



[AMEND](#) [CONTINUE](#)

12th International Conference on Life Cycle Assessment of Food

Submission ID

246

Title

Assessing the sustainability of food consumption patterns under the One Health approach in the Metropolis Ruhr (Germany)

Abstract

Background

Healthy diets that promote sustainable food systems are the ultimate concern [1]. Global food consumption is responsible for 26% of anthropogenic greenhouse gas (GHG) emissions, 32% of terrestrial acidification, 78% of eutrophication [2]. In Germany, the high intake of animal-based foods results in multiple environmental impacts and human health issues. While addressing the environmental impacts of dietary patterns, trade-offs among human health and animal health are inevitable. The One Health (OH) is an emerging concept that aims to bring together human, animal, and environmental health, by working collaboratively among different disciplines and spheres [3]. Many studies estimated the environmental impacts of diets in Europe and worldwide based on life cycle assessment (LCA), but most of them ignore further impacts on human health and especially on animal health. Here we propose an LCA framework for quantifying impacts on the environment, human and animal health of food consumption under the OH approach. We aim to assess the

We assess a food basket of products representing the average diet of the city Essen, taken as an example of a Western diet. The functional unit is the average food consumption per capita year⁻¹, defined as quantities of food items selected by relevance, using available data from the NVS II [4]. The system boundary was set from “farm-to-fork”, including agricultural stage (crop and livestock), processing, packing, distribution, retail, and consumption (preparation and food losses), not including final disposal and waste management. The data source and assumptions followed the guidelines of the “Product Environmental Footprint” (PEF) for the EU consumption [5], after LCA analytical methods modeled in the software Optimeal® based on the EU inventory dataset [6]. For each OH dimension (Figure), we selected representative indicators. Human health was assessed by dietary risk factors attributed to non-communicable-diseases (NCDs) using epidemiological data [7]. We estimated the environmental impacts at both midpoint (based on PEF recommendations) and endpoint levels under the ReCiPe method. For animal health, we used three animal welfare indicators [8], considering criteria from farm to slaughter.

