

Effect of protein and dietary fibre inclusion on physical properties and resistant starch content of extruded pea-flour based snacks

Tas, A. A., Chu, J., Brewood, K., Horne, O., Onarinde, B. A.

National Centre for Food Manufacturing, College of Science, University of Lincoln, United Kingdom

E-mail: atas@lincoln.ac.uk

Background

Increasing public health concerns necessitate the production of healthier snacks, preferably with lower glycaemic index. Resistant starch (RS) is a non-caloric ingredient and does not contribute to increased blood glucose. This study aims to investigate the effect of inclusion of protein and dietary fibre on the physical properties and RS content of extruded pea-flour based snacks.

Methods

Four snacks recipes were formulated using pea flour (PF), pea protein concentrate (PPC), faba bean protein concentrate (FBPC) and 2 insoluble fibre [yellow pea (YP) and maize fibre (MF)]. In addition to 77%PF, each recipe contained 20%PPC, 3%YPF [Snack 1]; 20%PPC, 3%MF [Snack 2]; 20%FBPC, 3%YPF [Snack 3] and 20%FBPC, 3%MF [Snack 4]. The recipe mix were then extruded using a co-rotating, twin-screw extruder cooker (Baker Perkins MP19c) and the resulting pellets expanded in an hot-air oven (Torbed). Moisture content, water activity, expansion ratio, bulk density and textural attributes (crispiness, crunchiness and hardness) of the snacks were determined. RS was determined using a Megazyme Kit (Wicklow, Ireland) based on AOAC method 2002.02. Independent t-tests were carried out to find out significant differences ($p < 0.05$).

Results

Regardless of the type of protein concentrate, the snacks prepared with MF had significantly higher contents (c. 3%) of RS when compared to samples containing YPF ($p < 0.05$). Snacks containing FBPC had higher expansion values. The snack containing FBPC and MF had crispiness (75 ± 4), crunchiness (408 ± 61) and hardness (96 ± 29 N) values comparable to YPF.

Conclusion

Pea flour, legume-based protein concentrates and dietary fibre have the potential to be used in expanded snacks. This study demonstrated that it was possible to increase the RS content of the snacks without adversely impacting on their physical properties.