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Scientific cooperation shows potential of bioprocessing for improving exploitability of wheat bran

A combination of enzymes and fermentation modifies bran structure and changes the bioavailability of the bioactive compound, according to new studies forming part of the European Union's large-scale HEALTHGRAIN project. Bioprocessing of bran has potential for making it a better ingredient for use in manufacturing nutritionally boosted cereal foods with high sensory quality.

The health benefits of whole grain and grain dietary fibre are well documented, and dietary recommendations worldwide urge an increase in the intake of foods containing more of these healthy ingredients. The intake of both dietary fibre and whole grain foods is clearly less than recommended. This is in part due to the technological challenge of achieving sensory properties that appeal to consumers.

The presence of hard and strong-tasting outer grain layers (bran) containing most of the health-promoting compounds demands new processing techniques to improve the quality of cereal food. Bread is a staple food consumed in large quantities throughout Europe, and is therefore a suitable food item for the purpose of increasing European grain fibre intake. The purpose of this study was to pre-treat cereal bran using bioprocessing techniques to make it better suited for baking bread. A further objective of using these bioprocesses was to improve the availability of healthy compounds of cereal bran, which involved a study of the effects of processing on the bioavailability of phenolic compounds.

The bioprocessing techniques studied included fermentation of wheat bran by using specific yeast and lactic acid starter cultures and enzymatic treatments using different cell-wall degrading enzymes. The most effective technique included a combination of cell-wall degrading enzymes and fermentation. Fermentation of bran with yeast prior to baking resulted in a higher bread volume and softer crumb of the samples of bread fortified with bran. Moreover, bioprocessing of bran by enzyme-aided fermentation increased the content of soluble fibre and the level of phytochemicals, the potentially bioactive compounds in bran. An increase was observed in the *in vitro* bioaccessibility of ferulic acid, the major phenolic acid in wheat, along with a change in the profile of its human metabolites. The significance to human health of these types of changes requires further study.

This way of bioprocessing of bran will create opportunities for making it a better ingredient for use in cereal foods, as well as in other food categories, thus aiding the manufacture of nutritionally boosted cereal foods (bread, biscuits, cereals, snacks, yoghurts) with high sensory quality.

Besides improvements in the technological quality and applicability of bran, the fact that bioprocessing changes both the amount and uptake of biologically active compounds in the body opens up new possibilities for tailoring the health effects of grain-based foods.

The work formed part of the European Union project HEALTHGRAIN, and was conducted by VTT Technical Research Centre of Finland in close collaboration with the University of Maastricht and TNO. VTT focused on development of bran processing and baking technologies, and also identified the human metabolites of the bioprocessed brans following the gastrointestinal modelling and human feeding trials performed at TNO and the University of Maastricht.



EXPLOITING BIOACTIVITY OF EUROPEAN CEREAL GRAINS FOR IMPROVED NUTRITION AND HEALTH BENEFITS

HEALTHGRAIN

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The EU Integrated Project HEALTHGRAIN

The HEALTHGRAIN project has substantially strengthened the scientific basis for a new generation of cereal based products with enhanced health benefits. The project also has formed a network of research organizations, industries and organizations communicating to consumers that will continue as the HEALTHGRAIN Forum.

*Results of the project will be presented in
the HEALTHGRAIN Conference on May 5-7 in Lund, Sweden:
www.healthgrain.org*

VTT Technical Research Centre of Finland

VTT is a globally networked multitechnological contract research organisation, providing high-end technology solutions and innovation services. We enhance our customers' competitiveness, thereby creating the prerequisites for the sustainable development, employment, and wellbeing of society.

University of Maastricht

Maastricht University Medical Centre (MUMC), located in the south of the Netherlands, integrates cutting-edge biomedical, clinical, public health and primary care research and provides new insights into health care and medical treatment. The NUTRIM School for Nutrition, Toxicology and Metabolism of MUMC initiates and catalyzes translational research into nutritional health benefits and risks focussing on metabolic and chronic inflammatory diseases

TNO

The Netherlands Organisation for Applied Scientific Research (TNO) is an independent research organisation whose expertise and research make an important contribution to the competitiveness of companies and organisations, to the economy and to the quality of society as a whole, in The Netherlands, Europe and world wide.

Key references:

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