QUALITY EVALUATION OF YOGHURT FROM PEANUT MILK

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ABSTRACT

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Peanut milk is white with a "nutty" odor. Other physico-chemical properties include a pH of 6.53, viscosity of 10 cps, 7% TSS, 1.57% TTA, 5.52% protein, 16.42% fat and 72.4% moisture.

Substituting commercial milk with peanut milk does not significantly alter the sensory qualities of yoghurt. Sensory qualities of peanut yoghurt can be improved with the incorporation of mango flavor. Flavored peanut yoghurt contains 4.42% protein, 10.6% fat and 81.19% moisture. It has a pH of 4.12, viscosity of 200 cps, 18% TSS and 12.21% TTA. Out of 74 consumers, 41.89% liked the developed product from peanut milk.

KEY WORDS: Cow's milk. Fermentation. Incubation. Peanut milk. Yoghurt.

INTRODUCTION

Yoghurt is a snow-white, custard-like cultured milk produced by fermenting a slightly concentrated whole milk with a mixed bacterial culture consisting of *Lactobacillus bulgaricus* and *Streptococcus thermophilus* added with non-fat dry milk (Lee et al., 1990). It is becoming popular to both young and old. Aside from its unique taste and flavor, its potential to prevent cancer is an important health benefit. The increased demand of yoghurt thus requires increased production.

However, availability of cow's milk is a problem to local dairy processing industries. Importation of dairy products in 1982 amounting

to US $109.5 M was done to alleviate the limited supply of dairy products. The dairy farm in Abuyog, for example, which is the main source of cow's milk in Leyte, Philippines, was closed in favor of the calves. Situations like this prompt food researchers to look into the possibility of utilizing other sources in the manufacture of dairy products.

Plants are possible sources considered in the production of dairy products. *Philsoy,* a beverage from soybean milk, is very popular in some parts of Luzon. Soymilk incorporated in some commercial powdered milk is already acceptable among consumers. Likewise, "taho", a curdled soymilk, is very popular throughout the country.

In this study, peanut milk was used in the production of yoghurt considering that its composition is similar to cow's milk and soybean. In Region 8, a large supply of peanut is available throughout the year making it cheaper than soybeans. As of the moment, peanut is used more in the manufacture of confectioneries and other delicacies. Not much work has been done to use peanut milk in the manufacture of yoghurt, hence this study.

MATERIALS AND METHODS

Milk extraction

Extraction of peanut milk was made employing the Tantratian (1990) method. One hundred grams of raw, shelled peanuts were soaked in tap water for 16 h at room temperature, drained and ground for 5 min using a Waring Blender. Milk was diluted to make a volume of 500 mL and the slurry was filtered through a three-layer cheesecloth. The resulting milk was dispersed into clean containers and kept refrigerated until use.

Product formulation

The standard procedure for making yoghurt was followed with some modifications (Figure 1). Cow's milk was substituted with peanut

