

KoRo's Product Carbon Footprints – Methodology Document

Version 1 – September 2026

Introduction

As part of our aim to increase transparency, the KoRo Sustainability team has developed a methodology to estimate the Product Carbon Footprints (PCFs) of over 100 of our key products. If a product has an estimated PCF, the emissions per unit are displayed on the website under the tab 'Product Journey and Impact'. This document serves to provide a detailed overview of the methodological approach undertaken to calculate the PCF per product. Every PCF displayed on the KoRo digital storefront includes a direct, unrestricted hyperlink to the dedicated PCF landing page to support substantiation and transparency.

The results are estimates within the calculation boundary described in this document and do not represent a complete cradle-to-grave product footprint.

Scope and Intended Use of the Calculation

The scope of the calculation is examining the carbon footprint of 166 products¹ actively sold directly to customers through the KoRo website or through retailers. The calculation follows a cradle-to-gate approach to estimate emissions within the defined calculation boundary and does not incorporate any carbon offsets, carbon credits or market-based compensation mechanisms to lower calculated totals.

The unit for analysis is a single KoRo product at point of sale, e.g. one jar of nut butter. Calculations are based on the declared net product weight, and in addition include any primary packaging and liquids (where applicable).

For this project, we use an external software provider, Cozero², to conduct our calculations. Though data collection takes place outside of the tool, we utilise the software to obtain and match emission factors and quantify final results.

This evaluation is strictly limited to climate impact, quantified as greenhouse gas emissions in CO₂ equivalents (CO₂e). This calculation does not assess other environmental impact categories such as water consumption, land degradation, biodiversity loss or circularity. Consequently the results do not constitute an overarching claim of general environmental performance across the product's full lifecycle.

The results are intended to increase transparency to our customers and enable internal benchmarking across KoRo's product portfolio. However, they are not intended to be used

¹ Status as of 31.08.2026, only including products in stock

² Cozero GmbH (2026) – [Product Carbon Footprint Software](#)

to compare products against external or third-party products. Differing system boundaries, life cycle databases or modelling assumptions could lead to different results for identical products. Consequently, direct comparisons with externally calculated product footprints should be avoided, and the figures displayed on the website should be interpreted within the contextual boundaries of KoRo's stated scope of calculations.

Calculation Boundary

The scope of this project is a cradle-to-gate assessment of product emissions, where we include raw material acquisition for our ingredients, packaging, processing, bottling and transportation up to our KoRo warehouse. This assessment excludes all downstream emission sources, such as shipment to direct customers, retail distribution, consumer storage and/or preparation and end-of-life packaging disposal. Therefore, this is cradle-to-gate and not a complete cradle-to-grave lifecycle assessment. This is visualised in Figure 1 below.

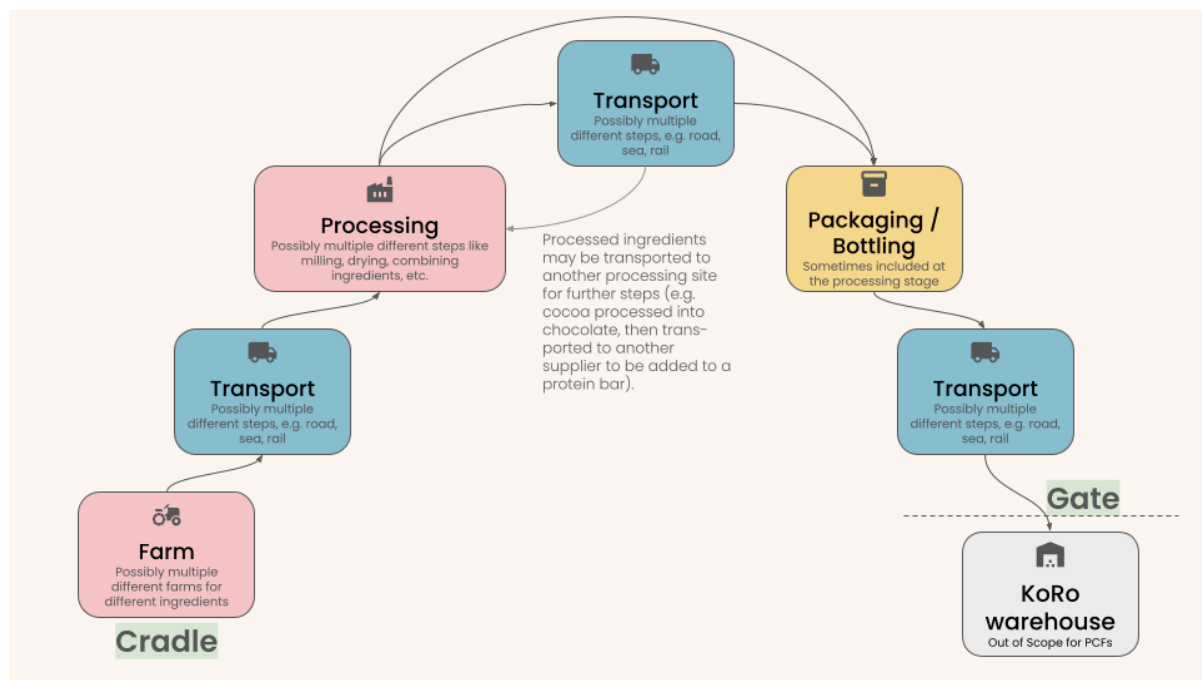


FIGURE 1: Simplified diagram showing KoRo's upstream value chain and scope of assessment

