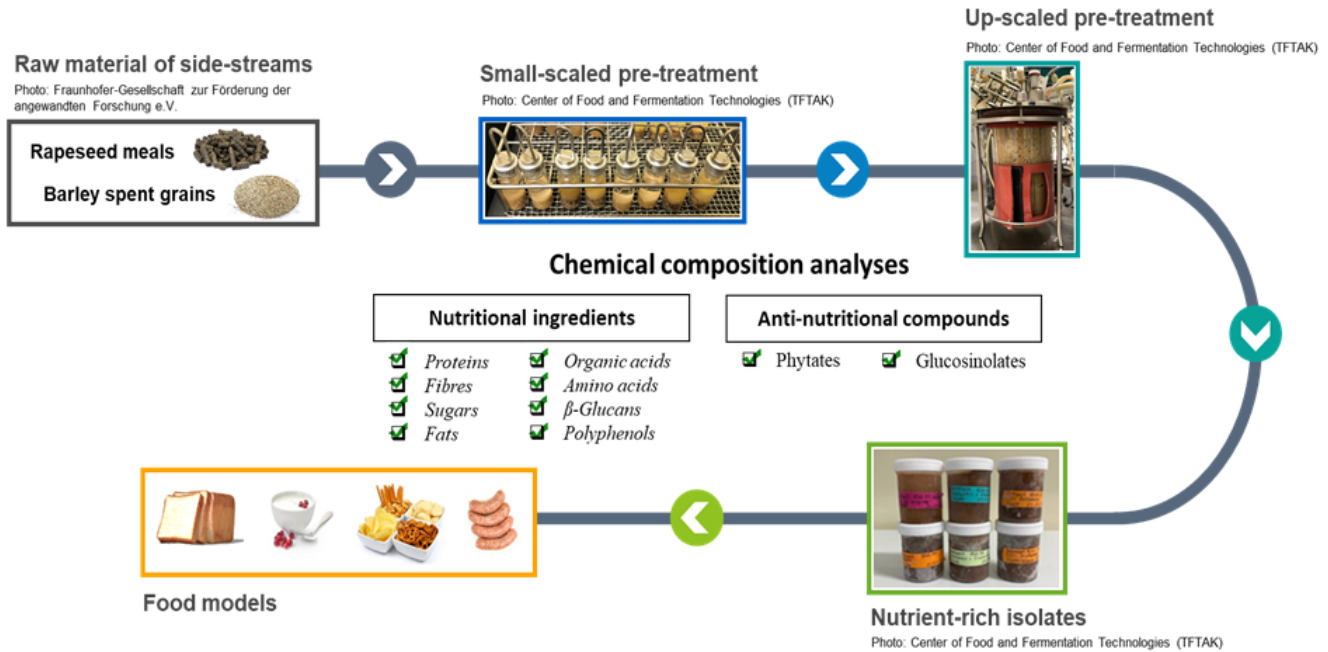


PROWASTE

PROTEIN-FIBRE FIBRE BIOREFINERY FOR SCATTERED MATERIAL STREAMS



2° Call: 2017

Project period: 03/2018 - 12/2021

Topic: Biorefinery, side-stream valorisation, protein and dietary fibre

Keywords: Side-stream, biorefining, protein, fibre, novel food and feed supplement

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Project partners: Research Unit: University of Turku, Finland; Center of Food and Fermentation Technologies (TFTAK), Estonia; Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V., Germany; Wrocław University of Environmental and Life Sciences, Poland. Commercial partners: Myssyfarmi Ltd, Finland; Regis Food Technology, Ltd, Poland; Polarforma Ltd, Finland; Bayerische Staatsbrauerei Weihenstephan, Germany.

Total funding: 742.000 €

Website: projects.au.dk/facesurplus/research-projects-2nd-call/prowaste

BACKGROUND

Annually, European food industries produce million tons of barley (*Hordeum vulgare*) spent grains, rapeseed/canola (*Brassica napus*) press cakes, and oat (*Avena sativa*) hulls. These side-streams contain high amounts of nutritional components (proteins, dietary fibres, and carbohydrates) and other health-promoting ingredients (phenolic compounds). Currently, these materials are used mostly as animal feeds, which seriously undervalues their potential for value addition. With proper approach, food-grade compounds could be isolated and sold to the food processing market as a valuable nutrient supplement. The challenge is still to combine existing technologies to produce a robust, inexpensive, and effective process suitable for varying side-streams.

OBJECTIVE

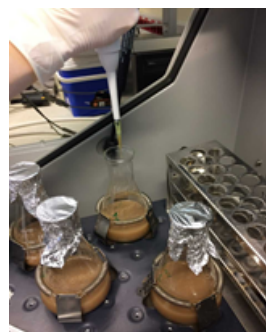
The overall objective was to valorize food production side-streams to minimize waste generated from brewing and oil industries, and to produce additional nutrient for several food and feed products.

METHODOLOGY

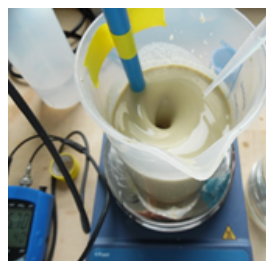
COMPOSITIONAL INVESTIGATION. Chemical profiles of side-stream materials and corresponding pre-treated samples are systematically investigated using colorimetric and chromatographic methods.

BIOLOGICAL PRE-TREATMENT. Enzymatic and fermentation processes are developed to improve extractability of value compounds and degradation of undesired components from side-stream materials.

FRACTIONATION. Fractionation process for side-streams is developed and optimized. Protein fractionation focus on solubilization and enrichment of protein. Fibre preparations are obtained from the precipitates of various pretreatments, leading to products with a high content of dietary fibres.



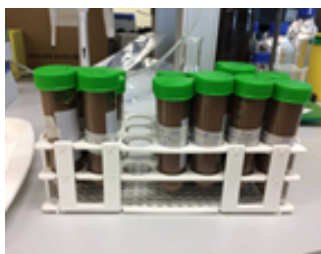
Enzymatic treatment
Photo: Center of Food and Fermentation Technologies (TFTAK)



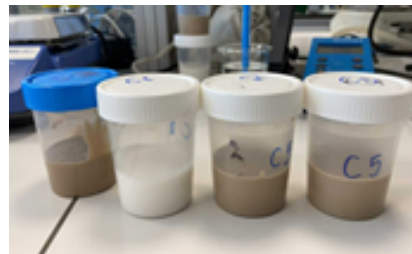
Isoelectric precipitation
Photo: Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.

RESULTS

- Chemical profiles of barley spent grains and canola press cakes are determined in detail:



Pre-treated samples for
compositional analyses
Photo: University of Turku



Different dosages of barley
spent grains in yogurt
Photo: Wrocław University of
Environmental and Life Sciences

- Enzymatic pre-treatment effectively enhances nutritional value and content of health-beneficial components and promotes degradation of undesired compounds in the side-stream materials;
- Barley spent grain soluble protein content could be increased up to 80% with enzymatic pre-treatment;
- Canola press cake soluble protein content has been increased through alkaline extraction up to 70%. With extra enzymatic pre-treatment step, the final soluble protein content is 80%;
- A low-cost but efficient approach is developed for valorisation of side-streams, providing an important technical guideline to the food industry.