

International Agri-Food & Climate Circle 2023

Using data to produce accurate environmental measurements, credibly and transparently

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ANIMAL NUTRITION AND HEALTH

ESSENTIAL
PRODUCTS

PERFORMANCE
SOLUTIONS +
BIOMIN®

PRECISION
SERVICES



DSM

BRIGHT SCIENCE. BRIGHTER LIVING.

The worldwide drive for sustainable animal protein demands accurate footprint measurement & improvement

50-60%

Feed impact on animal protein production cost

50-80%

Feed impact on animal protein footprint

Nutrition is key to more sustainable animal protein, driven by feed production, digestion and excretion.....

.... and requires **accurate, credible measurement** to meet emissions requirements of the downstream value chain

Change driven by the value chain



Sustainability conscious consumers put pressure on food brands & retailers



Investors want to mitigate risks & put pressure on food brands



Regulators setting new boundaries in which farms can operate



A full eco-system approach is required

to ensure animal protein production becomes more sustainable and profitable

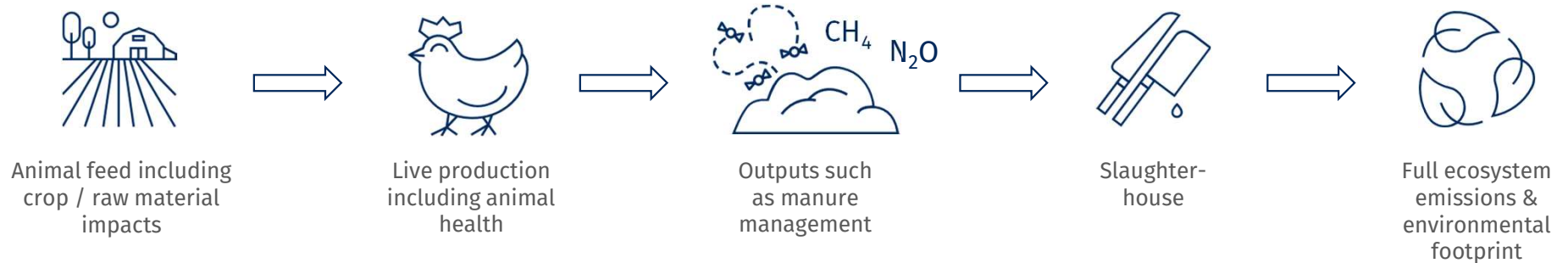
From a siloed industry approach

There are many **product-driven approaches** that are focused purely on single steps of the **ecosystem** looking at it from a **supplier perspective**



To full eco-system approach

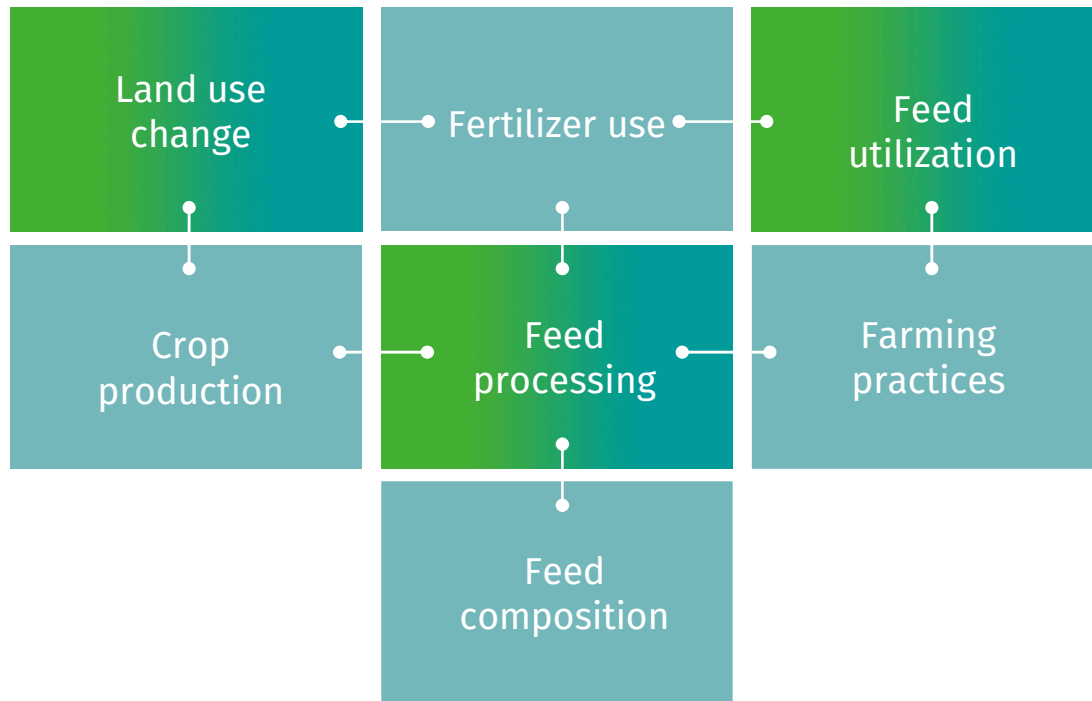
Need to take a **full ecosystem approach** to show and **measure the full environmental footprint** of animal protein production & how to improve with science-based solutions



