2018 Journal of Agricultural Production and Technology ISSN: 2360-9364

NUTRITIONAL COMPOSITION AND SENSORY PROPERTIES OF SOY-COCONUT YOGHURT

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ABSTRACT

The study assessed the nutritional composition and sensory properties of soy milk yoghurt supplemented with two levels of coconut milk. Sample A (Control) was produced from 100% soymilk while samples B and C blends of yoghurt were produced from soy milk with 25 and 50% coconut milk respectively. Soy bean was soaked, dehulled. Washed and ground in the blend to obtain slurry which was added with water and filtered through a cheese cloth to obtain coconut milk. The respective milk was blended in a clean blender in the above ratio, pasteurized to 38^{o}C, cooled to 45^{oC} and inoculated with starter culture to ferment. The results showed that supplementation significantly decreased ($p<0.05$) the protein and carbohydrate content of the soy-milk blend yoghurt. The soy-coconut milk blend yoghurts contained (%) protein (0.02±0.21 - 446±0.08), fat (2.67±0.32 - 3.28±0.25), ash (0.42±0.03 - 0.50±0.01), and crude fibre (0.24±0.06 - 0.31±0.01).The moisture content of the products ranged from 3.36±0.01 to 2.00±0.21 with increase substitution with coconut milk blend. Coconut has a significantly ($p<0.05$) higher iron and calcium content that ranged from calcium (52.86±2.82 - 65.00mg/1), iron (28.05±1.35-40.00±1.41mg/l) and magnesium (7.64±0.97-8.87±2.82mg/l). while soy had significant ($p<0.05$) the sensory evaluation was conducted using semi-trained panelist, result indicated products with 75:25 soy-coconut milk blend substitution of coconut milk in the product had no significant ($p<0.05$) effect on colour and consistency, but recorded significant ($p>0.05$) increase in the aroma and taste and overall acceptability for B. Coconut improved the sensory attribute of soy yoghurt. Soy-coconut yoghurt with 25% coconut milk had significantly better aroma, taste and overall acceptability than those with 50% coconut milk.

Key words: Nutrition, Sensory properties, Soybean, Coconut, Yoghurt.
J. Agric. Prod. & Tech.2018; 7:33-37

INTRODUCTION

Yoghurt can be defined as semi fermented often flavored milk food that is known and consumed in almost all parts of the world. Most Nigerians regularly take yoghurt either as desert, snack or as a probiotic food drink to aid digestion and to re-establish a balance within the intestinal micro-flora. The most popular yoghurts known in most African markets are those obtained from cow milk (Sackey, 2008).

The substrate that is usually employed in this diary type of yoghurt is evaporated; whole milk/skimmed solids or fresh milk from cow (Rite 2009). Although the substrate produced good quality yoghurt, there are certain limitations that make it difficult for the ordinary Nigerian middle/low income earner to afford the conventional yoghurt. This is because the substrate is relatively expensive compared to other possible substrates which have the potentials to produce a comparable effect as seen with cow milk. It is realized that strict vegetarians are also limited in their quest for probiotic yoghurts when there is a

confinement to only animal based yoghurts. It is therefore, of great importance to find out the feasibility of using the coconut milk as substrates (Belewu and Belewu 2007).

Yoghurt obtained by using coconut milk has been found to be delicious and nutritious (Imele and Atemnkeng, 2001). Coconut milk was found to be rich in calcium. The milk was reported to be high in minerals and vitamin content while total saturated fat was 10% of total energy (Thai Food Composition, 2004).

Several works have been done on soybean product to improve its acceptability. Bhattacharya and Jana (2007) worked on the gelling behavior of defatted soybean flour dispersions due to microwave treatment. Kumar and Mishra (2003) worked on the effect of mango pulp addition on textural profile of soy yoghurt while Odu *et al.,* (2012) studied the effect of different preservations on the shelf life of soymilk stored at different temperature. In all these studies, none reported on milk produced from soybean and coconut flesh.

Milk produced from soybean despite its nutritious and health benefit has low acceptability due to its beany flavor and there is a need to improve it in order to boost consumer's acceptability. This study was therefore carried out to determine the extent to which coconut milk can be used in boosting the nutritional and sensory properties of soy yoghurt.

