9:00 AM

Animal Sourced Foods Role in Sustainable Nutritio (#662)

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Short Abstract

Introduction

Amid growing concern regarding the food system that will be needed to support the estimated 10 billion people in 2050 are calls to reduce or eliminate animal sourced foods from human diets. This presentation will introduce a framework for evaluation and discuss remaining knowledge gaps regarding the role of ASF in sustainable food systems that provide nutritious diets.

Despite the green revolution and consequent increase in crop yields, micronutrient deficiencies are still problematic, particularly in developing regions: Zn deficiency (stunting) or Se (immune function). Even in developed regions, some subgroups are at risk for iron deficiency (teen girls) and older adults are subject to calcium and bone health issues (women in particular), or vitamin D (pregnant women). ASF are rich in micronutrients and are known to successfully ameliorate many of these issues.

Methods

Lifecycle assessment (LCA) is a systems framework to provide an accounting of environmental and sustainability characteristics of production systems. It is based on the ISO 14040/4 series of standards and consists of 4 iterative phases: goal and scope definition; lifecycle inventory collection; lifecycle impact assessment; and interpretation. LCA is used to evaluate full supply chains across a range of environmental metrics (climate change, eutrophication, human and ecosystem health, water and resource depletion, etc.). Lifecycle assessment can be used for product development, identification of environmental hotspots, improvement opportunities, and setting benchmarks against which future progress can be assessed. LCA has an explicit goal the identification of tradeoffs in complex systems, including tradeoffs between stages in the supply chain and tradeoffs across environmental dimensions (e.g., reducing water use at the expense of increased carbon emission).

There are emerging areas in LCA that include geospatial specificity, efforts to quantify impact of agricultural production systems on ecosystem services, including biodiversity, and incorporation of nutritional benefits/costs of the consumption of various foods and diets. In addition, there is an ongoing re-evaluation of the role of biogenic methane in climate change. The use of Global Warming Potential, based on IPCC guidance documents, to establish the impact of biogenic methane has been criticized based on the short-term dynamics of the carbon cycle. The fundamental argument is that due to its relatively short atmospheric lifetime that the most relevant metric of biogenic methane contribution to climate change is the concentration in the atmosphere, and if the concentration is stable, the implication is that there is no additional effect arising from continued biogenic methane emissions.

Results

White and Hall (2017) report that in the US animal source foods provide 24% of energy, 48% of protein approximately 50% of the essential amino acids and essential fatty acids as well as the micronutrients. They simulated a client-only agricultural sector which produced 23% more food but fewer of the populations requirements for essential nutrients which led to diets higher in calories due to generally lower nutrient density per calorie from plant foods. In an unpublished study using a hybrid lifecycle assessment technique, it was shown that while vegetarian diets resulted in generally lower environmental impacts across several categories (figure 1), that the US non-vegetarian recommended dietary guidelines led to increases for many categories. This is driven by the increased consumption of less calorically dense foods and changes in the patterns of food loss and waste.

Ongoing studies of US beef production systems are providing insight into factors behind the variability in sustainability driven by practice and location. One management practice receiving attention is Adaptively Managed Paddocks which is a system where beef cattle are stocked at extremely high densities (100,000 + kg/ha) for very short periods (hours). The paddock is typically visited once a year or less and the intense grazing stimulates root growth leading to substantial carbon sequestration (Rountree et al., 2016). Sequestration estimates (low, medium, and high) were combined, post-hoc, with process model simulations of cow calf finishing operations in the US. One system used conventional grain finishing and the other used grass finishing. The potential mitigation of GHG emissions from the potential sequestration is significant (figure 2).

Conclusions

Full assessment of the role of ASF in healthy diets from sustainable food systems requires a full understanding of the benefits and costs of alternatives and informed decisions based on understanding of tradeoffs – marginal vs. arable land use; social and economic benefits of wealth management through livestock, upcycling of protein quality (both marginal land and by-products of biofuels and non-edible organic material such as citrus pulp, almond hulls, etc.)

Notes

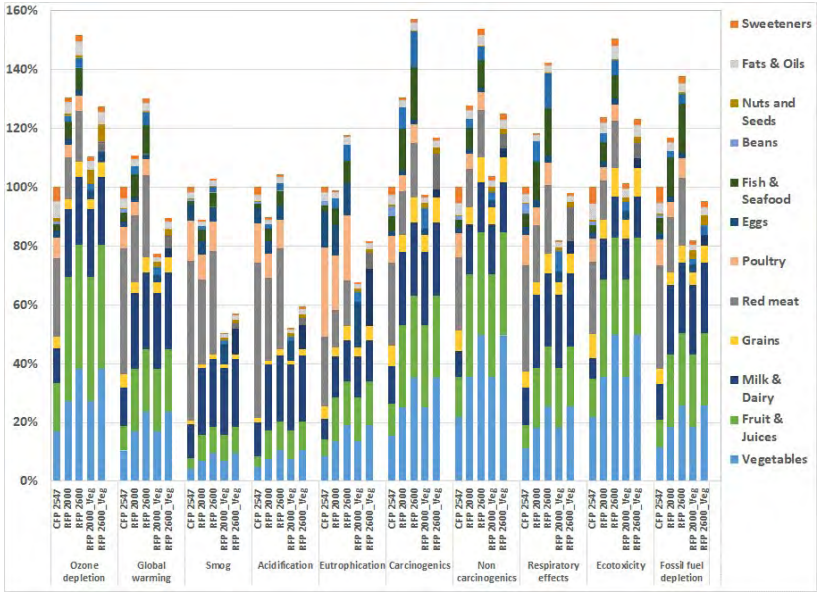

Figure 1

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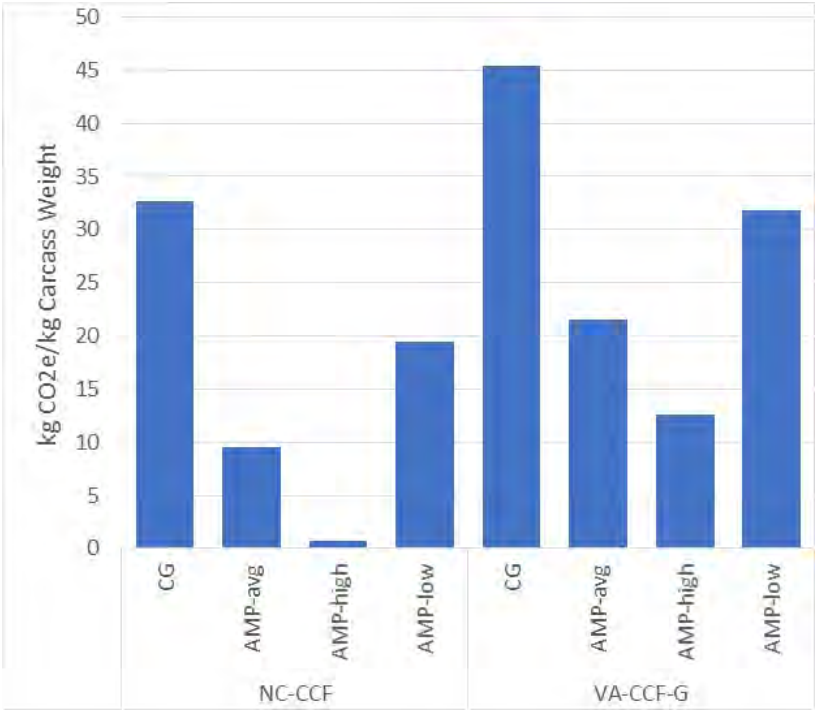

Figure 2

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