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Nutritional enrichment of "Económicos" through the incorporation of chestnut flour

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"Económicos" are traditional Portuguese cakes from the region of Trás-os-Montes, made from inexpensive ingredients, such as flour, sugar, margarine, olive oil, eggs and brandy. Although widely consumed, the combination of ingredients does not provide any significant nutritional benefit [1]. The species *Castanea sativa* Mill. represents a valuable natural resource in Northern Portugal, however not all fruits are commercialized due to fruit calibre requirements [2]. There are several studies that demonstrate the nutritional importance of chestnuts [3], thus, increasing the nutritional value of "Económicos" with chestnut, which could be an opportunity to improve these cakes. Therefore, in the present work, "económicos were incorporated with chestnut flour and analyzed over 32 days of storage time. The nutritional profile analysis, including proteins, crude fat, moisture, ash, fibers, carbohydrates and energy were carried out following the AOAC official methods [4]. Soluble sugars were determined using HPLC-RI, organic acids by UPLC-DAD and fatty acids by GC-FID. Two batches of "Económicos" were used, one with 9% of chestnut flour and the other one without any incorporation, and a two-way analysis of variance was applied (storage time and type of flour as the main factors). This traditional Portuguese pastry product showed a relatively low moisture content (13.1±0.8 g/100 g fw), with carbohydrates being the macronutrient present in the highest quantity (57±2 g/100 g fw), followed by proteins (7.4±0.5 g/100 g fw), offering an energy value of 417±8 kcal/100 g fw. Sucrose (28±4 g/100 g fw) was the only feee sugar present, while two organic acids were identified, with oxalic acid (0.04±0.01 g/100 g fw) standing out. Fourteen fatty acids were also found, with greater abundance of butyric (C4:0 – 11.4±1.6 g/100 g fw) and linoleic (C18:2n6c – 1.9±0.4 g/100 g fw) acids. Regarding the nutritional value of "Económicos", for moisture and ash, the interaction of both factors was significant, which did not allow for an individual classification of these factors; there was a statistically higher amount of crude fat in the control samples, but lower carbohydrates, meaning that the flour significantly influences the content of these two nutrients. Regarding the content in proteins, fibers and energy, no significant differences were verified. For the sucrose content and for the individual and total content of organic acids, a significant interaction between both factors was detected, although through the estimated marginal means, a higher amount of all these molecules was detected in the cakes with chestnut flour. Finally, concerning the fatty acid composition, the interaction of the two factors was significant, not allowing an individual classification. It could be concluded that the chestnut flour does not significantly influence the composition of the traditional "Económicos" at 9% of total flour, contributing to a market diversification and valorisation of this traditional product, while also providing higher nourishment and bioactive molecules to the traditional cakes. Sensorial analysis will be performed on the developed Económicos, as well as the bioactive analysis to understand other positive effects that chestnut flour can add to the "Económicos".

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