

Spirulina in the creation of new nutritionally fortified products



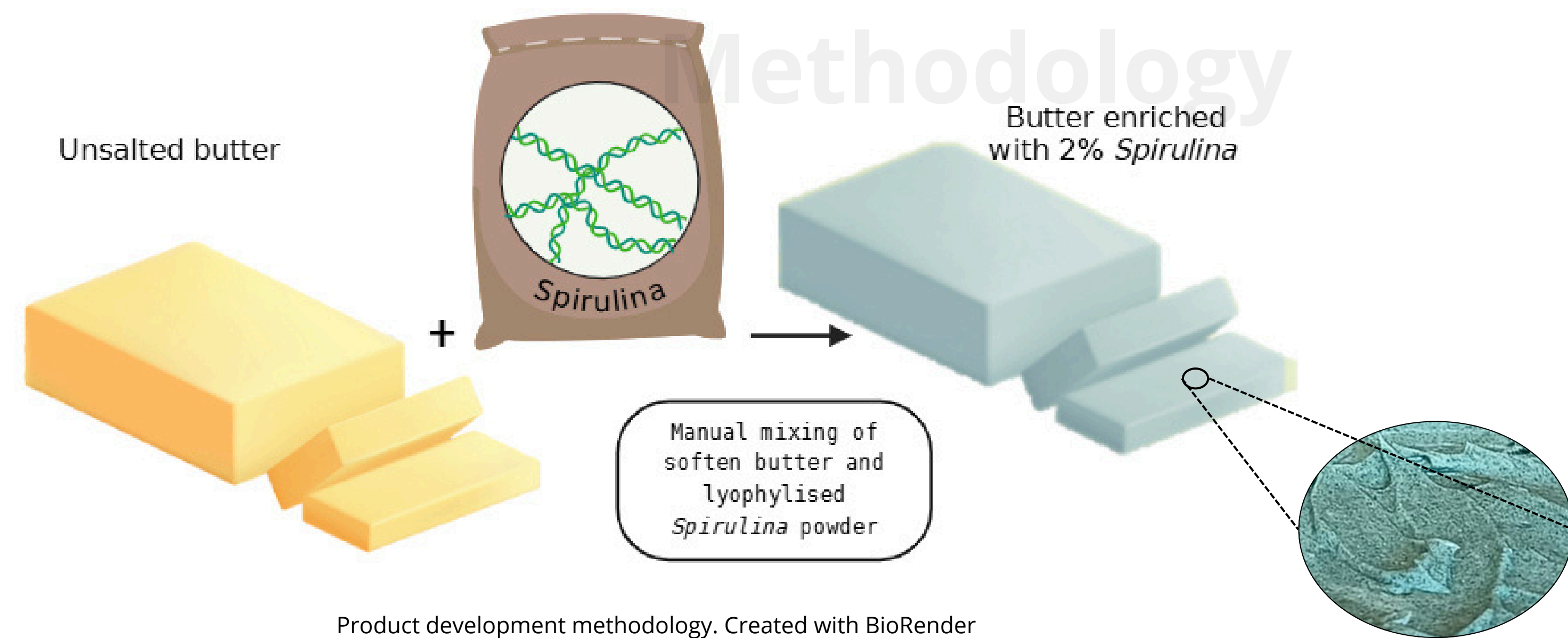
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Introduction

