EFFECT OF PARTIAL SUBSTITUTION OF COW MILK WITH BAMBARA GROUNDNUT MILK ON THE CHEMICAL COMPOSITION, ACCEPTABILITY AND SHELFLIFE OF YOGHURT

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Abstract
Chemical composition, acceptability and shelf-life of yoghurt produced from bambara groundnut and cow milk were studied. The yoghurt was produced from cow milk partially substituted with bambara groundnut milk in different ratios (0, 10, 20, 30 and 40%). Standard methods were used to determine the chemical, sensory and shelf life properties of the yoghurt samples. Sensory results showed that there was no significant difference ($p>0.05$) in the aroma and consistency while there was significant difference ($p<0.05$) in the taste, color and overall acceptability as influenced by varying proportions of added bambara groundnut milk. The pH and total titratable acidity was found between the range of 4.30 - 4.90 and 1.40 - 1.85 respectively. Microbial analysis carried out indicated that growth of micro-organisms in the yoghurt samples was almost constant from week 0 to week 3; a decrease was noticed on the fourth week thereby leading to deterioration of the yoghurt samples and reduction in the nutritional composition with storage. The study showed that yoghurt could be kept for three weeks with no appreciable decrease in nutritional composition. There was significant difference ($p<0.05$) in the protein composition and iron content with increase in added bambara groundnut milk. This work showed the potential of bambara groundnut as an alternative source of milk in yoghurt making with improved nutritional values and consumer acceptability.

Keywords: Bambara groundnut, cow milk, yogurt, protein, iron, shelf life.

Received: 16.10.2016 Received in revised form: 28.02.2017 Accepted: 03.03.2017

1. INTRODUCTION

Yoghurt is a fermented food made from fresh, whole or skimmed milk which is carried out by the action of bacterial starter cultures (Falade et al., 2014). As a result of its nutritional properties, it is traditionally consumed as a healthy food (Muniandy et al., 2016). Consistent consumption of yoghurt with live cultures is said to be effective in reducing serum cholesterol levels, lactose digestion in case of lactose intolerance, bowel syndromes, gut infections and inflammation, diarrhea and colon cancer (Muniandy et al., 2016). Yoghurt is a rich source of bioactive peptides which are formed during fermentation and it has been reported to contain antioxidant activity. For instance, Farvin et al. (2010) reported that the high oxidative stability of yogurt is associated with antioxidant peptides released during the fermentation of milk by lactic acid bacteria.

Streptococcus salivarus subsp. *thermophilus and Lactobacillus delbrueckii* subsp. *bulgaricus* are the major predominant cultures associated with the milk fermentation into yoghurt (Cavallini and Rossi, 2009, Falade et al., 2014). The scarcity of milk supply in developing countries has led to continuous search for development of alternative milk sources from vegetable sources. In addition, in cases of milk allergies or as vegetarian nutrition, vegetable milks could be used. Among the sources of vegetable milk, soybean has gained a considerable research attention, and more research is still being done to improve the quality of soymilk and soy-yoghurt (Cavallini and Rossi, 2009, Onuorah et al., 2007, Osundahunsi et al., 2007). Brough et al. (1993), reported that milk prepared from bambara groundnut gave preferred flavor compared to the milks from cowpea, pigeon pea and soybean. However, much attention has not been given to this underutilized crop.

Bambara groundnut is a neglected legume of Africa Origin, it is the third most important after groundnut (*Arachis hypogeal*) and cowpea (*Vigna unguiculata*) in Africa (Arise et al., 2015, Arise et al., 2016). The seed contains

