14th International Conference LCA FOOD 2024

SUMMARY OF THE PARALLEL SESSIONS, 9 – 11 September 2024

Combined Nutritional and environmental assessment of foods and diets (I)

The session started with a talk about REFRESH, a short questionnaire for quick and easy assessment of diets (Ujué Fresán), and validated using LCAs. Attendees then heard about the Planet Health Conformity Index, an ambitious research project to bridge the gap between nutritional and environmental sustainability in nLCAs (Toni Meier). Further topics included a comprehensive analysis of meal trays served in French public catering (Caroline Penicaud), and of 6000 menu items available in Japan (Genta Sugiyama). A longitudinal analysis of Swiss food trends (Alba Reguant-Closa) highlighted the need to focus on correcting nutrient deficiencies going forward, and a study on several alternative diets provided insights on priorities for future US diets (Brooke Bell).

Combined Nutritional and environmental assessment of foods and diets (II)

Identifying viable strategies to maximize the nutritional and environmental efficiency of agri-food systems is imperative for a sustainable and healthy future. In this context, the combination of Life Cycle Assessment (LCA) and nutritional studies serves as a valuable tool. As demonstrated in the Canadian case study, these results can be used to optimize land use and agricultural biomass.
Transitioning to sustainable and healthy diets could help avoid or mitigate various environmental challenges while also contributing to the health and well-being of society.

Combined nutritional and environmental assessment of foods and diets (III)

This 3rd session on nLCA generated some lively discussion. There were a range of presentations addressing novel concepts and research ideas. However, there was also some pushback from the audience challenging study designs and assumptions made. This is all very healthy practice for a scientific meeting. Speakers addressed a range of topics including carbon budgets for meals, MDCA weighting approaches, consequential implications of dietary change on agricultural trade, the dietary implications of greater uptake of cycling as a mode of transport, and protein quality adjustment. One highlight was Ashley Green's review of nutrient profiling models. This presentation was a reminder to diligently understand and critically evaluate the indicators we use. For example, across the conference it was observed that the NFR9.3 nutrient profiling tool appeared to be used with out critical consideration of its bias against saturated fats. However, recent research has concluded that saturated fatty acid rich foods, such as whole-fat dairy, unprocessed meats, and dark chocolate, are not associated with an increased risk of cardiovascular disease, and that the totality of evidence does not support limiting their intake.

GHG accounting and reporting

Although Climate Change impact has been quantified for as long as LCA exists (and even before), there are still some open questions and improvement room towards more robust results.

During the session, we touched upon various topics and systems across the globe, addressing some of the issues along all LCA stages: i) from the question on how to consider the natural background emissions of hybrid wild and extensive livestock systems within a surface-based FU, ii) through to developments to improve food inventories based on various ways to gather or model more site-specific data, and iii) finally questioning the impact characterisation metrics. The interpretation of results was then discussed in light of potential discrepancies in data source, models used (e.g., for SOC modelling) as well as in the timeframe considered. The time dimension plays a key role, whether we look back in time to encompass previously occurring emissions (from LUC at LCI level or to sum up radiative forcing from greenhouse gases with different lifetimes) or look into the future to model long-term SOC stabilisation or integrate various GHG radiative forcing.

Sustainable livestock systems (I)

In this session the environmental impacts of livestock systems were addressed while also keeping an eye on the ecosystem services they provide. The focus was on ruminant systems, and included presentations on beef and dairy production in Brazil, Sweden and Kenya, and on sheep production in Italy and Norway. Topics including water use, climate change, eutrophication, carbon sequestration and food provisioning came by. This session showed there is a clear trend towards improving methods to better understand and quantify the pro's, cons and tradeoffs with regards to various environmental issues and ecosystem services the livestock sector contributes to.

Sustainable livestock systems (II)

This session addressed a variety of environmental issues and livestock systems, with attention for the agricultural stage as well as the meat processing stage, and even the question whether hunting offers a more environmental friendly alternative was addressed. Cattle production in Ireland and Spain, and pig production in Italy, Sweden and Belgium came by. Also here, presentations show that there is a movement towards further improving methodologies to better understand and compare the pro's and cons of livestock systems and pathways for improvement, while keeping an eye on the environmental policies that steer the sector.

Sustainable livestock systems (III)

- The carbon footprint of crop production in different countries have a huge variation. Especially for rice production the differences were extremely high. This was explained by very low rice yields in some countries whereas the methane emissions per hectare were high.
- The use of spent coffee grounds for sheep feed seems to be more sustainable solution than regular waste management practices. However, further research is needed to consider the impacts of collecting and transportation of the coffee grounds.
- Optimal feed formulations accounting for GHG emissions and economic costs may lead to large reductions in carbon footprint per tonne of eggs produced. Future model refinement is necessary to take into account a larger array of constraints, particularly

related to hen health, additional environmental impact categories, and to incorporate low-impact, alternative ingredients, and valorized food waste products.