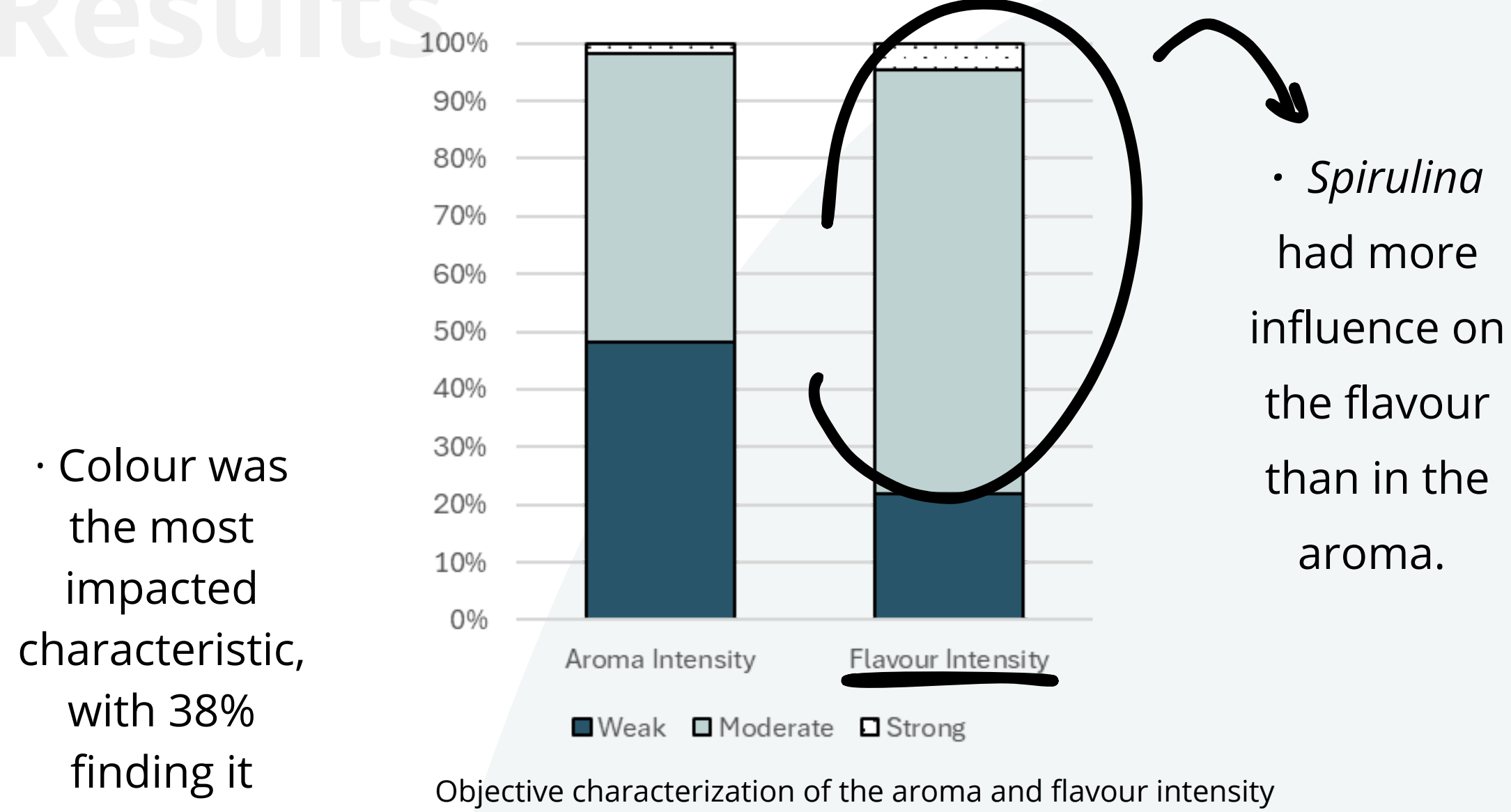
Protein sources will experience great increase in demand due primarily to the growing population and the change in consumer's habits. Animal proteins account for about 40% of global protein consumption, however, they are associated with a high environmental footprint¹. Microalgae are emerging as promising sustainable alternatives. Beyond their rich protein content, *Spirulina* has a spectrum of dietary bioactive compounds, essential fatty acids, and vitamins, positioning it as a valuable addition to mainstream foods, with the potential to increase their nutritional value and mitigate environmental impact^{1,2}.

Methodology



- Prepare products enriched with different amounts of *Spirulina* biomass.
- Evaluate the effect of the incorporation on nutritional quality
- Evaluate the effect of the incorporation on acceptance (sensory testing)

