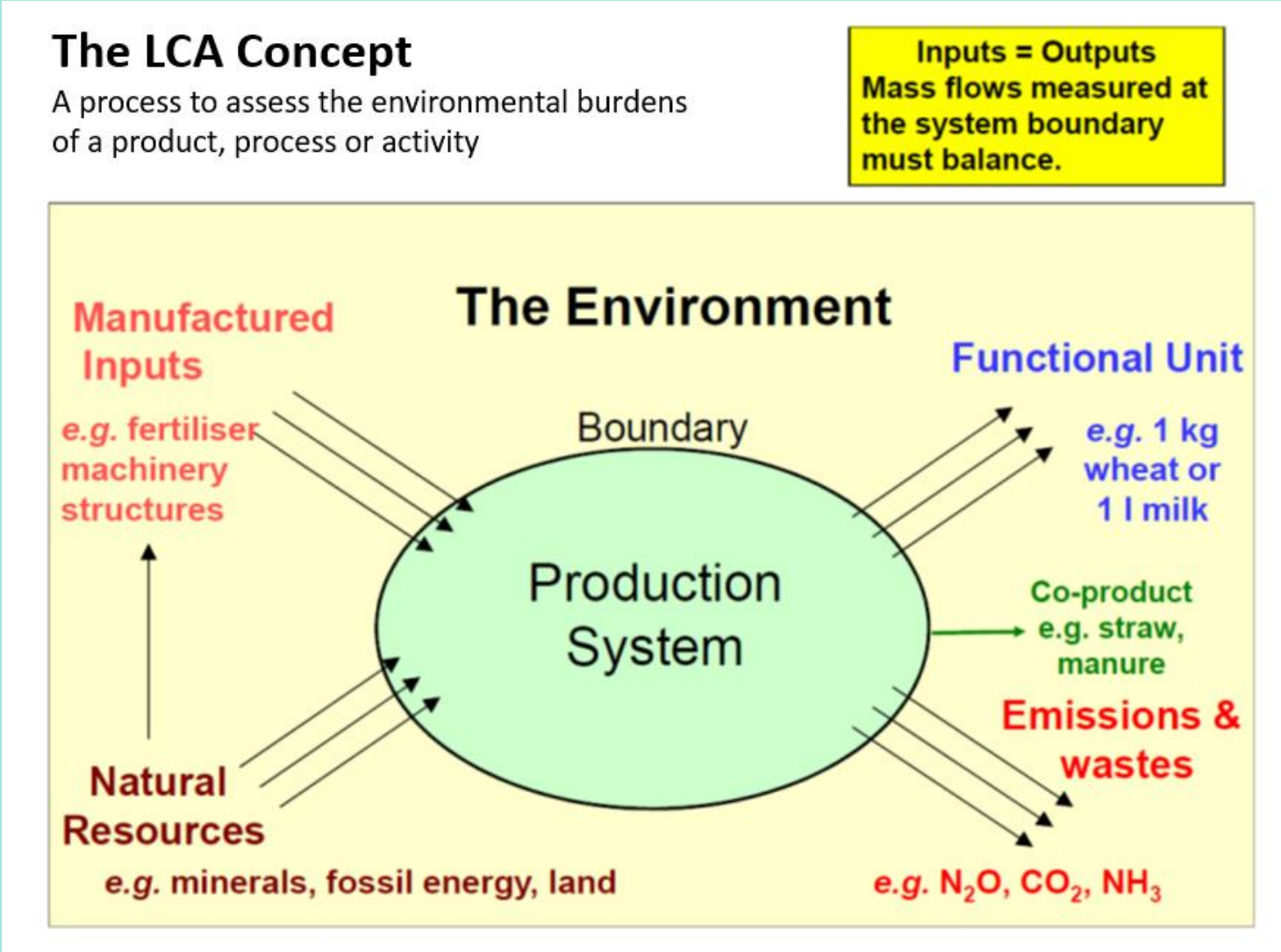


PATHWAYS objectives:

1. To develop **innovative holistic sustainability assessment methodologies** to enable livestock systems assessments from farm to fork
2. To **identify and evaluate innovations** within livestock systems through practice hubs and stakeholder engagement
3. To **co-design scenarios** and **associated transition pathways** with multi actors for a sustainable European livestock sector
4. To **support a timely effective transition** to sustainable livestock systems in Europe



Improving Life Cycle Assessment (LCA) to better represent livestock systems is central to the project



Why is this important?

