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The Role of Life Cycle Assessment in Supporting Sustainable Agri-Food Systems: A Review of the Challenges

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Abstract

Life cycle thinking is increasingly seen as a key concept for ensuring a transition towards more sustainable production and consumption patterns. As food production systems and consumption patterns are among the leading drivers of impacts on the environment, it is important to assess and improve food-related supply chains as much as possible. Over the years, life cycle assessment has been used extensively to assess agricultural systems and food processing and manufacturing activities, and compare alternatives “from field to fork” and through to food waste management. Notwithstanding the efforts, several methodological aspects of life cycle assessment still need further improvement in order to ensure adequate and robust support for decision making in both business and policy development contexts. This paper discusses the challenges for life cycle assessment arising from the complexity of food systems, and recommends research priorities for both scientific development and improvements in practical implementation. In summary, the intrinsic variability of food production systems requires dedicated modeling approaches, including addressing issues related to: the distinction between technosphere and ecosphere; the most appropriate functional unit; the multi-functionality of biological systems; and the modeling of the emissions and how this links with life cycle impact assessment. Also, data availability and interpretation of the results are two issues requiring further attention, including how to account for consumer behavior.

Journal of Cleaner Production (2016), doi: 10.1016/j.jclepro.2016.06.071

The study reported here in this Research Brief was not funded by the beef checkoff, but is made available to expand the usefulness of this checkoff-funded website for those interested in beef sustainability.