BECEL ORIGINAL LIQUID (plant-based) vs. dairy butter

Life Cycle Assessment
Technical Summary

May 2020
Version 1

BECEL ORIGINAL LIQUID VS. DAIRY BUTTER. LCA TECHNICAL SUMMARY

In 2017, Quantis was commissioned to conduct a Life Cycle Assessment (LCA) of Upfield's BECEL ORIGINAL LIQUID for the Nordic markets (Finland, Sweden and Denmark), compared to dairy butter sold in the same respective markets. The study was updated in 2020. Upfield's BECEL ORIGINAL LIQUID is a plant-based liquid that can be used as a substitute for butter (even solid butter) for cooking and baking.

This document provides a short summary of the scope of the study, functional unit and system boundaries, method and data sources, and results, as well as the climate footprint and equivalencies used for comparative climate claims.

LIFE CYCLE ASSESSMENT

LCA is a metric-based methodology used to assess environmental impacts resulting from, for example, greenhouse gas emissions, waste production, water, land and energy use. Environmental impacts are calculated over the life cycle of a product, from extraction of raw materials to the end-of-life.

METHOD

This study followed the regionalised LCA methodology described by Liao et al. (2020) to compare the environmental impacts of BECEL ORIGINAL LIQUID with dairy butter sold in three Nordic markets (Sweden, Finland and Denmark) on the basis of 1 kg of product. Data was collected with a cradle-to-grave approach for the product recipe, key ingredients sourcing countries, production factory, energy mixes, packaging designs, transportation and end-of-life scenarios. Spatially (archetype) differentiated agricultural life cycle inventory data were generated, as well as land use change (LUC) emissions for agricultural ingredients. A total of 18 environmental indicators were assessed. The LCA compares environmental impacts of Upfield's plant-based products and dairy butter using an attributional approach as per PAS 2050 (BSI, 2012), aligned with the latest international standards for dairy products, published by the International Dairy Federation (IDF, 2015) and the European Dairy Association (EDA, 2016).

CRITICAL REVIEW

The LCA respects ISO 14040 and 14044 standards for public disclosure of results. The LCA has been peer reviewed by a panel of three independent experts on topics such as LCA, agronomy and dairy production.

FUNCTIONAL UNIT

The functional unit (FU) is a reference unit for which all results are calculated and presented.

- For dairy butter and BECEL ORIGINAL LIQUID, the functional unit (FU) was 1 kg of product (fresh matter) for spreading, baking or shallow frying, at the consumer's home.

ENVIRONMENTAL IMPACT INDICATORS CONSIDERED

The assessment includes 15 environmental impact indicators from the European ILCD 2011 Midpoint+ v1.08 impact assessment method (JRC-IES 2011). Three additional indicators were included: land occupation (m^2.y), which reflects the total area of land used over one year and is a proxy for biodiversity and ecosystem services (Nemecek et al. 2011, Milà i Canals et al. 2012), water consumption (m^3), the total amount of fresh water consumed (ISO 14046), which includes, for example, evapotranspiration from irrigation water, and water scarcity footprint (m^3 water equivalent (eq)) based on the AWARE approach that assesses the water deprivation potential considering spatial water scarcity differences (Boulay et al. 2017).

FROM CRADLE-TO-GRAVE

The LCA considers all identifiable activities across the product life cycle (cradle-to-grave) for all products in the three markets (see Figure 1).

The study includes impacts from:

- Farming (crop production or milk production)
- Production of plant-based liquid or dairy butter
- Packaging
- Distribution
- Retail
- Consumption
- Waste treatment of packaging

