

Literature review on dairy products for an inventory of key issues: List of environmental initiatives and influences on the dairy sector

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This project aimed to highlight key issues in the dairy sector based on a literature review focused on Life Cycle Assessment (LCA) studies. This study provides a statistical analysis and therefore results are not only based on deterministic values. It also aimed to give an overview of initiatives and labels that play a role in the dairy sector and their implications for various stakeholders. Key issues have been identified based on 60 scientific articles, research reports and theses. Most of the studies are written with a European context, with some for New Zealand, Australia and USA situations. They give information on the different phases of dairy products life cycles: dairy farm, packaging, distribution, retail, use phase and end-of-life. The indicators considered for this literature review are climate change, resources (energy and water), aquatic acidification and eutrophication. The system studied considers the dairy farm (fodder production, cow raising, milking, refrigeration on farm), the packaging, the dairy (processes for production of various dairy products), the distribution (transport and retailers), the use phase (refrigeration but not cooking), and the end-of-life.

The results obtained show that the dairy farm is the most significant phase for all impact categories and all dairy products examined here. For greenhouse gas (GHG) emissions, the dairy farm contributes more than 80% of the impacts for milk and more than 90% for cheese. Among these emissions, about 50% are due to methane (CH₄) emissions from enteric fermentation. About one third are due to nitrous oxide (N₂O) emissions, mainly from manure management and nitrous fertilizers. The final one-sixth is due to carbon dioxide (CO₂), coming from tractors, trucks and electricity production. Among the non-farming phases, those of most importance for GHG emissions are the dairy and packaging production. One kg of milk at the farm emits approximately 1 kg CO₂e (GWP100). The rest of the life cycle (i.e., at consumer, including end-of-life of the packaging) adds 0.2 kg CO₂e per kg milk. The full (averaged) results (GHG emissions, energy consumption, water use, etc.) will be presented for milk, cheese (8.8 kgCO₂e/kg and 41 MJ/kg), yogurt (12 MJ/kg), cream (19 MJ/kg), butter (42 MJ/kg) and milk powder (58 MJ/kg). This study was commissioned and will be published in 2009 by the International Dairy Federation (IDF) (Belgium).