Specifically, we consider the following under each of the lifecycle stages:

- Raw material acquisition includes emissions from land management, machinery fuel, crop cultivation, land use change and agricultural inputs such as fertilisers and pesticides, to the extent covered by the selected emission factors..
- Packaging covers raw material extraction, processing and manufacturing emissions for primary product containers. Our boundary does not include any secondary or tertiary packaging, such as shipping boxes or pallets.

- Processing estimates emissions associated with facility energy, steam and electricity consumed during the physical transformation of raw commodities into finished products.
- Bottling is our final manufacturing step, which estimates the operational energy used by equipment to fill, seal and label each product unit.
- Transportation accounts for all freight emissions incurred while moving raw inputs from the sourcing region to further processing and bottling sites and the finished products to KoRo's warehouse in Germany. Our boundary does not include emissions incurred during storage at our warehouse, as we are following a cradle-to-gate approach.

In the charts displayed on our website, we aggregate emissions from raw material acquisition, including the agricultural on-farm emissions, processing and bottling under the category 'Product' to simplify our communication. As the final footprint results are estimates largely driven by secondary data, the figures are rounded accordingly before publication.

Data Collection & Quality

Relevant products to be included in the scope of the calculation are identified based on sales data from the last 12 months. This allows us to ensure that best-selling products are included in scope. From Akeneo, our internal product management system, we extract specific data for each product. This includes an ingredient list, information on sourcing regions and upstream suppliers, as well as data on packaging materials and size. In an effort to further enhance supply chain visibility, we collaborate with our Procurement teams to design and distribute targeted surveys, gathering details directly from suppliers regarding specific sourcing regions. As supplier-specific information is primarily qualitative, we rely on secondary data sets and do not currently incorporate supplier-specific quantitative activity of emissions data. These secondary datasets are selected based on geographic applicability, temporal relevance and technological alignment.

When dealing with any data gaps, we follow a specific source hierarchy: Akeneo data is used first, followed by supplier questionnaires and finally, secondary database proxies as a fallback when data is not available. For complex products, such as protein bars, we triangulate data from supplier questionnaires, Akeneo, and standardised assumptions to model the emissions.

Inventory Analysis

Based on the data collected from internal systems and additional data from surveys, we conduct each PCF calculation through the use of the external software. For each step within our calculation boundary, we have defined a specific calculation approach.

Raw Material Acquisition

For each product, recipes are checked and verified based on data from Akeneo. Each ingredient's raw material weight is calculated by multiplying its recipe percentage by the total unit weight. For liquid products, the calculation assumes 1 litre equates to 1 kg (no actual product mass or density is used).

An additional scaling factor is applied to account for upstream food loss incurred prior to final product manufacturing. The calculation incorporates a 16.3% additional raw material uplift, which is derived from the FAO food-loss rate of 13.8%³, rounded to 14%. A 13.8% loss corresponds to a 16.3% increase in the required input quantity. This is a general assumption; actual losses will differ depending on the specific product and supply chain. For dried fruit or fruit crisps, we assume up to 10x more fresh produce by weight⁴, given that the product weight is reduced significantly during the drying process.

These final ingredient weights are uploaded to our external software, where the most appropriate emission factor per ingredient is selected. If a specific emission factor is not available for an ingredient, a standardised proxy representing a closely related commodity is selected. Any necessary conversions from the emission factor unit to our product unit are done directly by the external software, as well as estimating final emissions from raw materials.

Any organic ingredients are assigned secondary database emission factors and are evaluated using the same baseline datasets as conventional inputs unless an organic emission factor is available for the specific ingredient. Using a generic literature benchmark for potentially reduced carbon emissions was excluded to maintain a conservative approach.

Packaging

Packaging specifications are retrieved from Akeneo or refined through data provided by suppliers in the survey. Data is provided as the weight of each packaging component per unit, which allows for a classification by packaging material to align with corresponding secondary emission databases. For example, when considering a glass of nut butter this would comprise of the glass jar and a metal lid. These final packaging component weights are uploaded to our external software. Any necessary conversions from the emission factor unit to our product unit are done directly by the external software, as well as estimating final emissions from packaging.

