

Ciona as potential salt replacer in pork burgers

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Introduction: The properties associated with NaCl make it a widely used preservative in the meat industry. However, the growing concern of consumers for their health force the reformulation of meat products, reducing the salt contents and therefore, giving rise to healthier products (Pateiro, Munekata, Cittadini, Domínguez, & Lorenzo, 2021). This leads to the search for alternatives that allow to reduce salt content without modifying its technological and sensory properties. The great abundance of essential minerals and trace elements in seafood makes possible to obtain healthy and functional meat products (Peñalver et al., 2020). Ciona is a sustainable resource from the sea composed by 100% of sea squirts, whose meal contains healthy marine fats and minerals (Hrůzová et al., 2021). Thus, the objective of this study was to assess the effect of Ciona meal and Ciona extract addition on mineral profile of pork burgers.

Materials and methods: For this study, 3 batches of pork burgers reformulated with Ciona meal/extract were prepared: control without Ciona (CON); and two batches with 500 mg/kg of Ciona meal (CIM) and Ciona extract (CIE) obtained by Pulsed Electric Field. Protein, moisture and ash contents were determined according to ISO procedures (ISO 1442, 1997; ISO 936, 1998; ISO 937, 1978). Total fat was determined following the methodology described by the American Oil Chemists' Society (AOCS, 2005). The procedure previously described by Lorenzo et al. (2015) was used for minerals determination (Ca, K, Mg, Na, P, Fe, Mn, Zn and Cu).

Results: In relation to chemical composition and sodium content, significant differences have been observed among the batches studied, except for moisture (68.40-71.02%) and fat (8.51-10.73%) content. Regarding protein content, control batch showed values significantly higher than the other ones. Within ash and sodium contents, the addition of Ciona meal and Ciona extract have a significant effect on ash content of pork burgers. CIM (with crude Ciona) displayed values significantly higher than the others (with values of 3.46% and 784 mg/100 g, respectively). This reflects the possibility of substitute salt by natural alternatives in ready-to-eat products (Horita et al., 2018). In this regard, promising results were found by Cerón-Guevara et al. (2020) who showed the possibility of reducing salt in frankfurter sausages with edible mushroom flours. Regarding mineral profile, the concentrations of all macro-elements were higher in the burgers manufactured with Ciona extracts. The most abundant macro-element was potassium (varying from 266.8 to 297.5 mg/100 g), followed by phosphorous (between 178.7 and 191.2 mg/100 g). Regarding micro-minerals, zinc presented the highest content, varying from 1.63 to 2.00 mg/100 g.

Conclusions: The inclusion of Ciona into pork burgers resulted in a feasible strategy to enhance the nutritional profile of these products through the reduction of salt intake.

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