DEVELOPMENT OF SENSORY ATTRACTIVE BREAD PRODUCTS HIGH IN BIOACTIVE COMPOUNDS

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HEALTH BREAD

Introduction

Dietary guidelines recommend 25-35g fibre intake per day for adults. Whole grain (WG) and cereal fibre products are increasingly mentioned as a preferred option due to their wide range of bioactive compounds as co-passengers. A major shift from white to WG bread would contribute to lowering the incidence of heart diseases, diabetes type-2 and colon cancer. However, most Europeans prefer the mild taste, soft crumb and crispy crusts of white bread. The HealthBread FP7 EU project (2012-2014) further developed the FP6 EU project HEALTHGRAIN results to produce bread products high in bioactive compounds from grain, whilst retaining the desired sensory attributes.

Obtaining wheat fractions high in fibre and other bioactive compounds

Wheat fractions with high levels of total dietary fibre (TDF), minerals, B-vitamins, anti-oxidants and other bioactives with light colour and mild taste were obtained with advanced dry milling technologies. Optionally, micronization was applied to reduce particle size and liberate bioactive compounds.

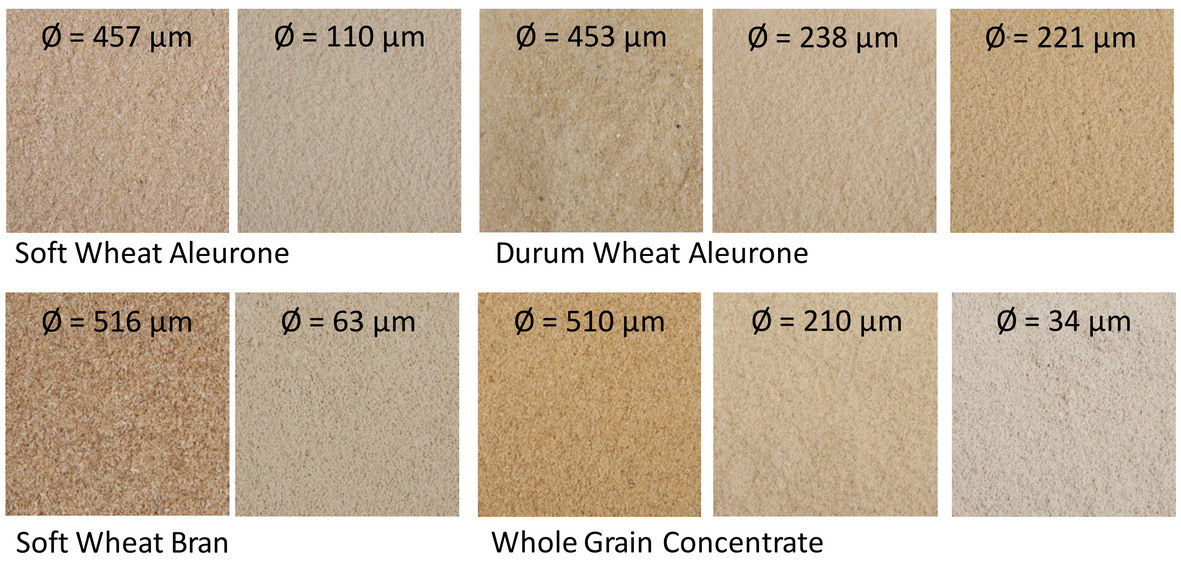


Fig 1: Bioactive-rich wheat fractions as produced by different advanced milling technologies.

Improving the bioaccessibility of bioactive compounds in wheat fractions

Fractions were incubated with xylanase and feruoylesterase in a yeast fermentation process ("bioprocessing"). Optimal process conditions were defined, combining maximal liberation of ferulic acid, degradation of phytic acid – and thereby bioaccessibility of minerals - with minimal dough stickiness. In HEALTHGRAIN, these increased levels of free ferulic acid not bound to fibre were associated with major anti-oxidative and anti-inflammatory effects.