Results



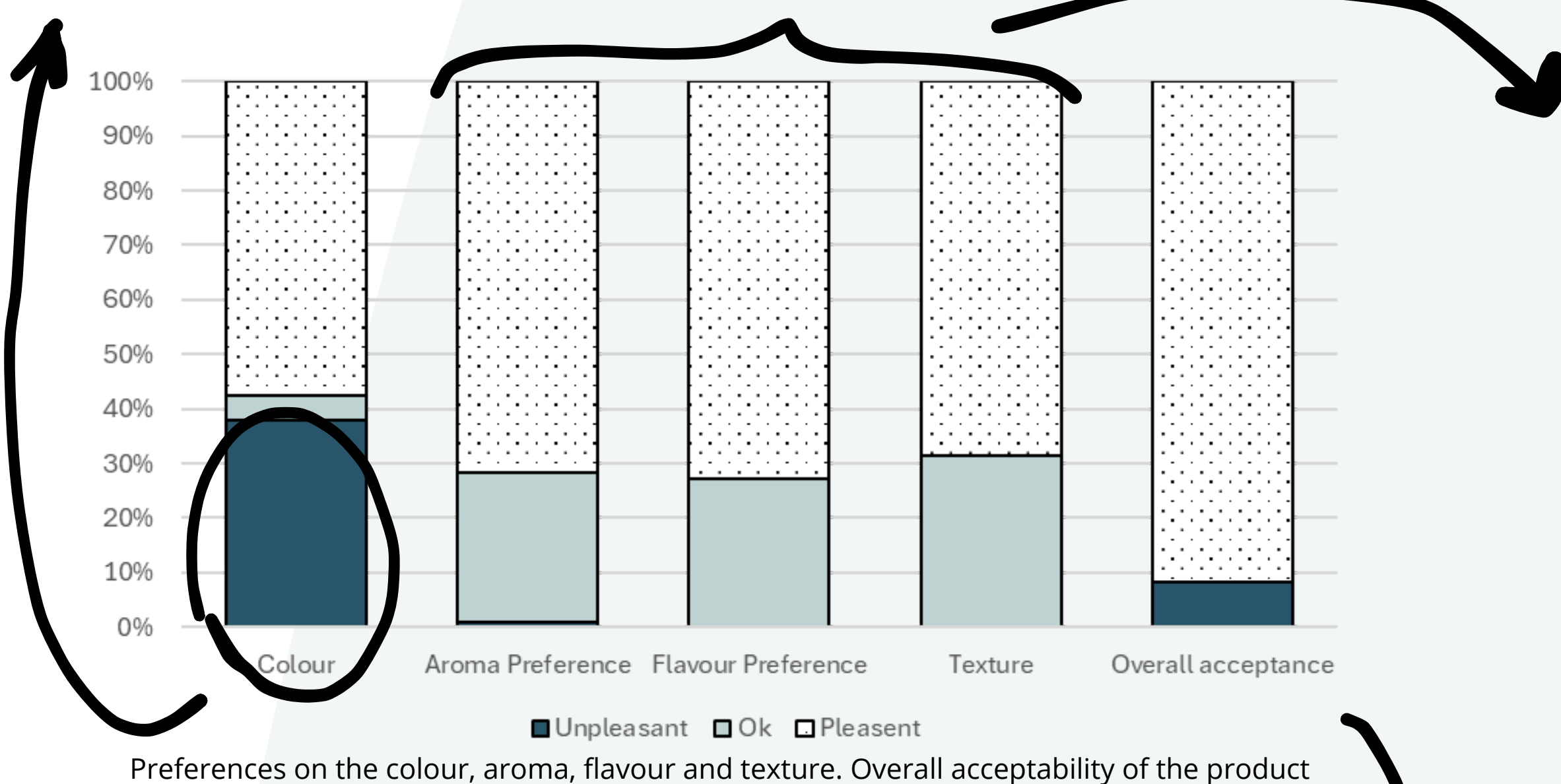
Sensory testing was performed by 111 individuals aged between 12 and 63. 68% of the inquiries admitted consuming butter daily or weekly, with only 2% revealing never eating butter. 55% of the inquirers revealed being very willing to try new products against the 3% reluctant.

	Enriched butter	Commercial butter
Energy	3052 kJ	3085 kJ
Fat	81 g	83 g
<i>of which saturated</i>	55 g	56 g
Carbohydrates	1.3 g	1.1 g
<i>of which sugars</i>	0.8 g	0.8 g
Protein	2.0 g	0.6 g
Salt	0.06 g	0.05 g
Fibre	0.16 g	

Comparison of the nutritional parameters between the formulated butter enriched with 2% of *Spirulina* (w/w) and the commercialised Primor sem sal®

227% increase in the protein content

Cannot be denominated as a "source" or as a "high protein" product since it less than 12% or 20% of the energy value provided by protein, respectively, according to the EC 1924/2006 Regulation



Additional comments were mainly positive and consisted of suggestions.

Several products with different *Spirulina* and salt concentrations could gather more potential consumers.

Future studies:

- Determine price and if the community finds it "fair"
- Formulate the butter with different concentrations and/or new ingredients and perform a comparative sensory test
- Formulate and test new products

Color was the less appreciated compared to other sensory attributes

Conclusions

Introducing a variety of related products and informing consumers about *Spirulina*'s benefits can help overcome initial doubts and further increase acceptance and popularity

Consumers demonstrated a good overall acceptance of the product

Even though only 3% revealed being reluctant to try new foods, neophobia must be taken into account since adherence to the test was not total

It is possible to provide options to enhance well-being and meet dietary needs in an environmentally conscious manner



1 - L. Probst, L. Frideres e B. A. F. Pedersen, "Sustainable, Safe and Nutritious Food: New nutrient sources," 2015.
 2 - M. Henchion, M. Hayes, A. Mullen, M. Fenelon e B. Tiwari, "Future Protein Supply and Demand: Strategies and Factors Influencing a Sustainable Equilibrium," *Foods*, vol. 6, n° 53, 2017. DOI: 10.3390/foods6070053

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