MATERIALS AND METHODS

Soybean (*Glycine max*) and coconut drupe (*Cocos nucifera*) were purchased from Anyigba main market. The inocullum (yoghurt starter culture) composed of *Lactobaccilus acidophilus* and *Lactobaccilus bulgaricus* was purchased from Tito gate, opposite Kogi State University Anyigba in Dekina Local Government Area of Kogi state, Nigeria.

A bulk of healthy seeds of soybean (*Glycine max*) used for this study was sorted for stone, immature seeds, damaged seeds and other contaminants like weed seeds. The sorted beans were rinsed with tap water, drained off after 6 hours and the beans manually dehulled. The dehulled beans was rinsed in distilled water and further blended to obtain slurry. 750 grams of the slurry was further diluted with 1.5 litres of distilled water and then filtered using a double layer of cheese cloth, the resulting liquid was soymilk in raw form.

The coconut drupes were crushed open and the liquid poured out. The meaty part which is the coconut was cracked, the brown part was scraped-off and the coconut flesh was washed. This was further blended to obtain coconut slurry; and 300grams of the slurry was diluted with 1 litre distilled water and filter through a double layer cheese cloth. The resulting liquid was coconut milk.

Each of the milk were pasteurized to 85 ± 2^0C for 15 minute and allowed to cool to 43^0C with the milk been stirred at intervals of 2mins to enable even cooling. Blends of soy and coconut milk were prepared. The control sample (A) consist of 100% soymilk, two other samples were prepared according to the following ratios of soymilk and coconut milk, respectively (Sample B, 75:25 and C, 50:50). The blends were thoroughly homogenized. The composition of the samples is as presented in table 1 below.

Table 1: Composition of Soy-Coconut Yoghurt Blend

Samples	A	B	C
Soymilk (ml)	100	75	50
Coconut milk (ml)	-	25	50

The blends were dispensed in glass jar and the incubator was preheated to 43^0C.The yoghurt premix was inoculated with starter culture at 3% per unit volume, and then stirred to distribute the cultures evenly within the milk. The glass jar were then covered and kept in the incubator to ferment and coagulate at room temperature (29 ± 2^0c) for 16 hours and refrigerated to 7^0C to avoid further fermentation.

The moisture, crude protein, fibre, ash, carbohydrate fat and mineral contents

were determined by the methods of AOAC (2000). Sensory Evaluation was carried out in the Sensory Evaluation Laboratory of the Department of Food Nutrition and Home Science of Kogi State University, Anyigba.

The refrigerated samples were dispensed in glass cups and coded A, B and C. Dangote ® brand of sugar was added to taste and 15 members untrained but experienced panelist who are familiar with the consumption of yoghurt were selected from the Department of Food, Nutrition and Home Science. Score sheets were given to the panelist and they were asked to rate on a 7-point hedonic scale with (7) as very much liked and (1) as very much disliked for color, taste, consistency, aroma and overall acceptability.

Data obtained were analyzed using the descriptive statistics and ANOVA of SPSS for windows version. 20.0 statistical package (SPSS, 2010).Mean values were separated at 5% level using Duncan's Multiple Range test of the software.

RESULTS AND DISCUSSIONS

Proximate Analysis: The proximate composition of the yoghurt drinks is as shown in Table 2 below. There were no significant differences ($p > 0.05$) in the moisture content of the samples which was still within the acceptable range of 80-90 percent reported by Kumar and Mishra, (2003).

There were significant ($p < 0.05$) differences in the protein content with sample A having the highest value (4.46±0.08%). Values for ash (0.4±0.03 – 0.5±0.01%), fat (2.60±0.32 – 3.28±0.25%) and fibre (0.24±0.06 – 0.31±0.01%) were not significantly ($p > 0.05$) different. Sample C had the highest score for fat content while sample A had the least value. Sample A had the highest content of ash, with the score of 0.50% followed by sample C and sample B had the least score of 0.42%. The ash content of the sample A gives an indication of the mineral composition of the blends. Ash content indicates that the food will not be mineral deficient (Agu and Aluya 2004). Fibre is needed to assist in digestion and keep the gastro-intestinal tract healthy and can also keep the blood sugar stable (Shaibu, 2012).

