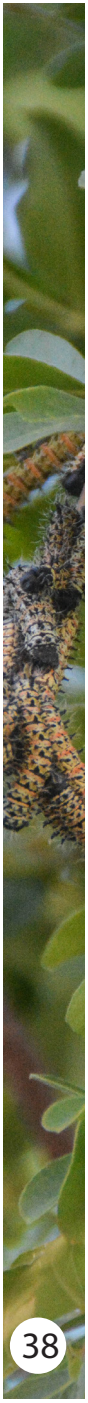

Extrusion texturisation of cricket flour and soy protein isolate: influence of insect content, cooking temperature and water-flow rate variation on textural properties and in vitro protein digestibility

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Abstract
Rapid increase in global population and the unsustainable meat production have created demand for alternative animal-derived protein. Edible insects: as cricket flour (CF) is a promising future and unconventional protein source to be used in developing meat analogues. Soy protein isolate (SPI) was substituted with full-fat CF or low- fat CF at 0, 15, 30 and 45% and extruded on a laboratory co-rotating twin-screw extruder with a throughput of 1 kg/h at 150 rpm screw speed. Cooking temperature was set to 120, 140 and 160 °C and water flow rate (WFR) at 9 and 10 ml/min. Firmness (N) and stress anisotropy index (AI) were evaluated on all settings whereas in vitro crude protein digestibility (CPD) was done on extrudates at settings: 15 and 45% CF inclusions, 120 and 160 °C, 10 ml/min. All the treatments had a significant effect (P< 0.0001) on textural properties. Cooking temperature at 9 and 10 ml/min WFR positively correlated (r= 0.5728 and 0.5582) with firmness. However CF inclusion had a negative correlation (r= -0.3866 and -0.4841) with firmness; low-fat CF blends had relatively lower firmness than full-fat counterparts and control samples. Extrudates with higher AI of 2.15, 2.35 and 2.80 from 15% low and full-fat CF inclusions (140 °C, 9 ml/min), and 30% low-fat CF inclusion (160 °C, 10 ml/min) respectively, revealed a meat-like fibrous structures under scanning electron microscopy. High temperatures and 10 ml/min WFR displayed increased stress AI. Cooking temperatures negatively correlated (r=-0.0931) with the CPD whereas CF inclusion demonstrated a positive correlation (r= 0.9310). Highest CPD was obtained from 15% and 45% full-fat CF blends at 120°C; 47.37% and 50.21%, respectively. Thus, cricket-soy meat analogue with better CPD could be tailored by controlling the cooking temperature, cricket flours content and water flow rate during extrusion.

Key words: Acheta domesticus, high-moisture extrusion

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