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Evaluation of Nutritional Composition and Acceptability of Soy-Coconut Milk-Based Yoghurt Fermented with Different Starter Cultures

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ABSTRACT

This study was carried out to investigate the effect of starter cultures on the nutritional composition and acceptability of soy-coconut milk-based yoghurt. The effect of the addition of non-fat dry milk (NFDM) to the yoghurt premixes on the quality of the resultant soy yoghurt was also evaluated. The pH of the yoghurt premixes at the onset of fermentation ranged between 6.29 and 6.78 and after fermentation it was between 4.74 and 5.44 with commercially available starter bringing about greatest pH reduction. The chemical composition of resulting soy yoghurts were as follows: titratable acidity as %lactic acid (0.25-0.73%), crude protein (3.13-4.69%), fat content (0.11-0.52%), total solid content (8.24-13.09%). Addition of NFDM and coconut milk to the yoghurt premixes before fermentation significantly increased the acidity, protein, ash and carbohydrate contents of the yoghurts. The sensory characteristics of soy yoghurts with the premix containing 10% coconut milk fermented with starter obtained from cow milk produced yoghurt with the best taste, aroma, colour and acceptability. Results from the present study have demonstrated that soy yoghurt could become a more acceptable product to the 'Western palate' if NFDM and an appropriate quantity of coconut milk were added to yoghurt premix before fermentation.

Keywords: non-fat dry milk, sensory evaluation, soy yoghurt, yoghurt starter
Abbreviations: LAB, lactic acid bacteria; **NFDM**, non fat dry milk; **TA**, titratable acidity

INTRODUCTION

Yoghurt has long been recognized as a product with many desirable effects for consumers, and it is also important that most consumers consider yoghurt to be a health food. Wood (1992) stated that yoghurt consumption has increased significantly, presumably because of its perceived health benefits. Cow milk-based yoghurt has become the most widely adopted yoghurt in the Western hemisphere. However, reports have indicated that soy milk-based yoghurt offers a considerable appeal for a growing segment of consumers with certain dietary and health concern as soy milk yoghurt has several nutritional advantages over cow milk yoghurt such as reduced levels of cholesterol and saturated fat, and it is lactose-free (Favaro *et al.* 2001).

Many soy products have limited human use in the Western hemisphere due to undesirable off-flavours (Kanda *et al*. 1976; Pinthong *et al*. 1980). Lactic acid fermentation has been reported as a mean to reduce beany flavours and anti-nutritional factors in soybean products and together with the addition of sweeteners it is possible to obtain products with better acceptance by panelists (Pinthong *et al*. 1980; Buono *et al*. 1990). A recent report also indicated that soy yoghurt acceptability could be enhanced by the addition of various flavourants and fruit flavours (Osundahunsi *et al.* 2007). Also, Lee *et al.* (1990) believed that increasing the total solid content of soy milk with non-fat dry milk (NFDM) for soy yoghurt production would contribute positively to its colour, flavour, body, texture and nutritional properties.

There are hundreds of ways of using coconut as food and also as a useful source of raw materials, hence it being referred to as the tree of life in the Pacific. Malolo *et al.* (1999) reported that the meat of coconut can also be used in the preparation of fermented dishes and coconut sauce or seasonings for vegetables and root crops, or cooked with other root crops to enhance flavour. Despite the promotion of coconut as a nutritious food, it continues to remain a controversial topic among health workers as its consumption was speculated to be a risk factor in cardiovascular disease. However, coconut oil neither lowers nor raises blood cholesterol levels. This special neutral feature is due to the chemical composition of coconut oil (Malolo *et al*. 1999).