LCA a popular method and uptake still rising…

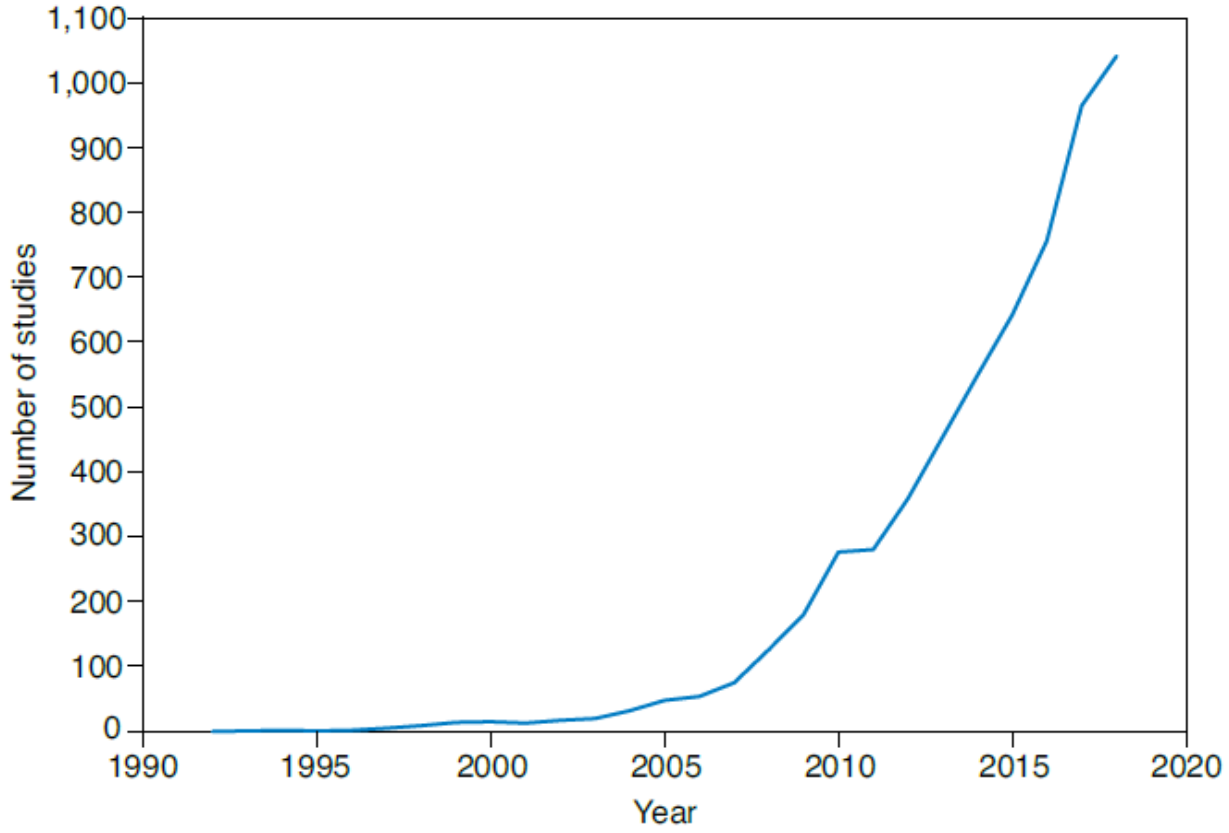
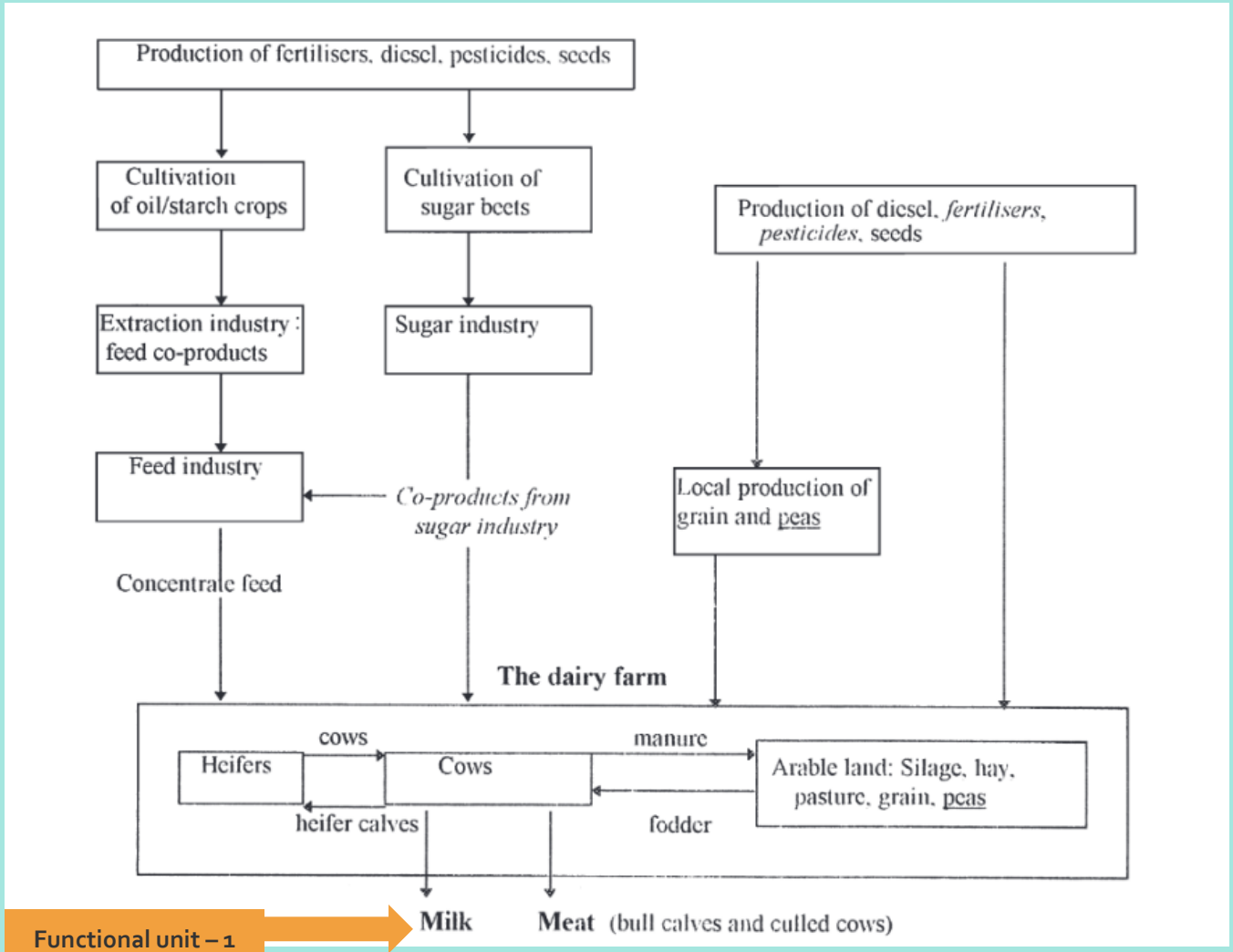


