Food Prototypes

of plant-based protein foods

PROTEIN2FOOD has developed **high-quality** and **high-content protein prototypes**, using newly developed plant-based protein ingredients. Along with meat-substitutes, dairy-substitutes and gluten-free bakery products, a range of hybrid-products containing wheat as well as pseudo-cereal and legume proteins were developed. These products have **high consumer acceptability** and are particularly promising for the fulfillment of human dietary requirements due to their **well-balanced amino acid profiles**.

Main Achievements

PROTEIN2FOOD has used the new plant-based ingredients developed in the project to produce an array of high-protein products. These include **bread** and **pasta** in which wheat has been partially replaced with high plant-protein ingredients (faba bean, buckwheat and lupin), allowing them to be labelled 'high protein' according to EU legislation. Gluten-free bread and pasta were produced using quinoa, amaranth and Andean lupin. Protein-rich wheat-based and **gluten-free cookies**, as well as protein-rich and iron-enhanced **snacks**, **breakfast cereals** and **flours**, using beans, amaranth, lupin and buckwheat, were also developed. **High consumer acceptance** was confirmed for these prototypes, and the formulations can easily be applied at the industrial scale.

"A high-protein lentil-based milk alternative was developed, and it scored as high as commercial milk substitutes in sensory tests"

A **high-protein lentil-based milk alternative** was also developed, using lentil protein isolate and scored as high as commercial beverages (e.g. soy, oat-based) in sensory tests. Unlike many other plant-based beverages, it contains **as much protein as cow's milk** and is **allergen free**. Also using lentil protein isolate, a **plant-based infant formula** was produced which meets the EU macronutrient and amino acid requirements. The powder dissolves well in water, is allergen free, easy to store and transport, and could potentially replace soy formulae.

Image 1. A selection of Protein2Food product prototypes

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In addition, researchers developed high-protein **spread-like meat substitutes** using combinations of quinoa, faba bean, buckwheat and lupin, which offer **new flavours** and high nutritional value. They also produced delicious and sustainable **high-moisture meat substitutes**, which can replace animal protein using regional plant sources without soy or wheat. These nuggets, chunks, strips and burgers can be flavoured with various aromas to satisfy different tastes.

Impacts

New nutritious plant-based choices

Plant-based products are often very low in protein, contain high levels of salt/sugar, or are based on soy and wheat. The PROTEIN2FOOD products harness a range of traditional and non-traditional EU protein sources to produce nutritious, high protein foods with great sensory appeal. Providing attractive alternatives for consumers is an essential step in facilitating the shift towards a more plant-based diet.

Technology Readiness Level (TRL)

The optimised food processing conditions and the product formulations have been validated and demonstrated in the lab and, for the infant formula, in pilot-scale environment; successfully reaching a technical readiness level (TRL) 4 (technology validated in lab). PROTEIN2FOOD company partners were able to operate at TRL 4-6 by validating food processing conditions and product formulations at an industrial level allowing them to introduce an innovative technology for protein-rich food into the value chain.

Recommendations

- The food industry should consider **lentil protein** along with other **high-quality legume proteins** as good alternatives to dairy and soy when developing new products, including infant formulae.
- Manufacturers should be made aware of alternative plant-based protein sources with **techno-functional and nutritional value** similar to soy and **the right processing conditions to produce high-quality foods.**
- Incorporating Andean grain flours and legumes (e.g., kañiwa flour) in gluten-free formulations may help to **increase protein and micronutrient content**.
- The developed hybrid-products for bread and pasta, containing faba bean, buckwheat and lupin protein ingredients, **should be advertised to industry stakeholders** and production at industrial scale should be encouraged.
- **Consumers** should be made aware of the **widely varying nutritional quality** of plant-based dairy alternatives, so they can make informed choices.
- A 'high in plant-protein' **claim specifically targeting plant-based foods** or foods containing high levels of plant-protein should be established.

References

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For more information visit: https://www.protein2food.eu

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