



# Food systems innovation and sustainability

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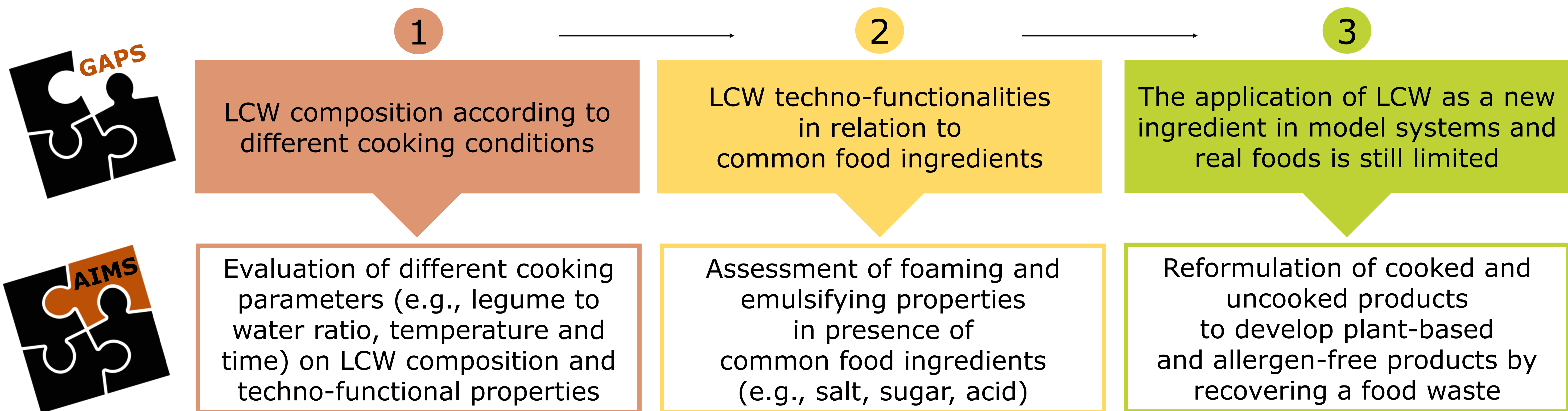
National PhD in Food Science, Technology and Biotechnology  
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## 1. State of the art

Foods are complex systems, and their production and consumption have an important impact on the environment. In the last 12 years, there has been an increase of 40% of legumes consumption and plant-based products<sup>[1]</sup>. To make legumes edible and reduce anti-nutritional factors, generally is applied a thermal treatment that requires a large amount of water <sup>[2;3]</sup>. Nowadays, the legume cooking water (LCW) is mostly treated as a waste food product, thus its (re)use as new food ingredient can play a crucial role in reducing the environmental impact (e.g., water and energy consumption) of legume products. For instance, chickpea cooking water known as Aquafaba (AF), has a low fat content (< 0.1 g/100 g) and no cholesterol<sup>[4]</sup>. Instead, it contains minerals (e.g., potassium, calcium) and phenolic acids<sup>[5]</sup>, and is an allergen-free ingredient with foaming, emulsion and thickening properties.

