Feed-a-Gene

Adapting the feed, the animal and the feeding techniques to improve the efficiency and sustainability of monogastric livestock production systems

Environmental assessment of new European protein sources for feed (Task 6.2)

Part 1 - at feedstuff perimeter

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Objectives

The use of Brazilian soybean is controversial in Europe because of its environmental impact due to deforestation and the use of genetically modified organism.

In this context the goal was to assess the environmental impacts of **new European protein sources** in order to replace Brazilian soybean meal in feed. **Four innovative feedstuffs (IF) were studied :**

- **Fine fraction of French rapeseed meal** obtained through physical treatment (IF1),
- **French soybean meal, obtained from dehulled soybeans** and with an innovative extrusion process DCP (IF2),
- **French soybean meal, obtained from non-dehulled soybeans** and with an innovative extrusion process CP (IF3),
- **Danish protein paste** extracted from green biomass (IF4).

Work plan

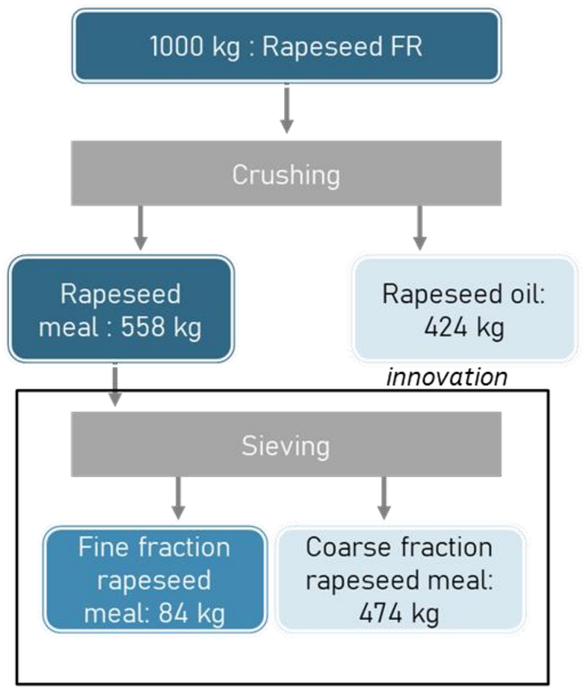
The production processes of the 4 innovative feedstuffs (**IF**) were defined.

Environmental impacts of IF were assessed by Life Cycle Assessment (LCA) for the impacts : Climate change (**CC**), Non-renewable Energy consumption (**EC**), Acidification (**A**), Eutrophication (**E**), Land occupation (**LO**).

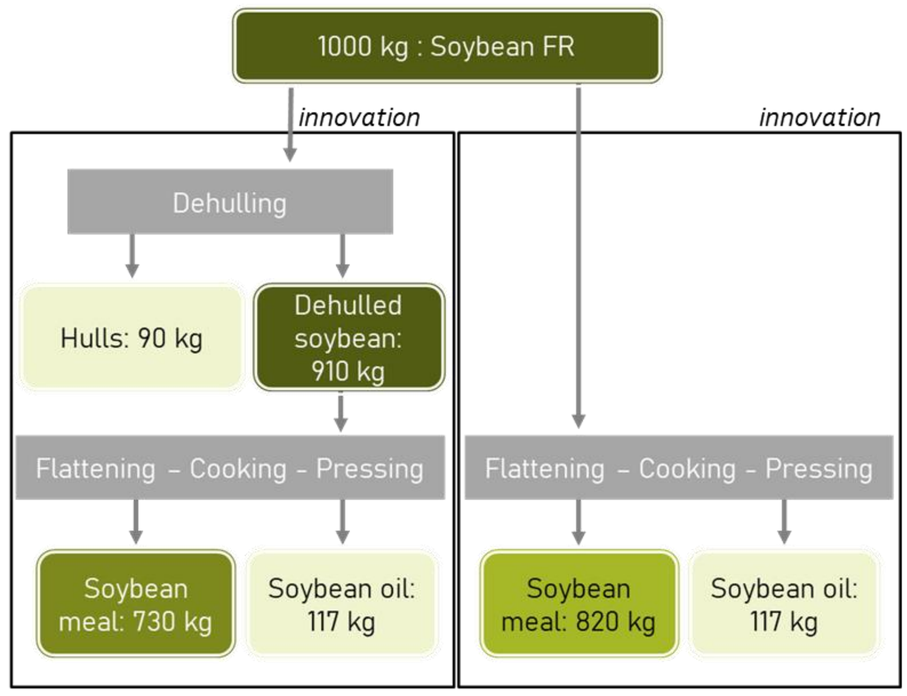
The result were expressed per kilogram of feedstuff and compared to a kilogram of Brazilian soybean meal produced by hexane oil extraction.