Fig. 1 | Annual number of peer-reviewed English-language articles published from 1990–2018 using LCA to assess agricultural and food systems. $n = 5{,}954$.

van der Werf et al. 2020

Current LCAs are limited in scope: example assessment for a livestock with arable farm:



Functional unit – 1 litre / 1 kg of product

Cederberg & Mattsson (2000)

Current limitations of livestock LCAs

- A "product-based" approach doesn't capture a broad range of ecosystem services relevant to the SDGs

- Such an approach tends to favour intensive high-input agricultural systems that produce higher yields but provide fewer ecosystem services

Key research questions for PATHWAYS:

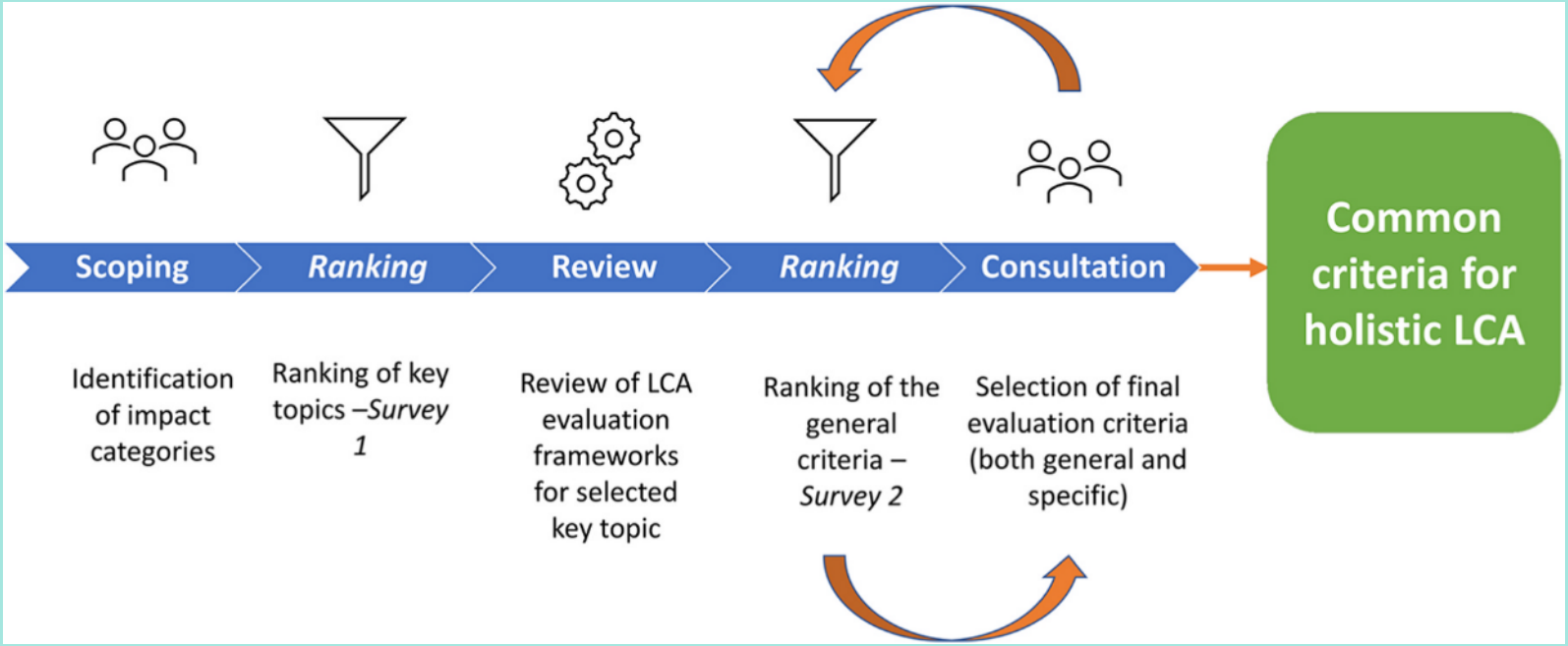
- *How can we better represent livestock systems in LCA?*