- Extension of lay cycles beyond current norms may not be an efficacious strategy for improving environmental sustainability outcomes in the Canadian egg industry, unless considerable improvements with respect to maintaining lay persistency and egg quality are achieved.
- There is a need to combine LCA and ecosystem services assessments as when applied separately they can guide decision-making in opposite directions.

Communication of LCA results and Integration of ESG criteria into business

The ultimate purpose of LCA is to provide evidence-based decision support, finally leading to changes in management. To achieve this, the decision makers and relevant stakeholders need to understand the LCA results and to derive the right measures. "Everything should be made as simple as possible, but not simpler." Several barriers have been identified such as data availability, lack of expertise, integration into management processes and lack of support by the management, selection of methods and tools, subjectivity of value choices, and harmonisation of metrics. Easily understandable visualisation, bi-directional information flow and monetanization have been proposed as possible solutions.

Life cycle sustainability assessment of food systems

The presentations delivered a few insights on the integration of different aspects of sustainability from dual aspects to multicriteria assessments into frameworks to assess trade-offs, synergies and controversial aspects of food products and drinks.

Session Life Cycle inventory: modelling, databases and tools (I)

In the session there were three blocks of topics:

1. Biodiversity indicators and characterization factors to use in impact assessment methods
2. Use of Input Output methodology to assess the cropland and calories footprints
3. Use of API, semiautomatic standardization to manage data and to carry out assessment

In each block improvements in the state of the art have been highlighted by putting in evidence the methodological and automation needs. Main message I take home is the relevance to use Artificial Intelligence for the management the complexity of the inventory data.

Life Cycle Inventory: modelling, databases, and tools (III)

Presentations uncovered three main aspects of databases development: inventory databases for regionalised animal based system in stage of agriculture and slaughterhouses; water footprint for numerous crops; and global pesticide databases.

Cocoa and olive oil: sustainability assessment

5 interesting presentations, 3 on cocoa and 2 on olive oil covering biodiversity, climate change impacts, social and economic viability of these two products.

Ecolabelling

A lot of studies are ongoing in the context of LCA-based environmental/sustainability food labelling, The presented results clearly showed, that further scientific work is needed, e.g. with respect to data bases, impact assessment methods, the adequate functional unit, the reduction of complexity, organic production but also aggregation/weighting or midpoint/endpoint indicators.

Also, the political framework is still not clear in many countries and interest of stakeholders are differing very much (politicians, food companies, retail, organic & conventional producers), but also amongst countries within the European Union.

However, it is possible to start with LCA-based environmental labelling as the case of France shows.

Circular food systems

The presentation showed that circular food systems in the context of using food waste/residues to generate new food products is a relevant issue of LCA research. In particular of interest was, how the LCA approach and the ecodesign framework can be combined in order to develop a (more) circular approach, mainly in the context of the provision of nutrients from food waste. But also in the broader context of how the potential of circular food system technologies can be assessed an promising framework was presented.

Sustainable cropping systems (II) and innovations in food production beyond the farm gate

As to the sustainable cropping systems: Reaching climate-neutral farming requires the assessment of the impacts of different agricultural practices such as the use of digital technologies. In addition, more inventories of the production, processing, and application of organic waste products is required.

As to the innovations beyond the farm gate, it must be remarked the role of transport distances in the impacts of food systems. In addition, the advances in the estimation of plastic waste emissions can improve the environmental comparisons of packaging materials used in food products.

Integration of agroecology and soil health in LCA

IN the presentations, different approaches have been used to capture the environmental effects of agroecological and organic farming practices on ecosystem services, mainly soil organic carbon and nutrient cycles. Spatial-explicit LCA modelling was used to identify areas in the EU where a transition to organic agriculture would be beneficial. Other studies combined LCA with other methods such as plus semiquantitative sustainability assessment, soil indicators calculated from soil analysis, and soil carbon modelling. It can be concluded that a standardized and agreed-upon framework is required for assessing and promoting agroecological practices.

Food loss and waste: environmental impacts and solutions

Looking at Food loss and waste with a global perspective, the session showcased the use of sensors to capture shelf-life dynamically in Chinese retail, resource recovery and circularity solutions in 2030 UK and retail and fine dining in Canada. Impacts of food loss and waste of a broad range of products in Catalonia where presented and a more methodological insight into which are optimal data to calculate food waste and loss impacts was given.

Key observations where that IoT-based sensors help measure and dynamically prolong the shelf-life of food, valorisation of food waste improves sustainable circularity in food systems and transport becomes important when cooling over longer distances is needed.

Sustainability in fisheries and aquaculture

Very innovative approaches have been presented related to the applicaibility of LCA on fish products. New ways of including biotic impacts, ecosystem services or new ways to include fish from ilegal fishing for example has been presented and widely discussed in the session. It is still a long way to go since the potential damage to marine ecosystems is not well reproted with traditional impact categories. Finally, It is important to point out the huge audience on the session, so for next conference we will need the big room for fish-lca team.

