



March 2019



FEEDING THE WORLD WITH DAIRY

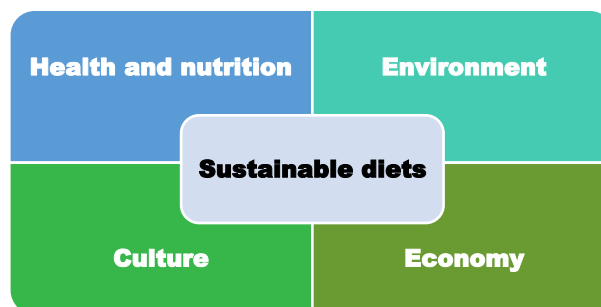
Why dairy is an important option to feed the world in a sustainable way



Sustainable diets as a condition for nutrition security ^a

Sustainable diets are those with low environmental impacts, which contribute to food and nutritional security, and also to healthy life for present and future generations. They are **nutritionally adequate, healthy and safe; protective and respectful of biodiversity and ecosystems; culturally acceptable, accessible, economically fair and affordable**; while also **optimising natural and human resources (FAO)**. ^(1,2)

When talking about sustainable diets, we must therefore take into consideration **four dimensions**: ^(3,4,5,6,7)



^a EDA [Factsheet](#): "Why dairy is important for achieving a healthy and sustainable diet"



Dairy is naturally nutrient-rich

Intake of nutrients ^b

- Dairy products are **nutrient-rich** and are excellent sources of **high-quality protein**, as well as **calcium, phosphorous, potassium, iodine, vitamin B2 and B12**.
- They also contain small amounts of other nutrients such as **zinc, selenium and magnesium; and other B vitamins (B3, B6, B9), as well as vitamin A**.
- Therefore, they can play an important role as part of a **healthy and balanced diet**.
(8,10,11)

The Dairy matrix ^(8,12,13)

The beneficial effects of milk and dairy products on health are becoming increasingly recognised. **The combination of nutrients, bioactive factors and how they interact with each other is known as the “dairy matrix”**.

Milk and dairy foods have been linked to a number of potential health benefits in areas such as blood pressure, bone health and weight control, as well as type 2 diabetes, cardiovascular disease and colorectal cancer. For example, milk’s beneficial effect on bone health may be partly due to the inherent interaction between calcium, protein and phosphorus, lactose and bioactive peptides.

Future dietary guidelines should consider the evidence of the effects of whole foods alongside that of individual nutrients. Hence, we support further research to provide a more detailed description of these holistic functions and effects in the human body.



Figure 1



Dairy is protective and respectful of biodiversity and ecosystems

Planetary boundaries ⁽¹⁴⁾

Planetary boundaries define the environmental boundaries of humanity’s “planetary playing field”.

The concept which was defined by Rockström et al. (2009) (15) and updated by Steffen et al. (2015) (16), establishes a safe operating space for humanity. The boundaries are interdependent and transgressing; one may shift the position of other boundaries.

Figure 2 presents the status of the nine planetary boundaries overlaid with an estimated role of agriculture. The world is responding to the challenges through innovation and the development of improved farming practices.

In particular, dairy industry is continuously working to have further alignment with the planetary boundaries.

^b EDA [Factsheet](#): “Nutrient-rich dairy, an affordable source of nutrition”

Figure (1): Dr Stephan Peters (Dutch Dairy Association, NZO). The food matrix: food is more than the sum of its nutrients. Voeding Magazine 2 – 2017



Low Carbon Dairy

For example, **low carbon livestock production** will help to achieve significant carbon related emission reductions. The **FAO** has proposed the following three ways to substantially reduce emissions from livestock:

- **productivity improvement** that reduces emission intensities (improved husbandry practices can **reduce emissions by 20 to 30%**),
- **carbon sequestration** through improved pasture management,
- and better livestock integration in the **circular bio-economy**. (18,19,20)

Biodiversity & Soil

Working on the **biosphere integrity** (biodiversity, etc) (Figure 2), is especially important in terms of planetary boundaries. As an example, farming dairy livestock (different species) helps to preserve animal biodiversity and revitalise landscapes. At the same time, keeping permanent grasslands not only supports plant growth, it also contributes to the restoration of the grasslands, plant and soil microorganism biodiversity, carbon sequestration in soils and land quality.