Tuitemwong and Tuitemwong (2003) reported that Lactic Acid Bacteria (LAB) from different sources have different efficiencies in soy yoghurt fermentation. Perhaps, this overlooked aspect of soy yoghurt fermentation, whereby any available yoghurt starter is being used for soy yoghurt production, may have been responsible for the non production of buttermilk-like aroma in soy yoghurt obtained through the use of conventional yoghurt starter as noted by Nsofor *et al.* (1992)

The present study focused on investigating the effect of different starters on the nutritional composition and acceptability of soy coconut milk based yoghurt. The effect of the addition of NFDM to the yoghurt premixes was also investigated. The objective of these investigations was to explore possible ways of improving the adoption of soy yoghurt in developing countries by consumers in the Western hemisphere.

MATERIALS AND METHODS

Materials

This study was carried out at The Polytechnic, Ibadan, Nigeria, between May and July 2007. Fresh cow milk was purchased from nomads at Bodija Market, Ibadan, Nigeria. It was transferred in a sterile container to the laboratory for the isolation of LAB. Soybean seeds (variety TGX-923-2E) were obtained from the Institute of Agricultural Research and Training, Moor Plantation, Ibadan,

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Nigeria. Commercially available yoghurt starters and other ingredients were purchased from local stores.

Production of soy milk and coconut milk

The method of Mital *et al.* as reported by Lee *et al*. (1990) was used to produce soy milk. To produce coconut milk, coconut seed was cracked manually and the coconut meat removed with a sharp knife. The brown part of the coconut meat was gently scraped off. It was cut into smaller pieces to enhance quicker blending. White coconut meat (200 g) was blended with 1 L of distilled water. The slurry obtained was further diluted with 1 L of distilled water. It was then sieved with double layers of cheese cloth. The filtrate obtained was coconut milk. It was kept inside a refrigerator and used within 45 min.

Isolation, characterization and identification of yoghurt starters

Both fresh cow milk and soy milk were left covered on the laboratory bench at ambient temperature of 29 ± 2°C overnight. LAB were isolated from the naturally fermenting milk by serial dilution in 0.1% peptone water and poured into De Mann Rogosa Sharpe (de Man *et al*. 1960) agar. The plates were incubated anaerobically at 30°C for 48 h. The isolates were purified by streak plating using the same medium. Morphological characteristics such as cell shape and arrangement were noted. Biochemical and physiological studies such as catalase reaction, oxidase reaction, type of fermentation, growth in 4% NaCl and sugar fermentation profiles were determined using standard methods (Harrigan and McCance 1976; Gerhardt *et al*. 1981). The results obtained from the tests carried out were used to identify the organisms by reference to Bergey's Manual of Systematic Bacteriology (Sneath *et al*. 1986).

Yoghurt manufacture

Four soy-based yoghurt premixes were formulated to contain: (a) soy milk containing 20% coconut milk and 5 g skimmed milk, (b) soy milk containing 10% coconut milk and 5 g skimmed milk, (c) soy milk containing 20% coconut milk and (d) soy milk only. The premixes also contained 3% sugar and 0.5% gelatin. Mixtures of premixes, sugar and gelatin were prepared, homogenized and pasteurized as previously described by Collins *et al*. (1991). The mixture was subsequently placed in a water bath to cool down to 43°C prior to inoculation of starter cultures. The cool down mixtures were inoculated with 1% commercial yoghurt culture (50:50 mixture of *Lactobacillus bulgaricus* and *Streptococcus thermophilus*) as described by Lee *et al*. (1990). The preculture of each of the two isolated LAB from soymilk (*L. bulgaricus* and *S. thermophilus*) was prepared; and the mixed culture were inoculated into the second portions of a cooled mixture of each of the premixes at 5% final volume as described by Murti *et al*. (1992). The same procedure was repeated for yoghurt starter obtained from cow milk. All the inoculated premixes were poured into separate sterile plastic cups. They were then incubated at 43°C and allowed to ferment for 12 h. After incubation, they were cooled in an ice bath, placed in a cabinet at 6 ± 2°C and held for evaluation within 12 h.