about 49-63.5% carbohydrate, 15-27% protein, 4.5-7.4% fat, 5.2- 6.4% fibre and 3.2-4.4% ash (Arise et al., 2015, Hillocks et al., 2012, Murevanhema and Jideani, 2013). Bambara groundnut is a good source of fiber, calcium, iron, potassium and is unusually high in methionine, an essential sulphur-containing amino acid. In addition to bambara nutritional benefits, bambara also contain some medicinal benefits for instance, the Lio tribe in Kenya use water from boiled bambara seeds to cure diarrhea (Adegbola and Bamishaiye, 2011). Bambara leaves are applied to abscesses and infected wounds and sap from bambara leaves is applied to the eye to treat epilepsy. Bambara roots are sometimes taken as an aphrodisiac and pulverized bambara seeds are mixed with water and used to treat cataracts in Senegal. The Igbos in Nigeria uses the plant to treat venereal diseases (Hillocks et al., 2012). Chewing and swallowing of raw seeds is being used to curb nausea and vomiting in South African pregnant women (Jideani and Diedericks, 2014). Furthermore, bambara is tolerant to drought and poor soil, adaptable to hot temperatures and low rainfall with good resistance to pests and diseases (Thammarat et al., 2015). Despite its drought tolerant ability and nutritional potential, bambara is underutilized (Yao et al., 2015). For instance, relatively little research attention has been given to production of yoghurt from bambara groundnut milk. Therefore, this study is aimed at investigating effect of partial substitution of cow milk with bambara groundnut milk on the chemical composition, acceptability and shelf life of yoghurt.

2. MATERIAL AND METHODS

Materials

Fresh cow milk was obtained from University of Ilorin farm while bambara groundnut, flavor, sugar and starter culture were gotten from a local market in Ilorin, Kwara State. Other materials and reagents used for all analysis were obtained from the food processing laboratory in the Department of Home Economics and Food Science, University of Ilorin and were all of analytical grade.

Methods

Preparation of Bambara-nut milk

The method described by Murevanhema and Jideani (2014) for the production of milk substitute was used for the production of bambara milk with some modifications. Briefly, the seeds of bambara groundnut was manually sorted, cleaned with portable water and soaked in water for 24 h, while water used in soaking was changed at every 6 h interval during the soaking duration. The seed coat of the seed was de-hulled after 24 h of soaking by rubbing the seed with the palm and the husks sieved out of the water and subsequently wet milled. Muslin cloth was used in the extraction of milk from the bambara groundnut mash and triple filtered and stored in a sterile white container for further use.

Procedure for yoghurt production

The method used by Dirar (1993), with slight modification. The milk (fresh cow milk) was pasteurized at 85°C for 30 min. The pasteurized milk was cooled down to 40 - 45°C. The bambara milk was also pasteurized at same temperature and also cooled to the same temperature as the cow milk. Yogurt samples were made from cow milk with added bambara groundnut milk in different proportions ranging from 10:90; 15:85; 20:80; 30:70; and 40:60 (Table 1). The hundred percent (100%) of cow milk was used as control sample. Cow milk and bambara milk were homogenized using blender, 1% sugar and powdered milk flavor were also added. The homogenized cow and bambara milks were inoculated with commercial starter (pure culture of mixed strain of *Lactobacillus bulgaricus* and *Streptococcus thermophillus*; 0.5 g of the culture was used to inoculate 1000 ml of milk to initiate fermentation). The inoculated milks were incubated at 38 ^{o}C for 10 h, after which the desired custard consistency was reached (Falade et al., 2014).

Table 1: Recipe mix for cow milk-bambara yoghurt

Materials	Sample cmy1	Sample bmy1	Sample bmy2	Sample bmy3	Sample bmy4
COW MILK	100 ml	90 ml	80 ml	70 ml	60 ml
BAMBARA GROUNDNUT MILK	----	10 ml	20 ml	30 ml	40 ml
STARTER CULTURE	2 g	2 g	2 g	2 g	2 g
SUGAR	10 g	10 g	10 g	10 g	10 g
FLAVOR	5 g	5 g	5 g	5 g	5 g

Table 2: Moisture composition of yoghurt samples (%)

Sample	Wk0	Wk1	Wk2	Wk3	Wk4
CMY1	89.30^{d}±0.11	89.22^{ab}±0.05	89.99^{c}±0.01	90.03^{c}±0.01	90.02^{c}±0.05
BMY1	88.42^{ab}±0.01	88.72^{a}±0.02	88.9^{a}±0.01	89.01^{a}±0.005	89.09^{a}±0.01
BMY2	88.72^{bc}±0.02	88.8^{ab}±0.01	88.91^{a}±0.01	89.1^{b}±0.005	89.23^{b}±0.02
BMY3	88.78^{c}±0.03	88.91^{ab}±0.01	89.01^{b}±0.01	89.09^{b}±0.01	89.24^{b}±0.01
BMY4	88.27^{a}±0.01	88.46^{a}±0.02	89.05^{b}±0.01	89.12^{b}±0.02	89.09^{c}±0.01

