

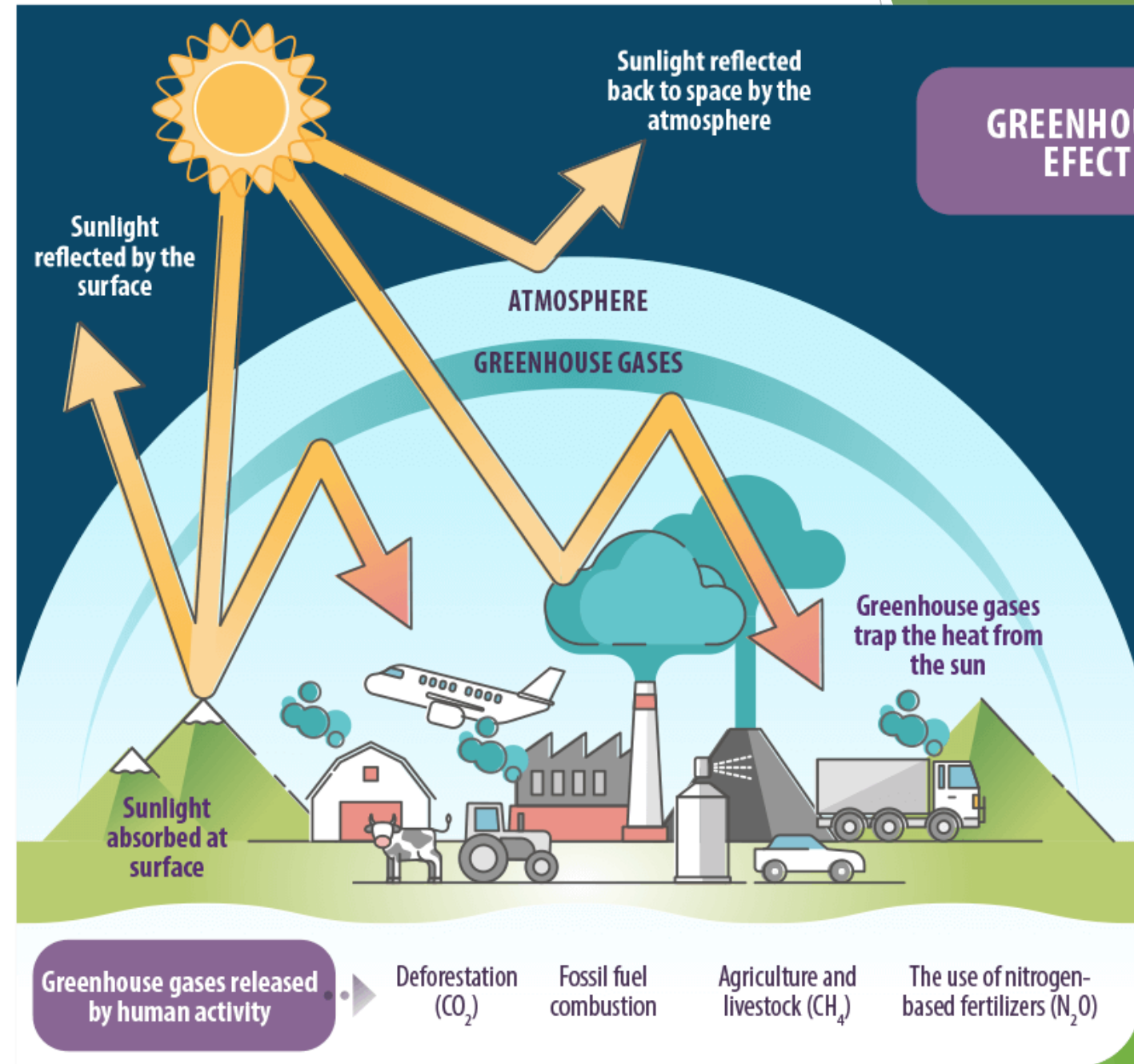
# Sustainability, a new Dimension in Poultry Feed Formulation- Including the Key Role of Soy products

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**USSEC consultant**  
**nutritionist monogastrics (NL)**

5th INTERNATIONAL ANIMAL NUTRITION CONGRESS, December 11-14, 2025  
Titanic Mardan Palace Kundu-Antalya, Turkey

