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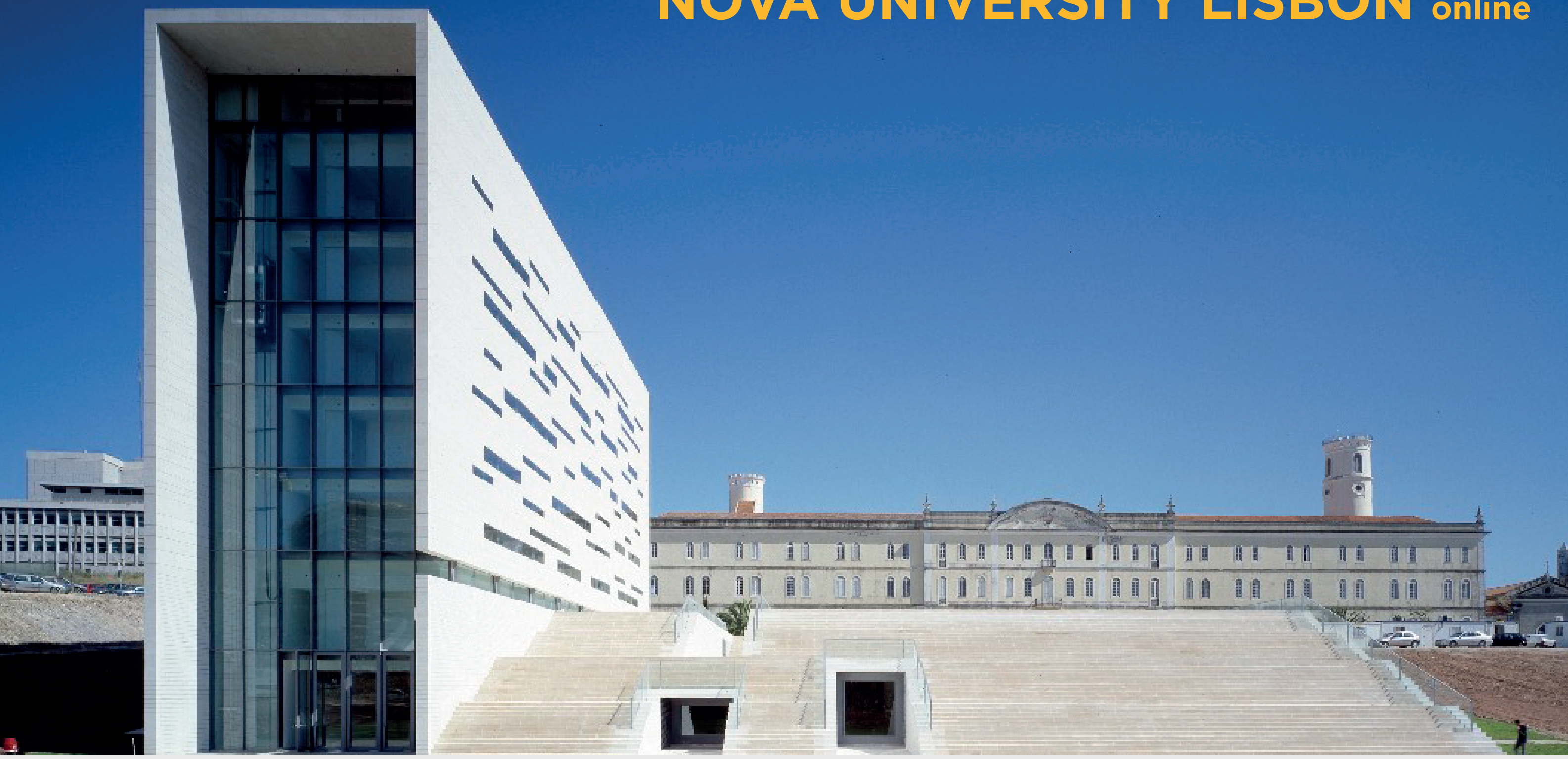

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313. Impact of gastrointestinal digestion on the biological activities of new functional cereal-based granules based on by-products from the food industry

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In recent years, the lifestyle and eating habits of the worldwide population have changed, encouraged by finding healthier and more nutritious food habits. In the last years, consumers have been searching for products with high protein content. Additionally, the consumption of cereals products has been expanding, due to the practicality[1]. In parallel, food industries generate a high amount of by-products, and although these by-products present a rich nutritional composition, most of these by-products are often undervalued and used as animal feed. In this context, the development of functional granules using by-products from the food industry is an opportunity to contribute to the food products diversification and to consumer health and well-being and to valorize the by-products, promoting the circular economy. Thus, the objective of this work was to evaluate the biological activities impacted by the gastrointestinal digestion (GID) of four new functional cereal-based granules, based on the valorisation of acorn and by-products such as wheat bran, wheat germ and okara. Granules were produced by cold extrusion and their formulation were presented in Figure 1. The GID was performed according to the standardized InfoGest protocol (Brodkorb et al., 2019)[2]. All granules were characterized regarding their nutritional composition. In addition, total polyphenols, antioxidant activity (ABTS and ORAC assays), proteins profile and oligosaccharides were evaluated in each stage of GID (mouth, stomach, intestinal phase), using FPLC and HPLC methods, respectively.

All formulations presented the requirements to attain the claim source or rich in protein (19.6 to 29.6%) and rich in fibre (≥6 g of fibre/100 g). During the GID the release of bioactive compounds was observed, and the in vitro antioxidant activity increased in the intestinal stage. Comparing the formulations, it was possible to observe that the F2 (formulation with acorn and okara) presented the highest ORAC values (11041.73 ± 384.98 µM of Trolox) after GID. Although F1 showed the highest polyphenols concentration (0.86 ± 0.02 mg of Gallic acid/ mL of sample) at the end of GID they all presented similar values. Concerning protein profile, all formulations showed after GID the release of peptides with low MW (< 3 KDa). Relatively to the soluble carbohydrates after GID all granules released oligosaccharides with low MW (< 5

KDa). In conclusion, the results indicated that GID improved the antioxidant activity in the functional granules probably due to the release of polyphenols bond to the fiber, thus suggesting health-protecting effects. Furthermore, these by-products can be valorized as potential ingredients for human consumption, reducing the waste in the food chain and satisfying a market niche based on functional and sustainable products.

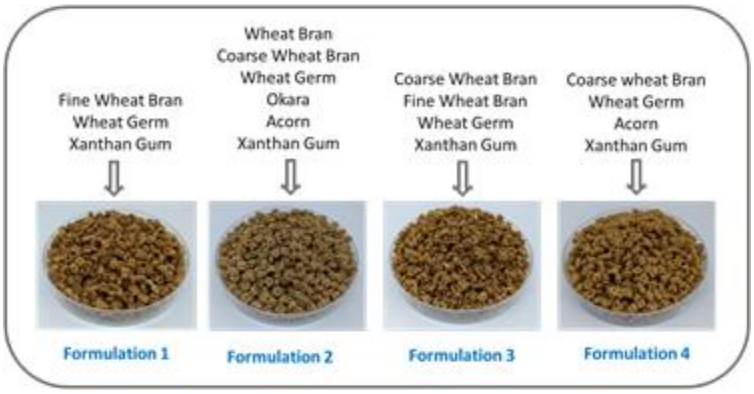

Figure 1. The formulation composition of functional cereal- based granules.

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