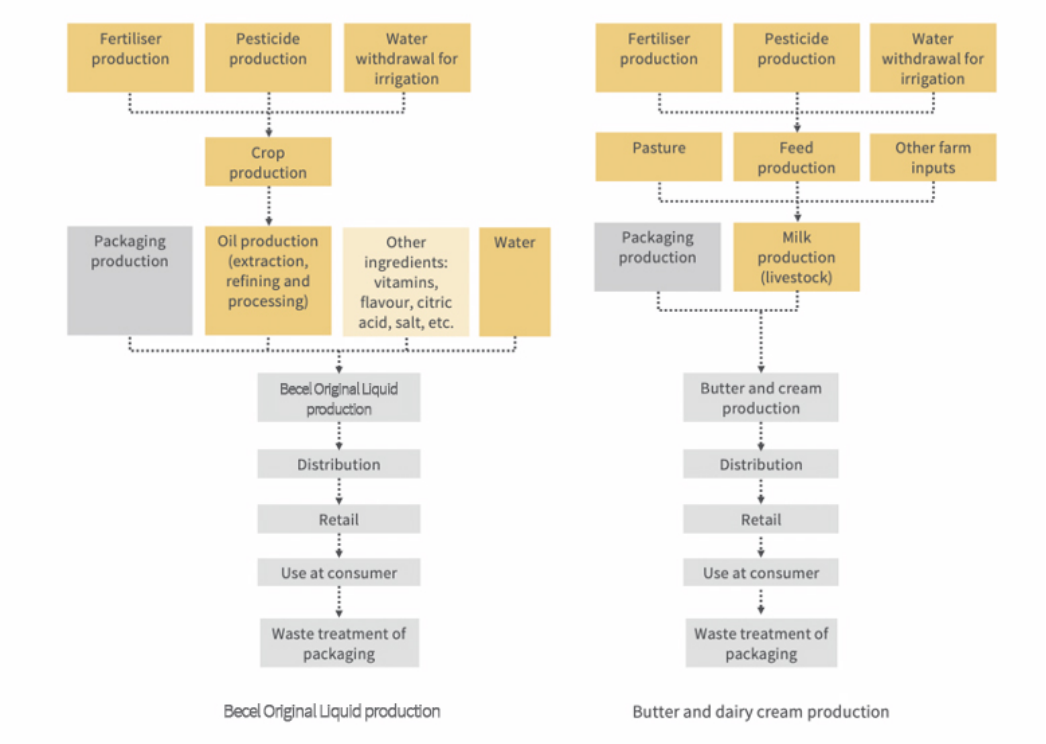

Figure 1. Schematic of the systems evaluated

The study does not include impacts from:

- Capital goods at the distribution centre and at the point of retail.
- Labour, commuting of workers, administrative work, cattle insemination and disease control processes.
- Food loss and food waste during distribution, at retail point and at the consumer's home.

DATA COLLECTION AND MODELLING

- Plant-based margarines and spreads: Primary data for the recipes and ingredient sources for BECEL ORIGINAL LIQUID were provided by Upfield.
- Dairy butter: Default data representative of European averages and published by the European Dairy Association and the European Commission were used to model dairy processing, packaging and distribution. Data was compiled for different product recipes, key ingredient sourcing countries, production factory locations, energy mixes, packaging designs, transportation and end-of-life scenarios. Spatially (archetype) differentiated agricultural life cycle inventory data were generated, as well as LUC emissions for agricultural ingredients in all markets relevant to each system's supply chain. All data has been assessed to ensure that it meets the quality standards required to make comparative assertions. The LCA modelling tool SimaPro version 9.0 was used to model individual datasets (such as oilseeds and packaging) required for plant-based products and for the life cycle of dairy products.

RESULTS AND DISCUSSION

CLIMATE CHANGE IMPACTS

Table 1 shows that BECEL ORIGINAL LIQUID has a significantly lower climate impact than dairy butter. The climate change impacts for BECEL ORIGINAL LIQUID in Denmark consider a single recipe, production sites and conservative transportation across countries. The climate change impacts of 1 kg of BECEL ORIGINAL LIQUID is 4.22 kg CO_2-eq, whereas the impact for Danish dairy butter is 9.87 kg CO_2-eq.

BECEL ORIGINAL LIQUID - Denmark*	Dairy butter in Denmark	Global warming potential (GWP) difference	
Global warming potential (GWP) (kg CO_2-eq/kg)	Global warming potential (GWP) (kg CO_2-eq/kg)	kg CO_2-eq/kg	%
4.22	9.87	5.65	-57%

**Nordic average*

Table 1. Carbon footprint for BECEL ORIGINAL LIQUID and dairy butter in Denmark (kg CO_2-eq per kg of product)

Figure 2 shows that the main drivers of GHG emissions for BECEL ORIGINAL LIQUID are oilseed farming and associated LUC emissions, which can vary significantly depending on the type of oilseed, its quantity and sourcing countries.

