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Pulses in snacks production: relationship between raw materials and product features

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< Pulses in snacks production: relationship between raw materials and product features

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Abstract

Nowadays, co-extruded snacks - crumbly bars with a cavity inside to fill a sweet or salty cream - are mainly obtained from cereals such as corn and rice; however, the growing interest in high-value foodstuffs has encouraged the snack producers to use different raw materials such as pulses, that are rich in protein and fiber.

This work aimed at evaluating the suitability of pulses (chickpea, red lentil and green pea) to be used as raw materials in dry extrusion process. Snacks production has been carried out at industrial level by Fudex Group S.p.A. (Settimo Torinese, Italy), using a co-rotating twin-screw extruder (model 2FB90; screw speed: 150 rpm; temperature: 110 °C; pressure: 70 bar).

Initially, the effect of the extrusion process on starch properties was evaluated measuring its susceptibility to α -amylase hydrolysis (AACCI 76-31.01), the pasting properties (MVAG, Brabender®) and the ability to absorb water (AACCI 56-37.01). Snacks morphological characteristics (section area and internal cavity area) were then studied by image analysis, while the texture characteristics were assessed by three-point flexural test (TA.XTplusC Texture Analyser). A snack based on white rice was used as control.

As expected, the extrusion process had a significant impact on starch properties by increasing its susceptibility to α -amylase hydrolysis and hydration properties, while decreasing the paste viscosity. However, the extent of such changes was lower in the snacks from pulses compared to rice. This is probably due to the different chemical composition and starch organization in pulses: the higher amount of amylose (about 30-35% in pulses vs 18-20% in rice) could limit starch gelatinization and therefore the process effectiveness. As far as the snacks, sample obtained from chickpea flour were characterized by little expansion and too firm texture values, suggesting that such a raw material is not suitable for obtaining a co-extruded snack. On the contrary, the extrusion of red lentils has led to the production of a snack similar to the rice product. Therefore, red lentils could replace rice in the snack production to increase the nutritional profile of the product. In conclusion, pulses can be used in the extrusion-cooking process for the production of the co-extruded snacks; however, not all pulses are the same, in fact, despite having similar composition, different pulses lead to products with different features.

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