

Sourdough fermentation as a tool to improve the bioactive properties of spelt.

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● Spelt (*Triticum aestivum* ssp. *spelta* L.) is a low-input plant that has gained attention due to its adaptation to harsh ecological conditions and high nutritional value. In baked products, the nutritional value of spelt flour may be further enhanced by sourdough fermentation, which contributes to protein degradation, leading to low-molecular-weight compounds such as bioactive peptides with nutraceutical potential. This study aimed to investigate the bioactive properties of the low molecular weight fraction (LMW) containing peptides extracted from sourdough spelt bread (SDS) prepared with previously selected lactic acid bacteria. Three other breads were prepared: sourdough bread with wheat flour (SDW), bread with bakery yeast and spelt flour (BYS) and wheat flour (BYW). LMW were tested on different cell lines: murine macrophages to evaluate the effects on oxidative stress after lipopolysaccharide treatment, and the Caco-2 cell line to assess their impact on intestinal barrier integrity and functionality. Both protein and free amino acid content were higher in sourdough breads compared to the respective bakery yeast formulations. LMW of SDS, SDW and BYW showed a higher antioxidant activity, reducing reactive oxygen species to a higher extent compared to BYW. All samples were able to contrast the barrier damage caused by treatment with lipopolysaccharide, inducing a recovery in epithelium integrity; SDS, SDW and BYW showed the strongest ability to enhance barrier integrity. Results highlighted the positive combined effect of spelt flour and sourdough fermentation, which can be exploited to manufacture bakery products with beneficial effects on oxidative and inflammatory status.