

***Chlorella*-enriched bread as a functional food: From the effect of added biomass on intestinal barrier integrity and its prebiotic potential to the chemical and sensory properties of enriched bread**

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Microalgae-enriched foods (such as breads) are developed to improve the nutritional value and sustainability of everyday foods. In response to the demand from food SMEs in the AT/CZ border region, solutions are being sought to meet requirements for increasing the content of PUFAs and antioxidant activity (eg. due to the presence of pigments) through the use of microalgae, to positively influence the effects of the additive on the human body (e.g., anti-inflammatory as well as prebiotic activity). Microalgae like *Chlorella* (approved as a not-novel food not requiring further administrative steps for SMEs) are naturally rich in high-quality proteins, essential amino acids, antioxidants, and bioactive compounds.

We investigated the potential of microalgal biomass as a functional ingredient in bread, with particular emphasis on wheat–rye and gluten-free bread formulations. Analytical work included the determination of pheophorbide *a* to ensure product safety, as well as profiling of fatty acids and lutein in microalgae-enriched bread. In addition, biological assays were conducted to evaluate intestinal barrier integrity, bioavailability of PUFAs, and the anti-inflammatory as well as prebiotic potential of selected microalgal strains. Free amino acid analysis revealed compounds associated with desirable sensory properties, including glutamic acid contributing to umami taste and proline related to characteristic bread aroma. A significant milestone of the first project year was the award of the KLASA quality label for wheat–rye bread from local SME containing 3% of *Chlorella* G120 microalgal biomass developed within the project.