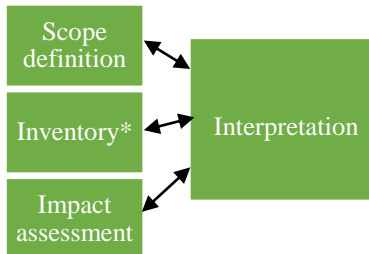


Goals and objectives:

(1) Shed light and identify the main aspects influencing the environmental impact of currently used compound feed in Spanish farms, (2) calculate the current environmental impact profile of these ingredients and (3) find the transport global warming potential impact in pig compound feed.

Methodology:

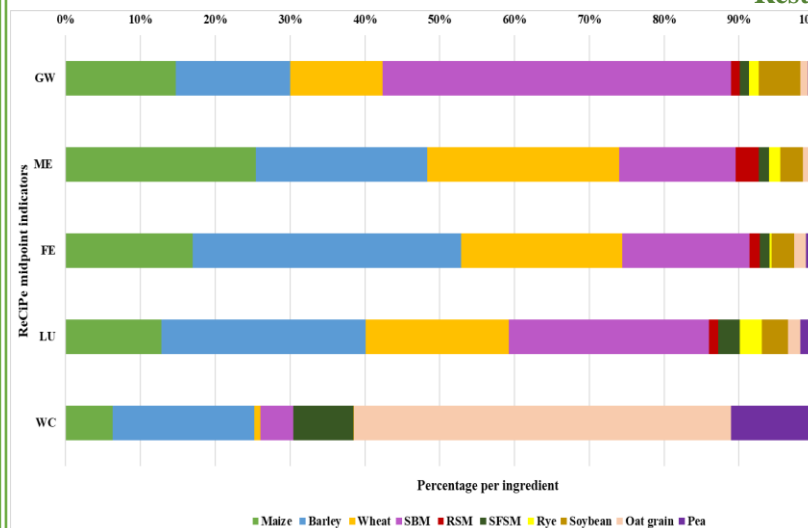
To achieve the final pig compound feed environmental profile it was made using the lyfe cycle assessment (LCA) methodology. This follows four steps: Scope definition, inventory, impact assessment and interpretation across all the steps showed in figure 1.

**Figure 1:** LCA steps.***Inventory:**

According to the 2021 report on compound feed in Spain by CNCAA¹, the ten most used feed ingredients are:

Table 1: Ten most used ingredients and its percentage per 1 kg of compound feed.

Ingredient	Percentage in compound feed
Maize	21,1%
Barley	19,5%
Wheat	17,6%
Soybean meal (SBM)	11,2%
Rapeseed meal (RSM)	1,7%
Sunflower seed meal (SFSM)	1,5%
Rye	1,4%
Soybean	1,4%
Oat grain	0,7%
Pea	0,5%

Results:**Figure 2:** Relative environmental impact of the ingredients in 1 kg compound feed.

In the figure 2 diagram we see the relative impact of each ingredient in 1 kg of pig compound feed for five midpoint ReCiPe indicators. ReCiPe is a methodology that uses different midpoint indicators to quantify the environmental impact of a functional unit of the LCA made.

Conclusions:

Ingredients that don't represent a great amount of the total compound have greater environmental impact than the ones that represent a major proportion.

Changes in compound feed ingredients need to be made evaluating all the ReCiPe midpoint indicators, not focused in one as there are ingredients with a good global warming potential profile but a bad water consumption profile as oat grain.

Transport doesn't have a major global warming potential.

Table 2: Comparative of the most remarkable impact assessment seen in figure 2 and the total indicators per 1 kg of compound feed.

ReCiPe midpoint indicators	Ingredients comparative		Total per 1 kg of compound feed
GW	Soybean meal	Maize	0,86 kg CO ₂ eq
	46,58%	14,72%	
ME	Soybean	Rye	5,9·10 ⁻⁴ kg N equivalent
	3,00%	1,55%	
FE	Barley	Maize	4,7·10 ⁻⁴ kg P equivalent
	35,88%	17,01%	
LU	Soybean meal	Maize	2,17 m ² a crop equivalent
	26,75%	12,76%	
WC	Oat grain	Wheat	9,54·10 ⁻³ m ³
	50,40%	0,84%	

Per its proportion in 1 kg of compound feed seen in table 1, soybean meal represents four times more global warming potential than maize. Soybean and rye represent the same percentage but have different environmental impact.

Table 3: Global warming (GW) potential of transport for each ingredient in 1 kg of compound feed.

Ingredient	Transport GW potential
Maize	16,35%
RSM	11,18%
Soybean	9,14%
Wheat	8,29%
SFSM	7,18%

Transport represents around the 10% of the total global warming per 1 kg of compound feed.

¹ Comisión Nacional de Coordinación en Materia Animal.

² GW (global warming potential in kg CO₂ equivalent), transport (in kg CO₂ equivalent), ME (marine eutrophication in kg N equivalent), FE (freshwater eutrophication in kg P equivalent), LU (land use in m²a crop equivalent) and WC (water consumption in m³).