The World Food LCA Database project: towards more accurate food datasets

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ABSTRACT

There is an increasing demand for LCA applied to the food and beverage sector. However, major limitations in doing LCA studies in this sector are currently the lack of inventory data and processes, and the absence of consistency among existing food datasets. There is a need to develop detailed, transparent, well-documented and reliable data in order to increase the accuracy and comparability of LCA in the food sector. This need is being addressed by the World Food LCA Database (WFLDB) project. The main aim of the WFLDB is to create a basis to assist companies and environmental authorities to assess and reduce ("eco-design") the impacts of food and beverage products, in initiatives like Environmental Product Declarations (EPD) or product labelling and also for academic research.

Keywords: Agriculture; database; environmental product declaration; inventory; LCI.

1. Introduction

Agricultural production and food processing contribute significantly to environmental impacts on global warming, eutrophication and acidification (Pardo and Zufia 2012; Ruviaro et al. 2012; Saarinen et al. 2012). The use of LCA for the assessment of these impacts is steadily increasing in the last decade (Notarnicola et al. 2012). However, major limitations to such assessments are the lack of reliable and consistent inventory data.

Existing libraries of LCA data on food are most often:

- Not transparent enough
- Incomplete: only few inventory flows are accounted for, which leads to an incomplete overview of the impacts of food products and misleading interpretations and conclusions
- Inconsistent among each other, due to different approaches and assumptions
- Outdated and consequently unreliable
- Not regionalized: country-specific data are rarely available

Therefore, it is critical to develop detailed, transparent, well-documented and reliable data to allow for more accurate and comparable LCA in the food sector.

In this context, Quantis and Agroscope launched early 2012 the World Food LCA Database (WFLDB) project which will be completed in 2015, in collaboration with, as of April 2014, ADEME, Bayer, Swiss Federal Office for the Environment, General Mills, Kraft Foods, Mars, Mondelēz International, Monsanto, Nestlé, Syngenta and Yara.

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2. Methods

A new set of food inventory data is being developed from existing LCA studies on food products (project partners' past LCAs, Agroscope and Quantis existing databases), literature reviews, statistical databases of governments and international organizations (such as the Food and Agriculture Organization of the United Nations), environmental reports from private companies, technical reports on food and agriculture, information on production processes provided by the project partners as well as primary data. Background datasets from the ecoinvent database are being used as a basis and compatibility with ecoinvent will be ensured.

The developed datasets include, when relevant, different production schemes (such as conventional, integrated or organic production), regional specificities and deforestation impact.

To guarantee its transparency, the inventory database is fully documented, unit processes are visible (except for confidential data) and all sources are referenced. The end-user will be able to differentiate among different stages of the process (e.g. agricultural production vs. food product manufacturing) and to identify the main impact contributors for each dataset (e.g. pesticides, fertilizer use, etc.).

Datasets created within the project will initially be solely available to the project partners and they will become public through their integration in ecoinvent.

The scientific modelling principles of the WFLDB are at a first instance based on:

1. ISO standards14040 and 14044 (ISO, 2006a; ISO 2006b)
2. ecoinvent quality guidelines (ecoinvent, 2013; Weidema et al, 2013)
3. ILCD guidelines (JRC, 2010)

The project managers collect data and define the methodological guidelines for modelling the WFLDB datasets. These rules are based on the above-mentioned documents and on other existing guidelines for modelling agricultural processes. By doing this, it is ensured that all datasets within the WFLDB are modelled according to internationally accepted standards and are fully consistent with each other. Furthermore, the project managers follow the developments within other international initiatives and organizations such as The Sustainability Consortium (TSC), the Food and Agriculture Organization of the United Nations (FAO), the Sustainable Agriculture Initiative Platform (SAI), the EU Food SCP Roundtable and the EU Product Environmental Footprint. Scientific guidelines used in other database initiatives such as Agri-BALYSE (Van der Werf et al., 2010) and ACYVIA (Bosque et al, 2012) are also considered for the definition of the WFLDB modelling principles (developments are considered as they occur).