CMY1, (100% cow milk); BMY1 (Bambara milk yogurt, 90 cow milk: 10 Bambara milk); BMY2 (Bambara milk yogurt, 80 cow milk: 20 Bambara milk); BMY3 (Bambara milk yogurt, 70 cow milk: 30 Bambara milk); BMY4 (Bambara milk yogurt, 60 cow milk: 40 Bambara milk. Wk0 week of production, Wk1 first week after production, Wk2 second week after production, Wk3 third week after production and Wk 4 fourth week after production

The yoghurt was filled into sterile plastic bottles, corked and stored in refrigerator for subsequent analysis The samples were monitored for sensory attributes pH, titratable acidity, microbial load and proximate composition once every week for 4 weeks.

Chemical analysis

Moisture, fat and ash content were determined using AOAC methods (AOAC, 2000). The protein content was determined by Kjeldahl method (N×6.25). Total carbohydrate was calculated by difference as expressed below.

Carbohydrate = 100 – (Moisture + Ash + Fat + Protein)

pH Determination

AOAC (2000) method was used with some modifications. Briefly, Fifty milliliters (50 mL) of each samples was measured in a beaker. The pH of the samples was determined using pH meter (Model 3520, Bibby Scientific Limited Dumow Essex, UK). The pH meter was calibrated with pH 4.0 and pH 7.0 buffer solutions before the measurement

Total titratable acidity (TTA)

A portion of yoghurt was measured into a 250 mL conical flask and four drops of phenolphthalein indicator was added. This was titrated with the standard 0.1N NaOH to distinct pink point. The total titratable acidity was expressed as lactic acid percent (g/100ml) as described by Agarry et al. (2010).

Sensory Evaluation

A panel of twenty untrained judges was drawn from the University community to assess yoghurt samples. White bulbs were fitted in the sensory room to detect the genuine colour of the sample. The samples were assessed for aroma, taste, colour, texture and overall acceptability. The panelists were instructed to sip water before and after assessing each product. The panelists were in good health and are familiar with the taste, flavour and other attributes of yogurt. The evaluation started around 1 p.m. The samples were assessed using 9 point hedonic scale ranging between 9 (likely extremely) to 1 (dislike extremely). Like

extremely 9; like very much 8; like moderately 7; like slightly 6; neither like nor dislike 5; dislike slightly 4; dislike moderately 3; dislike very much 2; dislike extremely 1.

Microbial analysis

Microbial analysis was carried out using the method of Fawole and Oso (2004) with some modifications. Briefly, 1 ml of each sample was pipetted aseptically into 9 ml of sterile distilled water in a test tube and shaken properly a 10^{-1} dilution. 1 ml was pipetted from the dilution 10^{-1} into another test tube containing 9 ml of sterile distilled water to make a dilution of 10^{-2}. This was repeated until a 10^{-5} dilution was achieved. 1ml each of 10^{-4} and 10^{-5} of the different samples were dispensed into sterile petri dishes using sterile pipettes. The pour plate method was used for the microbial enumeration. Cooled molten sterile nutrient agar was added to cover the mixture in the petri dishes and swirled. The plates were left for some minutes to solidify and later incubated at 37^{o}C for 24 hours. Colonies were counted after incubation using a colony counter.

Statistical analysis

All experiment were conducted in triplicates and subjected to analysis of variance using statistical package for social science (SPSS).

