Nutritional and Sensory Quality of Composite Extruded Complementary Food

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Abstract

Complementary foods in Ethiopia have nutritional and sensory limitations which can be attributed to cereal dominated ingredients and lack of appropriate processing techniques. This study aimed to optimise the nutritional and sensory quality of complementary food product through compositing and extrusion of various local ingredients. A constrained D-optimal mixture experiment with 13 runs was designed. Accordingly, 55–65 g/100g oats, 11–23 g/100g soybean and 6–11 g/100g linseed, and a premix of 9.9 g/100g sugar, 0.6 g/100g table salt, three g/100g *moringa* and 1.5 g/100g fenugreek were blended and extruded using a co-rotating twin screw extruder with set parameters. Statistical model evaluation and optimisation were done using Minitab version 16 software package. There is a statistically significant ($p < 0.05$) association between the blend of oats and soybean, oats and linseed, soybean and linseed, and the protein, fat, carbohydrate, fibre, ash, β-carotene content as well as aroma, taste and consistency. On the contrary, there is a no statistically significant ($p < 0.05$) association between the blends and moisture, energy and zinc content together with appearance and overall acceptability. The results showed that it is feasible to develop a nutritious complementary food with acceptable sensory properties by compositing and extrusion cooking of oats, soybean, linseed, and premix. The optimal blending ratio was 55.0 g/100g oats, 21.0 g/100g soybean and 9.0 g/100g linseed plus 15.0 g/100g premix induced significant improvement in the composite flour's nutritional quality and gruel's sensory attributes. Evidence based selection of locally grown plant-based ingredients, an optimal mixture of these ingredients and optimal processing can result in a complementary food product with an improved dietary quality for children in low-income settings. Small and medium food enterprises can make use of these results as a starting point for commercialisation of the developed product.

Keywords: Blending ratio, cereal fortification, Composite flour, Food extrusion, Food ingredients, Sensory properties

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