The methodological guidelines of the World Food LCA Database will be reviewed by a selected panel of external and independent experts and will be published in 2014.

The aim is to be as compliant as possible with the developments occurring within the above mentioned initiatives and organizations. Compliance with other initiatives is assured by the project advisory board, which has a consultative role and is constituted of members of non-governmental and research organizations.

The WFLDB datasets will be delivered in the most widely used data exchange formats for LCA software (i.e. ecospold v1, ecospold v2, SimaPro-CSV, Quantis SUITE 2.0-excel). This will enable using the datasets in common LCA software: SimaPro, GaBi, OpenLCA and Quantis SUITE 2.0. The datasets are released in three phases, the first release was in summer 2013. Two years after their release to the project partners, datasets will be submitted to the ecoinvent Centre for their integration in the ecoinvent database.

3. Conclusion

The WFLDB will be a comprehensive LCA food database providing detailed LCI data of high scientific quality, reliability and transparency, while being in line with other database developments such as ecoinvent v3.

The database will provide a large number of new food-related inventory datasets with a focus on different production schemes and regional specificities.

As an illustrative example, Figure 1 shows the preliminary results for carbon footprint of some processes related to coffee, from processes fairly upstream the life cycle of coffee (e.g., green coffee production) until fairly downstream the life cycle of coffee (e.g., decaffeinated instant coffee), for different technologies (e.g., spray and freeze drying). Furthermore, specific gate-to-gate steps are also modelled (such as roasting and grinding) and could be combined with customized processes (for example regional coffee production that would be modelled with primary data). This gives high flexibility to the final user of the WFLDB.

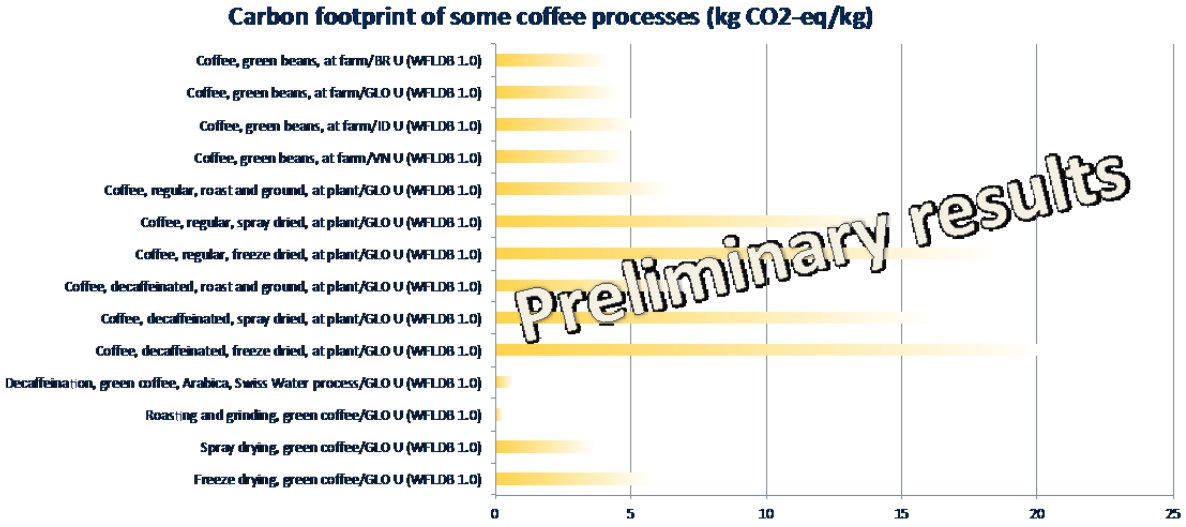

Figure 1. Preliminary results for carbon footprint of some processes related to coffee

Learning obtained in the last 2 years data collection as well as recommendations for any practitioner and company encountering challenges with food data collection will be presented.

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