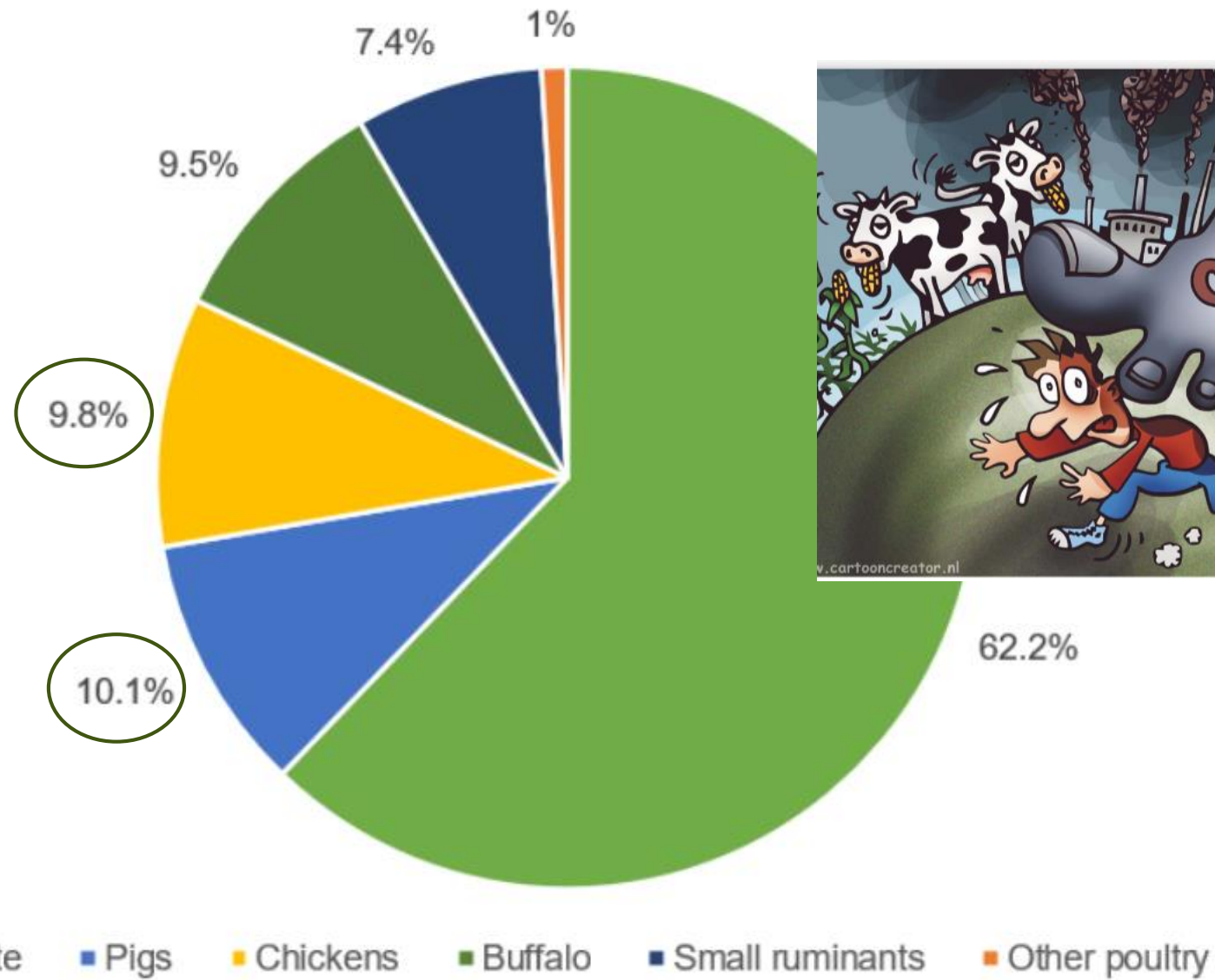
farm animals now account for 15-20 % of human-made greenhouse gas emissions

to measure and improve the footprint of farm animals, we must use reliable measurements called life cycle assessments (LCA) and full transparency

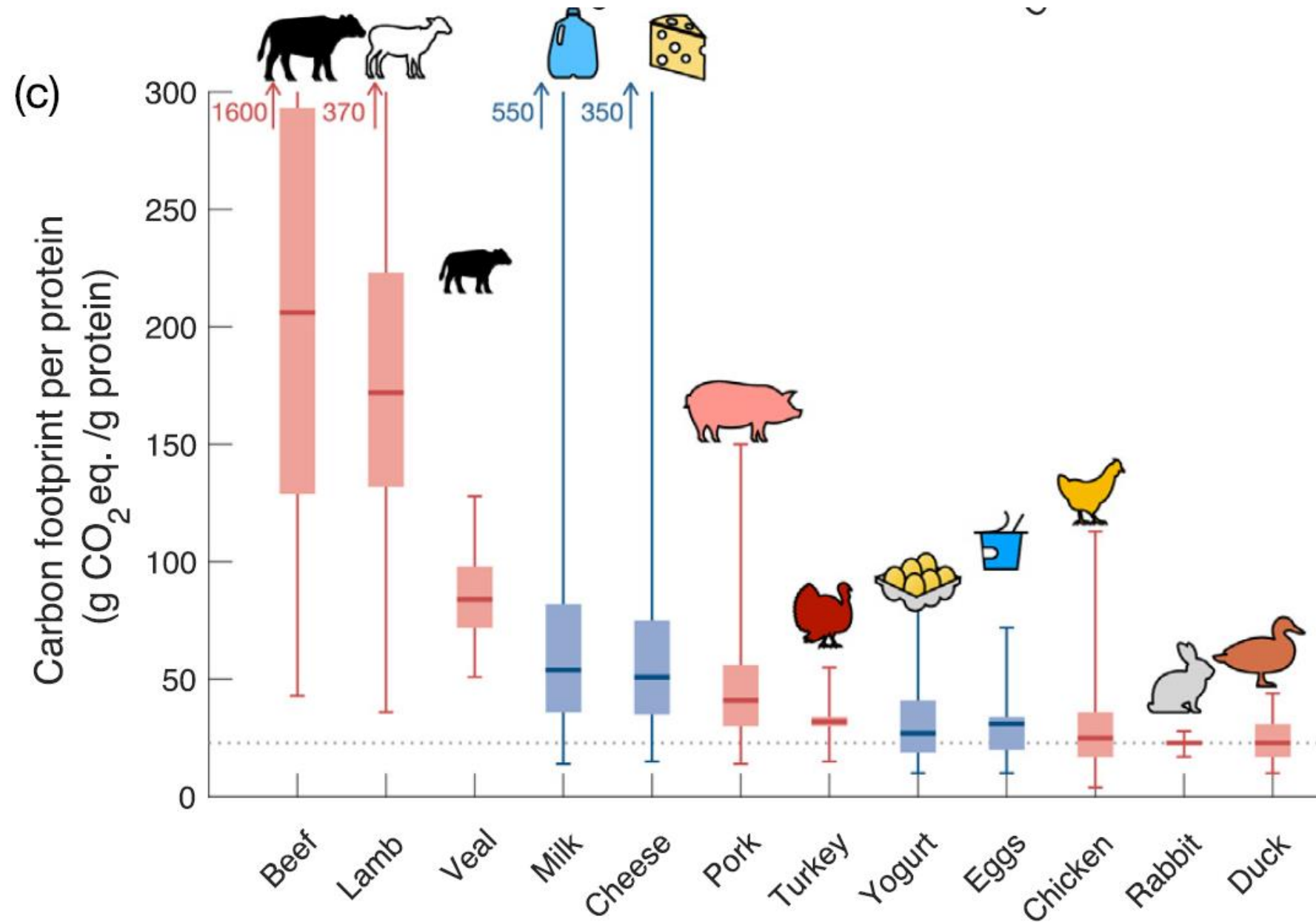


Sustainability is no longer optional—it's a business imperative

# Percentage contribution of global GHG emissions by livestock species



data taken from [GLEAM, by the FAO \(2017\)](#).

