



RESEARCH ARTICLE

BUTTERNUT SQUASH YOGHURT, BENEFIT AND CONSUMER ACCEPTANCE

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ABSTRACT

Butternut squash is rich in phytonutrients and antioxidants, low in fat, and dietary fibre for the maintenance of the human body. Yoghurt is custard-like food made from curdled milk. The culturing process makes yoghurt more digestible than milk. Yoghurt has less lactose than milk; the culturing process breaks down the milk sugar lactose into glucose and galactose and these can be easily absorbed by lactose-intolerant persons. The main objective of the research is to assess the proximate composition of the fruit and also develop a new product (butternut squash yoghurt) using butternut squash. Butternut squash was acquired from Kukobila in the Savelugu district of Northern region, Ghana and samples prepared for proximate analyses and the development of the new product; butternut squash yoghurt. To promote the production and reduction of postharvest losses in butternut squash, the study assessed the development and production of butternut squash yoghurt, its benefits and consumer acceptance. Butternut nut squash samples were acquired from Kukobila in the Savelugu district of Northern region, Ghana and prepared for the development of butternut squash yoghurt. Butternut squash yoghurt was prepared following the process for preparing Greek yoghurt in the proportion of 2 kg of butternut squash to 360 g of skimmed milk. Finished butternut squash yoghurt was analysed for proximate composition, and consumer acceptance using a taste panel of sample size thirty. Butternut squash yoghurt can be described as a healthy choice based on the proximate composition and the many benefits cultured yoghurt brings to consumers. Producing butternut squash yoghurt in commercial quantities will benefit farmers, processors and consumers.

Key words: Butternut squash, Yoghurt, Utilisation, Sensory, Consumer acceptance.

INTRODUCTION

Butternut squash (*Cucurbita maxima* Duch. ex Lam) from the family Cucurbitaceae and genus cucurbita originated from South America, possibly Peru and is now widely distributed throughout the Tropics (Tindall 1983). Butternut squash is shaped like a large pear; and has cream-colored skin, deep orange-colour flesh and a sweet flavour. Butternut squash is rich in phytonutrients and antioxidants, low in fat, and dietary fibre for the maintenance of the human body. It also provides significant amounts of potassium and vitamin B6 which is good for the proper functioning of the nervous and immune systems. Butternut squash should be stored in moderate temperature between 10 -16 °C and at a relative humidity of 60% for a shelf life of 50 days (Tindall 1983). Government of Ghana under the Export Development and Investment Fund (EDIF) introduced butternut squash as a new export product from Ghana on pilot base in some selected communities (GNA, 2011). The challenge some farmers face is in the storage of butternut squash safely over a period and marketing of the fruits locally due to the lack of inadequate information on the health benefits and ways of utilising butternut squash. Yoghurt is custard-like food made from curdled milk which can be enjoyed by people who cannot tolerate milk, either because of protein allergy or lactose intolerance. The culturing process makes yoghurt more digestible than milk in that the live active cultures create lactase, the enzyme lactose-

intolerant people lack, and another enzyme contained in some yoghurt (beta-galactosidase) also helps improve lactose absorption in lactase-deficient persons. Bacterial enzymes created by the culturing process, partially digest the milk protein casein, making it easier to absorb and less allergenic. Yoghurt has less lactose than milk as the culturing process breaks down the milk sugar lactose into glucose and galactose and these can be easily absorbed by lactose-intolerant persons (WebMD, 2007). Proximate determination provides information on the basic chemical composition of foods and feeds (Aurang *et al.*, 1987). The components of food or feed are moisture, ash, fat, protein, carbohydrate and crude fibre. These components are fundamental to the assessment of the nutritive quality and quantity of foodstuff been analysed. The knowledge of these constituents would enable consumers choose food of their dietary needs, while aiding researchers in further studies. To promote the production and reduction of postharvest losses, this study assessed the development and production of butternut squash yoghurt, its benefits and consumer acceptance.

MATERIALS AND METHODS

Butternut nut squash samples were acquired from Kukobila in the Savelugu district of Northern region, Ghana and prepared for the development of butternut squash yoghurt. The recommended methods of analysis of the Association of Official Analytical Chemist (A.O.A.C., 1997) were adopted for the determination of proximate composition. The

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parameters analysed for were protein, fat, carbohydrate, fibre and ash, all treatments were in triplicate. Butternut squash yoghurt was prepared in Tamale – Ghana by baking/roasting the butternut squash to soften the rind for easy removal of the rind without pulp loss and for effective mixing. The removed pulp was blender, sieved and added to immediately pasteurised skimmed milk following the process for making Greek yoghurt and is as indicated in Figure 1 in the proportion of 2 kg of butternut squash to 360 g of skimmed milk. Finished butternut squash yoghurt was analysed for proximate composition, and consumer acceptance using a taste panel of sample size thirty. The taste panel consisted of staff and students of the University for Development Studies, Nyankpala campus via Tamale. Proximate composition data was computed within samples for standard deviation and consumer acceptance ranked.