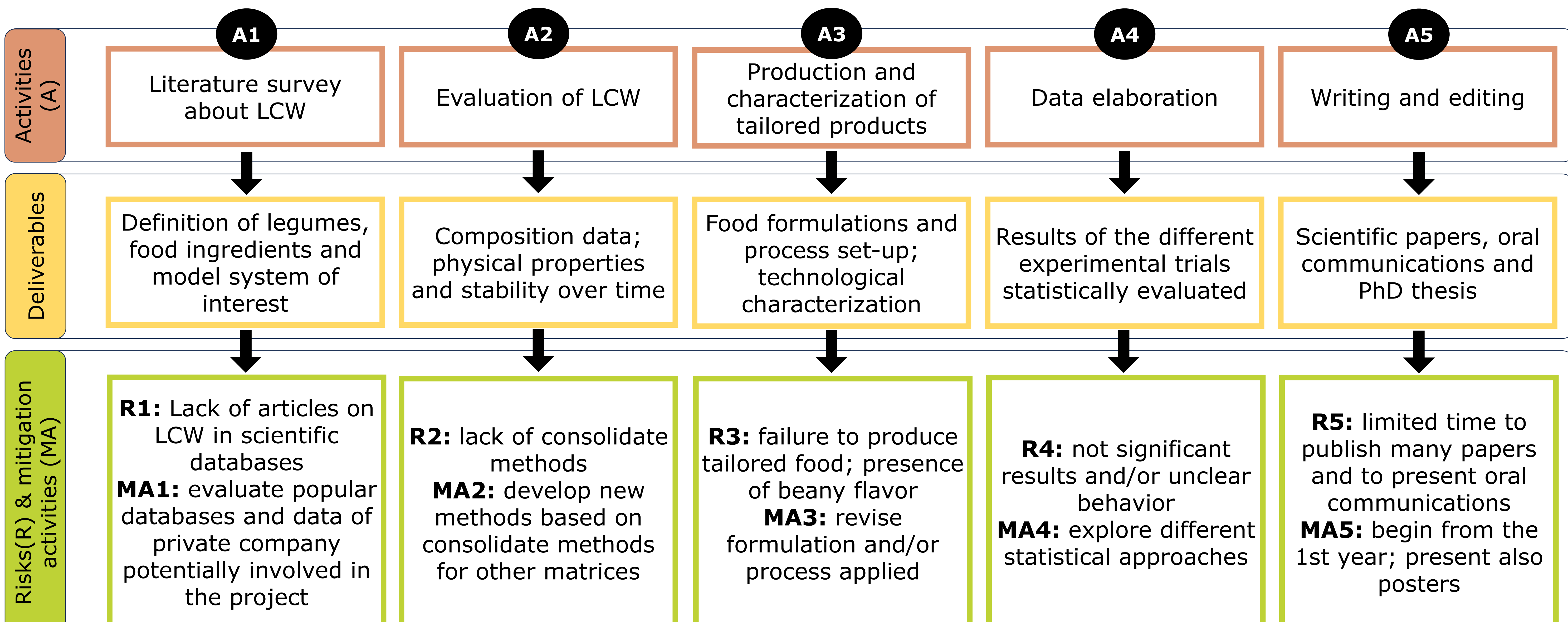
## 2. Scientific gaps and aims of the project



## 3. PhD project development

Activity	Year 1 (month)												Year 2 (month)												Year 3 (month)											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
<b>A1) Literature survey</b>	[Active]												[Active]												[Active]											
<b>A2) Evaluation of LCW properties</b>	[Active]												[Active]												[Active]											
1) Effect of cooking conditions on LCW chemical and physical characteristics	[Active]												[Active]												[Active]											
2) Effect of different ingredients on foaming and emulsifying properties	[Active]												[Active]												[Active]											
<b>A3) Production and characterization of tailored products</b>	[Active]												[Active]												[Active]											
1) Uncooked products	[Active]												[Active]												[Active]											
2) Cooked products	[Active]												[Active]												[Active]											
<b>A4) Data elaboration</b>	[Active]												[Active]												[Active]											
<b>A5) Writing and Editing</b>	[Active]												[Active]												[Active]											

Figure 1. Gantt chart of the PhD project



## 4. Selected references

- [1] <https://www.fao.org/faostat/en/#data/FS> (consulted in data 29/08/2024)
- [2] Henn K, Olsen SB, Goddyn H, Bredie WL (2022). Willingness to replace animal-based products with pulses among consumers in different European countries. *Food Research International*. 157: 111403
- [3] Serventi L (2020). Upcycling Legume Water: from wastewater to food ingredients, 1<sup>st</sup> ed, Christchurch (New Zealand), Springer International Publishing
- [4] Mustafa R, Reaney MJ (2020). Aquafaba, from food waste to a value-added product. *Food Wastes and By-products: Nutraceutical and Health Potential*. 93-126
- [5] Damian JJ, Huo S, Serventi L (2018). Phytochemical content and emulsifying ability of pulses cooking water. *European Food Research and Technology*. 244: 1647-1655