You don't improve what you don't measure

Relevant LCA metric systems and greater use of primary data are critical to measure and know how to reduce footprints in animal production

Requires a full systems understanding

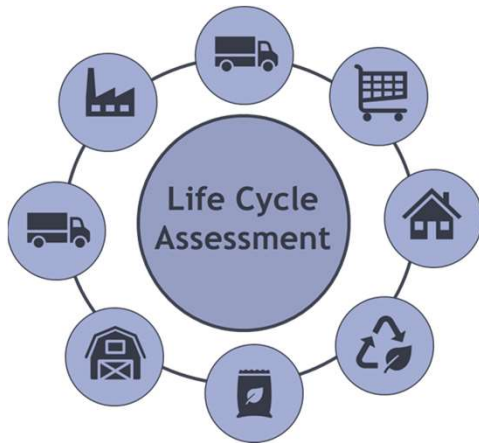


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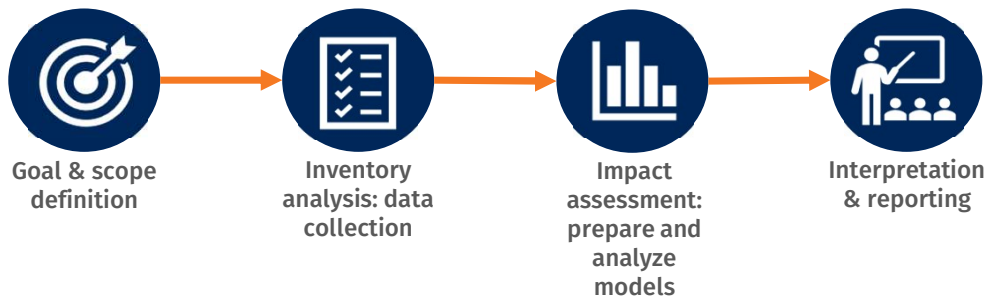
- Internationally recognized methods, databases and calculation tools to determine full environmental footprint
- at farm level
- to enable tangible and measurable reductions in footprint by different interventions (nutritional, animal, manure & housing management, etc.)



LCA provides scientifically robust metrics that highlight sustainability benefits and potential improvements



Life Cycle Assessment determines the environmental impacts of a product over its entire life cycle, or selected phases, by identifying the associated material, energy and waste flows



With our own production data and extensive specialist databases, using latest methodologies, our LCAs provide crucial sustainability information about our products and applications

At DSM we demonstrate ambitious climate leadership

Sustainability is in our DNA; engrained in our purpose, strategy, business and operations. We've been taking climate action for more than a decade

Absolute emissions reduction from operations (scope 1 & 2) by 2030

59%

Complimenting our value chain emissions (scope 3) reduction target

28%

Intensity reduction by 2030



At DSM we understand the key drivers for environmental footprint of our product portfolio and act to address them

Reducing emissions from our operations

Ex.: In 2019 DSM Sisseln commissioned a new biomass heat and power plant. Supplying steam to the site and exporting renewable electricity to the grid, **significantly reduced carbon footprint of our vitamins**



Energy impact reductions

Carbon footprint of steam reduced by 60%, electricity by 90%



Conventional energy sources have much higher impacts

Fossil-based sources have considerable higher environmental impacts than the DSM biomass energy plant. Where coal is used, these impacts can be up to 30x higher



... and it has been key to work with our supply chain to reduce our scope 3 emissions



As a **double A List** company, we are leaders in corporate transparency and action on climate change and water security.

