

# Development of Sliced Bread with Better Nutritional Quality: Optimization of Wheat Flour Replacement with Germinated Pseudocereals for Doughs with Better Rheological Properties

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**Abstract:** Incorporation of germinated grains in food formulation is of increasing trend due to its superior nutritional quality and health-promoting properties as compared to their ungerminated counterparts. The aims of this study were: 1) to improve the nutritional properties of sliced bread by the replacement of wheat flour (WF) with germinated quinoa (GQF), kiwicha (GKF) and cañihua (GCF) flours; and 2) to optimize composition of flour blends using a Simplex Centroid Mixture Design (SCMD), the desired function methodology and performing the screening of rheological parameters in bread doughs (development time, stability time, resistance to extension, gelatinization temperature and maximum gelatinization). Bioactive compounds (total phenolic compounds, TPC; gamma-aminobutyric acid, GABA) and antioxidant activity (oxygen radical absorbance capacity, ORAC) of flours from germinated grains was performed. A total of 14 flour blends formulations based on GQF (5-15%), GCF (5-15%) and WF (80-90%) blends or GKF (5-15%), GCF (5-15%) and WF (80-90%) were included in the SCMD to determine the optimal dough that guarantees a sliced bread with technological and sensory quality. TPC, GABA and ORAC in flours of germinated pseudocereals ranged from 72-134 mg gallic acid equivalents/100 g, 100-217 mg/100 g and 448-3395 mg trolox equivalents/100 g, respectively. The results indicated that the substitution levels influence the rheological properties of WF doughs (control). Highest desirability values were observed for doughs produced from the following two flour blends: 87.6% (WF), 5% (GKF) and 7.4% (GCF) and 84.6% (WF), 5% (GQF) and 10.4% (GCF). This investigation clearly indicates that germinated pseudocereal grains could be used to produce sliced breads with higher nutritional quality and acceptable technofunctional properties.

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