- *Which are the most appropriate methods to incorporate in LCAs for this improvement?*

Creating a Shared Framework for improving Life Cycle Assessments of Livestock Systems:

- A harmonisation approach based on the "Delphi" method was adopted to identify key topics and evaluation criteria for LCAs of livestock systems

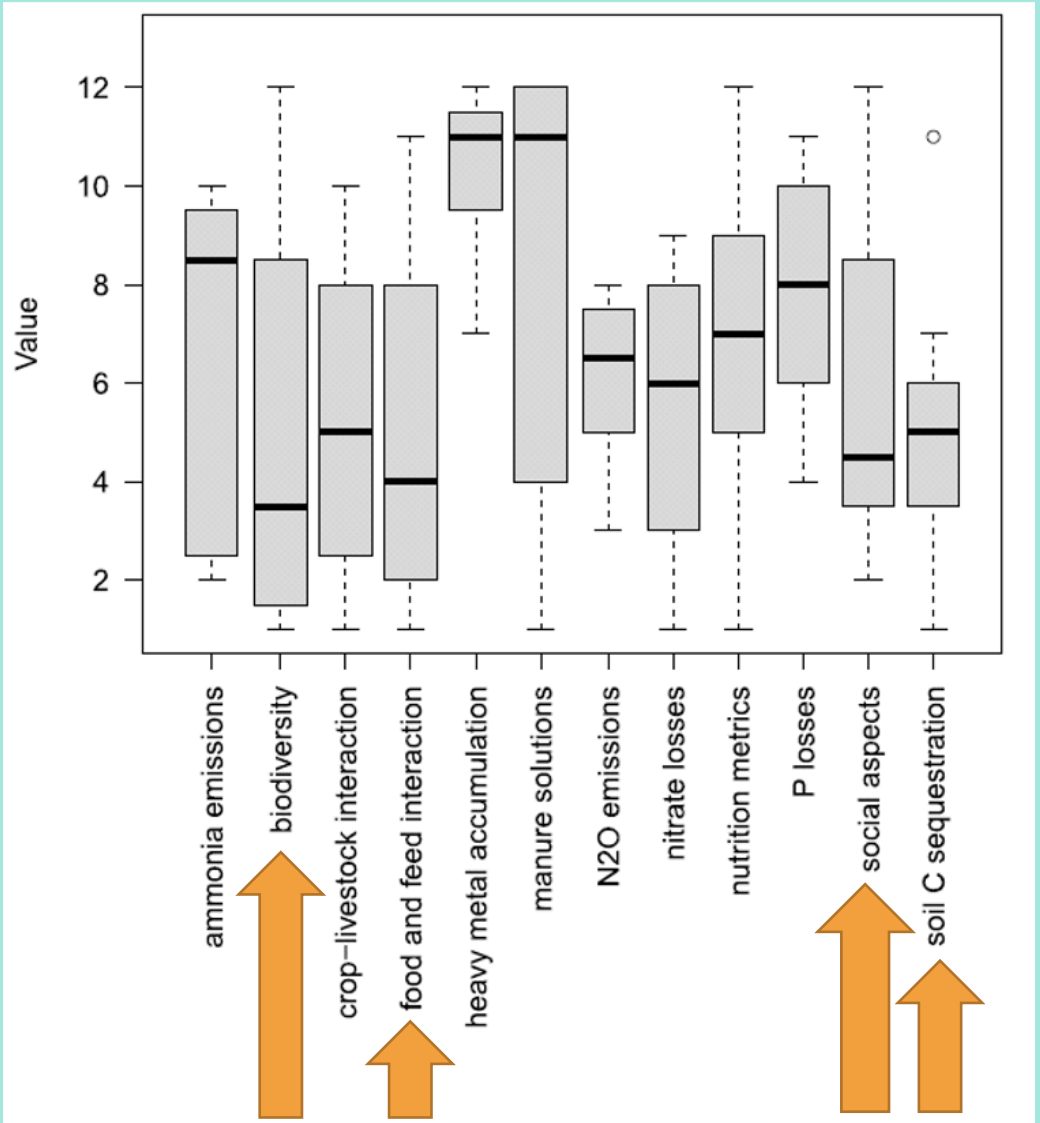
- General, specific, search and screening criteria for LCA methods of livestock systems were identified through literature review and 29 workshops with 21 experts on LCA, GHGs, biodiversity, nutrition and animal welfare.



