Proximate Composition and Antinutrient Content of Single Screw Extruded African Breadfruit-Soybean-Corn Snack.

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Introduction

Snack is a convenient food that provides calories satisfying short-term hunger; often eaten in a hurry and contains substantial amount of sweeteners, preservatives and aroma components providing tasty appeal to the consumer[1]. In developed countries snacks are eaten in between meals to check hunger, provide energy and tasty appeal; while in developing countries eaten as main meal because of their ready availability and affordability. The small nature of snacks makes them handy, easy to be managed and carried about. The process of snack production is largely a home art in most developing countries making the product differ considerably in terms of nutritional composition, microbiological safety and sensory attributes from one community to another. The extrusion technology has been employed in developing a wide range of half done or completely done acceptable food products such as breakfast cereals, snacks, flakes, quick cooking pasta products, texturised vegetable protein and breakfast gruel.

African breadfruit (*Treculia africana*) has been reported as a potential nutritional source for man and other domestic animals. The seed is known as 'Afon' in the south-west of Nigeria and 'Ukwa' in the south-east of Nigeria. The tree grows wildly in the high rainforest zone of Nigeria and other African countries producing enormous seeds during its fruiting season (March to April). A mature tree produces approximately fifty fruits annually measuring five to ten kilograms after processing[2,3]. The seeds are traditionally consumed as porridge or sauce meal when cooked with other food ingredients; boiled or roasted and eaten as dessert snacks or the flour prepared as breadfruit cake[3]. This work was aimed at determining the effects of extrusion cooking on the proximate composition and antinutrients contents of the snack.

Materials and Methods

Dry cleaned breadfruit seeds and decoated soybean seeds were separately milled in a disc attrition mill (7hp, China) and the respective flours passed through a screen of 75μm pore size; while for corn flour, the seeds were further dried in an air convection oven (Gallenkamp, England) at 60°C for 6h and pulverized in a disc attrition mill (7hp, China) and the flour passed through a 75μm screen. The resulting flours were stored in coded high density polyethylene bags. The method reported by Nwabueze *et al.* was adopted for the blending. The blending was in ratio of 70:25:5 (African breadfruit-soybean-corn). The flour blend was separately brought to 21% moisture content by water addition through material balance (Nwabueze *et al.*,). The prepared sample was extruded at selected constant extrusion condition: screw speed of 140rpm and barrel temperature of 140°C in a Brabender laboratory single-screw extruder (Duisburg DCE 330, New Jersey USA) fitted with 2mm die nozzle. The emerging extrudates as pellets at the die nozzle were collected and spread under fan on the laboratory table at room temperature (28+2°C) for 3h. The extrudates were later dried in an air convection oven (Gallenkamp, England) at 60°C for 10h. The resulting dried extrudates were packaged inside coded high density polyethene bag. Proximate composition and antinutrient contents were determined as described by AOAC[4]. Data obtained were analyzed by analysis of variance. Mean values were separated by least significant difference (LSD) test at 5% probability level.

Result and Discussion

The result of the proximate composition and antinutrient content of the raw flour blend and the corresponding extrudate is shown in Table 1. Extrusion cooking significantly ($p<0.05$) reduced the protein and moisture contents from 30.80 to 2.50% and 21.00 to 9.79% respectively. The reduction in protein could be attributed to novel products formation between protein and carbohydrate or lipid forming complex products that could resist digestion. However, the fat, crude fibre and the energy values were not significantly ($p>0.05$) affected. The ash and carbohydrate contents were significantly ($p<0.05$) increased on extrusion. The antinutrient contents (oxalate, phytate and trypsin inhibitor) were significantly ($p<0.05$) reduced. The reduction means increased nutrient bioavailability, digestion and absorption. However, there was no significant ($p>0.05$) reduction in the tannin content but, quantitatively there was a reduction from 2.30 to 1.50%. The tannin content of the extrudate does not constituent health any threat

Table 1: Proximate composition and antinutrient content of raw flour blend and the corresponding extrudate.

Proximate (%)	Raw	Extruded
Crude protein	$30.80^a \pm 0.20$	$24.50^b \pm 1.00$
Fat	$8.20^a \pm 1.00$	$7.60^a \pm 1.00$
Crude fibre	$6.00^a \pm 1.00$	$4.50^a \pm 1.00$
Ash	$2.85^b \pm 1.00$	$5.15^a \pm 1.00$
Moisture	$21.00^a \pm 0.58$	$9.70^b \pm 0.58$
Carbohydrate	$48.00^b \pm 1.00$	$54.10^a \pm 1.00$
Energy (Kcal/100g)	$389.00^a \pm 10.00$	$382.80^a \pm 5.77$
Antinutrient		
Tannin	$2.30^a \pm 1.00$	$1.50^a \pm 1.00$
Oxalate	$1.00^a \pm 0.20$	$0.50^b \pm 0.10$
Phytate	$0.90^a \pm 0.10$	$0.06^b \pm 0.10$
Trypsin Inhibitor	$4.30^a \pm 1.00$	$1.30^b \pm 1.00$

Values are means and standard deviations of three determinations. Values not followed by the same superscript in the same row are not significantly different ($p>0.05$).

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