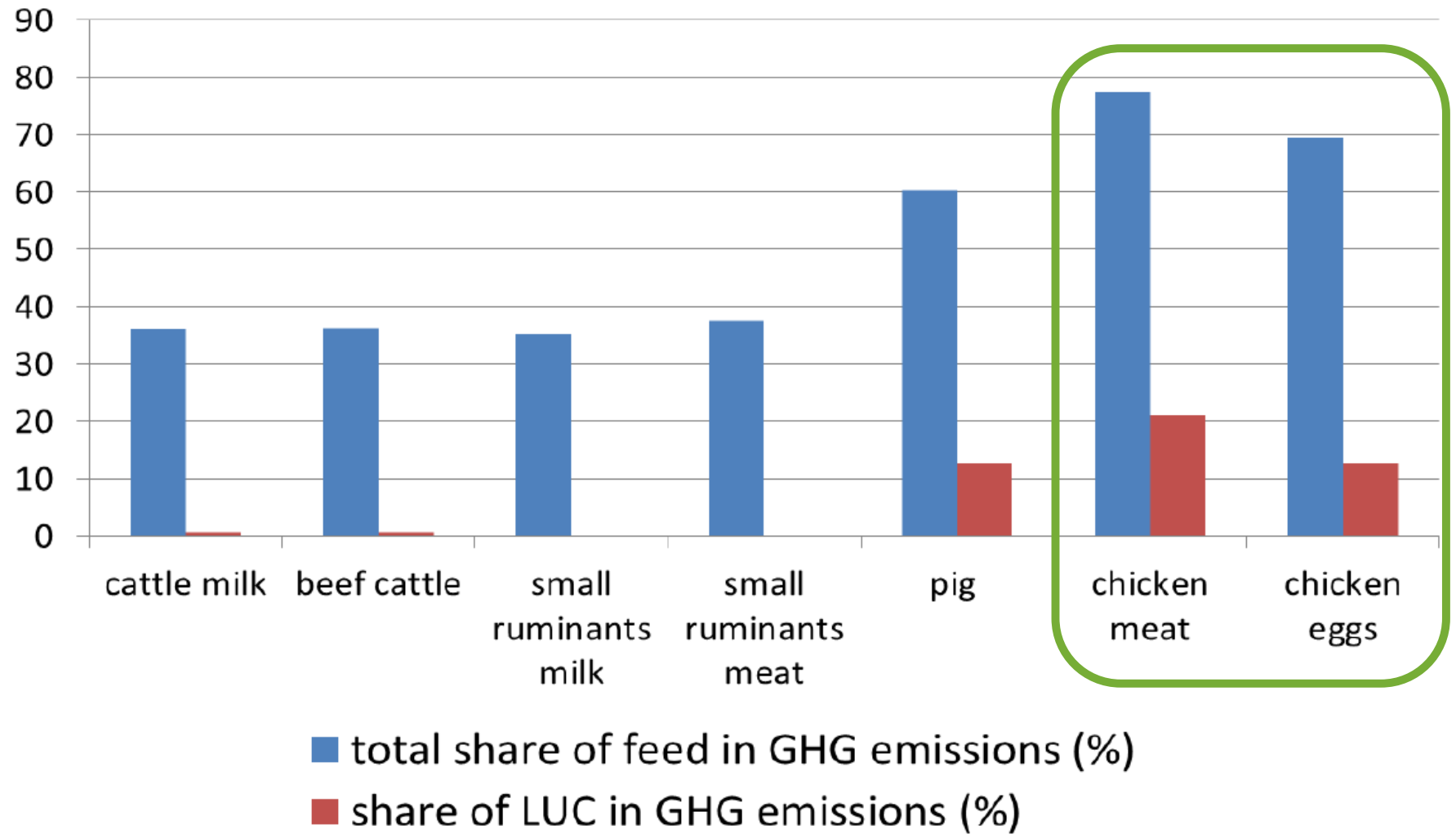


**carbon footprint (CO<sub>2</sub> eq) per gram of protein retained**

Gaillac & Marbach (2021)

# feed production accounts for an average of 45% of the global carbon footprint associated with livestock

(FAO, 2013)



Feed is mainly to blame for CO<sub>2</sub> emissions

- 75% of total carbon footprint in poultry meat
- 70% of total carbon footprint in eggs

You can't control what  
you can't measure.

carbon footprint (CO<sub>2</sub> eq kg/ton) of  
individual feedstuffs



## Global Feed LCA Institute (GFLI)



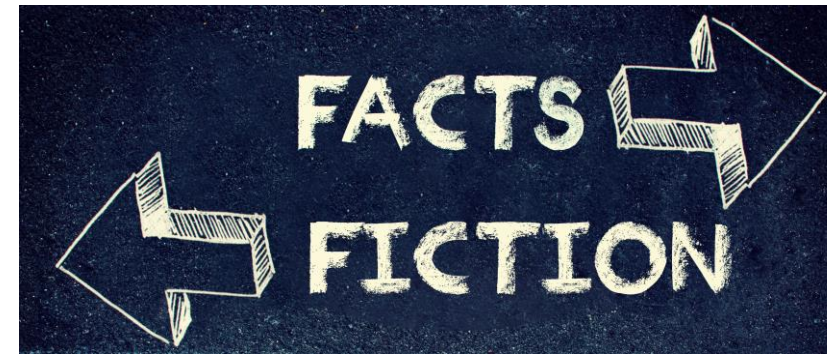
an **independent** non-profit institute that provides a **publicly available** database of life cycle assessment (LCA) data for animal feed ingredients.



Its goal is to support **transparency** and sustainability in livestock production through **standardized environmental metrics**.