Analyses

Samples were analyzed for proximate composition using standard methods of analyses of AOAC (1990). The pH of the various samples was determined using a pH meter. Acidity was measured as we described previously (Olubamiwa *et al*. 2007). A half ml of a 1% solution of phenolphthalein in 95% alcohol was added to 10 ml of yoghurt sample. Acidity was measured by titrating the mixture thus obtained with 0.1 N NaOH and it was expressed as g equivalent lactic acid/100 g. All the determinations were carried out in triplicate and mean values were calculated.

Sensory evaluation

The yoghurt samples were held at 6 ± 2°C until presented for evaluation. Sensory evaluation of the yoghurt samples was carried out by a 20-member panel of judges consisting of students and staff of The Polytechnic, Ibadan who were familiar with the product. The parameters used were flavour, colour, taste and over all acceptability. The ratings were presented on a nine-point Hedonic scale ranging from 9 = like extremely to 1 = dislike extremely.

Statistical analysis

Data obtained were expressed as means ± standard deviation. The statistical significance of differences was assessed using analysis of variance. A two-tailed P value of less than 0.05 was considered to be statistically significant. Values that were significantly different were separated using Duncan's Multiple Range test using SPSS for Windows ver. 11.0 statistical package.

Table 1 Morphological and biochemical characteristics of LAB isolates from naturally fermenting cow milk and soy milk.

Characteristics	Strains											
	1	**2**	**3**	**4**	**5**	***6**	**7**	**8**	**9**	**10**	****11**	****12**
Gram reaction	+	+	+	+	+	+	+	+	+	+	+	+
Shape	R	R	R	C	R	R	R	R	R	R	R	R
Oxidase	-	-	-	-	-	-	-	-	-	-	-	-
Catalase	-	-	-	-	-	-	-	-	-	-	-	-
Indole	-	-	-	-	-	-	-	-	-	-	-	-
Spore staining	-	-	-	-	-	-	-	-	-	-	-	-
Growth in 4% NaCl	+	+	+	-	+	+	+	+	+	+	+	+
Growth at 45°C	+	+	+	+	+	+	+	+	+	+	+	+
Growth at 4°C	-	-	+	-	-	-	-	-	-	-	-	-
H_2S production	-	-	-	-	-	-	-	-	-	-	-	-
Fermentation type	Hm	Hm	Hm	Ht	Hm	Hm	Hm	Hm	Hm	Ht	Hm	Hm
Glucose	+	+	+	+	+	+	+	+	+	+	+	+
Lactose	+	+	+	+	+	+	+	+	+	+	_	+
Sucrose	+	+	+	+	+	+	+	+	+	+	+	-
Galactose	+	+	+	+	+	+	+	+	+	+	+	-
Maltose	+	+	+	-	+	+	+	+	-	+	+	+
Fructose	+	+	+	+	+	+	+	+	+	+	+	+
Mannitol	-	-	+	+	-	-	-	-	-	-	+	+
Raffinose	-	-	+	+	-	+	-	-	-	-	+	-
Sorbitol	-	-	+	-	-	+	-	-	-	-	+	-
Xylose	-	-	-	-	-	-	-	+	-	-	-	-

Hm = homofermentative; Ht = heterofermentative; R = rod; C = coccus
*Isolate from cow milk only; **Isolates from soy milk only
Strains: 1 = *Lactobacillus leichmannii*; 2 = *L. casei*; 3 = *L. plantarum*; 4 = *Streptococcus thermophilus*; 5 = *L. acidophilus*; 6 = *L. salivarus*; 7 = *L. delbrueckii*; 8 = *L. xylosus*; 9 = *L. bulgaricus*; 10 = *L. fermentum*; 11 = *L. coryniformis*; 12 = *L. homohiochii*.

RESULTS

The characteristics of LAB isolated from naturally fermenting soy milk and cow milk are listed in **Table 1**. All the isolates were Gram positive, catalase negative, indole negative, oxidase negative and produced acid from glucose and galactose. Some of them fermented raffinose and sorbitol. The majority of them grew in 4% NaCl and at 45°C while only *Lactobacillus plantarum* grew at 4°C. Majority of these LAB were homofermentative.