³ This is based on data from the [FAO \(2019\)](#), which states that 14% of food loss occurs in upstream value chains.

⁴ Based on data that fresh fruit consists up to 90% of water, as stated in [Rejman et al. \(2021\)](#).

Secondary and tertiary packaging are excluded from our calculation boundary. As we are estimating emissions at product unit level, allocating shared bulk transport packaging across variable batch sizes and multi-product shipping configurations presents significant methodological allocation challenges. Furthermore, we use the final weight of the primary packaging at point of sale to calculate emissions and do not account for any manufacturing offcuts or scrap generated during the converting process. This exclusion is assumed to not materially affect the overall result and is due to limited visibility and lack of standardised reporting across suppliers.

Processing and Bottling

Products are assigned to specific product categories to allow for a distinction between energy-intensive manufacturing processes, such as dehydration of fresh fruits, and processes requiring less energy, such as dry packing grains and nuts. Leveraging a secondary emission factor database, the emissions from the 'transformation' stage of various food products were isolated. For each of the KoRo product categories, a specific emission factor was built by calculating an average of similar products from the database. These category averages serve as a representative baseline and do not show the exact manufacturing process of every individual supplier.

One broad 'Powder' category is utilised for powder products, even though the specific products and processing steps can vary. Plain freeze-dried fruit is assigned to the 'Dried Fruit' category because no separate freeze-drying category is utilised. Products with a high chocolate share or a clear confectionery character are assigned to 'Snacks'. Conversely, products that are mainly dried fruit with only a light coating remain categorised under 'Dried Fruit'. This rule is used uniformly for all similar products.

As base emission factors are expressed in kgCO₂e/kg of finished product, these are scaled by the net product weight to calculate final emissions per unit. These values are uploaded as a direct CO₂e entry to our external software to ensure inclusion in the final PCFs.

Through the use of this approach, there is a potential risk of double-counting processing impacts for monoproducts, as underlying processing emissions may already be partially embedded in secondary emission factors used to account for raw material acquisition. However, to maintain a conservative approach, ensure consistency in our calculations and reflect ingredients that serve as processed inputs for complex formulations, processing impacts are retained across all products.

Transport

For each ingredient, a multi-stage transportation route is defined leveraging an AI analysis, covering the shipment from the raw material origin, intermediate processing and/or

bottling and the final delivery to our central KoRo warehouse. Where granular origin data is unavailable, country-level sourcing is mapped to the primary geographic producing region for that specific commodity. For all ingredients with multi-regional sourcing, the calculation incorporates the maximum potential distance among the listed sourcing regions to ensure a conservative approach.

All intercontinental shipments are modelled using exclusively sea freight, as we do not have any air freight within our upstream supply chain. Each defined transportation leg, at ingredient level, is uploaded to our external software providing the weight of the shipment and the distance. Final calculations to determine the tonne-kilometers per shipment and estimate the related emissions are done directly by the external software.

Transportation emissions exclude packaging mass and do not incorporate the 16.3% food-loss uplift due to limited visibility of the exact loss points along the supply chain.

Emission Factor Sources

Secondary emission factor databases were used to estimate emissions, ensuring that robust sources were selected. Where secondary lifecycle datasets exceed a 10-year threshold, they are vetted by Cozero for technological representativeness and used where they are considered the best available proxy. Table 1 summarises the emission factor sources for each of the lifecycle stages:

Life Cycle Stage	Emission Factor Data Source
Raw Material Acquisition	ADEME (2018)
	Agribalyse (2023)
	BAFA (2023)
	Cozero (2022)
	Eaternity (2021)
	Ecoinvent (2017)
	GEMIS (2015)
	IPCC (2021)
	WRAP (2015)
Packaging	Cozero (2022)
	DEFRA (2025)

	Ecoinvent (2023)
	OEKEOBAUDAT (2023)
	World Steel (2022)
Processing & Bottling	Agribalyse (2025)
Transportation	DEFRA (2025)
	GLEC (2019)
	UBA (2020)

TABLE 1: Emission Factor Sources by Life Cycle Stage

Assurance & Review

The methodological approach and calculation logic undergo an internal first-party review before publication. As the responsibility of the data collection and calculation sits within the Sustainability Team, the review is conducted independently by KoRo's Legal Team to ensure strict separation of reporting lines to prevent conflict of interest. This internal evaluation constitutes an internal review rather than formal assurance and focuses specifically on assessing the consistency and logic of the underlying methodological approach. The results have not undergone external assurance.

PCFs are reviewed periodically on an annual basis or earlier if there are material changes to the product's recipe, supplier, origin, packaging, processing or calculation method. These regular updates support the continuous refinement of our calculation methodology, with the long-term goal of integrating primary supplier-specific data and allowing iterative methodological improvements to address any limitations.