Huge audience and interest, need of a bigger room for fish LCA people in the next conference

Sustainable territories and economies

This session put together six high-quality studies applying different approaches and methodologies such prospective or agent-based assessment as well as the last computing developments for complex mapping indicators, in order to transform complex information data sets into useful informative messages at the territorial level for different stakeholders such as consumers or policymakers, without losing scientific rigour and transparency. Temporal dynamics were still missing in some of the presentations, so challenges are still on the table and for sure we will more on sustainable territories and economies in the next LCA Food Conference.

Life cycle impact assessment: new developments

We had a very interesting second session on new developments in life cycle impact assessment. Some of these methodological developments focused on well-known and highly relevant impact categories for food systems but added new perspectives, while others introduced us to novel impact categories. For example, we learned about prospective assessments for either specific local conditions in Peru or global future scenarios. Another development focused on aligning the assessment of water and land as resources with those of mineral resources in terms of criticality. In another presentation, we delved into albedo impacts, a neglected factor affecting radiative forcing that we otherwise commonly assess. The final presentation gave insights into the developments regarding microplastics, a novel impact category.

Sustainability of food systems in developing and emerging economies

This was a very dynamic and well-attended session, covering examples of application of different life-cycle approaches (mostly LCA, also an example of social indicators assessment, although not covering the full life cycle). The geographical coverage was very well balanced, with presentations from Africa; South-East Asia; and Latin America and the Caribbean. The presentations covered many novel approaches including social indicators, biogenic C sequestration, approaches to data collection and treatment… Discussions with the audience were very engaging, denoting strong interest in seeing the application of Food LCA expanding into developing countries and emerging economies. However, while many of the presentations included co-authors from locally-based entities, the vast majority of authors were from either Global North and/or Global or Northern-based entities (often with local branches); there is a clear need for (expanding and) engaging more Global South institutions and expertise to further develop LCA capacity in these countries.

Topical session 1: Bridging the environmental footprint data gap: enhancing collaboration between users and creators of background databases

The discussion on how to bridge the environmental footprint data gap brought together academics, consultants, policy makers and company representatives. A common agreement was that there's a lack of connection among data generators, data managers and data users regarding both inventories and emission factors. In the group, ideal environmental impact data is judged to be transparent in terms of sources, methods and assumptions and flexible in terms of granularity of geographical coverage, and flexible in terms of generation among other traits. To make such data available and bridge the gap, working with incentives was an interesting alternative by all stakeholders. Incentives could be economic, but also access to sector or knowledge networks or clarity on what use will be given to data. Exploring this future is in everyone's interest!

Topical discussion session 2 "Opportunities from land use change assessments frameworks to unlock supply chain interventions".

We had about 40-50 participants. We first provided an overview of relevant LUC GHG assessment frameworks (10 min by BLONK (sLUC), 10 min by Embrapa (jdLUC) and 10 min by AdAstra (jdLUC). In the subsequence panel discussion, the audience was very engaged. Among many things, we discussed

- What specific supply chain interventions we can inform with available LUC frameworks.
- The role of traceability in reducing spatial variability.
- How to avoid cherry picking among (and within) available LUC GHG approaches.
- How to prevent claiming reductions from switching methodologies.
- How to refine approaches so that they can inform future decision making.

Topical Discussion 3: Achieving alignment and transparency within the feed and food supply chain: embracing the complexity of new developments in impact assessment and modelling.

The discussion began with opening remarks by the panelists regarding their views on our biggest challenges today for providers/users of feed LCA data, and these topics were then discussed in more detail by the session participants working in small groups. Participants and panelists, representing data users and providers in the context of the full value chain, agree on the challenges, including: a lack of data interoperability and transparency; difficulty balancing the need for consistency (in methods, data sources, etc.) with the need for flexibility; and precision/granularity versus quantity of datasets.

Discussions about how to tackle these challenges included: harmonizing activity data; working with third party verification to address concerns about confidentiality and credibility, particularly when considering the increasing demand for primary data; improving supply chain engagement for broad acceptance and application of standards and data interoperability; establishing a common data format as well as agreeing to acceptable levels of deviation; and agreeing on regular review cycles, where we know in advance when standards, methods, datasets will be updated.

Topical discussion session 4: Recommendations for sustainable dietary patterns in the political debate

Several aspects of developing national nutritional recommendations were discussed in the topical sesseion. For a successful outcome of such a development different stages of development have to fit together:

- It is necessary to have a good and unbiased scientific background from different perspectives (health, environment) for key aspects of healthy and/or environmentally friendly diets

- Interfaces in research need to be identified properly (e.g. product groups or nutritional requirements)

- Stakeholder should be involved in the discussion of the scientific background covering also interest groups for emerging products and environmental issues. This should include an independent moderation for identifying undisputed points and areas of conflict.

- The decision making on dietary recommendations and final release should be made by an independent organisation not representing any stakeholders

- Good and clear communication on different channels and for different audiences should be prepared

- The recommendations should be taken up in political decisions making (e.g. school meals, education, training of kitchen staff, subsidies for product groups)