Additionally, cows reside on land that cannot be used for agriculture; they therefore are able to **utilise landscapes that would otherwise be unsuitable for food production**. Van Zanten et al. (38) have recently published in a research review the concept of livestock fed with **'low opportunity' cost feedstuff**, were they suggest that the role of animals in the food system should be centered on converting biomass (biomass from grassland and leftovers) that we can not or do not want to eat into valuable products.

It has been offered as a potential strategy to reduce the environmental impact of 'animal source food' (ASF) production (Figure 3). By converting these leftover streams, livestock recycles nutrients back into the food system that otherwise would have been lost in food production.

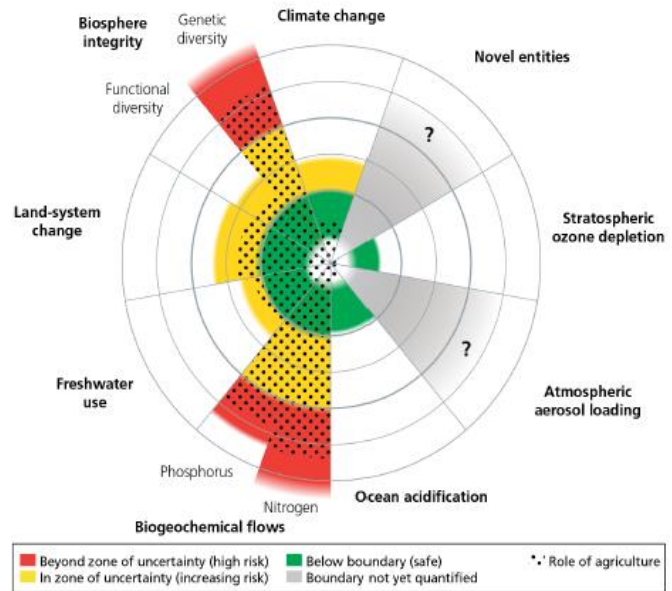


Figure 2

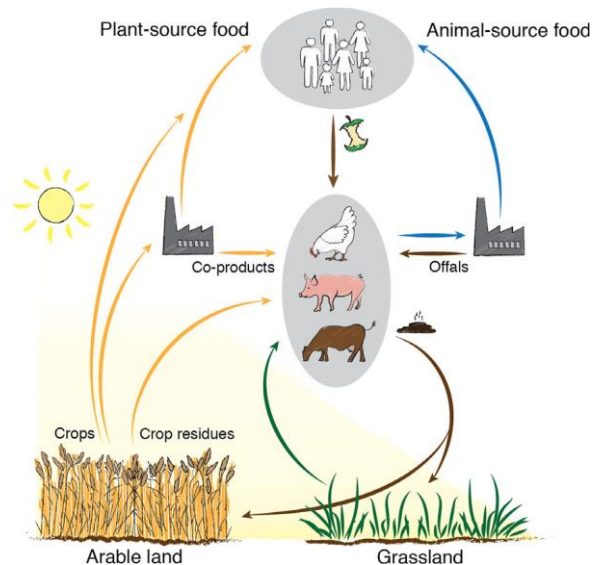


Figure 3

Figure (2): Campbell, B. M., et al. 2017. Agriculture production as a major driver of the earth system exceeding planetary boundaries. Ecology and Society, 22: 8.

Figure (3): Van Zanten et al. Defining a land boundary for sustainable livestock consumption. Glob Change Biol. 2018;24:4185–4194.



Phil Hogan, the **European Commissioner for Agriculture and Rural Development**, recently mentioned at the EDA Annual Convention 2018: “many soils in Europe have a low or very low organic matter content (0–2%)”⁽¹⁷⁾; and with efficient grazing/dairying we can compensate for the low fertility of soils.

While the “linear economy” has become common place in recent decades, the dairy sector has never lost the fundamental **circular economy** mind-set despite its permanent adaptation to the changes in the economic system.

Some projects (e.g. **TYFA project**: Ten Years for Agroecology in Europe) show that extensification of livestock grazing could have substantial effects, contributing to the restoration of biodiversity, climate mitigation and high-quality animal production.