*Show  
me the  
numbers!*

<https://globalfeedlca.org/gfli-database/>



Database allows feed, livestock and aquaculture sectors to:

- **use data based on a harmonized methodology;**
- **calculate the environmental footprint of products in a transparent and trustworthy manner;**
- **marketing and communication of results of own company based on data calculated using a transparent and harmonized methodology**

The GFLI 2.2 database was issued in October 2024

In total, the database consists of > 1800 datasets of feed ingredients from different geographical origins

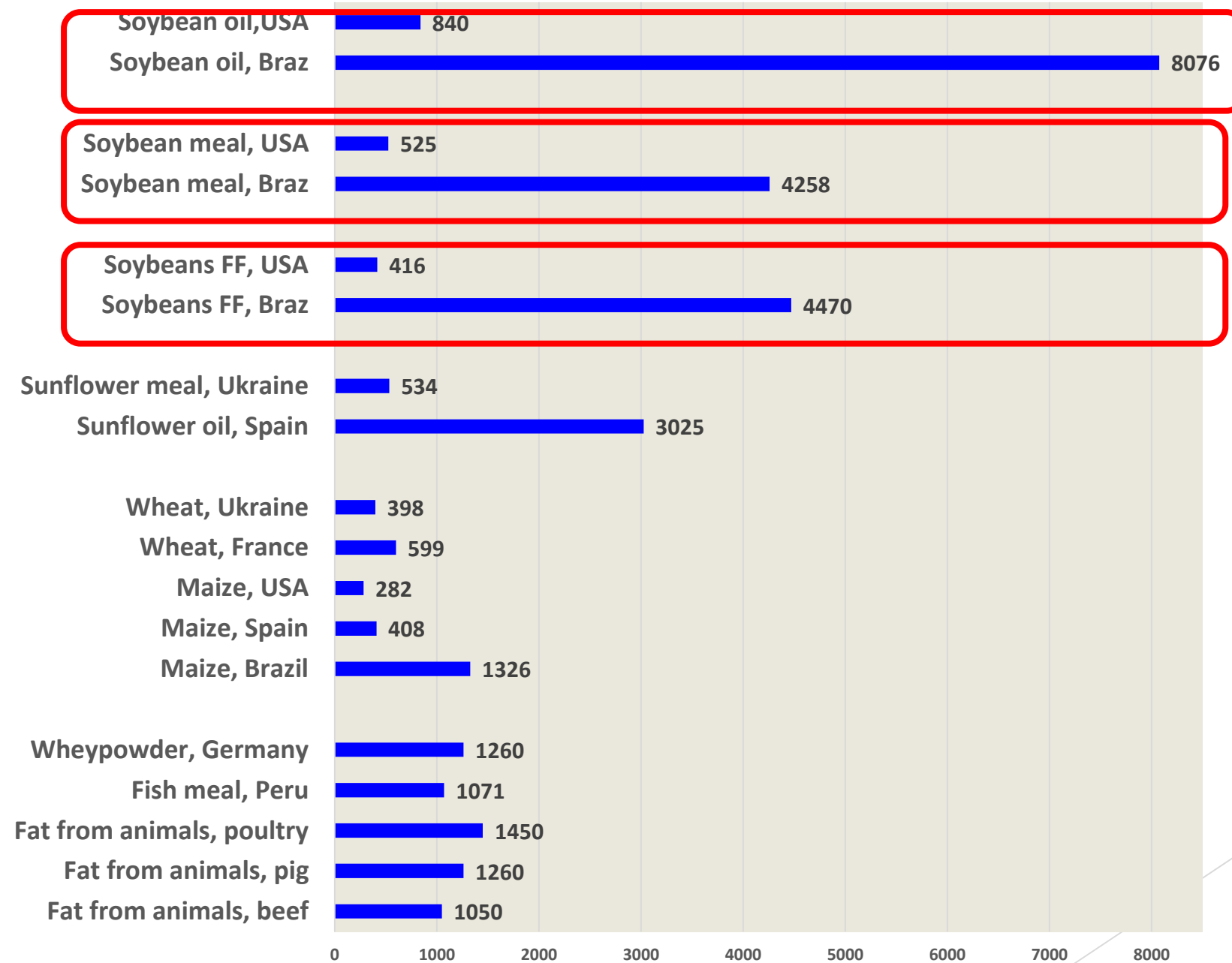
data available for all major environmental impact categories:

Impact category	Unit
Climate Change (CFP)	kg CO <sub>2</sub> -eq
Land Use Change (LUC)	kg CO <sub>2</sub> -eq
Water use	m <sup>3</sup> world eq
Land use	Soil quality index
Acidification	mol H <sup>+</sup> eq
Eutrophication, marine	kg P eq
Eutrophication, terrestrial	mol N eq
Eutrophication, freshwater	kg N eq
Single Score Impact	Person Years