The observed changes in pH of the fermenting yoghurt premixes are shown in **Table 2**. The pH of the yoghurt premixes at the onset of fermentation was between 6.29 and 6.78. After 12 h fermentation, the pH values were reduced to between 4.74 and 5.44. These results indicate that commercial starter brought about greater pH reductions compared to other two starters. This was closely followed by starters obtained from cow milk while starters from soy milk brought about the least pH reduction. It is evident from the present data that a reduction in the amount of coconut milk used in yoghurt premixes appeared to contribute to further drop in the pH of fermented yoghurt samples. Furthermore, the addition of NFDM equally contributed to a higher pH reduction in the fermented yoghurt premixes.

Table 3 shows the chemical characteristics of the different yoghurt samples. Titratable acidity (TA) values of the yoghurt samples varied between 0.25 and 0.73% (as lactic acid) Crude protein content was between 3.13 and 4.69% while the fat content ranged between 0.11 and 0.52%. As expected, the addition of NFDM significantly ($P<0.05$) increased the total solid content of soy yoghurt samples obtained from premixes that contained it. Generally, by adding NFDM and coconut milk to the yoghurt premixes prior to fermentation increased the protein, ash and carbohydrate contents of the ensuing yoghurt samples.

The result of the sensory evaluation of the soy yoghurt samples prepared from different yoghurt premixes is shown in **Table 4**. From our data, we could conclude that the addition of coconut milk to soy milk improved the sensory characteristics of the yoghurts obtained from such premixes. However, yoghurt premixes containing 10% coconut milk which was fermented by yoghurt starter isolated from cow milk produced soy yoghurt with the best taste, colour, consistency and overall acceptability. Results of our study suggest that the addition of NFDM to yoghurt premixes containing 20% coconut milk may not be positively affecting its sensory attributes.

DISCUSSION

The majority of LAB isolated from naturally fermenting cow milk and soy milk belong to the genus *Lactobacillus*, as reported by Adel Moneim *et al*. (2006) who claimed that *Lactobacillus* constituted 74% of the LAB associated with *garris* (a Sudanese fermented camel's milk product). This is not surprising as strains of these genera of LAB are known

Table 2 pH changes in fermenting soy yoghurt premixes.

	Time of fermentation (hour)				
Sample	**0**	**4**	**8**	**12**	**Change in pH (ΔpH)**
A	6.65 ± 0.07 ab	6.73 ± 0.04 a	5.32 ± 0.03 c	4.80 ± 0.05 d	1.85
B	6.37 ± 0.02 a	5.70 ± 0.02 b	5.10 ± 0.04 c	5.07 ± 0.03 cd	1.30
C	6.33 ± 0.06 a	5.66 ± 0.04 b	5.64 ± 0.02 b	5.02 ± 0.02 c	1.31
D	6.78 ± 0.02 a	6.75 ± 0.01 a	5.46 ± 0.05 b	4.77 ± 0.02 c	2.01
E	6.41 ± 0.01 a	5.91 ± 0.06 b	5.30 ± 0.03 c	5.33 ± 0.02 c	1.08
F	6.52 ± 0.03 a	5.60 ± 0.04 b	5.70 ± 0.05 b	4.93 ± 0.01 c	1.59
G	6.77 ± 0.09 a	6.66 ± 0.02 a	5.70 ± 0.01 b	4.74 ± 0.04 c	2.03
H	6.32 ± 0.04 a	5.50 ± 0.04 b	5.10 ± 0.03 c	5.02 ± 0.03 cd	1.30
I	6.48 ± 0.02 a	5.60 ± 0.05 b	5.11 ± 0.02 c	5.11 ± 0.03 c	1.37
J	6.34 ± 0.04 a	6.20 ± 0.05 a	5.92 ± 0.04 b	5.44 ± 0.04 c	0.90
K	6.29 ± 0.05 a	6.11 ± 0.04 a	5.80 ± 0.02 b	5.41 ± 0.05 c	0.88
L	6.41 ± 0.02 a	5.90 ± 0.03 b	5.22 ± 0.01c	4.81 ± 0.01 d	1.60