Our supplier engagement program **CO2REDUCE** collaborates with suppliers of key contributing raw materials to develop and implement emissions reduction action plans.

Exploring new opportunities for scope 3 emissions reductions **reduces the footprint of our products** and the **scope 3 emissions of our customers**



We unlock the value of sustainability by combining measurement with science-based solutions

Calculate the footprint of the products



Environmental Product Declarations & Premix Carbon Calculator

We start by transparently sharing our products' reduced footprints on 16 different metrics

Calculate the footprint of the animal protein



Intelligent Sustainability Service

We calculate the full environmental footprint of animal protein using primary feed and farm data, combined with expert knowledge and tailor-made, practical solutions to unlock the value of sustainability

Provide science-based, proven solutions for improvement



Innovative and complete portfolio

We provide innovative feed additives & nutritional solutions to address many of the key environmental footprint drivers



Environmental Product Declarations

A credible approach to communicate product sustainability metrics

ROVIMIX® A-1000
Environmental Product Declaration

EPD

This Environmental Product Declaration (EPD) provides customers with transparent documentation on the environmental footprint of ROVIMIX® A-1000. At DSM we deliver science-based solutions and metrics supporting our customers in their journey to reduce value chain emissions.

Animal protein production is under pressure to reduce its environmental footprint, cutting levels of carbon dioxide, nitrous oxide and methane, and reducing nitrogen and phosphorus emissions which lead to eutrophication and subsequent biodiversity loss.

ROVIMIX® A-1000
A sustainable vitamin A for better animal health and performance. Vitamins are nutrients, essential for the life and well-being of animals. Most of them cannot be synthesized by the animals so they must be added in feed. Particularly, Vitamin A is needed for:

- Vision and reproduction
- Integrity of epithelia
- Cell differentiation
- Modulate immune response reducing susceptibility to infection

ROVIMIX® A-1000 has been specifically produced for use as a stabilized and reliable source of Vitamin A in all type of animal diets.

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ESSENTIAL PRODUCTS
PERFORMANCE SOLUTIONS
BIOMIX™
PRECISION SERVICES

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ROVIMIX® A-1000
Environmental Product Declaration

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DSM's commitment to sustainability
Sustainability is integral part of DSM's Purpose led, Performance driven strategy.

Our strong growth platform is centered on developing innovative solutions addressing **Nutrition & Health, Climate & Energy and Resources & Circularity**. At DSM, sustainability is not only our core value and a key responsibility, it is also an important business driver that is fully engrained in our purpose, strategy, business and operations.

Our Nutrition business focuses on animal nutrition (vitamins, enzymes, exotics, cardenoids, with prems and other specialty solutions), human nutrition (ingredients and solutions for food & beverages, as well as specialty nutrition, nutritional ingredients, consumer-branded products and personalized nutrition) and personal care and aroma ingredients.

By reducing the impact of our own operations, we enable our customers to become more sustainable, reduce their risk profile and to potentially benefit from value created from future carbon tax savings. We further step up our ambitions regarding the reduction of greenhouse gas emissions in line with the Paris Agreement, our energy efficiency and our use of renewable energy.

To be a leader in climate action it's important to lead by example. Therefore we, at DSM, have introduced six sustainability platforms as part of our strategic initiative **BE MAKE IT POSSIBLE**, aligned to the United Nations Sustainable Development Goals (SDGs).

