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Short Communication

Promotion of coconut in the production of yoghurt

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Yoghurt was produced from milk obtained from coconut milk and skimmed cow milk, by fermentation using starter cultures. The results obtained show that the pH of the various products ranged from 4.2 - 4.4. The acceptability of the yoghurt produced was investigated in a sensory evaluation study. The sensory evaluation study of the samples indicated that yogurt produced from skimmed cow milk did not differ from those produced from coconut and cow milk composites in all sensory quality attributes. Thus coconut milk can be used with cow milk to produce acceptable and affordable yoghurt since coconut milk is cheaper. The results also showed that middle aged coconut (7 - 8 months old) could be used for the production of acceptable yoghurt.

Key words: Sensory evaluation, starter culture, coconut, substrate.

INTRODUCTION

Yoghurt is a fermented product obtained through an anaerobic fermentation of lactose in milk by relevant micro-organisms most of which are classified as pro-biotic (Tull, 1996). Most Ghanaians regularly take yoghurt either as a dessert, snack or as a pro-biotic food drink to aid digestion and to re-establish a balance within the intestinal micro-flora. The most popular yoghurts known on the Ghanaian market are those obtained from cow milk (Sackey-Addaquay, 2008).

The substrate that is usually employed in this type of yoghurt is evaporated whole milk/skimmed solids or fresh milk from cow. Although this substrate produces good quality yoghurt, there are certain limitations that make it difficult for the ordinary Ghanaian middle income earner to patronize. This is because the substrate is relatively expensive compared with other possible substrates which have the potential 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 the confinement to only animal base yoghurt. It is therefore of great importance to find out the feasibility of using the coconut milk as substrate for yoghurt production as are used in other experimental substrates such as, soy bean milk and tiger nuts milk (Belewu and Belewu, 2007). Yoghurt obtained by using coconut milk has been found to be delicious and a nutritional product (Imele and Atemnkeng, 2001). Belewu et al. (2005) have also documented the combination of soymilk (50%) and coconut milk (50%) in the preparation of soy-coconut yoghurt.

Coconut (*Cocos nucifera*) milk is being used by confectionaries, bakeries, biscuits and ice cream Industries worldwide to enhance flavor and taste of various products (Persley, 1992). Coconut milk was found to be rich in calcium. The milk was reported to be high in minerals and vitamin content (Nieuwentus and Nieuwelink, 2002) while total saturated fat was 10% of the total energy (Thai Food Composition, 2004).

In the light of the above, this research was taken to promote the use of coconut in the production of yoghurt. This is done by producing yoghurt from coconut milk extract, cow milk and their composites. Sensory evaluation is conducted on the various yoghurts produced and the results analyzed using the statistical package for social sciences (SPSS) version II for windows.

MATERIALS AND METHODS

Extraction and preparation of coconut milk

The fresh middle aged coconut (7 - 8 months old) used in this work was purchased from the local market. The coconut was crushed open and the juice poured and stored in a refrigerator. 2 kg of coconut flesh was then removed from the shell, grated and homogenized in a blender together with the coconut juice for 2 min. It was then passed through a fine sieve twice, with the volume adjusted to 1.5 l and stored in a bottle in a refrigerator.

The extracted coconut milk was transferred into a pot and pasteurized or heated at 90°C for 30 min and allowed to cool gradually to a temperature of 43°C. It was kept at this temperature for 12 h before it was finally cooled to room temperature of about 27°C.

Table 1. The physico-chemical properties of yoghurts.

Sample	Fat	Relative density	pH
A	1.4	1.017	4.20
B	1.4	1.021	4.22
C	1.8	1.026	4.27
D	2.0	1.034	4.40

Reparation of cow milk

Half kg of skimmed milk powder was weighed into a measuring cylinder. 1.5 l of warm water was added to the skimmed milk and thoroughly stirred to give a homogenous mixture. The mixture was heated to 90°C and held at this temperature for 30 min and cooled to a temperature of 43°C for 4 h and then allowed to cool to room temperature of about 27°C.

Preparation of yoghurts

The yoghurt was produced from the mixture of cow milk and coconut milk. The different mixtures were composed according to the following % presented below:

Sample A: 100% cow milk
Sample B: 75% cow milk and 25% coconut milk
Sample C: 50% cow milk and 50% coconut milk
Sample D: 100% coconut milk

The mixtures were incubated with a starter culture, stirred properly and kept at a temperature of 43°C for 5 h. 0.02 kg of Adamly starch and 0.01 kg of Recodan FS were added to the samples. These act as stabilizers and emulsifiers to add up to the nutritional value of the main ingredients and also to bind all the ingredients together without any separation. 0.45 kg of sugar was added to the mixture to sweeten and the samples were stored at a temperature between 1°C and 6°C.

Determination of pH

A Hanna HI-98128 stick pH meter was used to determine the pH of the yoghurts produced. The pH meter was switched on and allowed to warm up for about 15 min. The pH meter was adjusted to neutral value by using distilled water at ambient temperature. The electrodes of the meter were cleaned, dried and dipped into the different samples and the reading was noted.

