Environmental impacts of beef and milk-containing diets relative to other human activities

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In a world with a rapidly growing population, increasing standards of living and pressing needs to reduce human impacts on environment and climate, UN's member states have agreed on a global sustainable development agenda towards 2030. A sustainable development calls for vast improvements in the eco-efficiency of all our technical systems (more functionality with considerably less environmental impact). For our climate change impacts, the Paris agreement (UNFCCC, 2015) sets the target of keeping man-made atmospheric average temperature increases close to 1.5 degrees.

The Planetary Boundaries framework (Steffen et al., 2015) identifies nine categories of man-made impact of importance for keeping the stability of the climate and estimates boundaries for the impact, which will allow us to stay within a safe operating space. In addition to emissions of greenhouse gases, there are boundaries for our use of land, use of freshwater, manipulation of biogeochemical flows (nitrogen and phosphorus compounds) and more overarching, the loss of biodiversity that results from all of these impacts. Several of the planetary boundaries are exceeded, and they all have food production as a substantial, often dominating, contributor.

There is thus a burning platform for improvement of the eco-efficiency of our food production – we need to reduce impacts per produced output with up to one order of magnitude within the coming decades in order to meet the needs of a growing and more affluent population. But how do we measure eco-efficiency, and where should we focus in order to achieve the needed improvements? Life cycle assessment (LCA) is introduces as the tool to measure eco-efficiency and gauge the environmental dimension of sustainability. It is shown how it allows quantifying all relevant environmental impacts from the whole food value chain and express them in a metric that allows comparing different food products and diets impact per impact and across environmental impacts and put them into the perspective of the total impact from an average person's life style and consumption. LCA is focused on relative assessments ('is food product A more sustainable than food product B?'), but the presentation argues that an absolute sustainability perspective is needed to guide decisions about future food production systems and food products, to allow them to stay within their share of the environmental space, as it is set by global climate change targets, planetary boundaries that define a safe operating space for our civilization, or carrying capacities of regional ecosystems. The focus must shift from eco-efficiency to eco-effectiveness, from 'better' to 'good enough'.

Life cycle environmental impacts from different food items and novel food production systems are shown to offer a perspective of how we will be able in the future to feed the planet within the planetary boundaries.

References:

UNFCCC (2015) Adoption of the Paris Agreement FCCC/CP/2015/10/Add.1

Steffen W, Richardson K, Rockström J, Cornell SE, Fetzer I, Bennett EM, Biggs R, Carpenter SR, de Vries W, de Wit CA, Folke C, Gerten D, Heinke J, Mace GM, Persson LM, Ramanathan V, Reyers B, Sörlin S (2015) Planetary boundaries: Guiding human development on a changing planet. Science 347(6223):736-746.