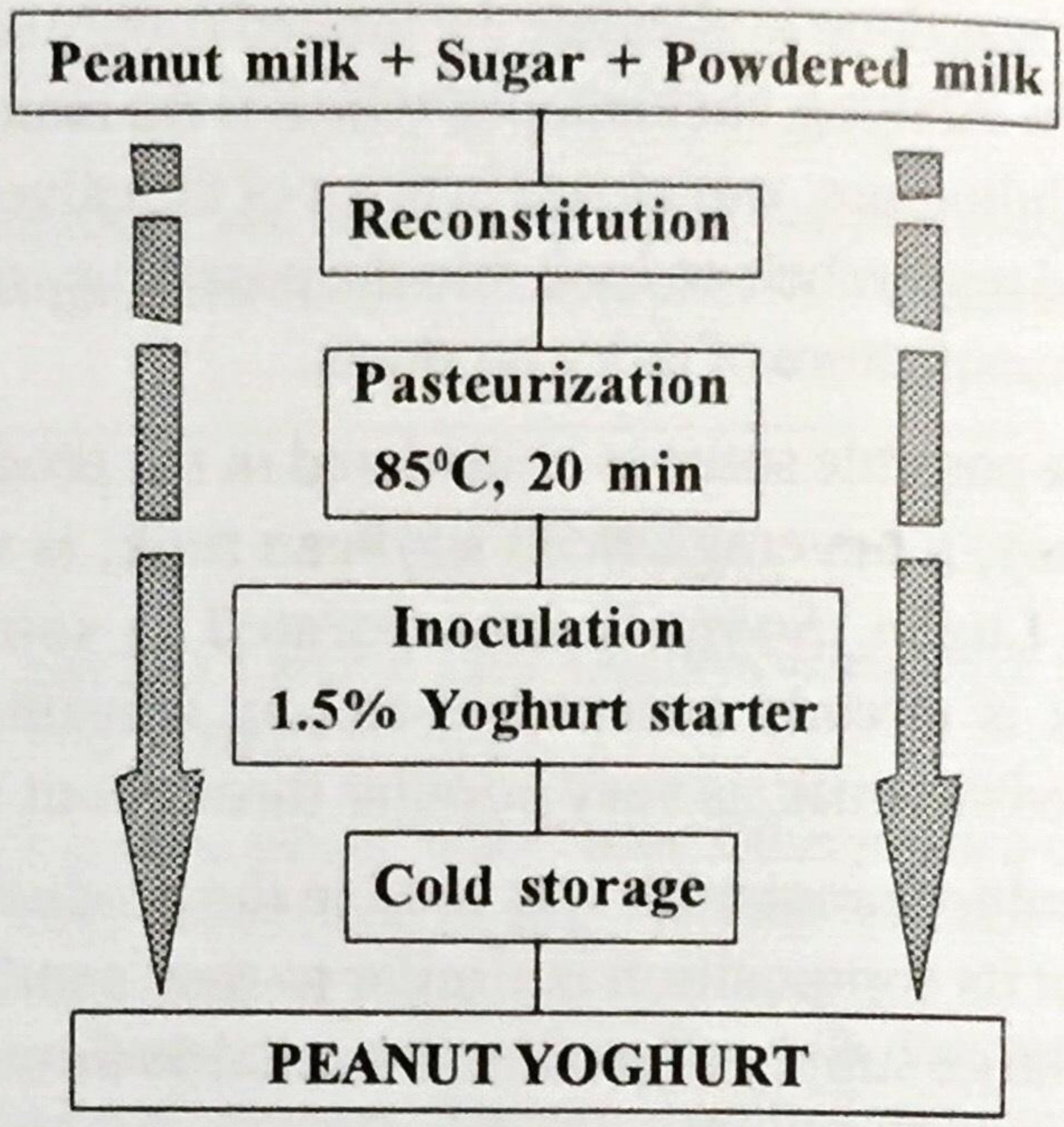

Figure 1. Process flow for peanut yoghurt manufacture

milk at certain levels. A mixed culture of *L. bulgaricus* and *S. thermophilus* was used.

Quality evaluation

Physical characteristics

Viscosity, pH, total soluble solids (TSS) and titratable acidity (TTA) of peanut milk and the finished product were determined. Viscosity was determined by multiplying the viscometer (Brookefield RVT model) reading with a factor. The pH and TSS were determined using a pH meter and refractometer, respectively. TTA was analyzed by titrating the sample with standard 0.1N NaOH solution.

Proximate composition

Proximate analysis of peanut milk and the finished product which consisted of moisture, protein and fat was conducted using the standard methods set by AOAC (1980).

Sensory evaluation

Sensory evaluation was done to determine the presence of desirable sensory attributes in the yoghurt from peanut. The evaluation had two replications and the sensory properties like texture, flavor, color, aftertaste and general acceptability were evaluated by 10 experienced panelists from the Food Section of the Department of Agricultural Chemistry and Food Science using a 5-point scale. Samples were coded with three-digit random numbers.

RESULTS AND DISCUSSION

Physical characteristics

The physical characteristics of peanut milk are given in Table 1 together with that of commercial milk. The latter is more viscous than the former. This could be due to the fact that the commercial milk used in the study was evaporated milk which was relatively concentrated. The higher TTA in commercial milk could be seen from its pH value although this is not always an indicator. TSS in commercial milk is high because it is made from pure cow's milk which has undergone evaporation and contains a high amount of lactose.

The extracted peanut milk had a "nutty" odor and white color. The creamy portion of the milk easily separates from whey when left undistributed. Curdling time was longer by 1 h for peanut milk because of the difference in the amount of soluble solids in the sample.

Table 1. Physical qualities of peanut vs. commercial milk.

