GLOBAL DAIRY PLATFORM

Perspective Paper

New Research Indicates Dairy is More Sustainable than Alternative Plant Beverages

Study also uncovers the complexities associated with developing a sustainability metric for foods

APRIL 2024

KEY TAKEAWAYS:

- When nutrition, socioeconomics and the environment are considered, semi-skimmed milk is a better choice than plant-based beverages.
- The scientific community is working on developing comprehensive metrics that can assess the various domains of sustainable foods.
- These findings should give pause to anyone considering dietary recommendations based solely on environmental metrics.

On the surface, a recently published manuscript by de Jong et al. entitled, Sustainability Evaluation of Plant-Based Beverages and Semi-Skimmed Milk Incorporating Nutrients, Market Prices, and Environmental Costs,[1] seems pretty straightforward: which is better for the environment and human health, dairy or alternative plant-based beverages (PBBs)? It depends on how you define sustainability. The United Nations Food and Agricultural Organization (FAO) describes a sustainable food system[2] as one that delivers food security and nutrition for all and is economically stable, has broad based benefits for society, and has a positive or neutral impact on the environment.

By that standard, the authors conclude that when environmental cost, nutrient content, and retail price are simultaneously considered, a serving of semi-skimmed milk is a better choice than PBBs. Beyond that, however, the paper also addresses several other complexities associated with incorporating multiple aspects of sustainability into a single score for a particular food when so many other variables are also at play. Such issues have implications for global sustainable diet recommendations, burgeoning concepts such as True Cost Accounting (what the retail cost of food products would be based on the effects on the environment, consumer health, and other factors), the complexity of the dairy food matrix, and the very essence of what sustainable eating really means.

Simple environmental metrics vary dramatically across production systems

Historically, researchers and others advocating for a more sustainable global food system have relied solely on environmental markers such as the carbon or water footprint of a particular food to assess the sustainability bona fides of that food. Even within this domain, however, estimations and extrapolations based on available data have led to errors or omission of important information. As the authors point out, greenhouse gas emissions per kilogram of food – for example, milk – is often measured in kilograms of CO2 equivalents and can vary dramatically based on the geography in which the milk is collected, the size of the farm from which it was collected, and milk production per cow on that farm, among several other factors. In fact, CO2 eq per kg of milk can vary by as much as six-fold depending on the geographic region of the farm. And while researchers have become savvier in recent years by endeavoring to account for differences in farm type, typology, and region, the fact remains that several variables besides those outlined above can affect the environmental footprint of food production.

PBBs production chain data are even murkier because greenhouse gas (GHG) emissions from these products are less well established. It is no wonder that life cycle assessments of food production can vary so much from study to study.

Protein quality highlights milk's value

The authors of this paper sought to compare the sustainability of semi-skimmed milk and several PBBs by linking CO2 emissions with a key function of the foods we eat, nutrient availability and uptake in the consumer's body, rather than the more commonly used but less biologically relevant measure of food weight. The nutritional variables they chose to assess were the Nutrient Rich Food Score,[3] as well as protein digestibility and indispensable amino acid content – markers of protein quality.

DAIRY LEADERSHIP: A CALL TO ACTION.

Challenge simplistic definitions of sustainability to become more holistic, incorporating measures of nutrition, bioavailability and socio-economic outcomes alongside environmental considerations.

Relating CO2 emissions to protein quality is not a new concept; in recent years Moughan[4] and McAuliffe et al,[5] among others, have used the Digestible Indispensable Amino Acid Score (DIAAS) as a means of generating protein quality values that could be used as a complimentary functional unit in life cycle assessments. In a 2021 paper,[4] Moughan made the point that calculating the environmental footprint of a food based on food weight or on a gross protein basis ignores the role of dietary protein as a supply of essential amino acids and does not account for differences in the protein quality of foods, which can influence conclusions about sustainable diets and food security.

By incorporating a nutritionally and biologically relevant (and well-studied) marker like protein quality into food sustainability measurements, a different picture emerges of how animal sourced foods differ from plant-based foods in their impact on the environment and human health. De Jong points out that when GHG production of foods is assessed, the footprint of dairy alternatives such as soy, oat, and almond beverages are generally lower than that of dairy. However, when protein quality is considered, GHG differences per amount of nutrients between plant and animal sources can disappear or move in the opposite direction.

According to de Jong and others,[6] the digestibility of dairy proteins has been shown to be twice as high as that of plant proteins, a phenomenon attributable in large part to the matrix effect of dairy. Among other things, this has implications for the quantity of plant or animal food a person needs to consume to ingest similar amount of amino acids, a factor with significant sustainability implications.

All things considered, milk is the healthy, sustainable choice

Results of the de Jong project indicate that whereas the carbon footprint of PBBs may appear lower than semi-skimmed milk when defined per unit mass, a serving of semi-skimmed milk is a better choice than PBBs from an overall sustainability perspective; a product with the lowest “societal cost” when environmental cost, nutrient content, and retail price are simultaneously considered, in nearly all instances, particularly when compared to non-fortified PBBs.

The carbon footprint of a soy beverage was slightly less than that of dairy milk, though with advancements in farm management and new feed additives on the horizon, the difference between dairy and soy is expected to disappear soon as well. Fortified PBBs exhibited lower carbon footprints versus semi skimmed until the authors introduced a retail cost metric to their assessment, at which point the lower cost of semi-skimmed milk compared to PBBs made dairy milk look even better from a sustainability perspective.

The authors further suggest that in instances where PBBs are used as alternatives to milk there could be public health concerns to reckon with as well. Besides the a forementioned protein quality differences between milk and PBBs, dairy is superior to PBBs with respect to nutrient density and overall micronutrient content, even without accounting for the impact of factors like the dairy matrix, which positively impacts the bioavailability of several milk-borne nutrients, or the anti-nutrients like phytic acid that exist in many plant-based foods.

There are gaps in knowledge regarding the environmental costs of processing and fortifying PBBs; the land use changes that would be required if more people consumed PBBs and its impact on the environment; food loss and waste that occur during the processing of foodstuffs that go into PBBs, and their impact on the sustainability of these products. We need to think hard before enacting policy changes that may affect the way we produce and consume foods globally. As other studies have shown, it is too simplistic to base nutritional density indexes[7] on only those foods with lower carbon emissions.

Enacting policy regulations based solely on environmental sustainability may have unintended consequences on consumers. As the de Jong paper, and many others published in recent years have shown, we need multi-criteria approaches that account for the full picture for both animal and plant-based foods.

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