Survey 1: ranking key topics for inclusion in an improved LCA of livestock systems

- Online survey containing list of key indicators sent to 21 LCA experts
- **Biodiversity** had the highest priority among respondents
- This was followed by **Social aspects, Soil C sequestration** and **Food-feed interactions**
- During the workshops, it was reported "**the choice of the key topic is often affected by the LCAs own research agenda**"

Box plot of the LCA expert responses to identify key priority for LCA of livestock systems. ***Lower values = higher importance***



Review of current established LCA evaluation frameworks and associated criteria – an overview of the approaches considered

- **RACER framework:** acronym for "Relevance, Accuracy, Completeness, Efficiency, and Reliability": A comprehensive methodology for assessing the quality of data used in life cycle assessment (LCA) studies. It emphasises evaluating data based on these five dimensions to ensure robust and credible environmental impact assessments. Recently used within the European context to assess resource dissipation

- **European Joint Research Centre (JRC) methods:** Developed in collaboration with industry partners for the International Life Cycle Database (ILCD) and for the Product Environmental Footprint Category Rules (PEFCR), which is based on LCA methodology

- **FAO LEAP (Livestock Environmental Assessment and Performance) method:** developed by the Food and Agriculture Organization (FAO) to assess the environmental performance of livestock production systems. It addresses the complexity of these systems by considering multiple stages such as feed production, animal management, and waste handling.

- **Framework for assessment soil carbon estimation methods published in Goglio et al (2015):** applicability and certainty were considered as part of a systematic review of methods for the evaluation of soil carbon changes in agricultural systems

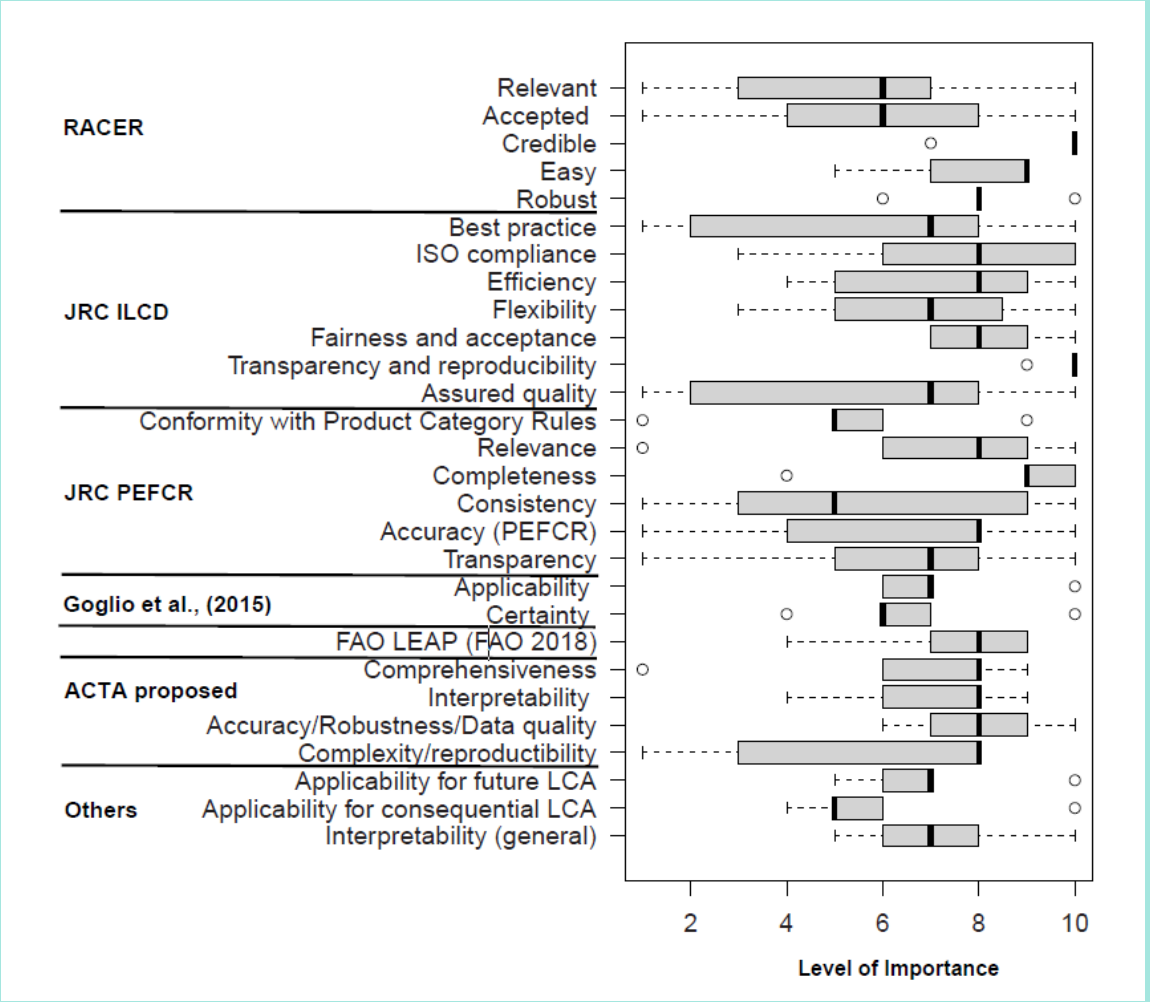
- **Association de Coordination Technique Agricole, (French farmers's development board association) proposed criteria** of Comprehensiveness, Interpretability, Accuracy / Robustness / Data quality and Complexity / Reproducibility