Within row values with different letters are statistically significant ($P<0.05$)
Means were separated using Duncan's Multiple Range test.
A, B and C are yoghurt premixes containing 20% coconut milk, 5 g skimmed milk and fermented with commercial yoghurt starter, starter from soy milk and starter from cow milk respectively.
D, E and F are yoghurt premixes containing 10% coconut milk, 5 g skimmed milk and fermented with commercial yoghurt starter, starter from soy milk and starter from cow milk respectively.
G, H and I are yoghurt premixes containing 20% coconut milk and fermented with commercial yoghurt starter, starter from soy milk and starter from cow milk respectively.
J, K and L are yoghurt premixes containing 0% coconut milk and fermented with commercial yoghurt starter, starter from soy milk and starter from cow milk respectively.

Table 3 Nutritional composition of soy yoghurt samples.

Sample	*Acidity	Moisture	Protein NX6.25	Fat	Ash	Carbohydrate	Total Solid
A	0.58 ± 0.03 ab	86.91 ± 1.51 b	4.69 ± 0.45 a	0.11 ± 0.02 ef	0.58 ± 0.02 a	7.70 ± 0.30 a	13.09 ± 0.59 a
B	0.39 ± 0.05 d	88.24 ± 0.80 ab	4.63 ± 0.30 a	0.15 ± 0.03 e	0.59 ± 0.02 a	6.39 ± 0.12 b	11.76 ± 0.41 b
C	0.65 ± 0.01 a	88.42 ± 1.21 ab	4.06 ± 0.20 ab	0.11 ± 0.03 ef	0.54 ± 0.01b	6.88 ± 0.25 ab	11.58 ± 0.46 b
D	0.63 ± 0.08 a	87.22 ± 1.00 b	4.20 ± 0.32 a	0.37 ± 0.05 b	0.53 ± 0.03 b	7.69 ± 0.19 a	12.78 ± 0.40 a
E	0.48 ± 0.02 c	89.29 ± 0.75 a	3.75 ± 0.30 b	0.29 ± 0.03 c	0.49 ± 0.02 bc	6.18 ± 0.15 b	10.71 ± 0.30 c
F	0.73 ± 0.05 a	89.43 ± 0.90 a	3.93 ± 0.39 b	0.52 ± 0.04 a	0.51 ± 0.04 b	5.61 ± 0.20 c	10.57 ± 0.22 c
G	0.58 ± 0.05 ab	88.02 ± 1.22 ab	4.25 ± 0.40 a	0.13 ± 0.01 e	0.64 ± 0.02 a	7.06 ± 0.26 a	11.98 ± 0.30 b
H	0.35 ± 0.04 d	90.36 ± 1.00 a	3.63 ± 0.22 b	0.30 ± 0.02 c	0.47 ± 0.03 c	5.24 ± 0.13 c	9.64 ± 0.20 d
I	0.43 ± 0.03 c	88.53 ± 0.45 ab	4.52 ± 0.32 a	0.40 ± 0.04 b	0.53 ± 0.05 b	6.02 ± 0.21 b	11.47 ± 0.22 b
J	0.25 ± 0.02 f	91.10 ± 0.65 a	3.62 ± 0.33 b	0.13 ± 0.01 e	0.29 ± 0.03 e	4.86 ± 0.16 cd	8.90 ± 0.19 e
K	0.25 ± 0.05 f	91.58 ± 0.69 a	3.50 ± 0.40 bc	0.26 ± 0.03 cd	0.35 ± 0.04 d	4.30 ± 0.11 d	8.42 ± 0.33 e
L	0.33 ± 0.03 e	91.76 ± 0.11 a	3.13 ± 0.10 c	0.23 ± 0.02 d	0.26 ± 0.03 e	4.59 ± 0.13 d	8.24 ± 0.41 e