Values obtained for carbohydrate content of the blended samples revealed that sample A had the highest value (3.36±0.01%) while sample C had the least (2.00±0.21%). The carbohydrate was however on the decline with increasing substitution of coconut milk.

Table 2: Proximate Analysis of Soy-Coconut Blend Yoghurt

Proximate Components	Samples A	B	C
Moisture	88.78±0.43	89.56±0.14	90.93±0.23[b]
Protein	4.46±0.08[a]	3.78±0.20[b]	3.02±0.21[c]
Fat	2.67±0.32	3.07±0.26	3.28±0.25
Ash	0.50±0.01	0.4±0.03	0.49±0.06
Carbohydrate	3.36±0.01[a]	2.87±0.18[b]	2.00±0.21[c]
Fibre	0.24±0.06	0.31±0.01	0.29±0.08

Values represents means of determinations ± S.D

[ab]Means within the same row with the different superscript(s) are significantly different ($p < 0.05$).

Sensory evaluation of soy-coconut yoghurt blend: The sensory mean scores obtained for supplemented soy-coconut yoghurt drink are as shown in Table 3 below. There were no significant difference ($p>0.05$) in the values for colour (5.60 – 6.00) and consistency (6.33 – 6.67). The values for aroma (4.47 – 6.00), taste (5.33 – 6.67) and overall acceptability (5.53 – 6.07) showed significant differences ($p<0.05$)

with sample C having the best values for aroma, taste and overall acceptability. The least acceptability for A could be attributed to its beany taste (Iwe, 2003). The highest aroma value for C could be due to the rich aroma of coconut which constitutes 50% of the yoghurt (Rite, 2009).

Table 3: Sensory evaluation of soy-coconut yoghurt blend

	Samples/Treatments		
Parameters	**A**	**B**	**C**
Colour	6.00±1.00	5.60±0.91	5.73±0.88
Consistency	6.53±0.74	6.67±0.63	6.33±0.72
Aroma	4.47±1.19^{b}	5.33±1.18^{ab}	6.00±0.85^{a}
Taste	5.33±1.23^{b}	5.93±0.80^{ab}	6.67±0.62^{a}
Overall Acceptability	5.53±1.25^{b}	6.07±0.88^{a}	5.80±0.77^{a} ^{b}

Values represent mean of (15) panelists scores ± S.D

^{ab}Means within the same row with the different superscript(s) are significantly different ($p < 0.05$).

Mineral composition: The mineral composition obtained for the blends of soy-coconut yoghurt drink is as shown in Table 4. There were significant differences ($p < 0.05$) in the values for calcium (52.86±2.82 - 65.00±0.00mg/1), iron (28.05±1.35 - 40.00±1.41mg/l) and magnesium (7.64±0.97 - 8.87±2.82mg/l). The values however did not follow any definite trend. All the samples contained appreciable quantities of calcium and consumption of the product could help meet part of the recommended daily dietary allowance. Calcium is the most important element the body requires and its deficiency is most prevalent than that of any other mineral (Shaibu, 2012).

Table 4: Mineral composition soy-coconut blend yoghurt

	Samples/Treatments		
Minerals	**A**	**B**	**C**
Calcium (mg/1)	52.86±2.82^{b}	58.57±1.41^{ab}	65.00±0.00^{a}
Iron (mg/I)	40.00±1.41^{a}	32.01±42a^{b}	28.05±1.35^{b}
Magnesium (mg/I)	8.87±2.82^{a}	8.09±32^{a}	7.64±0.97^{b}

Values represent means of duplicate determinations ±S.D

^{ab}Means within the same row with the different superscript(s) are significantly different ($p < 0.05$).

CONCLUSION AND RECOMMENDATION

- Fermentation and supplementation of soy-yoghurt with up to 50% coconut milk significantly increased its calcium level, increased consumer's acceptability for taste, aroma and overall acceptability and had no adverse effect on the quality.
- Further research need to be carried out on how to remove the beany flavor of soybean product to improve its acceptability.

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