3. RESULTS AND DISCUSSION

The proximate composition of yoghurt produced with added bambara milk showed significant difference ($p<0.05$) in all the parameters evaluated. This significant difference observed may be associated with the addition of bambara milk at varying proportions with cow milk for yoghurt making. The moisture content (Table 2) was highest (89.30%) in control sample (100% cow milk yoghurt) followed by 88.78% of yoghurt with 30% added bambara milk. The significant effect of addition of bambara groundnut milk on moisture content of yoghurt showed effect from 10% bambara groundnut milk substitution and declined to 88.27% moisture of sample with 40% addition of bambara groundnut milk. This result showed the effects of increasing addition of bambara milk on the moisture content of yoghurt, and there was slight increase in moisture content with storage, the moisture content showed significance difference($p<0.05$) at the end of 4wks storage time. The slight decrease in moisture content of the yoghurt when cow milk is substituted with bambara milk is an added advantage in increasing the yoghurt shelf life. This is because the higher the moisture content the more susceptible the yoghurt is to attack by spoilage microorganisms.

The trends observed on protein content of yoghurt (Table 3) showed increment as affected by increasing proportions of bambara milk. The protein content of the yoghurt sample was significantly different ($p<0.05$) from yoghurt samples with addition of bambara groundnut milk (10-40%) and the control whose protein increase from (3.61-4.38%) respectively. The study showed that protein content of yoghurt blends increased as percentage bambara milk increased. The protein values discovered in this study were higher than 3.8% reported by Egan et al. (1981) which shows that bambara milk increased the protein content of the sample. The yoghurt sample with 40% bambara groundnut milk showed the highest (4.38%) protein while the control sample of 100% cow milk was the least (3.61%).

Table 3: Crude protein composition of yoghurt sample (%)

Sample	Wk0	Wk1	Wk2	Wk3	Wk4
CMY1	3.61^{a}±0.01	3.59^{a}±0.01	3.59^{a}±0.01	3.56^{a}±0.02	3.54^{a}±0.02
BMY1	3.87^{b}±0.01	3.85^{ab}±0.01	3.8^{b}±0.01	3.85^{a}±0.01	3.81^{b}±0.01
BMY2	3.97^{c}±0.02	3.95^{ab}±0.02	3.98^{c}±0.03	3.94^{b}±0.01	3.91^{c}±0.01
BMY3	4.17^{d}±0.01	4.15^{ab}±0.01	4.12^{d}±0.02	4.09^{d}±0.01	4.07^{d}±0.02
BMY4	4.38^{e}±0.01	4.34^{b}±0.01	4.31^{e}±0.01	4.27^{c}±0.01	4.15^{e}±0.01

CMY1, (100% cow milk); BMY1 (Bambara milk yogurt, 90 cow milk: 10 Bambara milk); BMY2 (Bambara milk yogurt, 80 cow milk: 20 Bambara milk); BMY3 (Bambara milk yogurt, 70 cow milk: 30 Bambara milk); BMY4 (Bambara milk yogurt, 60 cow milk: 40 Bambara milk

Table 4: Crude fat composition of yoghurt samples (%)

Samples	Wk0	Wk1	Wk2	Wk3	Wk4
CMY1	2.60^{c}±0.01	2.59^{c}±0.01	2.60^{c}±0.02	2.61^{c}±0.01	2.62^{a}±0.02
BMY1	2.32^{c}±0.02	2.30^{d}±0.01	2.29^{b}±0.02	2.31^{b}±0.01	2.3^{b}±0.01
BMY2	2.29^{bc}±0.02	2.28^{c}±0.01	2.25^{b}±0.02	2.2^{a}±0.01	2.18^{a}±0.02
BMY3	2.27^{ab}±0.01	2.23^{b}±0.01	2.2^{a}±0.02	2.20^{a}±0.01	2.19^{a}±0.01
BMY4	2.17^{a}±0.01	2.16^{a}±0.01	2.18^{a}±0.02	2.15^{a}±0.01	2.16^{a}±0.02

CMY1, (100% cow milk); BMY1 (Bambara milk yogurt, 90 cow milk: 10 Bambara milk); BMY2 (Bambara milk yogurt, 80 cow milk: 20 Bambara milk); BMY3 (Bambara milk yogurt, 70 cow milk: 30 Bambara milk); BMY4 (Bambara milk yogurt, 60 cow milk: 40 Bambara milk

Table 5: Ash composition of yoghurt samples (%)