REDUCING FOOD LOSS & WASTE

- Minimizing downgrading and food waste along the value chain by improving meat, egg, milk and fish quality

IMPROVING LIFETIME PERFORMANCE OF FARM ANIMALS

- Supporting animal health and performance leads to enhanced animal growth efficiency due to a better feed conversion and livability under practical farm conditions

HELPING TACKLE ANTIMICROBIAL RESISTANCE

- Ensuring animal health and welfare in combination with other vitamins by supporting the functioning of the animals' immune system

REDUCING EMISSIONS FROM LIVESTOCK

- Reducing the overall environmental footprint and emissions by improving the efficiency of livestock production

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Reducing your environmental footprint by choosing ROVIMIX® A-1000

The cradle-to-gate environmental footprint of 1 kg of ROVIMIX® A-1000 is given in the table below. These values can be included to assess the environmental impact of ROVIMIX® A-1000 in your footprinting studies.

Impact category	Unit	ROVIMIX® A-1000
Climate change	kg CO ₂ eq	---
Climate change - fossil	kg CO ₂ eq	---
Climate change - biogenic	kg CO ₂ eq	---
Climate change - Land use and Land use change	kg CO ₂ eq	---
Ozone depletion	mg CFC ₁₁ eq	---
Ionizing radiation	kBq U ²³⁵ eq	---
Photochemical ozone formation	g NMVOC eq	---
Particulate matter	µdisease inc.	---
Human toxicity, non-cancer	µCTUh	---
Human toxicity, cancer	µCTUh	---
Acidification	mol H ⁺ eq	---
Eutrophication, freshwater	g P eq	---
Eutrophication, marine	g N eq	---
Eutrophication, terrestrial	mol N eq	---
Ecotoxicity, freshwater	kCTUe	---
Land use	Pt	---
Water use	m ³ deprivation	---
Resource use, fossils	MJ	---
Resource use, minerals and metals	mg Sb eq	---

Environmental footprint results according to alternative methods can be provided on request.

Life Cycle Assessment (LCA) standards used

DSM routinely applies ISO 14001 series standards for Life Cycle Assessment (LCA).

The cradle to gate footprint results have been calculated using the latest version of the [Environmental Footprint \(EF3\) Method](#), investigating 19 impact categories (PEF).

The cradle to gate footprint was executed using an attributional approach.

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- **Product specific environmental footprint data** with illustrative comparisons where available
- Key environmental data across **19 impact categories**
- Transparent descriptions of **standards, data sources and methods used**
- **3rd party verification** of the calculation and reporting processes

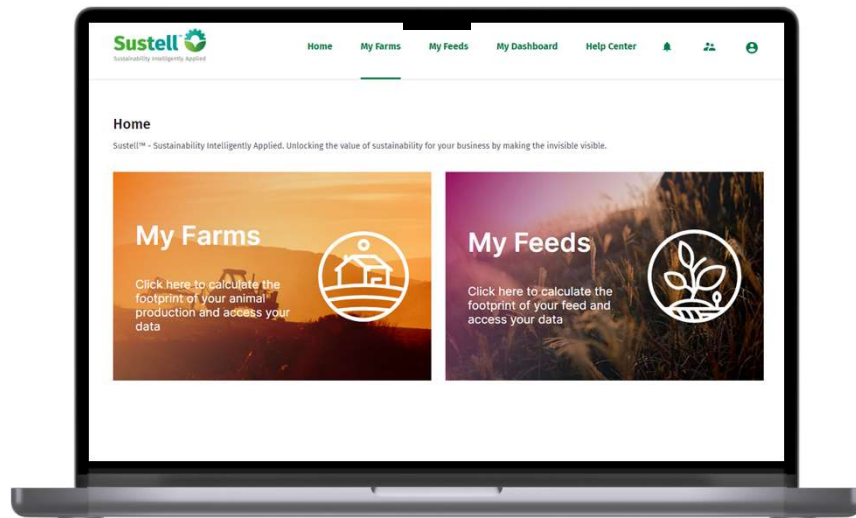
Critical review

This EPD is prepared in accordance with ISO 14021:2016, using DSM's internal calculation and reporting processes assured by DNV.