Importantly grazing livestock is not possible in all countries of the EU (Nordic countries) owing to weather conditions, environmental restrictions, etc. Likewise, in a recent research article, a **future food vision was developed for the Nordic countries**. The livestock, especially grazing livestock, was considered a vital component in re-localising the food system, through their ability to utilise local pasture resources, and also by-products from food processing. The results indicate that a local food system at the national level is not feasible for all Nordic countries. However, via the exchange of food between and within the different countries in the region, this would be possible.⁽³⁴⁾

Dairy PEF

As EDA, we are aware of our environmental responsibility and we are dedicated to continuously improve the dairy industry’s environmental footprint; consequently, the **Dairy Product Environmental Footprint**, “**Dairy PEF**”^(c,d) has been developed. This undertaking is officially recognised by the [European Commission and Member States](#), which includes a specific methodology (**PEFCR**) and communication guidance on the environmental footprint of different dairy products. The PEF integrates all the indicators that are used to assess overall impact of dairy on the environment, helping thus to reduce carbon/greenhouse gas emissions (GHGE) as well as water, land and energy uses, whilst all the while improving biodiversity and preserving a broad array of resources.⁽³²⁾

Reflections on the theoretical replacement of dairy^(21,22,23,24)

Theoretically, eating less animal-based product and more plant-based products would reduce the environmental footprint of the diet as a whole. However, health and nutrition aspects must also be considered for such dietary shifts. One method to evaluate different diets effect on both environment and nutrition is to use a computerised modelling tool like **Optimeal**® (the program keeps track of two environmental indicators: green-house gas emissions (GHGE) and land use).

^c EDA [Factsheet](#): “The Dairy Product Environmental Footprint”

^d EDA [Product Environmental Footprint Category Rules for Dairy Products](#)

Figure⁽⁴⁾: Michael Clark and David Tilman. Comparative analysis of environmental impacts of agricultural production systems, agricultural input efficiency, and food choice. Environ. Res. 2017. Lett. 12

Figure⁽⁵⁾: Stephan Peters. Decreasing the environmental footprint of our diet - wrong paradigm? 'less animal more plant-based' May 2018.



Figure 5 shows that avoiding all dairy products will probably have little impact on the overall environmental footprint of our diet.

In addition, **Figure 6** reflects the consequences of eating less meat and dairy (white) and of not eating meat and dairy product (black) in terms of macro- and micro-nutrients. (33) In order to reach the same quantities of nutrients, we would need to consume quantities of fruits, vegetables and legumes far greater than the recommended daily portions.

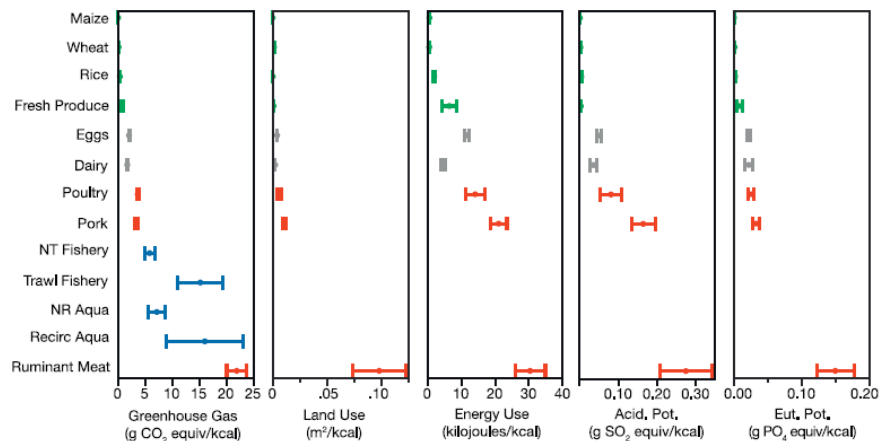
Macdiarmid et al. (29) published a good example of this; a sustainable diet that meets dietary requirements for good health with lower GHGE can be achieved with some changes, however, dairy products must be maintained at the same level, and overall diet cost cannot increase in order to allow access to all consumers. (6)

Numerous Life-Cycle Assessment (LCA) studies (e.g. Figure 7) report that plant-based foods produce less GHGE than animal-based foods. However, this is a simplistic view. Whilst, plant-based foods may appear beneficial in LCA models

because they produce lower GHGE/kcal, they also have a low nutrient density; in contrast, **animal-based products can have comparatively higher GHGE, but they also are nutrient-rich and excellent sources of high-quality protein.** (24-26). In addition, it is to be noticed that a high variation exists among products and producers around the world and that EU products may have lower average impact.