# Carbon footprint values of feedstuffs based on GFLI 2.2 - *economic allocation* -

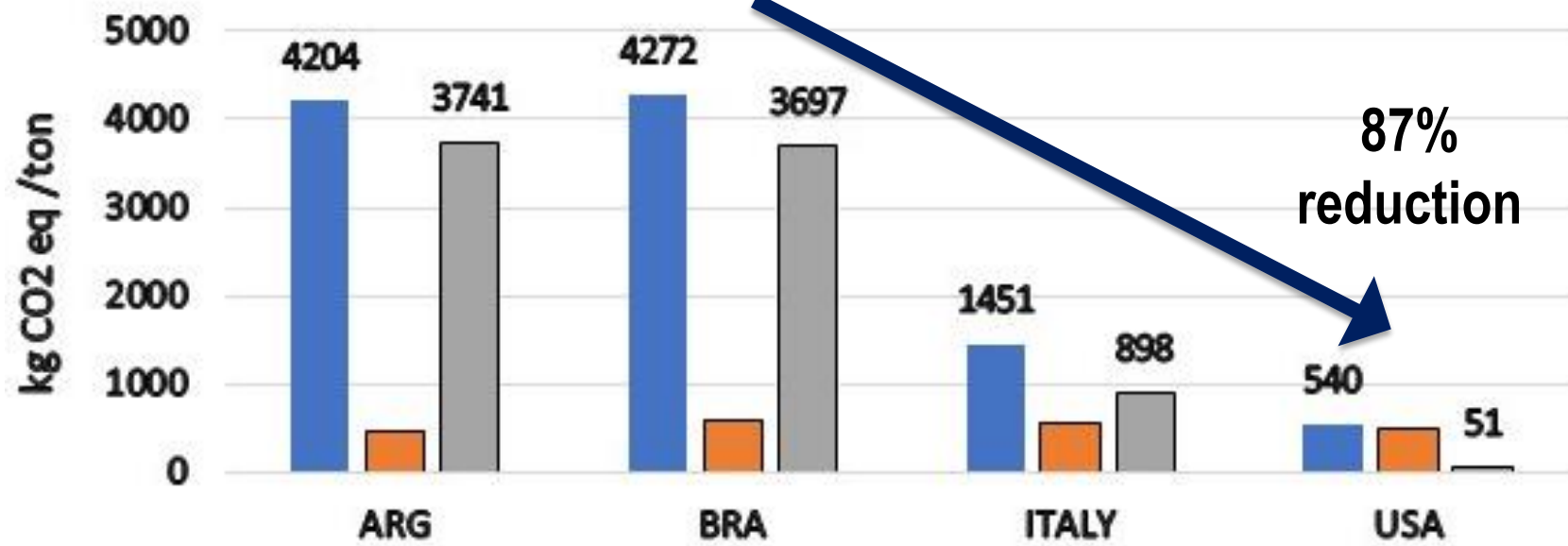
Global warming - Including LUC  
(kg CO<sub>2</sub> eq / ton product)



# SOYBEAN MEAL

## Sustainability facts based on GFLI 2.2

carbon footprint soybean meal and geographic origin (GFLI 2.0 data)



- Global warming - Including LUC (kg CO2 eq / ton product)
- Global warming - Excluding LUC (kg CO2 eq / ton product)
- Global warming - LUC only (kg CO2 eq / ton product)

# What is meant by LAND USE CHANGE (LUC) and DEFORESTATION

Transformation of land cover from one purpose to another can result in GHG emissions (e.g. deforestation).

Examples:

- Forest to cropland
- Grassland to cropland
- Cropland to perennial

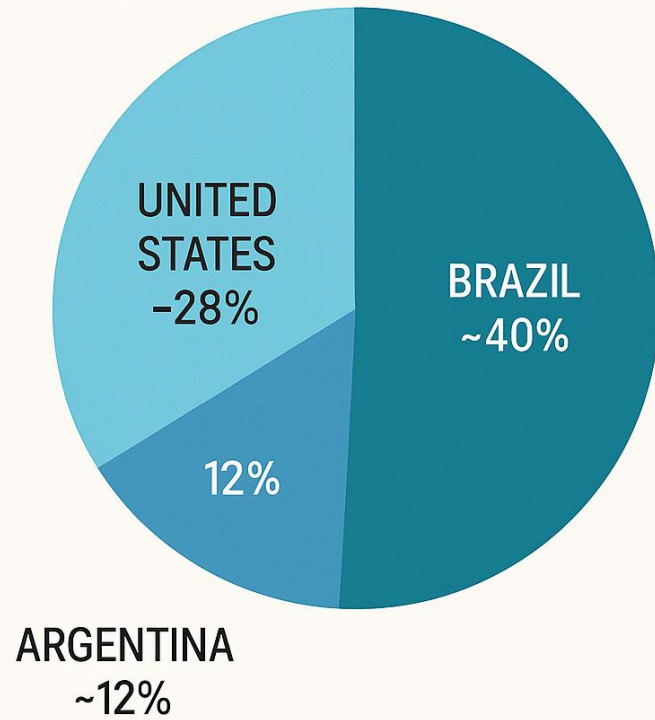
Standardized calculation method: PAS-2050

