



## Carbon footprint of food adds up along the food chain

**A recent study from Finland** on the carbon footprint of food can help producers and consumers make choices that lower the food chain's impact on climate change, by highlighting hotspots in the food chain for improvement and revealing food's overall impact.

**The environmental impact of food consumption** is of major concern, and efforts can be made to include greater environmental responsibility throughout the whole food chain, from cultivation, processing, transport and through to final cooking technique. There is often an emphasis on reducing the carbon footprint, i.e. the climate change impact - accounting for all greenhouse gases (GHGs) - of food.

The researchers assessed the carbon footprint of food in Finland using two different methods. The first used a national economic input-output model (EIO-LCA), which calculates the impacts of industry sectors based on national data. This is a macro level (or broad scale) assessment. The second method considered, the micro scale (or individual level) of food by using a process based life-cycle assessment (LCA), which considers the climate change impacts of individual processes used for each product, such as fertiliser application or cooking methods. This second approach was used to analyse 30 typical meals served on standard, nutritionally-balanced lunch plates, in order to provide meaningful information for consumers, who tend to conceive of food consumption in terms of individual meals.

At the macro level, the study estimated that the food chain is responsible for a significant amount of GHG emissions: 7% of all carbon dioxide emissions, 43% of methane emissions, 50% of nitrous oxide emissions, 12% of perfluorocarbon gas emissions and 69% of ammonia emissions produced in Finland. The food chain is therefore estimated to contribute 14% to Finland's impact on climate change.

The largest contribution to GHG emissions in the food chain came from agricultural production. Agricultural processes accounted for 69% of domestic climate change impacts, followed by 12% from the energy industry, 6% from trade and transport, 5% from the food processing industry and 15% from other economic sectors involved in food.

Using the lunch plate approach, one lunch portion was estimated to contribute 2-12% of a typical Finnish consumer's daily impact on climate change. One day's food consumption could account for 15-20% of a consumer's total daily climate change impact.

Mirroring results obtained from modelling at the macro level, 70% of the carbon footprint of the average lunch plate comes from emissions associated with farming processes. The study found that raising livestock contributed to three quarters of Finland's total climate change impact from agriculture. Methane emissions from beef and dairy cattle had the greatest impact on climate change.

At the macro level, it is suggested that policies to reduce the impact of the food chain should focus on animal production in farming, and at the micro, consumer level, it is suggested that consuming less meat will have climate change benefits.

Imported food products accounted for around 60% of the total impact on climate change arising from all imports (including energy and agro-chemicals) to the food chain. However, the international transport of food products had little impact for the Finnish food chain. This implies that policies to reduce imported environmental impacts should concentrate on reducing emissions from the production of foods in producer countries.

**Source:** Virtanen, Y., Kurppa, S., Saarinen, M. *et al.* (2011) Carbon footprint of food - approaches from national input-output statistics and a LCA of a food portion. *Journal of Cleaner Production*. 19: 1849-1856.

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