

Healthy nutrition as a parameter of sustainability

September 2025

As the conversation around food sustainability evolves, there is a growing need to shift from traditional Life Cycle Assessments (LCA) to Nutritional Life Cycle Assessments (nLCA). While LCA primarily focuses on environmental impact, such as carbon footprint, it tends to neglect the nutritional value of foods. nLCA, however, integrates both environmental and nutritional considerations, offering a more comprehensive perspective on sustainable diets.



Transitioning to plant-rich diets is a key strategy in the shift towards more sustainable diets. However, changing the current diet to a more plant-rich, nutrient-adequate pattern is more complex than simply decreasing animal-sourced products. Dairy products play a vital role in this balance, providing essential nutrients that are difficult to obtain from plant sources alone. Rather than eliminating dairy, sustainable diets should prioritize plant-sourced foods while incorporating appropriate amounts of dairy to prevent nutrient deficiencies. Food-based dietary guidelines serve as practical tools in this transition, promoting culturally relevant and nutritionally adequate eating patterns that support both human and planetary health.

A food transition is necessary to promote a more sustainable food system but should be based on right outcome parameters: from LCA to nLCA.

It is generally accepted that climate change will have tremendous impacts on human health and the whole planet, making the reduction of greenhouse gas emissions (GHGE) and of the overall carbon footprint imperative (1).

Agriculture and food production are sectors that have a non-negligible environmental impact. As such, it is acknowledged that it is necessary to make changes to the way we produce and consume food to reduce our environmental footprint.



Calculations of environmental footprints are based on the outcome of Life-Cycle Assessments (LCAs). LCA is a methodology for assessing environmental impact of foods adding up all stages of food production – from farm to fork – ending up with a footprint expressed per kilogram of product or per kilogram protein. Based on these calculations, foods can be grouped in products with a high LCA-outcome and products with a low LCA-outcome. These calculations show that, in general, animal-sourced products have a relative higher outcome when compared to plant-sourced products when expressed per kilogram of product. In many sustainable food policies, the higher footprint for animal-sourced proteins/foods has led to ‘protein/food transition strategies’ to reduce the environmental impact of the food production system.

It is important to note that significant sustainability improvements have already been achieved in animal food production, and further gains are expected as technologies and practices continue to evolve. Innovations in feed efficiency, methane reduction strategies, and regenerative farming techniques are helping lower the environmental footprint of animal agriculture. For example, a study on the Dutch dairy sector found that the carbon footprint (CF) of raw cow milk decreased by 35% between 1990 and 2019 – from 1522 to 992 grams of CO₂-equivalents per kilogram of fat- and protein-corrected milk. This reduction was largely driven by innovations in feed efficiency, improved agricultural practices, and increased milk yields. While such improvements have made animal agriculture more climate-friendly, the study also highlights the need for continued progress, particularly in reducing emissions from enteric fermentation and manure storage – to meet future climate targets. (8)

Although the protein/food transition paradigm theoretically seems to effectively decrease the footprint of the food production system, the calculations at its base, namely LCAs, were not developed for consumer advice nor for comparisons of different foods, but merely to identify the key levers to reduce carbon footprint in a specific food chain. Consumers do not merely ingest kilograms or proteins, but whole foods, which contain a variety of nutrients in addition to proteins. Kilogram of product and kilogram of protein as a function unit does not represent the overall nutritional function of a product as it omits assessment of the accompanying micro- and macronutrient composition. These nutrients (taken as whole) vary between different products underlining their different nutritional function in the diet. The lack of consideration of nutritional aspects in LCAs expressed on a mass base or protein content has been recognised by FAO in a recent report, “Integration of environment and nutrition in life cycle assessment of food items: opportunities and challenges (2021)”, which concludes that evaluating foods only on the basis of LCAs per kilogram or per protein cannot be directly used to guide food consumption. (2)



In this report, FAO advises to introduce nutrient indicators in LCAs to make them more applicable for defining sustainable diets and suggests a new outcome measure, namely, a nutritional LCA: nLCA. This new outcome allows us to understand the trade-offs made between provision of healthy nutrients and environmental protection which in turn creates a new way to envisage the food transition. Indeed, LCAs expressed per kilogram of product or per protein are developed to gain insight in the environmental impact of the food production. They can be used to compare efficiency steps in food production, but not for qualifying the role of a food in the transition towards more sustainable diets.

Including the different dimensions of sustainable diets

To prevent unintended trade-offs in food transitions, the FAO and WHO developed a grid to define sustainable healthy diets. According to them (3), sustainable healthy diets must be:

- ❖ Healthy: providing all essential nutrients, including the beneficial effects of whole foods on non-communicable diseases and health risk factors.
- ❖ Culturally acceptable to consumers.
- ❖ Economically feasible: the diet must be affordable, accessible and equitable.
- ❖ Produced in an environmentally friendly way, with an environmental footprint as low as possible.

Considering this definition, the accessibility, affordability, environmental sustainability, and cultural acceptability of a diet will naturally vary from country to country. This variability underscores the importance of local food-based dietary guidelines, which exist to guide consumers based on their specific regional and cultural contexts. These guidelines help ensure that dietary recommendations are tailored to the unique needs and circumstances of different populations, promoting healthier and more sustainable eating habits globally.

All food-based dietary guidelines recommend plant-rich nutrient adequate diets in which animal-sourced products have an important position (4). FBDGs recommend keeping the intake of dairy products at sufficient levels. Within the group of animal-sourced foods, dairy products are among the most nutrient rich products with the lowest environmental footprint, together with egg and fatty fish. (5, 7, 9)



Dairy products are a great source of nutrients which are not easily obtained from or replaced by plant sources alone, for example B-vitamins, calcium, iodine, vitamins D and K, zinc, selenium. Because of this, reducing or eliminating them from our diets creates a significant risk of nutrient deficiencies. This is even more relevant to the most vulnerable groups such as children, elderly, or pregnant women.

More acceptable changes might result from reducing the overconsumption of meat and replacing it with dairy products, which will also result in a lower environmental footprint (10). Since, among animal products, dairy products such as milk, yogurt, or fresh cheese have the highest nutrient density compared to the lowest environmental footprint, they appear to be the most preferred replacement for consumers.

Applying nLCA to dietary guidelines reveals that plant-rich diets with moderate inclusion of animal-sourced foods, particularly dairy, offer the best balance between health and environmental sustainability. (6)

Changing the current diet to a more plant-rich diet is more complex than just decreasing animal-sourced products and replacing them with plant-sourced foods. This might unintendedly result in nutrient inadequate diets. Diets that cannot provide all essential nutrients are not healthy diets and, therefore, cannot be called sustainable diets.



Figure 1. FAO guidelines on the 4 dimensions of a sustainable diet

In conclusion, sustainable diets are healthy diets, which are affordable, accessible and acceptable for consumers with an environmental footprint as low as possible.

Dairy plays a central role in this context: not only is it recommended by national food-based dietary guidelines as part of healthy and sustainable diets – as it contributes significantly to achieving an optimal balance between nutritional adequacy and environmental sustainability – but it is also generally affordable, accessible and culturally acceptable across the globe.

Sources:

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