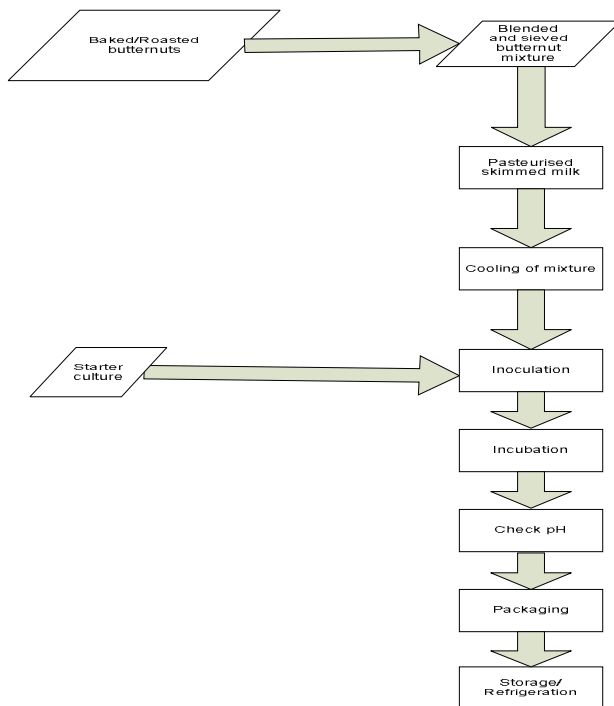


Fig 1: Flowchart for butternut squash yoghurt preparation

RESULTS AND DISCUSSION

Proximate Composition

Results from the proximate analyses showed an appreciable amount of all proportions making up food except for fibre which was negligible and is as indicated in Table 1. Hence squash yoghurt can be classified as food that can supplement the nutrient requirement of consumers for a healthy life. According to World Health Organisation (2007) and the United States recommended daily allowance (RDA), protein should be consumed by a minimum of 0.45 g and maximum of 0.8 g per kilogram of an ideal body weight per day and this can be compensated for from the protein in the yoghurt. Not less than 50 g of carbohydrate is required daily to prevent ketosis (FAO, 1998) and the carbohydrate from the yoghurt can augment nutritional needs of consumers per day. According to FAO (1995) the minimum intake of fat should be 15 percent of an adult's energy intake. Although from the results the fat content is quite low, it will also serve a healthy drink since the majority of consumers are particularly cautious

of the amount of fats and oils in foods. Butternut squash yoghurt can be described as a healthy choice based on the proximate composition regardless of the many benefits cultured yoghurt brings to consumers.

Table 1: Proximate composition of Squash yoghurt

Parameters	Mean values (g/100g)
Moisture	80.46 ± 0.14
Protein	4.6 ± 0.04
Carbohydrate	14.37 ± 0.01
Ash	0.56 ± 0.05
Fat	0.01 ± 0.01

*± Standard deviation

Sensory Analyses

Results show consumers' acceptance of the product as indicated in Table 2. Scores from the table can be interpreted as very good for flavour and viscosity while the rest of the parameters can be classified as approximately excellent. These thus suggest that butternut squash yoghurt can be manufactured in commercial quantities for sale to consumers; culminating in nutritional benefits for consumers and financial rewards for farmers, processors and all along the value chain. The use of butternut squash did not only enrich the nutritional composition of the finished product, it also served as natural colour and flavour replacer in yoghurt types that are coloured and flavoured given it a unique orange colour and a distinct flavour of milk and squash. Thus reducing the risk associated with the addition of artificial colour and flavour in yoghurt preparation. It can also reduce or eliminate the cost associated with acquiring these additives.

Table 2: Sensory analyses results

Parameters	Mean Scores
Colour	3.9 ± 0.3
Taste	3.7 ± 0.6
Flavour	3.1 ± 0.7
Viscosity	3.2 ± 0.7
Ropiness	3.8 ± 0.4
Smoothness	3.7 ± 0.7

* Ranked from 0-4 with the following meanings (0 = dislike, 1 = fair, 2 = good, 3 = very good, 4 = excellent), ± Standard deviation

Conclusion and Recommendation for Development

Utilizing butternut squash in the production of butternut squash yoghurt is an effective way of curbing postharvest losses and an incentive for farmers to produce butternut squash not only as an export crop but also for use locally. The nutritional value of butternut squash yoghurt makes it a healthy drink for consumers; consisting the nutrient value of milk and butternut squash. As such butternut squash yoghurt can be produced in commercial quantities for nutritional and economic benefits. For further development, forms of use can be researched into such as the extraction of colour from butternut squash for use as commercial food colour.

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