Animal proteins, such as dairy proteins, are of a 10-30% higher biological quality than vegetable sourced proteins. (36) This has been acknowledged by **EFSA in the “Scientific Opinion on Dietary Reference Values for protein” (2012).** (37)

Figure 4. Environmental impact of broad groups of foods per kilocalorie. The environmental indicators examined are greenhouse gas emissions, land use, energy use, acidification potential (Acid. Pot.) and eutrophication potential (Eut. Pot.). Bars show means and standard errors. Data from foods grown in greenhouses are not included when plotting this figure.



	Carbon emissions (kg CO ₂ eq/dag)	Land use (m ² *year/dag)
Optimal average diet	3,67 (100%)	4,00 (100%)
No dairy	3,53 (96,2%)	3,64 (91%)

Figure 5

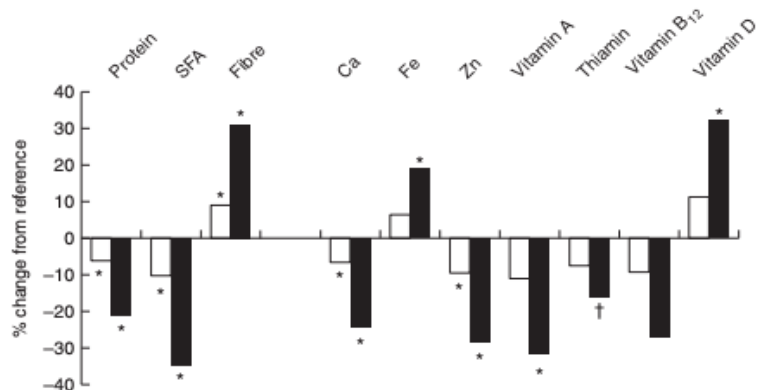


Figure 6



Whilst some plants are good sources of protein, most plant proteins are of low-quality, meaning they are deficient in 1 or more of 5 of the essential amino acids (EAAs).⁽²⁸⁾

Livestock currently produces more than one-third of world's protein, and ruminant animals have a unique capacity to convert non-digestible biomass into high-quality proteins, providing the optimal balance of essential amino acids (EAAs) that the human body requires and is not able to synthesise itself.

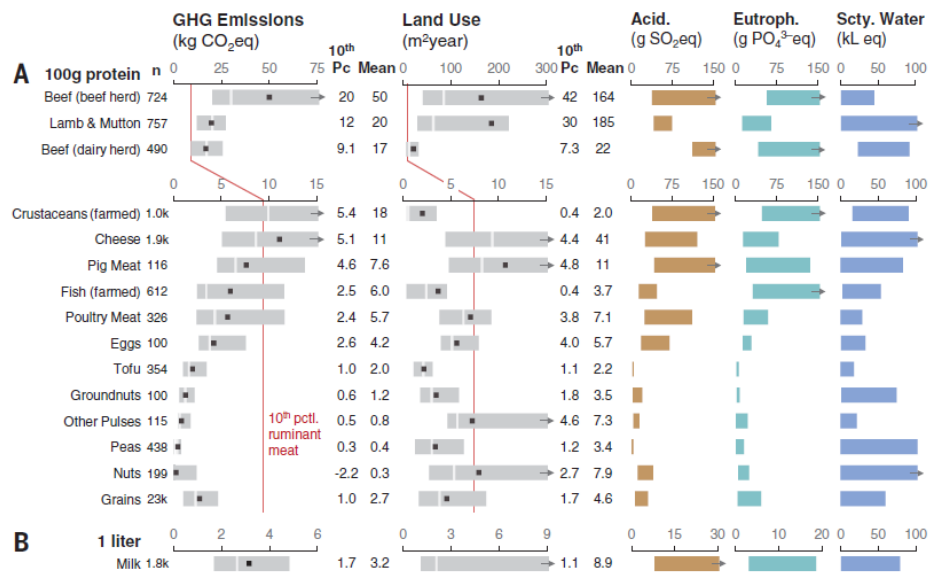


Figure 7. Estimated global variation in GHG emissions, land use, terrestrial acidification, eutrophication, and scarcity-weighted freshwater withdrawals.