Determination of fat

A 5 g sample of yoghurt was weighed with 0.01 g accuracy into a Cowbell Milky butyrometer (0 - 6%). 16 ml of sulphuric acid (H_2SO_4) and 1 ml of isoamyl alcohol were added. The butyrometer was capped tightly and turned up and down repeatedly, to have a homogeneous mixture and to have the proteins dissolved entirely. The butyrometer then was immersed in a 65 ± 2°C water bath for 5 min. Following heating, the butyrometer was centrifuged for 5 min at 1000 rpm. After removing from the centrifuge, the lower level of the fat column in the butyrometer was set at the start point of the scale by means of the cap. The reading was taken by the lower meniscus of the scale.

Determination of relative density (specific gravity)

With the aid of a lactometer (Zeal Type), the specific gravity (or relative density) of the yoghurts prepared was measured. A lactometer works on the principle of specific gravity of milk. The instrument was washed in distilled water and put in some amount of the yoghurt in a test tube, with the bulb of the meter dipped in the yoghurt. The meter sank until it floated. The level to which the meter sank in the yoghurt was read.

Sensory evaluation

Untrained panel of 40 made up of staff members of the maintenance department and 20 members of the catering department of the Ankaful Psychiatric Hospital were selected. They ranked some sensory attributes, such as appearance, mouth feel, sourness, consistency, general acceptance and aroma of the samples using the hedonic descriptive scale 1 - 5. The identities of the samples were concealed.

RESULTS AND DISCUSSION

Physico-chemical properties

The pH of the yoghurt produced ranged from 4.2 to 4.4 which agrees quite well with the results of other workers (Akpan et al., 2007). The fat content ranged between 1.4 to 2.0% which is in agreement with the results obtained by Imele and Atemnkeng (2001). The relative density of the yoghurt samples was found to range between 1.017 to 1.034, with the skimmed cow milk yoghurt having the least and the pure coconut yoghurt having the maximum. This indicated that the skimmed cow milk yoghurt contained more water than the pure coconut yoghurt. The physico-chemical properties of the yoghurts are given in Table 1.

Table 2 gives the score of comparative sensory evaluation of the coconut-cow milk yoghurt.

Appearance

The appearance is the look and texture of the yoghurt as it is poured into a glass. The yoghurt was poured into a glass without labels for the panel to see and comment on. The panelists accepted the appearance of all the samples as good. There was insignificant difference between the mean of the values of the samples. Sample C produced a clean natural colour with a smooth velvety appearance which agrees with acceptable standard described by Tull (1996).

Sourness

Sourness of yoghurt is derived from the various acids present in the yoghurt during fermentation. The panelists gave their comments based on the tartness they felt in their mouth after tasting the yoghurt. The analysis of the sourness revealed that samples A and D were very good. The composite samples (B and C) relatively had lower sourness.

Consistency

The panelists assessed the consistency of the stirred yoghurt. The stirred yoghurt should neither be watery nor

Table 2. Percentage score on comparative sensory evaluation of the coconut-cowmilk yoghurt.

Sample	Sensory qualities					
	Appearance	Sourness	Consistency	Aroma	Mouth feel	Overall acceptance
A	100	95	100	100	98	98
B	100	90	98	97	96	94
C	100	85	100	98	95	92
D	100	95	97	98	98	95

too thick. The panelists found the consistency of the samples was almost the same, with samples A and C being slightly preferred. The mean of the values showed no significant difference.

Aroma

The aroma of yoghurt is important to consumers. The panelists were asked to compare the aroma of the 4 yoghurt samples. The panelists accepted the aroma of all the samples with a slight preference for sample A.

Mouth feel

The panelists commented on the mouth feel of the four samples. 98% of the panelists accepted the mouth feel of samples A and B better than samples B and C. However, the difference between the samples was insignificant.

Overall acceptance

The panelists tasted and rated the samples on the 5 point hedonic scale on their degree of liking for the 4 samples of yoghurt presented. The overall acceptance was determined by the assessment of appearance, sourness, consistency, aroma and mouth feel.

98% of the panelists accepted sample A while 95% of them accepted sample D. Sample B was also preferred to sample C. Thus there seem to be a slight preference for the pure cow milk yoghurt and the pure coconut yoghurt.

This study has shown that yoghurt produced from skimmed cow milk did not differ organoleptically from those produced from coconut and cow milk composites and pure coconut milk in all the sensory quality attributes. The results of this work agree quite well with the results of Akoma et al. (2000).

Conclusion

Yogurt was produced from milk obtained from coconut milk and skimmed cow milk, by fermentation using starter cultures. The results obtained show that the pH of the various products ranged from 4.2 - 4.4. Also the measurement of the relative density of the yoghurts indicates that the skimmed cow milk yoghurt contained more water than the pure coconut yoghurt. The sensory evaluation study of the samples indicated that yogurt produced from skimmed cow milk did not differ from those produced from coconut and cow milk composites in all sensory quality attributes. Thus coconut milk can be used with cow milk to produce acceptable and affordable yoghurt since coconut milk is cheaper.

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