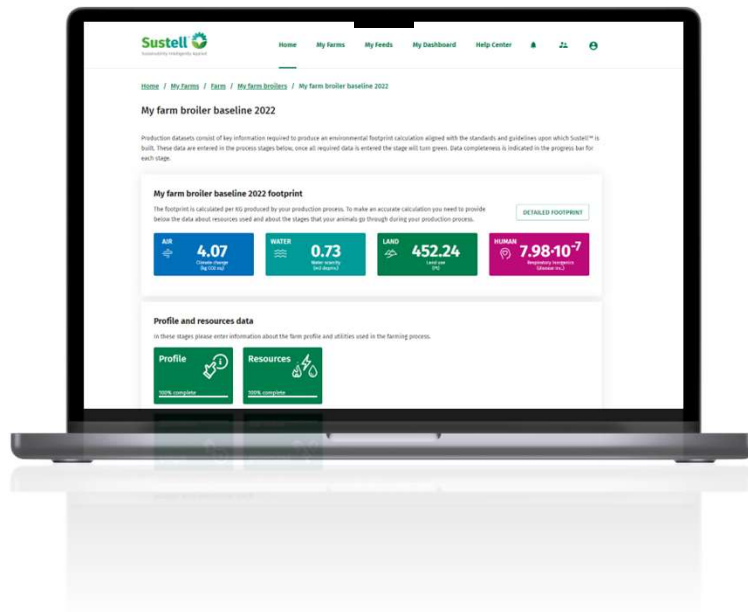
Sustell™ – An Intelligent Sustainability Service

Measurement combined with practical, science-based, proven solutions to unlock the value of sustainability across species (fish, dairy cows, swine, laying hens, chickens) and farming systems



Sustell™ – The Intelligence Platform

A highly advanced, yet user-friendly system for calculation and visualization of full environmental footprint results (19 variables)



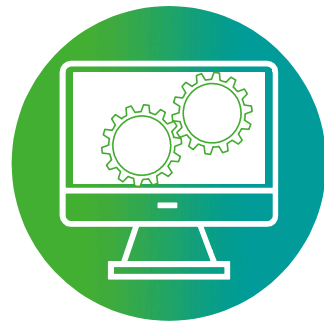
- Manages the complexity of thousands of data points with an intuitive, user-friendly interface that provides credibility and transparency of foot-printing
- Respects data sensitivities around data sharing and permissions to enable scalable, end-to-end foot-printing for the value chain

Sustell™ is an ISO assured system that delivers accurate full environmental footprint impacts



Verified input data

3rd party assured farm and feed data, according to recognized standards or approaches



Sustell™

LCA calculation and scenario analyses certified to ISO 14040/44



ISO assured results

Results calculated according to ISO 14040/44, with farm-level data assured to relevant standards

ISO assured results provide credible input for:

- Sustainability reporting
- Environmental labelling schemes (Eco-labels)
- GHG Accounting
- Sustainability Linked Loans
- Verified ESG reporting
- Best practices gains



All data privacy applicable laws and regulations conformed with



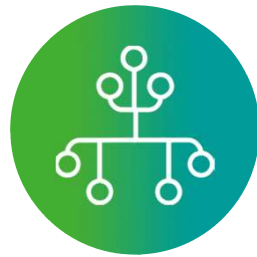
Data and data interpretation is key for credibility & value creation in sustainable food systems



Assured data

From feed ERP systems/feed formulation & Farm Management systems

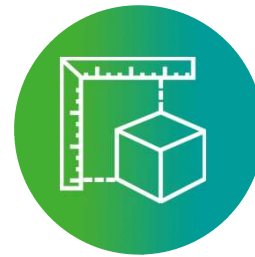
Credible databases such as Agri-Footprint & GFLI



LCA methods & ISO assurance

Adherence to the latest, internationally recognized LCA guidelines & methods

ISO assured LCA footprinting platform



Data based interventions

Based on proven evidence / science-based technologies



Data transparency

Traceable, credible, assured data from the data eco-system to unlock the value

Measurement combined with practical, science-based, proven solutions unlocks the value of sustainability

