

## **ENVIRONMENTAL ASSESSMENT OF INNOVATIVE PLANT-BASED PROTEIN-RICH FOOD PRODUCTS TOWARDS A MORE SUSTAINABLE FOOD CONSUMPTION**

### **ÉVALUATION ENVIRONNEMENTALE DES NOUVEAUX PRODUITS ALIMENTAIRES D'ORIGINE VÉGÉTALE ET RICHES EN PROTÉINES VERS UNE CONSOMMATION ALIMENTAIRE DURABLE**

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#### **Keywords**

environmental assessment, innovative food products, protein-rich crops, meat-free food, legume cultivation

#### **Abstract**

The environmental analysis of industrial processing of protein crops for innovative vegetarian food products is part of the project PROTEIN2FOOD (P2F), funded by the European Union's Horizon 2020 programme. About 70% of the crops required by EU food consumption serve as feed for animal-based products, which account only for 40 % of the EU average food intake as first estimates show. Therefore, P2F seeks to produce prototypes of a new product range of vegetarian products, such as vegetarian meat alternatives or protein rich pasta, with high consumer acceptance and a positive sustainability impact on an EU and global scales. This shall be achieved by enhancing the quality and quantity of proteins from selected seed crops and grain legumes by using a multi-disciplinary approach, involving genetics, agronomy, and food-processing engineering.

The conducted LCA aims to identify environmental hotspots and optimization potentials in the development and production of the innovative food products and to directly compare the environmental performance of P2F prototypes with traditional and modern food products. The challenge is to find ways of meaningful product comparisons in terms of function and functional unit definition. First results and literature research indicate that different functional units (e.g. kg of food product or percentage of daily protein requirements) may cause large differences in comparative conclusions.

The LCA for the innovative product line 'protein-rich fibre-like meat' compares a lupine and quinoa-based food prototype and chicken meat as traditional reference system. In a first step, the composition data of the selected food products are collected. The resulting supply and process chains are then translated into 'Farm to Fork' models. Figure 1 exemplarily shows the covered life cycle steps of a protein-rich fibre-like meat prototype and indicates the process data provided directly by P2F partners. Modelling of crop cultivation raises questions like 'How to consider N-fixation of legumes and crop rotation aspects?', 'Which nitrate emissions model is suitable?' or 'How to derive cultivation datasets representative for European countries?'. Challenges of crop processing stage models include an understanding of potential use of by-products, allocation of energy inputs and loss rates of processing steps as well as the transfer of pilot scale data into industrial production scale.

The LCA results will serve to explore benefits of innovative plant-based food solutions as alternatives to traditional animal-based protein food and for identification of environmentally most promising innovative protein food recipes. In order to be able to point out sustainability related improvement potentials for the overall food consumption in the EU, the LCA results will be linked with an EU average food flow model comprising the food flow from farm to fork in a later step of the project.

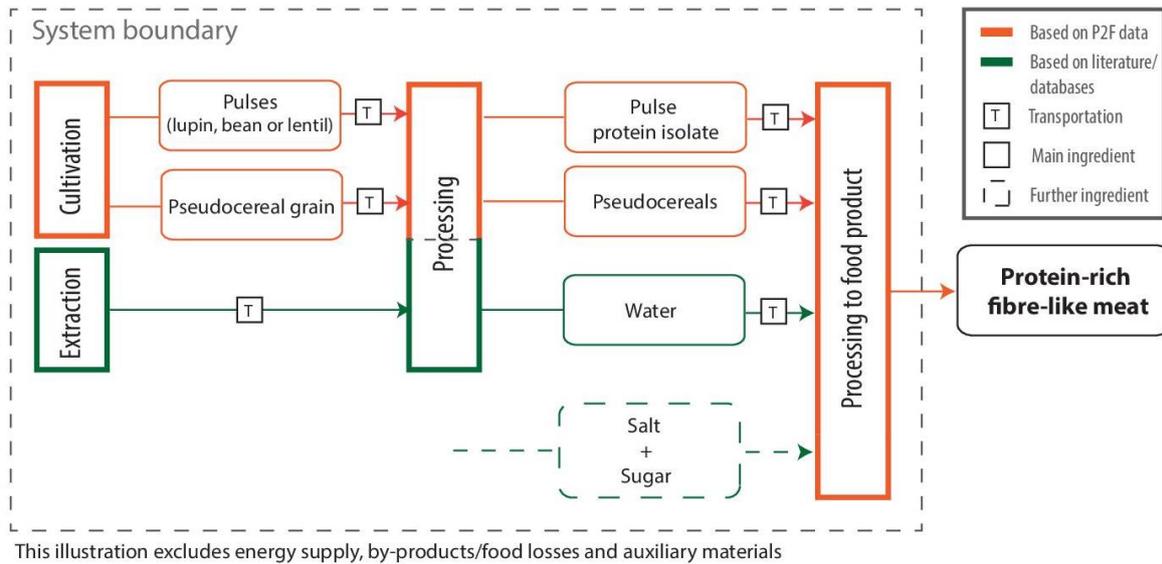


Figure 1: Process flow chart of protein-rich fibre-like meat prototype