LCA of Food and Agriculture

This chapter deals with the application of Life Cycle Assessment to evaluate the environmental sustainability of agriculture and food processing. The life cycle of a food product is split into six stages: production and transportation of inputs to the farm, cultivation, processing, distribution, consumption and waste management. A large number of LCA studies focus on the two first stages in cradle-to-farm gate studies, as they are the stages where most impacts typically occur, due to animal husbandry and manure handling, production and use of fertilisers and the consumption of fuel to operate farm machinery. In the processing step, the raw agricultural product leaving the farm gate is converted to a food item that can be consumed by the user. Distribution includes transportation of the food product before and after processing. In the consumption stage, environmental impacts arise due to storage, preparation and waste of the food. In the waste management stage, food waste can be handled using a number of technologies, such as landfilling, incineration, composting or digestion. A number of case studies are looked at here where the life cycles of typical food products (meat, cheese, bread, tomatoes, etc.), and an entire diet are discussed. Other case studies deal with what LCA can conclude on the differences between conventional and organic farming, and the perceived advantages of local food items. Finally, methodological issues in agricultural LCA are discussed: the choice of functional unit, setting the boundary between technosphere and ecosphere, modelling flows of nutrients and pesticides, and the generally limited number of impact categories included in LCA studies.