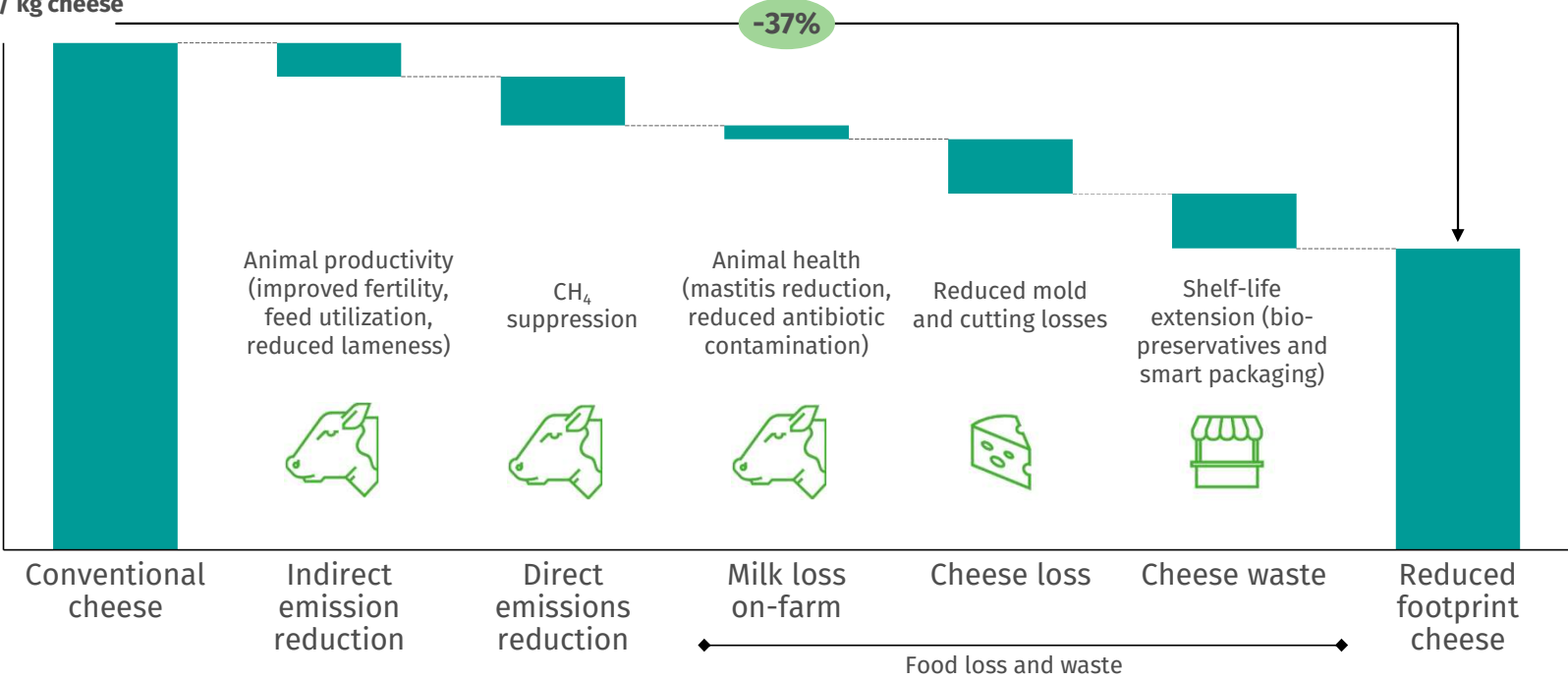
Example decarbonization of the dairy value chain



The dairy value chain is committing to decarbonizing their value chain & setting ambitious Net Zero targets (IDF, GDP)



Kg CO2 eq / kg cheese



Based on DSM data and 3rd party LCA commissioned by DSM in 2021 for selected solutions, according to FAO LEAP Guidelines and ISO standards
 Base case uses a current Dutch dairy system and Gouda cheese production

Sustell™ intelligently unlocks the value of sustainability

- **High precision:** primary farm & feed data (linked to credible LCA databases, Agri-Footprint and GFLI) & customer specific compliant LCI data
- **Credibility:** LCA process assured to ISO 14040/44, aligned w/leading methodologies (FAO LEAP & EU PEF, and IPCC guidelines)
- **Full environmental feed & farm footprint:** (aligned with impact assessment methodology EF 2.0) detailed insights & levers for improvement
- **Business insights dashboard:** for multi-farm footprint analysis & business decisions
- **Scalable:** fast, efficient multi-farm & feed analysis and multi-species 'what if scenarios'; API connections
- **Meeting the needs:** all stakeholders across animal protein value chain
- **Ease of use:** intuitive multi-user-interface saving time and cost, requires minimum training, user friendly design



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