- **Additional criteria proposed by LCA working group in PATHWAYS:** "applicability for future LCA" and "applicability for consequential LCA"

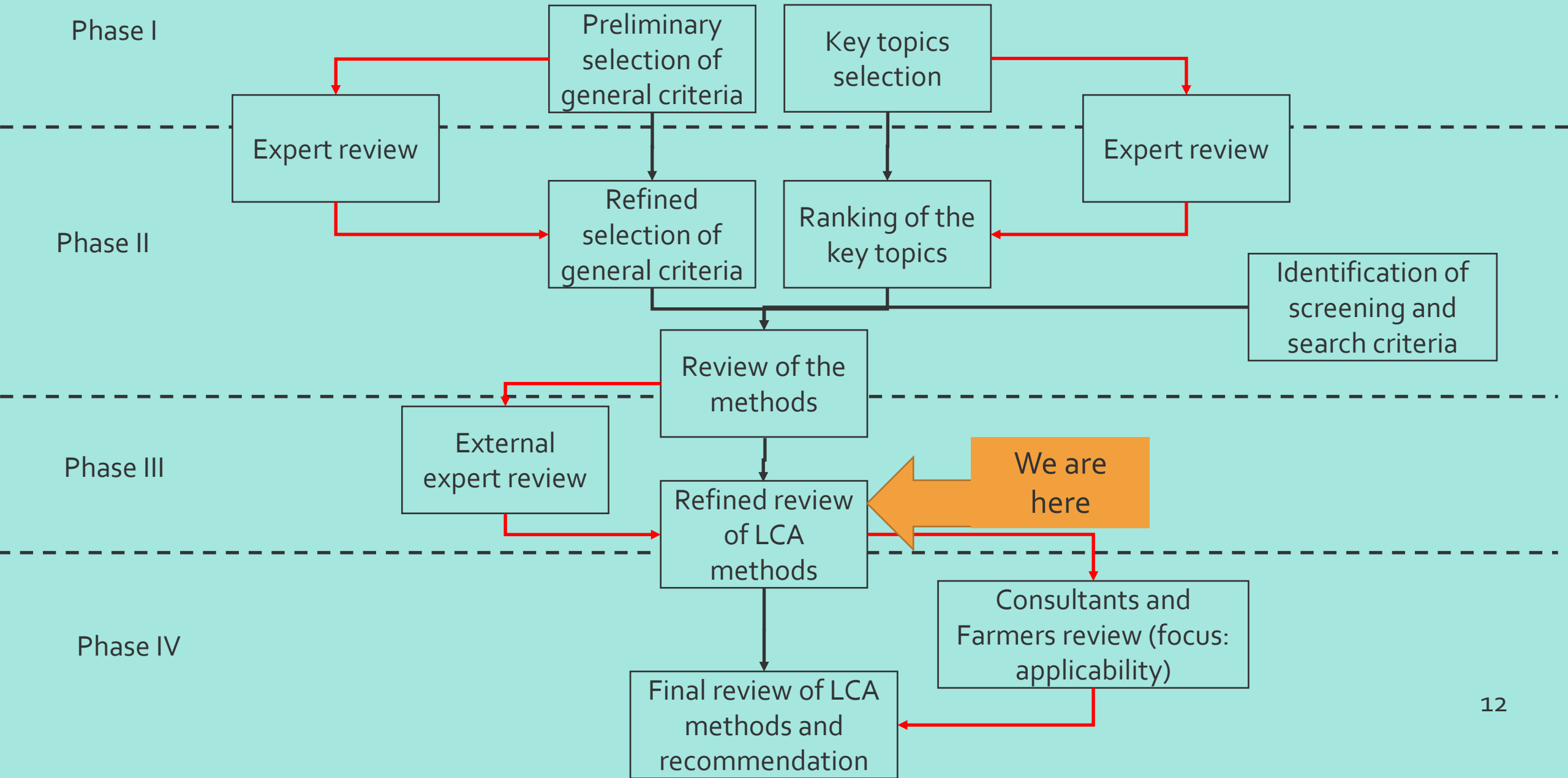
Survey 2: ranking of criteria for assessing LCA methods