Samples	Wk0	Wk1	Wk2	Wk3	Wk4
CMY1	0.55a±0.02	0.58a±0.01	0.57a±0.01	0.54a±0.02	0.55a±0.02
BMY1	0.61^{a}±0.01	0.60^{a}±0.01	0.59^{a}±0.02	0.58^{a}±0.01	0.55^{a}±0.02
BMY2	0.70^{b}±0.01	0.70^{b}±0.01	0.73^{a}±0.03	0.71^{b}±0.01	0.68^{c}±0.01
BMY3	0.80^{c}±0.01	0.80^{c}±0.01	0.81^{bc}±0.02	0.80^{c}±0.01	0.75^{a}±0.01
BMY4	1.00^{d}±0.01	1.00^{d}±0.01	0.94^{c}±0.01	0.97^{d}±0.01	0.96^{c}±0.01

CMY1, (100% cow milk); BMY1 (Bambara milk yogurt, 90 cow milk: 10 Bambara milk); BMY2 (Bambara milk yogurt, 80 cow milk: 20 Bambara milk); BMY3 (Bambara milk yogurt, 70 cow milk: 30 Bambara milk); BMY4 (Bambara milk yogurt, 60 cow milk: 40 Bambara milk

These results showed that the addition of bambara groundnut milk from 10% proportion will significantly ($p<0.05$) increase the protein content of the yoghurt. There was slight decrease in protein content with storage with sample with ratio 60:40 which has the highest protein composition ranging from 4.38% in week zero - 4.15% in week four.

On the contrary, the trend observed in fat content of yoghurt samples (Table 4) was found differed from that of protein, the control sample had the highest (2.90%) fat content. Yoghurt samples with added bambara groundnut milk (10-40%) declined in fat contents from 2.32-2.17% respectively. However, this variation was found significant ($p<0.05$) and the result may be associated partly to the varying proportions of bambara groundnut milk used in the production and partly due to the level and nature of fat in bambara groundnut used.

Bambara groundnut is a non-oily legume as such has low fat content (Hillocks et al., 2012, Arise et al., 2015). Similar results were observed in fermented ground nut milk (Sunny-Roberts et al., 2004). In addition, the homogenization step in this study may have also influenced the fat content of the yoghurt samples (Tamime et al., 2005). Reduction in fat content may be beneficial as it contributes to the keeping quality of yoghurt, since the chances of rancidity would be greatly reduced (Sunny-Roberts et al., 2004).

The ash content of yoghurt samples varied significantly ($p<0.05$) and increased among the yoghurt samples with increasing proportion of addition of bambara groundnut milk (Table 5). The control sample had 0.55% the least, while yoghurt with added bambara groundnut milk increased from 0.61-1% of ash content (10% and 40% proportions of added bambara groundnut milk respectively) this may be due to high ash content in bambara groundnut than cow milk. The investigation on proximate composition in this study has showed the potential influence of added bambara groundnut milk as cheap source in improving the nutritional value of yoghurt. The ash content in foodstuffs is a measure of mineral element in food. This is in agreement with the finding that high amount of ash contained in plants, is an indication that the plant provides appreciable quantity of minerals essentially required by the body (Tounkara et al., 2014).

The effects of storage period on pH and titratable acidity of yoghurts samples are shown in Fig. 1a and b. pH of the samples decreased with storage time while the titratable acidity (TTA) of the samples increased with storage time. pH was highest (4.9) in control sample (100% raw cow milk) and yoghurt with 40% bambara groundnut milk as the lowest pH (4.6).