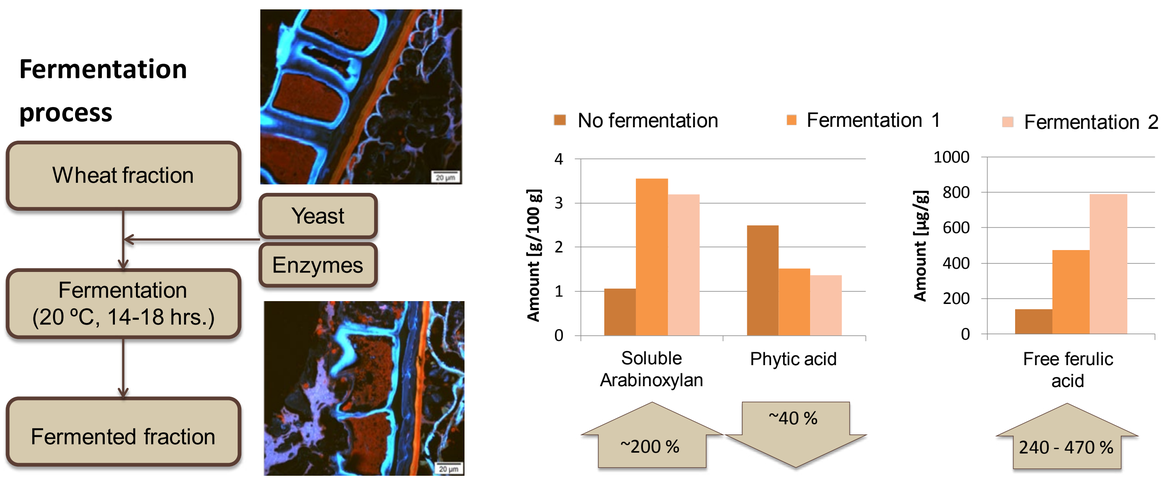


Fig 2: Effects of optimized fermentation processing on one of the wheat fractions.

Conclusions

The HealthBread project successfully developed bread products with improved nutritional and sensory qualities by elaborating and applying scientific and technological results from the EU FP6 HEALTHGRAIN project.

Guiding the formulation of bread with substantially improved nutritional quality

The required additional level of wheat fractions to white flour was calculated for producing bread products with > 6% TDF, i.e. "high in fibre". In most formulations, levels of Fe, Zn, Mg, vitamin B1 and folate were adequate for "source of" nutrition claims. Optimized bioprocessing of wheat fractions, especially with addition of phytase and lactic acid, resulted in substantial degradation of phytic acid.

Figure 3: Phytic acid degradation in bread (>6% TDF) with two different wheat fractions

Optimizing the bread sensory quality

Using baking tests guided by experimental design, the effects of wheat fractions, formulation, enzymes- and process variations were studied and a predictive model was computed. With this model, substantial quality improvements were obtained: sensorially attractive breads with high volume, crumb softness, light colour and positive flavour.

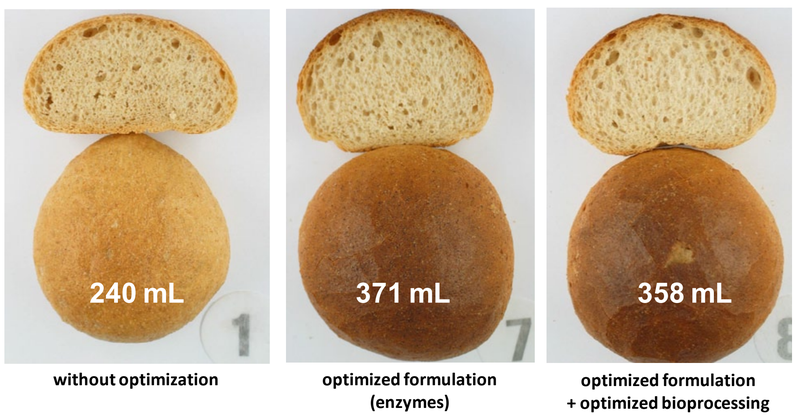
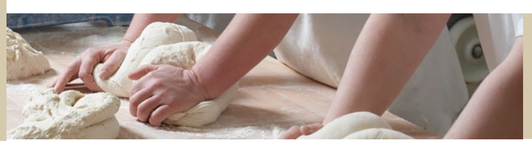


Fig 4: Example of optimized bread quality for whole grain concentrate on crispy rolls with >6%TDF.

Product and business development

Eight SME bakeries - in Austria, Germany, Italy and the Netherlands - were involved in the HealthBread project to develop nutritionally enriched bread products with optimized sensory properties, which were positively evaluated by consumers. As a result, SME bakeries can strengthen their positioning with speciality products in a highly competitive market.



TASTY AND HEALTHY

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