- Covers direct Land Use Change (dLUC)
- **20 year amortization period**

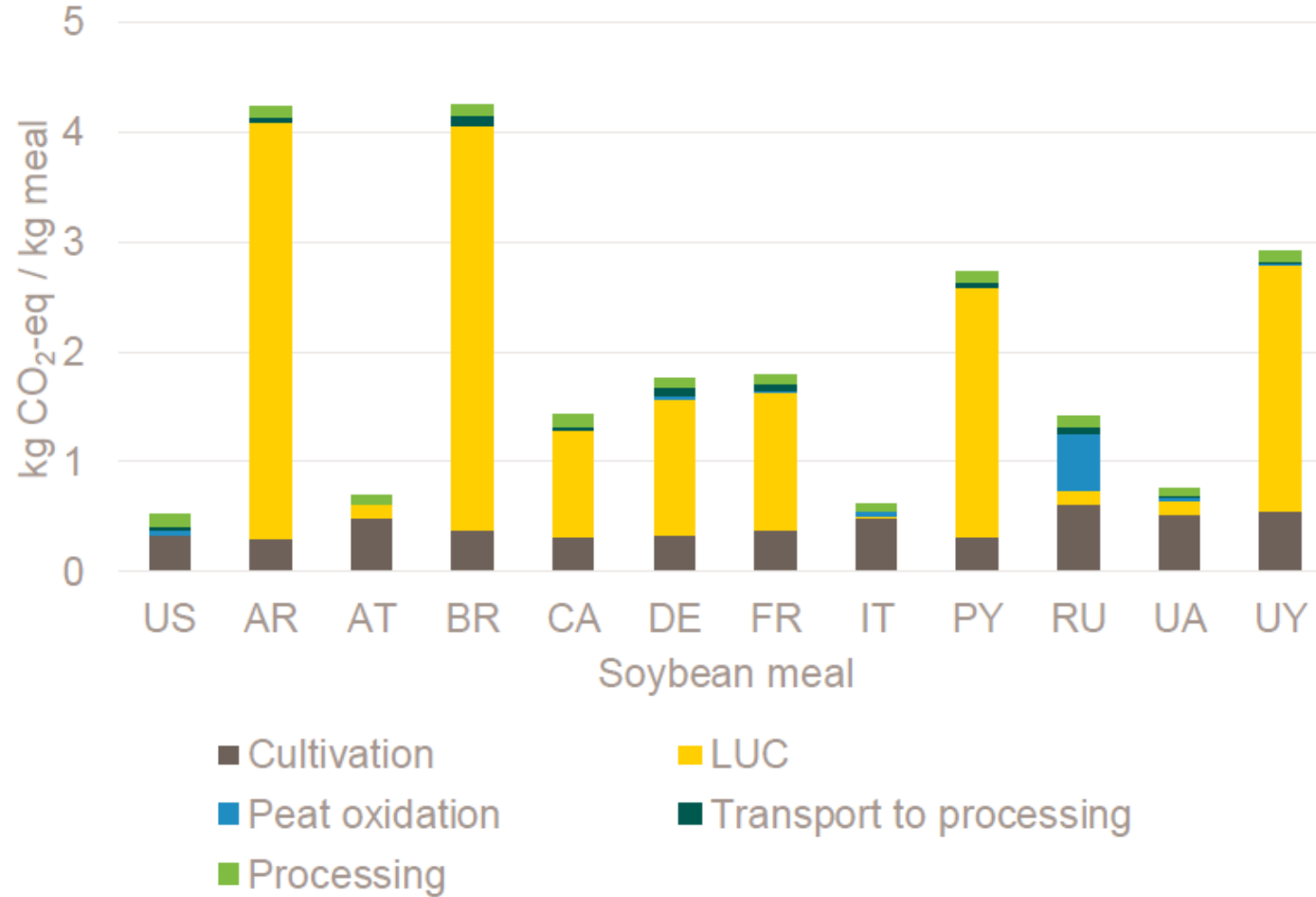
(Example: emissions due to 1 ha deforested area in 2010 are equally divided over the next 20 years, after 2030 the land is deforestation free).



Global Share of Soybean Production



Climate change kg per meal

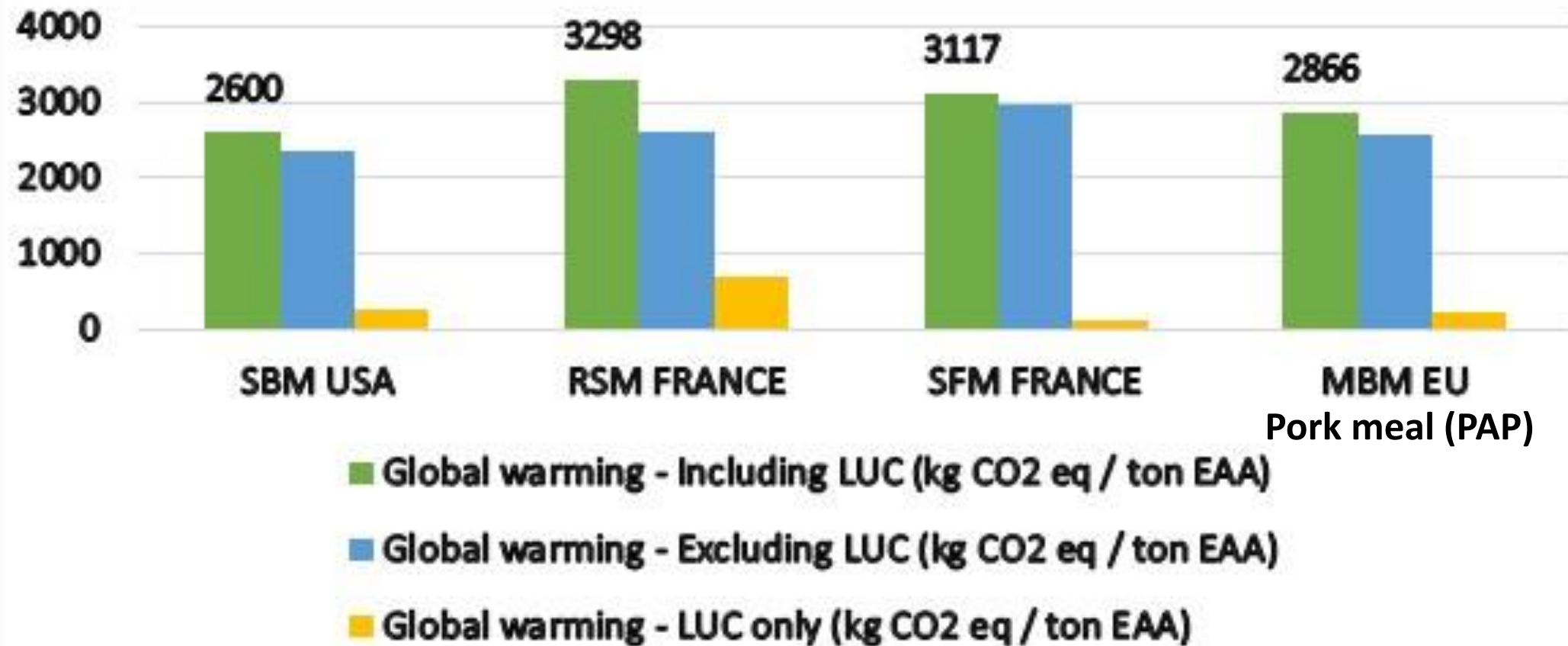


Mérieux NutriSciences | Blonk

**Ignoring the geographic origin of soy products make CFP calculations in feed useless and meaningless**

# 'the good, the bad and the ugly' - key protein sources in GFLI 2.2 -

carbon footprint from best ranked sources of key protein-rich ingredients per ton of essential amino acids (EAA)



- SBM soybean meal
- RSM rapeseed meal
- SFM sunflower meal
- MBM meat & bone meal

Pork meal (PAP)