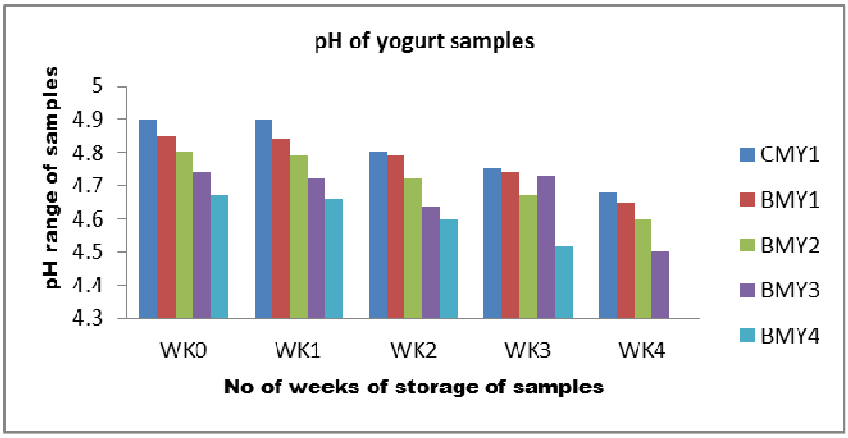

Fig. 1a. Effect of storage period on ph of the yoghurt samples

CMY1, (100% cow milk); BMY1 (Bambara milk yogurt, 90 cow milk: 10 Bambara milk); BMY2 (Bambara milk yogurt, 80 cow milk: 20 Bambara milk); BMY3 (Bambara milk yogurt, 70 cow milk: 30 Bambara milk); BMY4 (Bambara milk yogurt, 60 cow milk: 40 Bambara milk

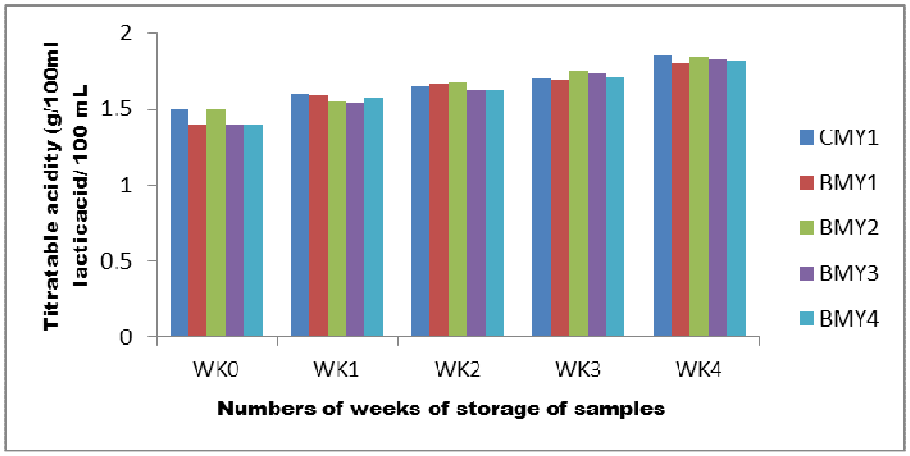

Fig. 1b. Effect of storage period on the titratable acidity of the yoghurt samples

CMY1, (100% cow milk); BMY1 (Bambara milk yogurt, 90 cow milk: 10 Bambara milk); BMY2 (Bambara milk yogurt, 80 cow milk: 20 Bambara milk); BMY3 (Bambara milk yogurt, 70 cow milk: 30 Bambara milk); BMY4 (Bambara milk yogurt, 60 cow milk: 40 Bambara milk

The significant effect of added bambara groundnut milk on pH of yoghurt showed effect from 10% bambara groundnut milk substitution and declined to 4.8 pH sample with 40% added bambara groundnut milk. There was decrease in pH of all yoghurt samples with storage. The pH of the yoghurt stored by refrigeration at 4^{o}C was within 4.3 to 4.8, these values were within the pH of yoghurt as documented by Tamime et al. (2005). The decreased pH and simultaneous increased titratable acidity of the yoghurts sample during the storage period could be attributed to the starter culture's activity, such as post acidification due to formation of lactic acid or growth of the bacteria used during fermentation (Osundahunsi et al., 2007). There was no significant difference in the color, aroma and consistency ($p>0.05$) of all the yoghurt samples (Table 6), but there was significant difference in the taste and overall acceptability of the yoghurt samples ($p<0.05$) with sample BMY2 which has a blend of 80:20 as the most acceptable yoghurt sample.