Qualities	Peanut Milk	Commercial Milk
pH	6.53	6.23
Titratable acidity	1.57	4.14
Total soluble solids (%)	7.00	25.00
Viscosity (cps)	10.00	25.00

Proximate composition of peanut milk, fresh milk and evaporated milk

Fresh cow's milk had higher moisture content than peanut milk and commercial milk (Table 2). Fat content was highest for peanut milk, followed by evaporated and fresh cow's milk. This high fat content in peanut milk could be attributed to the high fat content of peanut kernels which is 87.5%. In terms of protein, evaporated milk had higher percentage protein compared to peanut and fresh cow's milk. Commercial milk was relatively concentrated since it had undergone evaporation which removed some of its moisture content, thus, higher percentage of protein was obtained.

Proximate composition of finished product

The proximate composition of milk as raw material for yoghurt production influenced the proximate compostion of the finished product. Yoghurt from peanut milk had lower moisture content than its counterparts but was high in fat and protein(Table 3).

Table 2. Proximate composition of peanut milk, cow's milk and commercial milk.

Proximate composition (%)	Peanut milk	Cow's milk (Pure)	Commercial milk (Evaporated)
Moisture	72.49	86.06	74.00
Fat	16.42	4.00	7.90
Protein	5.52	3.05	7.14

Table 3. Proximate composition of yoghurt from different milk sources.

Milk Source	Proximate Composition, %		
	Moisture	Fat	Protein
Peanut yoghurt	81.19	10.68	4.24
Fresh cow's milk	88.00	3.26	2.86
Commercial mik	89.00	1.63	3.26

Sensory evaluation

Results of the sensory evaluation of yoghurt from peanut milk are presented in Table 4. Yoghurt formulation with 75% evaporated milk and 25% peanut milk got the highest mean sensory score due to its smooth texture. Any proportion of peanut milk in a formulation did not significantly alter the texture of the product. This implies that using peanut milk in yoghurt production is possible. The same is true for color wherein the panelists were not able to discern any significant differences among the formulations evaluated. Flavor and aftertaste of the product had the lowest mean sensory scores regardless of the level of peanut milk in the formulation. This finding could be attributed to the fact that the people of Leyte are not used to eating fermented products, thus, the taste and flavor of yoghurt was new to the panelists. Nevertheless, the mean scores still fall on the acceptable level of the scale.

Of all the formulations evaluated, 100% peanut milk got the lowest mean score but this was not significantly different from that of the other formulations, not even the control. The insignificant differences could be attributed to the slight differences in physical and chemical properties of the milk samples used. Thus, all treatments seem to be comparable with the control and with each other. This finding also implies that yoghurt from milk is acceptable.

Table 4. Mean sensory scores of yoghurt with different levels of peanut milk in the formulation.

Levels of milk (Commercial: Peanut)	Mean sensory scores				
	Color	Texture	Flavor	Aftertaste	General acceptability
100:0	4.01	4.12	2.81	2.85	4.20
75:25	3.95	4.38	2.79	2.79	4.15
50:50	3.90	3.82	2.78	2.80	4.00
25:75	3.95	4.11	2.74	2.88	4.02
0:100	3.86	4.10	2.70	2.82	3.95

To enhance the flavor of yoghurt, flavoring materials were incorporated and results of a preliminary evaluation showed that mango is a suitable flavoring for peanut yoghurt (Table 5). Color of yoghurt was not significantly altered by the addition of mango. Although yoghurt with 11% mango in the formualtion obtained the highest mean sensory score, this was not significantly different from the other treatments evaluated.

Flavor was significantly enhanced by the incorporation of 9-11% mango in the formulation. This was because the acidic flavor of the yoghurt was masked by the incorporation of mango. However, the general acceptability of the product was not significantly affected by the addition of flavoring material which implies that plain yoghurt is acceptable.

Consumers' evaluation

Results of the consumers' evaluation showed that 74% of the comsumers liked yoghurt and 26% disliked it. Of the 74%, 51.35% signified their preference for the peanut milk yoghurt and 41.89% for the control. Consumers who signified their dislike commented that they do not like the sour taste of the yoghurt.

Table 5. Mean sensory scores of peanut yoghurt with different proportions of mango as flavoring material.[1]

Levels of mango in the formulation (w/v)	Mean sensory scores				
	Color	Flavor	Texture	Aftertaste	General Acceptability
Control	4.32	3.06a	3.24	3.30	3.17
7:100	4.02	3.12a	3.37	3.52	3.11
9:100	4.27	4.16b	3.67	3.46	3.03
11:100	4.48	3.98b	3.94	3.51	3.12

[1] Means followed by the same letter are not significantly different at 5% level, according to Duncan's Multiple Range Test (DMRT).

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