- The following criteria were prioritised:
  - *Transparency and Reproducibility*
  - *Completeness*
  - *Fairness and Acceptance*
  - *Robustness*
- A separate "Accuracy" criterion was also formulated, following recommendations from the expert group
- Several experts reported "soil C observations depend on appropriate timescales and long term monitoring"
- It was also noted that "***several criteria were voted for by experts because of the framework they belong to (ie. PEFCR) rather than the clarity of the definition***"

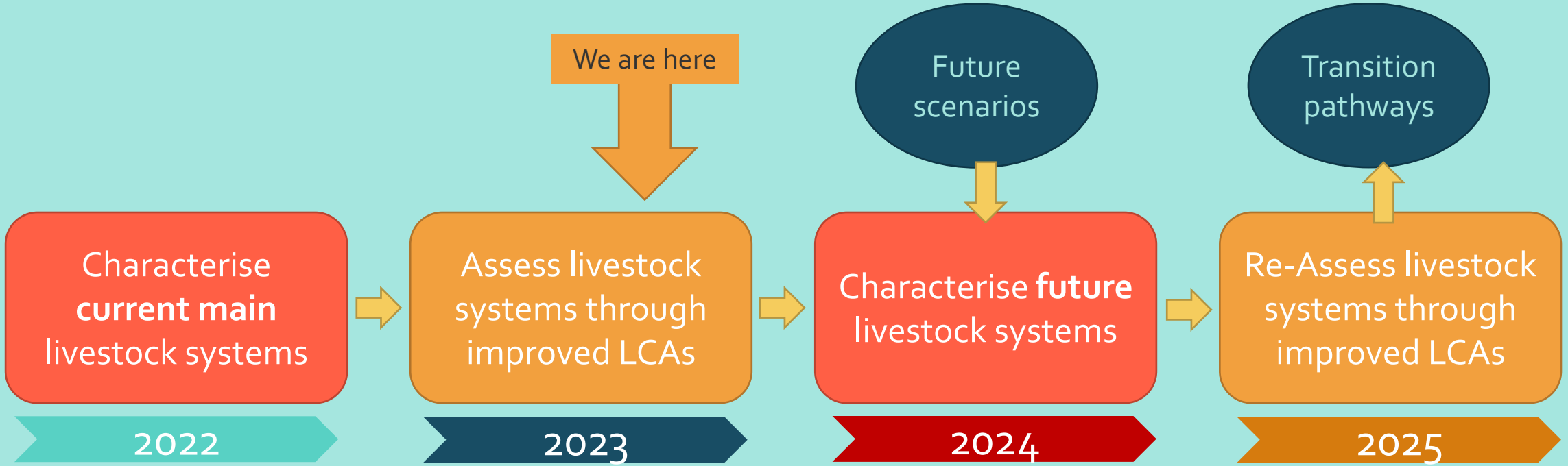
Box plot of expert responses to identify general criteria for the assessment of LCA methods for livestock systems and products