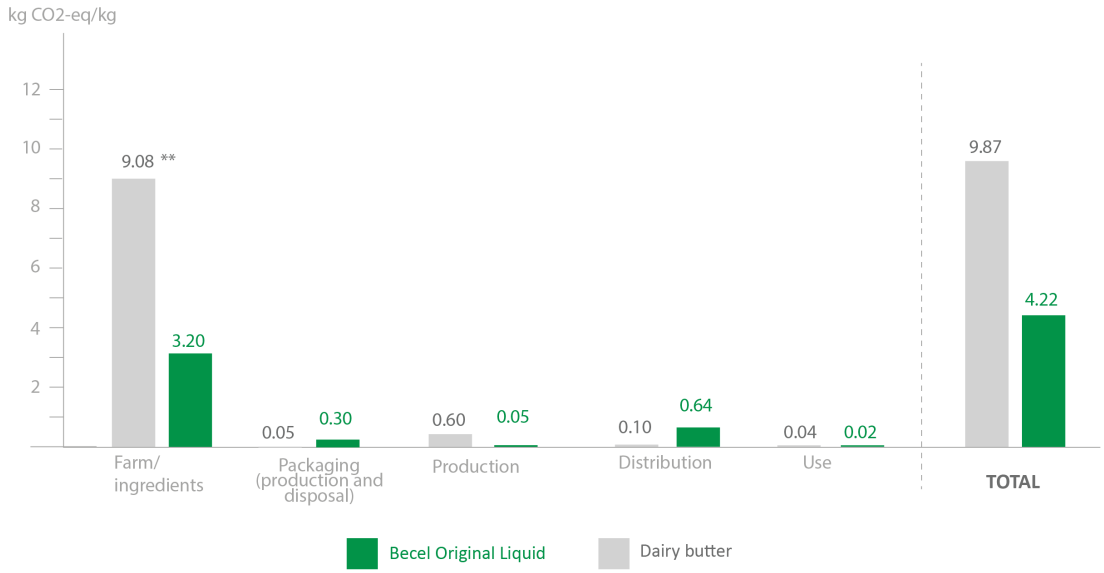

Figure 2. Climate change results per life cycle stage per 1 kg of product

** CO_2-eq emissions per kg of dairy butter by farm activity in Denmark: Enteric emissions: 3.46 kg; Manure management: 1.48 kg; Pasture feed: 0.13 kg; Pasture peat degradation: 0.04 kg; Feed fodder: 1.96 kg; Fodder land use change: 1.24 kg; other farm activities: 0.77 kg. The weighted average enteric emissions account for 38% for the dairy butter carbon footprint of Denmark.

CONCLUSIONS AND OUTLOOK

This study shows that BECEL ORIGINAL LIQUID has significantly lower climate impacts than dairy butter. The climate change impacts for BECEL ORIGINAL LIQUID is dominated by vegetable oil ingredients' production. When moving towards transparency of sustainable supply chains and developing potential mitigation strategies, producers can only understand the impacts of their products and look for opportunities to reduce these impacts if they thoroughly and accurately assess their product supply chains. When moving towards more sustainable plant-based margarines and spreads, a key factor would be to reduce embodied environmental impacts from oilseed ingredients through better understanding and improvements in supply chain sourcing, farm level agricultural practices, and product recipe design. The key challenges of performing regionalised LCA lies in the collection and organization of all relevant data and models, performing gap assessment and prioritization, developing missing data or improving data quality, and linking inventory data with impact assessment, to draw robust conclusions and meet requirements for data quality.

CLIMATE FOOTPRINT

The greenhouse gas emissions of:

- one kilogram of BECEL ORIGINAL LIQUID is 4.2 kg CO_2-eq
- one 500 g bottle is 2.1 kg CO_2-eq
- 100 g would be 0.42 kg CO_2-eq
- a single serving of 10 g would be 42 g CO_2-eq

DO YOU WANT TO KNOW MORE ABOUT THE STUDY?

Read the complete study published in The International Journal of Life Cycle Assessment and get more detailed information at: https://link.springer.com/article/10.1007/s11367-019-01703-w

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With offices in the US, France, Switzerland, Germany, Italy and Colombia and clients around the world, Quantis is a key partner in inspiring sustainable change on a global scale.

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