A Sustainable Food System

A **Sustainable Food System (SFS)** is a food system that delivers food security and nutrition for all in such a way that the economic, social and environmental bases are not compromised. This means that: it is profitable throughout (**economic sustainability**); it has broad-based benefits for society (**social sustainability**); and it has a positive or neutral impact on the natural environment (**environmental sustainability**) (FAO).

A sustainable food system lies at the heart of the **United Nations' Sustainable Development Goals (UN SDGs)**; and at a global level **dairy plays a key role in delivering on the SDGs**, helping to fight hunger and poverty, providing livelihoods to millions of people, promoting gender equality and women empowerment, quality education, contributing to a healthy planet and providing nutrition and food security.^(e)



Figure 8

^e EDA Factsheet: "Dairy Contribution to social sustainability"

Figure (6): Seves SM et al. Are more environmentally sustainable diets with less meat and dairy nutritionally adequate? Public Health Nutr. 2017 Aug;20(11):2050-2062

Figure (7): Poore et al. Reducing food's environmental impacts through producers and consumers. Science. 2018. 360, 987-992

Figure (8): [Internet] available from: <https://www.stockholmresilience.org/research/research-news/2016-06-14-how-food-connects-all-the-sdgs.html>






High quality products come from dairy producers who take great care of their animals and provide them with high quality feed. Dairy farmers are stewards of much of the world's land and both farmers and processors can play a key role in protecting biodiversity. ^(35,41)

Rural areas are very important because they have always been **the origin of many traditions**. They are the birthplace of artisanal procedures, keepers of traditions and know-how, which give their products an **added value** appreciated by consumers. They ensure certain **quality standards**, they benefit farmers producing these products, and they are positive for **external trade**.

To maintain and to protect our products, we have **Geographical Indication (GI) labels**, a high level of **animal welfare** and **environmental requirements** ⁽³⁰⁾ as EU approach as well as many other special initiatives (**Table 1**).

As EDA we are conscious of our responsibilities, and the solutions mentioned in this factsheet can be combined with the areas of work from the COP 24 decision, the UN SDGs and the global 2030 development goals actively supported by the European Commission ([link](#)).

Table 1.	
Geographical indication	
Animal welfare	 and Others
Environmentally friendly	 and Others

The analysis reported by the UN Food and Agriculture Organisation (**FAO**), calculates GHGE from the dairy sector over a 10-year period (2005-2015). **The study highlights the progress that has been achieved, since all dairy regions have improved through increased productivity per animal, increasing farm management efficiency and increased feed efficiency.** ⁽³⁵⁾

Through the work of initiatives such as **the Dairy Sustainability Framework (DSF)**, the sector is committed to continuously seek ways to reduce GHGE and many others strong indicators from farms and businesses by all economically viable means.

Last but not least, some scientific reports (e.g. EAT-Lancet report) have recently done a welcome contribution to the debate on sustainable diets and global nutrition security. Creating a truly sustainable food system that protects the future of our planet whilst continuing to adequately nourish its population is one of the biggest challenges we face. **They rightly recognise dairy as a fundamental part of a healthy and sustainable diet, as well as essential for feeding the world in the future.**

Figure ^(9,10,11): EDA [Factsheet](#): "Dairy Contribution to social sustainability"

Figure ⁽¹²⁾: Laia Mataró-Nogueras. Defining "milk quality" The construction of meaning. Thesis report CPT-81333 (course 2014-2015)

Figure ⁽¹³⁾: [Internet] available from: http://ec.europa.eu/environment/eussd/smqp/pdf/PEFCR-DairyProducts_2018-04-25_V1.pdf

Figure ⁽¹⁴⁾: [Internet] available from: https://ec.europa.eu/agriculture/organic/downloads/logo_en

Figure ⁽¹⁵⁾: [Internet] available from: <https://www.granmoravia.com/en/water-footprint-gran-moravia-cheese/>



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