# Sustainability and feed formulation

Ingredient supply & price



Nutritional requirements

Sustainability

**LEAST-COST AND LEAST-IMPACT FEED FORMULATION**

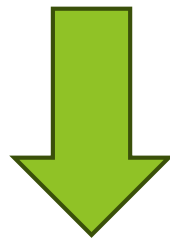
# Sustainability and feed formulation

## Basic, simple approach:

- add the carbon footprint (CO<sub>2</sub>) as a proxy value for every single feed ingredient as a “nutrient” value to your ingredient matrices



ignoring differences in geographic origins (e.g. soybean meal !)



kg CO<sub>2</sub>-eq per ton of  
single feeds

# Sustainability and feed formulation

## Advanced approach:

- connect your feed formulation system with an Life Cycle Assessment (LCA) platform, developed to measure and manage the environmental footprint of animal protein production from feed to fork

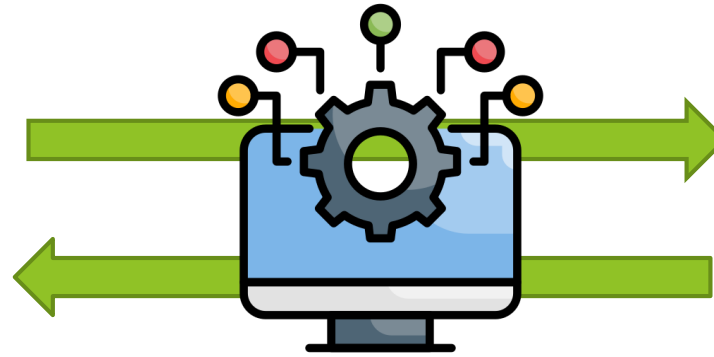


**kg CO<sub>2</sub>-eq per ton of broiler  
meat or liveweight**

# advanced approach:

## LCF system

**.BESTMIX<sup>®</sup>**  
SOFTWARE feeding the future



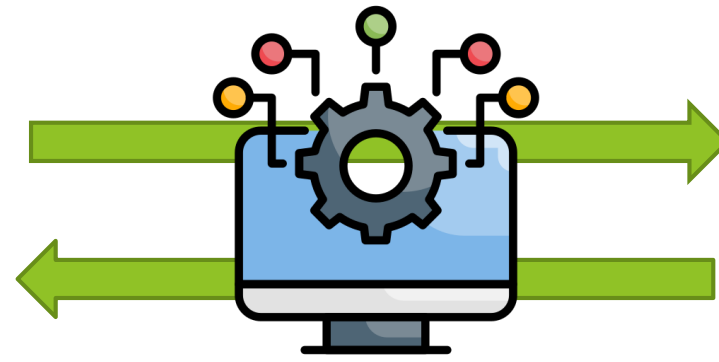
## LCA Platform

**Sustell<sup>™</sup>**   
Sustainability Intelligently Applied



Feed formulation results from LCF software are the driver (= input) for LCA sustainability analytics and the key results from these LCA analytics are returned to the LCF software as a part of the final feed formulas

LCF system

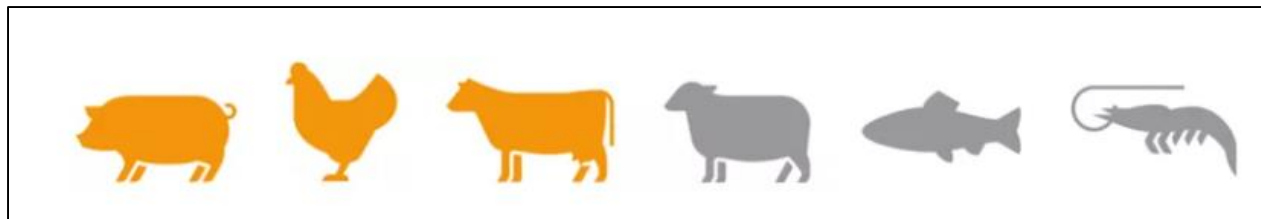


LCA Platform

Sustainability\* includes:

- Feed, Farm, Slaughtering process -

\*carbon footprint as well as 15 other key environmental indicators.



## advanced approach:

a case study on the role of soybean meal in sustainable poultry production



illustrations of such innovative LCA tools that visualizes carbon footprint data (in CO<sub>2</sub> kg eq.) in broiler meat production, applied to practical feed scenarios:

1. "the effects of country origin of soybean meal, **US SOY**  
**versus Soy BRAZIL**
2. the effects of partial replacement of SBM by **rape- and**  
**sunflower meal**



## Sustainable poultry meat production: deforestation versus non-deforestation

broiler studies – West Europe*	average	kg CO <sub>2</sub> -eq per ton of broiler liveweight		
	dietary SBM inclusion	SOY Brazil	US SOY	% reduction
USSEC (internal study - 2022)	26%	3522	1981	44

\* applying NUVIO PLANET™ database and tool

it is all about the soybean meal origin



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Lemme study_I (WPSA SA-2023)	22%	2954	1814	39
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## Sustainable poultry meat production: deforestation versus non-deforestation