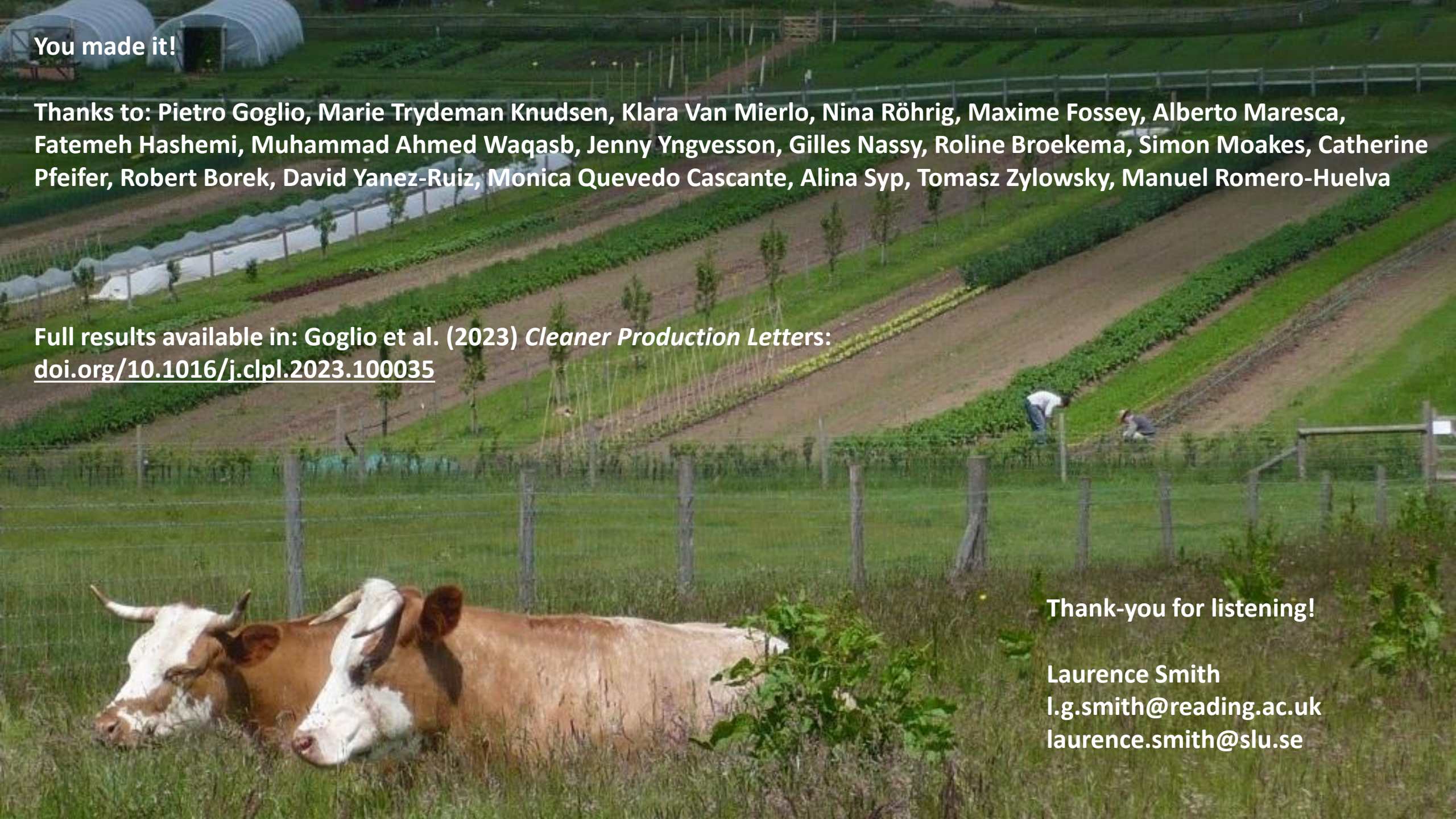


Next steps in the development of an improved LCA framework



Next steps in application of improved LCA in PATHWAYS





You made it!

Thanks to: Pietro Goglio, Marie Trydeman Knudsen, Klara Van Mierlo, Nina Röhrig, Maxime Fossey, Alberto Maresca, Fatemeh Hashemi, Muhammad Ahmed Waqasb, Jenny Yngvesson, Gilles Nassy, Roline Broekema, Simon Moakes, Catherine Pfeifer, Robert Borek, David Yanez-Ruiz, Monica Quevedo Cascante, Alina Syp, Tomasz Zylowsky, Manuel Romero-Huelva

Full results available in: Goglio et al. (2023) *Cleaner Production Letters*:
doi.org/10.1016/j.clpl.2023.100035

Thank-you for listening!

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With the aim of reducing environmental impacts while addressing societal demands for safe, nutritious and affordable meat and dairy products, PATHWAYS is about identifying and increasing sustainable practices along the supply and production chains of the European livestock sector. Coordinated by the Swedish University of Agricultural Sciences (SLU) and comprising 28 partners from 12 countries, this 5-year (2021-2026) €9 million Horizon 2020 project contributes to the EU Farm-to-Fork Strategy which is at the heart of the EU Green Deal.

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