Means were separated using Duncan's Multiple Range test.
Within column values with different letters are statistically significant ($P<0.05$)
A, B and C are yoghurt premixes containing 20% coconut milk, 5 g skimmed milk and fermented with commercial yoghurt starter, starter from soy milk and starter from cow milk respectively.
D, E and F are yoghurt premixes containing 10% coconut milk, 5 g skimmed milk and fermented with commercial yoghurt starter, starter from soy milk and starter from cow milk respectively.
G, H and I are yoghurt premixes containing 20% coconut milk and fermented with commercial yoghurt starter, starter from soy milk and starter from cow milk respectively.
J, K and L are yoghurt premixes containing 0% coconut milk and fermented with commercial yoghurt starter, starter from soy milk and starter from cow milk respectively.

Table 4 Sensory evaluation of soy yoghurt samples.

Sample	Colour	Taste	Aroma	Consistency	Acceptability
A	5.20 ± 0.15 de	3.55 ± 0.35 h	4.55 ± 0.25 de	4.95 ± 0.30 cde	4.52 ± 0.22 d
B	5.55 ± 0.20 cde	3.65 ± 0.29 gh	4.30 ± 0.22 ef	4.60 ± 0.19 de	4.52 ± 0.19 d
C	6.85 ± 0.30 a	6.25 ± 0.20 ab	5.65 ± 0.18 bc	5.95 ± 0.11 bc	6.18 ± 0.12 b
D	6.55 ± 0.10 cd	6.25 ± 0.15 ab	6.15 ± 0.20 b	6.10 ± 0.09 ab	6.26 ± 0.19 ab
E	5.55 ± 0.12 cde	4.55 ± 0.20 f	5.10 ± 0.15 cd	5.65 ± 0.03 bc	5.21 ± 0.15 b
F	7.45 ± 0.14 a	6.85 ± 0.11 a	6.85 ± 0.19 a	6.55 ± 0.04 a	6.93 ± 0.09 a
G	6.40 ± 0.17 cd	6.20 ± 0.20 ab	6.15 ± 0.21 b	6.30 ± 0.22 ab	6.26 ± 0.08 ab
H	5.80 ± 0.23 d	4.80 ± 0.19 de	5.25 ± 0.23 bcd	5.90 ± 0.31 bc	5.44 ± 0.20 b
I	7.33 ± 0.11 ab	6.80 ± 0.30 a	7.05 ± 0.19 a	6.40 ± 0.22 a	6.88 ± 0.16 a
J	4.30 ± 0.09 f	4.70 ± 0.18 de	4.40 ± 0.18 def	4.20 ± 0.19 ef	4.40 ± 0.13 ef
K	5.00 ± 0.11 c	3.90 ± 0.25 g	4.50 ± 0.15 de	4.15 ± 0.10 ef	4.39 ± 0.21 ef
L	6.70 ± 0.21 bc	5.40 ± 0.30 c	5.15 ± 0.24 c	6.35 ± 0.20 ab	5.90 ± 0.31 c

Means were separated using Duncan's Multiple Range test.
Within column values with different letters are statistically significant ($P<0.05$).
A, B and C are yoghurt premixes containing 20% coconut milk, 5 g skimmed milk and fermented with commercial yoghurt starter, starter from soy milk and starter from cow milk respectively.
D, E and F are yoghurt premixes containing 10% coconut milk, 5 g skimmed milk and fermented with commercial yoghurt starter, starter from soy milk and starter from cow milk respectively.
G, H and I are yoghurt premixes containing 20% coconut milk and fermented with commercial yoghurt starter, starter from soy milk and starter from cow milk respectively.
J, K and L are yoghurt premixes containing 0% coconut milk and fermented with commercial yoghurt starter, starter from soy milk and starter from cow milk respectively.

