Popular Science Summary – Master Thesis

Title: Development of a vegan cooking cream prototype from faba beans with a high protein content.
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In response to the growing global demand for sustainable, nutritious, and plant-based food sources, this thesis explores the potential of faba beans (*Vicia faba* L.) as an alternative protein source. Faba beans are rich in protein, comprising 26 to 33 percent of their composition, and offer a well-balanced amino acid profile along with bioactive peptides that provide antioxidant, antidiabetic, and anti-inflammatory benefits. This positions faba beans as a viable substitute for animal-derived proteins, suitable for individuals with common allergies such as soy and nuts. This thesis, conducted in collaboration with The Green Dairy (TGD), a plant-based dairy company, aims to develop a plant-based cooking cream utilizing faba beans.

Membrane ultrafiltration was evaluated for concentrating proteins in the faba bean base, assessing the scaling up potential to industrial-sized membrane elements. A parameter study determined the optimal crossflow velocity of 0.12 m/s and transmembrane pressure of 0.65 bar for efficient protein retention (89-91 %) by the 5000 Da ultrafiltration membrane. A concentration study was then conducted, increasing the protein content of the faba base from 3.4 % to 7.6 % through removal of 30 litres of permeate from a starting volume of 45 litres.

Multiple sample recipes with varying faba base and fat contents were formulated for the plant-based cooking cream prototype. Proximate analysis revealed protein contents ranging from 3.4-4.8%. Oil droplet size measurements and stability tests indicated stable emulsions. The prototypes exhibited comparable characteristics to commercial cooking creams, offering a sustainable and nutritious alternative with the added benefit of a favourable plant-based protein profile.

The findings of this research highlight the nutritional and environmental advantages of faba beans, underscoring their potential to contribute significantly to the plant-based food industry and sustainable agriculture. The developed product aligns with TGD's mission to promote healthy, sustainable, and nutritious food alternatives, showcasing faba beans as a key component in future food systems.