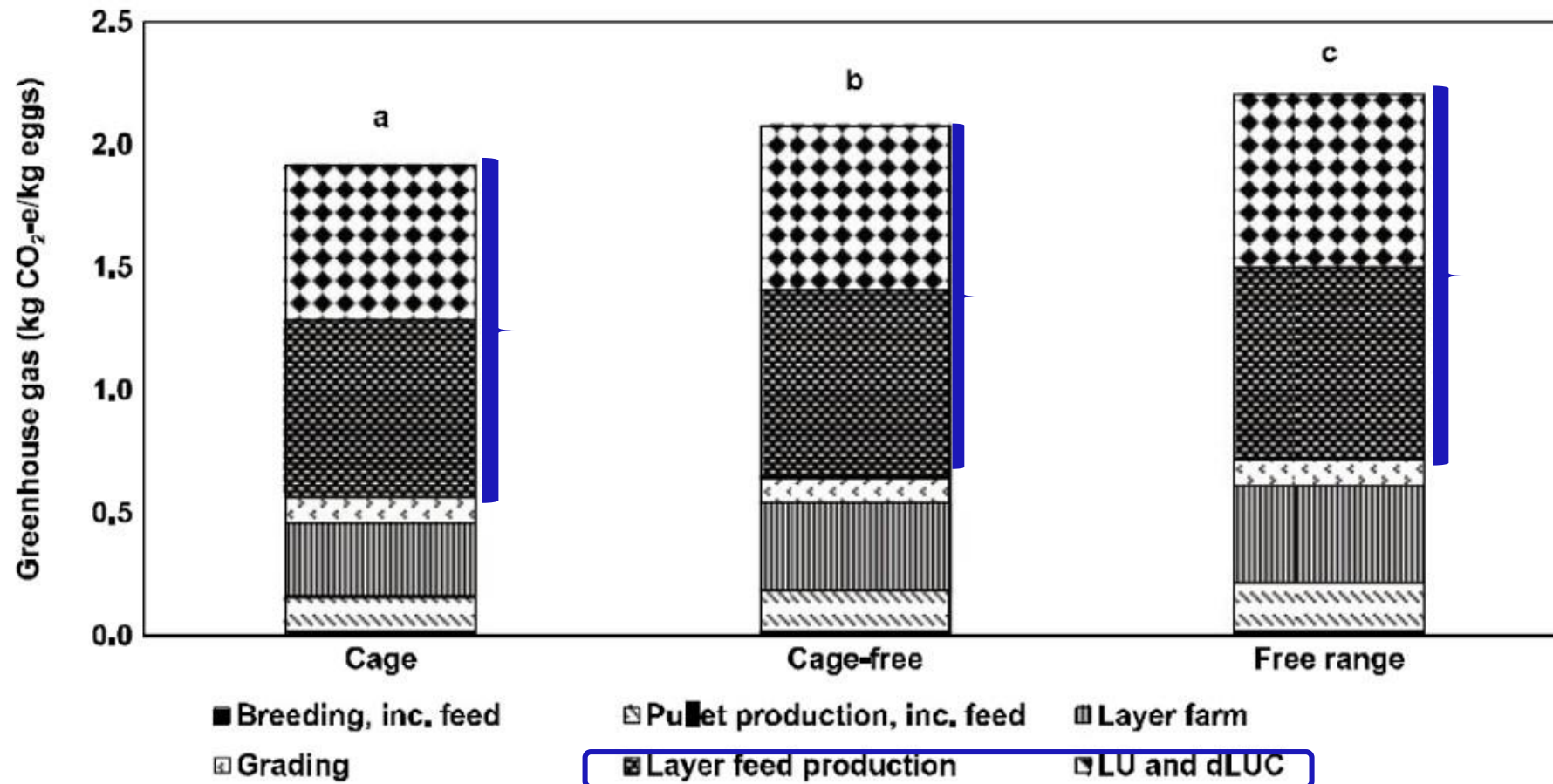
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Hofstraeten (APPC-2023)	19%	2524	(1517)	(40)

\* applying NUVIO PLANET™ database and tool

it is all about the soybean meal origin



# Sources of emissions in egg production



## Environmental impacts of the Australian poultry industry 2. Egg production

M. A. Copley<sup>A\*</sup>, S. G. Wiedemann<sup>A</sup> and E. I. McGahan<sup>A</sup>

CSIRO, Animal Production Sci. 2023

# Sources of emissions in egg production and the effect of soy origin

kg CO <sub>2</sub> eq. per kg eggs		
	cage	cage-free
<b>FCR (kg feed / kg eggs)</b>	2.1	2.3
- layer feed (excl. LUC)	}	
- layer farm		
- grading and distribution eggs		
- pullet production (+ feed)		
- breeding (+ feed)		
<b>- LUC per kg eggs (10% SBM Brazil)</b>	<b>0.60 (33%)</b>	<b>0.70 (33%)</b>
<b>TOTAL, kg CO<sub>2</sub> eq per kg eggs</b>	<b>1.80</b>	<b>2.10</b>
<b>- LUC per kg eggs (10% US SOY)</b>	<b>0.09</b>	<b>0.11</b>
<b>TOTAL, kg CO<sub>2</sub> eq per kg eggs</b>	<b>1.29</b>	<b>1.51</b>
Relative to change in soy origin	<b>72%</b>	<b>72%</b>



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CSIRO, Animal Production Sci.. 2023

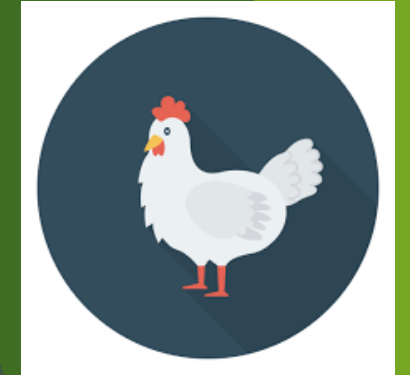
M. A. Copley<sup>A\*</sup>, S. G. Wiedemann<sup>A</sup> and E. I. McGahan<sup>A</sup>

# SUMMARY & CONCLUSIONS I



- ▶ GFLI database is the global reference for independent sustainability data of feedstuffs
- ▶ The carbon footprint of soybean meal depends heavily on the geographic origin
- ▶ Among globally traded protein sources, US soybean meal delivers the lowest CO<sub>2</sub> kg per metric ton of essential amino acids
- ▶ Technologies are available which integrate feed formulation and environmental impact calculations

## SUMMARY & CONCLUSIONS II



- ▶ Illustrations of such innovative tools have been provided, showcasing quantitative carbon footprint data (kg CO<sub>2</sub> eq.) in broiler meat production across some practical scenarios:
  - ▶ the effect of country origin of soybean meal (US versus BRAZIL)
- ▶ a reduction of 30–40% in the carbon footprint of poultry production can be achieved by substituting Brazilian soybean meal with U.S. soy