to contaminate raw milk during milking from various sources such as the exterior of the udder, dairy utensils, dust, grass, cattle dung and feedstuffs (Sharpe 1981; Teuber and Geize 1981). Some strains of *Lactobacillus* reported in the present study are similar to those reported in many cultured African dairy products. For instance, Abdel Moneim (2001) and Sulma *et al.* (1991) reported on the occurrence of *L. fermentum* in Sudanese *robe* and *kisra* respectively. *L. plantarum* was found to be associated with fermented milk in Northern Tanzania and Cameroon (Jiwoua and Millier 1990; Isono *et al*. 2001).

The pH values of soy milk used in this study for yoghurt production is lower than 7.2 reported by Osundahunsi *et al*. (2007). However, the present values compare favourably with 6.6 obtained by Favaro *et al*. (2001). The pH reduction observed in the yoghurt sequel to 12 h fermentation depicted the ability of the starter cultures to effect lactic acid fermentation of the yoghurt premixes. However, the differences observed in the degree of pH decrease in the fermenting yoghurt premixes might be a reflection of the ability of the yoghurt bacteria to proliferate and mediate lactic acid fermentation of the premixes as opined by Tuitemwong and Tuitemwong (2003).

The effect of the addition of NFDM to the yoghurt premixes on the titratable acidity (as % lactic acid) developed in the soy yoghurt is obvious in the present study. Lee *et al.* (1990) had stated earlier that NFDM provides lactose as a substrate for yoghurt culture. The supposed increase in this fermentable sugar content of the yoghurt premixes that contain NFDM in the present study may have been responsible for the elevated level of acidity in the soy yoghurt samples obtained from such premixes. Data from the present study shows that acidity development in the yoghurt samples also depended on the chemical composition and the starter culture used in the fermentation process. In this sense, LAB obtained from cow milk developed highest acidity in the yoghurt premixes that contained a smaller quantity of coconut milk.

The proximate composition of soy yoghurts from the present study is similar to those reported by Favaro *et al.* (2001). The significant increase ($P<0.05$) in the crude protein and ash content of soy yoghurts obtained from the premixes that contained NFDM and coconut milk may not be particularly surprising. The observed increase in the contents of these proximate parameters may have been contributed by the added materials. Data from the present study depicts that soy yoghurt could be helpful in meeting a significant portion of the daily need of these nutrients. In this regards, soy yoghurt obtained from premixes that contained NFDM and coconut milk have had their value improved upon and it therefore appears to be more promising.

Studies have shown that consumers' acceptability of soy milk and its fermented product could be enhanced by premix formulation during the production process (Osundahunsi *et al*. 2007; Kolapo and Oladimeji 2008). The result of the sensory evaluation from this study has shown that soy yoghurt could become a more acceptable product to the 'Western palate' if an appropriate amount of coconut milk is added to the premix before fermentation. Ellen (2004) observed that commercial starters are sometimes not effective in soy yoghurt production. This observation is being tacitly supported by the present study as starter cultures obtained from cow milk proved to be more effective than commercial starter culture. In the past, the common practice was to classify cow milk-based yoghurt and soy milk-based yoghurt in the same group (Pinthong *et al*. 1980; Favaro *et al*. 2001). However, results from comparative sensory evaluation of the two yoghurts prompted some researchers to advocate that the two yoghurts are incomparable and should not be included in the same category because they are entirely different in major characteristics (Favaro *et al.* 2001; Tuitemwong and Tuitemwong 2003). Results of the present study also suggest that this perceived difference may also exist in the choice of the starter culture to be used in their production. Hence, a soy yoghurt producer needs to be careful in the choice of yoghurt starter rather than using any culture branded as commercial yoghurt starter.

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