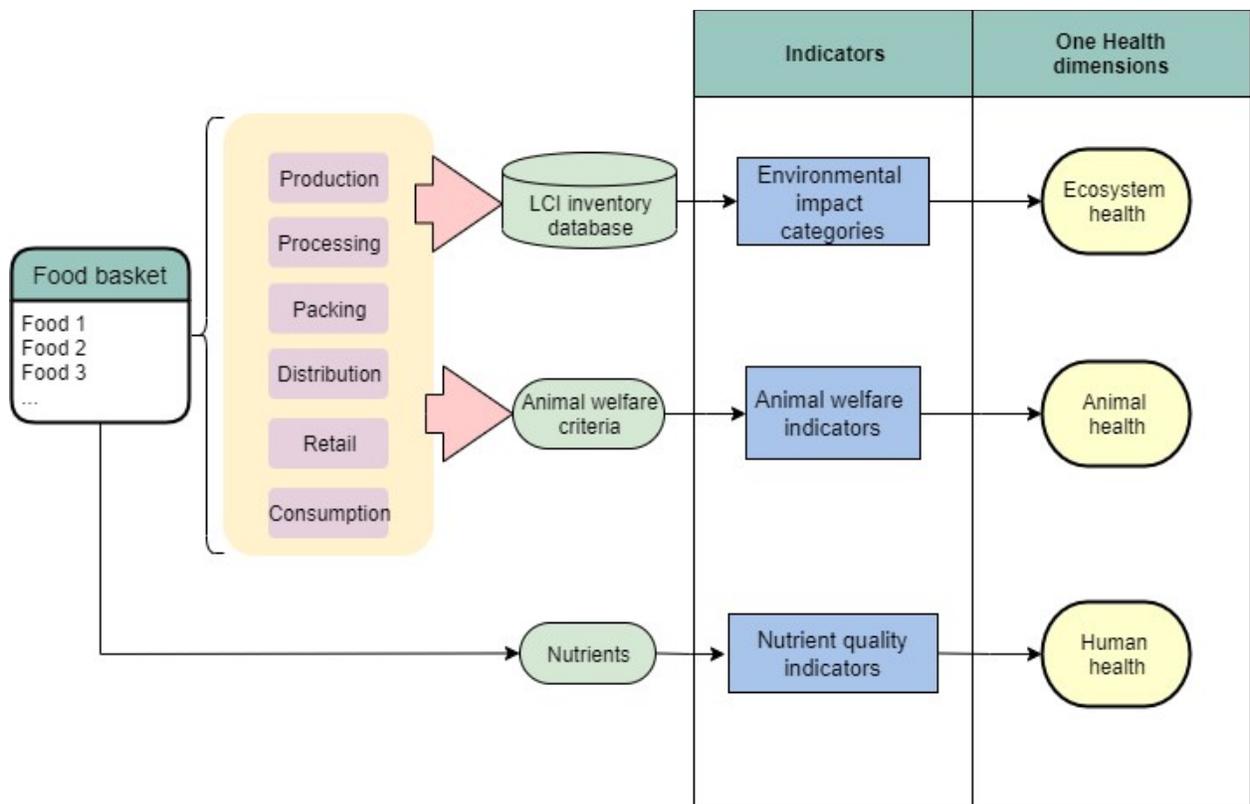


Figure: Methodological framework

Results-discussion

Animal-based foods generate the most significant impact on global warming, land use, acidification, eutrophication, and water scarcity, especially pork derivatives and dairy products, highly consumed in the Ruhr area. Poultry, eggs, and seafood are major contributors to animal welfare loss. The choice of the animal product is decisive for the overall sustainability, although tradeoffs among indicators exist when choosing pork or beef. High intake of red meat and sausages increases the dietary risk factor for developing cardiovascular disease. While the intake of vegetables reduces the risk of NCD, the vegetables of the basket (tomato and lettuce) cause higher global warming and eutrophication. Choosing among other vegetables would reduce overall environmental impact. The limitations of this study are the use of data sources within the EU context, the simplicity of animal welfare indicators, and the use of secondary food consumption data. However, our framework helps understand the

tradeoffs of food consumption. For future work, survey-based food consumption data and diet optimization would be recommendable.



LCAFood2021

Contact
Event
Admin



1. Willett, W. *et al.*, 2019. *Lancet*. **393**, 447–492.
2. Poore, J. & Nemecek, T., 2018. *Science (80-)*. **360**, 987–992.
3. Lebov, J. *et al.*, 2017. *One Heal*. **3**, 44–50.
4. MRI, 2008. Nationale Verzehrs Studie II.
5. European Commission, 2018. PEF Category Rules. v. 6.3. 1–142.
6. Broekema, R. *et al.*, 2019. Optimeal EU dataset.
7. IHME, 2017. *Global Burden of Diseases*
8. Scherer, L. *et al.*, 2018. *Int. J. Life Cycle Assess*. **23**, 1476–1490.

Keywords

LCA, One Health, Germany

Authors and Affiliations

Juliana Minetto Gellert Paris (Presenting)

E-mail *: jparimi@uni-bonn.de

University of Bonn, Bonn, Germany

Neus Escobar

E-mail *: neus.escobar@ilr.uni-bonn.de

University of Bonn, Bonn, Germany

Timo Falkenberg

E-mail *: falkenberg@uni-bonn.de

University of Bonn, Bonn, Germany

Tina Beuchel

E-mail *: tbeuchel@uni-bonn.de

University of Bonn, Bonn, Germany

Christian Borgemeister

E-mail *: cb@uni-bonn.de

University of Bonn, Bonn, Germany

Ute Nöthlings

E-mail *: noethlings@uni-bonn.de

University of Bonn, Bonn, Germany

Permission to publish

Check this box to give us permission to publish your submission on electronic media and in hard copy if it is accepted for presentation



LCA Food 2021

Contact
Event
Admin



Author Approval

I confirm that this submission has been approved by all authors

Author will attend

I confirm that at least one author will register in full to attend and present the paper at the Conference

Presentation

Either

Topics

E. Methodological challenges in food LCA