



InProve

*Photo: Jon-Are Berg-Jacobsen © Nofima*

New technologies:  
Less waste, better  
food

# InProVe

We want to make better use of peels, stalks and other waste from the potato and vegetable industries, by using technologies that reduce food waste, have a low environmental impact and provide healthier and more tasteful foods.



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Worldwide, an estimated 400 million metric tonnes of plant-based food waste is created every year, and the potential for improvement is enormous. Implementing new technologies in the food industry can help us utilize more of each plant, and thereby reduce waste.

In the EU funded research project InProVe, European research scientists are working to provide the food industry with new opportunities for creating more sustainable potato and vegetable products. The researchers are teaming up with food manufacturers to ensure that the research is relevant to the industry.

New ready-made food products will be developed during the project.

## **Microwaves: Killing germs faster**

Preventing bacterial growth is crucial to all food manufacturers. The researchers will test how efficiently three new microwave techniques can make off with bacteria on potatoes and vegetables.

Microwaves require little power and water in order to neutralize bacteria, compared to autoclaves, and is much faster – for some products microwave treatment can speed up the process by up to 90 percent.

As the food is exposed to heat for a significantly shorter period of time, it does not become overcooked, and vegetables retain more of their nutrients.

### **Pulsed electric fields (PEF): Avoiding chemicals**

Pulsed electric fields, or PEF, is a technology where electricity is used to induce pores in microbial, plant or animal cells. PEF can be used as a pretreatment to increase the yield by extracting starch from potato waste, or carotenoids from carrot peels. The valuable components in peels, stalks and other waste can be extracted in a safe and simple manner without having to resort to chemicals which are harmful for the environment.

Foods that undergo treatment from these new technologies also become safer, healthier and more tasteful.

### **Using less energy**

The researchers will work with potatoes, carrots, broccoli, cauliflowers, black salsify, celery roots, peas and legumes. As a part of the testing, the researchers will investigate the food safety, quality and nutritional value of potatoes and other vegetables that are treated with the new technologies.

The project also aims to develop computer models to predict how different processes will affect the nutritional value of food products. In addition, they will create a tool for



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helping food manufacturers to reduce their energy and water consumption and thereby increase profitability. In order to save even more energy, the researchers will also try out entirely new ways of packaging products.

The goal is that the technical solutions we develop as part of this project will result in less waste on all levels of the potato and vegetable production, from delivery at the production plants to when they are eaten.

# InProVe: Less waste and better food with new technologies

*Processing design and innovative technologies:* Design and develop enhanced innovative processes to improve the use of food raw materials and improve food quality.

*By-product processing:* Develop processes to valorize potato and vegetable by-products from the pre-processing and stabilization of by-products, and extract valuable compounds using green extraction technologies such as SFE on PEF pre-treated biomass.

*Modelling and validation:* Compare conventional and industrial scale microwave systems in validation studies and nutrient retention analyses.

*Product quality and safety:* Perform macro- and micro-nutrient, microbiological and sensory analysis on fresh and processed vegetables.

*Dissemination and communication:* Communicate and transfer knowledge from research results to the potato and vegetable industries as well as the public in general.

*Management:* Coordinate the work between researchers and stakeholders to secure progress and deliveries according to plan.



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