The perimeter of LCA includes :

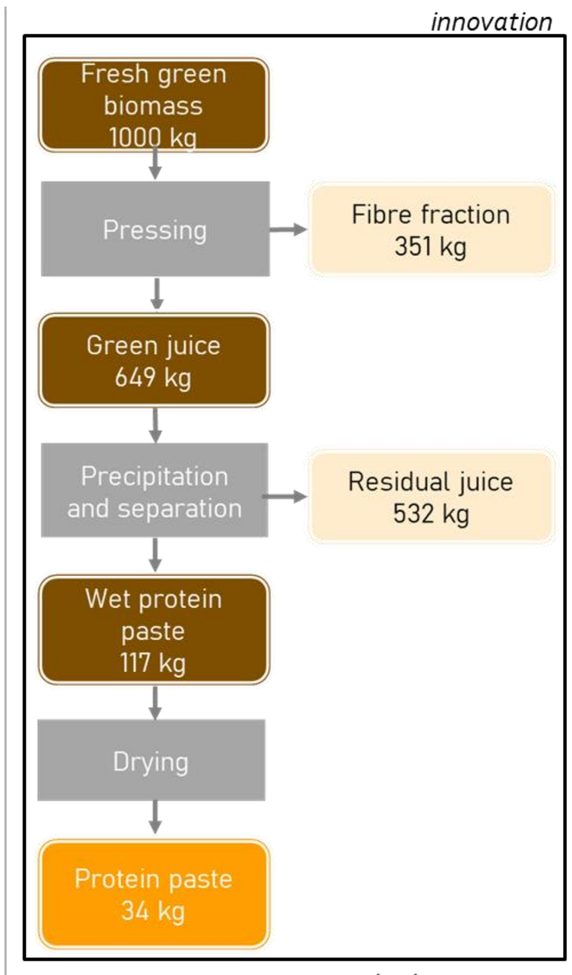
- The production of the initial crop (rapeseed, soybean, fresh green biomass) with the production of the inputs (fertilizer, energy, water, equipment…) and the field operations
- The transformation processes (crushing, dehulling, pressing…).



Fine fraction rapeseed meal (IF1)



Soybean meal with (IF2) and without dehulling (IF3)



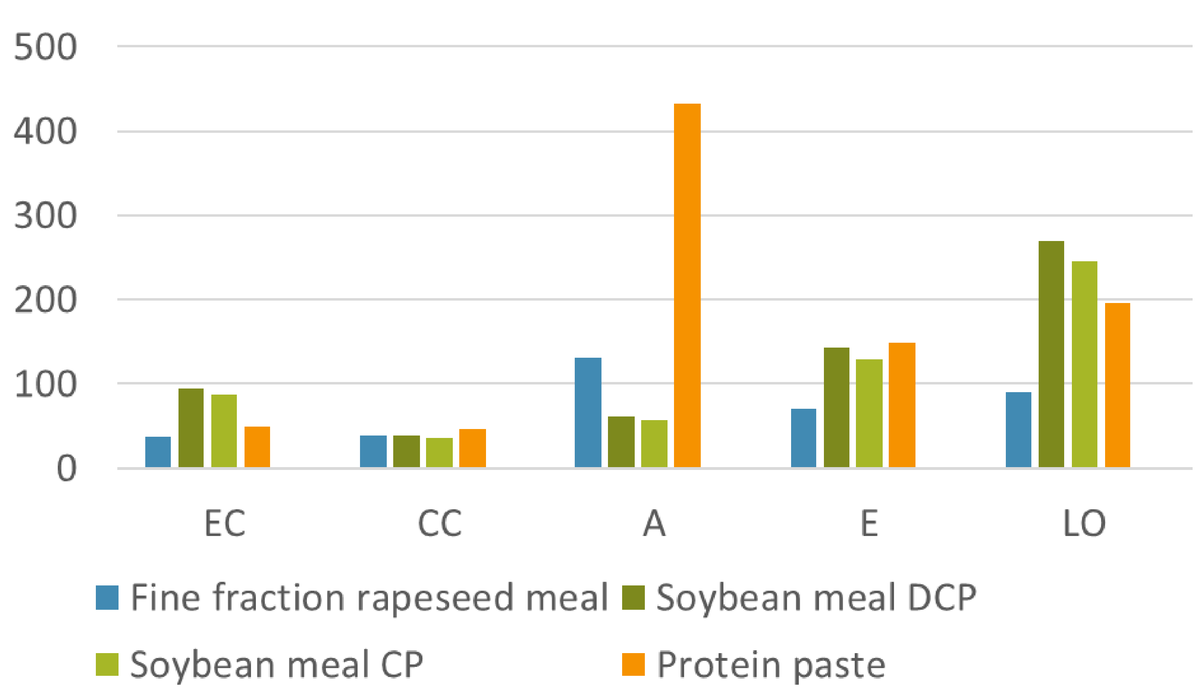
Protein paste (IF4)

Nutritional content / kg feedstuff	Protein content (g)	Fiber (g)	Fat (g)	Net energy for fattening pig (MJ)	Digestible Lysine / net energy (g/MJ)
BR soybean meal	463	59	16	8,3	3,12
IF1	385	72	17	7,1	2,16
IF2	505	32	59	9,6	2,96
IF3	466	51	78	9,6	2,72
IF4	337	205	63	5,1	2,59

Results

- **Impacts of climate change and energy consumption are systematically reduced for IF compared to BR soybean meal.**
  - 60% of the impact on CC of BR soybean meal is linked to deforestation, especially to the Brazilian primary forest.
  - 40% of the impact EC of BR soybean meal is due to the transport from Brazil to France.
- **Higher impact A for the protein paste and the fine fraction of rapeseed meal** compared to BR soybean meal. This impact is explained for more than 95% by the production of the crop and its fertilisation.
- **Higher impact LO for European soybean meal and protein paste.**
  - Brazil produces two crops of soybean per year.

Impacts of innovative feedstuffs (in% of the impacts of Brazilian soybean meal)



- **Protein sources not equivalent in terms of nutritional profile**

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The Feed-a-Gene Project has received funding from the European Union's H2020 Programme under grant agreement no 633531.