There were changes in the sensory characteristics of the yoghurt samples with storage time and this is caused by continuous activity of microorganisms in yoghurt hence affecting the viscosity of the yoghurt samples. There were also changes in the taste of the samples with increasing storage time, it was also noticed that the product started becoming slimy in the fourth week which makes it un-palatable for consumption at the fourth week. Time of storage has effects on the lightness of bambara groundnut yoghurt.

Table 6: Sensory analysis of bambara yoghurt

Sample	Aroma	Taste	Consistency	Color	Overall acceptability
CMY1	6.30^{a}	5.55^{ab}	6.60^{a}	6.85^{ab}	6.10^{ab}
BMY1	6.40^{a}	6.20^{bc}	6.15^{a}	6.65^{ab}	6.10^{ab}
BMY2	6.90^{a}	7.15^{c}	6.75^{a}	7.10^{b}	7.35^{a}
BMY3	6.00^{a}	5.50^{ab}	5.35^{a}	5.85^{a}	5.95^{a}
BMY4	5.95^{a}	4.95^{a}	5.90^{a}	7.10^{b}	5.5^{a}

CMY1, (100% cow milk); BMY1 (Bambara milk yogurt, 90 cow milk: 10 Bambara milk); BMY2 (Bambara milk yogurt, 80 cow milk: 20 Bambara milk); BMY3 (Bambara milk yogurt, 70 cow milk: 30 Bambara milk); BMY4 (Bambara milk yogurt, 60 cow milk: 40 Bambara milk

Table 7: Total bacterial count (cfu/g)

Sample	WK0	Wk1	Wk2	Wk3	Wk4
CMY1	4.1×10^{5}	4.1×10^{5}	4.0×10^{5}	4.0×10^{5}	3.5×10^{5}
BMY1	4.2×10^{5}	4.2×10^{5}	4.2×10^{5}	4.2×10^{5}	3.4×10^{5}
BMY2	4.1×10^{5}	4.1×10^{5}	4.2×10^{5}	4.2×10^{5}	3.5×10^{5}
BMY3	4.1×10^{5}	4.1×10^{5}	4.1×10^{5}	4.2×10^{5}	3.5×10^{5}
BMY4	4.2×10^{5}	4.2×10^{5}	4.1×10^{5}	4.1×10^{5}	3.6×10^{5}
BMY4	1.5×10^{5}	2.0×10^{5}	2.6×10^{5}	4.3×10^{5}	6.0×10^{5}

CMY1, (100% cow milk); BMY1 (Bambara milk yogurt, 90 cow milk: 10 Bambara milk); BMY2 (Bambara milk yogurt, 80 cow milk: 20 Bambara milk); BMY3 (Bambara milk yogurt, 70 cow milk: 30 Bambara milk); BMY4 (Bambara milk yogurt, 60 cow milk: 40 Bambara milk

The result of the microbial analysis of the yoghurt samples is presented in Table 7. The bacterial count was stable from week 0 to week 3, after which a decrease was observed in the bacterial population on the fourth week. This trend is expected since the samples were kept in the refrigerator where multiplication of the organisms was inhibited. On the fourth week however, a decline phase of growth had set in, which resulted in a decrease in the population of the organisms. Deterioration may have probably set in. Similar trend was also reported by Falade *et al* (2014) in the production of yoghurt from bambara groundnut and soybean. The possibility of spoilage and pathogenic organisms in the yoghurt samples is not likely because starter cultures are known to produce organic acids and other metabolites (such as bacteriocins) that act against spoilage and pathogenic organisms during fermentation (Jayeola et al., 2010).

4. CONCLUSIONS

The aim of this study was to check the effect of partial substitution of cow milk with bambara groundnut milk on the nutritional properties of yogurt and to determine consumer acceptability of the yogurt samples and the storage life of the yogurt. It was observed that bambara groundnut milk increased the nutritional properties of yoghurt and the findings showed bambara groundnut as a rich source of protein and iron supplement and this makes it suitable for consumption by both adults and infants. Yoghurt partially substituted with bambara groundnut is accepted by consumer, it is interesting to find out that BMY2 (ratio 80:20 is more acceptable than the yoghurt from cow milk. Yogurt should not be stored for more than three weeks as spoilage begins after 3 weeks of storage.

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