Food and beverage carbon dioxide emissions from producer to consumer - applying and communicating LCA

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Abstract

This paper reports on the use of a method that utilises agronomic Life Cycle Inventory (LCI) data to calculate carbon dioxide (CO_2) emissions of food recipes and it has been developed with food and beverage producers. Measurements of CO_2 emissions for the production of crop and livestock ingredients were converted to typical CO_2 emissions for whole recipes using crop yield data. This method was extended to converting energy use data for drying, milling and baking to equivalent CO_2 emissions for the ingredients used in the recipes. The method has utilised published figures of CO_2 emissions for packaging and transport to account for typical CO_2 emissions generated in transporting and packaging food products. The approach provides a potential toolbox for calculating carbon emissions associated with food products.

These results have been used to benchmark products, production methods and financial costs between recipes and sites of supply with the aim of improving product information transferred to consumers. The results show that agronomic and manufacturing production CO_2 emissions associated with recipes are 100-500 g CO_2 kg^{-1} product. This is lower than some of those currently reported within the food and beverage sector and we discuss the reasons and implications for this.

The results are discussed in the context of current issues in nutrition and public health. It is clear that carbon dioxide intensive diets have increased calorific value. Developing frameworks of communicating these issues with the food supply chain is an important outcome of the LCA and LCI focussed approaches we have utilised.

Investigation of CO_2 emissions associated with transportation and distribution has shown that these factors supply chain functions can be managed to lower CO_2 emissions. However, communicating the outcomes of transportation and distribution to the customer are complex and a suitable form of labelling products is increasingly important within the food and beverage sector. The research reported here has considered CO_2 emissions associated with food production with regard to current policy development. There is scope to include other factors in our method, such as crop- and soil-carbon sequestration, the effects of which are reported here.

Our method, while not representing a full LCA, does provide a means of integrating agronomic, manufacturing, logistical and consumer information for the food and beverage sector. It can provide a means to improve resource efficiency in food supply chains, communicate complex issues and benchmark production performance with regard to regulatory standards.

References

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